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Uneven Ground: The Archaeology of Social Transformation in Zanzibar, Tanzania

By

Wolfgang A. Alders

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Anthropology

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Associate Professor Lisa Maher, Chair

Associate Professor Jun Sunseri

Associate Professor Benjamin Porter

Professor Adria LaViolette

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Abstract

Uneven Ground: The Archaeology of Social Transformation in Zanzibar, Tanzania

By

Wolfgang A. Alders

Doctor of Philosophy in Anthropology

University of California, Berkeley

Lisa Maher, Chair

Uneven Ground synthesizes archaeological field survey, historical map analysis, ceramic analysis, and geospatial modeling to investigate a region of northern Zanzibar, Tanzania across multiple environmental zones and time periods. Results address fundamental anthropological questions related to landscapes of settlement, historical ecology, and social change. I reconstruct settlement systems in the inland areas of the island, across four transformative historical periods: 1) the initial recolonization of the island by early Swahili people in the late first millennium, 2) social stratification and precolonial urbanism in the early second millennium, 3) Portuguese and Omani rule in the early colonial period (1500-1830 CE), and 4) during the development of the plantation system starting around 1830, and the formation of the Omani (1749-1856) and Zanzibari (1856-1963) states.

Results show that inland villages of the early second millennium (1000-1400 CE) and plantation estates of the late colonial period (1830-1963 CE) developed across similar contexts in the central and western regions of north Zanzibar, where environmental conditions favored intensive agricultural production. These areas supported large settlement systems, but sociopolitical changes disrupted occupation in this region across multiple periods. In contrast, the agriculturally marginal and rocky eastern regions supported enduring small-scale occupations from the earliest period to the present. Landscapes of the east have the longest and most consistent history of settlement and land use in the survey region. This was made possible by specific techniques of agricultural landscape modification and proximity to near-shore reefs. Parts of the eastern region may have served as a refuge during politically turbulent periods.

I also demonstrate that starting around 1830, the development of the plantation system transformed settlements across rural inland areas in north Zanzibar. Archaeological and geospatial analyses show the effects of this episode on rural communities. Settlement systems clustered spatially and became more politically integrated for the first time. Imported ceramics increased in count and variability, and local ceramics became more standardized in temper, fabric color, clay color, and form. Settlement and ceramic trends reflected the impacts of the mass importation of enslaved East Africans into rural areas on the island, the entrainment of Zanzibar's agricultural landscapes within global commodity flows, and the contours of state formation and political integration across the island. Spatial analyses show that while 19th-century elites in the urban center of Stone Town were able to extract wealth from the rural areas, they did not successfully integrate heterarchical elements within their state. This pattern shaped anti-colonial resistance and revolution at the end of the late colonial period.

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Chapter 1: Project Synopsis

1.1 Introduction

This dissertation addresses social transformations in the landscapes and environments of Zanzibar, an island off the coast of Tanzania in southeast Africa. I have used systematic and judgmental surveys, ceramic analyses, historical sources, and spatial analyses to reconstruct settlement in a region of inland Zanzibar from the late first millennium CE (6th-10th centuries) to the late colonial period (1830-1963) when settlers from Oman developed a plantation system based around clove agriculture. Spatial analyses of settlement systems shed light on economic, political, and demographic transformations, and the contours of anti-colonial resistance. The densest settlement clusters of the plantation system in the late colonial period developed in specific environmental zones across the central and western areas of the island, nearly on top of precolonial inland village communities. While agriculturally fertile regions supported large settlement areas, occupation histories are fragmented chronologically and reflect dramatic periods of social reorganization. In contrast, the rocky, marginal eastern regions of the island have supported small-scale occupation from the earliest period to the present. Specific agricultural adaptations in these areas may have allowed rural communities to persist through periods of social reorganization and political marginalization. Across my selected survey region, local ceramic trends show a shift from localized to regional production over the last millennium, reflecting the reorganization of craft production on the island alongside the development of the late colonial plantation system. This trend is paralleled by shifts in imported ceramics, reflecting Zanzibar's increased integration within specific 19th-century global commodity flows.

In this project synopsis, I give an overview of my research questions, motivations, methods, data sources, and results. Then I outline the themes and results of each chapter.

1.2 Research Questions

This dissertation seeks to understand long-term social transformations in the rural areas of Zanzibar, Tanzania, for phases of systemic social and political change on the East African Swahili Coast over the second millennium CE. These phases are 1) the initial recolonization of the island by early Swahili agriculturalists from the 6th to 10th centuries CE, 2) the development of social stratification and urbanism in the early second millennium, associated with the conversion to Islam and increasing maritimity, 3) the reorganization of village life following Portuguese and Omani incursions in the early colonial period from 1500-1830, and 4) the transformation of rural society during the development of the plantation system starting in 1830, and the formation of the Omani (1749-1856) and Zanzibari (1856-1890) states in the 19th century. Table 1.1 lists the project's research questions, below, organized by theme and shown with corresponding methods.

Theoretical Framework	Landscape Archaeology	Historical Ecology	Social Transformation
Research Question	Research Question 1: What are the settlement patterns in rural inland Zanzibar from the period of earliest occupation to the present, and how do they compare to other regions of the East African coast?	Research Question 2: How did different environmental contexts mediate Swahili social development and the development of the clove plantation system?	Research Question 3: How were rural inland Swahili communities impacted by, and how did they negotiate with, social transformation and political reorganization in the precolonial, early colonial, and late colonial periods?
Method	Systematic survey, judgmental survey, and historical map analysis, along with C14 dating and imported ceramic analyses for dating sites	Zonal statistical analysis of settlement in relation to environmental zones; opportunistic survey of agricultural field systems and land use practices	Spatial statistical analysis of settlement, and local ceramic type and attribute analysis to investigate changes in ceramic production

Table 1-1. Theoretical frameworks, research questions, and methods.

In short, I ask how the residents of rural inland communities occupied and settled the landscape, how they adapted to and negotiated these episodes of social transformation, and how environmental zones in the island mediated this process. Reconstructing long-term settlement patterns, land use, and ceramic production and use across multiple environmental zones permits this project to address questions of anthropological significance in relation to landscape archaeology, historical ecology, and the dynamics of social transformation.

1.3 Motivation for Research

Settlement Reconstruction: A historical and archaeological gap in knowledge of Zanzibar’s history motivates my first research question, which concerns the reconstruction of the settlement system in inland areas from a long-term perspective. When starting my research, I initially sought to develop a project that would address land use and agricultural change in Zanzibar. My aim was to investigate episodes of agricultural intensification and extensification related to rice and clove farming, and the impact of these processes on the landscape. I soon realized that addressing these higher order questions was not possible due to a dearth of settlement information. While archaeologists have identified important precolonial settlements on the coastal fringe of the island (Crowther et al. 2016a; Horton and Clark 1985; Juma 2004; Fitton 2018) and historians have written amply about the 19th century economic system (Bishara 2017; Cooper 1977; Sheriff 1987; Vernet 2017), settlement patterns across the island and specifically in inland areas have not been recorded or analyzed in a systematic way prior to this project. In addition to reconstructing settlement patterns through archaeological survey, I also address this gap in knowledge through the analysis of historical settlement trends in late colonial maps, like the 1907 Khan Bahadur map (see Chapter 11). This project fills in gaps in Swahili archaeology and East African history, by merging and synthesizing historical, geospatial, and archaeological sources to reconstruct the settlements and landscapes of Zanzibar.

Historical Ecology: The second aim, to analyze trends in settlement and land use over time and across environmental zones, emerged from a desire to address fundamental anthropological questions about how environments mediated long-term social and agricultural development in an island system within an understudied region of the world. This research orientation builds on current research on historical ecology and human-environment interactions in the Swahili world (e.g., Crowther et al. 2016a; Quintana Morales and Horton 2014; Quintana Morales and Prendergast 2018; Pawlowicz et al. 2014; Prendergast et al. 2017; Stoetzel 2014).

Despite on-going research, a gap exists in the historical ecology of coastal East Africa. Recent studies have focused either on faunal evidence and marine resource subsistence at early coastal villages (e.g., Prendergast et al. 2017) or the early origins of Asian crop introductions to coastal East Africa (e.g., Boivin et al. 2014; Power et al. 2019). In contrast, researchers looking

at long-term agricultural change and intensification at the scale of the landscape have focused on mainland East African environments (Davies 2009; Håkansson and Widgren 2014; Stone 1994; Stump 2006; Widgren and Sutton 2004). One reason for this is that field and terrace systems are visible and accessible in the arid environments of western Kenya or inland Tanzania, and data reflecting coastal subsistence trends and marine resource exploitation is readily available at many Swahili sites. The lack of research on Swahili agricultural systems also reflects long-standing disciplinary tendencies within African archaeology and history—while mid-20th century scholars saw mainland African societies as ideal contexts for agrarian and peasant studies (e.g., Boserup 1965; Wittfogel 1976 [1957]), archaeologists and historians of the Swahili world have long emphasized trade, maritimism, and urban cosmopolitanism as fundamental aspects of Swahili society. These features certainly did structure the political and economic systems of the Swahili world by the start of the second millennium (Fleisher et al. 2015); however, the result of a research emphasis on these processes has meant that long-term agricultural change has gone understudied on the coast (although see Stoetzel 2014; Walshaw 2010, 2015; Walshaw and Stoetzel 2018). The orientation of this research toward understanding the historical ecology of long-term environmental and agricultural change in Zanzibar using new geospatial methods may address this gap and help create a fuller understanding of Swahili social and political development.

Social Transformation: This research addresses the effects of social and political transformations on rural inland communities on the island of Zanzibar, from a long-term perspective. This framework builds on approaches to Swahili archaeology concerning rural-urban dynamics and hinterlands (e.g., Fleisher 2010c; Kusimba et al. 2013; LaViolette and Fleisher 2009; 2018; Pawlowicz 2019; Rødland 2021; Wynne-Jones and Fleisher 2016), social stratification and power (Fleisher 2010b; LaViolette 2008), and Swahili continuity through colonialism (LaViolette and Norman, in press; Croucher 2014; Walz 2018). One aim of this research is to bridge these analyses by investigating a single region from the period of earliest occupation to the late colonial period. For the precolonial and early colonial periods, this research study adds evidence to produce a more diverse picture of rural settlement dynamics, informing theories of urban-rural interaction and early Portuguese colonial impacts.

For the late colonial period, settlement systems and the effect of social change on rural communities in Zanzibar are poorly understood, despite historical research on slavery and the plantation economy (Bishara 2017; Cooper 1977; Sheriff 1987, 1991; Vernet 2017) and archaeological research on plantation estates (Croucher 2014). To address this gap, this research uses spatial analyses of archaeological and historical sites and ceramic attribute analyses to understand settlement and craft reorganization related to the development of plantation system and the integration of rural communities within the Omani (1749-1856) and Zanzibari states (1856-1890). This project merges and synthesizes historical, geospatial, and archaeological sources. These analyses permit me to tie economic and political transformations in coastal East Africa to archaeological and material evidence, producing a picture of the social landscape of Zanzibar during the late colonial period for the first time.

1.4 Data Sources

The data for this project originate from three sources:

1. Settlement and ceramic data that I collected with a team during systematic archaeological surveys in 2019 in the north-central region of Zanzibar. I feature these data in Chapters 6-9 (site survey results), Chapter 10 (spatial analysis of settlements), and Chapters 12-15 (ceramic data and analysis)

2. Spatial data I created by digitizing a historical map of the island, the 1907 Khan Bahadur map. This map shows historical settlement, road systems, and hydrological features of the island during the final decade of the 19th century. I present and analyze this data in Chapter 11.
3. Environmental and historical geospatial data from a variety of sources, which I also digitized and analyzed. I outline these data sources in Chapter 3 and analyze them in comparison with settlement data in Chapters 10 and 11.

1.5 Methods

Table 1-1 above summarizes the methods that this project uses to investigate research questions and theoretical frameworks. To reconstruct settlement patterns, this project surveyed inland areas in Zanzibar using shovel-test pit grids and analyzed imported ceramics and C14 samples to date sites and sort them chronologically. To link these settlement patterns to the broader island-wide settlement system of the late colonial period, the project digitized the settlement system represented by the 1907 Khan Bahadur map. To understand human-environment relations across a landscape, the project compared settlement trends to environmental zones using zonal statistical analyses in ArcGIS Pro. To evaluate the effects of social transformations in inland Zanzibar, the project used spatial statistics (Multi-Scale Cluster Analysis and Rank-Size Analysis) to understand changes in settlement systems over time. Analyses also analyzed attributes features of local ceramics and compared them to settlement change over time and across environmental zones.

This project uses conventional archaeological methods like systematic and judgmental survey, ceramic analysis, and radiocarbon dating analysis, but augments these methods with geospatial methods and analyses. The motivation to use spatial statistics, zonal statistical analyses, and remotely sensed satellite and aerial imagery to address the last two research questions draws on emerging conversations in archaeology about the potential for geospatial methods to alter the kinds of questions that are possible to ask and investigate. Remote sensing technologies are still nascent in the archaeology of coastal East Africa (although see Fitton 2017; Wynne-Jones 2012). New developments in sensing and measuring tropical African environments (e.g., Davis and Douglass 2021; Klehm et al. 2019; Reid 2016; 2020) have demonstrated the potential of geospatial and remote sensing technology to produce new insights into settlement patterns, land use and ecological relationships at a large scale. The refinement of these methods, along with the increasing availability of high-resolution multispectral imagery, ecological datasets, and computer systems capable of handling large quantities of spatial data make research agendas feasible that would have been previously too time consuming, inefficient, or imprecise (Davis and Douglass 2020; Klehm and Gokee 2020; Opitz and Limp 2015).

1.6 Results

The following sections cover the main results of the project.

Result #1, A Chronological Synthesis for the Colonial Period: The first contribution of this research project has been to develop a new chronology for colonial Zanzibar, based on a synthesis of archaeological and historical sources. As discussed in Chapter 2, I follow standard chronological divisions for the post-Iron-Age chronology of precolonial Zanzibar, based on the work of historians and archaeologists (e.g., Baužytė 2019; Fitton 2018; Horton in press; Horton and Middleton 2000; Rødland 2021). My contribution is to formalize periodization for the colonial period based on a synthesis of historical and archaeological evidence. I divide the

colonial era into two periods, with four distinct phases based on historical and archaeological evidence from my survey region.

Period 3 was the early colonial period, from first contact by the Portuguese around 1500 to the development of the clove plantation system in Zanzibar around 1830. Phase 1 of this period was the era of Portuguese rule on the East African coast, from 1500 to 1698. In my survey region, this phase was characterized by the persistence of derived Tana/TIW open bowl forms, late Ming Chinese blue and white porcelain, late glazed monochrome ware, and Bahla ware. Phase 2, from 1698 to 1830, was the period of Yarubid (1698-1749) and then Busaid (1749-1830) Omani rule on the coast, prior to the full development of the clove plantation system. Phase 2 was characterized by a shift toward everted rim cooking pots, and an overall lack of imported ceramic material in the rural areas of the survey region.

Period 4 is the start of the late colonial period, from 1830 to 1963. The decision to distinguish between the period before and after 1830 is not conventional in archaeology but is based on historical research by Cooper (1977), Sheriff (2018), and Vernet (2017). Prior to 1830, clove agriculture on the island was primarily an activity of Sultan and his immediate family alone; after 1830, the Omani plantation aristocracy developed in its own right and transformed the rural areas of the island. Furthermore, the dates of 1820 to 1830 coincide with the emergence of whiteware production in England; it is this horizon of European industrial whiteware and late Qing blue and white porcelain that appears in settlements in Zanzibar starting in the early to mid-19th century. If the rural areas were integrated into global flows of capital stemming from plantation production earlier than this, whiteware would likely not be the dominant imported artifact, having only fully replaced pearlware around 1830. The lack of a single sherd of pearlware suggests that this ware had already passed out of use by the time the plantation zones of the rural areas were integrated into global commerce.

Phase 1 of this period, from 1830 to 1890, is a span of time when the Omani rulers of Zanzibar were independent from foreign rule. Phase 2, from 1890 to 1963, was the period of the British protectorate. During this second phase, clove prices plummeted, the plantation class fell into debt, and the racial antagonisms which sparked the Zanzibar Revolution of 1964 took shape. I discuss the archaeology and history of these periods more in Chapter 2.

Result #2, Reconstruction of the Settlement System in northern Zanzibar: Figure 1-1 shows the 44 settlements that our team recorded during systematic survey, across a region of north-central Zanzibar. This survey recorded seven precolonial sites (1000-1500 CE), four sites of the early colonial period (1500-1830), 32 sites of the late colonial period (1830-1963), and two sites of indeterminate age. One contribution of this research has been to demonstrate the existence of precolonial inland village communities in northern Zanzibar, which were long assumed to have existed in relation to the town on the offshore island of Tumbatu. Another result was to demonstrate the persistence of inland settlements during the early colonial period in the east, when many settlements along the coastal fringe of the island were abandoned. A final result was to record and describe various types of settlements during the late colonial period and theorize their relation to the plantation system. These late colonial settlements can be divided into four types: swidden field plot sites of the eastern region, surface scatters related to hamlets and small villages in the west and central areas, plantation estates, and finally, the town or large village of Chaani.

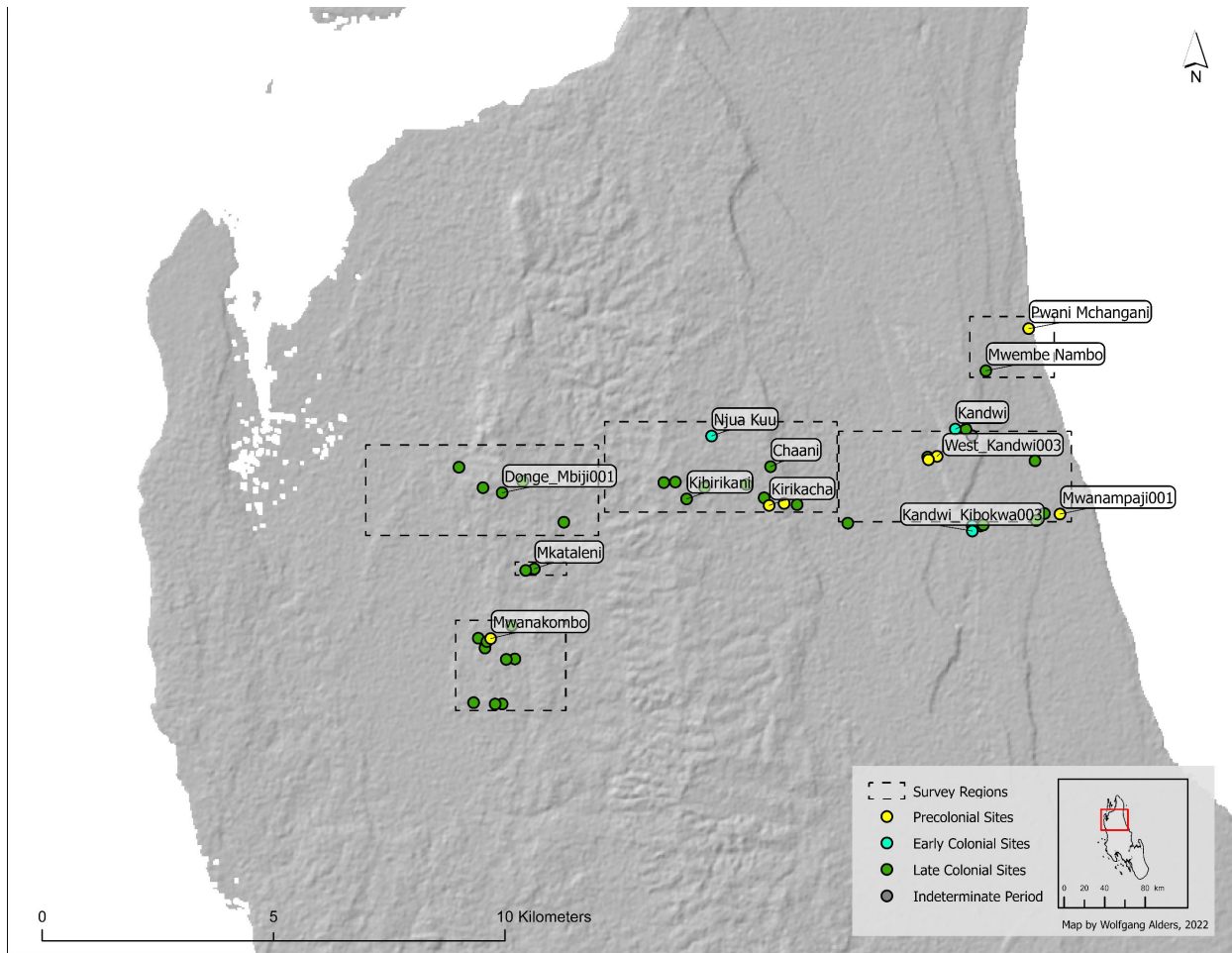


Figure 1-1. Sites recovered during the 2019 survey.

Result #3, Reconstructing Late-19th-Century Settlement Patterns on Zanzibar: Though archaeological survey, I documented sites and material culture up to the early 20th century. However, starting in the late 19th century, historical maps are more efficient for reconstructing the settlement systems of the entire island. One such map is the Khan Bahadur map, which was based on surveys carried out between 1890 and 1900 and published in 1907 (see Chapter 11). This map presents a detailed record of settlement, road systems, hydrology, and other features from a period that coincides with the final years of slavery in Zanzibar before abolition. As such, it is a useful historical source for understanding the landscapes and settlement systems of the plantation system in Zanzibar during the late colonial period.

Using this map and survey data from the late colonial period, I have reconstructed the late 19th-century settlement system for the island. I digitized the map and interpreted the size-classes of the settlement system on the basis of typographical and illustrative conventions and comparisons with archaeological sites. Below, Figure 1-2 shows the settlement system that I have reconstructed from an analysis of the 1907 Khan Bahadur map. I discuss the process of digitizing this map in greater detail in Chapter 11. This work builds on efforts by Croucher (2006), who used judgmental surveys to investigate 19th-century site components at Dunga and Mahonda. Other archaeological studies of the 19th century in coastal East Africa have focused on specific settlements, like Vumba Kuu (Wynne-Jones 2010, 2015), Takwa (Wilson 2019), or Mgoli (Croucher 2014). Walz's (2017) surveys of the Pangani River Basin and Pawlowicz's

(2011) surveys at Mikindani Bay revealed 19th-century settlements, but these areas were not the focus of research. Furthermore, few other regions of the Swahili Coast have such extensive historical evidence for late colonial settlement systems like the Khan Bahadur map; it was only through the synthesis of this source with systematic archaeological survey that I have been able to reconstruct and model 19th-century settlement systems for the entire island. In Chapter 11, I also document the hydrological system represented in the map, along with other features.

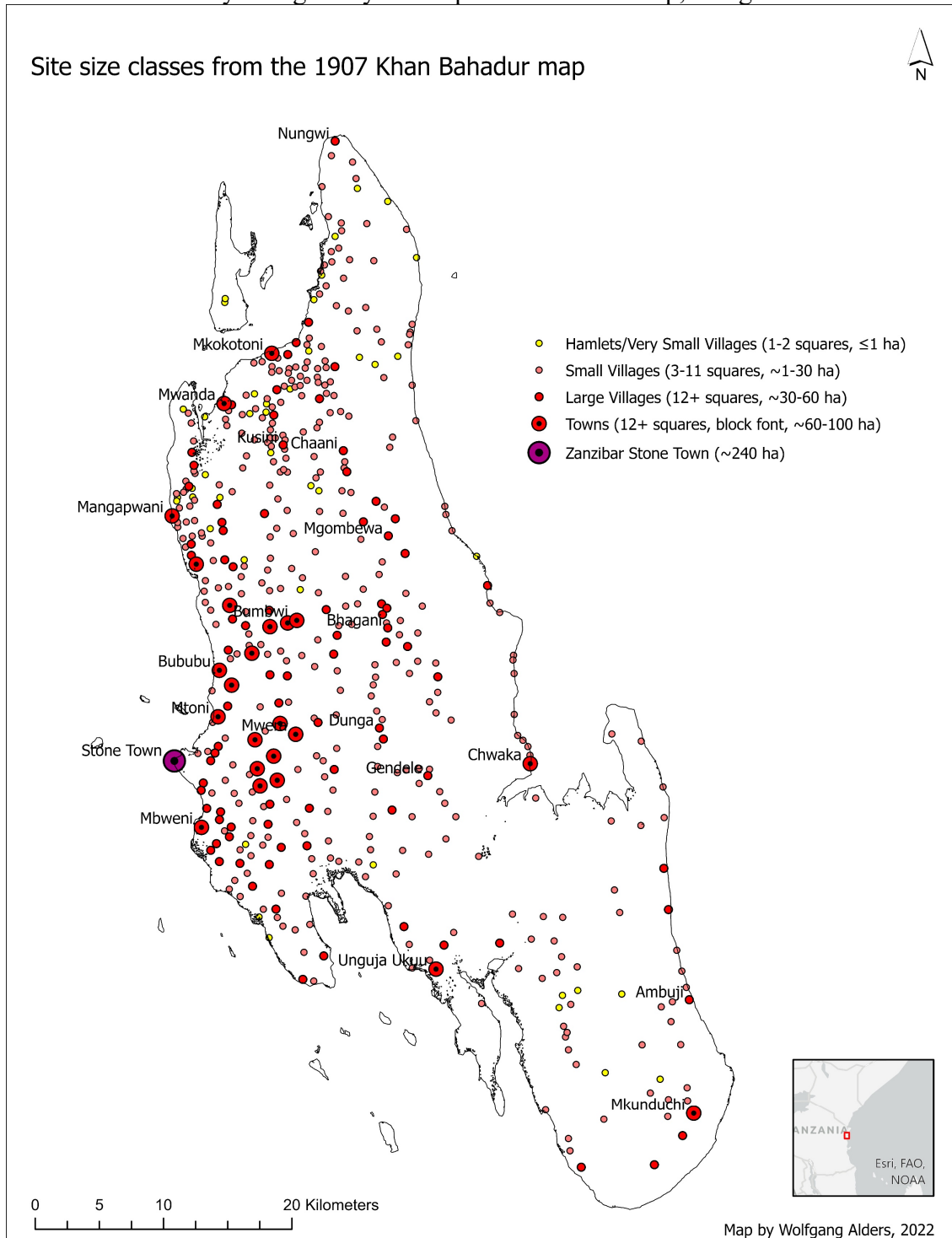


Figure 1-2. Settlement in Zanzibar from 1890-1900. Based on the 1907 Khan Bahadur map.

Result #4, Site Clustering and Site Rank-Size Analysis: I used two spatial statistical metrics to evaluate settlement dynamics over time: multi-scale spatial clustering analysis with Ripley's K statistic, and site-size distribution analysis using the Rank-Size Rule. During the precolonial and early colonial periods, settlement is dispersed rather than clustered, and the site-size distribution forms a convex pattern. This suggests that settlements were not well-integrated politically, nor were they dominated by the large town of Tumbatu. Settlement during these periods consisted of independent and autonomous villages, which engaged with Indian Ocean trade and emerging Islamic urban centers on their own terms. During the late colonial period, identified archaeological sites became clustered, and formed a primo-convex pattern. Settlement clustering reflects increasing regional integration as well as preferences for specific environmental zones. The primo-convex pattern reflects distinct features of the plantation landscape. Chaani is a town which likely grew as a result of demographic shifts due to the mass importation of enslaved people, which was surrounded by smaller hamlets and estates in the west and central areas that remained tied to the land and focused on agricultural production.

Spatial statistics for the settlements of the 1907 Khan Bahadur map reflect the same trends as the sites we recovered for the late colonial period during survey. This supports the idea that our survey methodology produced a representative sample. The spatial patterns of settlement for the entire island also reflect key trends that had solidified by the end of the 19th century. This research has shown that settlements across the island were spatially clustered at multiple scales, reflecting preferences for specific zones and environments (see below) as well as a preference to settle in proximity to other villages, which may reflect kin-based systems of land tenure among Swahili people on the island. The rank-size distribution for the settlement system is also primo-convex, which similarly reflects the specific conditions of the plantation system at this time. While Stone Town was the primate urban center, it was smaller than the rank-size rule predicts, likely because of the particularities of being an urban center whose wealth was based in controlling agricultural produce from the rural areas. As slaveholders, the elites of Stone Town dominated the other residents of the island and used their power to keep populations settled in the rural countryside on plantation estates. This produced a relatively unintegrated state, in which many villages and towns of enslaved and free people alike remained self-sufficient and politically unintegrated. Populations did not flow toward the urban center; rather, they were kept tied to the land by force (in the case of enslaved people) or excluded and marginalized (in the case of free Swahili people who were not plantation owners). Stone Town, in this respect, was more like a "gated community" than an urban population center. This result provides a new perspective on colonial East African urban landscapes, as well as plantation landscapes globally. A relative lack of political integration within the state during the late colonial period produced the conditions whereby the British were able to easily seize state power in 1890. This pattern helps explain why anti-colonial resistance in Zanzibar and coastal East Africa did not occur at the level of the state; rather, heterarchical forces of town leaders, religious clerics, and Swahili patricians organized anti-colonial resistance, like in the case of the Abushiri Revolt of 1888-89.

Result #5, Zonal Environmental Analysis and Predictive Modeling: I analyzed archaeological sites across different environmental zones, to produce environmental suitability models for sites from the precolonial, early colonial, and late colonial periods (see Chapter 10). These models reflect some consistent factors for settlement preference throughout time. In the precolonial period, preferred locations for inland villages are areas with *kinongo* soils, soil with moderate water infiltration, on slopes of 3 to 10 degrees, at elevations between 31 to 69 m, and in areas within 100 m of perennial streams. These attributes characterize settlement zones within

the “fertile” west of the island. The late colonial model for site suitability is roughly similar, though it reflects slightly wider margins for suitability especially with regard to hydrological conditions, since well construction developed in the inland areas during this time which made Swahili communities less reliant on above-ground streams for fresh water. Overall, catenas of *kinongo* soil with moderate infiltration correlate to specific types of documented agricultural village communities from the precolonial period to the late colonial era. The environmental suitability model for late colonial period settlements that we identified in survey matches up well with actual settlement locations reflected on the Khan Bahadur map, suggesting that this model should accurately predict archaeological site locations for the entire island (see Figure 1-3).

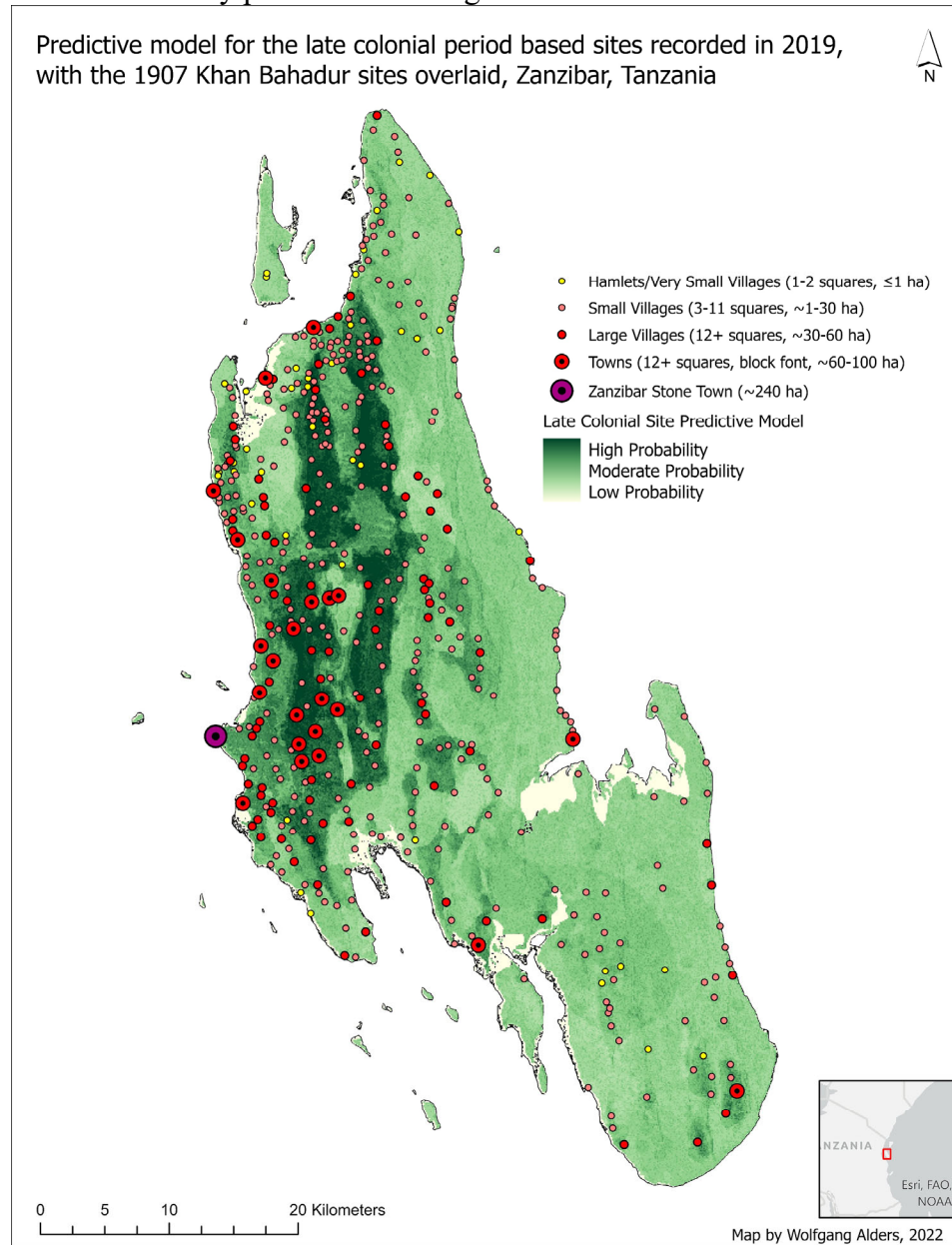


Figure 1-3. Late colonial site predictive model based on archaeological evidence, overlaid with the actual settlement system of 1890-1900.

Similarities between the favored environments of precolonial villages and late colonial sites are striking, and likely reflect preferences for agricultural production. The two documented precolonial villages lie directly adjacent to the most intensively occupied areas of the late colonial period, at Chaani and Mahonda. Plantation settlements in the late colonial period took advantage of the same specific microenvironmental niches. This pattern possibly suggests some degree of displacement and dispossession; for instance, the plantation estate of Mwanakombo is built directly over an earlier Swahili settlement. On the other hand, it may suggest the degree to which Omani planters collaborated with local Swahili elites and integrated their ecological knowledge about preferred locations for agriculture and settlement.

While the settlement patterns of precolonial early village communities and late colonial plantation sites correlate to the specific environments of *kinongo* soil zones, other site types falling outside these areas are not adequately captured by the Khan Bahadur map. These instances attest to the necessity of archaeological survey, even when historical maps of settlement are available. In the east, in *uwanda* and *maweni* soil areas with high infiltration, lower rainfall, and karstic limestone bedrock, ceramic surface scatters indicate the presence of seasonal or non-permanent occupation from the early second millennium, through the early colonial era, and into the late colonial period. In these areas, Swahili people developed agricultural adaptations for planting in stony field plots, including the method of *kupiga makongo* (cutting holes in coral for planting and soil conservation) and the construction of *mabigili* (stone field walls for keeping out pests). Additionally, well construction in the east and south by the late colonial period (see Figure 3-7) enabled Swahili communities to persist in areas without perennial rain-fed streams.

While the fertile western zones supported larger and more numerous settlement systems throughout the second millennium, settlement there was chronologically fragmented. The east is the only zone with continuous evidence for land use and habitation from the earliest periods, through the early colonial period, and into the present day. During the early colonial period, seasonal occupation of field plots persisted while inland village communities in the west remained abandoned. During this turbulent era of Portuguese incursion, Swahili people may have favored the difficult terrain of the eastern areas, prioritizing refuge and seclusion over increased agricultural productivity in the west. The large village of this region Kandwi, is a fortified village on a plateau that is obscured from view from the coast, and the name of the village itself means “stay here without fear”. The eastern zone continues to be used for seasonal farming in field plots during the late colonial period. One final factor for settlement in the east may have also been the proximity to near-shore reefs, which line the eastern coast of the island and are easily fished by a single person in a canoe. In contrast, reefs are further off-shore in west Zanzibar, permitting deeper ports but also requiring larger-scale coordination with bigger ships for fishing.

Overall, environmental analysis shows that the division of Zanzibar into a fertile western zone and a barren eastern zone (e.g., Middleton 1961) does not adequately capture the diverse microenvironments of the island landscape. The west is not uniformly fertile, and the east is not uniformly barren; furthermore, incremental landscape modifications like the technique of *kupiga makongo*, the construction of stone walls and the digging of wells in the rocky eastern regions may have made inhospitable land capable of supporting larger populations than would be expected. While fertile zones in the west were favored for early precolonial village communities and late colonial clove plantation expansion, the secluded and difficult terrain of the east may have been favored for centuries as a zone of refuge and retreat during hard times.

Result #6, Ceramic Trends: Local ceramics during the precolonial period are broadly similar to types found across the coast and elsewhere in Zanzibar. Open bowls dominate the assemblage like in many other parts of coastal East Africa during the early second millennium. However, this project has shown that fabric color, temper, and clay color during the precolonial period directly correlate to environmental zones where the ceramics were found. From east to west, ceramic fabric and clay colors become lighter and temper became coarser and sandier. This corresponds to geological and soils zones across these regions, which move from darker, finer silty clays in the east to sandier, light-colored sandy clays in the west. This pattern suggests localized production, with ceramics being discarded close to the sources of clay from which they were produced. During the early colonial period, ceramic types remained derived from earlier precolonial forms. During the late colonial period, the trend of localized production did not continue; instead, ceramics from all regions are uniformly darker in fabric and clay color, and have finer tempers compared to ceramics from earlier periods. This pattern suggests that ceramic production shifted regionally—either clays become more regularly sourced from a smaller number of locations, or ceramic production methods become more refined and efficient. This pattern mirrors other trends of regional social integration as towns developed and settlements became clustered. This trend also coincides with the arrival of large numbers of mainland East African enslaved people during the late colonial period who adopted Swahili pottery forms (*c.f.* Wynne-Jones and Mapunda 2008) but may have introduced changes in methods of clay sourcing, construction, and firing. Furthermore, during the late colonial period, cooking pots with everted rims replaced open bowls as the dominant local vessel type. This may reflect 1) the replacement of locally made eating bowls with imported European whiteware and Chinese blue and white porcelain, 2) changing food preparation practices, perhaps related to the introduction and widespread adoption of cassava on the island starting in 1799, and 3) the increased orientation toward cooking for workers in areas outside of the domestic household, which is how vessels of this type are used today.

1.7 Overview of Chapters

This synopsis has served as an introduction to the project and has provided an overview of the research questions, their motivations, and the results. Below, I outline each chapter and discuss its relevance to the overall project.

Chapter 2 provides an overview of the Zanzibar and the East African Swahili Coast, from historical and archaeological perspectives. A contribution of this chapter is to clarify the wider historical context of the western Indian Ocean and East African coast in relation to archaeological data, and merge historical and archaeological chronologies into a unified framework.

Chapter 3 provides a background for the environmental context of Zanzibar and the East African Swahili Coast and outlines historical and environmental geospatial datasets for this project. This chapter helps frame a later discussion of settlement distribution across different zones over time, which is the main way I address questions of historical ecology in this project. A contribution of this chapter is to describe microenvironmental zones, which helps move past a normative historical understanding of the island as being divided into a fertile west and a barren east.

Chapter 4 describes the research questions and hypotheses for this project and gives a background for the theoretical perspectives in anthropology and archaeology that I draw on. These are perspectives in landscape archaeology, historical ecology, and theories of social transformation and change. I use these theoretical frameworks as lenses through which to

evaluate the evidence for long-term social change in Zanzibar, and its consequences across different environmental zones.

Chapter 5 describes the site survey methodology used for this research, which I draw from the tradition of shovel-test pit systematic grid survey that was developed in North America and then brought to coastal East Africa. I also discuss the motivation for sampling several zones judgmentally, at the behest of community partners and stakeholders.

Chapter 6 presents the survey results from the field season in 2019, in the form of site tables listed by survey region. I also describe each survey region in terms of environment and modern land use. I end the chapter by discussing interviews and investigations into two different forms of land use: rice and clove farming in the west and central regions, and methods of swidden field plot agriculture in the eastern region. In this chapter, I outline specific agricultural adaptations that may have permitted settlement in the more environmentally marginal areas of the eastern region.

Chapter 7 presents the layouts and artifacts from precolonial sites that our team identified during survey. The chapter focuses on the two villages at Mwanakombo and Kirikacha, in relation to the social and economic factors of the precolonial period from 1000 to 1400. It also describes the evidence for small field plot sites in the eastern region, which are first used and occupied at this time.

Chapter 8 focuses on sites from the early colonial period. The chapter considers the abandonment of the settlement of Pwani Mchangani in the 15th century and the consolidation of a small village settlement at Kandwi on a stone bluff inland from the coast, in an area with good soil and freshwater ponds in the eastern region. I then evaluate Kandwi in relation to the coast using a viewshed analysis and argue that the site's location reflected a preference for seclusion and defense during the turbulent period of Portuguese incursion. The chapter also details the persistence of swidden field plot sites in the eastern region.

Chapter 9 discusses important archaeological sites that our team identified during the late colonial period, in relation to the social and economic setting of the plantation system. I present four different site types from this period: ceramic scatters in swidden plots in the east, ceramic scatters representing hamlets and small villages in the west and central areas, plantation estates, and the town or large village of Chaani.

Chapter 10 presents spatial and statistical analyses for the settlements recorded during the 2019 survey. This chapter describes settlement trends by region and then discusses zonal environmental analysis, spatial statistics, and predictive models based on the locations of sites that we identified for each period. Spatial analyses show that settlement within the survey region changed from dispersed to clustered, and from a convex, unintegrated rank-size distribution to a primo-convex distribution characteristic of the plantation system. Zonal statistical analyses show certain environmental zones that are highly favored during the precolonial and late colonial periods, likely because of their utility for agriculture. These zonal analyses also show that these zones were relatively unimportant during the early colonial period, when residents of this region may have favored seclusion, defensibility, and access to small-scale marine resource subsistence over agricultural productivity.

Chapter 11 considers Zanzibar's settlement system at the end of the 19th century and into the early 20th century, through a spatial and statistical analysis of the Khan Bahadur map, a depiction of the village network across Zanzibar made for the British Survey of India by Imam Sherif Khan Bahadur, published in 1907. These analyses reveal settlement patterns specific to the late colonial plantation system. I also discuss the integration of communities within the state.

Chapter 12 describes the background and methodology for local ceramic analysis on the Swahili Coast, emphasizing the need to synthesize precolonial and colonial period ceramic divisions. Chapter 13 presents the results of local ceramic analysis. The chapter describes the hybrid type-feature framework used to analyze locally produced coarse earthenware, which is inspired by Fleisher's (2003) description of ceramics in northern Pemba. The first part of this chapter describes 20 types recovered across the survey region: seven types of the precolonial period, five types of the early colonial period, and eight types of the late colonial period, as well as miscellaneous ceramics. For the precolonial period, types map onto typological distinctions from elsewhere on the coast. For the early and late colonial periods ceramic types remain poorly understood and references only come from disparate and unintegrated sources. One contribution of this research is an attempt to synthesize these sources and create uniform types for this period. The second part of this chapter describes attribute analyses for local ceramics from the survey region. One result is to show that ceramics of the precolonial period are darkest and have the finest grit temper in the east region and grow coarser and lighter colored as one goes west; this corresponds to clay and soil types across the island, which are darker and finer in the east and sandier and coarser in the west. This suggests localized production. By the late colonial period, this trend changed—all ceramics have fine temper, and dark clay and fabric colors. This shift suggests a movement away from local production, toward increasing regional integration and communal clay sourcing and production at a larger scale and may reflect demographic changes relating to the development of the clove plantation system.

Chapter 14 presents the imported ceramic finds from the 2019 survey. Simple identification was the main prerogative, for the purpose of understanding settlement chronology. For the precolonial period, the main imported ceramic we identified in inland areas was late sgraffiato, a common ware across the East African coast from 1000-1400 CE. For the early colonial period, we identified a small number of glazed monochrome sherds, some Chinese blue and white porcelain, and a vessel of Bahla ware. In the late colonial period European industrially produced glazed whiteware was the most common import type. Common designs are hand painted polychrome floral decorations, transfer prints, and sponge-decorated designs. Other common imports are late Qing Chinese blue and white porcelain, Indian red earthenware, and some Middle Eastern earthenware.

Chapter 15 presents a synthesis of local and imported ceramic analyses, relating trends in their production, acquisition and use to broader social transformations. This chapter lends supporting evidence to the idea that most rural areas in the survey zone were not occupied intensively for clove planting prior to 1830, on the basis of an analysis of European whiteware and Chinese blue and white porcelain. It also compares local ceramic type and attribute analyses to broader social transformations. In the precolonial period, the preponderance of open bowl forms likely relates to increased rice consumption, as is the case in Pemba (Fleisher 2010b; Walshaw 2010). Ceramic finds are scant in the early colonial period but suggest continuity with derived late Tana/TIW forms. In the late colonial period, the shifts toward uniform fabric color, clay color and temper and the emergence of everted rim cooking pots as the dominant local form related to sociopolitical changes brought by the emergence of the plantation system.

Chapter 16 describes other finds recorded during survey, and background research on these materials on the Swahili Coast. Objects include glass, iron, slag, shell, beads, bead grinders, spindle whorls, lamps, incense burners, copal, *mofa* oven fragments, and clay tokens. I did not extensively analyze these objects, but their presence suggests future avenues for research to understand the domestic craft economy in Zanzibar across different periods.

Chapter 17 offers an interpretation of the findings across the dissertation, and evaluates the initial questions proposed in this introduction. I evaluate archaeological and historical data in the context of the social, ecological, and economic history of the Swahili Coast, and I use results of the research in a discussion of broader anthropological topics related to landscape archaeology, human-environment relations, and social reorganization and state formation. Chapter 18 is the conclusion, which provides an overview of the main contributions of this project to archaeology and the history of coastal East Africa.

Appendix A shows site forms, locality forms, transect forms, shovel-test pit forms, artifact scatter forms, and findspot forms. Appendix B shows ceramic find frequency data. Appendix C shows AMS C14 data. Appendix D shows relevant permits.

1.8 Conclusion

In this project synopsis, I have introduced the area of study, described research questions, and outlined the methods and motivations for undertaking this dissertation project. Next, I summarized key results of this research project. This dissertation synthesizes chronologies for the colonial period using archaeological and historical sources, reconstructs settlement across Zanzibar using archaeological survey and historical map analyses, and analyzes settlement patterns using spatial and zonal statistics. Finally, the dissertation compares ceramic trends to settlement patterns and sociopolitical transformations over time. Following these summaries, I outlined each chapter to follow. In the next chapter, I give an overview of Zanzibar's historical and archaeological background.

Chapter 2: Historical and Archaeological Background of Zanzibar

2.1 Introduction

Zanzibar, an island off the coast of modern-day Tanzania (Figure 2-1), is home to famous archaeological sites that span millennia of coastal history and attest to diverse historical mosaics of interaction across a varied environmental landscape. Kuumbi Cave, with evidence for human occupation from 18,000 to 12,000 BP, is one of the few large coastal terminal Pleistocene hunter-gatherer sites known in East Africa. Unguja Ukuu, recorded by outsiders since the early medieval period, is a large town with evidence for late Roman and Abbasid trade links to coastal Tanzania. Tumbatu is another well-known elite medieval site, with monumental stone architecture. Kizimkazi is the site of the earliest mosque still in use in East Africa, with a sandstone inscription dating the building to 1107 CE. Finally, Zanzibar Stone Town is famous as a precolonial stone town in its own right, as the site of a Portuguese church and factory, and later as the capital of the Omani Empire and Zanzibar Sultanate in the 19th century. During this later period, Omani settlers and Swahili elites transformed Stone Town into a wealthy trade entrepôt through which flowed the wealth of the East African caravan trade. Omani and Swahili elites reinvested wealth from the caravan trade into the production of cloves for export using enslaved people from the mainland, which made Zanzibar the wealthiest city in East Africa for a period in the 19th century. The dynamics of Zanzibar's clove plantation system produced intense class and racial antagonism into the 20th century, which shaped the processes of post-colonial nation building and have affected the social and political contours of modern Tanzania.

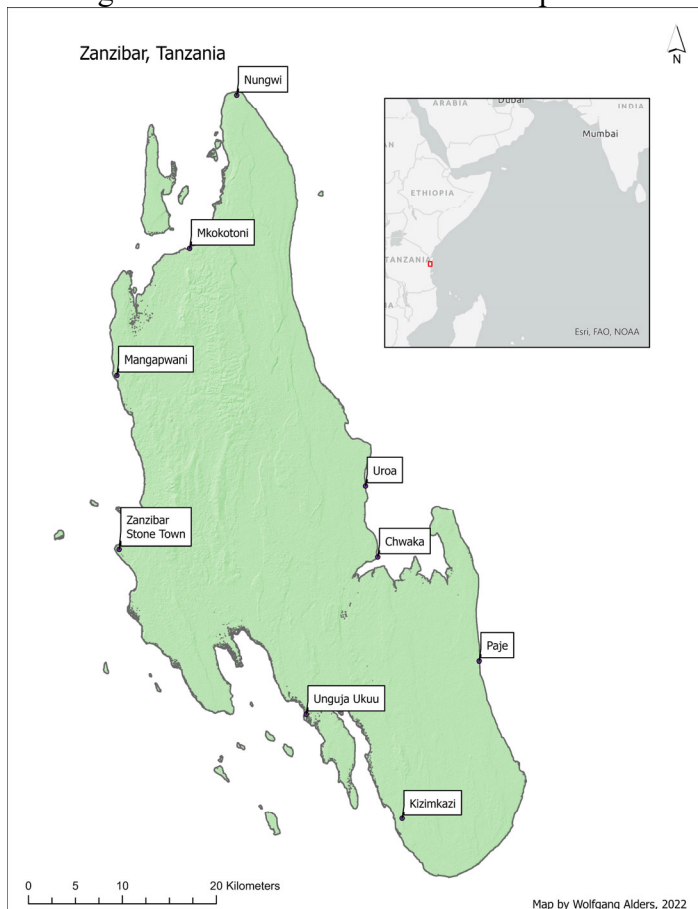


Figure 2-1. Map of Zanzibar, with certain modern towns.

A question that this dissertation asks is, what actually occurred when Omani settlers arrived in Zanzibar during the late 18th and early to mid-19th century, and ventured beyond Stone Town to establish plantations with retinues of enslaved East Africans? Within this question are nested other questions: What social and historical landscapes did Omani settlers encounter in the rural areas of the island, and how did they go about establishing their authority? Did Swahili people already live in the rural farming areas claimed by Omani settlers and if so, how did they negotiate this period of colonial contact? How did demographic and environmental changes impact the rural settlement system, from a long-term perspective? Furthermore, how did centuries of indigenous Swahili land use and settlement in rural areas shape the development of the 19th-century plantation system, and how did these practices vary across different environments? This dissertation investigates these questions in Zanzibar, using archaeological, historical, and geospatial methods. Archaeology may be uniquely situated to shed light on these issues, informing anthropological and historical understandings of early rural Swahili landscapes, the dynamics of colonial contact, human-environment relationships, and formation of the 19th century plantation system and the Omani and Zanzibari states. The results of this study have general implications for understanding social transformation and adaptation to political instability.

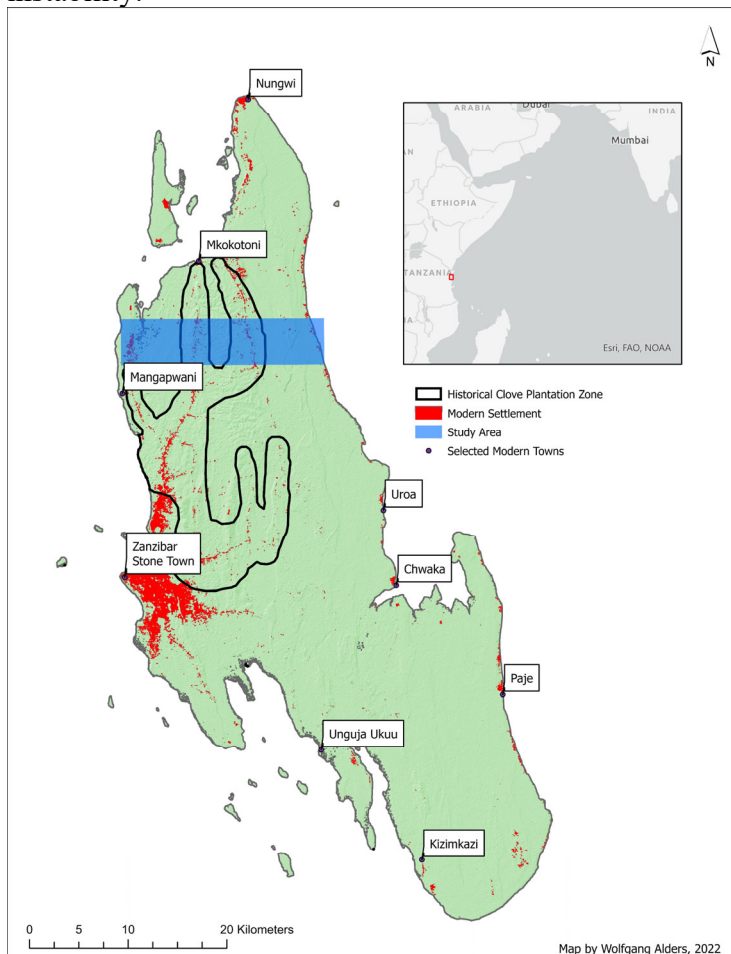


Figure 2-2. Study area, and area of the historical clove plantation zone (Sheriff 1991: 108). The map also includes areas of modern settlement were created by reclassifying Sentinel-2A satellite imagery, provided by the European Space Agency.

The setting for this research is the plantation region of the central-north area of Zanzibar, Tanzania. The study area falls both outside and inside of the historical plantation zone, while also lying in a relatively rural area of the island (Figure 2-2). This region is one of the most ecologically diverse and socially complex within the Swahili world, with alternating barren and fertile landscapes at the intersection of multiple ethnic identities. Small, dynamic communities in this inland area played a key role in transforming the social and political landscape of the island and the course of social development, from the early period of Swahili political autonomy to the mass importation of enslaved East African workers and the development of cash crop agriculture in the 19th century. Furthermore, the modern rural environment means that site detection is less hindered by modern settlement, as would be the case closer to Stone Town.

2.2 Historical Background

The Swahili are an East African people, who presently live across the coastal regions of East Africa from southern Somalia to northern Mozambique. Their societies grew out of agricultural and maritime communities on the East African coast that had been developing for centuries prior in relation to larger interaction spheres, including the interior of the African continent and the wider Indian Ocean world (Wynne-Jones and LaViolette 2018). Swahili people produced coral stone-built Islamic architecture as early as the 8th century CE on the northern coast, with Islam reaching its entire length by the 15th century at the latest (Horton and Middleton 2000; Pawlowicz 2012). Small towns and villages on this coastline have existed since at least the 1st century CE, when Greek texts describe market emporia south of Somalia that traded ivory, tortoise shell, skins, and other forest products for grain, iron implements, cloth, dates and wine (Seland 2014). Structures in these early settlements were presumably built of earth and thatch, as no stone remains have been found yet earlier than the late 8th century (Horton and Middleton 2000). Wealthy urban societies developed in the late first and early second millennium CE. By the 11th century CE, a prosperous network of independent Islamic Swahili towns had come to dominate and manage trade between the interior of East Africa and the Indian Ocean world. These societies shared commonalities such as the widespread adoption of Islam, townscapes composed of buildings made from coral limestone and plaster and earth-and-thatch buildings, a unique pottery tradition with regional variations, and participation in trade networks linking East Africa to global economies (Chami 1998, Horton and Middleton 2000, Wynne-Jones and LaViolette 2018).

Starting in 1497 with the first voyage of Vasco Da Gama around the Horn of Africa, Portuguese explorers and soldiers attempted to take control of trade in the western Indian Ocean. They created a series of forts and bases to aid in shipping to India and East Asia. The Portuguese sacked the Swahili city of Kilwa in 1505 and built a fort there but abandoned it soon after. On Zanzibar they constructed a fort and church in Zanzibar Stone Town, as well as fortified “farms” on the north of the island sometime in the 17th century (LaViolette and Norman, in press). From 1593 to 1596 they constructed Fort Jesus in Mombasa, which was to remain their main base of operations until Omani forces ousted them in 1698.

Historical research for the Portuguese period is based on Portuguese, Arabic, and Indian sources. Strandes (1961 [1899]) and Gray (1962) were the first historians to investigate the Portuguese sources. Other more recent examples include Pearson (1998), Vernet (2010; 2015) and Subrahmanyam (2019). Textual sources make up the bulk of information regarding the Portuguese in East Africa. Portuguese writers remarked on the agricultural produce and landscapes of the places they encountered. Of Zanzibar and Pemba, Duarte Barbosa wrote in 1512 that, “They are very fertile islands, with plenty of provisions, rice, millet and flesh, and

abundant oranges, lemons and cedrats... the inhabitants trade with the mainland with their provisions and fruit... In these islands they live in great luxury and abundance; they dress in very good clothes of silk and cotton which they buy in Mombasa of the merchants from Cambay (Gujarat) who reside there. Their wives adorn themselves with many jewels of gold from Sofala (near Beira), and silver in chains, earrings, bracelets and annul rings, and are dressed in silk stuffs” (quoted in Gray 1962: 30).

The account of Vasco da Gama by Strandes (1961 [1899]) contains several references to agricultural products on the East African coast, in the form of tribute or spoils obtained by the marauding Portuguese. Along the Mozambique coast da Gama encountered a small town with a local sheik who is a dependent of Kilwa. After a skirmish they captured “cotton cloths, mats, a big bowl of butter, cotton thread, bottles of rosewater, a fishing net, matting sacks filled with millet, and Arabic books” (Strandes 1961 [1899]: 23). They later captured “timber masts” (Strandes 1961 [1899]: 25) from Pemba. When they reached Mombasa, da Gama and his crew were presented with goats, chickens, lemons, limes, sugarcane, oranges, spices, ivory and what is translated as ‘corn’ (Strandes 1961 [1899]: 25-26), which probably refers to either millet, rice or wheat. Malindi was similarly well supplied with ‘corn’, cattle, fowl and goats (Strandes 1961 [1899]: 28), and when leaving Malindi da Gama noted that his ships were heavily provisioned, with only wheat in short supply because it had to be imported from Cambay, in India (Strandes 1961 [1899]: 30). On the way back from India da Gama stopped at Zanzibar, and here Strandes writes that “The Portuguese found the local inhabitants to be Muslims, particularly given to commerce, who traded with all parts of the coast in their small, open, single-masted boats, acting as freighters, especially for corn. The fertility of the island, and the quality and quantity of fruit, especially oranges, were particularly remarked...” (Strandes 1961 [1899]: 33).

In 1503 the Portuguese pirate Ruy Lourenco Ravasco captured twenty vessels heavily laden with grain, going across the channel from Pemba to the mainland (Strandes 1961 [1899]: 50). Millet and rice, honey, butter, cattle and goats were looted from Mombasa after the city was sacked in 1505 (Strandes 1961 [1899]:72), and grain was also mentioned as loot from the small town of Oja just north of Malindi (Strandes 1961 [1899]: 75). There were fruit orchards watered by wells around Mombasa and Kilwa, as well as the cultivation of black millet, coconut, beans, rice, sugarcane, areca, and tamarind (Strandes 1961 [1899]: 91)

Prestholdt (2001) discusses the specific framework of familiarity through which the Portuguese viewed the Swahili, unlike their relations with other African groups. The material and religious worlds of Swahili societies were evocative of northern Africa and Muslim Spain, regions with which the Portuguese were intimately familiar (Prestholdt 2001: 383). Prestholdt argues that nowhere else in Africa did Portuguese imperialists arrive with such violence (e.g., the sacking of Kilwa) and yet develop such intimate and interdependent relationships, and nowhere else were they as disinterested in proselytizing as on the Swahili Coast. He attributes this phenomenon to the degrees of familiarity that the Portuguese recognized in the urban, seafaring, money-using, literate societies of the Swahili world (Prestholdt 2001: 385). For instance, writers like Barbosa in 1517 wrote that Kilwa had, “...many fair houses of stone and mortar with many windows *after our fashion*, very well arranged in streets, with many flat roofs. The doors are of wood, well carved, with excellent joinery” (Barbosa 1918: 17; cited in Prestholdt 2001: 390, Prestholdt’s emphasis). Other 16th century Portuguese writers compare Kilwa to the Portuguese city of Setuvel, Malindi to Acouchette, the Kilwan landscape to southern Spain, and the flora of Zanzibar to Portugal (Prestholdt 2001: 390). Based on degrees of similarity, the Portuguese came to see the East African and Indian Ocean worlds through Swahili eyes, adopting Swahili

concepts of identity and difference for inland African peoples. Degrees of similarity did not prevent violence and the development of a hierarchical early modern world system, but unlike later British colonialists who saw the Swahili as primitive, stagnant and a civilizational “other”, the 16th-century Portuguese perceived them as familiar. This familiarity may explain why Swahili society was so marginally impacted by two centuries of Portuguese rule on the coast (Prestholdt 2001: 398). Furthermore, Prestholdt argues that 18th-century Swahili petitions from patricians in Kilwa and Mombasa to the Estado da India for help against Arab rulers should cast some doubt on a view of Swahili-Portuguese relations as being antagonistic at all times and places (Prestholdt 2001: 398)

In 1698, the Omani state under the Yarubid dynasty drove the Portuguese out of their last strongholds in East Africa north of Mozambique, and they appeared poised to consolidate their power into an empire of the western Indian Ocean, with access to the lucrative caravan trade routes of East Africa. For over a decade, the Yarubids intensified the slave and caravan trade, and maneuvered to install friendly governors at every major coastal East African town (Vernet 2017: 68). In 1709, a “queen” of Zanzibar was permitted to return to the island by the Yarubids, after her long exile by the Portuguese, and the urban center at Zanzibar Stone Town grew under her son who became the local ruler in 1728 (Sheriff 2018: 530). It is not clear whether these rulers were agents of the Yarubid state, or whether they were Swahili rulers who co-existed with an Omani governor, as is the case in later periods with the Mwinyi Mkuu. Regardless, Yarubid power did not last—after the death of the Imam and Sultan bin Sayf al-Yarubi in 1719, a dispute over succession plunged the Omani state into over 20 years of factional conflict and civil war, resulting in the occupation of large areas of Oman by Afsharid-era Persian forces from 1737 to 1747. Out of this intense period of struggle, the governor of Sohar, Ahmed bin Said of the Busaid family won the support of the Ibadi tribes of Oman for his role in expelling the Persian occupiers. By 1749 he had defeated the last Yarubid claimant to the throne and consolidated his power as the Sultan of the Omani Empire. His descendants would go on to rule Oman into the 21st century. (Rabi 2011).

Though Ahmed bin Said and his Busaid clan were able to claim Oman, they were initially less successful in bending the unruly governors of the East African coast back to Omani rule. During the period of civil strife from the early to mid-18th century, many East African governors who were formerly allied with the Yarubids took the clan’s downfall as an opportunity to reassert *de facto* independence, and they fervently resisted Busaid attempts to unify them under a centralized political authority. Eventually the Busaids brought the whole coast north of Mozambique under their control, but this process lasted well into the 19th century. For instance, Lamu, on the north Kenyan coast, was returned to Omani rule in 1812, when Busaid forces helped Lamu residents repel a combined Pate-Mombasa alliance. The Mazrui (another powerful Omani family, formerly allied with the Yarubids), rulers of Mombasa, declared independence in 1746 following the ascension of the Busaid family, and Mombasa was an independent city-state until its annexation by the Busaids in 1837. The town of Siyu, ruled by the Nabahani of Pate in the Lamu archipelago, was one of the last cities to fall to the Busaids in 1863.

While fighting a protracted conflict against the Mazrui (in Mombasa) and the Nabahani (in Pate) for control of the fertile island of Pemba and the mainland coast, the Busaids solidified their control over their colony in Zanzibar. This was the largest of the offshore islands across from the Kenya and Tanzanian mainland, and a place where Busaid power was uncontested from the mid-to-late 18th century. Eventually, nearly all products from caravan trading in East Africa passed through Zanzibar on their way to Oman and the wider world. By the late 18th century, the

city of Zanzibar (known hereafter as Stone Town) was a wealthy cosmopolitan city under direct Busaid control, home to residents from all over the western Indian Ocean world (Vernet 2017: 76). In 1777, Dutch East India Company agents describe being treated to a picnic on the estate of the Busaid governor of Zanzibar (Vernet 2017: 83), and the French slaver Morice describes the ease of acquiring enslaved people there from the Busaids in the 1770s as well (Vernet 2017: 74).

There were challenges to Busaid power on the island, however. In 1779 and then again in 1784, Hilal bin Ahmad, the blind eldest son of Ahmed bin Said, dispatched Omani warships to quell and defeat rebellions by the indigenous rulers of Zanzibar, who had allied with Pemban and Mombasan forces to challenge Busaid control (Pearce 1920). The indigenous ruler of Zanzibar, known as the Mwinyi Mkuu, held sway with the indigenous Swahili people in the north, east, and south of the island. Sources suggest that the Busaids arranged a power-sharing agreement with the Mwinyi Mkuu and his descendants, until the last indigenous ruler died in 1865 and was not replaced (Gray 1962: 86).

As the central entrepôt for all caravan routes in mainland East Africa throughout the 19th century, the elite Swahili and Omani residents of Stone Town profited from ivory, enslaved people, gold, and other mainland East African products that passed to the Middle East, Asia, and Europe. During this time Zanzibar Stone Town developed from a relatively standard Swahili urban center into the wealthiest city on the East African coast, and the center of power as the capital of the Busaid state (Sheriff 2018). Indigenous Indian credit networks were the basis of this system, where fortunes could be made through speculation in commodity markets. Wealthy Indians reinvested capital from manufacturing industries in Bombay into East Africa and Arabia by the mid-18th century, and businessmen from Gujarat and Surat, older centers of finance, also continued to supply much of the credit for burgeoning economies in Zanzibar and Muscat (Bishara 2017: 26).

More than other parts of the coast, Zanzibar became a hub for the East African slave trade from the mid-18th century onward, with approximately 1000-2000 enslaved people a year passing through the island between 1775 and 1800 (Vernet 2017: 75). This was a shift from the patterns of the 16th and 17th centuries when the trade was dominated by slavers from Pate and the Lamu archipelago (Vernet 2009: 44). Vernet documents an apparent paradox in which large amounts of enslaved people were bought and kept by Omanis in Zanzibar during the late 18th and early 19th century, prior to any noticeable increase in agricultural production (Vernet 2017: 74). While the Mazrui in Mombasa were keen on intensifying rice production in their colony of Pemba in order to pay their hinterland dependents, the Busaids had no such demand for agricultural produce beyond subsistence, leisure, and public consumption. Elites in Zanzibar accumulated enslaved people in Zanzibar for social competition and prestige, or to “store” them there for a period before being sold to date plantations in Oman and other parts of the Middle East. Slave labor was used solely to maintain the country estates of Omani elites, who valued a manorial lifestyle over intensified production. During the late 18th century and early 19th century slave holdings increased greatly, but Zanzibar remained an importer of grain and other foods from other parts of the coast, especially from Pemba and Mafia. For a brief period from 1810 to 1820 Zanzibar began producing grain crops for export; however, this trend quickly reverted when the Busaids found a new, far more lucrative use for slave labor: clove production (Vernet 2017: 79-80).

Cloves are the flower buds of the clove tree (*Syzygium aromaticum*), native to the Moluccas in Indonesia. When dried (Figure 2-3), they are valued as a spice used for flavoring

dishes, baked goods, and beverages; they also have medicinal qualities and act a mild analgesic for tooth pain. Merchants traded cloves in deep antiquity, with the first known evidence for cloves identified at the site of Terqa in Syria, in 1720 BCE (Buccellati and Buccellati 1977). Apocryphally, French traders brought cloves to Zanzibar by way of Mauritius at some point in the early 19th century. Clove production for export in earnest did not begin prior to 1820. Production started first solely on the plantations of Seyyid Said, the Busaid sultan who ruled from 1807 to 1856.



Figure 2-3. Cloves drying on mats near Mahonda, in Zanzibar, Tanzania. Photo by the author.



Figure 2-4. Clove trees, near Mkataleni. Photo by the author.

The sultan Seyyid Said oversaw the transformation of Zanzibar's rural areas into a plantation system focused on the production of cloves, until his death in 1856. The net wealth of clove exports caused the customs revenues in Zanzibar to surpass those of Muscat by the 1830s, and Seyyid Said officially relocated the capital of the empire to the island in 1840 (Bishara 2017:

51). The peak of clove planting occurred between 1835 and 1850, as many Omani settlers migrated to the island and started acquiring land for their own plantations. In 1840 Sultan Seyyid's share of the clove market was two-thirds of the total supply; but by the time of his death in 1856 his holdings only represented 6% of the total supply of cloves being exported from Zanzibar (Cooper 1977: 51). The years from 1835 to 1856 were referred to as period of "clove-mania" by the French traveler Guillain who visited the island in 1846. During this period, plantation owners destroyed and uprooted subsistence crops and coconut orchards across the island to make room for clove trees. Deforestation and land clearances altered the environment of the island: in 1879, the explorer Joseph Thompson reports that so much land had been cleared that the meteorological measurements taken by Richard Burton in 1857 no longer applied and needed to be redone (Cooper 1977: 59). By 1860, Omani, Indian and Swahili landed proprietors constituted an aristocratic class in Zanzibar, though Omanis constituted the large majority. Clove plantations also expanded to Pemba, where Wapemba people made up a larger percentage of plantation owners compared to Zanzibar (Vernet 2017: 72). Though clove production continued to dominate the island's economic system into the 20th century, declining prices meant that the plantation owners never achieved the same levels of wealth as during the early decades in the 1840s and 50s.

Managing orchards (and the enslaved people who worked them) was a leisurely activity of the upper classes of both Swahili and Omani society, comparable to date farming in Oman. It was distinct from the more labor-intensive modes of farming in the *makonde* (grain crop) fields further out from Swahili towns, where grain and other staples were grown. Owning land, trees, and enslaved people, and living off the produce of one's own plantation came to be a hallmark of aristocratic privilege by the 19th century, to the extent that later British observers criticized plantation owners for their indolence and lack of industriousness in expanding production (Bishara 2017: 225). Yet despite their leisurely pretenses, the broader flows of finance had effectively separated owners from their trees by the early to mid-19th century. By the mid-19th century trees came to have an assigned economic value and constituted a metric against which a loan could be measured. Cloves were bought and sold before they even ripened on the branch (Bishara 2017: 46). The journey of cloves from orchards to international markets, and the travel of credit from Bombay to Zanzibar, transformed farms into plantations.

While the clove plantation system was transforming Zanzibar's environment, the arrival of Omani settlers and the mass importation of enslaved East Africans also transformed the demographic makeup of the island. Omani settlers never numbered more than a few thousand throughout the 19th century (Cooper 1977: 54) and may have only amounted to a few hundred during the late 18th and early 19th century (Vernet 2017: 75). The indigenous residents of Zanzibar, Swahili people known as Wahadimu in the south and east and Watumbatu in the north and west¹ would have made up a substantial population; however, enslaved East Africans

¹ Wahadimu and Watumbatu are identities of the 19th century. While today residents of Tumbatu island may refer to themselves as Watumbatu, in the 19th century this was an ethnic moniker for many residents across north-western Zanzibar, while Wahadimu people lived in the south and east (Middleton 1961). In the early to mid-20th century these identities mixed and merged due to a shared experience of dispossession, and 20th century accounts often described all non-Arabs on the island as Hadimu or Wahadimu. During the Time of Politics (1957-1963), political activists encouraged residents to adopt the new moniker of "Shirazi". They argued that the name Wahadimu in particular was a pejorative name related to slavery. The ethnic moniker Shirazi differentiated indigenous Swahili residents from Arab Omanis, but also from formerly enslaved East African mainlanders, who adopted the term Swahili as they integrated into coastal society (Glassman 2014). Shirazi has since fallen out of favor as an ethnic identification in Zanzibar due to its association with the Afro-Shirazi Party (ASP), which carried out the 1964

brought to the island by Busaid Omanis appear to have outnumbered residents even as early as 1811. Cooper reports 150,000 enslaved people and 50,00 free Zanzibaris in 1811, 360,000 enslaved people and 90,00 free people in 1844, and 200,000 enslaved people and 100,000 free people in 1857 (Cooper 1977: 56), though Vernet (2017) disputes the reliability of such numbers.

Omani planters were able to acquire land in Zanzibar relatively easily during the early to mid-19th century. The Frenchman Fortuné Albrand remarked in 1819 that land could be obtained by any who wanted it through a payment of rice to the Swahili chief in charge of the area (Vernet 2017: 76). Albrand also attests that two-thirds of the island lay uncultivated, though it is difficult to discern the meaning of this statement. Would Albrand, a European of the early 19th century, have recognized the swidden agricultural practices (see Chapter 6) of indigenous Swahili people in the rocky south and east as “cultivation”? If not, then his claim that two-thirds of the island was uncultivated would almost match the landscape of Zanzibar today, where most of the land is used for these marginal farming practices, in areas often mistaken for natural scrub brush. This statement, taken at face value to imply that Zanzibar was relatively empty prior to Omani colonialism, might in fact reflect the opposite—the fertile, rice-growing areas of the northwest may have been fully utilized by Albrand’s time, constituting the “one-third” of the island that he would have viewed as cultivated.

When Seyyid Said died in 1856, his two sons Majid bin Said and Thuwaini bin Said struggled with one another for the throne, resulting in the division of the Omani Empire into two realms: the Sultanate of Zanzibar, and the Sultanate of Muscat and Oman. Majid bin Said became the first ruler of the Sultanate of Zanzibar from 1856 to 1870, while Thuwaini bin Said became the ruler of the Sultanate of Muscat and Oman. Following Majid bin Said was his half-brother Barghash bin Said, who ruled from 1870 to 1888. He developed the infrastructure of Zanzibar and was the last sultan to maintain relative independence from foreign powers (Rabi 2011). In 1876 the British also enforced the formal abolition of the slave trade in the western Indian Ocean. Despite this, the slave trade intensified in the late 19th and early 20th century, due to economic growth as a result of the stability brought by British rule, and increased demand for the products produced by the slave trade: dates, cloves, and pearls (Hopper 2015). Illegal slave holding pens like those at Mangapwani in Zanzibar attest to the continued presence of the slave trade during this period.

Barghash’s younger brother Khalifah bin Said succeeded him and ruled for only two years, from 1888 to 1890, when he died suddenly. In 1888 Germans forced him to cede all territories on the Tanganyika coast to them. This sparked the Abushiri Revolt, an insurrection organized by the Arab and Swahili populations on the mainland, from 1888-89. The insurrection was defeated, and mainland Tanganyika came under German control. Next, his successor Ali bin Said was forced in 1890 to accept British rule over Zanzibar and the Kenyan coast in the form of a protectorate, as well as the abolition of slavery within Zanzibar. Under the protectorate, the British built roads connecting towns in the east to Stone Town. It is during this period that the first references appear to the dispossession of Swahili people from fertile areas in the west, and to the idea of the rocky east as being a “preserve” of indigenous Swahili people in the rural areas, who cultivated chili and tobacco as export crops (Owens 2007).

Revolution and had some role in the racial violence that followed it. To avoid dealing with the historical contingencies of these terms, in this dissertation I use “indigenous Swahili” to refer to residents of the island who descend from precolonial communities, rather than from enslaved East African mainland communities that came to the island in the 19th century.

Ali bin Said's descendants ruled as puppet monarchs until 1963 under the protectorate when the British granted Zanzibar independence that December (Glassman 2011). The Sultanate of Zanzibar became independent again, only to fall several weeks later. On the 12th of January 1964, revolutionary forces led by the pan-Africanist Afro-Shirazi Party (ASP) seized Stone Town and overthrew Sultan Jamshid bin Abdullah, the last Busaid ruler of Zanzibar. The weeks after the revolution were characterized by racial violence by indigenous Swahili and mainland Africans against the predominately Omani Arab and Indian upper classes. The violence of the revolutionary period originated in the tensions of the plantation society that preceded it. It was mostly upper-class Omani Arabs with ties to the extended family of the Busaid dynasty who subjugated black mainland Africans as enslaved people in the 19th century and squatters in the 20th. While racial and class tensions had simmered throughout the 19th and early 20th century, it was the political atmosphere of decolonization and Pan-Africanism in the mid-20th century that finally cohered class and racial antagonisms into revolution, and the anti-Arab and anti-Indian racial attacks that followed (Glassman 2011; 2014).

In 1964 the ASP assumed control over Zanzibar, and the president Abeid Karuma negotiated with Julius Nyerere, leader of the political party Tanganyika African National Union (TANU), to merge Tanganyika and Zanzibar into the new state of Tanzania. The ASP and TANU merged and reformed as the *Chama Cha Mapinduzi*, or the Party of the Revolution (CCM). CCM then adopted what they called African Socialism, or *ujamaa*. They enacted substantial land reforms in Zanzibar that broke up the large plantation estates owned by the wealthy minority and parceled off land in 3 km² farming plots to citizens. Additionally, the party seized the mansions of Stone Town and divided them into apartments which stand today. While initially voluntary, the collectivization efforts of *ujamaa* proved unpopular by the 1970s, and the government response was to mandate forced collectivization in villages. Forced collectivization did not take place in Zanzibar, but in a few regions of mainland Tanzania. CCM did not officially abandon *ujamaa* until the Zanzibar Declaration of 1991, but the project had all but disintegrated by the 1980s (Lal 2015). Tourism has become the largest industry in Zanzibar, overtaking cash crop production for the first time in the mid-1990s (Marks 1996).

2.3 Archaeology in Zanzibar

Archaeology has revealed the diversity of site types on the Swahili Coast, during the precolonial phases that I outline in Table 2-1, below. While early scholarship almost exclusively investigated large stone-built towns (e.g., Kirkman 1954; Chittick 1974), more recent work has uncovered evidence for a wide range of settlements involved in rural agricultural production, marine resource exploitation, craft production, and Indian Ocean trade outside urban areas, from the 6th to the 16th centuries (e.g., Crowther et al. 2016a; Fitton 2017; Fleisher 2003; Helm 2000; Kusimba et al. 2013; LaViolette and Fleisher 2009; Pawlowicz 2011; Walshaw 2010, 2015; Wynne-Jones 2007). Other recent archaeological work in coastal East Africa has spanned a variety of topics: on ceramic typology and the use of ceramics (Croucher and Wynne-Jones 2006; Pawlowicz 2013), rural and urban connectivity (Fleisher 2010c; Helm 2000; Helm et al. 2012; Kusimba et al. 2013; LaViolette and Fleisher 2009; Shipton et al. 2013; Walz 2017, 2018), public space (Fleisher and Wynne-Jones 2012; Fleisher 2014; Fleisher and Sulas 2015; Sulas et al. 2016), slavery and labor (Alexander 2001; Croucher 2014; Kusimba 2004; Lane 2014; Rødland et al. 2020); subsistence and consumption (Fleisher 2010b; Quintana Morales 2013; Prendergast et al. 2017; Walshaw 2010, 2015), and historical ecology (Boivin et al. 2014; Crowther et al. 2016a; Ekblom 2004; Fuller et al. 2015; Håkansson 2004; Kusimba and Kusimba 2007; Langley et al. 2016; Pawlowicz et al. 2014; Stoetzel 2014; Sulas and Madella 2012). This

research has emphasized the economic and social relationships between rural hinterland societies and urban centers at different geographical scales.

Fukuchani, Unguja Ukuu, and Mkokotoni are well-known mid-to-late first millennium sites in Zanzibar, during Phase 1 (see Table 2-1) of the precolonial period (Fitton 2017; Juma 2004; Shipton et al. 2016). These sites were a part of the late first-millennium Swahili region, which developed out of agricultural Iron Age communities along the East African coast. These societies shared commonalities in ceramic traditions, maritime resource exploitation, links to Indian Ocean trading networks, and East African Islamic practices (Wynne-Jones and LaViolette 2018). From the 11th to 15th century (phases 2 and 3 of the precolonial period, Table 2-1), settlement patterns throughout the Zanzibar archipelago shifted, possibly in response to changing trade routes, population increases, or the development of Islam as a structuring social force (Fleisher 2010b; LaViolette and Fleisher 2009). Early first millennium sites were abandoned, and people occupied larger towns built around monumental stone centers at Tumbatu, Shangani, and Kizimkazi on Zanzibar, and at Chwaka, Ras Mkumbuu, and Mtambwe Mkuu on Pemba, the northern island of Zanzibar (Fitton 2017). These trends align with the general pattern of urbanization on the coast from the 11th to 15th century (Horton and Middleton 2000; Wynne-Jones and LaViolette 2018).

Monumental stone architecture at the site of Tumbatu attests to a large and wealthy settlement on the small island of Tumbatu directly off the northwest coast of Zanzibar. Research suggest that this site was occupied and abandoned from the 12th to 14th centuries. The town lies directly adjacent to the large site of Mkokotoni, a village which supplied residents in the stone town with resources, and which has persisted from the 8th century CE to the present day (Rødland 2021). Stone Town (also known as Shangani when referenced during the precolonial period), was founded in the 10th century as a fishing community on the westernmost peninsula of the island (Horton and Clark 1985). This community developed into an urban center by the 12th century and was a large urban center by the 16th century when the Portuguese established a base there. Though the original layout of the town is not well understood due to modern occupations, monumental stone architecture dating from the 12th to 15th centuries was unearthed in 2017 below the Old Fort, a 19th century Omani construction built on top of a 17th century Portuguese Church, which itself appears to have been built over the ruins of a precolonial Swahili stone complex (Horton pers. comm.; Leech 2017). The long and complex urban history of modern Stone Town is not well understood, but ceramic assemblages from the 2017 excavations suggest a well-developed Swahili urban culture, comparable to stone towns elsewhere on the coast like Kilwa, Chwaka, Gede, or Shanga (Horton pers. comm.).

Archaeological research in Zanzibar has focused on understanding sites found on the coastal fringe of the island (e.g Baužytė 2019; Fitton 2017; Fleisher 2003; Juma 2004; LaViolette and Fleisher 2009; Rødland 2021; Sulas et al. 2019). While Swahili settlement is well understood from the 6th to 15th century on Zanzibar, all known 1st and early second millennium Swahili sites are located directly on the coast of the island and are those that were oriented toward marine resource exploitation and coastal trade (Fitton 2018). Unlike on Pemba (e.g., LaViolette and Fleisher 2009; Walshaw 2010; Stoetzel 2014), no research has been conducted to understand the settlement systems in rural areas inland from the coast on Zanzibar during the precolonial period. It is true that Zanzibar does not have a true “hinterland”; anywhere on Zanzibar is within a day’s walk from the coast. However, early Swahili settlements found on beaches and coves (e.g., Fitton 2017; Juma 2004), or the urban towns of Shangani (Zanzibar Stone Town), Kizimkazi, and Tumbatu (Horton and Clark 1985), are all removed from the fertile

areas of agricultural production that developed during the 19th century for rice, coconut, and clove farming. Nevertheless, it is likely that settlement systems existed outside of the coastal areas in desirable agricultural land.

Research into rural-urban dynamics on the East African coast has also mostly taken place in precolonial contexts (prior to the 16th century), through investigations of central urban places and their surrounding hinterlands. On Zanzibar, Rødland (2021) investigated social and economic relationships between Tumbatu and Mkokotoni, a port site across the channel from the offshore urban center. In northern Pemba, LaViolette and Fleisher have investigated these processes during the precolonial period, emphasizing the complexity of the countryside in its own right (LaViolette and Fleisher 2018). Urbanization on Pemba proceeded through a process referred to as synoecism, wherein rural areas were depopulated as urban centers grew from the 11th to 15th centuries CE. During the colonial period urban centers were abandoned and the island went through a process of ruralization that has persisted to the present day (Fleisher 2010c). Elsewhere on the Swahili Coast archaeologists have investigated rural interactions around Kilwa (Wynne-Jones 2007), at Mikindani Bay (Pawlowicz 2011), inland around Pangani Bay (Walz 2017, 2018) and across the Kenyan hinterland (Helm 2000; Kusimba et al. 2013; Kusimba and Kusimba 2018). These studies have fundamentally changed the perspective on Swahili social development. Rather than the previous view of Swahili urban centers as isolated outposts, these studies suggest that urban Swahili society was deeply integrated within local, regional, and trans-continental networks of exchange and patronage and that Swahili site types ranged from small field houses to hamlets, villages, towns, and monumental urban centers.

Exceptions to the focus on precolonial, pre-15th century archaeology in Zanzibar include Croucher's (2006) archaeological study of 19th century plantation sites, LaViolette and Norman's (in press) investigation of the Portuguese period in northern Zanzibar, and Horton's study of the Portuguese period at the Omani Fort in Zanzibar Stone Town (Leech 2017; Horton in press). Outside Zanzibar, research into settlement dynamics in later periods includes work by Chami et al. (2000) at Bagamoyo, Walz (2017) in the Pangani River Basin, and Wynne-Jones (2010) at Vumba Kuu.

2.4 Chronology and Periodization

Political and economic transformations in Zanzibar and coastal East Africa constitute the background for understanding rural settlement change in the plantation region. Zanzibar's history of human occupation can be divided into six periods, which I summarize in Table 2-1.

When referring to long-term history, this dissertation covers three periods of social reorganization on the Swahili Coast over the last thousand years (see the green highlighted periods in the table below)². The first period covers the emergence of early Swahili communities on Zanzibar and the shift in settlement toward urban development and intensified social stratification from 550 to 1500 CE. The early colonial period is the period during which Swahili polities realigned in relation to the Portuguese Empire and the Omani Empire, and the end of political autonomy for towns on the coast, from 1500 to 1840. The late colonial period covers the years from 1840 to 1963. The first phase within this period begins with the relocation of the capital of the Empire of Oman to Zanzibar in 1840. The middle-to-late 19th century saw the development of the clove plantation system and the transformation of Zanzibar into a wealthy

² I have divided these periods in ways that I feel make sense for Zanzibar, favoring local regional chronologies over a framework that uses the terms Early, Middle, and Late Iron Age.

commercial hub. The second phase within this period was the era of the British Protectorate from 1890 to 1963.

Period	Phases	Historical Conditions	Material Culture	Notable Sites
1. Terminal Pleistocene Occupation (18,000–12,000 BP).		Zanzibar not yet separated from mainland; mobile hunter-gatherer groups on the coast use Kuumbi Cave as a shelter (Sarathi 2018; Shipton et al. 2016)	-Quartz microlith tools -Bone tools	-Kuumbi Cave
2. Early First Millennium (1-500 CE)		Zanzibar is a possible location of Menuthias, an island stopover on the way to Rhapta, mentioned in the Periplus of the Erythraean Sea (Seland 2014)	None attested	None
3. Precolonial Period (550-1500 CE).	Phase 1 (550-1000) Phase 2 (1000-1400) Phase 3 (1400-1500)	Phase 1: Early iron-working Bantu communities resettle the island for the first time since the Pleistocene (Fitton 2018) Phase 2: Independent Islamic Swahili polities rule the East African coast; Tumbatu and then Shangani (Stone Town) are primary sites on Zanzibar (Rødland 2021) Phase 3: Unguja Ukuu reoccupied, and Zanzibar Stone Town became the primary urban center on the island (Juma 2004; Fitton 2018)	-In Phase 1 , A and B of Tana/TIW ceramics (Horton 1996), late Roman trade ceramics, turquoise-glazed ware, and other early Middle Eastern wares. -In Phase 2-3 , B, C and D Tana/TIW ceramics (Horton 1996), sgraffiato, Longquan celadon, and glazed monochrome wares -Stone monumental architecture in addition to earth and thatch -Iron slag, beads and glass	-Unguja Ukuu, -Fukuchani -Mkokotoni -Tumbatu -Zanzibar Stone Town founded, as Shangani -Kizimkazi
4. Early Colonial Period (1500-1840 CE).	Phase 1 (1500-1698) Phase 2 (1698-1840)	Phase 1: Portuguese rule, expulsion, and aftermath on the East African coast, north of Mozambique by 1698 (LaViolette and Norman, in press) Phase 2: Yarubid Omanis control coast before period of civil war from 1719-1749, followed by Busaids from 1749-1840 (Rabi 2011)	-Later derived Tana/TIW ceramics -“Type 13” decorative motifs -Chinese Ming and Kangxi blue and white porcelain -Glazed and unglazed wares from the Arabian/Persian Gulf	-Chwaka -Uroa -Mvuleni -Fukuchani -Stone Town
5. Late Colonial Period (1840-1963 CE)	Phase 1 (1840-1890) Phase 2 (1890-1963)	Phase 1: Relocation of capital of Omani Empire to Zanzibar in 1840 under Seyyid Said bin Sultan, and the development of clove plantations. Split between Sultanate of Muscat and Sultanate of Zanzibar in 1856. Abolition of the slave trade in 1876 (Sheriff 1987; 1991) Phase 2: British protectorate seizes power in 1890, which lasts until 1963 (Bishara 2017)	-Everted rim cooking pots with incised motifs -Glazed European whiteware and stoneware -Qing Chinese blue and white porcelain -Unglazed and glazed wares from the Arabian/Persian Gulf -Indian red earthenware Phase 2: Metal vessels and mass-produced modern whitewares become common toward the mid-20 th century	-Stone Town -Busaid estates: Mtoni, Marahubi, Kizimbani, Kidichi, Chukwani, Marseilles, Khole, Chuini,, Bet El Ras, Beit el Sahel
6. Post-Colonial Period		1964 Revolution and merger to form Tanzania, followed by <i>ujamaa</i> policies through the 60s and 70s. By 1991 <i>ujamaa</i> is officially ended. Transition to tourism-based economy in 2000s (Lal 2015; Marks 1996)	-Metal, plastic, and mass-produced modern whiteware ceramics; continued use of some earlier imported wares as antiques. -Mass-produced modern consumer goods	-Stone Town

Table 2-1. Historical periods of Zanzibar. This table also includes specific phases within them where necessary. I have highlighted the periods addressed in this dissertation in green.

2.5 Conclusion

This chapter has outlined the historical and archaeological background of Zanzibar. While historical analyses of the early colonial period (Vernet 2017) and the late colonial period (Bishara 2017; Glassman 2011; Owens 2006; Sheriff 1987; 1991, 2018) give detailed accounts of the economic and political transformations that occurred across the island during those eras, these accounts do not capture a bottom-up perspective of rural settlement dynamics within the interstices of Zanzibar's plantation society, or across the long-term settlement history of inland region. Archaeology is uniquely suited to investigate these processes and to offer these perspectives of settlement and social change, from the initial phase of island colonization by early iron-working Swahili settlers to the late historical period. This research project aims to synthesize historical and archaeological frameworks to understand the formation of the plantation system within the context of the long-term economic, environmental, and political history of Zanzibar and the East African Swahili Coast.

To understand the origins and development of the 19th-century plantation economy, it is necessary to understand the general settlement history of inland Zanzibar, from the earliest period of occupation to the present. How were local patterns of settlement impacted by new forms of capital accumulation and slavery in the clove and copra plantations of the 19th century, and how did these forms vary in relation to local environmental and historical differences? When agricultural production intensified in the 19th century, did the plantations developed by Swahili and Omani landowners grow over the sites of earlier, hitherto unrecorded Swahili settlements? To what extent did precolonial Swahili landscapes shape the development of the plantation system and the process of state formation? With these questions in mind, I aimed to systematically test areas of known 19th-century occupations, to reconstruct the long-term settlement history of the inland region, and to address contemporary anthropological questions about social reorganization, human-environment relationships, and state formation in an African context. In the next chapter, I provide further background on the environment of Zanzibar and the East African coast. In the following chapters, I describe my methodology for investigating these topics and present my results.

Chapter 3: The Environment of Zanzibar and the Swahili Coast

3.1 Introduction

Zanzibar lies in the tropical zone, approximately 680 kilometers south of the equator and 36 kilometers off the East African coast. The geographical eastern coast of Africa extends from Cape Gardafui in northern Somalia to the tip of South Africa, an enormous expanse of beaches, cliffs, dune systems, mangroves, coral reefs, floodplains, marshes, forests, and deserts. Coastal East Africa also includes offshore islands like Socotra, the Zanzibar archipelago, Mafia, the Comoros, and Madagascar, as well as more distant islands like the Seychelles, Réunion, and Mauritius. Archaeologists have designated part of this coast as the Swahili Coast, based on the geographical distribution of settlements and ceramics associated with Swahili people from the late first millennium to the present day. The historical extent of the Sabaki language family prior to the 19th century also delimits the extent of the Swahili Coast, from which the different dialects of Swahili and Comorian languages originate (Nurse and Spear 1985). The Swahili Coast extends from Mogadishu in Somali to Sofala in Mozambique and includes nearshore islands like the Lamu archipelago and Mombasa, as well as the offshore islands of Pemba, Zanzibar, Mafia, and the Comoros (Horton and Middleton 2000; Lane and Breen 2018). The northwestern coast of Madagascar is also included in the Swahili region, given the presence of stone towns there and the use of a dialect of Swahili (Radhimilahy 1998). The coastal region is made up of variable environments, which have been altered due to human activities and climate change over millennia. These environments do not naturally end at the coast, and in fact exist further inland into many areas which are described in analyses of Swahili regional systems as hinterlands (e.g., Kusimba et al. 2013; Walz 2018).

This chapter describes various aspects of the environment and physical landscape for the Swahili Coast in broad terms, and then turns to describe the environment of Zanzibar in more detail. The first sections discuss the coastal environmental zones from north to south, the climate, the monsoon system, and the process by which Zanzibar formed as an island. After, I discuss specific environmental variables for Zanzibar.

3.2 Regions of the East African Coast

The vegetal eco-regions of the coastal zone are listed by Lane and Breen (2018: 29-31) from north to south. In the north, the Hobyo grassland and shrubland is a narrow coastal plain with a dune system, with perennial grasslands and shrubs. This region runs from the central Somali coast to Mogadishu. Directly south is the Somali Acacia-Commiphora bushland, which is comprised of dryland scrub and woodland that turns into deserts and grasslands the further from the coast one gets, as aridity increases. South of this is the primary vegetation type of the Swahili Coast—the Zanzibar-Inhambane coastal forest environment. This region extends from the Juba Valley in Somalia to southern Mozambique and represents the broadest and most ecologically diverse region on the coast. Much of the endemic forest of this region is fragmented due to modern human land use, with the largest surviving patches located near Malindi in the Arabuko Sokoke forest reserve. In many other parts of Kenya, forest groves with cultural and historical significance are called *kayas* and are protected by local custom (Willis 1993; Helm 2004). Breen and Lane (2018) divide this region into northern and southern parts, which are characterized by different topographies. While the northern plain is flatter and more regular, the southern plain has hills and plateaus. The Zanzibar-Inhambane Forest zone also includes the offshore islands of Zanzibar, Pemba, Mafia, and the Comoros. The Comorian vegetation is also characterized by

cloud forests in higher elevations. On the central Mozambique coast, and within Zanzibar-Inhambane Forest zone, the Zambebian coastal flooded savanna region consists of swamps, marshes, floodplains, and inland lakes. This area has a high degree of ecological diversity and is a hot spot for water bird breeding and migration.

Breen and Lane (2018: 31) also estimate that mangrove environments cover almost 100,000 hectares along the coast from Somalia to Mozambique, along creeks or on open coastlines. In Mozambique, some mangroves extend as far as 50 kilometers inland and can be up to 30 meters in height. Wherever they are found, mangroves protect against coastal erosion, provide shelter and resources for a variety of plant and animal species, and provide local communities with resources for food, fuel, and construction (Taylor et al. 2003).

Climates on the Swahili Coast change seasonally, but also vary according to topography, surface sea temperature, and the cycle of El Niño events. Furthermore, climates have changed over time, resulting in changes to sea levels and coastal environments. The Swahili Coast was warmer and wetter 11,000 to 5,000 years ago and had more intense monsoons compared to later periods. More arid conditions emerging from 4,500 to 4,100 years ago. From 2000 years ago onward, the tendency has been toward a wetter climate, though the period from 1000 to 1270 CE which roughly corresponds to the Medieval Warm Period resulted in increased aridity (Breen and Lane 2018: 24). More in-depth long term environmental reconstructions are relatively few in coastal East Africa, and represent a patchy, regionally specific record. Some examples include a study of environmental change and land use at Mtwapa (Szymanski 2018), an on-site paleoenvironmental reconstruction of a tropical coastal grassland environment at the cave of Panga ya Saidi in Kenya (Roberts et al. 2020), a reconstruction of mangrove ecosystem dynamics during the Holocene based on sediments, pollen, and charcoal data (Punwong et al. 2013), an analysis of sea level changes, island formation, and defaunation on Zanzibar based on sedimentary, cultural, and faunal datasets from Kuumbi Cave (Prendergast et al. 2016), a reconstruction of grassland and forest use on Pemba based on phytolith data (Stoetzel 2014), and environmental reconstruction at Mikindani in southern Tanzania (Pawlowicz et al. 2014).

3.3 The Sea

The most consistent feature across the Swahili Coast is the sea, which has shaped daily life, subsistence, and social development across the region for millennia. The depth of the sea is variable, which impacts the richness and density of marine life. Major currents also impact the distribution of marine resources. The South Equatorial Current flows from the east, north over Madagascar, and partially becomes the Mozambique perennial current and the Madagascar current, which flow south, and join the southern Agulhas Current which heads toward South Africa. The Southern Equatorial Current also flows north, into the East African Coastal Current (Lane and Breen 2018: 20).

The currents, combined with the monsoon seasons, influence the temporality of seasonal variation and impact the biogeography of the coast. From November to March, the *kaskazi* monsoon wind blows south from the northeast, which allowed trade and coastal activity to move south along the coast. Historically, in this season, ships from Arabia and India moved south and stopped at different ports of call as far south as Sofala (Sheriff 1987: 10-12). Past Sofala, the wind drops off, and return became difficult. The *kusi*, or southern winds, begin in June and last into the fall, which blow from the south and would have been used by vessels leaving the East African coast to head to Arabia or India. With the monsoon system, ships could easily voyage to and from East Africa to other parts of the Indian Ocean within a year (Breen and Lane 2018: 22-23). These seasonal monsoon winds also affect rainfall and produce two distinct rainy seasons on

the coast. The *kaskazi* fall monsoon winds bring rain between October and December (the *vuli*, or short rains), while the *kusi* spring monsoon brings a longer, more intense rainy season from March to June (the *masika*, or long rains), as well as stormy conditions at sea from May to August (Breen and Lane 2018: 23).

3.4 Zanzibar Island Formation

Zanzibar lies roughly 36 kilometers off the Tanzanian mainland coast. It was likely an island during most interglacial periods in the Quaternary period. However, a land bridge has existed between the island and the mainland during periods of low sea level caused by glacial formation. The last time Zanzibar was connected to the coast was during the Last Glacial Maximum, approximately 11,700 years ago. As such, flora and fauna and the history of human settlement on Zanzibar are considerably different compared to Pemba, which has been isolated since at least the early Pliocene (Prendergast et al. 2016: 2).

Sea level change in the southwestern Indian Ocean is regionally variable; however, all datasets suggest sea level rises from around the early to mid-Holocene which likely severed Zanzibar from the mainland. Data from coral reef cores and studies on coral reef terrace elevations in the Comoros, Mauritius, and the Reunion islands suggest a rapid increase in sea levels from 10,000 to 7500 years ago, which slowed and then stabilized at the present mean sea level approximately 3000 years ago. Data from Unguja Ukuu on Zanzibar suggests that sea levels likely dropped almost a meter over the last millennium compared to present sea levels. These data were also compared with data from Mozambique and South Africa, which suggest regional variations in sea levels (Prendergast et al. 2016: 7). Prendergast et al. (2016) have reconstructed the development of Zanzibar Island, using the stratigraphic sequence at Unguja Ukuu, as well as pollen, charcoal, and loss on ignition data obtained from samples taken from seven sediment cores in northwest and southwest of the island, as well as from the Rufiji delta on the mainland. This data supports a model of sea level rise between 12,000 to 11,000 years ago and the total severing of the island from the mainland by 9000 to 8000 years ago (Prendergast et al. 2016: 7). While Pemba did not change and remained an island, Mafia to the south also severed from the mainland, though the model suggests that it did not fully detach before 6000 years ago. Pollen records show changes to mangrove communities around 4000 years ago, consistent with a drought across eastern Africa that created savannas and lowered lake levels.

3.5 Environmental Zones of Zanzibar

Many descriptions of Zanzibar's environment have depicted the island as divided between a fertile western region, and a barren eastern and southern region. Tourist maps of the island reflect this division, showing the west as darker and the east and south as lighter in color (Figure 3-1). This understanding is based on colonial accounts of the island that emphasize the fertility of the west and the remoteness and barrenness of the east and south (e.g. Fitzgerald 1898; Ingrams 1920; Middleton 1961). The division also maps onto a particular spatial and historical discourse about Zanzibar: that the western areas were developed as fertile plantations by Omani settlers, while the east and south of the island were the traditional homelands of indigenous Swahili people on the island (Glassman 2011, 2014). Arab nationalists of the mid-20th century repeated this claim in the years leading up to the 1964 Revolution, saying that barren areas in the east and south were the ancestral homelands of indigenous Swahili people and that fertile western areas were left untended and free for the taking by plantation owners (Glassman 2011: 95). Meanwhile Afro-Shirazi Party activists contended that Swahili people were dispossessed from the fertile lands to the west and forced into rocky areas of the east and south,

which is now the dominant academic view (Glassman 2011: 32). While the west:fertile::barren:east/south distinction is correct at a certain scale, this claim elides smaller microenvironmental differences in the landscapes of Zanzibar that are relevant for understanding long-term human-environment relationships on the island. In the following section, I present geospatial datasets that reflect environmental differences across the island at a more descriptive and relevant scale.

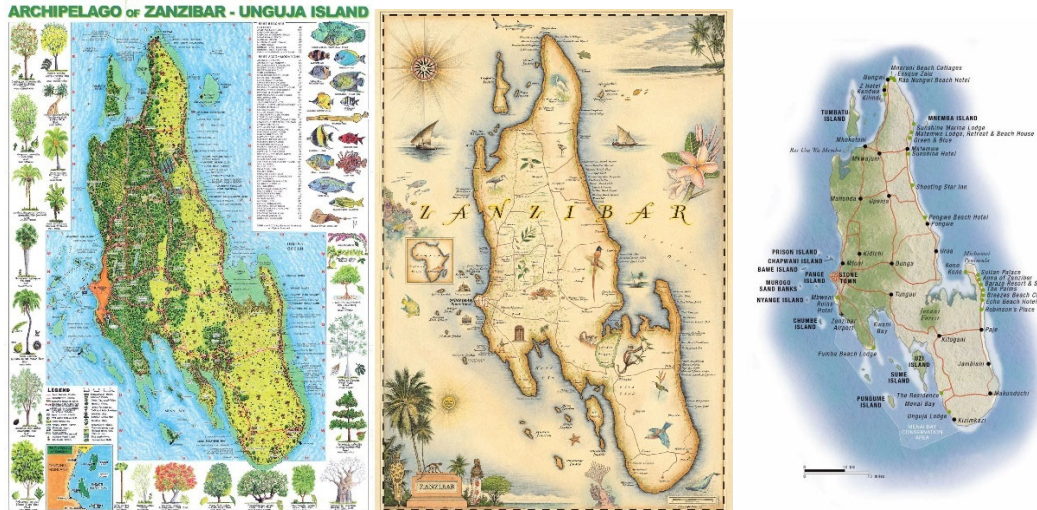


Figure 3-1. Tourist maps of Zanzibar, showing west-east environmental divisions.

I created zonal raster images showing elevation, aspect, slope, hydrological flow, geology, soil types, soil infiltration, rainfall, land use, the historical extent of the clove plantation zones, distance to the coast, and distance to offshore reefs in ArcGIS Pro, using data from multiple sources. These are some variables which constitute the socioecological systems of Zanzibar Island (Barton et al. 2004; Fitzhugh et al. 2019; see Chapter 4 for a discussion of socioecological systems). These zonal rasters can be queried alongside settlement data using zonal statistics, to better understand the environmental factors related to settlement patterns across different periods. I compare these zonal rasters to sites located during my survey in Chapter 10, and to settlement data digitized from a historical map (the 1907 Khan Bahadur map) for the entire island in Chapter 11. Table 3-1 lists each zonal raster and describes its source.

Zonal Raster Type	Description	Source
Elevation (Figure 3-2)	Classifies land by elevation zones from 0-135m	Derived from a digital elevation model, from 30m SRTM satellite imagery
Slope (Figure 3-3)	Classifies land by slope of hills in degrees	Derived from a digital elevation model, from 30m SRTM satellite imagery
Aspect (Figure 3-4)	Classifies land by orientation of hill slopes	Derived from a digital elevation model, from 30m SRTM satellite imagery
Hydrology Buffer from DEM (Figure 3-5)	Classifies land by distance from ravines and areas of lowest elevation where water can flow	Derived from a digital elevation model, from 30m SRTM satellite imagery
Hydrology Buffer from 1907 Streams (Figure 3-6)	Classifies land by distance from streams depicted in the 1907 Khan Bahadur map	Derived from the 1907 Khan Bahadur map
Hydrology Buffer from 1907 Wells (Figure 3-7)	Classifies land by distance from wells depicted in the 1907 Khan Bahadur map	Derived from the 1907 Khan Bahadur map
Combined 1907 Hydrology Buffer (Figure 3-8)	Classifies land by distance from all hydrological features depicted in the 1907 Khan Bahadur map	Derived from the 1907 Khan Bahadur map
Geology (Figure 3-9)	Show geological zones	Geology map from Hardy et al. (2015: 6)
Soil types (Figure 3-10)	Shows soil types according to indigenous Zanzibari categories	Soil type map from Khamis et al. (2017: 120)
Infiltration (Figure 3-11)	Shows areas of high, moderate, and slow infiltration into soils	Soil infiltration map from Hardy et al. (2015: 6)

Rainfall (Figure 3-12)	Shows three zones of yearly rainfall amounts, in mm.	Rainfall map from Juma (2004: 48)
Land use (Figure 3-13)	Shows areas of high and low vegetation, bare earth, urban areas, and coastal sandy environments.	Reclassified from imagery of African land use, from the European Space Agency's Sentinel-2A satellite
Historical clove plantations and modern settlement (Figure 3-14)	Depicts the zone of the historical clove plantation system, along with modern settlement derived from the land use map.	Clove plantation zones derived from the map by Sheriff (1991: 108); modern settlement derived from reclassified Sentinel-2A imagery.
Distance to sea (Figure 3-15)	Depicts zones of distance to the shoreline	Made with the multi-ring buffer tool in ArcGIS Pro
Distance to coral reefs (Figure 3-16)	Depicts zones of distance to off-shore reefs	Derived from soil map by Khamis et al. (2017: 120), with multi-ring buffer zones created in ArcGIS Pro

Table 3-1. Types of zonal rasters.

Figure 3-2 through Figure 3-16 show each zonal raster below, along with descriptions that highlight the main features of each zone.

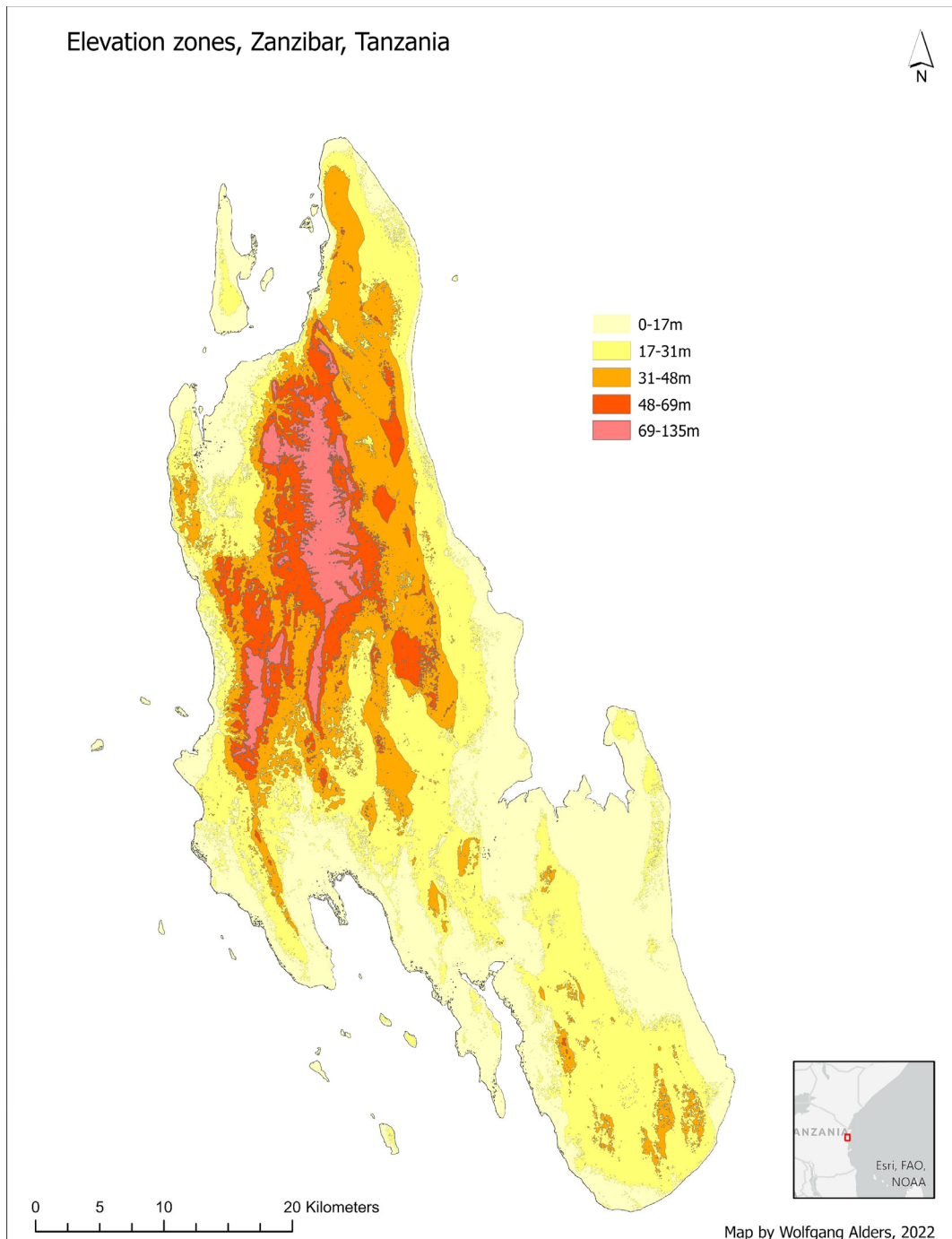


Figure 3-2. Elevation zones.

The highest hills in Zanzibar reach a higher elevation than the highest hills on Pemba, Zanzibar’s northern neighbor. However, Zanzibar still has a reputation as the flatter island of the two since hills are only concentrated in the northwest zone and much of the island consists of a flat plain. While elevation gradients are continuous on the ground, I analyzed settlement in comparison to elevation in this project by dividing the landscape into five different elevation zones. I created these zones by reclassifying the SRTM DEM using the Natural Breaks function in ArcGIS Pro, and then converting this raster to a polygon image.

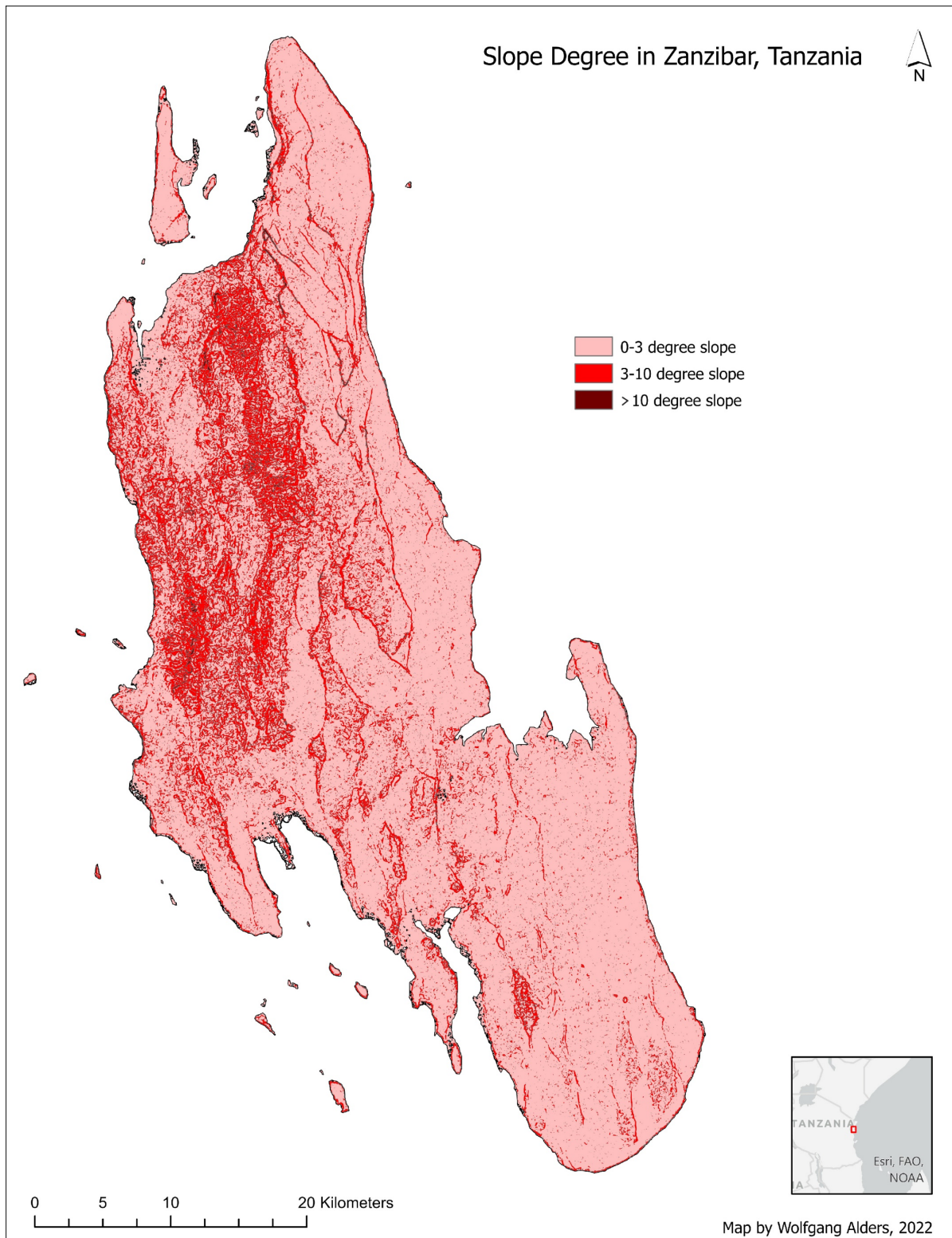


Figure 3-3. Slope zones.

Slopes in Zanzibar are relatively mild, as the hill system primarily consists of gentle rolling hills of lateritic sandy clay. The exception is in some areas of the northeast and south, where coralline limestone bedrock cliffs form steep-sided plateaus.

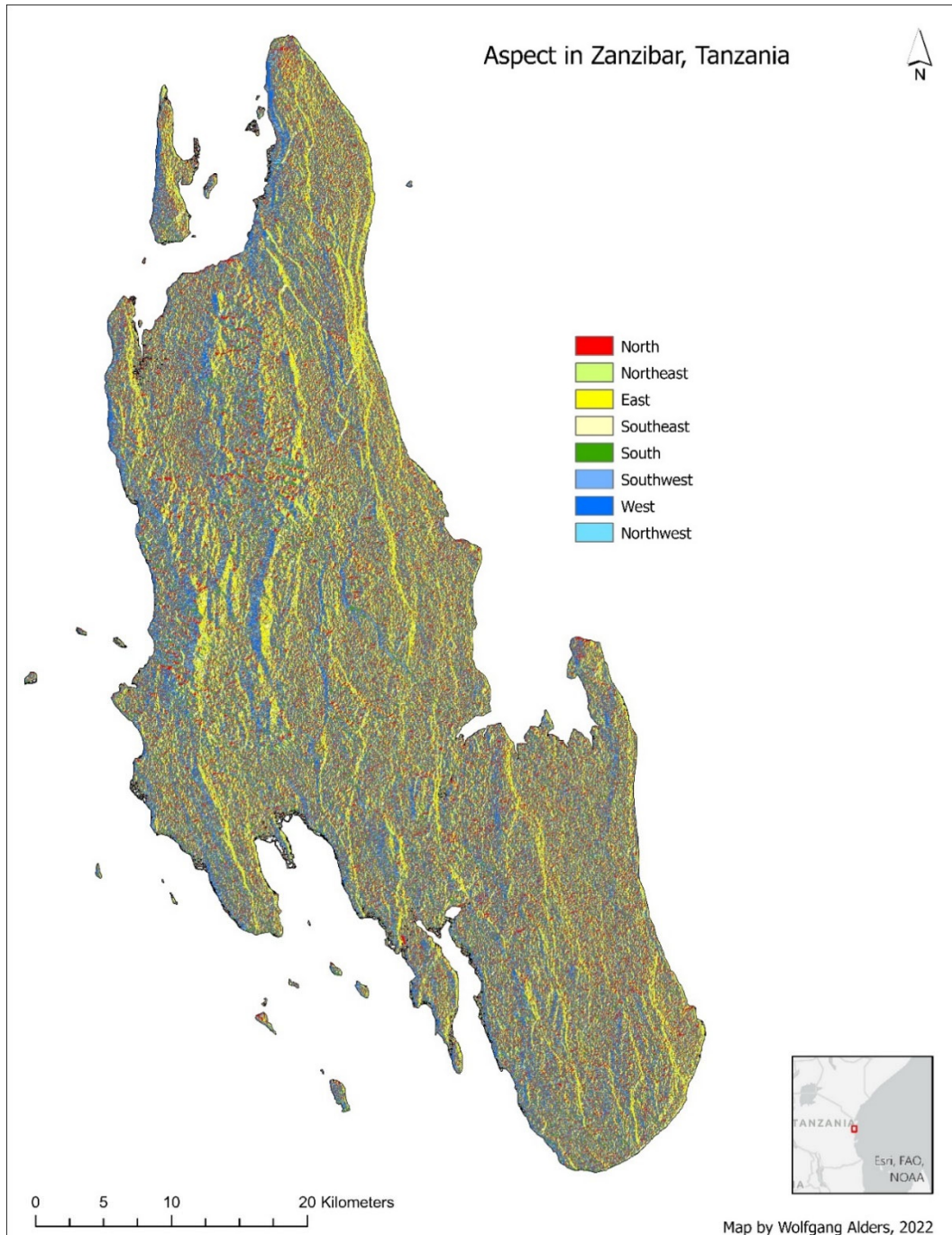


Figure 3-4. Aspect.

Aspect refers to the directional orientation of hill slopes. Since Zanzibar’s hill system runs north to south, most hills are either west or east facing. The following chart shows the total slope area in km² for each direction. Table 3-2 shows the area in km² for each aspect zone.

	N	NE	E	SE	S	SW	W	NW
area (km ²)	190	195	223	193	177	199	223	195

Table 3-2. Area in km² for each aspect zone.

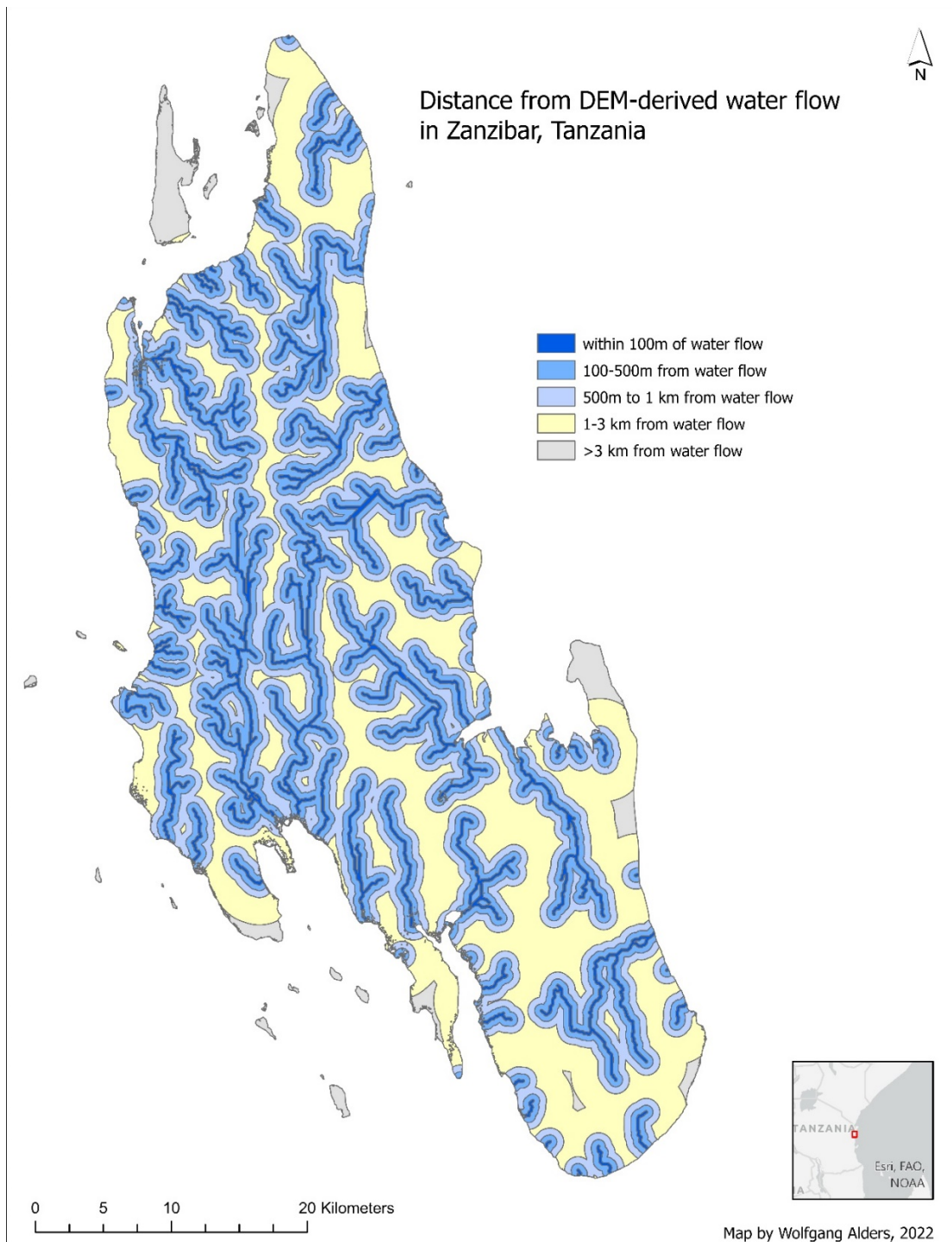


Figure 3-5. DEM-Derived Water Flow.

This zonal raster depicts distances on the island from areas of lowest elevation, where water accumulates in a hydrological model. In areas without above ground streams, it may

indicate where water accumulates and is accessible underground in wells or caves. Note that it is considerably different from the historical stream map recorded in 1907, below.

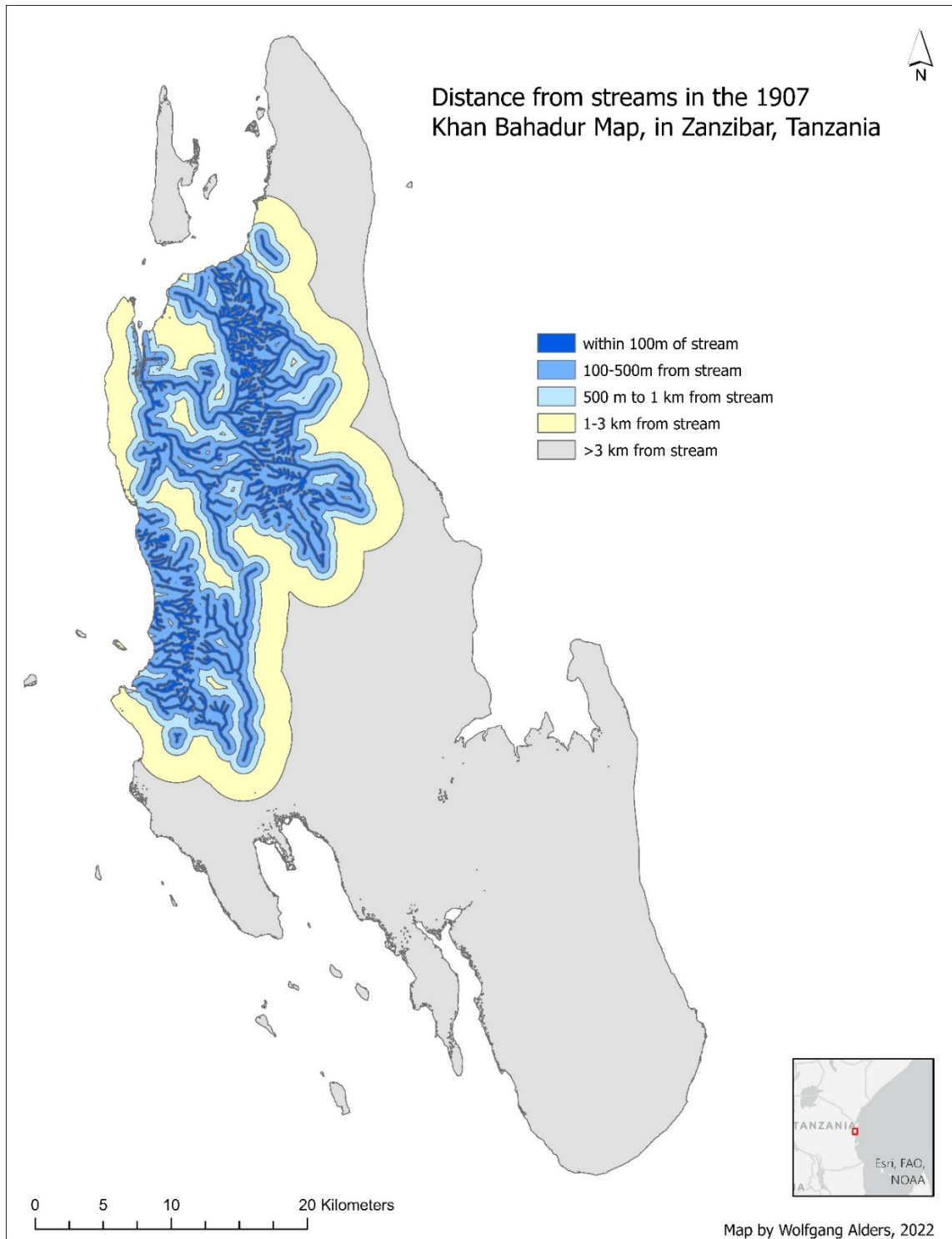


Figure 3-6. Hydrology buffer zones for 1907 streams.

This map represents distances from the streams recorded by Imam Sherif Khan Bahadur in 1907 for the British Survey of India. I digitized these streams by hand. They are notably found only in the northwest of the island, where deeper soils support above-ground water flow.

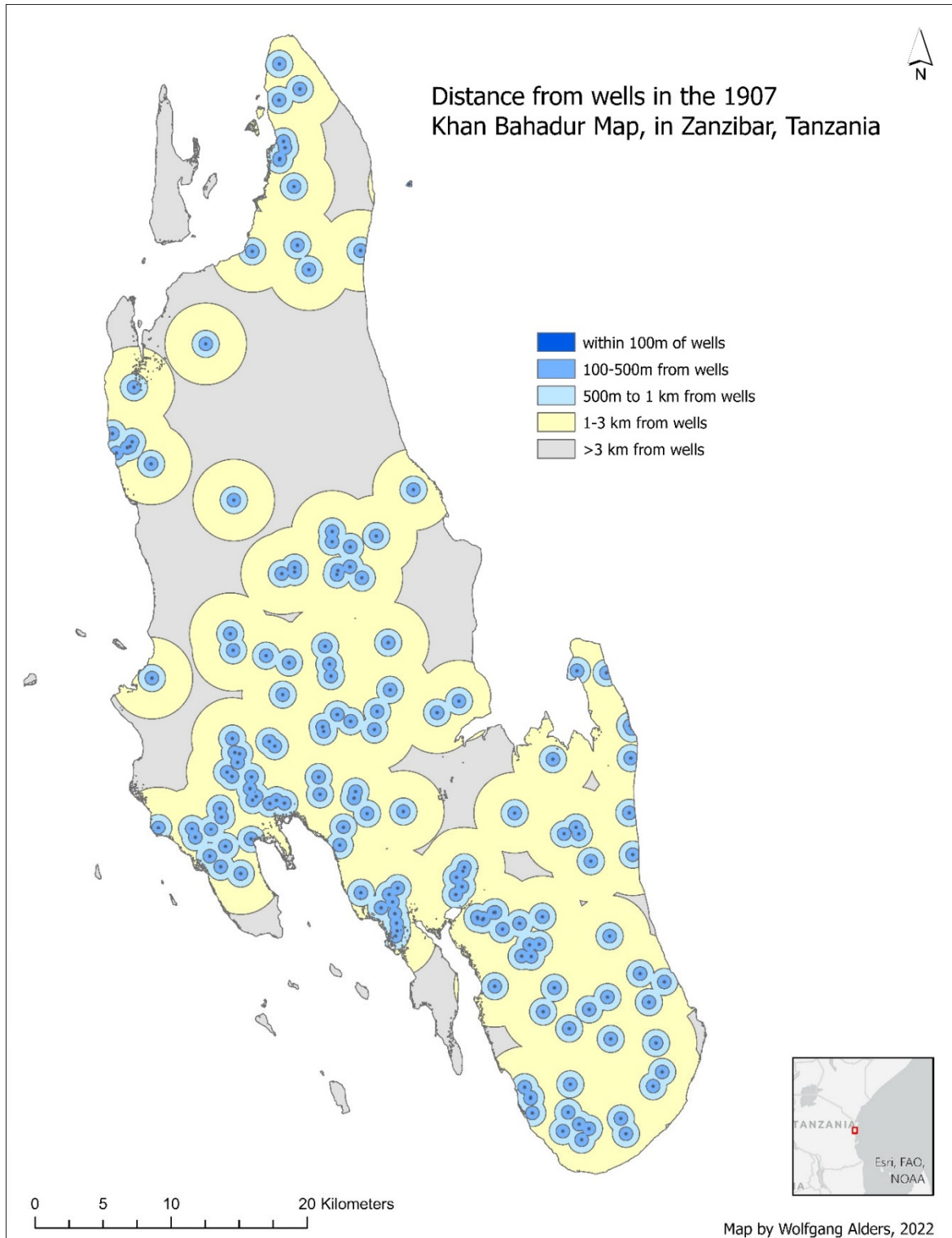


Figure 3-7. Hydrology distance buffer zones for 1907 wells.

This map shows wells recorded by Imam Sherif Khan Bahadur on his 1907 map. It is notable how their spatial pattern is inversely related to the streams he depicted, above. They are primarily found in areas without above ground water.

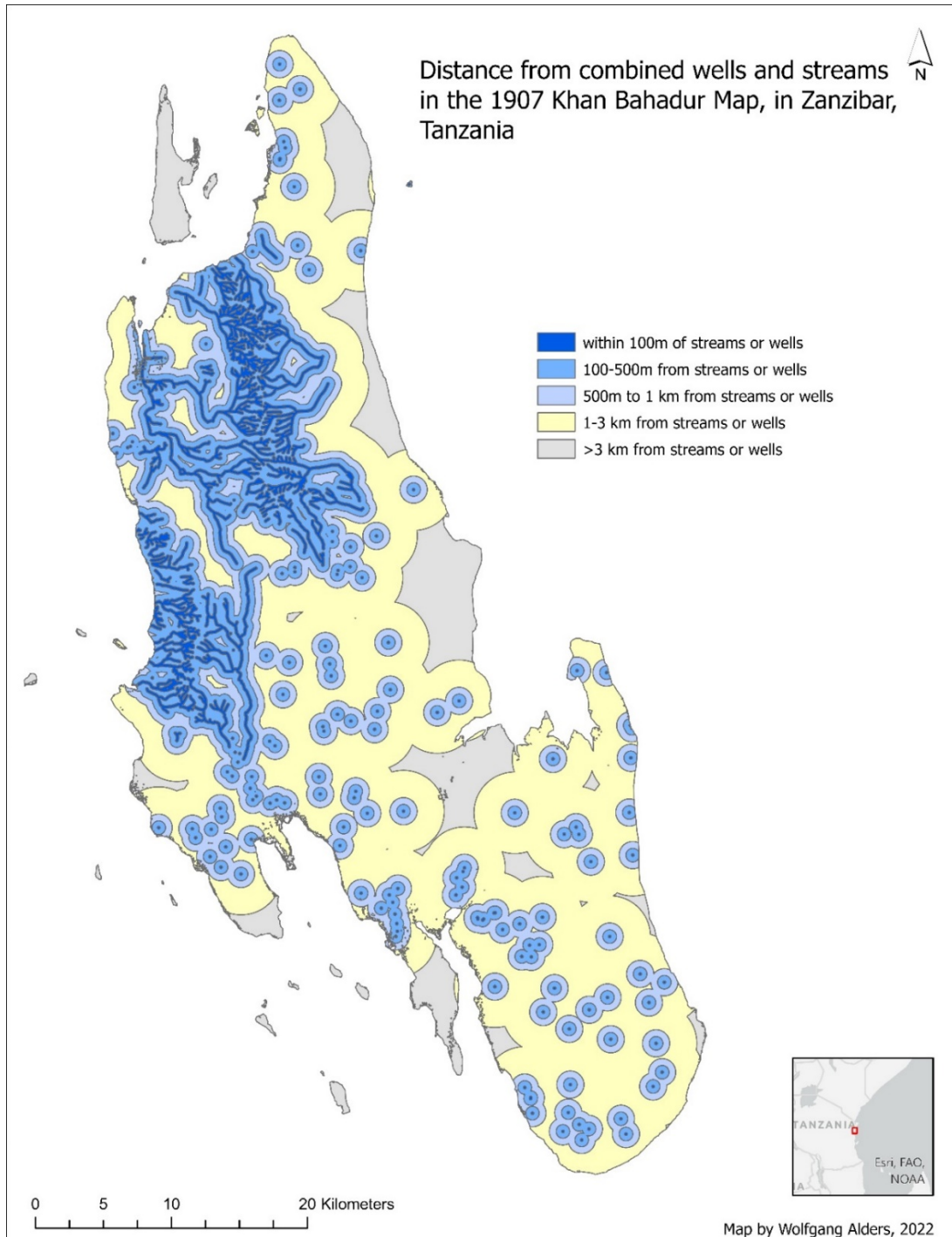


Figure 3-8. Hydrology distance buffer zones, for combined 1907 hydrology.

This map represents the relationship between streams and wells, and the overall picture of hydrological features on Zanzibar that Khan Bahadur recorded and published in 1907.

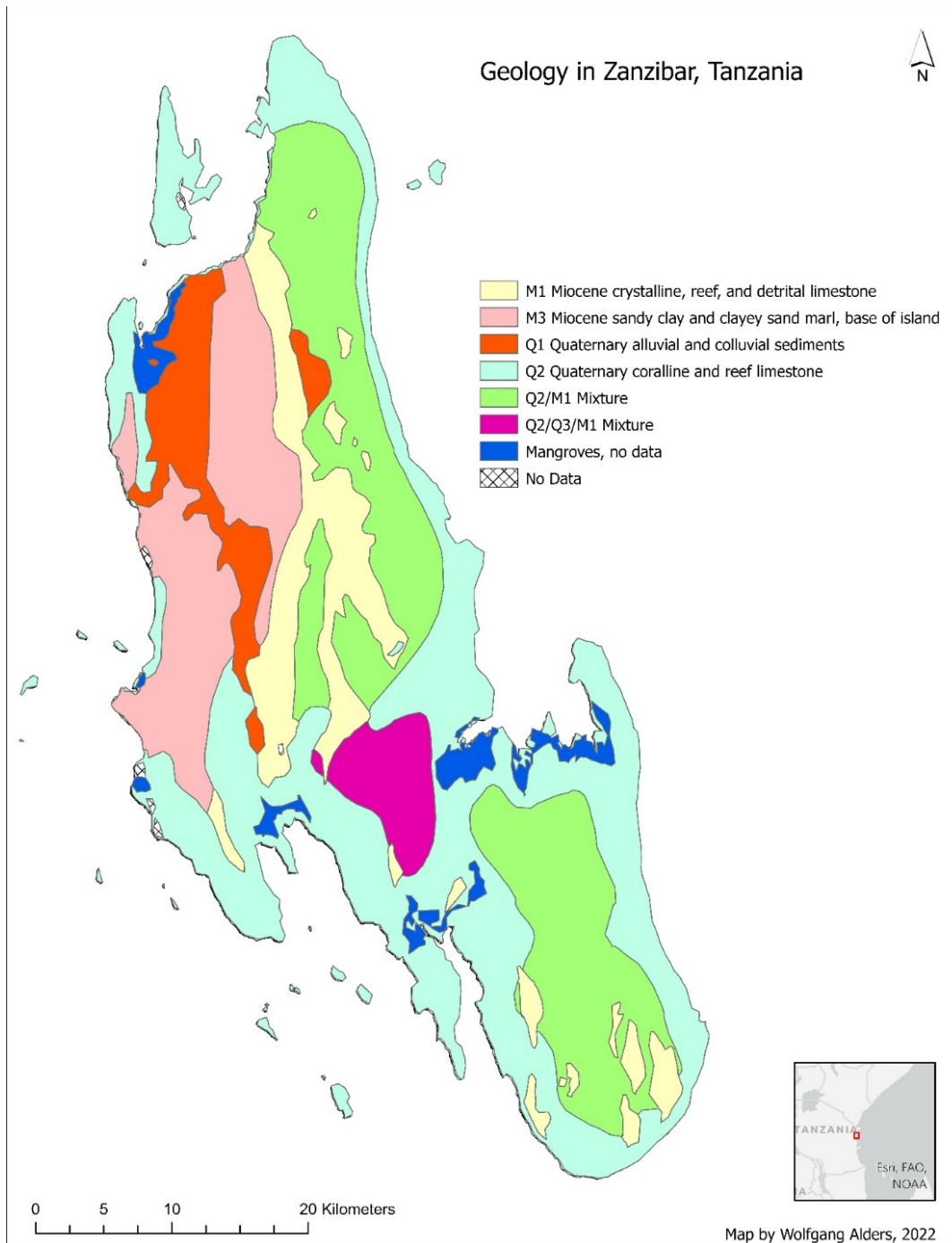


Figure 3-9. Geology zones.

The present-day geology of Zanzibar formed during the Miocene (23-5 mya) and the Quaternary period (2.5 mya to the present). The geological base of Zanzibar is Miocene sandy clay marl (M3). During the period of Zanzibar's formation in the Miocene, limestone reef structures formed, which are now primarily visible in the center of the island (M1). During the Quaternary period, coralline limestone continued to form, and is found today in the south and east (Q2). During this period, Miocene sandy clay sediments were washed downslope by alluvial and colluvial forces and deposited in areas of low elevation, forming distinct catenas (Q1).

Finally, some Quaternary marine sands cemented into light grey sandstones (Q3). These geological features also mixed in some areas of the island, where the map indicates. Table 3-3 shows complete geological descriptions for each geological zone.

Name	Description
M1, Miocene Limestone	Miocene deposits of crystalline, reef, and detrital limestone. Hard and dense, made up of limestone, gritty sand, coal, shell, and flint. Formed initially as a coral reef. Cavernous in some places, with underground aquifers that supply water to ponds, streams, and wells.
M3, Miocene sandy clay and clayey sand marl	Forms the base of the entire island—it is the foundation on which later coralline limestones developed. Blue, grey, green in color. Contains dense and poorly sorted Miocene chalk and veins of gravel that weather and become red, yellow, or brown.
Q1, Recent quaternary deposits of fine-grained soils, laterites, and alluvial and colluvial sediments	Sediments are washed down from areas of M3 sandy clay. Soils are red, brown and black, due to their high iron oxide content. Typical of tropical environments. In some places Q1 maintains a water table with an underground aquifer, a source of water for springs.
Q2, Quaternary deposits of coralline and reef limestone.	White, cream, yellow or brown in color underground, and grey in areas where it emerges to the surface as rocky outcrops. Free from iron staining. Forms the main underground aquifer for Zanzibar and forms many caverns with cave wells.
Q3, Quaternary marine and fluvial sands and sandstone.	Sands with shell, fish bones and shark teeth, cemented into grey, coarse sandstone.

Table 3-3. Geological zones in Zanzibar, based on Hardy et al. (2015) and Colbert et al. (1987).

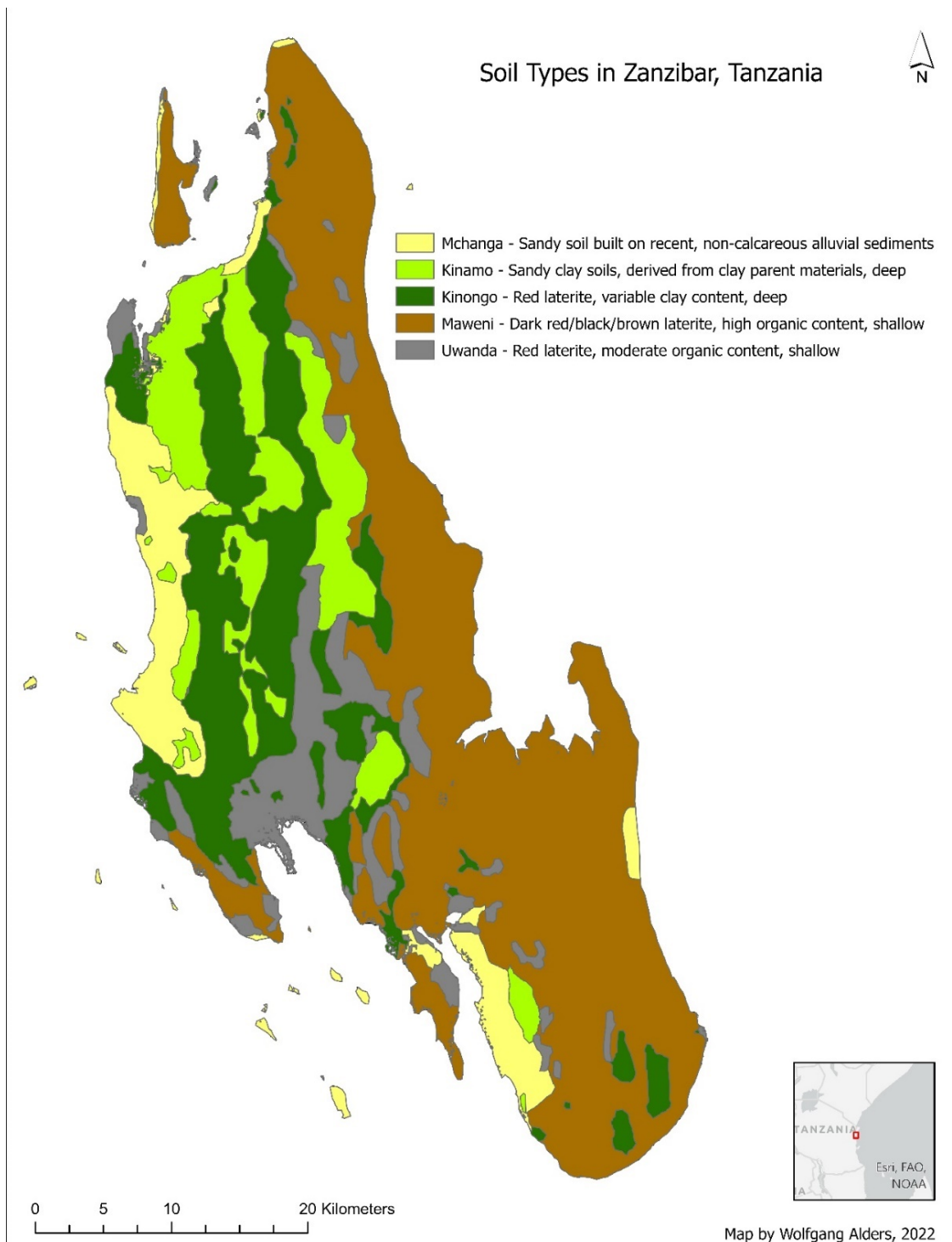


Figure 3-10. Soil zones.

In pedological terms there are only three soil types in Zanzibar: sandy soils built on alluvial sediments (*mchanga*), sandy clay soils which have developed over sandy clay marl (*kinamo*), and iron-rich laterites, which have eroded from limestone parent materials (*kinongo*, *maweni*, and *uwanda*). However, given the importance of different soil types for farming, ceramic production, and house construction, Swahili people in Zanzibar classify soil types into

five categories based on their composition, color, location, and depth. Table 3-4 below describes the Swahili soil categories on the island.

Swahili Name	Description
Mchanga	A sandy soil derived from recent, non-calcareous alluvial sandy sediments. The name means sand in Swahili.
Kinamo	Sandy clay and clayey sand soils, derived from sandy clay marl parent material. The name means “flexible” in Swahili, referring to the clayey quality.
Kinongo	Lateritic soils eroded from weathered Miocene and Quaternary coralline limestone. Ranges from light to dark red in color. Variable clay content and variable organic content. This is the primary soil used for earth-and-thatch house construction in rural areas. The name is likely related to the word <i>udongo</i> , meaning dirt or soil.
Maweni	Lateritic soils eroded from weathered Miocene and Quaternary coralline limestone. Dark or black in color, with high organic carbon content. Alkaline pH. A soil found in forests and scrub brush. Finally, it is characterized by its shallow depth over outcrops of coralline limestone bedrock. The name means “in stone”, referring to its location in rocky limestone bedrock areas.
Uwanda	Lateritic soils eroded from weathered Miocene and Quaternary coralline limestone. Red in color, with moderate organic carbon content. Neutral or alkaline pH. Also found at shallow depths over outcrops of coralline limestone bedrock. The name means field, plain, or open space in Swahili, referring to the presence of this soil in areas of low-lying scrub brush.

Table 3-4. Soil types in Zanzibar, based on Khamis et al. (2017).

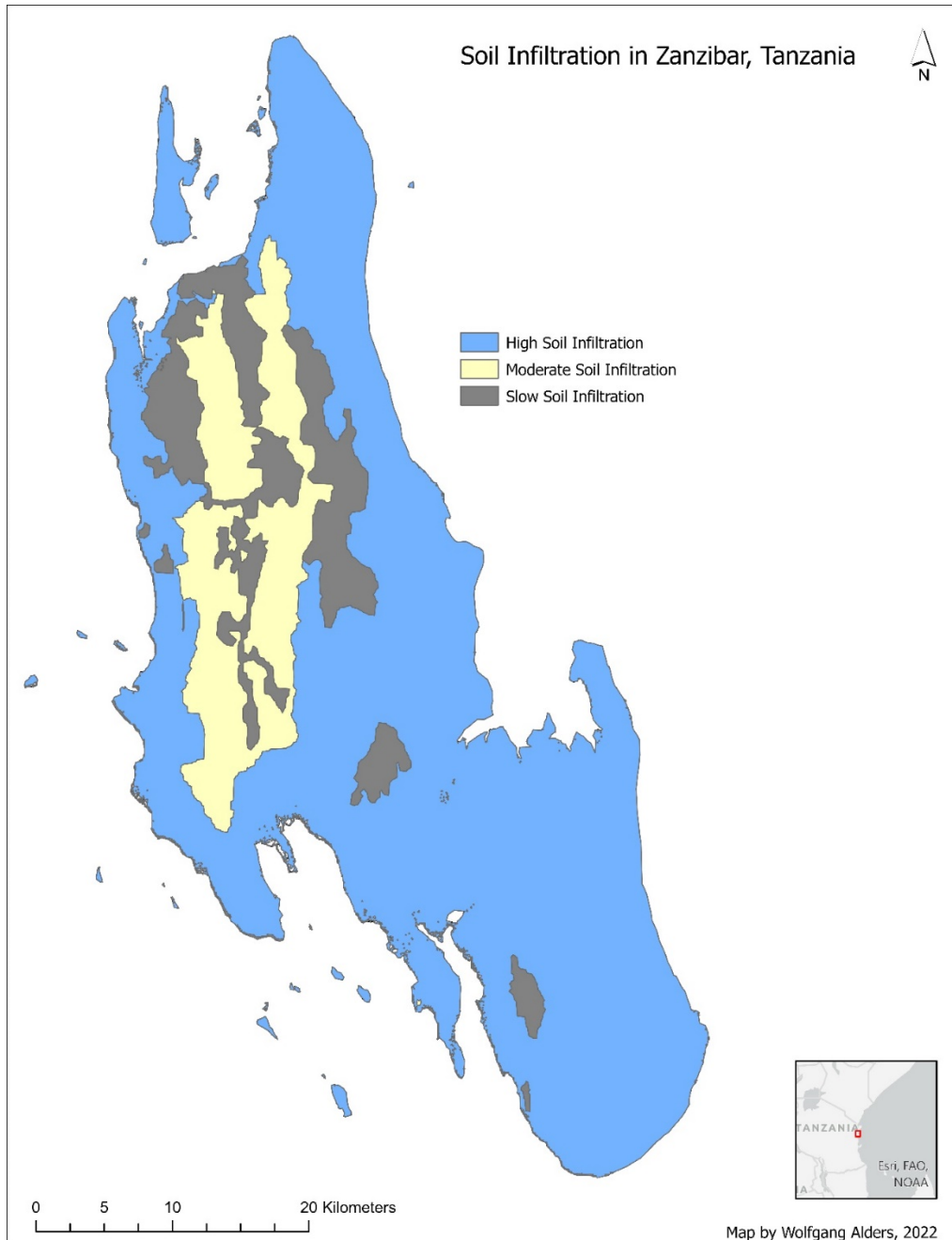


Figure 3-11. Soil infiltration zones.

This is a hydrogeological measure referring to the speed at which water permeates soil. It is the primary factor in determining the presence of above-ground water, as well as things like the capacity for growing irrigated crops like rice or sugar cane. Most the island in the south and east consists of karstic coralline limestone bedrock, which is porous and results in a high degree of soil infiltration. The far west also has high infiltration due to the presence of sandy soils. Areas of moderate soil infiltration correspond to areas with *kinongo* soils, which are deep lateritic sandy clays. Areas of slow soil infiltration correspond to *kinamo* soils, which are the areas of deep sandy clay marl.

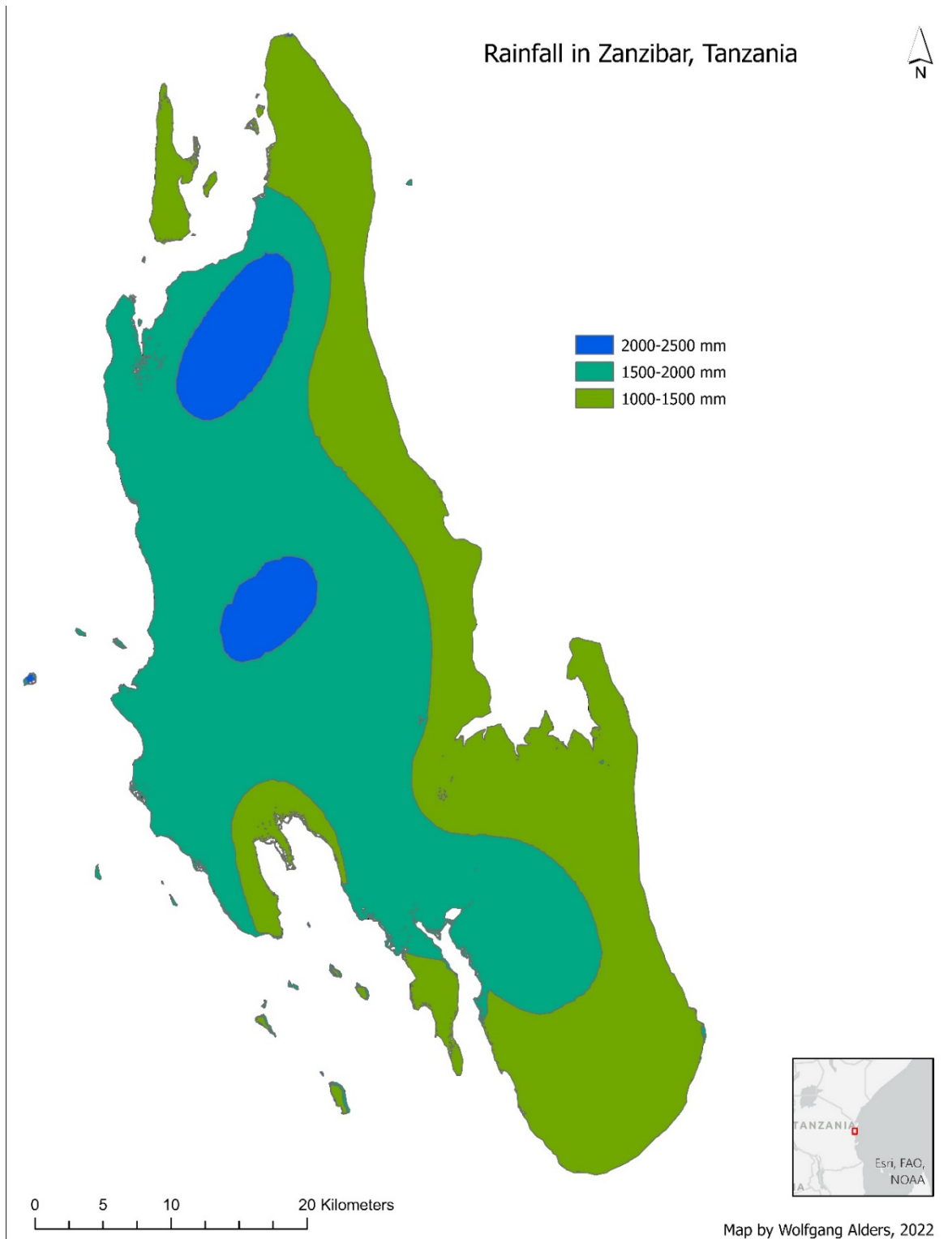


Figure 3-12. Rainfall zones.

Zanzibar is one of the rainiest areas of the East African coast, though within the island there are significant variations. The south and east are drier than the north and west. In the north-

center of the island, a few regions receive even higher rainfall per year. The map is reproduced from a map by Juma (2004: 48).

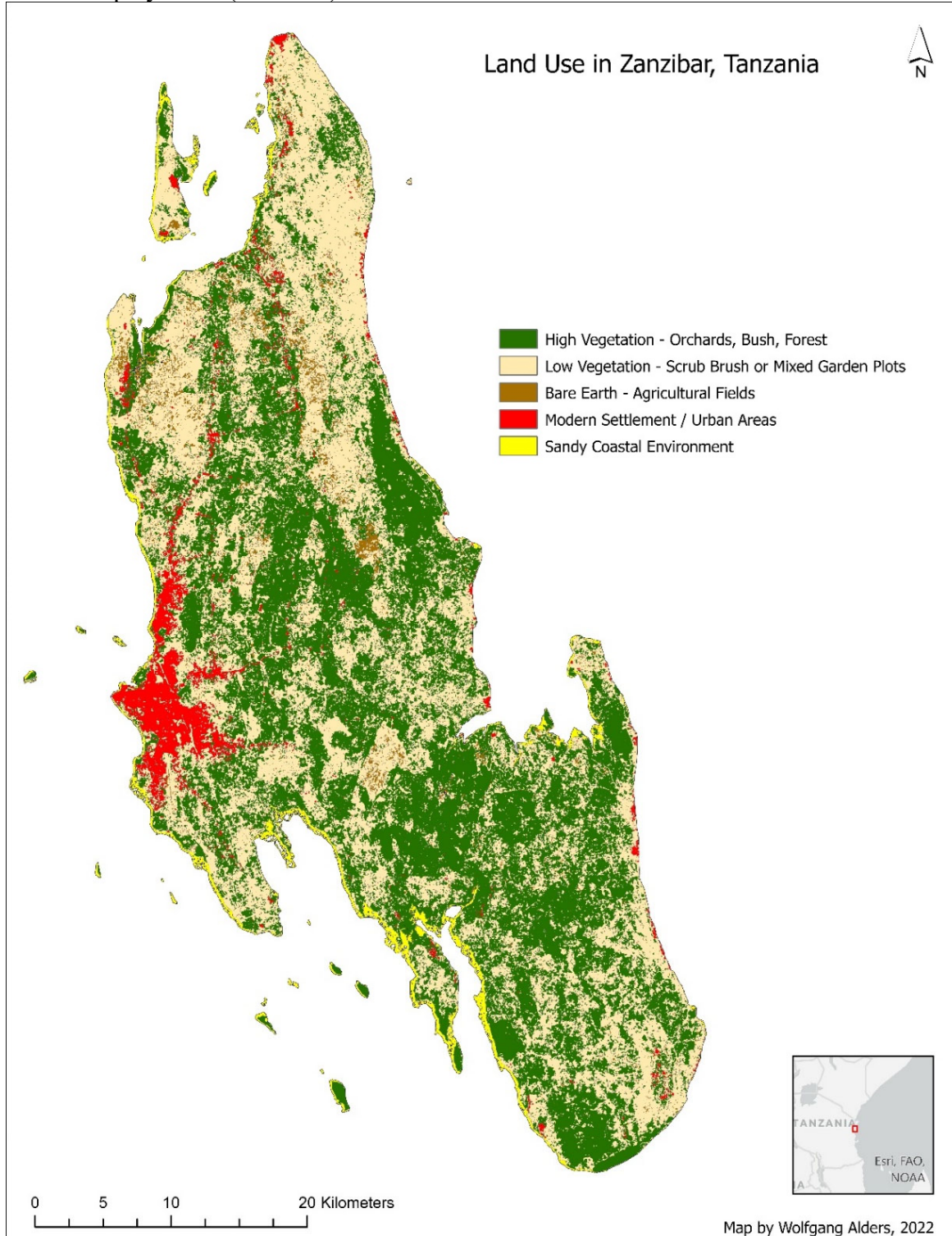


Figure 3-13. Land use zones.

Several land use maps of Zanzibar exist in other publications which claim to show agricultural and settlement areas in more refined detail (e.g., Juma 2004: 48; Hardy et al. 2015:

6; Khamis et al. 2017: 124). However, these maps show conflicting details that may reflect the work of different government agencies in Zanzibar at different times. Instead of reproducing these maps, I reclassified a dataset of African land use based on multispectral Sentinel-2A imagery provided by the European Space Agency, captured in 2016. This imagery can be used to distinguish surface reflectances of vegetation, soil, and human-made features. One advantage of this data is that it can capture spectral diversity at a high spatial resolution, providing a far clearer picture of the mosaic of vegetation and modern settlement within Zanzibar's environment. A disadvantage is that this imagery cannot easily distinguish between natural forests and planted coconut or clove orchards, or between low-lying scrub brush and mixed garden plots, though this might be possible with access to more imagery from different seasons. For a basic level of analysis, I classified this imagery into high vegetation and low vegetation areas. Some distinctions can be deduced from the distribution of these areas, however—dark green areas interspersed among modern settlement likely represent orchards, whereas more solid dark green areas away from human settlement represent forests. Areas of bare earth are more clearly representative of agricultural practices, primarily consisting of ploughed fields of rice and cassava.

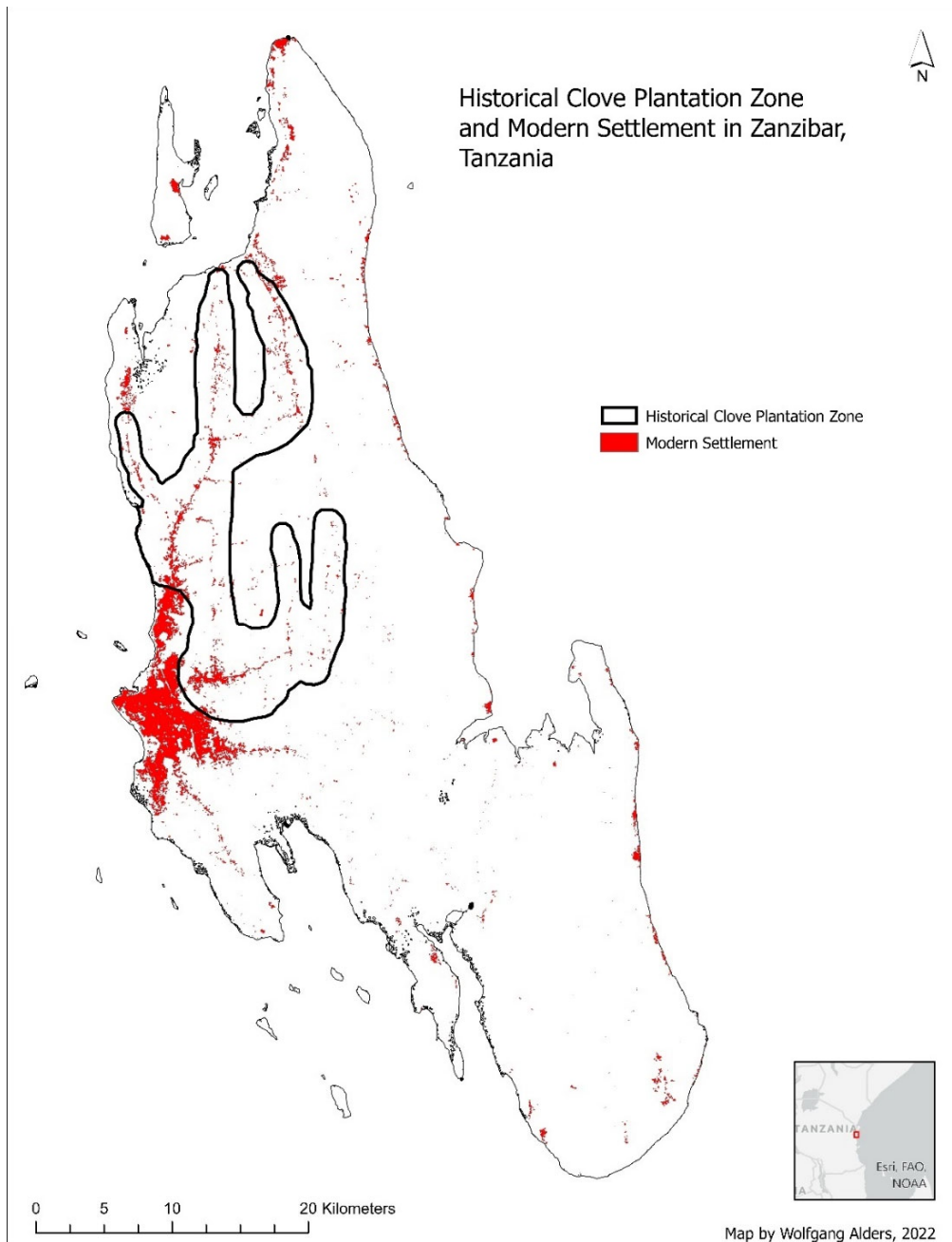


Figure 3-14. Historical zones of the clove plantation system, compared with modern settlement.

This map depicts the historical extent of the clove plantation zone, described by Sheriff (1991: 108) and reproduced in Sheriff et al. (2016: 20). It is not clear in either of these publications where Sheriff derived this dataset from, but a juxtaposition of the zone with areas of modern settlement in Zanzibar (derived from the previous land use map) suggests the source. The arms of the clove plantation zone appear to follow the main areas of settlement on the island outside of Stone Town. This may indicate that Sheriff derived an estimate of the clove plantation zone from a map of modern settlement. Alternatively, if Sheriff's data was derived independently, this map suggests that modern settlement patterns in Zanzibar follow the areas of clove plantation intensification.

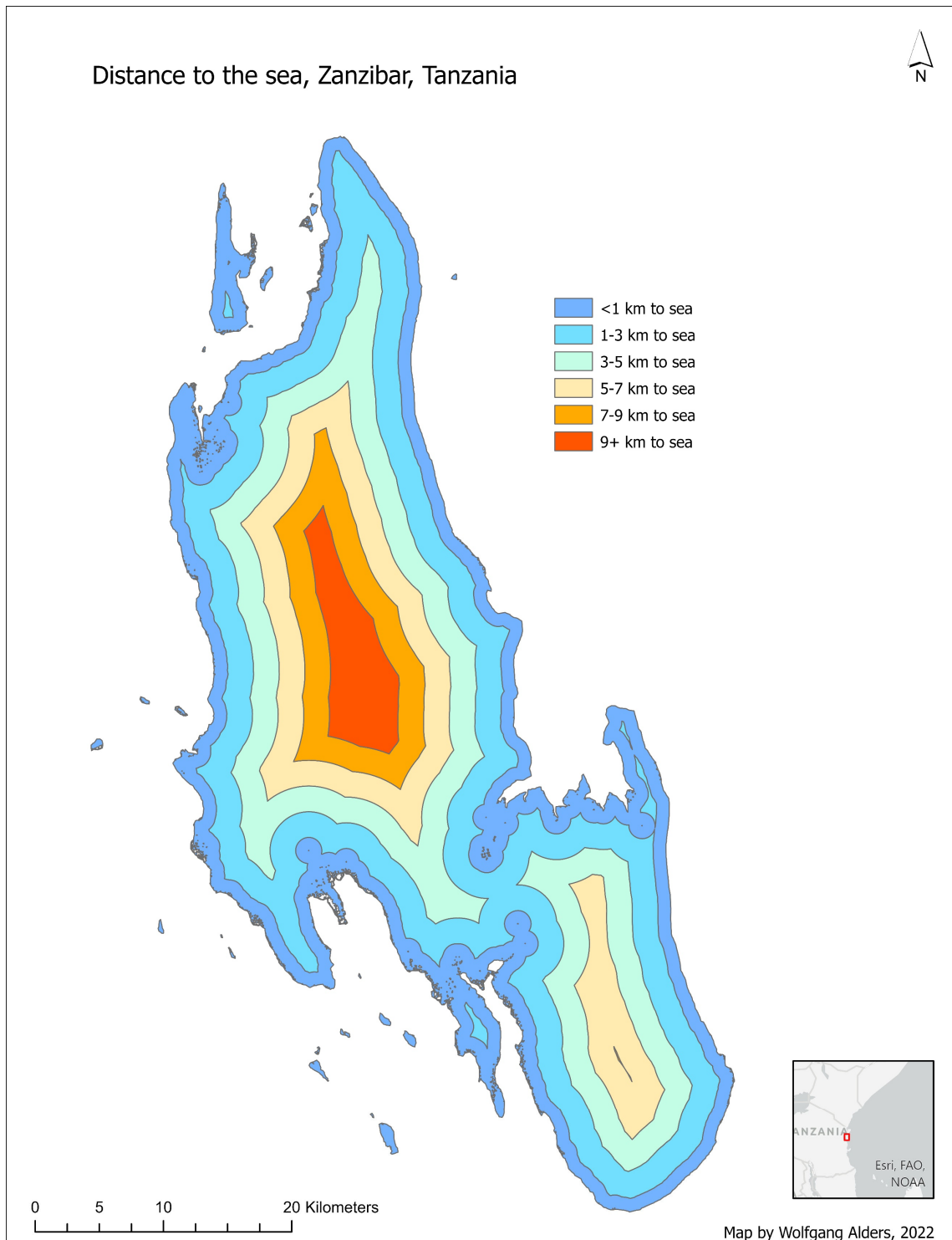


Figure 3-15. Distance to the sea.

This map presents a buffered raster of distance to the coast, created using the multi-distance buffer tool in ArcGIS Pro, with a model of the coastline derived from SRTM 30m imagery. It is used to model settlement distance to the shore in Chapter 11.

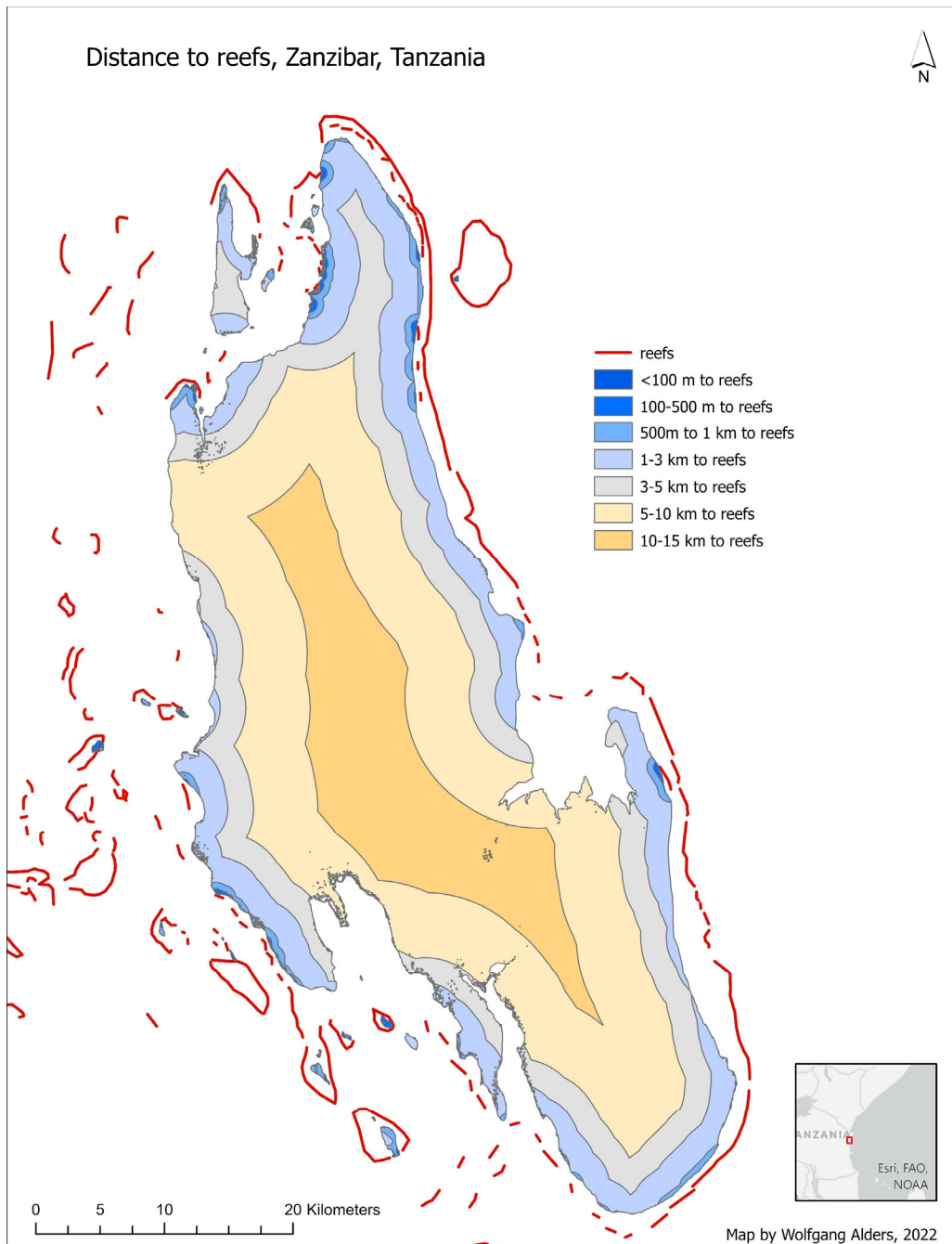


Figure 3-16. Distance to coral reefs.

I created this map by tracing the reef dataset from a soil map in Khamis et al. (2017: 120). I then used a multi-ring buffer tool to model the distance from reef features to areas inland. Since reefs represent areas with higher fish diversity and also act to break up and smooth out large waves, their presence indicates places where small-scale fishing, gathering, and seaweed farming is easier and more accessible. This gives a more nuanced perspective on the marine resources of Zanzibar compared to the previous map, which shows only distance to the sea. The map of reefs shows a long reef close to shore across the eastern part of the island, which explains why seaweed farming is more prevalent on the eastern coast than the west today (e.g., Cleyndert

et al. 2021). The lack of reefs close to shore on the west side of the island may have also facilitated large-scale shipping and been a reason for the rise of Stone Town as a port city, since the absence of close-shore reefs would have enabled large ships to come closer to shore on the west side of the island compared to the east side. Interestingly, the area between Mkokotoni and the precolonial town of Tumbatu also is free of reefs, meaning that this area would have been accessible to large ships during the precolonial period as well.

The maps and figures listed above portray 15 different environmental and socioecological features which I have divided into zones, using buffering methods in ArcGIS Pro. These features constitute the environment of Zanzibar and will be used in Chapters 10 and 11 to compare with archaeological and historical settlement.

3.6 Conclusion: The Environmental Context of the 2019 Survey

This chapter has described the environments of the East African Swahili Coast and presented geospatial datasets that characterize the environments of Zanzibar. At a broad scale, Zanzibar is an island split between fertile northwestern areas, and a rocky barren region to the south and east. However, more fine-grained juxtapositions of environmental datasets reveal complexity within each of these regions as well. Though the northwest has deeper soils, higher rainfall, perennial streams, and slower soil infiltration, it is comprised of different geological and soil catenas that affect agricultural production and settlement preferences in diverse ways. Though the south and east are rockier and drier, there are numerous “islands” of deep *kinongo* soil within these areas that may reproduce the conditions of the northwest at a local level. Finally, there is proximity to the sea and to reefs—while few places in Zanzibar are more than a day’s walk to the seashore, near-shore reefs are more common on the eastern side of the island, which permit close-shore fishing in canoes, seaweed farming, and other more small-scale marine resource foraging activities. In contrast, many parts of the western region lack near-shore reefs, making it easier for large ships to approach closer to shore. This appears to be the case around both Zanzibar Stone Town and Mkokotoni/Tumbatu, suggesting that these reef-free locations were factors in the development of these ports during earlier centuries.

The environmental zones described above form the dataset for answering my second research question, regarding the ways in which different environments mediated rural inland Swahili social development over multiple periods. In Chapters 10 and 11, I describe zonal statistical analyses of settlement across these zones. The patterning of settlement systems across these environmental zones reflects ecological dynamics that shaped Swahili settlement and the roots of the plantation system in the late colonial period. In the next chapter I discuss the theoretical background of my research questions in more depth.

Chapter 4: Research Questions and Theoretical Framework

4.1 Introduction

This chapter addresses the research questions and theoretical perspectives that orient this project. These are perspectives in landscape archaeology, historical ecology and human ecodynamics, and the archaeology of social reorganization and state formation. They serve as a guide for the more specific details of research design: the formulation of hypotheses, the selection of the survey region, the development of the methodology, and the analysis of data. Table 4-1 shows the overarching research questions of this project, divided by theoretical perspectives.

Theoretical Framework	Landscape Archaeology	Historical Ecology	Social Transformation
Research Question	Research Question 1: What are the settlement patterns in rural Zanzibar from the period of earliest occupation to the present, and how does this compare to other regions of the East African coast?	Research Question 2: How did different environmental contexts mediate Swahili social development and the development of the clove plantation system?	Research Question 3: How were rural inland Swahili communities impacted by, and how did they negotiate with, social transformation and political reorganization in the precolonial, early colonial, and late colonial periods?
Method	Systematic survey, judgmental survey, and historical map analysis, along with C14 dating and imported ceramic analyses for dating sites	Zonal statistical analysis of settlement in relation to environmental zones; opportunistic survey of agricultural field systems and land use practices	Spatial statistical analysis of settlement, and local ceramic type and attribute analysis to investigate changes in ceramic production

Table 4-1. Research questions, theories, and methods.

In the following sections, I describe these three theoretical perspectives and address how this project will investigate the research questions shown in the table above.

4.2 Landscape Archaeology

Landscape archaeology asserts that humans do not randomly occupy the earth but make decisions about settlement at every scale that reflect their embeddedness in social, material, and ecological systems (Banning 2001). By studying landscapes through spatial archaeological methods, it is possible to trace and understand the accretional or historical residues of past human activity and patterning (Fleming 2017; Morrison 2013). These residues mediated human actions and experiences in the past, constitute the present, and provide the terrain in which the future unfolds. In this section I outline the landscape concept and its relevance to this project.

Landscape as a concept came into the English language from the Dutch word *landschap*, through the popularity of late 16th century Dutch artists who painted scenes of farmers, towns, hills, forests, ruins, and the pastoral countryside (David and Thomas 2008: 27; Schama 1995). Kluiving and Guttmann-Bond (2012) argue that the landscape concept has two points of origin—first, as the notion of a territory with bounded space, settlements, and geographical features and, secondly, as a visual scene requiring a viewer, in the sense of landscape painting (Kluiving and Guttmann-Bond 2012: 11; Olwig 1993; Renes 2011). In archaeology, this has translated into both a methodological orientation toward field archaeology aimed at understanding the spatial dimensions of past human activity over a region, and a theoretical commitment to understanding how humans are mediated by, experience, and produce physical and conceptual space.

Regionally focused field archaeology began with antiquarianism in 17th century Europe, when educated aristocrats would hike through the countryside and record ruins as they went (Ashbee 1972: 47; Shanks 2012). For instance, John Aubrey's (1982 [1693]) *Monumenta*

Britannica combined observations of Stonehenge, Avebury, Roman sites, and other stone ruins on the English landscape with concerns about history and language. The focus on a territory of bounded space with a variety of human and natural elements can date back to the origins of historical and physical geography, for example, the Greek historian and geographer Herodotus, or the Roman geographer Strabo (Kluiving and Guttmann-Bond 2012: 11). Historical and physical geography developed in the 19th century, with figures like Alexander von Humboldt (Kluiving and Guttmann-Bond 2012: 11). In the 20th century, Sauer (1925) developed the concept of the cultural landscape, a physical space modified by humans. Arguing that landscapes continually change through human action, he is credited with the development of human cultural geography (Kluiving and Guttmann-Bond 2012: 12). Crawford (1953) and Hoskins (1955) were early users of aerial imagery in this field, which was quickly taken up by archaeologists as well (Ashbee 1972: 61-62).

In archaeology the landscape concept was only first used in the mid-1970s, when archaeologists investigating areas larger than the site developed two related but distinct approaches: spatial studies, and regional or landscape archaeology (Grzymiski 2004: 9). Spatial studies investigated the patterning of artifacts and features from the microlevel (as small as a room in a house) to the macrolevel (looking at urban space and settlement patterns). Flannery's (2009 [1976]) book *The Early Mesoamerican Village* exemplified the spatial approach, and overlapped with the processual aims of the New Archaeology through its incorporation of statistical analysis and hypothesis testing. Regional or landscape archaeology developed out of historical geography (Chisholm 1962; Haggett 1965), emphasizing a focus on field survey and sites in their natural environment (e.g., Barker 1991). Regional, and landscape archaeologists in the 1970s and 1980s were influenced by site-catchment analysis (Vita-Finzi and Higgs 1970; Walsh 1999), Christaller's (1933) central place theory, and von Thünen's (1826) law of diminishing returns with distance. Archaeologists applied rank-size analysis and site hierarchy to settlement patterns in Mesoamerica (Marcus 1973), Iraq (Adams 1981), and Sudan (Grzymiski 1986), among other places.

Since the 1980s, archaeologists have developed the landscape concept in a variety of contexts (e.g., Ashmore and Knapp 1999; Bernardi 1992; David and Thomas 2008; Gillings et al. 1999; Kluiving and Guttmann-Bond 2012; Leveau et al. 1999; Lock and Stancic 1995; Harmansah 2014; Nash 1997; Shanks 2012; Thomas 2001; Ucko and Layton 1999; Wagstaff 1987). Archaeologists see landscapes as built environments, stages for cosmological and performative aspects of identity, and as subsistence and settlement systems (Walker 2012). Other archaeological studies focus on ecological and environmental systems from a landscape perspective, in the fields of historical ecology and human behavioral ecology (Erickson 2006; Håkansson and Widgren 2014; Ladefoged et al. 2011, see also section 4.3).

The post-processual turn in landscape archaeology is exemplified by Tilley's *A Phenomenology of Landscape*, in which Tilley examines how landscapes exist as experiences of humans as they encounter the world through bodily movement, emotion, and other forms of perception that are mediated by symbolic systems (Tilley 1994). Phenomenological perspectives are many (Barrett 1994; Bender et al. 1997; Hingley 1990; Richards 1993; Thomas 1991, 1993, 1996) and have also been the object of intense criticism, especially for being ahistorical and for making uniform assumptions about the bodies and experiential modes of past people (Bruck 2005). Fleming (2017) argues that, more so than other fields, landscape archaeology was singled out for reconstruction by post-processualists of the 1980s and 1990s in what he terms the "re-humanization project", as an attempt to theorize systems of human meaning and experience in

archaeology (Fleming 2017: 29). The post-processualists saw traditional positivist landscape archaeology as a theory which made humans a “ghost in the machine” by attempting to detail every natural force surrounding humans, so that they are only knowable as the gap in the picture when all else is accounted for around them (Fleming 2017: 29; Thomas 1993: 26). Fleming argues that lived experience is best explained through the development of detailed spatial, statistical, and forensic techniques, and that lived experience should not necessarily be the focus of landscape archaeology at all. Rather, Fleming advocates a re-historicization of landscape archaeology instead of a re-humanization (Fleming 2017: 36). A re-historicization would mean a detailed focus on specific, place-based histories and contexts and, especially, an investigation of historical ecology (Fleming 2017: 39).

I find the term landscape most useful for referring to a space or territory shaped through the accretional residues of past human action. With this concept, a landscape can be “historicized” in the sense of Fleming (2017) by using archaeological methods to measure the specific material traces of human activity across a region. A landscape is more than a context or environment in which actions take place, since actions constitute, and develop in relation to, the environment itself. As David and Thomas (2008) argue, “...landscape is something other, and more than, environment... being-in-the-world is entangled in social processes and is not entirely reducible to notions of environmental adaptation, and... [it is an] ...understanding that sees people and culture at the core of worldly engagements” (David and Thomas 2008: 36). This concept of landscape emphasizes the primacy of human action in shaping both natural and cultural terrain. The present and potential future are constituted through the accretional residues of past human action (Morrison 2013). It is the role of the archaeologist to investigate the courses of human activity that have produced landscapes which persist into the present, and which mediate—and threaten to constrain—possibilities for action in the future.

This notion of landscape is also informed in part by Ingold (1993), who argues that “...human life is a process that involves the passage of time”, and that “...this life process is also the process of the formation of landscapes in which people have lived” (Ingold 1993: 152). This description of the relationship between human life, time, and the material world reframed debates between processual and post-processual archaeology, by shifting away from an understanding of the landscape as either a natural background to human activity with mechanistic laws, or the cognitive constitution of space through symbolic systems (Hicks 2016: 6). Ingold describes the idea of “dwelling” in the world, meaning the patterns and practices of human daily life that are incorporated into the material world and simultaneously shape human experience. Landscape, in this view, is “...a living process... the forms of landscape are generated in movement” (Ingold 1993: 162). Drawing on Mead’s (1977[1938]: 97) claim that every object can be considered a collapsed act, landscapes can be considered “...a pattern of activities collapsed into an array of features” (Ingold 1993: 162). These activities do not inscribe “culture” upon “nature”; there is no given substrate.

Most recently, developments in geospatial technology have broadened the horizon for possible research in landscape archaeology, potentially ushering in a geospatial revolution (McCoy 2021) akin the chronological revolution of radiocarbon dating. Some of these developments have occurred specifically in sub-Saharan African contexts (e.g., Davis and Douglass 2021, Klehm et al. 2019, Reid 2016; 2020). This work has demonstrated the potential of geospatial and remote sensing technology to produce new insights into landscape patterns at a large scale. The refinement of these methods, along with the increasing availability of high-resolution multispectral imagery, ecological datasets, and computer systems capable handling

large quantities of spatial data make research agendas feasible that would have been previously too time consuming, inefficient, or imprecise (Davis and Douglass 2020; Klehm and Gokee 2020; Opitz and Limp 2015).

Remote sensing technologies have already been used for site-specific mapping on Zanzibar (e.g., Fitton 2017) and elsewhere on the East African coast (e.g., Wynne-Jones 2012). But new high-density methods, technologies, and datasets make it possible to systematically investigate East African landscapes at a regional level for the first time. Combined with spatial statistical methods for settlement pattern analysis like Ripley's K (Harrower et al. 2022), the Getis-Ord formula (Megahed 2020), rank-size analysis (Fleisher 2010c), spatial autocorrelation (Carrer et al. 2021), and gravity modeling (Osborne 2013), these methods make possible an understanding of settlement dynamics and urban-rural transformations at a scale not previously feasible in coastal East African archaeology.

The perspective of landscape archaeology orients the first research question for this project: What are the settlement patterns in rural Zanzibar, and how did Swahili people use, occupy, and experience these inland areas from the period of earliest occupation to the present? How were these patterns similar or different in Zanzibar from other recorded landscapes on the East African coast? To address this question, I use systematic and judgmental archaeological settlement survey (Chapters 5 and 6), spatial analysis of settlement patterns (Chapters 10 and 11), and analysis of artifact types (Chapters 13, 14 and 15). These analyses allow me to reconstruct the landscape history of Zanzibar from the earliest period of occupation to the early 20th century.

4.3 Historical Ecology and Human Ecodynamics

Another premise of this research is that relations between landscapes and humans in Zanzibar can be best understood through theories of human-environment relationships. Current research in historical ecology and human ecodynamics emphasizes the inextricability of cultural and natural systems, referred to by Fitzhugh et al. (2019) as socioecological systems (from Barton et al. 2004). These systems develop through recursive and nonlinear processes that mediate and shape the landscapes in which human activities unfold. Historical ecology and human ecodynamics perspectives emphasize contingent, historically situated, and place-based investigations to model these systems.

A review by Fitzhugh et al. (2019) describes trends in archaeological research on human-environment relationships, starting from the earliest applications of cultural ecology by Julian Steward (1955). They outline well-known approaches to human-environment studies in archaeology: human behavioral ecology, niche construction theory, historical ecology, resilience theory, and human ecodynamics. While human behavioral ecology, niche construction theory, and resilience theory rely on formal models, the place-based, inductive perspectives of historical ecology and human ecodynamics are the guiding perspectives for my research. After outlining these perspectives, I consider some approaches for understanding socioecological systems in Zanzibar within the framework of historical ecology and human ecodynamics: agricultural intensification, extensification, and adaptation.

HBE, Niche Construction, and Resilience Theory: Human behavioral ecology (HBE) attempts to develop models of optimal behavior of individual agents with respect to a given environment (e.g., Winterhalder and Smith 1981, 2000). In a complementary way, niche construction theory postulates that humans and other living creatures modify their environments, in ways that can also be optimally modeled (Laland and O'Brien 2011). Fitzhugh et al. (2019: 1079) argue that niche construction theory is a complementary framework to HBE, given that

both perspectives take a deductive approach to modeling human behavior and optimized individual rationality. In contrast to agent-based models of human-environment interaction represented by HBE and niche construction theory, resilience theory (RT) attempts to model adaptations to environmental stability and change at a systemic level and in a way that accommodates nonlinear, emergent systems (Holling 2001; Redman 2005; Walker and Salt 2006). The appeal of RT is its promise to reframe discussions of long-term change in ways that incorporate both natural and social systems; however, its applicability in archaeology is still limited (Bradtmöller et al. 2017). Like HBE and niche construction theory, resilience theory applies a formal model of human social behavior in relation to environmental factors, although through system modeling in contrast to agent-based modeling.

Historical Ecology: In contrast to the agent and system-based modeling of HBE and niche construction theory, historical ecology refers to a place-based, contingent, and inductive approach to studying human-environment relationships and the causes and courses of landscape change (Fitzhugh et al. 2019: 1080). Early theorists of historical ecology sought to integrate natural science and social science approaches to landscapes, to understand how people modify, and are shaped by, their environments over the long-term (Balée 1998; 2006; Balée and Erickson 2006; Crumley 1994; 2007). The most well-known studies in the early phase of historical ecology centered around the South American Amazon, and specifically the question of human landscape modifications to produce dark *terra preta* soils (e.g., Graham 2006). Historical ecology in archaeology began by addressing localized contexts but researchers have also turned toward problems that are global in scale. A major intervention of historical ecology has been to demonstrate the myth of pristine, natural environments that were assumed to be untouched by human intervention. This has led directly to a debate about the concept of the global Anthropocene, a term coined to describe the way in which humans have collectively shaped the ecological systems of the planet (Steffen et al. 2007; Zalasiewicz et al. 2011). Since the 2010s, there have been several reviews of historical ecology's impact on the disciplines of anthropology, history, ecology, and geography, many of which emphasize the potential utility of historical ecology for addressing the impacts of the Anthropocene, global climate change and ecological collapse (e.g., Armstrong et al. 2017; Crumley 2021).

Fitzhugh et al. (2019) clarify the "historical" aspect of this framework, writing that:

...history (the changes in social and environmental configurations and relationships through time) is the product of a dialectic interaction between agents, human and non-human, that transpire in particular places and times, driving change. In other words, history is the outcome of cumulative small and large interactions and responses, in the human context often driven by individual beliefs and motivations but conditioned by the 'hard' realities of their situation in particular socio-environmental configurations (Fitzhugh et al. 2019: 1080).

In this way, historical ecology draws from other theories of historical change including Marxist dialectic history, structuration theory (Giddens 1984) and practice theory (Bourdieu 1977; Ortner 1984). Historical ecology emphasizes the way that landscapes mediated, and were affected by, human action in the past. The term reflects a view of human and natural systems as inextricably linked.

Human Ecodynamics: A similar perspective to historical ecology is the concept of human ecodynamics. Fitzhugh et al. (2019) describe how this idea shares a focus on long-term, place-

based, and contingent socioecological histories with historical ecology (Fitzhugh et al. 2019: 1083). McGlade (1995) was the first archaeologist to develop the term, in an influential paper which asserted that human ecodynamics called for a rethinking of the basic assumptions of ecology. For McGlade, human ecodynamics implies: “1. There is no environment, 2. There is no ‘ecosystem’ and 3. There are only socio-natural systems” (McGlade 1995: 126), which are the proper field of analysis. The terms environment and ecosystem have “...no single identifiable definition independent of human observation” (McGlade 1995: 126). This perspective emphasizes space as social-constructed, and time as a substantive aspect of human experience. Understanding socio-natural systems (rephrased by Fitzhugh et al. (2019) as socioecological systems) means trying to model how non-linear socioecological phenomena generate long-term dynamics (McGlade 1995: 130). For McGlade, this meant experimenting with complex mathematical systems models, which have largely remained out of reach for most subsequent archaeological analyses. While the specific mathematical models proposed by McGlade have not gained much currency within archaeology, the emphasis on non-linear causality, the concept of the socioecological system, and the experimental approach to modeling systems has. While historical ecology developed within the contexts of research on landscape modifications in the South American Amazon rainforest, human ecodynamics evolved in archaeology along within the context of archaeological research on islands, which present unique laboratories for modeling whole socioecological systems (e.g., Braje et al. 2017; Kirch 2007).

Fitzhugh et al. (2019) argue that historical ecology and human ecodynamics have converged along similar foci since their inception and adoption by archaeologists. They point out how archaeologists who publish on human ecodynamics have also published similar work in historical ecology, citing Kirch and Hunt (1997) and Kirch (2007), or McGovern et al. (2007) and McGovern (2014) as examples. Both disciplinary subfields emphasize tracing and modeling contingent, place-based, and historically particular circumstances in which socioecological systems develop.

Both historical ecology and human ecodynamics orient certain aspects of my research on Zanzibar’s rural landscapes. This synthesis leads to my second research question: How did different environmental contexts mediate Swahili social development and the development of the clove plantation system? I primarily address this question through a comparison of archaeological settlement across different zonal rasters in Zanzibar, from the earliest occupations in inland areas to the early 20th century. These analyses take place in Chapters 6 and 13. They reveal long-term trends in settlement within different socioecological systems, and highlight the mediating effects of spatial climate variation, geology, soil, elevation, and other factors.

Drawing more from human ecodynamics, I also explore how the island of Zanzibar might provide laboratory-like conditions for modeling socioecological systems, in the way that archaeologists have applied human ecodynamics for studying socioecological systems on islands elsewhere (e.g., Kirch 2007; Braje et al. 2017). For Kirch, the Hawaiian archipelago has five “cultural state factors” that make a human ecodynamics perspective effective (Kirch 2007: 9). I show these in Table 4-2, alongside features particular to Zanzibar.

Cultural State Factors for Hawaii (Kirch 2007: 9)	Comparable factors in Zanzibar
1. Late colonization of a previously uninhabited landscape, by people with an agrarian economy	Ironworkers and farmers from the East African mainland colonized Zanzibar in the 6 th century CE at the sites of Fukuchani and Unguja Ukuu (Fitton 2018: 239). Zanzibar had been uninhabited at this point for nearly 12,600 years, when rising sea levels formed a channel between the island and the mainland. Prior to island formation Zanzibar was home to late Pleistocene hunter-gatherers from 18,000-12,000 years BP.
2. A short, well-controlled time scale for cultural evolution, from 800 to 1800 CE	Most other early sites in Zanzibar founded between the 9 th and 12 th centuries, with settlement persisting to the present day.

3. Near total isolation of the cultural group after initial period of colonization and two-way voyaging	Close to the mainland, Zanzibaris remained in contact with other settlements of the Swahili world throughout the Iron Age and into the colonial period.
4. A demographic transition from small, low-density populations to large, high-density populations	This research project suggests demographic expansions associated with urbanism (11 th -15 th centuries CE) and the late colonial period (18 th -20 th centuries CE)
5. A major transformation in the scale of sociopolitical complexity, expressed in hierarchy, economic control systems, material symbols of rank, monumentality, and similar indices	Sociopolitical transformations accompany demographic shifts. The 11 th -15 th centuries see the rise of social hierarchy and urban elites within town-sized settlements. Sociopolitical complexity intensifies from 1749 to 1856 with the consolidation of the Omani Empire in Zanzibar, and then further solidifies during the period of the independent Zanzibar Sultanate (1856-1890).

Table 4-2. Comparison between Hawaii and Zanzibar across factors identified by Kirch (2007). Green boxes indicate similarities between Zanzibar and Hawaii, while the red box indicates a significant difference.

The main difference with respect to Kirch’s factors is that Zanzibar is a near-shore island. The sea and the monsoon trade winds of the western Indian Ocean facilitated travel along the East African coast, which differentiates Zanzibar from oceanic island systems that developed in relative isolation. Maritime travel was a factor in Zanzibar’s integration rather than isolation. This factor meant that Zanzibari people negotiated the Swahili regional settlement system, western Indian Ocean exchange networks, and spheres of colonial influence in later periods. Apart from this difference, Zanzibar still presents an opportunity for socioecological modeling of agricultural intensification, extensification, and adaptation, which I discuss below.

Agricultural Change: Intensification, Extensification, and Capital: Zanzibar’s rural landscapes are fundamentally agricultural landscapes; as such, one avenue for research in historical ecology and human ecodynamics is modeling the dynamics of agricultural change, and its role in mediating social development and human action in Zanzibar over the last thousand years.

In Table 4-3, I describe different pathways to agricultural change. This table is based on a model made by Kirch (1994), but with added categories based on other studies which are cited.

Process of Agricultural Change	Description
Intensification	An increase in agricultural production resulting from increased labor input per unit of land. In the classical example from Boserup (1965), farmers increase production by shortening fallow times in fields. In Geertz’ (1963) study of rice farming in Java, farmers intensify production by simply increasing the number of rice plants per square hectare, leading to diminishing returns in a process Geertz refers to as agricultural involution. Intensification was first described as a process that conservative, smallholding peasant farmers (e.g., Chayanov 1926; Netting 1993; Sahlins 1972) are forced into, to maintain a sufficient level of production to meet the needs of their domestic households. Other studies have investigated intensification in order to fulfil the demands of social and ritual consumption (e.g., Brookfield 1972, 1984) or market demands (e.g., Håkansson 2008).
Extensification	An increase in agricultural production resulting from the increased availability of land. This is often the case in the initial phases of island colonization, as farmers expand into all areas with favorable soil in order to increase production. During population increases, extensification often precedes intensification, as farmers first expand into all available areas before increasing labor inputs. Like intensification, this process is also often forced upon farmers due to socio-political conditions (Porter et al. 2014)
Development of Laboresque Capital	The term laboresque capital was original created by Sen (1959) in reference to capital investments which make labor more productive. Capital investments are “laboresque” when they simulate the addition of more labor. Examples include the introduction of mulching, fertilizers, or animal and mechanical traction. This is what Kirch (1994) refers to as agronomic-technologic innovation, often undertaken to gain productive advantages in the context of production for social or market consumption.
Development of Landesque Capital	The term landesque capital was also developed by Sen (1959). It refers to permanent capital investments that make land more productive per unit of area, like terracing, fencing, or canal construction. It is “landesque” because it simulates the addition of more land. Unlike laboresque capital, archaeologists have substantially investigated this process because it involves the production of easily recoverable and durable landscape features (e.g., Håkansson and Widgren 2014; Morrison 2014; Sheridan 2014; Zaro 2014).
Genetic Innovation	A final form of agricultural change occurs through the adoption or selection breeding of new types of crops, which may increase yields or permit new areas to be farmed. One example is the spread

	of certain Asian food crops to Africa, enabling new forms of subsistence (Power et al. 2019). A more famous example is the spread of the potato to many parts of African and Eurasia, which permitted farmers to survive in more marginal environments, and which had substantial sociopolitical ramifications (e.g., Jia 2014; Scott 2009). Another example is simply the long-term process of plant domestication itself.
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Table 4-3. Pathways to agricultural change, based on Kirch (1994).

Processes of agricultural change fundamentally relate to four factors: population growth, available land, technological development, and labor power. Boserup (1965), writing during the high point of post-colonial agrarian developmentalism, formalized the notion that it was possible to increase the productive capacity of land in response to increasing populations. While the classical economist Malthus (1798) argued that the relative inelasticity of agricultural productivity compared to population growth would lead to inevitable disaster if populations were not regulated through mechanisms like warfare, disease, and social proscription, Boserup questioned the assumption of land being inherently inelastic. She argued that increasing populations could improve the productivity of land through increased labor inputs. An example she gave was the reduction of fallow time, observed during her fieldwork in East Africa among swidden farmers (Boserup 1965). This was the original concept of agricultural intensification—the shortening of fallow times to meet the needs of an expanding population (see Table 4-3).

Most archaeologists studying agroecosystems accepted Boserup’s notion of elastic productivity and the potential for agricultural change as an adaptive strategy to increasing population size. However, there was also been substantial criticism of Boserup’s idea for its evolutionary assumptions (Erickson 2006; Leach 1999; Morrison 1994, 1996, 2007), its assumptions about human behavior and energy-expenditure (Bronson 1972, Morrison 1994), its lack of consideration for other factors that might drive increases in labor input, like the demands of social production (Brookfield 1972, 1984), or market incentives (Erickson 2006: 335; Shriar 2001; Håkansson 2008; Thurston 2006; Rocha 2011). Other studies considered agricultural intensification within the contexts of land tenure and land reform (Griggs 1982), cultural attitudes (Stone 1997), and social reorganization (Eerkens 2004). Within historical ecology and landscape archaeology, the interactions between ecological relationships, cultural preferences, sociopolitical organization, and historical circumstance (Kirch 1994; Widgren and Sutton 2004; Porter et al. 2014; Morrison 2013). Nevertheless, more nuanced understandings of population pressure still have currency as both proximate as well as ultimate causes for intensification and societal change (Acabado 2012; Kirch et al. 2012; Stone 2001).

While I divided types of agricultural change into discrete categories in Table 4-3, change may not simply be explained by reference to a single factor like surplus demand or demography. Nevertheless, Kirch (1994) argues that an understanding of the different pathways of agricultural change may reveal key structural differences in societies. For instance, in the “dry” societies of Oceania, the more burdensome route of short-fallow dryland extensification and intensification led to differences in sociopolitical structures like the tendency toward aggressive territorial expansion; meanwhile the “wet” societies of Oceania that developed landesque capital in the form of pondfield irrigation were able to absorb additional labor and meet demands for increased production without ever needing to expand their lands (Kirch 1994: 244).

What kinds of agricultural change occurred in Zanzibar from the period of earliest island colonization by farming East African mainlanders, to the high point of the clove plantation system in the late 19th and early 20th century? How did demographic changes, measured through site size and density, relate to the processes of agricultural intensification, extensification, laboresque and landesque capital, or the adoption of new crops? Furthermore, how were these

agricultural changes related to developments in the sociopolitical realm? I aim to investigate these questions through a comparison of settlement patterns with environmental features, documented in survey and statistically measured through satellite remote sensing. Chapter 10: discusses sites recorded in 2019 across different environmental zones, while Chapter 11: discusses these patterns with respect to the late 19th and early 20th century settlement patterns recorded in the Khan Bahadur map.

4.4 Social Transformations

Over the last millennium, Zanzibari social systems in rural areas changed in transformative ways. From a long-term perspective I understand these episodes as instances of non-linear social reorganization resulting from internal and external factors. Social change is transformative rather than additive. This is a perspective I explicitly take from Morrison (1996), who writes,

Are states, for example, just chiefdoms plus, or does social change imply fundamental structural reorganization at all levels?... It may be fair to say that many archaeological conceptions of long-term history have stressed the additive rather than the transformative nature of change and have viewed human groups as pyramidal arrangements of varying numbers of building blocks in which subsistence strategies constitute the essence of each block and the complexity of the group can be easily measured in terms of the number of blocks in each pile... the “basic” elements of each block are seen as somehow enduring.... (Morrison 1996: 586)

The additive view of social change assumes that there are fundamental social elements that may form specific configurations but can nevertheless be considered outside of their context. As a critique, Morrison characterizes social change as relational, in which social elements are constituted structurally and are themselves transformed through the process of change. Morrison writes that “...it will be in the analysis of actual paths of change rather than in the abstracted isomorphic plains of our formal models that archaeologists will generate more realistic and powerful views of both how and why change occurs” (Morrison 1996: 586). It is the aim of this dissertation to describe the actual paths of changes that Morrison refers to, and to understand how transformative processes within a social system impacted the archaeological record across a landscape.

Studies of urban and rural African landscapes have been essential to understandings of social organization and stratification on the continent (LaViolette and Fleisher 2005, 2009; McIntosh 1999; Sinclair 2013; Stahl 2004). African archaeologists working on urban settlement systems and rural landscapes have altered standard anthropological models by presenting evidence for alternative pathways toward social complexity, state formation, inequality, heterarchy, economic specialization, monumentality, power and resistance, and the use of public space (e.g., Chirikure et al. 2016; Davies 2009; Klehm 2017; Lang and Stump 2017; Monroe 2018; Stahl and Logan 2014; Richard 2018; Walshaw 2010; Wynne-Jones and Fleisher 2014). African models of social reorganization have directly impacted global understandings of urban and rural social processes within complex human societies (e.g., Jervis et al. 2021).

My final research question address social transformation across different periods, and its effects on rural communities in inland Zanzibar. How were rural Swahili communities impacted by, and how did they negotiate with, social reorganization in the precolonial, early colonial, and late colonial periods? In the following sections, I discuss aspects of social reorganization across

these three periods in Zanzibar: the precolonial period of the early second millennium (1000-1500), the early colonial period (1500-1830), and the late colonial period (1830-1963).

4.4.1 The Precolonial Period: Social Stratification and Urbanization

Like other regions of the Swahili Coast, Zanzibar’s settlement system underwent a series of transformations at the start of the early second millennium. Precolonial social transformations across the Swahili Coast involved multiple convergent dynamics, including urbanization and the development of power dynamics between central and peripheral places. I describe these changes in Table 4-4.

Social Transformations on the Swahili Coast (1000-1500 CE)	Description
Settlement Shifts and Urbanization	Settlement patterns shifted across the coast, as many stone towns were founded while other first millennium settlements were abandoned (Helm 2000; LaViolette and Fleisher 2018; Wilson 1982). On Zanzibar, Stone Town, Kizimkazi and Tumbatu were founded (Fitton 2018; Rødland 2021), and Unguja Ukuu was abandoned or declined in size (Juma 2004).
Social Stratification	Social elites organized the construction of public space and monumental architecture in stone towns (Fleisher 2013; Fleisher 2014; Wynne-Jones and Fleisher 2014). On Zanzibar, this occurred at Tumbatu, Kizimkazi, and probably in Stone Town (Fitton 2018).
Islamic conversion	Most coastal Swahili people converted to Islam from 1000 to 1500 CE (Horton 2001; 2004; Walshaw 2010). The first stone mosques in Zanzibar were built at Tumbatu and Kizimkazi in the 12 th century and likely also at Stone Town.
Maritimity	Maritimity developed in the early second millennium. It was characterized by settlement shifts toward coastal areas, the development of deep-sea fishing and long-distance voyaging, and maritime architecture built in proximity to the coast (Fleisher et al. 2015, although see Kusimba and Walz 2018). At Tumbatu, the port and mosque locations reflected an orientation toward the sea (Fitton 2017: 31; Rødland 2021: 224).
Changing Trade Links	There was a shift from the turquoise-glazed wares (Sassanian-Islamic ware) of the late first millennium to sgraffiato and black-on-yellow wares of the early second millennium, across much of the coast (Horton 1996: 291).
Changes in Consumption and Foodways	On Pemba, there was a shift from pearl millet to rice, around the year 1000 CE, based on archaeobotanical analysis (Walshaw 2010, 2015). This corresponded with an increase in grass-based phytoliths across Pemba, likely representing the proliferation of rice fields (Stoetzel 2014). In Pemba and across sites in the Swahili world, the early second millennium was associated with a shift toward an increasing frequency of open bowls, likely used for rice and curry-based dishes. The necked jars of the late-first millennium persisted but decrease in frequency (e.g., Fleisher 2003; Horton 1996).

Table 4-4. Social transformations of the early second millennium on the Swahili Coast.

During the early second millennium, relatively egalitarian village communities resettled and transformed into socially stratified towns with a distinct class of elite residents, referred to as *waungwana* in some northern coastal towns. The *waungwana* practiced Islam, constructed monumental stone buildings, held communal feasts, and may have controlled aspects of regional trade, agricultural surpluses, and craft production (Allen 1993). During this time, slavery may have intensified, especially toward the end of the period at socially stratified elite towns like Songo Mnara (Rødland et al 2020), and the patron-client relationships between Swahili elites and hinterland peoples may have formed. The social transformations toward increasing social stratification and complexity on the Swahili Coast during this period mirror social change and state formation occurring across Africa during the Middle Iron Age (e.g., Kusimba et al. 2006; Monroe 2013).

The stone-built sites of this period first inspired archaeological research on the coast in the mid-20th century when culture-historical approaches emphasizing migration and diffusion were still the dominant theoretical perspective (Trigger 1989: 150). Archaeologists during this time interpreted stone-built sites on the coast as transplanted settlements of the societies of the Middle East, built by seafaring traders and settlers from the Arabian/Persian Gulf (e.g., Kirkman 1954; Chittick 1974). Since the societies of the Middle East were already urbanized, these early archaeologists did not theorize urbanism as a social transformation in East Africa itself. Rather,

they assumed that the urban settlements they encountered at places like Gede and Kilwa were transplanted urban forms from long-established social systems in Arabia or Persia.

Post-colonial archaeologists on the East African coast, working after the developments of processual archaeology and within a theoretical framework that emphasized internal social development, thoroughly discredited the idea that Swahili urban centers were built by foreign settlers (Chami 1998; Horton 1996). This shift in research set the stage for theorizing the African origins of urbanism and social transformation on the coast during the early second millennium.

One model of Swahili social reorganization during the precolonial period suggests that rural areas were captured by urban centers through unequal systems of patronage, and that Swahili cities managed economic relationships between town and country, while still assimilating outsiders. This accords with the “city-state” view of Swahili towns (Spear 2012; Gilbert 2017) and the general model of urbanization and state formation in other parts of the world (e.g., Yoffee 2005). In this model, hinterland activities are spatially extensive but integrated into the political system of the town, and settlement growth in the rural countryside develops concurrently with growth in the urban center (Fleisher 2010c: 277). Research on the Kenyan coast (e.g., Kusimba et al. 2013; Wilson and Omar 1997) and historical analyses on hinterland communities around Mombasa (Willis 1993) and Lamu (Vernet 2010) develop some perspectives that are similar to this model, emphasizing clientage relationships between towns and hinterlands.

A study from Pemba suggests that rural village communities there maintained autonomy and participated in trans-continental networks on their own terms (LaViolette and Fleisher 2018). In this model, urban centers developed as ritual centers that attracted residents away from their rural homesteads. In the towns, Swahili elites constructed monumental architecture and competed in communal feasting rituals (Fleisher 2010b, 2013). Elites were not overlords who controlled labor, but ritual and social specialists who used ideology to influence and accrue followers. Rural areas in Pemba were depopulated as urban centers grew from the 11th to 15th centuries CE because elites attracted followers through performance, ritual specialization, access to craft and luxury goods, and communal feasting. When the social order of these Swahili elites broke down in the early colonial period (see below), the island went through a process of ruralization that has persisted to the present day (LaViolette and Fleisher 2009). Evidence from Pemba does not necessarily contradict a model of Swahili city-states and a politically integrated hinterland; rather, it adds to an understanding of political diversity on the Swahili Coast.

Concurrently, other studies have demonstrated regional settlement diversity on the coast in ways that do not neatly conform to either of the above models. In the Kilwa hinterland (Wynne-Jones 2007), the growth of the urban center parallels the growth of hinterland communities, but these rural areas are not well-integrated with the urban center (Fleisher 2010c: 277). Rather, Kilwa stands out as a Swahili polity oriented toward foreign trade. Around Mikindani bay, coastal Swahili settlements integrated with hinterland communities, but did not develop socially stratified towns or a cosmopolitan culture oriented toward the Indian Ocean (Pawlowicz 2012). Similar entanglements between Swahili and hinterland societies in the absence of precolonial town formation occurred around Pangani Bay (Walz 2017, 2018). On Zanzibar, Rødland (2021: 1996) theorizes relations of reciprocity between Tumbatu and Mkokotoni that may have enabled the town residents to acquire agricultural foodstuffs. At Gede, Pawlowicz (2019) has argued that there was considerable diversity in social status among “non-elites” at the site, suggesting that the political composition of urban communities should not be assumed.

The emerging picture of Swahili social dynamics is one of regional diversity. The above studies have fundamentally changed our perspective on the development of Swahili society. The diversity of models signals the maturity of Swahili archaeology, which has now moved beyond disproving foreign origins toward a more regionally specific and higher-resolution perspective of Swahili social transformation. This new perspective still centers African agency and also does not apply a totalizing model of social development to the entire coast.

Within Zanzibar, examples of archaeological research into precolonial social transformation include Juma’s (2004) study of urbanism at Unguja Ukuu, and Rødland’s (2021) investigation of social and economic relationships between Tumbatu and Mkokotoni, a port site across the channel from the offshore urban center. Recent excavations at the Old Fort in Stone Town (Leech 2017) also have revealed precolonial Swahili stone architecture, suggesting that this site may also hold important clues for understanding social change on the island during the early second millennium. However, many questions remain. How were rural Swahili communities impacted by, and how did they negotiate with, precolonial urbanization and stratification? Did rural areas in precolonial Zanzibar constitute a hinterland for urban centers, or did communities in rural areas maintain their independence and negotiate with the outside world on their own terms? One aim of systematic survey across inland regions is to reveal previously unrecorded precolonial settlements in the rural areas. I use ceramics and other artifacts to theorize about connections between these sites, urban centers, and networks of craft production and exchange in the wider region.

4.4.2 The Early Colonial Period: Portuguese Incursions and Settlement Change

LaViolette’s (2000, 2018) work at Pujini covers the transition between the precolonial period and the early colonial period. Pujini is a site with classical Swahili stone architecture of the 14th and 15th centuries but a novel spatial orientation and a fort-like layout more characteristic of sites in the later colonial periods. LaViolette argues that the fortifications at Pujini reflected guardedness, the tensions of a changing western Indian Ocean world, and the breakdown of old social and political orders (LaViolette 2018: 236). During the first phase of the early colonial period (1500-1698), Portuguese invaders disrupted Swahili social systems. In the second phase (1698-1830), Yarubid and Busaid Omani rulers continued attempts to monopolize trade and control Swahili towns (Rabi 2011; Vernet 2017). Swahili political independence collapsed, but Swahili elites were not necessarily subjugated. Instead, they leveraged their traditional role as middlemen and their knowledge of maritime and caravan trade routes to access the power brought to the region by outsiders, to further their own limited political aims. Table 4-5 below describes social transformations among the Swahili from 1500-1830 CE.

Social Transformations on the Swahili Coast (1500-1830 CE)	Description
Abandonment of some Swahili towns across the coast	Across the Swahili Coast, some famous precolonial Swahili towns were abandoned or destroyed by the end of the 15 th or early 16 th century. Kilwa (Chittick 1974), Gede (Kirkman 1974), Unguja Ukuu (Juma 2004) Chwaka (LaViolette and Fleisher 2009) and Shanga (Horton 1996) are well-known examples. On Pemba, the period from 1500 onward saw a ruralization of the settlement system, as stone town residents dispersed into the countryside (LaViolette and Fleisher 2009).
Cities develop and urbanize	The largest and most well-known modern cities in coastal East Africa developed or were founded during this period. Mogadishu, Lamu, Pate, Malindi, Mombasa, Tanga and Zanzibar Stone Town are the most notable examples. Tanga was notable for being a Portuguese trading post founded in this period, which then developed into a large city by the end of the colonial period (Gilbert 2004).
End of independent Swahili political autonomy, as Portuguese and then Yarubid Omani rulers take control of coastal cities	The Portuguese built large forts on Mozambique Island (Fort São Sebastião) and in Mombasa (Fort Jesus) which still stand today. At Kilwa (Chittick 1974: 213) and in Zanzibar Stone Town, later Omani rulers built forts over earlier Portuguese structures, thought to be churches

	(Leech 2017). In northern Zanzibar the Portuguese occupied two fortified houses (LaViolette and Norman in press). The Portuguese also established bases in Malindi and on Pemba.
Slavery intensifies	Slave traders from Pate and the Comoros controlled an increasingly intensified slave trade, procuring enslaved people from Madagascar and Mozambique for sale in the Middle East (Vernet 2009).
Changing trade links	Middle Eastern imported ceramics decreased in frequency, as Chinese blue and white porcelain became the most common import to the western Indian Ocean (Power 2015).
Columbian exchange brings American crops to Africa	The Portuguese began cultivating maize in Mombasa in the late 16 th century in Mombasa to feed their garrison there, and maize appears to have become staple crop in East Africa earlier than other parts of the continent (McCann 2005: 29). Other American crops brought to East Africa may include chilis, tobacco and peanuts. Cassava is only first mentioned in Zanzibar in 1799, brought through Reunion from Brazil (Hillocks 2002). Like in other parts of the world, American crops may have enabled population expansion and agricultural adaptations to more marginal environments.

Table 4-5. Social transformations during the early colonial period.

Archaeological and historical research on the early colonial period is scant. Only one project, currently ongoing, explicitly looks at uncovering the Portuguese presence in East Africa (LaViolette and Norman, in press). Archaeologists have also excavated trenches in a few Swahili towns which were occupied throughout this period, at Pate (Wilson and Omar 1997), Malindi (Qin and Ding 2018), Takwa (Wilson 2019), Mombasa (Kiriamama 2018), and Manda (Chittick 1984), though research has not been nearly as extensive as at precolonial sites. This is due to the difficulties in surveying and excavating sites which have persisted as cities into the present, where modern occupation makes large-scale excavations impractical. The most intensive and detailed excavation from this period is at Fort Jesus in Mombasa (Kirkman 1974). There, Kirkman uncovered stratified deposits from the early 17th to 19th centuries. He produced a ceramic typology for this period that directly relates to the ceramics of the uppermost levels of precolonial Swahili stone towns, demonstrating continuity in Swahili pottery manufacture through this period.

The most visible debate with respect to social transformation in the early colonial period concerns the impact of the Portuguese on Swahili social systems. Early colonial historians portrayed the Portuguese as oppressors who fundamentally disrupted Swahili society, causing social collapse (e.g., Ingrams 1920; Kirkman 1964; Pearce 1920). Later historians have contested this claim arguing that while Portuguese invaders committed brutal acts, their position was relatively weak in East Africa and relied on alliances that Swahili elites used to their own advantage (Pearson 1998; Pouwels 2000; Prestholdt 2001; Vernet 2009). Pearson argues that this debate is the result of confusion between the official policies of the Portuguese state, and the actual on-the-ground actions of Portuguese officers, governors, sailors, soldiers, and private individuals (Pearson 1998: 150). Official policies had lofty aims: to disrupt the open trading system of the Swahili world and impose monopolies on cloth, ivory, enslaved people, and spices, to capture the gold mines supplying Sofala, and to assert control over the region and develop it as a colony with settlers. Alongside these aims were conflicting and heterogeneous aims of Portuguese people on the coast, who at times intermarried, integrated into, or were made dependents of, previously existing Swahili and western Indian Ocean social systems. The actual on-the-ground presence of the Portuguese was more akin to many other groups at the time, like the "...Armenians, Jews, Shirazis, Turks, and the host of other people trading and living and marrying in this polyglot and heterogeneous maritime world" (Pearson 1998: 151).

Regardless of the actual impact of the Portuguese, this period is characterized by instability, as settlement systems changed. During this time, the basic settlement structure of the modern East African coast was formed. The period saw the rise of Mogadishu, Lamu, Malindi, Mombasa and Zanzibar Stone Town as the primary urban centers of the East African coast, a

trend which continues today. These urban developments were accompanied by the emptying out of the countryside. Areas which are rural today in East Africa became rural during this period as people either moved into small, ephemeral settlements that are difficult to recover archaeologically, or flocked to the cities.

What impact did social transformations in the early colonial period have in rural agricultural areas? How did rural communities respond to Portuguese and early Omani incursions, intensified slave raiding, and the Columbian exchange? I use artifact analysis and spatial analysis to assess differences between the two periods. By tracing changes from the precolonial to the early colonial settlement system through systematic survey, I aim to investigate the impacts of social, economic, and environmental transformations.

4.4.3 The Late Colonial Period: Economic Change and State Formation

Starting in the middle to late-18th century, two processes simultaneously began which came to transform the societies of the East African coast. On a broad global scale, industrial capitalist production in Europe and the Americas entrained the societies of the western Indian Ocean and East African coast into circuits of surplus production, capital accumulation, and consumerism. More regionally, the aspirations and actions of the Busaid dynasty in Oman resulted in the unification of Zanzibar and the East African coast under a centralized political authority by the mid-19th century, a process of state formation. State formation was intrinsically linked to global capital accumulation and surplus production, since the financiers of the Busaid state were Indian creditors who had already accrued substantial wealth overseeing manufacturing in India to supply global commodity markets (Bishara 2017: 26). These two intertwined processes produced a variety of knock-on effects, which transformed coastal society more than ever before. Table 4-6 shows transformations on the coast during the late colonial period.

Social Transformations on the Swahili Coast (1830-1890 CE)	Description
Capital accumulation and consumerism	Indian financiers reinvested capital from manufacturing in Bombay into the caravan trade in East Africa and funded the expansion of Busaid state power in order to secure and stabilize the equally lucrative trade in enslaved people, ivory, and other East African products (Bishara 2017: 26). In Zanzibar and elsewhere on the East African coast, cash crop production and caravan trading intensified to meet global demand for products like cloves, copra, ivory, and other products (Sheriff 2010). Consumer demand among East Africans for industrial goods produced in Europe and the Americas shaped the networks of trade (Prestholdt 2008).
State formation	Busaid power, based in Oman and Zanzibar by the early 18 th century, expanded to encompass the entire East African coast by 1856 as the Omani Empire. This process required the defeat of Busaid rivals, most notably the Mazrui in Mombasa and the Nabahani in Pate. For the first time, the East African coast was brought under centralized political authority (Vernet 2017). The Busaids secured the caravan routes into the interior, resulting in the intensification of ivory and slave trading.
The slave trade intensifies	The East African slave trade reached its zenith in the middle to late 19 th century, with almost 20,000 enslaved people passing through Zanzibar each year by 1860 (Cooper 1977: 43). This constituted a nearly 20-fold increase compared to the previous century.
Agricultural Transformations	From 1830 onward, Omani settlers transformed their estates into plantations that produced cloves and other agricultural products for export as cash crops, actions which considerably altered Zanzibar's rural agricultural landscapes (Croucher 2014; Sheriff 2010; Vernet 2017). During this period cassava was also introduced to Zanzibar, and it is widely mentioned as the staple source of enslaved people and their descendants from the early 19 th century onwards (Cooper 1977: 64; Ingrams 1920: 276; Pearce 1920: 14; Vernet 2017: 78). It is still associated with poverty, hunger, and dependence in modern Tanzania (Kinshella 2014). It was first mentioned in Zanzibar in 1799, having come by way of Réunion from Brazil (Hillocks 2002). Cassava's introduction to Zanzibar coincided with the increase in the enslaved population of the island starting in the late 18 th and early 19 th centuries.
Demographic Shifts	The importation of enslaved people into Zanzibar greatly shifted the demographics of the island. The enslaved population of Zanzibar grew to nearly equal and sometimes outnumber the total population of native Swahili people on the island by the mid-19 th century, constituting a rapid increase (Cooper 1977: 56) that must have had significant effects on settlement and production in the rural areas.
Increasing Urbanization	Clove production and the caravan trade also transformed the urban center of Zanzibar Stone Town, as wealthy elites accumulated more wealth than ever before. Stone Town developed into a large city with mixed stone and earthen buildings and supplied with water by aqueducts. Across swampy areas to the

	west, the <i>N'gambo</i> or native quarter also developed during this period, settled by enslaved people and other less wealthy Swahili (Sheriff 2018).
European Colonial Expansion	Europeans were visitors and traders to the East African coast throughout the 19 th century but began exercising political power in the region by the 1870s. In 1876 they forced Sultan Barghash to ban the slave trade within his realm. By 1886 the Germans had acquired mainland Tanganyika as a colony, and by 1890 the British forced the Sultan to accept a protectorate over Zanzibar and the Kenyan coast.

Table 4-6. Social transformations during the late colonial period.

The development of the clove plantation system in Zanzibar during this period turned the island from a trade entrepôt and endpoint of the caravan routes for enslaved people and ivory into a center of economic production in its own right. This transformation reshaped the island's rural agricultural areas, as plantation owners seized land and uprooted subsistence crops to make room for clove orchards. The processes by which plantation owners acquired land in the fertile north and west are not recorded in historical sources, but it is likely that expropriation involved some degree of force, especially as the profitability of clove production became apparent. By the mid-19th century, the planter class possessed nearly all of the most agriculturally fertile areas in Zanzibar and used them for cash crop production; meanwhile, indigenous Swahili people used the rocky and marginal farming areas in the south and east of the island for subsistence agriculture. This pattern continued into the 20th century, and was used to justify land reform after the 1964 Revolution (Cooper 1977: 58; Glassman 2011)

Once the plantation system was fully developed however, increased production did not transform Zanzibari society further. Planters were ultimately constrained by the limits of a slave-based system of production that could not endlessly expand without more land, or transition toward an industrial mode of production involving manufacturing (Cooper 1977: 149). Without an external impetus, the plantation system formed in the dynamic period of the early to mid-19th century began to stagnate. The falling price of cloves globally and the increasing value of labor when the slave trade was made illegal dropped the rate of profitability substantially by the early 20th century and forced a significant number of plantation owners into bankruptcy.

Bishara (2017) criticized economic models of the 19th century western Indian Ocean for ignoring political authority. He argued that until recently most scholars have relied on the black box of the “network”, in which trade is assumed to work according to systems of trust that lie outside of the realm of the state and the law. An emphasis on networks of trust can obscure how dynamics of trade intersected with Islamic and British courts, state authorities and customs houses, and the long contractual traditions of the western Indian Ocean that were based in Islamic law but were also adapted to facilitate mercantile expansion (Bishara 2017: 9). The network model of trade and exchange that Bishara refers to is similar to archaeological theories of precolonial economic systems of the western Indian Ocean. In the precolonial period, it does seem to be the case that personal and kin-based networks across the western Indian Ocean may have facilitated trade relationships in the absence of a centralized state (e.g., Fleisher 2010a; LaViolette 2008). Bishara argues that these models should not be uncritically applied to the late colonial period, when the Busaid states of the Omani Empire and Zanzibar Sultanate constituted centralized authorities which regulated economic exchange.

The first state to centralize political authority on the coast was the Empire of Oman under the Busaids, a process that occurred between 1749 and 1856. The next episode of state formation occurred when this empire split into the independent Sultanate of Zanzibar (1856-1963, though ruled as a British protectorate from 1890-1963) and the Sultanate of Oman (1856 to the present). The formation, consolidation, and eventual collapse of these polities can be viewed through archaeological and historical theories of state formation. Following Bishara (2017), this

theoretical framework serves to emphasize the role of political power in structuring the 19th century social and economic systems on the East African Swahili coast.

In a review of power and state formation in Africa, Monroe (2013: 20) has described how African models of state formation have been instrumental in critiquing macrosystemic views of the state, which he argues are ultimately based around trait lists and measurable thresholds. The macrosystemic view of the state is of a set of specialized and centralized political institutions adapted to environmental and social pressures (e.g., Johnson and Earle 2000; Service 1975) (Monroe 2013: 19). In contrast, Monroe argues for a view of African state formation that emphasizes the agency of political actors and contingent histories. This process produced states that were heterarchical and decentralized. They were “...works in progress that depend[ed] as much on elite political maneuvering as socioenvironmental stimulus” (Monroe 2013: 20). When archaeologists began investigating state formation in African societies, it became difficult to ignore heterarchical pathways to social complexity on the continent, “...in which overlapping and decentralized political institutions are integrated by forms of corporate power that resist, or at least restrain, the development of social hierarchy” (Monroe 2013: 20). Examples of heterarchy in African state formation include McIntosh’s (1999) study of states in the inland Niger delta, or Southall’s (1988) concept of the segmentary state, in which power is shared by exclusionary corporate associations like age sets, ritual specialists, and secret societies. Examples from the Swahili Coast have also emphasized the creative power of ritual specialists, consumption, and performance in constituting and legitimizing authority, as opposed to the instrumental power of despots (e.g., Fleisher and Wynne-Jones 2010) (Monroe 2013: 20). Monroe argues that African examples not only challenge normative views of state formation but also may influence archaeologists to identify and study heterarchical dynamics in states around the world.

Yoffee (2016) describes infrastructural power as an aspect of heterarchy. Though the term has multiple meanings (see Mann 2008), he uses the term infrastructure to mean “groups of people and their leaders who stand apart from or are not a part of the institutions of the state” (Yoffee 2016: 1055), and who resist state attempts at integration. Yoffee argues that, in contrast to the insistence of Mesopotamian rulers that they were all-powerful despots, most Mesopotamian states were fragile, and failed to integrate various infrastructures into state institutions over the long-term. Yoffee identifies a heterarchy of social, legal, and commercial power in the earliest and most “pristine” archaic states of Mesopotamia (Yoffee 2016: 1056). Monumental architecture and systems of writing functioned in early states to control the movement of people and control the semiotic and ideological order of the state, in an attempt to integrate this heterarchy. Despite archaeologists characterizing states as “complex societies”, these technologies were used by state administrators for the explicit purpose of *simplifying* complexity, by integrating (and thereby nullifying) the power of local heterarchical infrastructures and naturalizing their subjugation (Yoffee 2016: 1058).

Macrosystemic models of state formation often attribute collapse to disasters like climate change, invasion, or disease. But this view ignores the fact that the mechanisms for integrating infrastructural power into the state’s system of control were often fragmented, fragile, and unstable. Heterarchical elements often contested power in states in way that led to their collapse and disintegration, even without external complicating factors. This process is exemplified by the Spanish conquests of the Aztecs and Incas—though these states were vast, powerful, and centralized, they quickly collapsed when their native allies exercised their heterarchical power to join the Spanish and overthrow them (Yoffee 2016: 1060). In these cases, the external force of

Spanish invasion was only one factor in the dissolution of the Aztec and Inca states, and not necessarily the most important one—more important, argues Yoffee, was the failure of these states to integrate heterarchical elements in the long term.

Yoffee's (2016) description of infrastructural power and the failure of many early states to integrate heterarchical elements may apply in more ways than one to the formation, expansion, and ultimate dissolution of the Busaid Empire of Oman, and later the Zanzibar Sultanate's failure to resist subjugation by the British. The Busaids themselves emerged out of the fragility and disintegration of the Yarubid Omani state, as one faction in a civil war fought on the basis of competing claims to succession between two major factions: the Ibadhi Hinawi, and the Sunni Ghafiri. Ahmed bin Said, the first Busaid leader, was able to integrate these two factions into the Omani state more effectively than his Yarubid predecessors (Rabi 2011: 25).

However, Busaid expansion into East Africa throughout the 18th and 19th centuries was marked by a constant need to appease, bribe, or militarily subjugate diverse heterarchical infrastructures within coastal society (Rabi 2011; Sheriff 1987; 1991). These infrastructures consisted of rival Omani families like the Mazrui and Nabahani, the Swahili patricians of coastal towns, the diverse array of coastal hinterland groups that acted as clients for Swahili rulers, and the heterogeneous assortment of merchants, mercenaries, clerics and pilgrims who made up the cosmopolitan societies of the western Indian Ocean. Busaid sultans of the Omani Empire did not complete the subjugation of the coast before the empire split in 1856, through a dispute over succession following the death of Seyyid Said (Rabi 2011). Even after the Zanzibar Sultanate (the Omani Empire's successor state in East Africa) managed to conquer every coastal town, they were limited in their capacity to exercise power and integrate their new possessions into a stable empire. They could depose governors appointed by rival Omani families and appoint their own officials, but they had to adopt a strategy of constant appeasement and negotiation when dealing with the diverse array of actors that constituted the social and economic systems of the East African coast.

The fragility of this system was exemplified by Sultan Barghash's conflict with the Swahili ruler of Witu in 1885. The Witu ruler, formerly the Sultan of Pate, immediately rebelled against the Zanzibar Sultanate as soon as he became assured of support by the German state (Ylvisaker 1978). Though Swahili patricians on the mainland went on to rebel against German colonial rule in the Abushiri revolt of 1888 (Glassman 1995), their rebellion against German rule was not based on a desire to remain part of the Zanzibari state. Rather, it was an attempt to assert political independence in a moment in which they perceived Busaid state power to be particularly weak.

Within Zanzibar itself, Sultan Seyyid Said, arguably the most powerful ruler of the Busaid Omani Empire, was forced to accept a power-sharing agreement with the indigenous Swahili ruler of the island, the Mwinyi Mkuu. Only in the 1870s did a Busaid Sultan take over the direct administration of Swahili towns in rural Zanzibar, which were previously ruled by the mayors appointed by the Mwinyi Mkuu (Middleton 1961: 13). I argue that indigenous Swahili people in Zanzibar remained a powerful "infrastructure", despite their subjugation and dispossession from fertile lands in the west. Enslaved populations, and their squatter descendants, also came to eventually form a political constituency during the 20th century. I also contend that the failure of the Sultanate to hold onto power for more than a few weeks against pan-Africanist forces following the withdrawal of the British in 1963 attests to the failure of this state to integrate any of the heterarchical factions that emerged during the late colonial period.

One aim of this dissertation is to merge the long-term economic and social histories of Zanzibar with an approach aimed at identifying the heterarchical infrastructures of Swahili resistance to state power. An archaeology of rural communities in the late colonial period should seek to interrogate how Swahili people negotiated state formation and integration across multiple scales, across different arenas of activity (economic, political, social) and across different environmental zones. How did small communities in rural areas of Zanzibar negotiate the tandem processes of state formation and the development of the plantation system? Do settlement patterns and trends in ceramic production and consumption reflect integration or exclusion within these systems? I use settlement survey, spatial analysis, and artifactual analysis of local and imported ceramics to address this question.

4.5 Conclusion

To address the research questions listed above in Table 4-1, I have designed a three-part project. The first aim of the project is to reconstruct archaeological and historical settlement in inland Zanzibar from a long-term perspective. I accomplish this through archaeological surveys across the north-central part of the island (Chapter 6), and through an analysis of historical settlement referenced in maps and textual sources, specifically the Khan Bahadur map (Chapter 11). This methodology addresses the fundamental aim of reconstructing landscape history and understanding settlement change in relation to social transformations.

The second aim is to analyze settlement patterns in relation to social and environmental contexts. I planned my survey from east to west, to capture a view of settlement across diverse environmental zones in Zanzibar (which vary more from east to west than from north to south). I then used geospatial environmental datasets to compare settlement locations across diverse environmental variables, in Chapter 10. I also compare late 19th/early 20th century settlement across environmental variables in Chapter 11. This method addresses the aim of reconstructing socioecological systems in Zanzibar, and theorizing human-environment relationships from a long-term perspective.

The third aim is to analyze patterns in locally produced and imported ceramics, to identify trends that might relate to the aforementioned social transformations. I discuss these analyses in Chapters 13, 14, and 15. This method also produces data relevant to understanding social transformation and human-environment interaction.

Having summarized the long-term history of Zanzibar in Chapter 2, outlined the coastal environment in Chapter 3, and laid out my research questions, theoretical perspectives, and project goals in this chapter, I now turn to describing the survey methodology I employed in Zanzibar in 2019 during the course of the field project.

Chapter 5: Survey Methodology

5.1 Introduction

This chapter outlines the methodology for archaeological survey that I used in this project. The aim was to understand settlement patterns across a range of ecological zones on the island of Unguja, Zanzibar, from the period of earliest settlement to the end of the late colonial period. The earliest period of settlement in the survey region was unknown prior to the survey, but I suspected it to be no older than the 6th century CE, when the earliest known Iron Age settlements on Zanzibar were founded at Fukuchani and Unguja Ukuu (Fitton 2018; Juma 2004).

Another aim was to understand the development of settlement in relation to the plantation system of the 19th century, which transformed the economy and society of the island. A final aim was to determine how settlement varied across different environmental zones present on the island. Using maps of soil types, land use, vegetation, rainfall, elevation, hydrogeology, known archaeological sites, and historical data, I determined that a swath across the north-central region of Zanzibar had the best chance of capturing the breadth of landscape data that was necessary and was an appropriate size and scale given the constraints of time, funding, and labor. A swath from Pwani Mchangani in the east to Mangapwani in the west covered the largest possible number of land use, vegetation, soil, rainfall, and hydrogeological types. This swath overlapped the historical areas of clove plantation development, as well as areas adjacent to and in between clove farming areas. Finally, this region also abutted and overlapped some judgmental surveys done by Sarah Croucher in 2006 on 19th-century plantation sites in Mahonda, Zanzibar, providing a standard for comparison.

I carried out research for this project from June to September 2019. During this time, we completed our intended research design for field survey. While I had intended to stay until the end of the October to excavate trenches at different sites, I had to leave the field in September due to a medical emergency. I intended to return next year, but by early 2020 the global COVID-19 pandemic prevented all research and travel in Zanzibar and elsewhere.

While doing field research in 2019, our team stayed at a rented house in Mkokotoni, north of our survey region. Thanks are due to Ame Haji Ame, the Sheha of Mkokotoni, for hosting us there. Our crew was comprised of myself and collaborators, including Ali Vuai of the Zanzibar Department of Museums and Antiquities, Zaynab Makame Manzi, Asia Haji Ubwa, Kombo Othman Juma, Mikidadi Hassan Mussa, and Hadifh Salum Muhammed (recent graduates in archaeology from SUZA, the State University of Zanzibar, Hamad Suleiman, our driver and also a member of the archaeological field team, Neema Othman Suwaka, our cook, and rotating crews of locally hired workers appointed by mayors of different towns where we surveyed. I am immensely grateful for the perseverance, hard work, and patience of our field team. The following sections describe the background and methodology for the 2019 survey.

5.2 Archaeological Survey in Coastal East Africa

Archaeological surveys in coastal East Africa likely originated with expeditions to map and investigate stone ruins, carried out by colonial explorers. The French explorer Guillain was one of the first Europeans to make note of archaeological sites on the coast, during his journeys between 1846 and 1848 (Guillain 1856). During the late 19th and early 20th centuries, European explorers and settlers in East Africa made a hobby of touring old ruins and chipping out porcelain bowls from the masonry, until almost none were left by the 1920s (Meier 2016: 149). Fitzgerald (1898) wrote extensively about landscapes in Zanzibar and coastal East Africa as he

traveled on foot and by ship. Further documentation of East African coastal sites continued with Kirk (1897) at Gede and Lamu and Stigand (1966 [1913]) at Lamu, Takwa and Pate, and Pearce (1920), Ingrams (1920) and Buchanan (1932) in Zanzibar and Pemba.

In 1948, Kirkman initiated the first systematic archaeological investigation on the coast at the site of Gede (Kirkman 1954), but it was not until 1969 that Neville Chittick performed the first explicit archaeological survey in the region. This was a survey of sites and monuments in southern Somalia (Chittick 1969). The project catalogued sites with the help of residents. Next, Thomas Wilson initiated archaeological reconnaissance on the Kenyan coast, recording monumental stone sites around the Lamu archipelago (Wilson 1978), on the south and central Kenyan coast (Wilson 1980), and in southern Somalia (Wilson 1984). These projects led to the first examples of regional spatial analysis in coastal East African archaeology (Wilson 1982) and the southern Somali coast (Wilson 1992). Wilson was the first to develop a site-type system that separated sites into classes that were ranked by size and population, and he was also one of the first to discuss the archaeological potential of non-stone hinterland settlements between and around the stone cities of the medieval period (Wilson 1982: 216). At a similar time, Horton and Clark (1985) also catalogued monumental architectural sites on Zanzibar and Pemba.

Slightly later, North American archaeologists LaViolette, Fawcett and Schmidt from the US brought Americanist survey methods for intra-regional analysis to coastal East Africa, specifically in their work in archaeological field schools at the University of Dar es Salaam in the Archaeology Unit there, which was founded in 1985 (LaViolette et al. 1999; LaViolette 2002). This field school applied systematic shovel-test pit survey on the East African coast for the first time, to sample an area of several kilometers south from Dar es Salaam to Bagamoyo (Fawcett et al. 1989; LaViolette et al. 1999). Shovel-test pit methods were developed in North American archaeology, having emerged in the late 1970s and onwards (e.g., Chartkoff 1978; Lightfoot 1986). LaViolette and Fleisher took this method to Pemba in the 1990s, using shovel-test pit surveys to investigate earth and thatch settlements not visible from the surface (Fleisher and LaViolette 1999). Since then, archaeologists have adapted this method to several regions of the Swahili Coast for intra-regional survey, in the Kilwa hinterland (Wynne-Jones 2005), around Mikindani Bay (Pawlowicz 2011) and across northern Pemba (Fleisher 2003). This methodology is an invaluable tool in coastal East African environments, being perhaps more responsible than anything for an understanding of site diversity and non-stone, non-elite settlement on the Swahili Coast today.

Archaeologists on the coast have also developed methods for survey at the intra-site scale that include coring, geochemical sampling, and remote sensing with ground-penetrating radar and UAV aerial imagery. They have also adapted shovel-test pit methods to understand artifact densities and spatial layout at Gede (Pawlowicz 2019), Songo Mnara (Pawlowicz et al. 2021), and Tumbatu and Mkokotoni (Rødland 2021). For instance, Stoetzel (2014) used shovel-test pits to sample for phytoliths in northern Pemba, at Mikindani Bay, and at Kilwa (Stoetzel 2014). At Unguja Ukuu, researchers have used geophysical survey, test pits, and sediment cores to understand and map the site (Juma 2044; Sulas et al. 2019), and Fitton (2017) employed geophysical survey and aerial remote sensing to understand early Swahili harbors at Tumbe, Fukuchani and Unguja Ukuu on Pemba and Zanzibar.

In conclusion, survey and spatial analysis on the Swahili Coast began at the regional scale with catalogues and gazettes of stone-built ruins. These surveys drew attention to the lack of knowledge concerning hinterland areas between and around monumental sites. Systematic shovel-test pit survey methods were then developed to address this deficiency, and these methods

led to the identification of the “hidden majority” (Fleisher and LaViolette 1999)—subsurface archaeological remains of earth and thatch dwellings that constituted the bulk of Swahili settlement in and around more visible stone monumental sites. This survey methodology fundamentally changed how archaeologists think about Swahili urbanism, in emphasizing the outer lying earth and thatch neighborhoods around and between every stone-built urban center on the coast. Finally, survey methods were adapted to investigate archaeological patterns on the level of the site, and archaeologists have diversified their approach by adapting new methods like geophysical survey, phytolith analysis, and aerial remote sensing.

The methodological approaches to survey on the East African coast played an important role in the broader methodological trends in Swahili archaeology. A chronological progression from the regional scale to the intra-regional scale the level of the site reflects the increasing maturity of archaeological research on the East African coast, which began with regional culture-historical reconstruction and emphasis on urban centers and has moved into addressing anthropological questions at a variety of scales as data became more available (Wynne-Jones and Fleisher 2015). All three scales of archaeological research (regional, intra-regional, and site-based) are important fields for understanding Swahili social dynamics, and survey methodologies developed for each scale remain relevant. While advanced technological tools like remote sensing have mostly only been applied at the scale of individual sites (e.g., Fitton 2017), they have an emerging potential to greatly aid in survey and spatial analysis at the regional and intra-regional scale as well.

5.3 The 2019 Field Season: Survey Methodology

The methodology for the 2019 archaeological survey was partly based on Fleisher’s (2003) intra-region survey of northern Pemba, which aimed to systematically describe the archaeological regions within and between known stone-built sites. Our team used shovel-test pit grids on transects to identify sites, and a cross-grid STP pattern to measure site size (Figure 5-2). The survey method was designed to address the problem of site visibility in areas covered by vegetation, and to detect sites without any surface remains and quantify their size and spatial relationships.

5.3.1 The Survey Region

Figure 5-1 shows the planned survey region. The entire survey region is approximately 20 x 3 kilometers in size, covering a strip that extends from the east to the west coast of the north-central part of the island. This map also shows systematic, judgmental, and incomplete survey squares, which I discuss below.

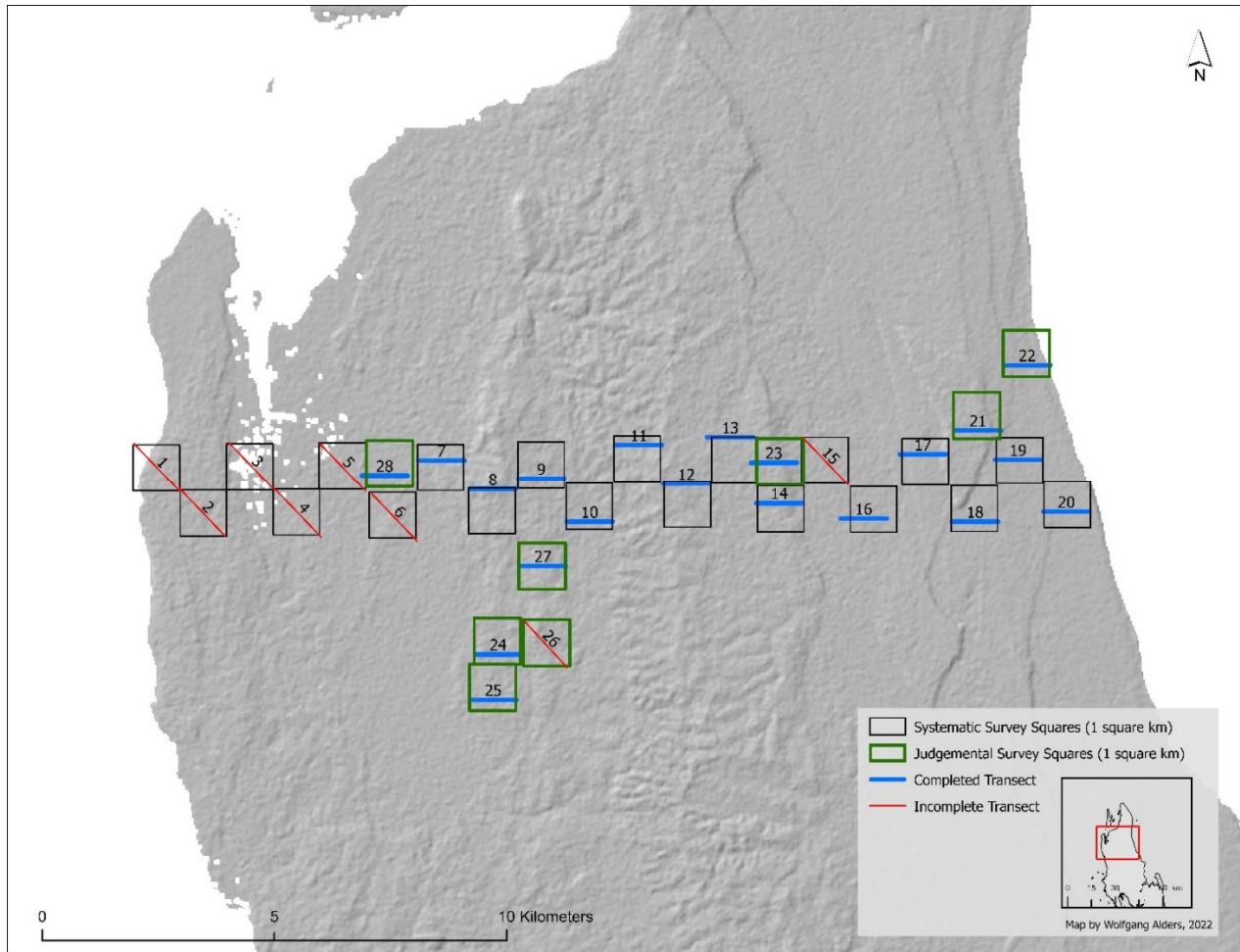


Figure 5-1. Survey region with systematic, judgmental, and incomplete survey squares.

Systematic Survey Squares: I divided the area into 20 different 1 km² units, extending across the breadth of the island from east to west. Rather than having these units about one another, the squares were staggered to cover a wider range of areas from north to south. This resulted in a staggered grid pattern across the island. Within each 1 km² unit, our survey team chose a transect running east to west by selecting a number randomly from one to ten. One corresponded to the southern-most east to west line of the unit, and ten to the northernmost. Five corresponded to a line in the middle of the unit. This methodology incorporated an element of randomness within the systematic survey, giving the coverage necessary to detect a range of sites across a landscape and the probabilistic framework necessary to extrapolate from patterns. We chose all transects at once, and then marked them on the map and inputted their locations into a Trimble GeoXH 6000 series GPS. We followed these transects faithfully. Only twice was it necessary to move the transect north or south to avoid inaccessible areas.

Judgmental Survey Squares: During our field season, we also carried out judgmental surveys along eight different transects in order to make up missed transects, to investigate specific questions, and as part of our collaborative efforts with community partners. In the Mahonda region, we planned three transects (squares 24, 25, and 26) to intersect areas where residents previously showed Sarah Croucher 19th-century surface materials (Croucher 2006: 363-368). The aim of survey in this region was to test for the presence of sub-surface deposits and

map the surrounding archaeological landscape. Next, we completed a single transect in the Mkataleni region at the behest of community partners (square 27), following a visit to a large late 19th or early 20th-century house described as an enslaved person residence by community members. This transect intersected the house and identified areas of archaeological activity around it. We planned square 22 in the inland areas behind the town of Pwani Mchangani, after a visit to the town and the discovery of a large shell midden, a stone well, and imported ceramics from the 14th-15th century, shown to us by the residents. Finally, we planned squares 23 and 28 to work around survey difficulties. We surveyed square 28 because square 6 was impassable due to sugarcane fields, and we surveyed square 23 because square 15 was impassable, due to ongoing rice harvests in the fields there.

Incomplete Survey Squares: Figure 5-1 shows incomplete survey transects to the far west of the western survey region during this project. These areas are comprised of a narrow coastal region which gives way to mangrove swamps. Many areas that are not swampy have been significantly denuded and mined for sand and gravel, up to three meters deep in some places, destroying archaeological contexts. Other areas that are not mangrove swamps or sand and gravel mines are used for private commercial sugar cane farming and therefore inaccessible for pedestrian survey. Due to time constraints and the chance that survey in this region would be unfeasible and unproductive, we decided to forego survey in this area. A survey focused on this area in the future might nevertheless produce interesting settlement data, as mangroves are known to have sustained coastal East African communities and are used for lumber, hunting, and marine subsistence strategies to this day (Taylor et al. 2003). While settlement directly within the swampy mangrove areas is unlikely, it is likely that the mangroves were visited by local inhabitants for centuries if not millennia. Furthermore, the far west contains the slave-holding site at Mangapwani, an underground bunker built for hiding enslaved people during the period of the illegal slave trade. I carried out a limited reconnaissance survey in this region in 2016 that recorded a stone well, local diagnostic sherds, and 19th-century European industrial whitewares. Based on this, it is likely that other 19th and 20th-century features and architectural remains may be present in the area.

5.3.2 Sampling Transects and Delineating Sites

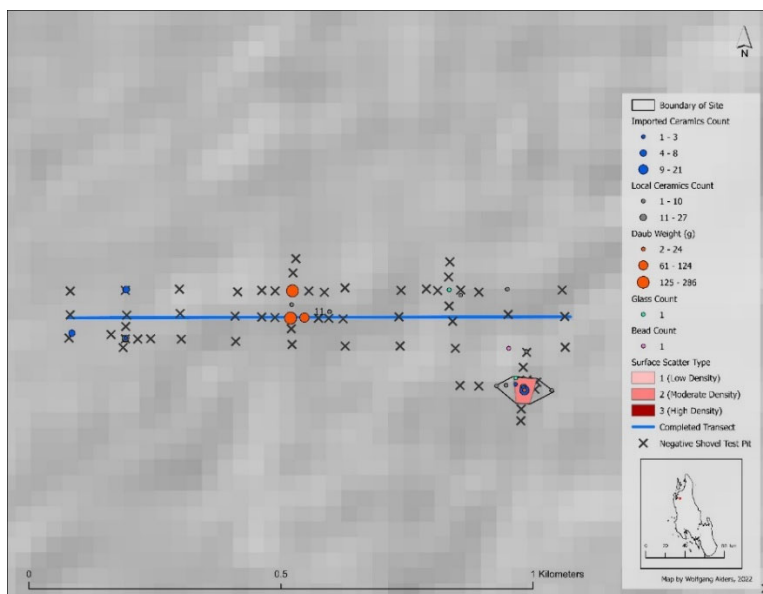


Figure 5-2. Example of a transect, showing shovel-test pit grids, artifacts, and a site.

Figure 5-2 shows an example of transect we surveyed. We mapped each transect into the center of a grid of 1 km by 100 meters, and then marked two shovel-test pits a hundred meters apart on either side of the transect, and a third halfway between those. This produced a spacing of 50 meters between shovel pits. We repeated this process ten more times at intervals of 110 meters, allowing our survey team to reach the end of the kilometer transect having dug 30 shovel-test pits spaced at an even interval. While digging the first three pits, one team member would go forward along with Ali Vuai Heritage Representative from the Department of Museums and Antiquities, to plan subsequent test pits and to discuss plans with residents. While walking from one line of shovel-test pits to the next, our team would spread out and scan the ground to look for surface remains, which we recorded either as find spots or artifact scatters.

We dug the shovel-test pits with long-handled shovels to various depths, depending on the nature of the local geology, and we screened all dirt with one-centimeter mesh. In areas where topsoil was deep and sandy, teams dug up to 120 cm, as deep as the shovels could reach. In other areas where topsoil was shallow and lateritic clay or coral limestone bedrock was close to the surface, teams would dig shallower holes. Digging teams recorded attributes of soil colors, soil types, any artifacts found, any pictures taken, and the bag numbers for artifacts. They also recorded the depth of the entire STP, the depth of changes in soil morphology, and the depth of any artifacts recorded. We collected all archaeological materials found in test pits. Initially, I would supervise judgment calls about when to stop digging, but as our field team gained more experience, I left judgments about soil types and appropriate STP depths to the digging groups. In total, we dug 935 shovel-test pits. We recorded shovel-test pits using a shovel-test pit form, which can be found in Appendix A.

The Cross Grid Method: Figure 5-2 also shows our method for delineating sites. When we located subsurface archaeological materials, we dug 4 shovel-test pits 40 meters in four cardinal directions away from the initial find. If no materials were found, we then dug 4 shovel-test pits 20 meters from the initial find, to further clarify boundaries. If we found material, then we shovel-test pits continually at 40 m intervals in all directions until we produced two negative shovel-test pits. When we deemed it appropriate, this distance was increased with every subsequent shovel test-pit to find site boundaries. We also used this cross-grid method to sample the subsurface deposits of artifact scatters found on the surface.

Difficulty Sampling in the East: Figure 5-3 shows some transects from the eastern region. In these areas, thick brush made it difficult to stay true to transect lines, and rocky coralline limestone bedrock made shovel-test pits impossible. In these areas, we did our best to follow transect lines and we used surface survey methods to investigate artifact scatters and findspots.

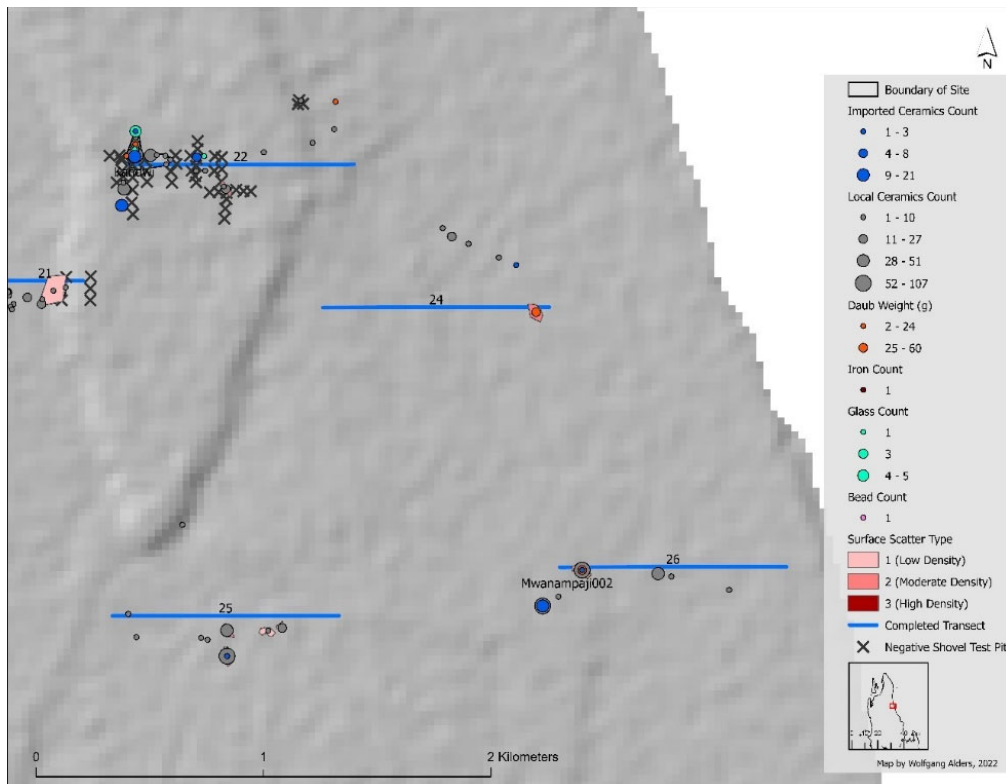


Figure 5-3. Transects in the east region. In these areas, rocky coralline limestone bedrock made shovel-test pits impossible, and thick brush prevented us from staying true to the transect lines in some instances.

Artifact Scatters: Figure 5-2 and Figure 5-3 also show artifact scatters, which partially constituted sites. Many transects intersected artifact scatters, which were defined as areas with a contiguous scatter of more than 20 artifacts. We located almost every site recorded in this survey through the presence of an artifact scatter, given the shallow topsoil in much of inland Zanzibar. We recorded these artifact scatters through a method of surface collection and mapping. Upon reaching an artifact scatter, the entire team would fan out in multiple directions, and attempt to look for the boundaries of the scatter—the points at which the density of artifacts either dropped precipitously or simply ended. These boundaries were often difficult to ascertain with full confidence due to the vegetation cover or changes in the landscape; however, in general it was possible to make an accurate assessment of the approximate size and contours of the scatter. One team member would then use the GPS to record a line and walk around the boundaries of the artifact scatter to record its size. While a team member was measuring the boundaries, the rest of the team would line up with 20 meters between each person and walk through the scatter to collect artifacts for analysis. The aim of the collection was to gather diagnostic ceramics—imported ceramics, and local pieces with decorations or rim designs that would help establish chronological control through reference to well-established ceramic sequences (e.g., Chittick 1974; Horton 1996; Fleisher and Wynne-Jones 2011; Power 2015). This turned out to be the most effective way to gain a sample of artifacts for study, since most artifact scatters contained few or no sub-surface deposits. Our aim was to collect diagnostic sherds but depending on the size of the artifact scatter we also collected apparently undiagnostic sherds at fixed intervals of 5 meters to not miss diagnostic elements that dirt might have obscured (*c.f.* Banning et al. 2011).

Since we collected ceramics with the aim of ascertaining site type, the numbers of ceramics in artifact scatter collections are not representative of the intensity of occupation at the site. Instead, we assessed site occupation intensity through a judgment of artifact density across the entire artifact scatter. Before collections began, artifact scatters were assigned a number based on the density of artifacts present. A Type 1 artifact scatter was judged as the sparsest. Walking through a type 1 artifact scatter, one would expect to find an artifact every 8-10 paces. A type 2 artifact scatter was the median density. Walking through a type 2 artifact scatter, one would find an artifact every 3-5 paces. Finally, we assigned a type 3 artifact scatter to sites with the highest density. In these sites, one would expect to find artifact almost everywhere one stepped, often with 10s or hundreds of small ceramics present on the surface in many areas. Finally, we assigned type 4 to artifact scatters where it was clear a scatter existed, but it was not possible to ascertain the density and boundaries of the scatter because of thick vegetation or modern occupation. I named these type 4 scatters indeterminate surface scatters in later analyses.

Once we mapped an artifact scatter and made a surface collection, we dug a series of STPs inside and outside of the artifact scatter to test whether surface materials were present under the surface as well. We dug two STPs inside the artifact scatter, at distances that were equidistant from one another as well as equidistant from the two furthest boundaries of the scatter. For each of these test pits, we dug STP cross grids around them if artifacts were recovered in the subsurface. Outside the artifact scatter, we dug a wider cross grid along four cardinal directions, starting 20 meters north, west, south, or east of the boundaries of the artifact scatter. We continued to dig STPs on lines moving away from the artifact scatter boundaries until STPs with negative results were recovered. This method enabled an accurate assessment of the size and distribution of site activities related to the artifact scatter, whether materials were on the surface or subsurface.

We recorded artifact scatters using an artifact scatter form, which can be found in Appendix A.

Findspots: Findspots are singular locations where 1 to 20 artifacts were present. They were places we deemed too small to constitute an artifact scatter, but which were still archaeologically relevant. The majority of findspots consisted of only 1 or 2 artifacts in a location. Before determining whether artifacts were to be collected as a findspot, we briefly searched the surrounding area to ensure that the artifacts were not part of a larger artifact scatter. If the artifacts were a singular find, we collected them, gave them a bag number, and recorded them as a findspot. No shovel-test pits were dug in relation to findspots. In post-field analyses, findspots were considered site components, and are discussed below. We recorded findspots using a findspot form, which can be found in Appendix A.

Features and Architecture: During survey, we encountered architectural features. In each case, we took a GPS point, and described the feature in brief. In the case of architecture, we took photographs from all angles, and measured the structure and drew it on graph paper. We noted other features like wells, baobab trees, shrines, graves, or interesting stratigraphic profiles in a log and briefly described them. In the eastern region, we mapped some low field walls with a GPS handheld device, but this was not done systematically as many field walls ran through inaccessible and overgrown areas.

Following surveys, I divided the regions we were able to survey into three main zones, based on maps of land use, vegetation, rainfall, elevation, hydrogeology, and soil types: the West, the Central, and the East survey regions (Figure 5-4). I also delineated three other zones,

based on our judgmental surveys: the Mahonda, Mkataleni, and Northeast zones. I refer to these zones when describing settlement patterns.

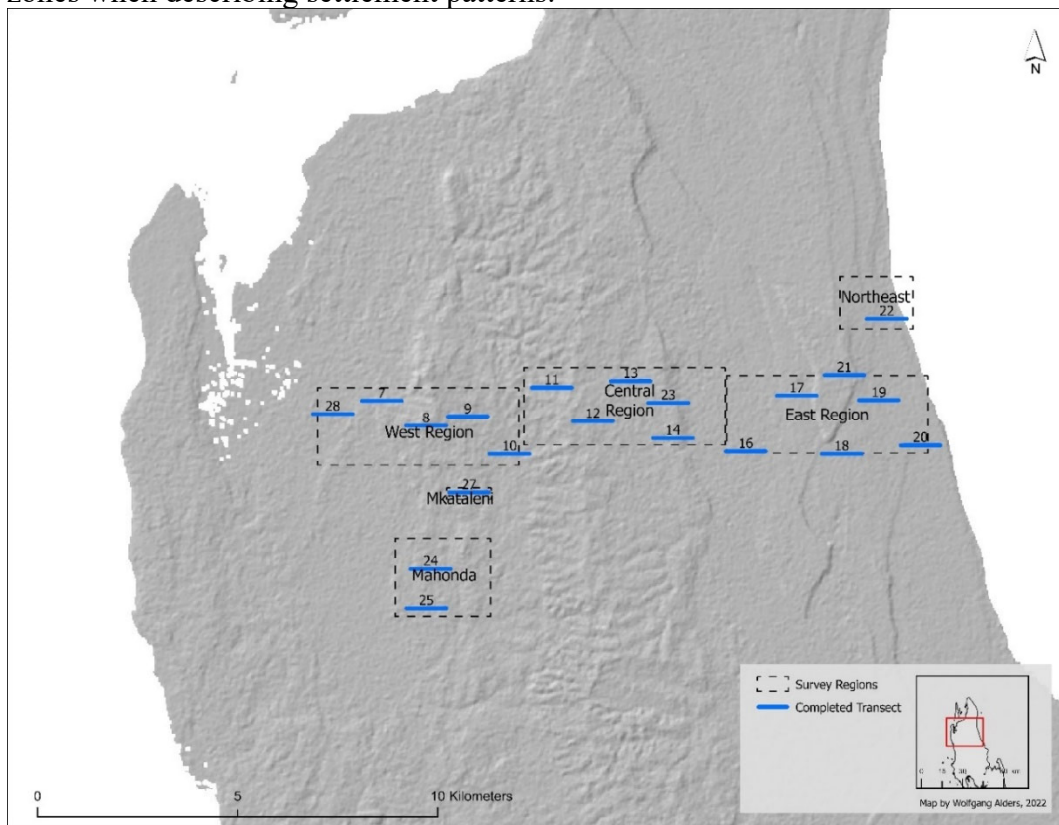


Figure 5-4. Survey regions based on completed transects.

This section has described our method for transect survey and for recording archaeological materials. In section 5.4 below, I discuss our methods for designating sites.

5.4 Designating Sites

We recorded all artifact scatters, findspots, subsurface deposits found through STPs and architectural features that we encountered in the field. Following the field season, I mapped and analyzed these phenomena. This analysis produced three categories: sites, site components, and indeterminate surface scatters.

Sites: The site is the unit of analysis for understanding the dynamics of settlement history. It is an interpretation of past human activity, based on multiple lines of evidence recovered during survey. While there are already initial interpretive decisions made regarding the classification of phenomena as artifacts, artifact scatters, or features, the classification of a site involves mustering a larger array of historical, archaeological, and evidentiary sources to infer an area of past human activity and occupation.

The criteria for determining a site for this research are as follows: sites are areas of contiguous physical space, with 20 or more artifacts present across an area from an artifact scatter, or from at least three discrete findspots or shovel-test pits within 40 meters of proximity of one another. By this definition, all artifact scatters are sites. Findspots alone are not sites but may be part of a site if shovel-test pits around them produce artifacts within 40 meters. Shovel-test pits with artifacts alone are not sites either but can be parts of a site if enough contiguous shovel-test pits produce artifacts. Architectural features were recorded separately and do not

constitute sites on their own, since many architectural features are low-lying dry-stone walls in field systems with no associated artifacts.

We recorded 44 sites using this method, many far exceeding the requirements of 20 artifacts from three discrete locations within 40 meters. I only noticed a small number of sites upon later examination of the spatial clustering of recorded artifacts, when it became apparent that some artifacts formed clusters of <40 meters apart, using a Nearest Neighbor analysis in GIS. However, most sites were readily apparent upon their discovery in the field, even if their boundaries were not immediately clear.

In the field, we determined that the sites of Mwanakombo, Kirikacha, and Kibirikani were dense enough and large enough to warrant the use of an STP grid to investigate the distributions of artifacts within the site as a preliminary exploration of artifact density and to identify activity areas. For this, we used STP grids across the sites to characterize spatial artifact density and to permit systematic bulk soil sampling in some cases. For Mwanakombo and Kirikacha, we dug five rows of three STPs, for 15 STPs in total, spaced 20 meters apart at Mwanakombo and 25 meters apart at Kirikacha. For Kibirikani, we dug three rows of three STPs, spaced 15 meters apart. In the case of Kirikacha, we took bulk soil samples from visible sediment layers, but I did not have time or funding to analyze these samples. We recorded initial impressions of sites in the field using a site form, which can be found in Appendix A.

Site components: These are discrete finds that are 40 or more meters from any other two discrete finds. We recorded 142 of these site components. In many cases, we located singular finds hundreds of meters from other finds. In some cases, two discrete finds were found within 40 meters of one another, but these were not counted as sites. Site components may represent small areas of seasonal activity, like a campfire or field house, or a simple discrete event in which a ceramic vessel was discarded. Site components are theorized areas of ephemeral human activity that are based primarily on find spots. For both sites and site components, we chose 40 meters as the definitional distance because it was the distance used for testing finds through the cross-grid testing method. This is an established method for site detection in coastal East Africa (e.g., Fleisher 2003: 128).

Indeterminate Surface Scatters: These were areas where it was apparent that artifacts were present in a scatter, but where either vegetation or modern settlement precluded an accurate assessment of the size and distribution of artifacts. I designated 16 of these areas based on the survey data. Most often, these scatters were within the house spaces of modern towns, where artifacts could be found trampled in roadways or emerging from rubbish heaps. A few examples from the eastern region were cases where artifacts were clearly present on the ground in gaps found in thick brush, but measurements of the size of the scatter were not possible. These areas should be considered to contain sites; however, they are not included in the representative sample of sites because they cannot be compared based on size or chronology, and it is not clear if these scatters are one or several sites. This category is separate from “artifact scatters” in general, which are counted as sites. Indeterminate surface scatters are designated from artifact scatters that could not be counted as individual sites.

Architectural Features: Our team recorded six different architectural features. Four of the features were found at the site of Mwanakombo and relate to a 19th and 20th-century sugar mill. These features include a stone house, a stone chicken enclosure, a stone base for a water wheel, and a broken stone bridge in a stream. Another site, Kibirikani, has a single tall rectangular stone feature which is possibly a 19th-century oven or furnace. The site of Mkataleni has a large stone house of 19th or early 20th century origin. The house is currently occupied, so I have not included

pictures out of respect for the residents. Finally, we recorded many stacked limestone walls in parts of the eastern survey region, without definitive dates.

5.5 Recording Environmental Data

In addition to recording artifactual data, our survey team recorded environmental data pertaining to each survey area.

Localities: In every survey area, we used a locality sheet to characterize the local environment. The purpose of a locality designation is to record the environmental context in which archaeological materials are found. Locality sheets record land use, local geology, soil types, water elements, slope, elevation, and contemporary settlement and human activities. They also give an overview of the archaeological features present in the area. Photographs were taken for each locality, showcasing environmental features and modern human activities. Some transects contained multiple localities, when the transect passed from one microenvironment into another. Other localities encompassed multiple transects. An example of a locality sheet can be found in Appendix A.

Transects: We also completed transect forms. While localities might cover multiple transects and are dependent on the environment, transect forms were used to specifically describe the environmental and archaeological conditions of each 1-kilometer transect. These forms were completed after each transect was finished. They were used to record environmental and hydrological features, modern occupation, and archaeological finds. An example of a transect form can be found in Appendix A.

5.6 Conclusion

The survey method described here was effective at revealing traces of land use and settlement across our survey regions, with some exceptions. This methodology was limited by certain aspects of modern land like sand and gravel mining, and sugarcane fields in the far west. Our cross-grid survey methodology also was not adequate for delineating the site boundaries of the largest site, Chaani—I discuss this further in Chapter 9. Overall, we recorded 44 sites, 142 site components, and 16 indeterminate artifact scatters across 20 transects, and 935 shovel-test pits. Surveys also recorded environmental and land use data for each transect. These datasets have been integrated into a GIS with historical, environmental, and land use geospatial data. Chapter 6 presents the results of this survey, describing sites, settlement patterns, and land use data for each region of the survey area.

Chapter 6: Survey Results

6.1 Introduction

In this chapter I present statistics for shovel-test pits and transects, and then describe each survey region, detailing the environment and the sites recorded. Finally, I describe different forms of land use and agriculture encountered during survey. For each survey region I present open-source imagery that I accessed for free from the Zanzibar Mapping Initiative (ZMI) and the Commission for Lands of the Revolutionary Government of Zanzibar (COLA). This imagery was produced through a full-coverage mapping survey of Zanzibar and Pemba with small, winged drones, resulting in high-resolution imagery (~7 cm pixels). I have noted where I used this imagery in this chapter, as well as in Chapters 7, 8, and 9 for site context figures.

6.2 Artifact and Transect Statistics

Our survey team completed and recorded 935 shovel-test pits, and 114 find spots. Figure 6-1 shows all shovel-test pits and find spots across the survey region.

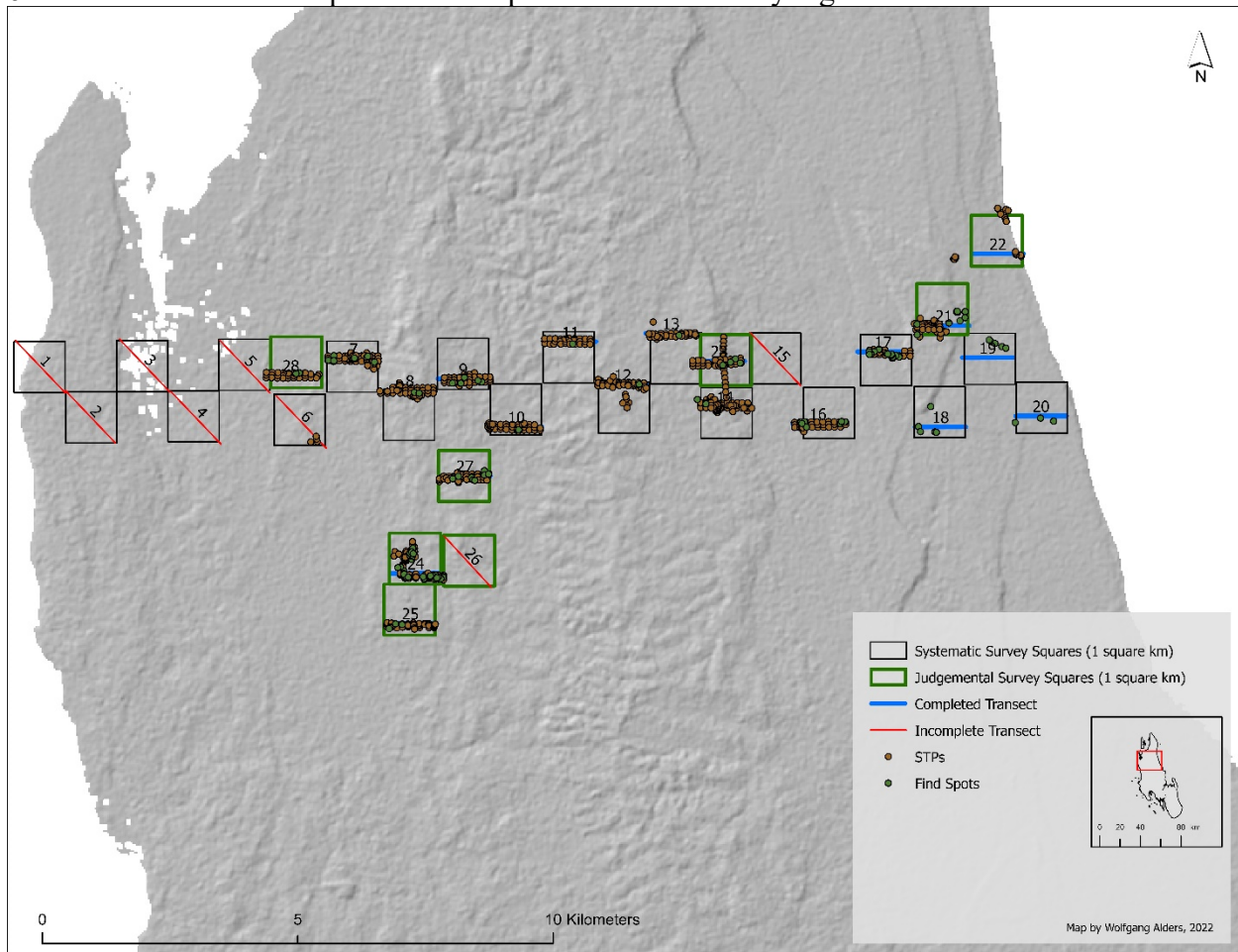


Figure 6-1. STPs and find spots across the survey region.

Some basic statistics about these STPs are meaningful. Table 6-1 summarizes these statistics.

	Total Count	Positive STPs	% Positive	Average Depth
STPs within systematic survey squares	475	112	24%	
STPs within judgmental survey squares	366	140	38%	
STPs within neither (due to edge effects)	94	23	24%	
Total STPs	935	285	30%	62 cm

Table 6-1. STP statistics showing positive and negative counts.

6.3 Sites, Site Components, and Indeterminate Artifact Scatters

As stated in Chapter 5, I analyzed findspots, subsurface finds from STPs, and artifact scatters to produce three different categories of occupation and land use: sites, site components, and indeterminate artifact scatters. Sites are areas of intensive occupation, which I defined in Chapter 5. Site components are find-spots of artifacts in isolated contexts, more than 40 meters from any other artifact or feature. Indeterminate artifact scatters are Type 4 surface scatters, which could not be defined in terms of size and boundaries due to vegetation or modern urban development. Both these features are too small and numerous to depict on a map of the entire survey region. Instead, I depict these features individual sections of the survey region, in the sections that follow.

Table 6-2 shows counts of sites, site components, and indeterminate artifact scatters for each transect, across each survey region. Refer back to Figure 5-1 in Chapter 5 for the map of the survey regions.

Survey Region	Survey Square / Transect #	Site Component (count)	Sites (count)	Indeterminate Artifact Scatter (count)
West	6	1	0	0
	7	9	2	0
	8	8	2	1
	9	19	1	0
	10	3	1	0
	28	3	0	0
Central	11	1	1	1
	12	3	4	0
	13	8	1	0
	14	5	4	1
	23	0	1	0
East	17	8	3	2
	21	10	3	0
	19	5	1	0
	18	5	4	0
	20	3	3	0
	16	5	2	4
Northeast		0	1	0
	22	0	0	5
Mkataleni	27	9	2	0
Mahonda	24	11	4	0

	25	5	4	2
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Table 6-2. Site components, sites, and indeterminate artifact scatters across each region.

Figure 6-2 shows the 44 sites we recorded during survey. Figure 6-3 shows the site components and indeterminate artifact scatters we recorded.

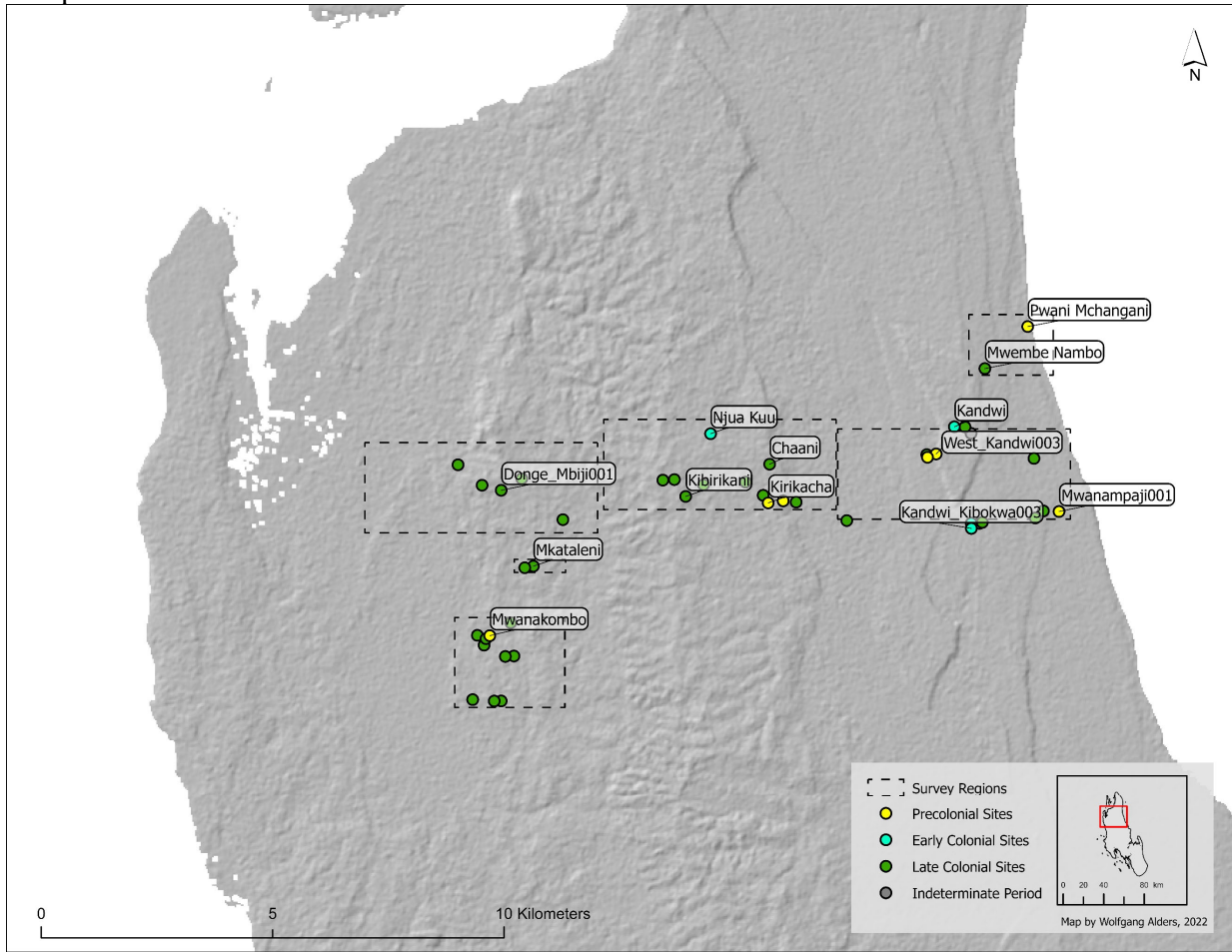


Figure 6-2. Overview of sites in the 2019 survey regions. Color designate time periods, based on imported ceramics. Yellow dots are precolonial sites, light blue dots are early colonial sites, and green dots are late colonial sites.

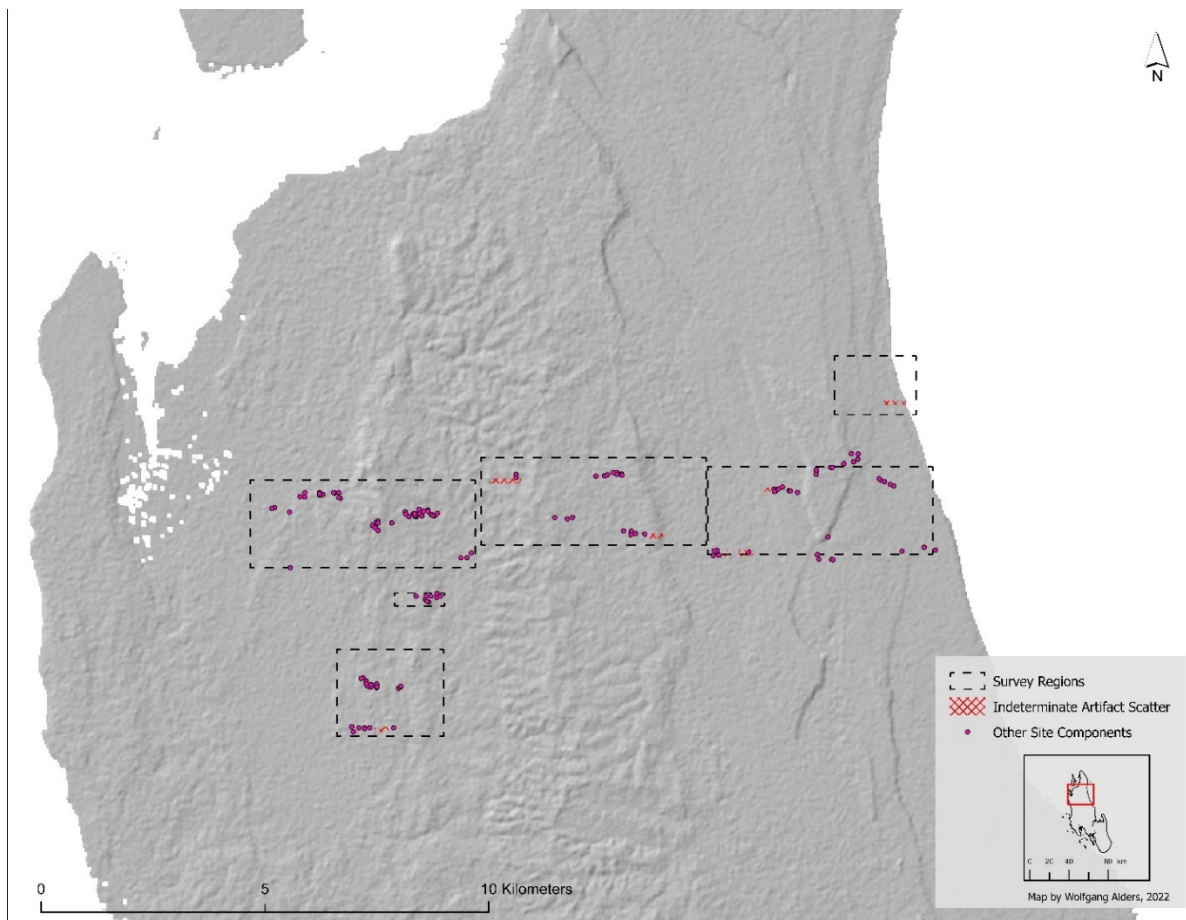


Figure 6-3. Site components and indeterminate artifact scatters in the 2019 survey regions.

Site components are findspots not included within delineated sites. Indeterminate artifact scatters are areas with ceramic surface scatters that could not be defined and incorporated into sites because of modern settlement or thick brush obscuring boundaries. Table 6-3 and Table 6-4 below show the overall statistics for site components and indeterminate surface scatters. I have categorized site components based on date, using imported ceramics. For indeterminate artifact scatters, I have only listed their region.

Total Site Components (IZAS0045-188)	Count
Total Early Second Millennium (1000-1500)	7
Total Late Second Millennium (1500-1963)	50
Total indeterminate	85
Total site components	142

Table 6-3. List of site components.

Number	Survey Region
IZAS0189	Mahonda
IZAS0190	Mahonda
IZAS0191	Northeast
IZAS0192	Central
IZAS0193	Central

IZAS0194	West
IZAS0195	Northeast
IZAS0196	Northeast
IZAS0197	Northeast
IZAS0198	Northeast
IZAS0199	East
IZAS0200	East
IZAS0201	East
IZAS0202	East
IZAS0203	East
IZAS0204	East

Table 6-4. List of indeterminate surface scatters.

In the following section, I focus in on sites, which are the most useful category of occupation for understanding settlement systems in the survey region.

6.4 Dating and Analyzing Sites

Sites produced the most evidence for occupation, material culture, and land use, so from now on I focus on sites exclusively, and leave out further discussions of site components and indeterminate artifact scatters. Table 6-5 shows the list of sites that we recorded during survey.

ID	Map #	Site Name	Main Period	Date Range	Area (ha)	Site Type	Region
IZAS_0001	01	West_Kandwi003	Precolonial	1000-1400 CE	0.02	Swidden Plot / Surface Scatter	East
IZAS_0002	02	Mwanampaji001	Precolonial	1000-1400 CE	0.09	Swidden Plot / Surface Scatter	East
IZAS_0003	03	Kikobweni001	Precolonial	1000-1400 CE	0.9	Site on hillslope, size indeterminate	Central
IZAS_0004	04	West_Kandwi001	Precolonial	1000-1400 CE	0.9	Swidden Plot / Surface Scatter	East
IZAS_0005	05	Kirikacha	Precolonial	1000-1400 CE, also has 7 th to 9 th c. C14 date	1.67	Small Village	Central
IZAS_0006	06	Mwanakombo	Precolonial	1000-1400 CE, also has 19th century components	4.24	Village	Mahonda
IZAS_0007	07	Pwani Mchangani	Precolonial	1400-1500 CE, also has late first millennium site components	5.56	Village	Northeast
IZAS_0008	08	Kandwi_Kibokwa002	Early Colonial	1500 CE to present	0.18	Swidden Plot / Surface Scatter	East
IZAS_0009	09	Kandwi_Kibokwa003	Early Colonial	1500 CE to present	0.2	Swidden Plot / Surface Scatter	East
IZAS_0010	10	Kandwi	Early Colonial	1500 CE to present, also has late first millennium site components	1.53	Small Village	East
IZAS_0011	11	Njua_Kuu	Early Colonial	18th or early 19th c.	1.77	Small Village	Central

IZAS_0012	12	West_Kandwi002	Late Colonial	~1830 to present	0.01	Swidden Plot / Surface Scatter	East
IZAS_0013	13	Kandwi002	Late Colonial	~1830 to 1900	0.02	Field house / Surface Scatter	East
IZAS_0014	14	Kanisani001	Late Colonial	~1830 to 1900	0.06	Field house / Surface Scatter	Mahonda
IZAS_0015	15	Donge_Karange001	Late Colonial	~1830 to 1900	0.07	Field house / Surface Scatter	West
IZAS_0016	16	Mahonda002	Late Colonial	~1830 to 1900	0.09	Field house / Surface Scatter	Mahonda
IZAS_0017	17	Kandwi_Kibokwa001	Late Colonial	~1830 to present	0.1	Swidden Plot / Surface Scatter	East
IZAS_0018	18	Chaani_Kibokwa001	Late Colonial	~1830 to 1900	0.1	Field House / Surface Scatter	East
IZAS_0019	19	Kikobweni003	Late Colonial	~1830 to 1900	0.14	Hamlet / Surface Scatter	Central
IZAS_0020	20	Mahonda003	Late Colonial	~1830 to 1900	0.16	Hamlet / Surface Scatter	Mahonda
IZAS_0021	21	Mwanampaji003	Late Colonial	~1830 to present	0.17	Swidden Plot / Surface Scatter	East
IZAS_0022	22	Mwanampaji002	Late Colonial	~1830 to present	0.23	Swidden Plot / Surface Scatter	East
IZAS_0023	23	Kikobweni004	Late Colonial	~1830 to 1900	0.26	Hamlet / Surface Scatter	Central
IZAS_0024	24	Mahonda001	Late Colonial	~1830 to 1900	0.28	Hamlet / Surface Scatter	Mahonda
IZAS_0025	25	East_Kandwi001	Late Colonial	~1830 to present	0.31	Swidden Plot / Surface Scatter	East
IZAS_0026	26	Donge_Mbiji002	Late Colonial	~1830 to 1900	0.31	Hamlet / Surface Scatter	West
IZAS_0027	27	Muembe Nambo	Late Colonial	~1830 to present, also has early second millennium components	0.38	Hamlet / Surface Scatter	Northeast
IZAS_0028	28	Daraja_La_Mwanakombo001	Late Colonial	~1830 to 1900	0.4	Hamlet / Surface Scatter	Mahonda
IZAS_0029	29	Donge_Pwani002	Late Colonial	~1830 to 1900	0.4	Hamlet / Surface Scatter	West
IZAS_0030	30	Mkataleni002	Late Colonial	~1830 to 1900	0.49	Hamlet / Surface Scatter	Mkataleni
IZAS_0031	31	Kichangani003	Late Colonial	~1830 to 1900	0.65	Hamlet / Surface Scatter	Central
IZAS_0032	32	Mkataleni001	Late Colonial	~1830 to 1900	0.7	Hamlet / Surface Scatter	Mkataleni
IZAS_0033	33	Kikobweni002	Late Colonial	~1830 to 1900	0.71	Hamlet / Surface Scatter	Central
IZAS_0034	34	Mnyimbi001	Late Colonial	~1830 to 1900	0.74	Hamlet / Surface Scatter	Mahonda
IZAS_0035	35	Mahonda_Mkataleni003	Late Colonial	~1830 to 1900	0.78	Hamlet / Surface Scatter	Mahonda
IZAS_0036	36	Mahonda_Mkataleni001	Late Colonial	~1830 to 1900	0.8	Hamlet / Surface Scatter	Mahonda
IZAS_0037	37	Donge_Karange002	Late Colonial	~1830 to 1900	1.08	Small Village / Surface Scatter	West

IZAS_0038	38	Donge_Mbiji001	Late Colonial	~1830 to 1900	1.09	Small Village / Surface Scatter	West
IZAS_0039	39	Kichangani001	Late Colonial	~1830 to 1900	1.59	Small Village / Surface Scatter	Central
IZAS_0040	40	Kibirikani	Late Colonial	~1830 to 1900	1.99	Small Village / Surface Scatter	Central
IZAS_0041	41	Kichangani002	Late Colonial	~1830 to 1900, also has 10th c. C14 date	2.04	Small Village / Surface Scatter	Central
IZAS_0042	42	Chaani	Late Colonial	~1830 to present	~60	Town	Central
IZAS_0043	43	Kandwi003	Indeterminate	Probably 19th c.	0.12	Swidden Plot / Surface Scatter	East
IZAS_0044	44	Kandwi_Kibokwa004	Indeterminate	Probably 19th c.	0.18	Swidden Plot / Surface Scatter	East

Table 6-5. Sites recovered during the 2019 survey, with approximate dates based on ceramic chronologies, site sizes, site type, and region of occurrence.

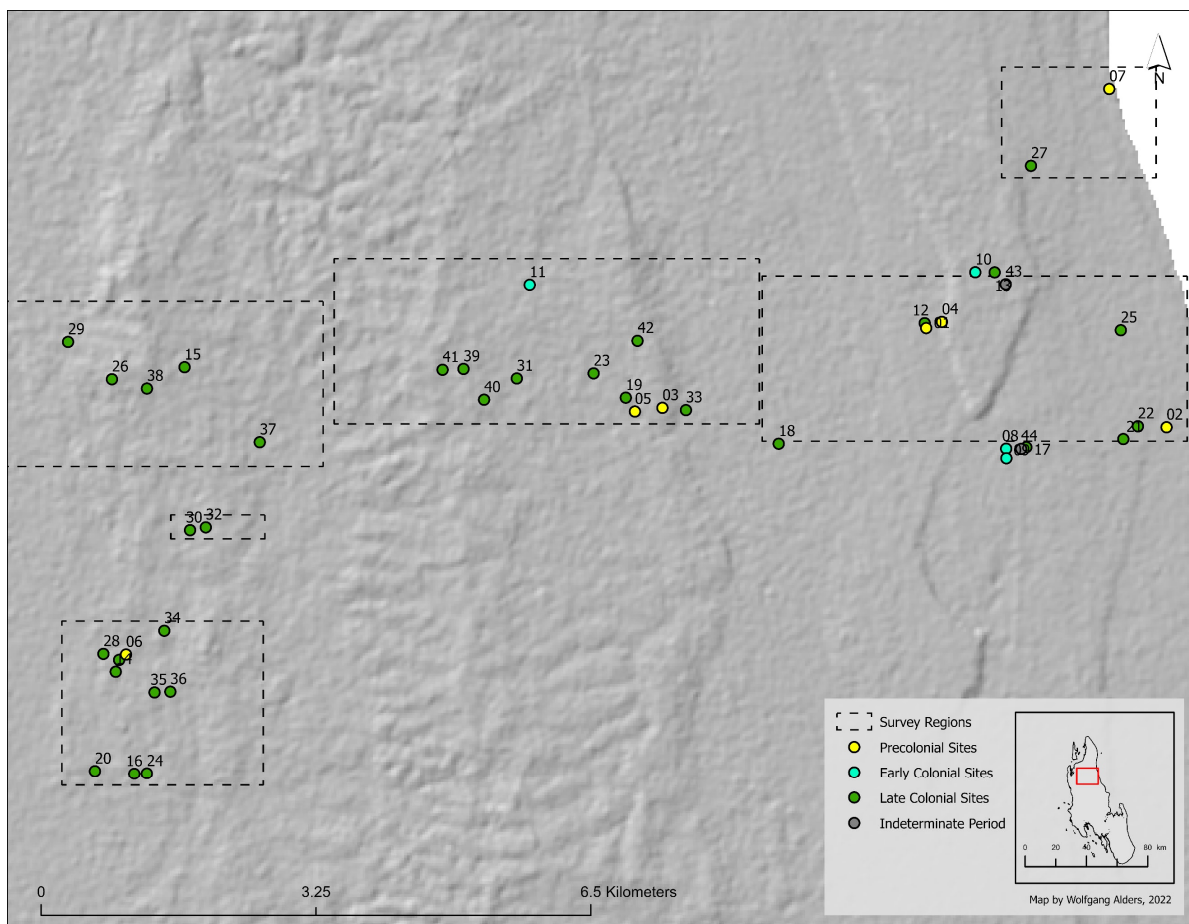


Figure 6-4. Map of all sites listed in Table 6-5 above, by site number.

Imported ceramics were the primary means for dating sites, a well-established method on the Swahili Coast (Fleisher 2003: 132) and a cost-effective and speedy way to date sites during survey. In most cases, we used imported sherds from surface and sub-surface deposits, as these artifacts have the most securely dateable chronologies available for comparison. In a small

number of cases, we used local ceramic forms and decorations when imported sherds were not found, and if the forms could be tied to a secure period. In a few instances we could not date sites due to the lack of chronologically diagnostic artifacts. These sites are listed as having an indeterminate date. Chapter 14 discusses the imported ceramics found during the 2019 survey in more detail.

A secondary means for dating was through a select number of charcoal samples taken from sites. The results for these dates are presented below and referenced in the text under the relevant sites. These dates come from sites that I was able to sample prior to having to leave the field due to a medical emergency, so they are not well distributed across the sites that I would have preferred to sample. Appendix C describes radiocarbon dates in full and discuss the contexts of their acquisition in greater detail. Table 6-6 displays an overview the C14 dating results.

Site	Shovel-Test Pit Name	depth (cm)	¹⁴ C age (BP) ± 15	Estimated Date Range (CE), 95.4% probability
Mwanakombo	Mwanakombo-stp2	65	1035	994-1140, ±15
Mwanakombo (inside stone house)	NyumbaMK-stp8	80	160	1686-1921, ±15
Mwanakombo (inside stone house)	NyumbaMK-stp8	70	135	1698-1810, ±15
Mwanakombo	Mwanakombo-stp11	82	960	1045-1183, ±15
Mwanakombo	Mwanakombo-stp17	80	950	1046-1210, ±15
Mwanakombo	Mwanakombo-stp17	70	1135	896-1015, ±15
Mwanakombo	Mwanakombo-stp15	35	135	1698-1810, ±15
Kichangani002	15-as1test1	35	1145	895-994, ±15
Kirikacha	Kirikacha-stp3	75	1295	685-856, ±15

Table 6-6. Radiocarbon dates of charcoal samples. See Appendix C for AMS C14 data.

The dates for the early second millennium contexts of Mwanakombo are from the bottom levels of anthropogenic material found in shovel-test pits. These mainly date to the 11th and 12th centuries, which accords well with ceramic data found at the site (see Chapter 13).

The other dates from this site come from the STPs labeled “NyumbaMK”. These were taken from the floor of the stone house at the site of Mwanakombo, which is attested to have been built in the early 20th century by the landowner. These dates were taken from the deepest anthropogenic layer under the house floor, with the intention to date the earliest occupation at the site prior to the construction of the stone architecture. These dates show a late second millennium date with 95.4% probability, as expected. Full C14 charts for these dates (see Appendix C) show 19th-century dates with less confidence, though with more certainty than for earlier or later periods from the later second millennium.

I was only able to take a single sample from Kirikacha. Unfortunately, logistical problems due to the COVID-19 pandemic prevented our team from returning to Kirikacha for further excavation and sampling, so this sample is all that we could test. Kirikacha also has ceramics which date the site from the 11th-14th centuries, but this sample, taken from 75 cm, appears to date between the late 7th and mid-9th century CE. This is a relatively early date for a site of this type, comparable to the sites of Fukuchani and Unguja Ukuu of the late first millennium (Fitton 2018). These other sites of this period are found directly on the coast, so Kirikacha would be a unique site type for this period since it is inland. Other lines of evidence do not support such an early occupation for the site of Kirikacha. The imported and locally made ceramics we collected from the STP where this sample was taken (as well as from all over the

site) appear characteristic of the 11th-14th centuries CE, like at Mwanakombo. We did not find sherds characteristic of the late first millennium (see Chapter 13). As of the time of this writing, it makes most sense to consider Kirikacha as primarily a second millennium site. Nevertheless, the C14 sample suggests that the site may have earlier levels that are yet to be found and investigated, so it warrants further research.

Finally, one C14 sample was taken from Kichangani002, a site on a ridgeline in the central region. The site is primarily an artifact scatter of 19th-century materials. However, we found one subsurface deposit in an STP at the site which was a layer of ash and charcoal with undiagnostic local ceramics mixed in, approximately 20 to 40 cm below the surface. We sampled and tested a large piece of charcoal directly touching a ceramic sherd, which returned a date from the 10th century. Since this site is located on a ridgeline, it is possible that colluvial processes have destroyed most of what remained of late first-millennium occupation in this area. Alternatively, charcoal from this deposit may have been created by a natural fire in the 10th century, or by old wood used by later inhabitants.

In the sections below, I give an overview of the landscapes and sites we located across each region.

6.5 Landscape and Sites of the West Region

The western survey region is roughly 2 x 5 kilometers, making it 10 km² in total. It runs east to west as a large rectangle. It extends from low-lying foothills in the east, planted with clove trees and mixed-garden plots, to deep valleys in the west, planted with rice fields. At the far southwestern end of the survey region, much of the land is denuded due to modern sand and gravel mining, which has removed several meters of earth from a wide area. Figure 6-5 shows the extent of soil erosion. In the northwestern end of the survey region, deep rice valleys give way to mangrove swamps which preclude any kind of standard shovel test-pit survey. The region is an area of low alluvial plains, riverine areas, and small rolling foothills.



Figure 6-5. Damage caused by sand and gravel mining in parts of the far west region. The base of the baobab tree (center) that which was preserved shows the previous surface of the land.

Figure 6-6 shows imagery for this region. This area is one of the most fertile in Zanzibar. It has some of the highest amounts of rainfall recorded on the Zanzibar islands and the East African coast, up to over 2000 mm per year in certain areas (Juma 2004: 43). In a map of 19th-century plantation areas (Sheriff et al. 2016: 20), one of the two northern arms of the plantation zone stretches directly through this region. Historical and oral records of the area attest to clove planters living in the vicinity, and it was common during survey to be told that a certain mound or plot was the former house of an Arab or Indian plantation owner. The region had an enslaved population, which became a squatter population following abolition in the late 19th century. Middleton (1961: 32) describes this region as a central zone for squatting clove laborers in the mid-20th century, and a place where traditional indigenous Swahili kin-based systems of land tenure were thoroughly eroded by the plantation system.

The survey region falls within the modern region of Donge. This area contains several *shehia*, named Donge Mbiji, Donge Pwani, and Donge Karange. The *shehia* is a local administrative unit, but it does not designate hard boundaries, and maps delineating these boundaries are not available. Instead, the *shehia* are based on the village and farmland areas governed by a *Sheha*, or mayor. For this project, I have named environmental localities according to the *shehia* they fall within.

Geology: The geology of this region is comprised of quaternary soils, laterites, alluvium, and colluvium. Lateritic sandy clays developed over parent materials consisting of Miocene sands, gravels, and limestones. Underground aquifers are found 25 to 60 meters below the surface in lowland areas and are tapped by wells, while aquifers in hilly areas produce above-ground springs that form several perennial streams (Hardy et al. 2015). Local terminologies for sediments include white and grey clayey sands known locally as *mchanga*, a catena of which dominates the western areas, while the central and eastern parts of the survey region have darker red and dark brown sediments known as *kinongo* (laterites) and *kinamo* (hard clays) respectively (Juma 2004: 43). The *mchanga* soils are recent alluvial and colluvial deposits, which settle at the bottom of the large central hilly spine on Zanzibar, and overlay the base deposit of Miocene sandy clays, which have eroded from Miocene coral limestone that forms the base of the island. Soil infiltration is slow to moderate due to clayey soils (Hardy et al. 2015: 4-6).

Land Use: In the east and central zones of this survey area, most of the land is cultivated with banana, cassava, coconut, clove, purple yam, sweet potato, taro, maize, and other garden crops, which are used for subsistence, as well as for sale at markets. In the low-lying western zones, some of the land is used for industrial sugar cane and rice farming. The areas with sugar cane were impassable for survey and were thus avoided. Much of the land has been cleared for agricultural use, although pockets of brush and forest can be found between and within fallow fields. In the west, water infiltration into the soil is higher than in the center and east, due to groundwater being closer to the surface, as well as higher rainfall (Hardy et al. 2015). Several small perennial waterways flow through the region, but water for agriculture and daily use is also acquired through wells that tap underground aquifers, ranging from 25 to 60 meters below the surface, which are replenished by rainfall. The largest stream in the region is the Mwanakombo stream, which enters the survey region in the far west but was obscured from our surveys because it passed through an area of intensive industrial sugar cane farming.

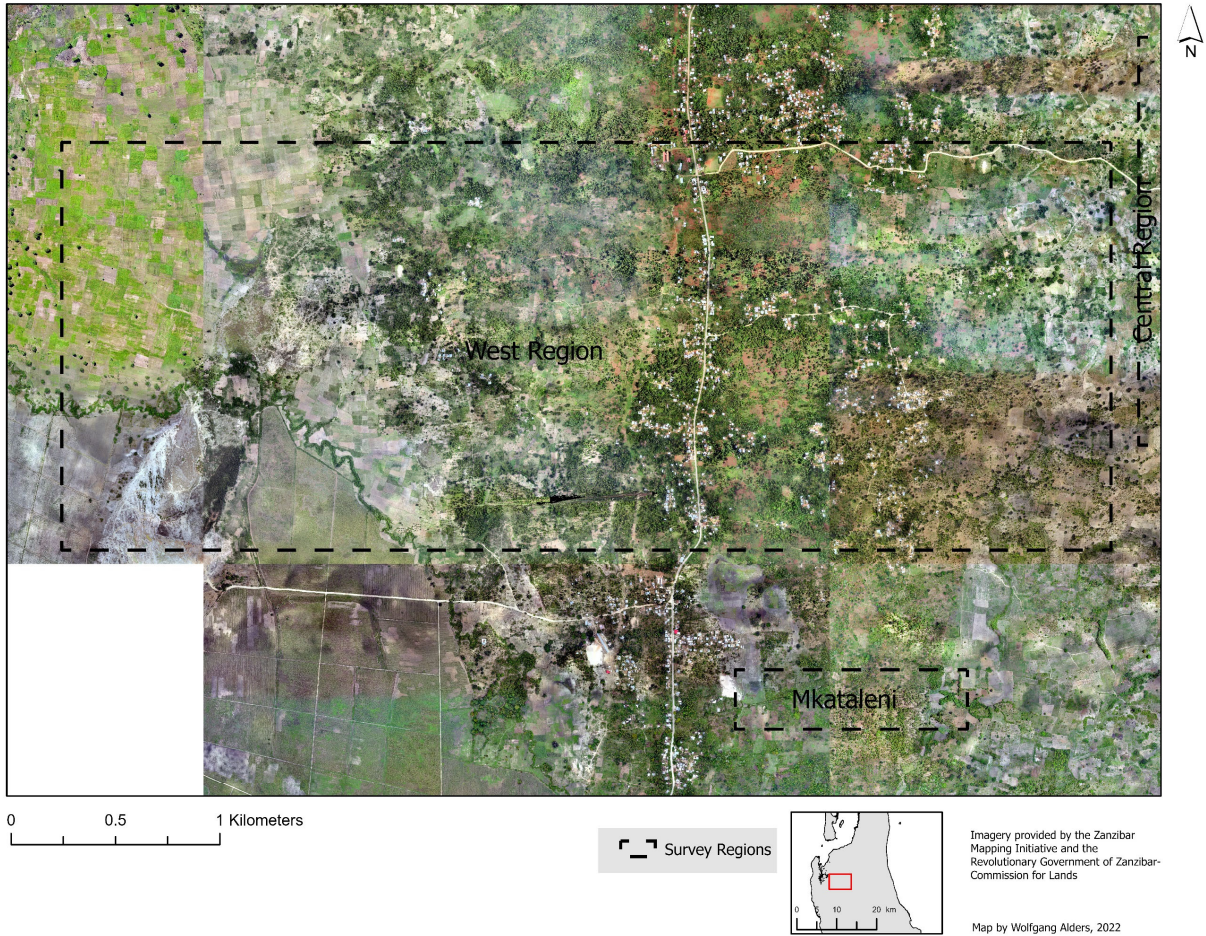


Figure 6-6. Imagery of the west survey region, provided by the Zanzibar Mapping Initiative.

West Region Sites: Including focused investigations of sites, we dug 280 shovel-test pits in total, of which 53, or 18%, produced archaeological materials. We recorded five defined artifact scatters, one indeterminate artifact scatter, and 16 find spots. From this data, we identified five new sites in the west region, and 43 site components (Figure 6-7). The following section describes the sites located in this region. Images and analyses of ceramics can be found in Chapters 13 and 14.

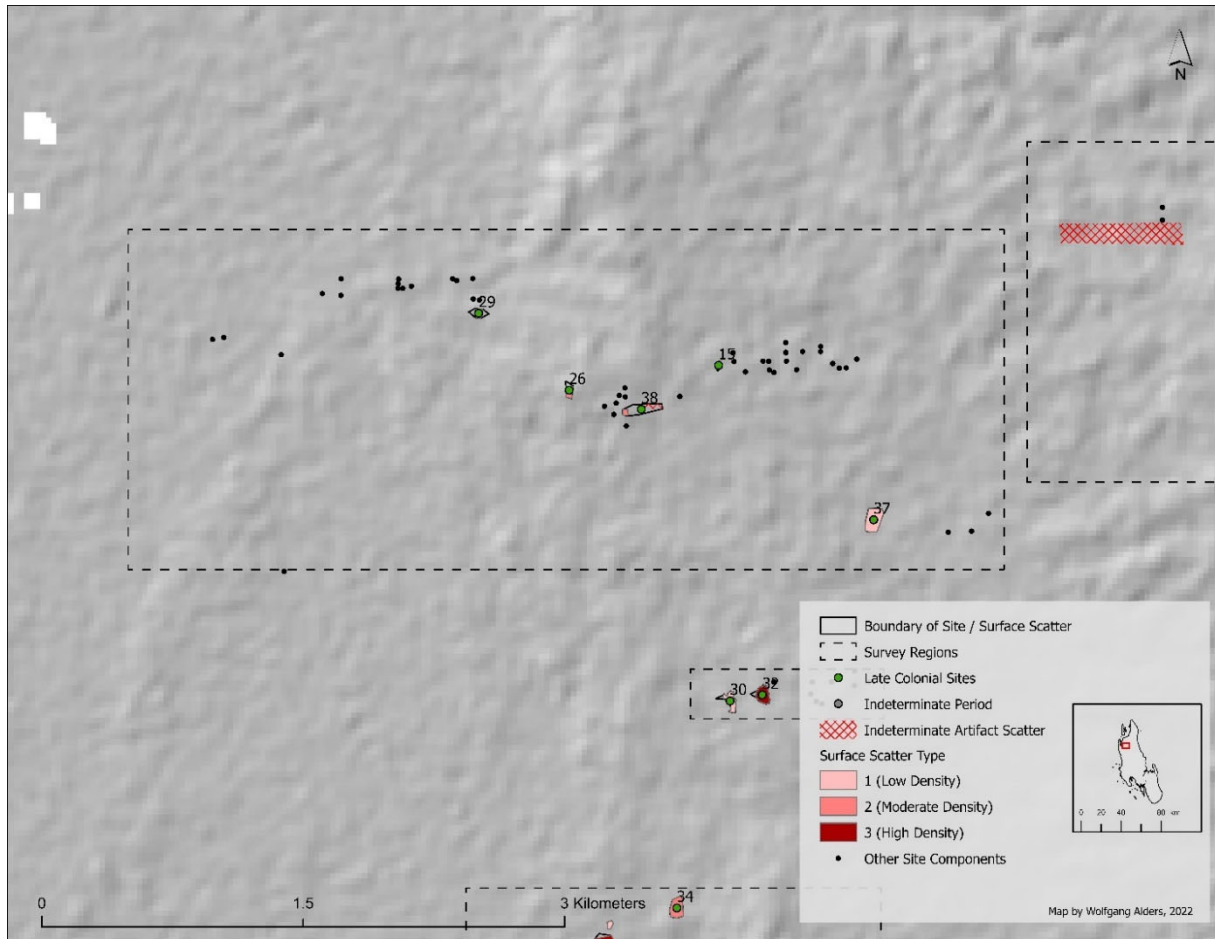


Figure 6-7. Site boundaries in the west survey region, with site components and artifact scatters.

Site Name	Donge Karange001 (IZAS0015), number 15 on the map
Size and Type	0.07 ha, a field house site
Date	1830-1900
Summary	The artifact scatter was a Type 3, high density. Though small, it has dense materials, suggesting a longer period of occupation than most field houses. Several shovel-test pits around the artifact scatter produced ceramics, extending the size of the site. The 1907 map shows several square settlement features near the site, suggesting that it persisted into the early 20 th century.
Finds	Finds at this site center around a small but dense surface scatter of local and imported ceramics. 19th-century materials include thin-walled red Indian earthenware with turned-out rims, European painted earthenware, and a sherd of 19th-century Chinese porcelain, with square pins like 19th-century materials from Fort Jesus (Kirkman 1974: 100-101). Most local ceramic sherds are undiagnostic. Materials that are possibly earlier include three locally produced sherds with impressions or dashes on their carinations which date from the 16th to 18th century.

Site Name	Donge Karange002 (IZAS0037), number 37 on the map
Size and Type	1.08 ha, ephemerally occupied
Date	1830-1900
Summary	This site is an artifact scatter found at the western edge of transect 10. The artifact scatter at the site is Type 1, which is the least dense. Only a carinated everted rim sherd hints at the possibility that the site dates to somewhere in the late second millennium. This site is spread over a relatively large area, at 1.08 ha. This may be a similar site type to Njua Kuu (see central region) although less intensively occupied, having late second millennium local ceramics but no European glazed earthenware. However, given the scantness of artifacts, it is difficult to describe this site by the category into which it falls, which is a small village. The area was not occupied for long, and probably represents seasonal activities related to agricultural labor. The 1907 map shows several square settlement features near the site, suggesting that human activities persisted nearby into the early 20 th century.
Finds	Some subsurface finds from shovel-test pits were found but the site is mainly a surface-level scatter of local undiagnostic pottery and daub.

Site Name	Donge Mbiji001 (IZAS0038), number 38 on the map
Size and Type	1.09 ha, a small village.
Date	1830-1900
Summary	This site is a dense artifact scatter that extends approximately 200 meters east under the surface, based on the results of shovel test-pit grids. The artifact scatter is Type 2, medium density. Based on the density of finds, the proximity of the site to other surrounding finds, and the location of the site directly adjacent to a modern community, it seems likely that this site was in fact a small 19 th /20 th -century village. The 1907 map shows several square settlement features near the site, suggesting that it persisted into the early 20 th century.
Finds	Artifacts include round and rolled lip spherical pots, 16 th to 18 th c. decorative types, 19 th c. decorative types, glass, polychrome painted cool whiteware, plain granite whiteware, blue painted comb, or Sino-Sanskrit pattern on European whiteware, red Indian earthenware, long-necked inflected pots, and several carinated everted rim cooking pots. Most local ceramic sherds at the site are undiagnostic.

Site Name	Donge Mbiji002 (IZAS0026), number 26 on the map
Size and Type	0.31 hectares, a hamlet.
Date	1830-1900
Summary	This site is an artifact scatter which is Type 2, medium density. It appears to have been occupied as a hamlet based on the density of artifacts. The artifacts date the site to the 18 th or 19 th centuries, though the lack of European industrial whitewares suggests that the site was occupied early in the 19 th century, similar to Njua Kuu (central region) and Donge Karange002. The 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	Artifacts include Chinese blue and white porcelain with the Chrysanthemum pattern, red Indian earthenware, a spherical pot with rolled rim sherd, everted rim cooking pots, local undiagnostic ceramics, glass, and iron.

Site Name	Donge Pwani002 (IZAS0029) number 29 on the map
Size and Type	0.4 ha, a hamlet
Date	1830-1900
Summary	This site is an artifact scatter with subsurface deposits. The artifact scatter is Type 2, medium density. Based on the site size and artifacts, this site was occupied as a hamlet into the 19 th century. The 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	Finds include a locally made lamp, local undiagnostic ceramics, type 17 ceramics, carinated vessels, carinated everted rim cooking pots, daub, and glass. Imported ceramics include polychrome painted cool whiteware, sponge-decorated whiteware, green transfer print ware, slipped, banded whiteware, red Indian earthenware, and plain rounded granite whiteware.

We also located and recorded 43 site components during this survey. 38 of these were undiagnostic ceramics, while five were identifiable as dating to the 19th century. A single indeterminate surface scatter was also located within transect 8.

6.6 Landscape and Sites of the Central Region

Context: The second region is the Central region. This area is located in the center, across the “spine” of the steep hills that peak in the center of the island and run from the south to north. This region has the highest elevation of the surveyed areas. The central region is relatively fertile compared to the east, but less fertile than the western areas and has shallower topsoil. The western side of the survey region receives between 2000-2500 mm a year, higher than most parts of the island, while the eastern half receives between 1500-2000 mm (Hardy et al. 2015). Rice is grown in small flat areas among the hills, and in the easternmost quarter of the region where the land drops in elevation and fields run east. Figure 6-8 shows UAV imagery for this region.

Clove plantations are historically attested in this area, and some areas are used for clove growing today. A part of the historical plantation area runs through the eastern side of this region (Sheriff et al. 2016: 20). The 1907 Khan Bahadur map labels the western part of the region as Kichanga, but shows no settlements there, while the eastern part of the region shows the town of Chaani and a smaller settlement just to the south at Kikobweni. Today, the town of Chaani is the largest settlement in the area, on hills overlooking the rice fields to the east.

Geology: The geology of the region is split between sandy clay Miocene marl in the western half of the region and Quaternary colluvial sediments over Miocene limestone bedrock in the east, forming the parent material for overlying dark red laterites. There is also a small

region of recent alluvial deposits over coralline limestone in the far east (Hardy et al. 2015: 4-5). Sediments range from dark brown *kinamo* soils in the west, to deeper red *kinongo* soils in the east. Streams flow from springs at higher elevations. Soil infiltration is slow to moderate, due to the clayey-ness of laterites and limestone marl.

Land Use: The topography of the region is comprised of undulating hills and valleys that rise toward the center of the island. Much of the land in the hilly areas is used today for pineapple farming. Otherwise, small garden plots, banana groves, and cassava fields dominate the landscape in areas adjacent to settlement. Beyond farmed areas, the landscape has uncultivated scrub brush and large baobab trees on the hillslopes to the east. The hilly areas have natural forests, pockets of which remain. The far eastern area is a flat sandy plain leading into the coralline limestone bedrock region, planted with rice and *Borassus* (*Borassus aethiopum*) palms.

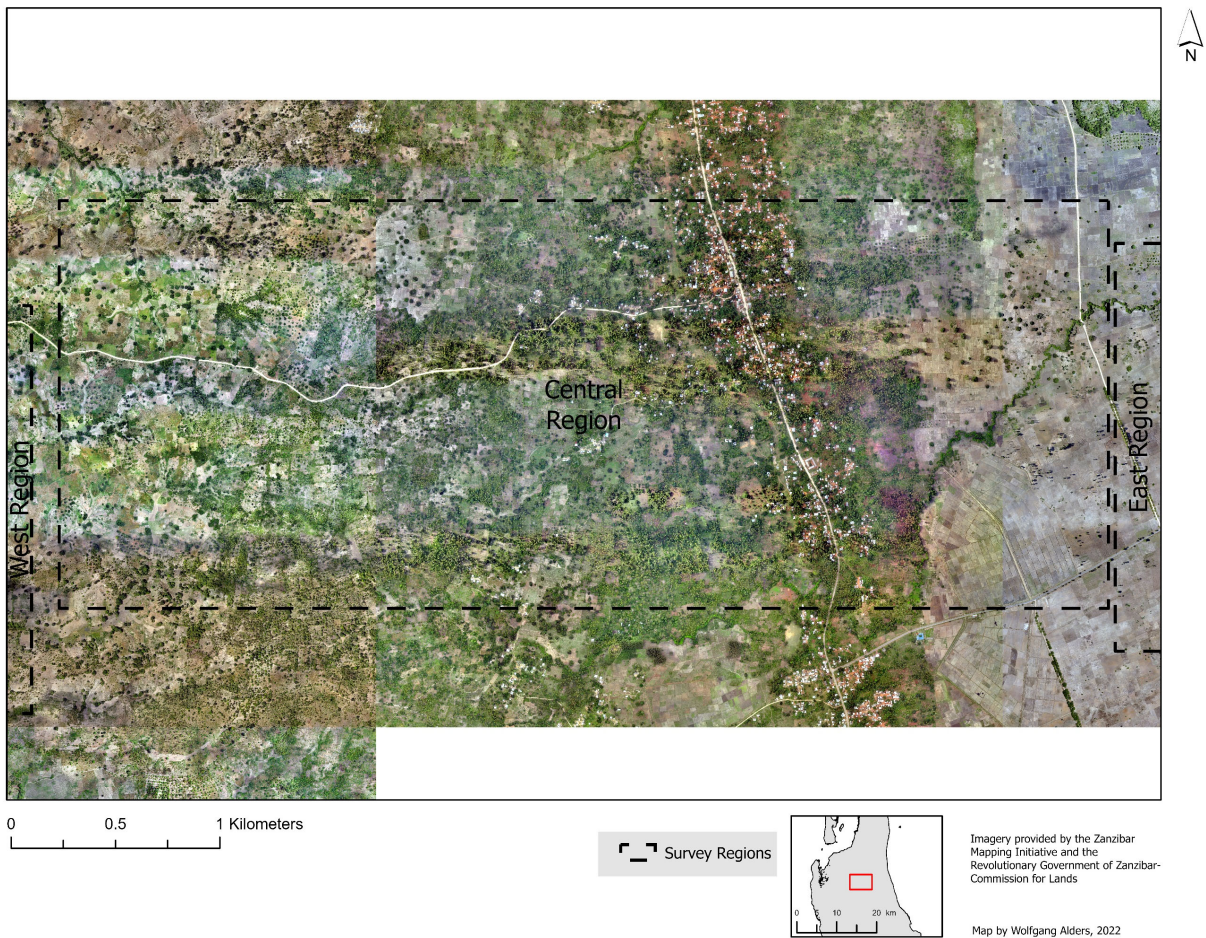


Figure 6-8. Imagery of the central region, provided by the Zanzibar Mapping Initiative.

Central Region Sites: Including focused investigations of sites, we dug 288 shovel-test pits in total, of which 111, or 38%, produced archaeological materials. We recorded 24 defined artifact scatters, two indeterminate artifact scatters, and 10 find spots (Figure 6-9). From this data, we identified 12 new sites in the central region, and 17 site components. The following section describes sites located in this region.

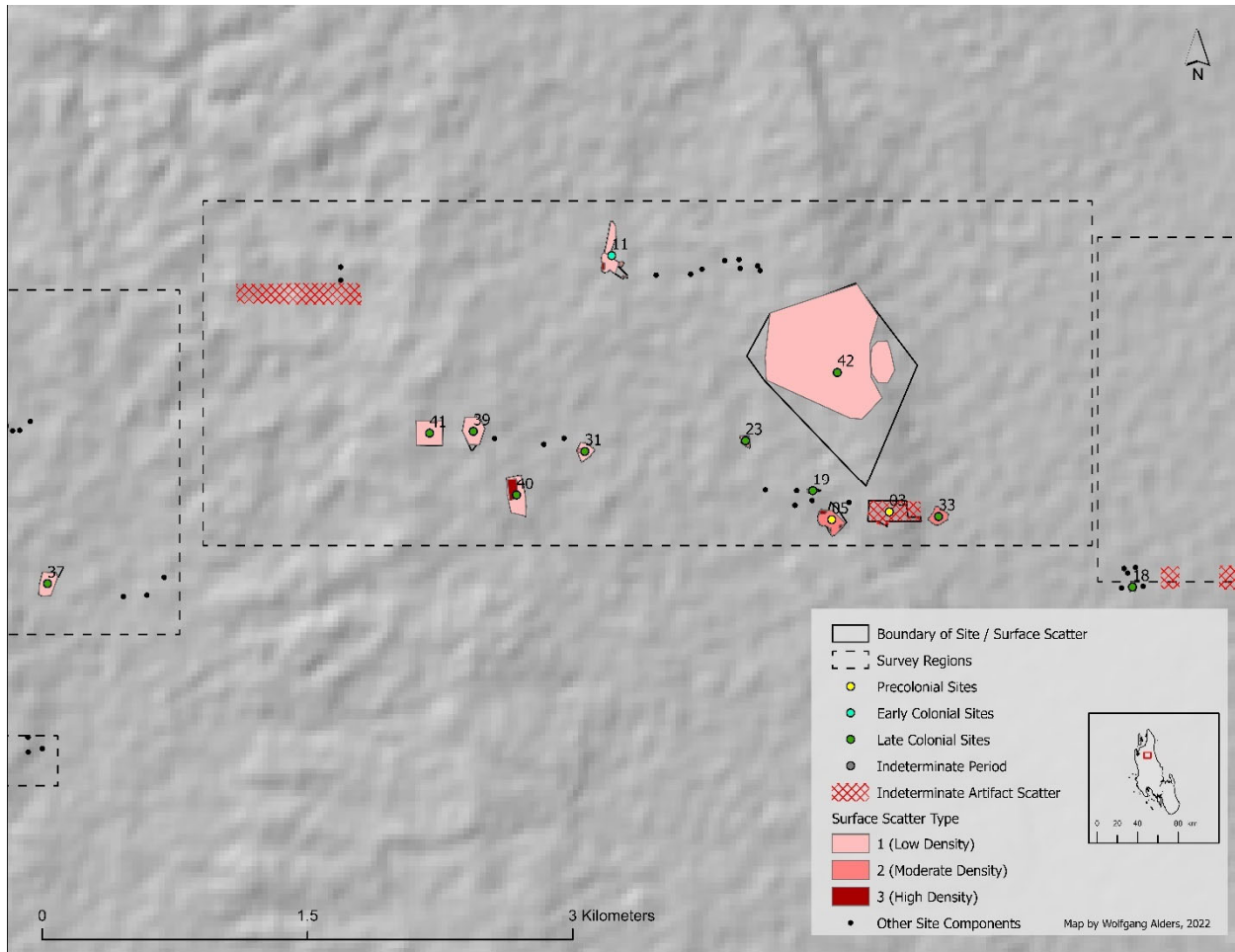


Figure 6-9. Sites of the central region, with site components and artifact scatters.

Site Name	Kichangani001 (IZAS0039), number 39 on the map
Size and Type	1.59 ha, a small village.
Date	1830-1900
Summary	This is a site in the highland area. The site is an artifact scatter (Type 1), with some subsurface deposits, on a ridge. The transect itself runs across rolling hills, with a site located on each ridgeline.
Finds	The finds include local undiagnostic ceramics, round spherical pots, everted rim cooking pots, carinated vessels, type 17 ceramics, daub, and beads. Imported ceramics include polychrome painted cool whiteware, hand-painted blue pearlware with broad brush strokes, Chinese blue and white porcelain, and blue Willow pattern transfer print ware. These imports suggest an early-mid 19th-century date. A few unnamed square dwellings are present on the 1907 map near this site, suggesting that it persisted into the early 20 th century.

Site Name	Kichangani002 (IZAS0041), number 41 on the map
Size and Type	2.04 ha, a small village.
Date	10 th century, 1830-1900
Summary	This is another site along the same transect as Kichangani001, on a hilly ridgeline. The site has a surface artifact scatter (Type 1) with one subsurface deposit in the shovel-test pit 16-as1test1. The sub-surface deposit at Kichangani002 is unusual for 19th-century sites and suggests that at least some part of the site was occupied much earlier than the 19 th century. While the area was reoccupied in the 19 th century, the 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	Artifacts above ground include local undiagnostic ceramics, carinated everted rim cooking pots, glass, Khunj ware, red Indian earthenware, Chinese blue and white porcelain, grey and black Chinese porcelain, warm polychrome hand-painted blue pearlware, a dark blue transfer print ware with “field dots” motif, and an Omani coin dated to the reign of the Sultan Barghash (1870-1888). These finds suggest a mid- to late-19th-century date.

Site Name	Kibirikani (IZAS0040), number 40 on the map
Size and Type	1.99 ha, a small village.

Date	1830-1900
Summary	This site was not located during the transect survey, but through a local resident's directions. The site is known locally due to the presence of a large stone feature, on a raised mound. The stone feature is described further in (Chapter 9), but it seems to be some sort of oven with a chimney, suggested by the semi-circular, lime plastered vault within. One possibility is that this was part of a facility for drying coconuts to produce copra. Another possibility is that this is a simple vertical updraft kiln for ceramic production. The structure was not made within the living memory of anyone we spoke to, although we did thoroughly search for interlocutors. Around the stone feature, relatively dense deposits are found on the surface as well as below the ground. In a cassava field to the northeast, a dense (Type 3) artifact scatter is also present. The stone architecture at the site and the density of the ceramics suggests that the site may have been a relatively important 18 th to 19 th -century settlement. This site is not present on the 1907 map, suggesting that it did not persist into the 20 th century, which would explain why residents are not able to interpret the stone feature.
Finds	Finds include local undiagnostic ceramics, everted rim cooking pots, carinated vessels, rolled rim spherical vessels, type 17 ceramics, daub, glass, and iron. No other 19 th -century decorative motifs were located. Imported ceramics include Chinese blue and white porcelain, Chinese grey and black porcelain, polychrome painted cool whiteware, warm polychrome hand painted blue pearlware, hand painted blue pearlware with broad brush strokes, English transfer print ware, and un-scalloped, impressed blue edged ware. The amount of Chinese blue and white porcelain at this site exceeds the amount of any other site by a good margin. Unfortunately, the imported ceramics for this site were lost before being photographed, preventing further analysis of the motifs on the Chinese blue and white sherds. The imported ceramics and local decorative motifs suggest that the site was occupied in the early to mid-19 th century, but possibly was founded as early as the 18 th century.

Site Name	Chaani (IZAS0042), number 42 on the map
Size and Type	~60 ha, a town.
Date	1830 to the present
Summary	<p>This was the largest site recorded during survey, spanning approximately 60 hectares. The method of site size delineation, using STPs at intervals in the cardinal directions, likely was not sufficient for recording the size of this site, due to limited time. Initially, we recorded STPs at intervals of 40 meters, but seeing that every STP was producing positive results, we extended the interval to 75, and then 100 meters. For the north, west, and east delineation lines, we reached areas with two negative STPs, but in the south direction, no negative STPs were found before it became necessary to move on from the location. The site is within the modern town of Chaani, suggesting that the site has been continually occupied from initial settlement to the present day. The site and modern town are perched on the ridge of a steep hill, overlooking the rice plain to the east (see Figure 6-8). On the slopes of the hill, more dense artifact scatters (Type 2) were found, suggesting that these artifacts were deposited from uphill through colluvial processes. Within the site, subsurface deposits between 10-20 cm were common.</p> <p>There are deep, dark red soils throughout, with unclear or non-existent horizon boundaries. The geomorphology of the site suggests long-term occupation concurrent with pedogenesis within a base of red lateritic sandy clay. Also present at the site, especially on the slope going down toward the rice plain, are several large, old baobab trees, suggestive of long-term settlement (see Chapter 9). Mixed garden farming, coconut, and clove trees are planted in and around the modern town. One area in a north-central location had the deepest and most dense distribution of artifacts (artifact scatter, Type 3) located near several large baobab trees. This area was also pointed out to us by local interlocutors as the place in which the first <i>Sheha</i> (mayor, or sheikh) of Chaani lived.</p> <p>The size of the site suggests that this location was a central hub during the 19th century and continued to be a central place during the 20th century and into the present. The 19th-century town probably grew up around a village that was already established in the 18th century and may have been founded as early as the 16th century, based on artifacts found. The 1907 map shows a large settlement the roughly accords with the boundaries of the site that were established through survey.</p>
Finds	Artifacts found in the central artifact scatter include local undiagnostic ceramics, everted rim cooking pots, carinated everted rim cooking pots, an earthenware lamp, rolled spherical vessels, open bowls with applied bases, indeterminate local coarse earthenware rim types, daub, glass, type 17 ceramics, and other 19 th -century motifs. Several different Chinese blue and white porcelain motifs were recorded: Chrysanthemum pattern motifs, bare ring interior types, comb, or sino-sanskrit pattern, trellis patterns, and banded patterns. Another less common type of Chinese blue and white porcelain was also recorded, a plate from the Raoping kiln in Guangdong. Other imports include red Indian earthenware, plain granite whiteware, slipped banded whiteware, polychrome painted cool whiteware, stenciled, or sprig-painted whiteware, unscalloped impressed blue edged ware, moulded edge creamware, warm polychrome hand-painted blue pearlware, red Indian earthenware with black painted lines, and cut-sponge decorated ware. Two other wares were found with indeterminate provenance: one is a small buff unglazed earthenware sherd with "pin-prick" impressions in triangular shapes. Another is a hard, thick brown/grey jar with a large, curved handle and combed or rouletted lines. I discuss these wares in Chapter 14. No comparative examples for this vessel type been found. The artifacts from the site suggest the main phase of occupation began in the 18 th century and continued through the 19 th -20 th centuries to the present.

Site Name	Kikobweni002 (IZAS0033), number 33 on the map
Size and Type	0.71 hectares, a hamlet
Date	1830-1900

Summary	This site is located at the base of a hill and at the start of the rice plain which stretches east. The site is likely related to agricultural activities in the rice plain. The 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	Finds include spherical pots, type 17 ceramics, plain carinated vessels, red Indian earthenware, plain granite whiteware, daub, and local undiagnostic ceramics.

Site Name	Kikobweni001 (IZAS0003), number 03 on the map
Size and Type	2.8 ha, a large artifact scatter (Type 1) produced by colluvial deposits from sites upslope (Kirikacha and Chaani).
Date	12 th to 19 th centuries
Summary	This site runs along the slope down from a plateau of good soil to the rice plain which lies below and to the east. It is difficult to ascribe a site type to this location since it is located on a slope and may represent colluvial deposition from higher ground in addition to <i>in situ</i> occupation. The site is located just downslope from the 11 th -14 th -century site at Kirikacha. The 1907 map shows several square settlement features at the site, suggesting that the 19 th /20 th century materials may be from dwellings that persisted into the 20 th century.
Finds	Artifacts include spherical pots, open bowls with plain rims, open bowls with thickened rims, type 17 ceramics, everted rim cooking pots, carinated vessels, spherical pots with rolled rims, daub, iron, polychrome painted cool whiteware, one small singular sherd of sgraffiato, and local undiagnostic ceramics.

Site Name	Kikobweni003 (IZAS0019), number 19 on the map
Size and Type	0.14 ha, a small hamlet.
Date	1830-1900
Summary	This site is across the main road from the 11 th -14 th c. site of Kirikacha. The site is an artifact scatter (Type 2). A resident showed us this site, which is near a cotton tree that he said his grandfather planted. The 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	Finds consist of local undiagnostic ceramics, carinated vessels, daub, Chinese blue and white porcelain with a Chrysanthemum pattern, polychrome painted cool whiteware, a medium blue transfer print, and warm polychrome hand-painted blue pearlware.

Site Name	Kichangani003 (IZAS0031), number 31 on the map
Size and Type	0.65 hectares, a hamlet.
Date	1830-1900
Summary	This site is third in a row of sites found on ridges along a transect through a hilly region, though this site is in a flatter clearing compared to the previous two. The site is a Type 2 artifact scatter within a larger Type 1 scatter, with few subsurface deposits. The 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	The artifacts present include type 17 ceramics, other 19 th -century decorations, local undiagnostic ceramics, everted rim cooking pots, iron, Chinese blue and white porcelain, polychrome painted cool whiteware, sponge-decorated whiteware, cut-sponge decorated whiteware, slipped banded whiteware, and transfer print ware.

Site Name	Kikobweni004 (IZAS0023), number 23 on the map
Size and Type	0.26 ha, a hamlet.
Date	1830-1900
Summary	This site is an artifact scatter (Type 2) southwest of Chaani. The 1907 map does not show any settlement in the area, suggesting that it was abandoned prior to the 20 th century.
Finds	Artifacts recorded include everted rim cooking pots, carinated everted rim cooking pots, red Indian earthenware, and local undiagnostic ceramics.

Site Name	Njua Kuu001 (IZAS0011), number 11 on the map
Size and Type	0.77 hectares, a small village.
Date	1699-1830
Summary	This site has multiple dense artifact scatters, connected throughout by a less dense scatter. Two artifact scatters within the site are Type 3 (most dense) and one is Type 2 (medium dense). The large area in between these scatters is covered by a Type 1 scatter (least dense). Though it is counted as a single site, it may have been comprised of three hamlets, each represented by one of the denser artifact scatters. It lies along what is purportedly an old, locally significant road, <i>njua kuu</i> , which is an Unguja dialect rendering of standard Swahili, <i>njia kuu</i> , or main road. The path today is a simple dirt road, and settlement in the area is scant. Njua Kuu is not present on the 1907 map, indicating that settlement did not persist there into the 20 th century. Furthermore, the lack of common 19 th -century imports like European whiteware on a site of this size suggests that the site was primarily occupied and abandoned before the main developments of the 19 th -century clove plantation system.
Finds	The artifacts collected include local undiagnostic ceramics, open bowls with applied bases, everted rim cooking pots, carinated vessels, 17 th -century decorations, 19 th -century decorations, Chinese blue and white porcelain, beads, daub, iron and glass.

Site Name	Kirikacha001 (IZAS0005), number 05 on the map
Size and Type	1.67 ha, a small village.

Date	1000-1400, possible 7 th to 9 th century date from charcoal
Summary	This site, along with Mwanakombo, is an example of an early second-millennium precolonial village site. The site is located on a slightly raised bluff, on the bend of a small stream. The modern site is used for an irrigated agricultural project, with water from the stream being pumped up to furrows where chili, cassava, and spinach is grown. The name Kirikacha is a phonetic rendering of the English word agriculture into Swahili. The site was identified through a dense artifact scatter (Type 3), but further testing confirmed deposits of up to 80 cm deep in some places. The site, like Chaani, overlooks a rice plain to the east. The 1907 map shows no settlement at this location.
Finds	Imported pottery is primarily green and yellow late sgraffiato ware, some with repair holes. We also collected a small number of sherds of Khunj, polychrome painted cool whiteware, and plain granite whiteware, suggesting occupation in the 19th century as well. Local ceramics include 11th-12 th -century late TIW/Tana decorations, 11th-14 th -century neck punctating decorations, carinated spherical pots, spherical pots, open bowls with plain rims, type 17 ceramics, everted rim cooking pots, carinated vessels, vessels with high shoulders and inflected necks, vessels with thickened carinations, spherical pots with rolled rims, lamps, and local undiagnostic ceramics. The assemblage is particularly characteristic of the period from 1100 to 1400 AD, specifically the late sgraffiato, the neck punctating wares, and the wares with thickened carinations and hatches over the carination. Also found at the site were fragments of a mofa oven, suggesting bread baking.

6.7 Landscape and Sites of the East Region

Context: The third region is the eastern region, which is the most starkly different in terms of environment from the others. This area is comprised of a series of large flat plateaus that drop off in sharp cliffs every kilometer or two, as one travels from the central hills toward the east coast. The eastern region lies outside the historically attested plantation areas (Sheriff et al. 2016); thus, clove and coconut plantations are not known in this region. Like the rest of the survey universe, this area is first recorded in detail on the Khan Bahadur 1907 survey map for the British Survey of India, establishing several persistent place names, including the Ziwa Kibokwa, a small marshy lake. However, the map lists only a single settlement in the area that our survey covered, the village at Kandwi. Figure 6-10 shows imagery for this region.

Geology: The west part of this region is a rice valley just east of Chaani, which is in an area formed of recent alluvial soils and laterites. This lies directly over quaternary coralline limestone bedrock, which becomes exposed to the surface just east of the rice valley and continues east until it hits the sea. This bedrock lies over Miocene limestones, which ultimately rest on a bed of Miocene sandy clay marl. Topsoil is thin or nonexistent and is known as *uwanda* soil (Juma 2004: 43), which is a red laterite that erodes directly from the limestone bedrock. Approximately 1 kilometer from the coast, seawater invades fresh water sources at depth, though good quality water is still present in some places where perched aquifers sit about the level of seawater intrusion (Hardy et al. 2015). Soil infiltration is slow in the west due to clayey soils, but high throughout the rest of the region due to the karstic limestone landscape and lack of soil. Streams are not found above ground in most of the survey region.

Land Use: Much of the land is scrub brush, sometimes up to four or five meters high, with narrow paths cut through the brush and cleared areas for cultivation. Soils are shallow, and much of the land consists of exposed coralline limestone bedrock. The exposed coralline limestone bedrock is karstic, meaning that in many areas there are caves and holes in the sharp craggy limestone surface, making it difficult to walk without sturdy shoes. Exposed coral limestone bedrock continues directly up to the beachline, where white sandy beaches have made the region an attractive area for tourists in recent history. The survey region also falls over the northern tip of the Kiwengwa Pongwe forest, which stretches to the south. Modern settlements exist on the coastline and in places where soils are deep enough to farm and build houses with stable foundations, and pockets of land are farmed or kept fallow on rotation, using swidden agricultural techniques.

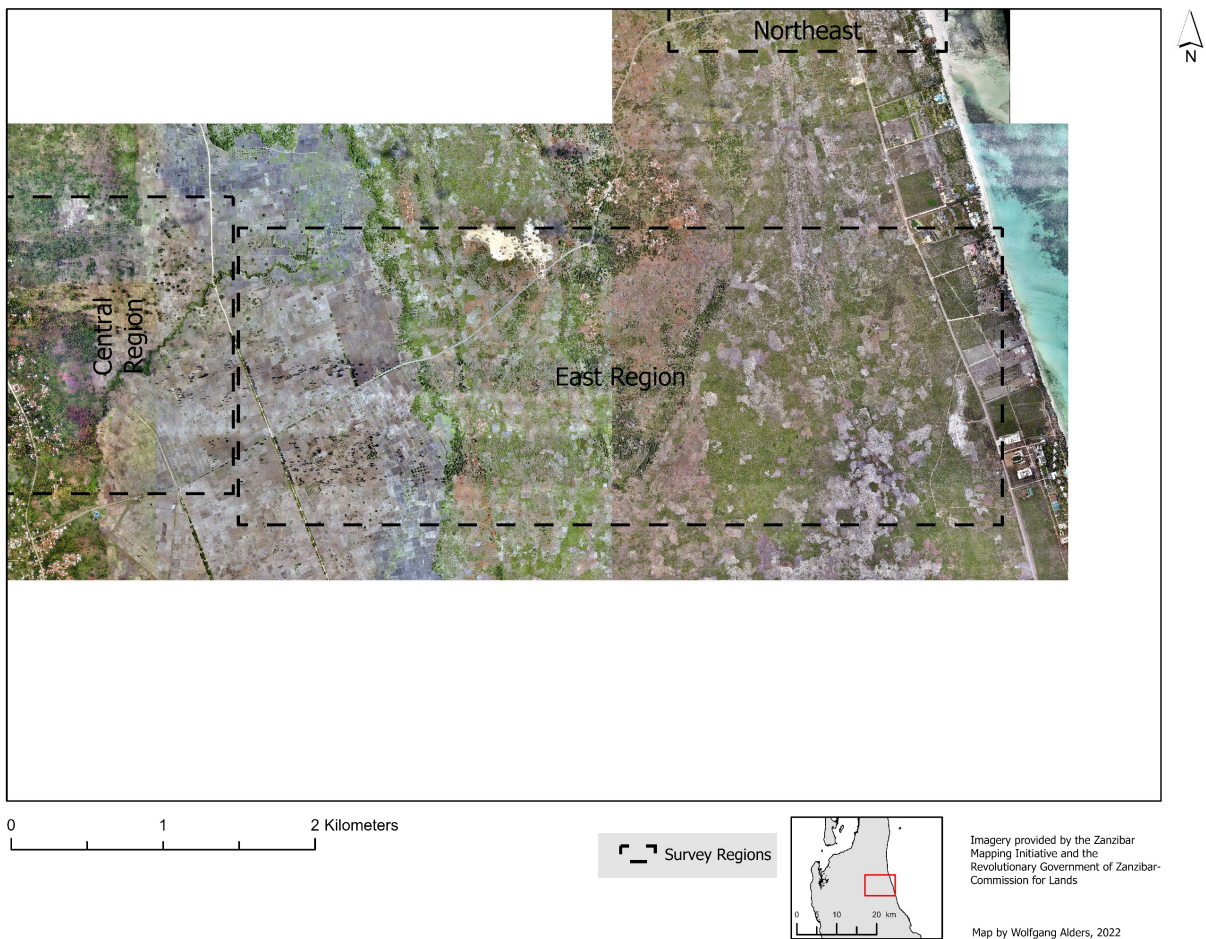


Figure 6-10. Imagery of the east region, provided by the Zanzibar Mapping Initiative.

East Region Sites: We investigated the east region through transects 21, 22, 24, 25, 26, and 28, which amounted to 66 systematic shovel-test pits on 30-STP transect grids (Figure 6-11). Of these, six, or 9%, produced archaeological materials. The low number of STPs in the eastern region in general was the result of dense brush and coral bedrock on the surface in many areas, which prevented us from digging grids as we were able to in other areas. In many places where soils were too shallow to dig, we resorted to surface survey.

Including focused investigations of sites, we dug 120 shovel-test pits in total, of which 25, or 20%, produced archaeological materials. We recorded 13 defined artifact scatters, six indeterminate artifact scatters, and 42 find spots. From this data, we identified 16 new sites in the east region, and 36 site components. The following section describes sites located in this region.

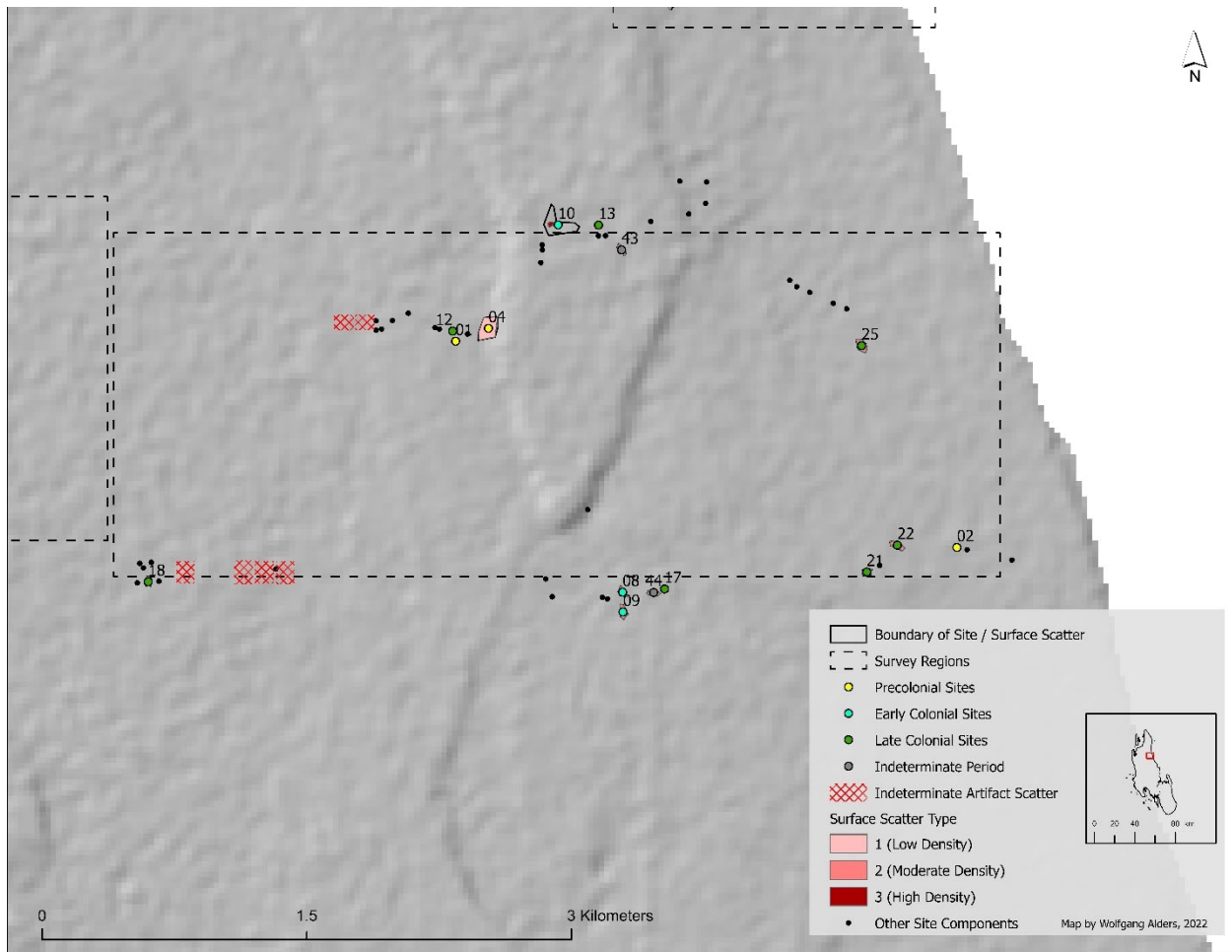


Figure 6-11. Sites in the east survey region, with site components and artifact scatters.

Site Name	Chaani Kibokwa001 (IZAS0018), number 18 on the map
Size and Type	0.14 ha, a large field house or hamlet.
Date	1830-1900
Summary	This site lies on the western edge of a large rice plain, directly east of the hills along the central spine of the island. This rice plain is smaller than those to the west, but it nevertheless is a substantial fertile area within the eastern zone. The site consists of an artifact scatter (Type 2). The 1907 map shows no settlement at this location.
Finds	Finds include daub and plain granite whiteware in the scatter. These imports suggest a later 19 th century or early 20 th century date. Daub was also found in subsurface deposits. The lack of locally produced coarse earthenware suggests it was briefly occupied, and the site likely had an agricultural function, such as for rice processing, or as a field house.

Site Name	East Kandwi001 (IZAS0025), number 25 on the map
Size and Type	0.31 ha, a hamlet, though it likely was only occupied seasonally for agricultural planting in the coral bedrock areas.
Date	1830-1900
Summary	This site is in a coral bedrock area, in a cleared patch of agricultural land that is planted through the agricultural method called <i>kupiga makongo</i> , described in detail in Chapter 6. The site is an artifact scatter (Type 2). The 1907 map shows no settlement at this location.
Finds	Finds consist of local undiagnostic ceramics, everted rim cooking pots, black open bowls with thickened rims, and daub. Everted pots have straight necks and undecorated shoulders.

Site Name	Kandwi Kibokwa001 (IZAS0017), number 17 on the map
Size and Type	0.10 hectares, a field house.
Date	1830 to present
Summary	This site is a medium density artifact scatter (Type 2). The site is located in an area cleared for modern agricultural work. No date can be ascribed due to the lack of diagnostic ceramics. The site was likely used

	seasonally for agricultural work in the past, based on ethnographic accounts (e.g., Middleton 1961) and modern analogues. The site is found in a coral bedrock area and involves modern planting within coral holes that were cut using the <i>kupiga makongo</i> method (see Chapter 6). The 1907 map shows no settlement at this location.
Finds	Undiagnostic locally produced ceramics.

Site Name	Kandwi Kibokwa002 (IZAS0008), number 08 on the map
Size and Type	0.18 ha, a small hamlet, though it is more likely the spread-out remains of seasonal occupations for agricultural labor.
Date	1500-1830
Summary	This site is an artifact scatter (Type 2) within a coral bedrock area that was recently cleared of brush, with agriculture involving coral holes that were cut using the <i>kupiga makongo</i> method. The 1907 map shows no settlement at this location.
Finds	The site contains local undiagnostic ceramics, undecorated carinated everted rim cooking pots, and a sherd with square punctates, characteristic of the 16th-18th centuries (Kirkman 1974: 219), though the diagnostic sherds from this site were lost and not analyzed.

Site Name	Kandwi Kibokwa003 (IZAS0009), number 09 on the map
Size and Type	0.2 ha, an area of seasonal occupation for agricultural labor.
Date	1500-1830
Summary	This site is an artifact scatter (Type 2) within a coral bedrock area that was recently cleared of brush, where agriculture involving coral holes that were cut using the <i>kupiga makongo</i> method is used. The site is in an area of modern agricultural activities that are likely similar to ones in the past, and which have cleared the brush to reveal archaeological materials. Its size would lead us designate it as a hamlet, but its material culture suggests it is the remains of seasonal occupations of agricultural laborers. Based on the artifacts, this site likely dates from the early colonial period and into the present, as a seasonally occupied campsite used for agricultural work. The 1907 map shows no settlement at this location.
Finds	The artifact scatter contains locally made everted rim cooking pots with carinations, a local pot with an inflected, high shoulder, a local pot with a long, inflected neck, local undiagnostic ceramics, and a single find of a base sherd of Bahla ware.

Site Name	Kandwi Kibokwa004 (IZAS0044), number 44 on the map
Size and Type	0.18 hectares, an area of seasonal agricultural labor
Date	Indeterminate
Summary	This site is a low-density artifact scatter (Type 1) within a coral bedrock area that was recently cleared of brush, where agriculture involving coral holes that were cut using the <i>kupiga makongo</i> method is employed. The site is in an area cleared by modern agricultural work. The 1907 map shows no settlement at this location.
Finds	The site is a small artifact scatter with local undiagnostic ceramics, so no exact date can be confirmed.

Site Name	Kandwi001 (IZAS0010), number 10 on the map
Size and Type	1.53 ha, a small village.
Date	1500 to the present
Summary	This site is the largest settlement in the eastern survey area. It is in an area with good soils, on a plateau overlooking a plain of scrub brush and coral limestone bedrock. The site also encompasses several small ponds, a rare hydrogeological feature in Zanzibar in general, but made possible by the soil and karstic bedrock formations in the specific microenvironment. The site is found in and around small garden plots of cassava and fruit orchards, as well as near modern houses. The overall assemblage suggests dates from the 15th to 19th centuries, and likely to the present day, as the site lies near the modern town of Kandwi. The site lies near several groves of large baobab trees. It is perched on a coralline limestone plateau with a single small, narrow path that extends two and a half kilometers to the eastern sea, which villagers use today to access the sea. This settlement is the only one in the eastern region that is recorded on the 1907 map.
Finds	A small number of artifacts there include locally made pottery with early Tana/TIW decorative features (Fleisher 2003: 236; Horton 1996: 253). Their occurrence stretches back the earliest possible date of occupation of the site to the 9 th or 10 th centuries. However, most of the finds date from the 15 th century onwards, and include blue and grey Islamic monochromes, type 17 ceramics, Chinese blue and white porcelain, red Indian water jug sherds, European polychrome hand-painted cool wares, a black English transfer print with a Willow pattern, and local spherical pots and black plain open bowls. Other artifacts include local undiagnostic ceramics, daub, glass, iron, beads, and spindle whorl fragments.

Site Name	Kandwi002 (IZAS0013), number 13 on the map
Size and Type	0.02 ha, a small field house.
Date	1830 to 1900
Summary	This site is found directly east of the main site of Kandwi, within a coral bedrock area. It is a small artifact scatter (Type 2). The site likely may represent a homestead which was cleared and developed beyond the traditional boundaries of Kandwi in the 19 th century, following population increases and demographic shifts. The 1907 map shows no settlement at this location.

Finds	The site contains locally made everted rim cooking pots, red Indian earthenware, European hand-painted cool polychrome whiteware, 19th-century decorative motifs, and local undiagnostic ceramics.
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Site Name	Kandwi003 (IZAS0043), number 43 on the map
Size and Type	0.12 ha, a hamlet-sized area of seasonal agricultural activity.
Date	Indeterminate
Summary	This site is within the area of good soil on the plateau by the modern town of Kandwi. It is a relatively small artifact scatter (Type 2), within an area of mixed soil and coral bedrock. The 1907 map shows no settlement at this location.
Finds	Found at the site was a sherd decorated with a horizontal line under the rim and dashed lines on the carination, of indeterminate date, and unlike others found in the survey. The site also has local undiagnostic ceramics, local ceramics with everted rim cooking pots, and local sherds with inflected high shoulders.

Site Name	Mwanampaji001 (IZAS0002), number 02 on the map
Size and Type	0.09 ha, a field house that was likely a seasonal occupation for agricultural labor.
Date	1000-1400 CE
Summary	This site is found within an area cleared of scrub brush, on coral limestone bedrock that is used for planting through the method of cutting coral holes. The site is used as an area of modern agriculture, and likely was also seasonally occupied in the past for planting. Artifacts were found in a scatter (Type 2). The 1907 map shows no settlement at this location.
Finds	Artifacts include local ceramics with incised triangular decorations, local carinated everted rim cooking pots, local pots with inflected high shoulders, local long necked inflected pots, and local undiagnostic ceramics. These diagnostic ceramics suggest an early date for the site, possibly from the early second millennium, with a possible reoccupation in the late second millennium based on the presence of carinated everted rim cooking pots. No imported ceramics were found.

Site Name	Mwanampaji002 (IZAS0022), number 22 on the map
Size and Type	0.23 ha, a hamlet-sized area of season agricultural activity.
Date	1830 to present
Summary	This site is found within a cleared area, on coral limestone bedrock that is used for planting through the method of cutting coral holes. The site is used as an area of modern agriculture, and likely was also seasonally occupied in the past for planting. Artifacts at the site were found in an artifact scatter (Type 2). The 1907 map shows no settlement at this location.
Finds	Chinese grey stoneware or a degraded form of Chinese blue and white pottery, European hand-painted polychrome cool whiteware, type 17 local decorated pottery, daub, glass, long-necked inflected local earthenware, and local undiagnostic ceramics.

Site Name	Mwanampaji003 (IZAS0021), number 21 on the map
Size and Type	0.17 ha, a hamlet-sized area of season agricultural activity.
Date	1830 to present
Summary	This site is found within an area cleared of scrub brush, on coral limestone bedrock that is used for planting through the method of cutting coral holes. The site is used for modern agricultural activities, and likely was also seasonally occupied in the past for planting. Artifacts at the site were found in an artifact scatter (Type 2). The 1907 map shows no settlement at this location.
Finds	Artifacts include type 17 ceramics, plain straight-walled and curve-walled carinated everted rim cooking pots, European hand-painted warm polychrome glazed blue pearlware, plain granite whiteware, glass, iron, and local undiagnostic ceramics.

Site Name	West Kandwi001 (IZAS0004), number 04 on the map
Size and Type	1.15 ha, a small village-sized area of season agricultural activity. The low density of artifacts at the site suggests seasonal rather than full-time occupation.
Date	1000-1400 CE
Summary	This site is found within a cleared area in scrub brush, on coral limestone bedrock that is used for planting through the method of cutting coral holes. The site is used for modern agricultural activities. This site is located directly west of the plateau of deeper soil where the modern town of Kandwi stands, directly at the bottom of the slope coming down from the plateau. Artifacts were found in a low-density scatter (Type 1). Some evidence for settlement just north of this site exists on the 1907 map.
Finds	Artifacts include 11th-14 th -century punctate neck pottery, spherical pots, black open bowls with plain rims, everted rim cooking pots, type 17 ceramics, and local undiagnostic ceramics. These artifacts suggest periods of occupation from the 11th-14th century.

Site Name	West Kandwi002 (IZAS0012), number 12 on the map
Size and Type	0.01 ha, a small, seasonally occupied field house.
Date	1830 to present

Summary	This site is found within a cleared area in scrub brush, on coral limestone bedrock that is used for planting through the method of cutting coral holes. The site is used as an area of modern agriculture. This site is located directly west of the plateau of good soil where the modern town of Kandwi stands, though slightly further west than West_Kandwi001, at the bottom of the slope coming down from the plateau. Artifacts were found in a low-density artifact scatter (Type 1). The 1907 map shows no settlement at this location.
Finds	Artifacts include carinated everted rim cooking pots and local undiagnostic ceramics.

Site Name	West_Kandwi003 (IZAS0001), number 01 on the map
Size and Type	0.02 ha, a small, seasonally occupied field house.
Date	1000-1400 CE
Summary	This site is found within a cleared area in scrub brush, on coral limestone bedrock that is used for planting through the method of cutting coral holes. The site is used as an area of modern agriculture. This site is located directly west of the plateau of good soil where the modern town of Kandwi stands. The 1907 map shows no settlement at this location.
Finds	Ceramics consist of local undiagnostic as well as decorated ceramics including neck punctating wares, suggesting a date of the 11 th -14 th centuries CE.

6.8 Landscape and Sites of the Mahonda Region

Context: The Mahonda survey region encompasses the modern town of Mahonda, which lies across two *shehia*: the *shehia* of Mahonda Mkataleni in the north, and the *shehia* of Mahonda in the south. This region is located south of the Mkataleni and West survey regions. We chose this area to investigate areas that Croucher (2006) recorded in the early 2000s, since this was the only area in northern Zanzibar with confirmed 19th-century inland plantation sites prior to this survey. As part of her survey of plantation areas, Croucher recorded 11 site components around the modern town, in areas that she was shown by residents during oral history interviews (Croucher 2006: 363-368). These plantation sites were primarily documented as places associated with historical areas in the oral traditions of residents. Croucher recorded the surface finds in a general area around these places. A few sites also included stone foundations or coral rag rubble, which constituted the remains of house structures. The aim of our survey in this area was to investigate the sub-surface deposits of an area of known 19th-century settlement, to see whether earlier sites lay below the plantation sites, or whether 19th-century sites produced their own sub-surface remains. We located several other sites in this region based on conversations with residents. The site of Mwanakombo was located by chance, as we were walking from the end of one transect to another.

Geology: This survey region has a similar geological profile to the West region. In the western half of the region, the geology is comprised of quaternary soils, laterites, and alluvial and colluvial sediments over a base of coralline limestone, which itself lies over Miocene sandy clay marl. In the hillier region to the east, sandy clay marls are exposed to the surface, under thin brown sandy clay *mchanga* topsoil. Brown clayey *mchanga* sands are the most common topsoil type. Soil infiltration is slow to moderate due to the clayey-ness of soils. The perennial stream of Mwanakombo flows west through the region.

Land Use: The Mahonda locality encompasses the modern town of Mahonda as well as mixed garden and farming plots around the town, and commercial rice and sugar cane fields to the west. Located within Mahonda is a state-owned industrial sugar plant, which makes sugar from the surrounding fields of mono-cropped sugar cane. The locality slopes slightly west and is on fertile land with relatively deep agricultural topsoil. The Mwanakombo stream runs through the north, and a large modern cement bridge spans the stream at the location of the main road.

The area has scrub brush, garden plots, orchards, and small areas of rice cultivation. Coconut, cassava, cloves, bananas, and other fruit trees are the most common crops. The transect slopes slightly to the west and is flat. The subsoil is a red and brown sandy clay laterite, with

dark agricultural sandy clay topsoil above. Wells are found throughout the area. Transect 25 passes through a denser part of the modern town. Town soils are compacted dark red sandy clays, made of the trampled remnants of previously occupied earth and thatch houses. Other areas investigated include a grassy field near a school. Figure 6-12 shows imagery of the Mahonda region.

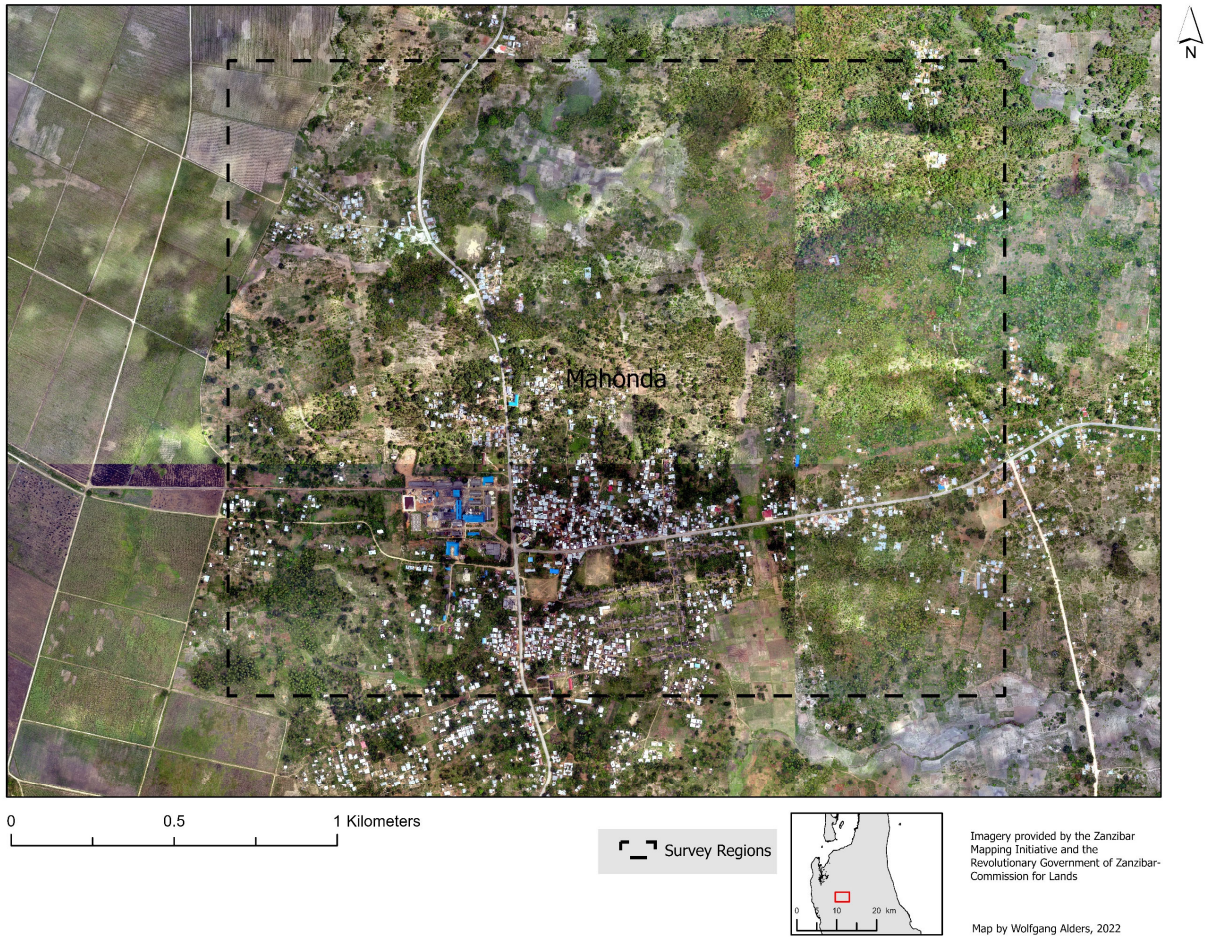


Figure 6-12. Imagery of the Mahonda region, provided by the Zanzibar Mapping Initiative.

Mahonda Region Sites: We investigated the Mahonda region through transects 24, 25, and 26, though 26 was not completed (see Figure 6-13). This amounted to 95 systematic shovel-test pits on 30-STP transect grids. This number is slightly higher per transect than other areas, because this was the first area investigated during the survey and we initially began by attempting 50 STPs per transect, before realizing this would be too intensive. Of these 30, or 32%, produced archaeological materials. Including focused investigations of sites, we dug 172 shovel-test pits in total, of which 81, or 47%, produced archaeological materials. We recorded six defined artifact scatters, two indeterminate artifact scatters, and 38 find spots. From this data, we identified 11 new sites in the Mahonda region, and 16 site components. The following section describes sites located in this region.

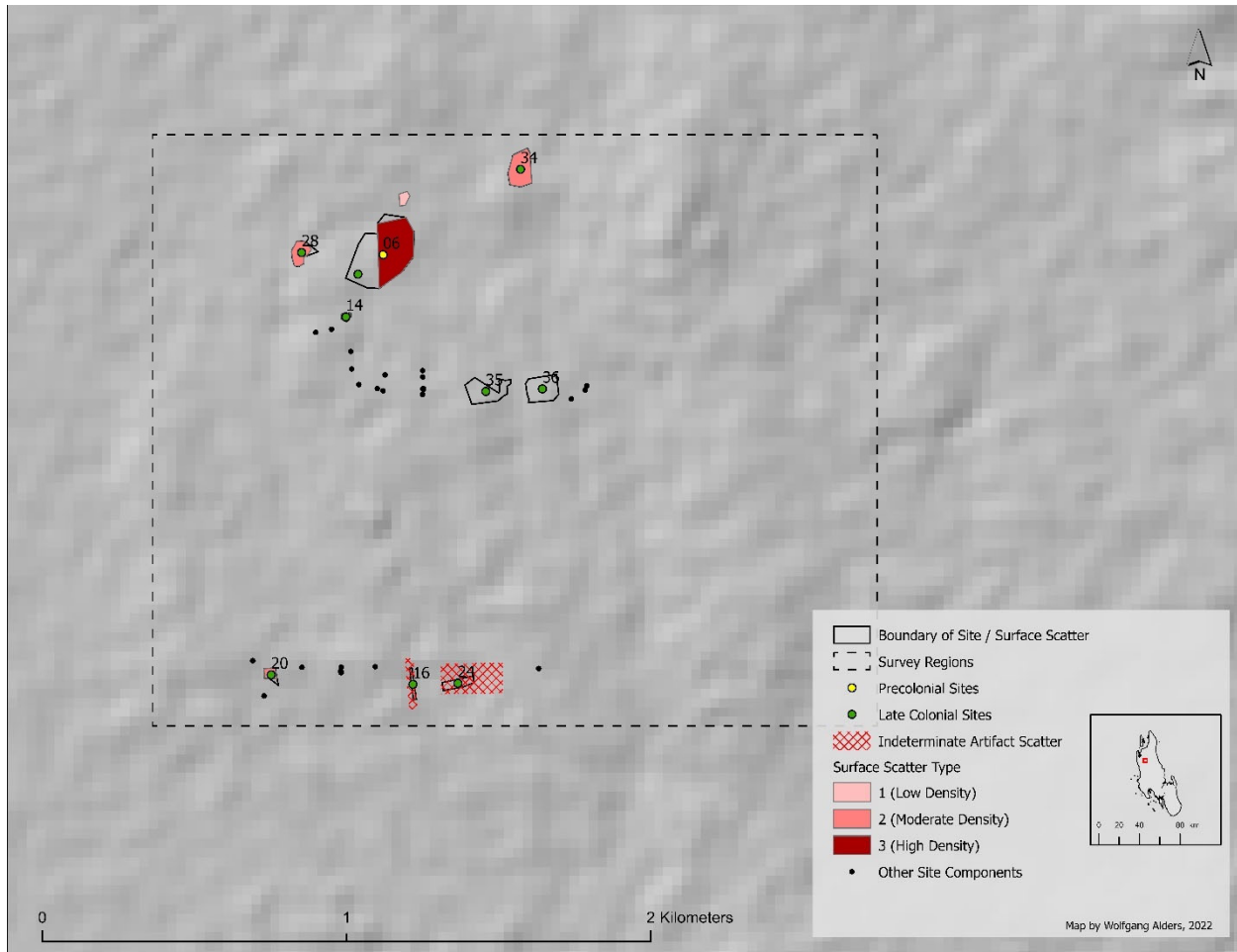


Figure 6-13. Sites in the Mahonda survey region, with site components and artifact scatters.

Site Name	Mwanakombo001 (IZAS0006), number 06 on the map
Size and Type	3.35 ha, a village
Date	1000-1400 CE, also has late colonial reoccupation
Summary	This site was located just north of transect 24, in an open and recently tilled cassava field. It abuts the Mwanakombo stream. Much of the site consists of subsurface deposits with 11 th -14 th century materials, which are also found on the surface and constitute a Type 3 artifact scatter of approximately 2 hectares. To the southwest, the site has a less dense scatter of 19 th -century materials (Type 1), at the center of which lies a stone house. The 1907 map does not show settlement in this area.
Finds	Early diagnostic finds from the area include plain green, apple-green, and yellow brown sgraffiato wares, late TIW necked pots, and neck punctating wares, along with spherical pots and open bowls with thickened rims and applied bases. Other finds at the site include iron slag, a bead grinder, polished circular ceramic sherds that may represent game pieces, a spindle whorl, local undiagnostic ceramics, and fragments of a <i>mofa</i> oven, suggesting bread baking. Some locally decorated sherds with 16th to 18th-century motifs were also found. Artifacts from the 19 th and 20 th centuries include a small number of 19th-century Chinese blue and white porcelain, plain granite whiteware, hand-painted polychrome cool whiteware, and red Indian earthenware.

Site Name	Kanisani001 (IZAS0014), number 14 on the map
Size and Type	0.06 ha, field house sized, though heavily disturbed after deposition.
Date	1830-1900
Summary	This is the site of a 20 th -century Christian church at Mahonda, which is now abandoned. The site is a concrete building off the main road in Mahonda, surrounded by fallow fields, brush, and some cassava furrows. The ground around the church is hard and compacted, possibly from cars or foot traffic. Residents informed us that an Arab homestead used to be at the site before the construction of the church. The 1907 map shows no settlement in this area.
Finds	Finds include local undiagnostic ceramics, plain granite whiteware, a black transfer print on ironware, iron, and glass, suggesting that occupation at the site dates to the mid to late 19th century.

Site Name	Daraja la Mwanakombo001 (IZAS0028), number 28
Size and Type	The site is 0.4 hectares, a hamlet.
Date	1830-1963
Summary	This is a site next to the Mwanakombo bridge, which spans the Mwanakombo stream at the main road. The site was shown to us by residents. The main area of the site is a large earthen mound, where one resident found a large copper door bolt, in the style of those found on Zanzibari doors today in Stone Town (see Chapter 16). The earthen mound was formed from hard and compacted sandy clays on top, which covered a softer, porous buried anthropogenic topsoil below. We dug three STPs which produced only a single, whole mid-20 th -century Omani-style coffee cup, as well as a few local undiagnostic sherds. It is possible that the mound was made from fill deposited during the construction of the road or the bridge, since it does not appear to be the site of intensive occupation. Instead, the majority of finds from the site came from the artifact scatter (Type 2) outside the mound area, in the furrows of cassava fields. The 1907 map shows no settlement in this area.
Finds	Artifacts include beads, daub, glass, an Omani-style coffee cup, slipped banded multicolor whiteware, polychrome painted cool whiteware, all pink, whiteware with blue flow, warm polychrome hand-painted pearlware, all blue, Chinese blue and white porcelain with a Chrysanthemum pattern, a piece of European stoneware with an all-blue base, plain granite whiteware, cut-sponge decorated whiteware, sponge-decorated whiteware, red Indian earthenware, an unknown whiteware with a black surface, a brown English transfer print ware, and a ribbed granite whiteware. Local sherds included carinated everted rim cooking pots, a lamp, and local undiagnostic ceramics.

Site Name	Mnyimbi001 (IZAS0034), number 34 on the map
Size and Type	0.74 hectares, a hamlet.
Date	1830-1900
Summary	The site is an artifact scatter (Type 2) on a hill, overlooking a cassava field. No subsurface deposits were found. The imported sherds place the site squarely in the 19th century, while the decorative elements on local earthenware suggest a slightly earlier date within the late second millennium. The 1907 map shows no settlement in this area.
Finds	Ceramics included local ceramics with 16th to 18th-century decorations, Chinese blue and white porcelain, red Indian earthenware, warm blue polychrome hand-painted pearlware, some with broad brush strokes, cut-sponge decorated ware, cool polychrome hand-painted whiteware, slipped, banded green whiteware, blue transfer print ware with a Willow pattern, brown transfer print ware, plain granite whiteware, and carinated everted rim cooking pots. Other finds include local undiagnostic ceramics, beads, daub, iron, and glass.

Site Name	Mahonda001 (IZAS0024), number 24 on the map
Size and Type	0.28 hectares, a hamlet.
Date	1830-1900
Summary	The site is located to the south of the modern town of Mahonda and is a sparse artifact scatter (Type 1). This site is just north of marked settlements on the 1907 map.
Finds	Finds include local undiagnostic ceramics, locally made carinated everted rim cooking pots, daub, and iron.

Site Name	Mahonda002 (IZAS0016), number 16 on the map
Size and Type	0.09 ha, a field house.
Date	1830-1900
Summary	The site is located to the south of the modern town of Mahonda and is a sparse artifact scatter (Type 1). The 1907 map shows no settlement in this area.
Finds	The site contains undiagnostic local ceramics, carinated everted rim cooking pots, plain granite whiteware, daub and iron.

Site Name	Mahonda003 (IZAS0020), number 20 on the map
Size and Type	0.16 ha, a small hamlet.
Date	1830-1900
Summary	The site is located to the south of the modern town of Mahonda and is a sparse artifact scatter (Type 1). This site is just north of marked settlements on the 1907 map.
Finds	Finds include carinated everted rim cooking pots, type 17 ceramics, local undiagnostic ceramics, plain granite whiteware, and whiteware with a blue band on the rim.

Site Name	Mahonda Mkataleni001 (IZAS0036), number 36 on the map
Size and Type	0.80, a hamlet sized site.
Date	1830-1900
Summary	This site lies within the town of Mahonda. This site encompasses SC13, a site component identified by Croucher (2006: 363), which was of a small mound said to be the remains of a building. No settlement is listed in this area on the 1907 map.
Finds	The finds from the site are red Indian earthenware, local undiagnostic ceramics, and a single find of a piece of late sgraffiato from a subsurface deposit.

Site Name	Mahonda Mkataleni003 (IZAS0037), number 37 on the map
Size and Type	0.78 ha, a hamlet.
Date	1830-1900
Summary	This site is within the town of Mahonda. It is located just south of SC21 (Croucher 2006: 368). It is adjacent to settlements shown on the 1907 map.
Finds	Imported finds include red Indian earthenware, Chinese blue and white porcelain, cut-sponge decorated whiteware, polychrome painted cool whiteware, a degraded blue transfer print sherd, and slipped banded whiteware. Local pottery includes sherds with 16th to 18th-century decorative motifs, many examples of carinated everted rim cooking pots, and local undiagnostic ceramics.

6.9 Landscape and Sites of the Mkataleni Region

Context: The Mkataleni region was a single transect planned to intersect a stone house that landowners of the Mwanakombo site showed us. They told us that the stone house was used in the early 20th century as covert holding area for illegally enslaved workers, in a similar fashion to the way that structures at the more well-known site of Mangapwani were used. They also claimed that the name “Mkataleni” itself refers to a place for holding enslaved people; however, other elders we met during community meetings did not agree on the meaning of the name and presented us with other explanations. The stone house itself is currently occupied today, though we were not able to contact the present owners. We did not investigate the house itself any further, because of issues of privacy. It is unclear whether this house was used to hold enslaved people, but the house construction materials and the artifact scatter around the perimeter do date to the 19th century. The house is also much larger than most modern houses, is isolated in the rural countryside, and is invisible from any roads that pass nearby, giving credence to the idea that it was built for covert purposes and may have housed many people. Besides recording the artifact scatter around the house, we did not investigate the area much further, and instead focused our efforts on surveying a transect through the region.

Geology: This region lies over an area of exposed Miocene sandy clay marl, which forms the foundations of the island, and which is exposed in the hilly regions (Hardy et al. 2015). Topsoil is a deep red *kinongo* laterite. Soil infiltration is moderate, due to sandy soils.

Land Use: The region itself begins in a lowland swampy area with rice and cassava agriculture, and transitions toward the east to rolling foothills with shallower, harder soils and clove trees. These foothills are used for mixed garden agricultural plots and tree orchards. No wells were observed during the survey. The transect ends near the central spine of the island, at an intersection of two streams. Figure 6-14 shows imagery of this region.

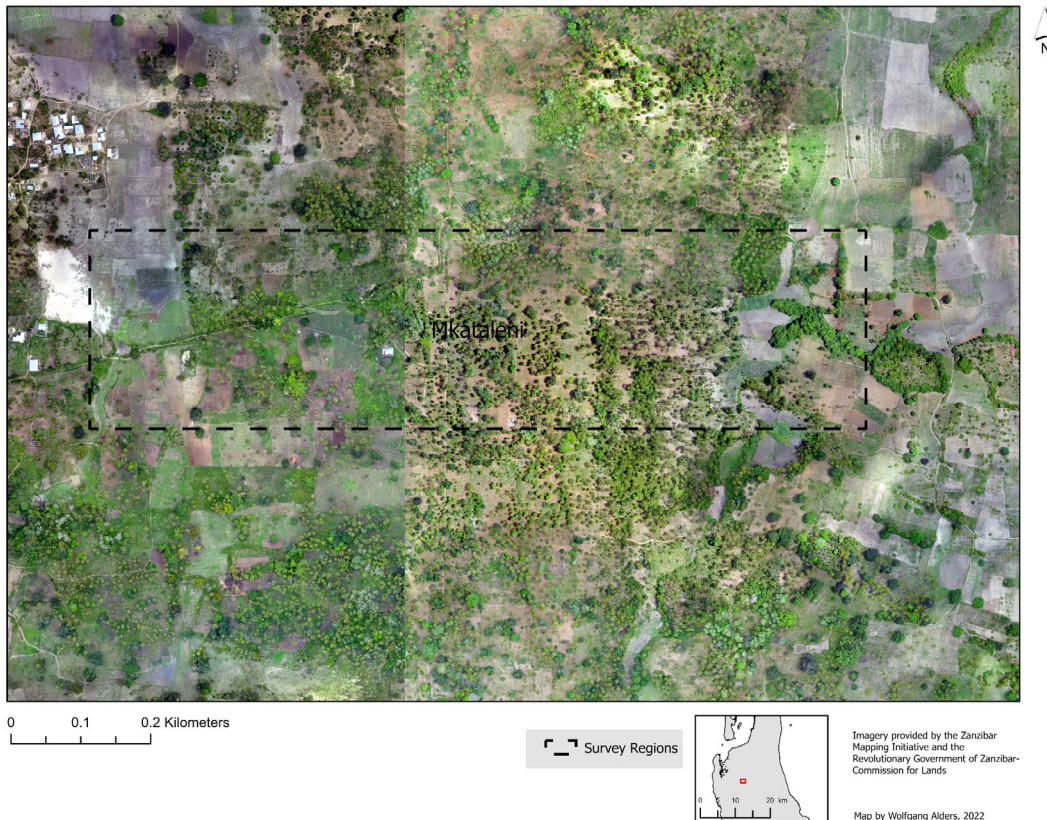


Figure 6-14. Imagery of the Mkataleni region, provided by the Zanzibar Mapping Initiative.

Mkataleni Region Sites: We investigated the Mkataleni region through transect 27. This amounted to 30 systematic shovel-test pits on a transect grid. Of these, five, or 16%, produced archaeological materials. Including our focused investigation of sites, we dug 41 shovel-test pits in total, of which seven, or 17%, produced archaeological materials. We recorded three defined artifact scatters, no indeterminate artifact scatters, and eight find spots (Figure 6-15). From this data, we identified two new sites in the Mkataleni region, and nine site components. The following section describes sites located in this region.

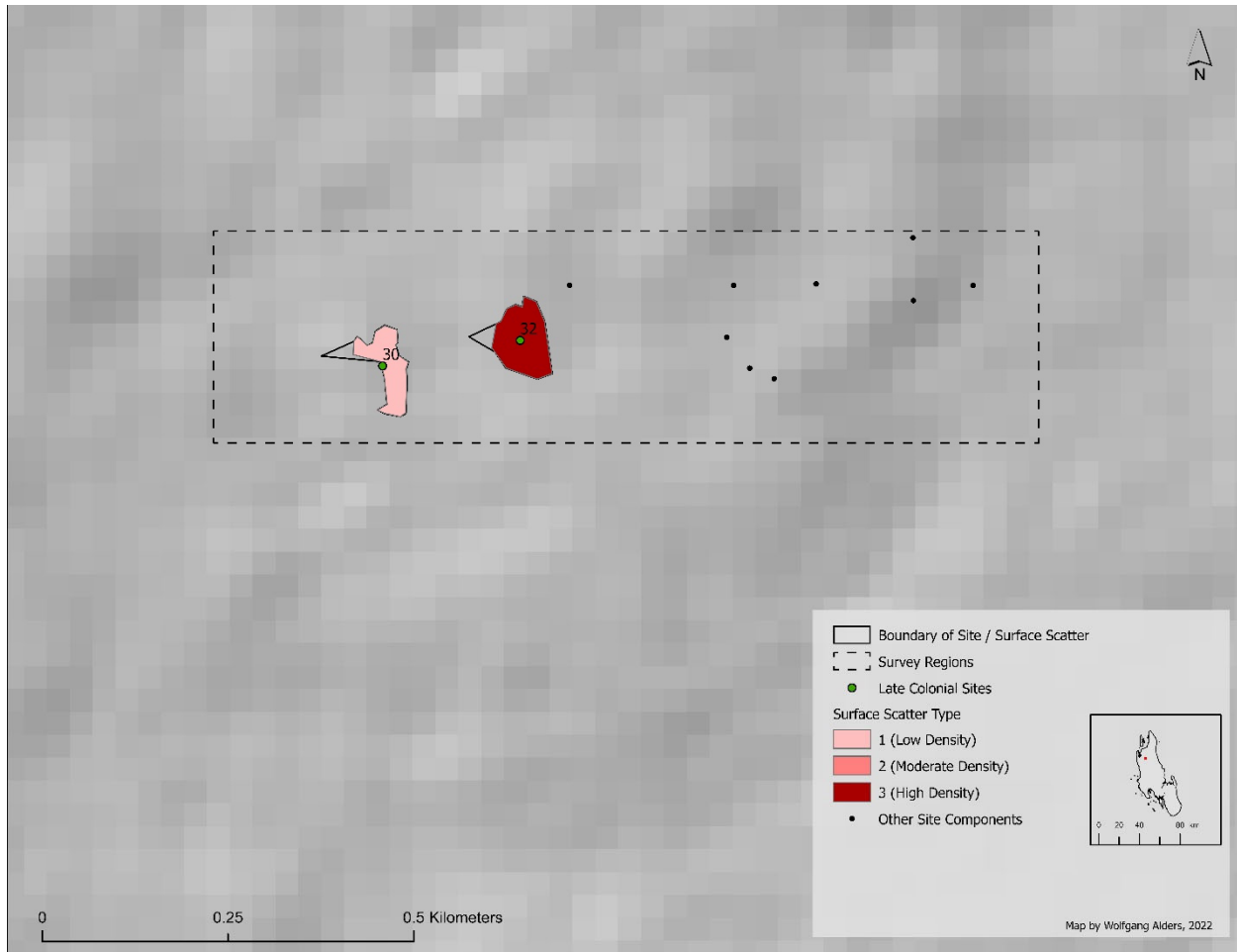


Figure 6-15. Sites in the Mkataleni survey region, with site components and artifact scatters.

Site Name	Mkataleni001 (IZAS0032), number 32 on the map
Size and Type	0.7 ha, a hamlet.
Date	1830-1900
Summary	This is the site with the stone house, shown to us by landowners at Mwanakombo. The artifacts found at the site were part of an artifact scatter (Type 3), with no sub-surface deposits. The site is on a foothill that slopes to the east, up a dirt road, though invisible from the road and surrounded by large fruit trees. The soils are hard and compact. This large stone house is not indicated on the 1907 map, suggesting three possibilities: 1) it was simply overlooked by surveyors, 2) it was not yet built in 1907, meaning that the artifact scatter at the site was created by people occupying a previous, more ephemeral 19th-century structure, or 3) it was intentionally hidden from surveyors due to its relationship to the trafficking of enslaved people. The site is unique, and no cases like this are documented elsewhere on the Swahili Coast.
Finds	The artifact scatter contained the following imported ceramics: A medium blue transfer print ware, an Omani coffee cup comparable to Late Islamic 2 style cups (Power 2015: 13), red Indian earthenware, whiteware with flow-blue, Khunj ware, a brown glazed Chinese ginger jar, cut-sponge decorated whiteware, Chinese blue and white that is degraded, so it appears grey and black, warm polychrome blue hand-painted pearlware, some with broad brush strokes, polychrome painted cool whiteware, black transfer print ware with a Willow pattern, red Indian earthenware, sponge-decorated whiteware, and slipped, banded whiteware. Local diagnostic pottery includes red open bowls, carinated everted rim cooking pots, 19th-century local decoration motifs, long-necked inflected jars, and 1 local undiagnostic ceramics. Other finds include beads, daub, glass, and iron. Finally, some indeterminate artifacts were found, including pottery with a green glaze and whiteware paste, as well as a coarse earthenware sherd with burnishing and a roulette pattern, possibly a decorative motif from mainland East Africa.

Site Name	Mkataleni002 (IZAS0030), number 30 on the map
Size and Type	0.49 ha, a hamlet.
Date	1830-1900
Summary	This is an artifact scatter with different levels of density, with a Type 2 scatter in a central area, and a Type 1 scatter beyond that. The site is located west of the stone house at Mkataleni, near the beginning of the transect. It

	has no architecture, but much of the same artifactual remains as those found around the house. This suggests it might have been the site of an earth and thatch structure built in parallel with the stone house. This site is not visible on the 1907 map, indicating that it was abandoned prior to the 20 th century.
Finds	Finds include plain granite whiteware, red Indian earthenware, whiteware with a flow-blue band on the rim, Chinese blue and white porcelain with a dynastic mark, Chinese blue and white porcelain with the Chrysanthemum pattern, polychrome painted cool whiteware, slipped banded whiteware, solid blue in color, a transfer print ware with a blue Willow pattern, cut-sponge decorated whiteware, a European whiteware painted with the Chinese “comb” or “sino-sanskrit” pattern, popular in the late 19th century, an unidentified turquoise glazed buff/grey ware, a brown transfer print ware, Stafford English stoneware, and a warm polychrome hand-painted ware, with orange and lime colored paints. Local artifacts include type 17 ceramics, everted rim cooking pots, and local undiagnostic ceramics.

In addition to these two sites, we recorded nine site components, most of which fall toward the eastern side of the transect. These included pieces of brick in addition to locally made pottery. This suggests that occupations on the eastern side were more modern, and likely correspond to the mid-20th century at the earliest.

6.10 Landscape and Sites of the Northeast Region

Context: The northeast survey region is like the East region in that the immediate coastal strip has deep, white sands, while the areas directly inland are comprised of coralline limestone bedrock exposed to the surface with a thin layer of dark red sandy clay over top. Scrub brush covers much of the region, except in areas where farmers have burned away plots of land for swidden agriculture. Our survey here was planned based on a visit with the *Sheha* of Pwani Mchangani, a town on the east coast of the island just north of the East survey region. The *Sheha* showed us an archaeological site near the primary school, which is known as the original settlement of the Pwani Mchangani village. We investigated the site and then planned a transect south of the village, traveling west. The aim was to investigate areas inland from the settlement. The exposed bedrock of the area meant that we were unable to dig shovel-test pits, and instead used a surface survey method to investigate the transect. We located archaeological materials in this area, but since we were traveling through dense brush and modern dwellings, we were only able to record these materials as part of an indeterminate artifact scatter.

The dense brush and coralline limestone bedrock directly east of the coastal strip proved difficult to navigate, forcing us to give up on systematic survey after 500 meters. Because of this, we determined that a grove of large baobab trees off the road along the transect might represent our best chance at locating an inland site related to Pwani Mchangani. We investigated this grove and recorded the site of Muembe Nambo.

This area, like the East region, was historically outside the extent of the clove plantation system. The 1907 map shows a small village called Pwani Mchangani, just south of the site we located which goes by the same name. Two other places names are recorded on the map, near the site of Muembe Nambo: Mwaza Vumba, and Kwaja Mkanda.

Geology: The geology of this region is comprised of coralline limestone bedrock, which lays over Miocene limestone, which itself rests on a bed of Miocene sandy clay marl. Topsoil is nonexistent in many areas, but where it does exist, it is a thin, dark red *wanda* soil (Juma 2004: 43). Soil infiltration is high, and no streams are found above ground.

Land Use: Like the East region, land in this area is exposed coralline limestone bedrock and scrub brush over thin soils. Patches of brush are cleared in small plots for agriculture, but much of the land is uncultivated. A large area of land along the transect is also part of the modern town of Pwani Mchangani. Directly on the coast there are white sandy beaches and coconut palms. Large baobabs are also found inland. The thick brush directly to the west of the modern town of Pwani Mchangani made survey difficult. Figure 6-16 shows imagery of this region.

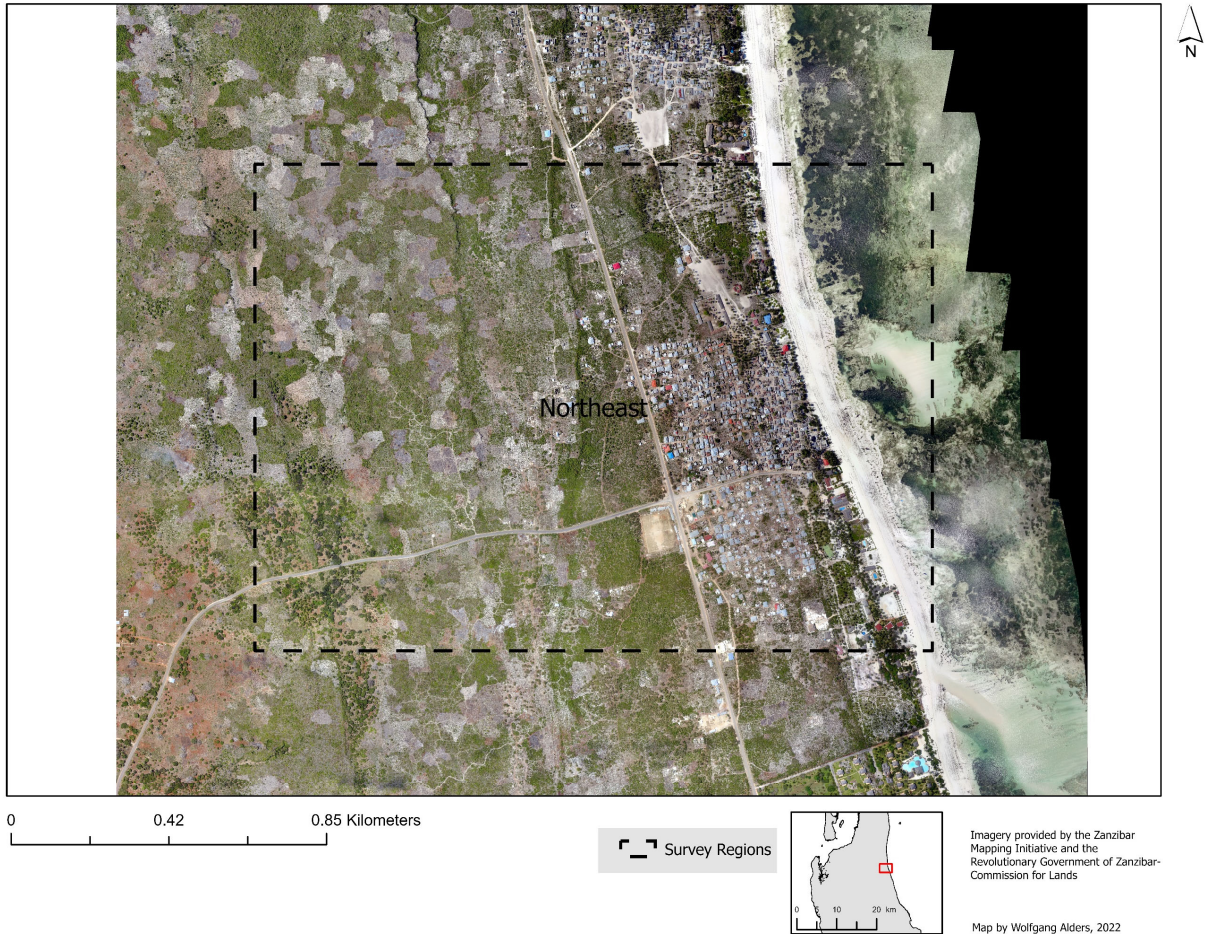


Figure 6-16. Imagery of the northeast region, provided by the Zanzibar Mapping Initiative.

Northeast Region Sites: We investigated the northeast region through transect 22, and through judgmental investigations around a baobab grove and an area pointed out to us by residents of the town of Pwani Mchangani. We were only able to dig five STPs in transect 22. These STPs were in the sandy areas adjacent to the beach at the beginning of the transect. All the rest of the transect passed through rocky coralline limestone bedrock areas, prohibiting digging. None of these five STPs produced archaeological materials.

Including our focused investigation of sites in the northeast region, we dug 21 shovel-test pits in total, of which eight, or 38%, produced archaeological materials. We recorded four defined artifact scatters, five indeterminate artifact scatters, and no find spots (Figure 6-17). From this data, we identified two new sites in the northeast region, and 0 site components. The following section describes sites located in this region.

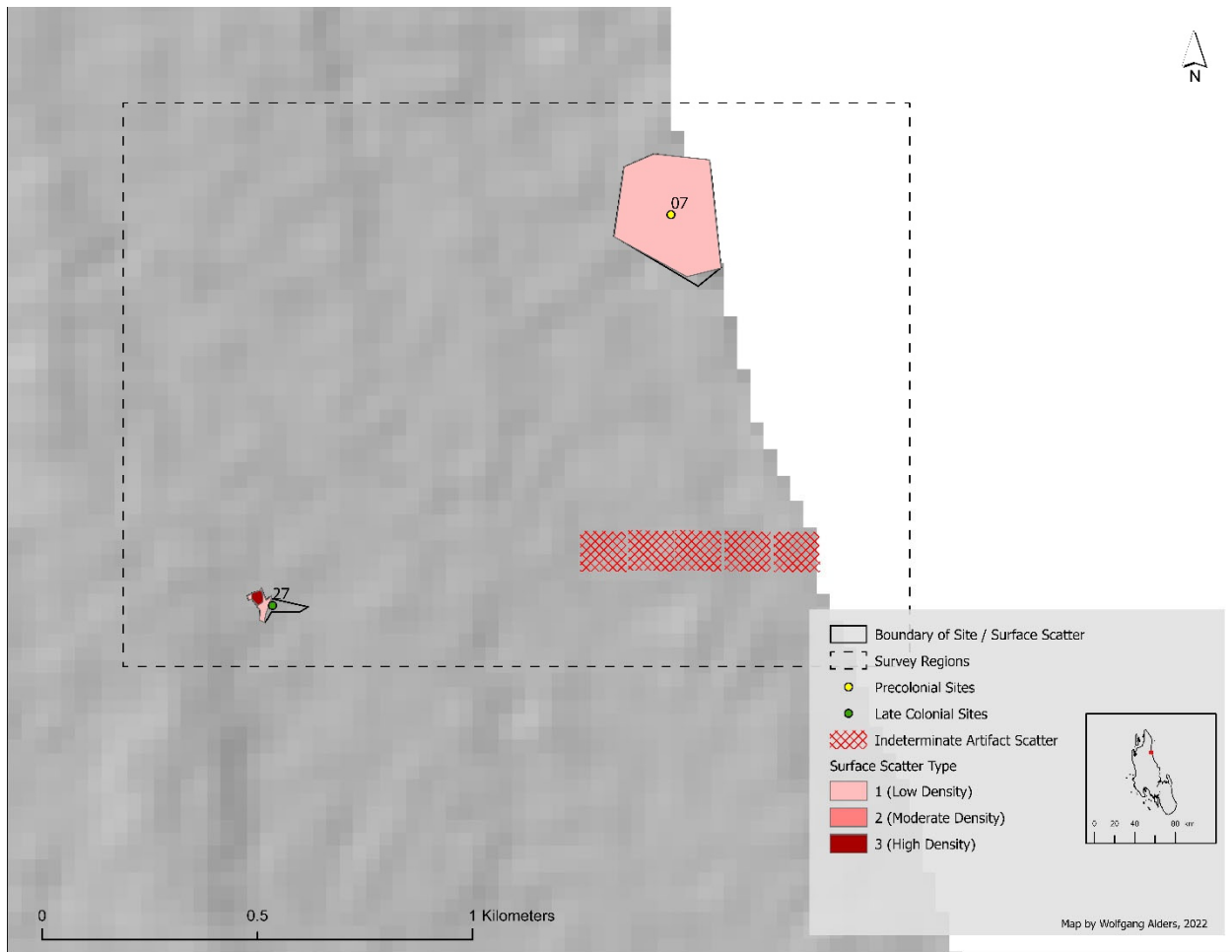


Figure 6-17. Sites in the northeast survey region, with site components and indeterminate artifact scatters.

Site Name	Muembe_Nambo001 (IZAS0027), number 27 on the map
Size and Type	0.38 ha, a hamlet.
Date	Early second millennium, 1830 to present
Summary	We found this site during a judgmental survey investigating a grove of large baobab trees off the main road to Pwani Mchangani. The large baobabs stand over and around a rock shelter or coral limestone cave, and a cleared area with cut coral holes that are used for modern planting. No artifacts were found within the cave, though the entrance is not easily accessible and only a cursory inspection could be made. The cleared area is sown with taro, cassava, banana, and lime trees. One side of the field has a boundary marked by a stone <i>bigili</i> wall. The site itself is an artifact scatter (Type 3 in one area, Type 1 across the rest of the site), with some shallow deposits in dark red soils. Though this site type, in coralline limestone bedrock, is characteristic of seasonal occupation for swidden agriculture, the density of artifacts suggests that people likely returned to the same place many times over a long period. The importance of this place was likely related to its location in a grove of large baobabs, and near a coral limestone cave. No structural materials like daub or stone were located, apart from the <i>bigili</i> wall. Likely, a structure was built from wooden or thatch materials. The 1907 map does not show settlement in this area.
Finds	Finds include sherds from a thick, red, coarse punctate necked jar from the 11 th -14 th centuries. Another sherd was a thick, coarse shoulder with impressed dentate arcs, which is possibly second millennium Dembeni ware, a rare type from the Comoros (Wright 1984: 38), found also at Shanga (Horton 1996: 254) and Mikindani (Pawlowicz 2011: 228). Other local sherds have later-period decorations. In addition, there are undecorated sherds from vessels with inflected high shoulders, a black base of an open bowl, sherds of everted rim cooking pots, and local undiagnostic ceramics. Imported sherds include black painted thick red earthenware, possibly Indian in origin, as well as a thick buff ware with thick brown slip, possibly from the Persian Gulf. In addition to this there are European wares, including English black transfer print with a Willow pattern, sponge-decorated whiteware, a medium-blue English transfer print, and polychrome painted cool whiteware. Additional finds include beads and glass.

Site Name	Pwani_Mchangani001 (IZAS0007), number 07 on the map
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Size and Type	5.56 ha, a village
Date	1400-1500, also has some late first-millennium components
Summary	This was the only coastal site recorded during the survey. It was sampled and mapped on the recommendation of the Sheha of Pwani Mchangani, who told us that the site is the old settlement prior to the construction of the modern town. There is a stone well at the site, which residents claim was built by the Portuguese. The site itself is a large shell mound and artifact scatter (Type 1). To the north, there are purportedly many ancestral burials of village residents, but we did not investigate these areas. There are multiple shell mounds with deposits up to 1.5 meters deep, and other deposits present around a large baobab tree of a similar depth. A large variety of marine shells were collected from the STPs. There was also a large amount of local pottery, and some imported sherds. The site is located just north of a community labeled Pwani Mchangani on the 1907 map, suggesting that the area was reoccupied at some point, likely in the 19 th century.
Finds	The imported sherds include blue and green Islamic monochrome ware, and a sherd of Longquan celadon. Local sherds include 11 th -14 th century neck punctating ware, carinated spherical pots, rounded spherical pots, open bowls with applied bases, with rounded or thickened rims, carinated everted rim cooking pots, inflected high shouldered pots, long-necked inflected pots, rolled rim spherical pots, a pot decorated with incised ringed bands around the neck, a “late 17 th -century” decorative motif identified by Kirkman (1974), and local undiagnostic ceramics. Another find at the site was a sherd of Husuni-modelled ware, which fits the timeframe of the site’s occupation but is rare outside the town of Kilwa. The locally made ceramics may date anywhere from the 11 th to 15 th centuries, while the imported artifacts for the site suggest the main phase of occupation was from the 14 th -15 th centuries, based on the presence Islamic monochromes and celadon.

To the south of the Pwani Mchangani site, we carried out a surface survey which revealed a small number of artifacts across four scatters in a 500 by 100 m area, within the modern village of Pwani Mchangani. These were locally made undiagnostic sherds, though we also recorded some 19th-century imported materials. These remains likely represent later and modern settlement south of the original village site at Pwani Mchangani.

6.11 Land Use Survey

In addition to archaeological survey for site recovery, we also apportioned some of our time to investigating modern land use practices across Zanzibar, in order to draw analogies between past sites and modern activities. In 2016, I surveyed western and central areas in Zanzibar, to better understand modern rice farming practices on Zanzibar. In 2019, our survey team met farmers in the eastern region of the survey area, and discussions with them helped us understand farming in the rocky coralline limestone areas of the island. The following sections outline the results of these interviews, providing background context for understanding land use practices in rural areas.

6.11.1 Rice Farming in the Northwest

Rice has been a staple crop in Zanzibar since at least the early second millennium (Power et al. 2019). While Portuguese and Omani writers described Pemba as the main rice-producing island in the colonial period, Zanzibar also has a favorable climate for rice growing in the northwestern areas of the island. One aim of land use survey related to rice farming was to document different environmental niches where rice is grown today. South of the survey region, I visited rice farms around the western and central areas of Zanzibar in 2016 to learn more about the practices of rice farming in the fertile areas of the island, in places with relatively deep *kinongo* and *kinamo* soils. I observed different variations in rice farming practices: rice grown in systematized, irrigated fields (Figure 6-18); rain-fed rice in flat areas (Figure 6-19), rice grown opportunistically in swampy areas (Figure 6-20, Figure 6-21), rain-fed rice in sandy areas adjacent to the coast (Figure 6-22) rain-fed rice in hilly areas in the central region (Figure 6-23), and rain-fed rice with earthen berms adjacent to mangrove swamps (Figure 6-24). The figures listed show these different contexts. The results of this survey suggest that while large-scale, irrigated rice fields may produce the largest quantities of rice today, it is also possible to grow rice on the island in smaller, opportunistic patches of land that are not considered ideal for rice farming. As a comparison, in Nara, Japan, swampy marshes were the first places where early

farmers started cultivating rice prior to the development of larger and more intensively managed field systems (Barnes et al. 2005). This may have also been the case in Zanzibar-- in earlier periods when large parts of the inland region were still forested, swampy areas closer to the coast like the fields at Mto wa Pwani (Figure 6-22) could have been used prior to intensification for small-scale rice cultivation. Although large-scale systematic rice fields operate today, these smaller marginal areas for rice cultivation continue to sustain communities. Future might focus on tying the development of a rice field system to the settlement history of a particular region, to investigate how social changes shaped rice intensification.



Figure 6-18. Well-fed, irrigated rice field system in Bumbwisudi, west-central Zanzibar.



Figure 6-19. Rain-fed rice field system in Chaani Kibokwa, east-central Zanzibar.



Figure 6-20. Rice grown in a swampy area along the Mwera stream.



Figure 6-21. Rice grown opportunistically in a swampy area near Frazer's Sugar Mill, in northwest Zanzibar.



Figure 6-22. Rain-fed rice in sandy, flat area, in northwest Zanzibar near Mto wa Pwani, close to the coast.



Figure 6-23. Rain-fed rice in hilly region of central Zanzibar, near Kipange.



Figure 6-24. Rain-fed rice grown adjacent to a mangrove swamp, with an earthen berm built to keep out salt water. Also pictured is a good example of a modern field house, which may represent a past form of occupation that produced small ceramic scatter in rural areas.

6.11.2 Field Plots, *Kupiga Makongo*, and *Mabigili* in the Northeast

In the eastern survey region during 2019, we repeatedly encountered farmers clearing plots of land in stony soils for planting. These clear field plots were the only places we could venture off the paths of the region, since we were surrounded by thick brush on all sides. The clear plots also were the only places where ceramic sherds were visible on the ground. Observing modern farmers in these areas and their activities, we came to suspect that ceramic surface scatters in field plots likely represented past episodes of farming and camping, in similar ways to how this practice occurs in the present. Therefore, we sought to learn about modern farming methods in the stony eastern region, to inform an archaeological understanding of past land use. We learned some of this through discussions with two groups of farmers, whom we encountered during survey in an area called Kandwi Kibokwa, near the sites of Kandwi_Kibokwa001, 002, and 003. These were not formal interviews, but discussions were nevertheless approved by the Institutional Review Board (IRB, CHPS Protocol Number 2017-12-10574, see Appendix D) Three farmers were men, and two were women. In the following sections, I describe our discussions, and what we learned about farming in stony soil. I did not use the farmer's names for the sake of privacy.

The first group of farmers were two men, who were planting a field with cassava, or *mihogo*. Their field plot is shown below in Figure 6-25. It is considerably stony, with shallow soils.



Figure 6-25. Field plot in eastern region.

Like many areas we encountered in the eastern region, this field plot had shallow soils with protruding coralline limestone bedrock visible on the surface in many areas. The soil is *maweni*, a dark, shallow lateritic soil eroded from limestone parent material, with high organic carbon content (see Chapter 3). Though they were planting cassava, they first described to us the variety of crops they could plant in this plot using Swahili names, which I list below in Table 6-7. These are fruit tree crops and roots crops. Tree crops are planted once and tended over time, whereas root crops are planted seasonally.

Crop	Swahili Name
Mango trees	<i>Miembe</i>
Lime trees	<i>Midimu</i>
Tangerine trees	<i>Micheza</i>
Orange trees	<i>Michungwa</i>
Cassava (<i>Manihot esculenta</i>)	<i>Mihogo</i>
Taro (<i>Colocasia esculenta</i>)	<i>Viazi vya magimbi (also simply called magimbi)</i>
Sweet potato (<i>Ipomoea batatas</i>)	<i>Viazi vya chonga (lit. "potatoes for peeling"), also called viazi vidogo (small potatoes) or viazi vitamu (sweet potatoes)</i>
Purple yam (<i>Dioscorea alata</i>)	<i>Viazi vikuu (lit. main potatoes)</i>

Table 6-7. Crops farmed in the field plot in Figure 6-25.

Cassava is a South American root crop that reached Zanzibar relatively late, sometime around the turn of the 19th century (Hillocks 2002). It was, and is, a food crop associated with poverty, slavery, and dependency in Tanzania (Kinshella 2014). It was brought to Zanzibar to cheaply provision enslaved people. Sweet potato is also an American root crop, with an uncertain date of introduction to Zanzibar. Interestingly though, the two other root crops—taro and purple yam, are southeast Asian cultivars associated with Austronesian migration to Madagascar and

the Comoros. When these tubers reached Zanzibar is not currently clear, but a single Persian source does mention the presence of tuber crops prior to the Columbian Exchange at Qanbalu, thought to be Pemba, in the 10th century. Buzurg ibn Shahriyyah described the people of Qanbalu as eating meat, honey, millet, bananas, and a tuber called *kalari* (Freeman-Grenville 1966: 16). As far as I can tell, the name *kalari* has not been investigated, but it seems likely that it may have been a southeast Asian cultivar, possibly taro or purple yam, initially brought to the western Indian Ocean by Austronesian voyagers. Studies of Southeast Asian crop dispersal in coastal East Africa have focused on seed crops that can be investigated through preserved archaeobotanical remains, but plant microfossil studies might reveal the presence of taro and purple yam at early sites as well (Crowther et al. 2016b).

The farmers then described the method for planting. The first step is the process called *kufyeka msitu* – clearing the brush. This is achieved through cutting the brush, with the use of a tool called an *mndu*, or billhook, a heavy machete (Figure 6-26). Elsewhere nearby, we have observed fields that were recently cleared with controlled burning, but these farmers insisted that they do not burn their fields. This may be because they do not want to damage fruit trees; the fields we observed that were burned did not have fruit trees. Clearing brush by hand took the two farmers we spoke to a total of four days, for an area of approximately 1 hectare.



Figure 6-26. *Mndu*, or billhook.

The next step is preparing the field for planting, a process called *kupiga makongo*. *Kupiga* is a word meaning “hit”, but idiomatically in Swahili it can mean a wide variety of things depending on the word that comes after. In this case, the word *makongo* (singular *kongo*) refers to holes, cut into the rocky coralline limestone bedrock and stony soil. The phrase, then, means to dig holes in the coral bedrock. This process produces pockets in the ground that conserve soil and transform rocky areas into ones capable of supporting subsistence agriculture. Practiced seasonally, *kupiga makongo* may transform landscapes, creating holes for planting over generations that alter the soil conserving properties of these stony areas. This adaptation may have been a crucial aspect for root crop agriculture in this region, from the earliest period of agricultural activity to the present. The tools for *kupiga makongo* are a pickaxe, known as a *sururu*, as well as a long straight iron crowbar, called an *mtaimbo* (Figure 6-27). The process of *kupiga makongo* took these two farmers only a single day, for an area of about one hectare.



Figure 6-27. An *mtaimbo*, a long straight crowbar used to dig holes in the coral bedrock (*kupiga makongo*).



Figure 6-28. A cassava stalk planted in a *kongo*, or planting hole in the coral limestone bedrock. Note the recently removed limestone boulder.

When planting stalks of cassava in the *makongo*, soil is piled back over the hole that was dug out (Figure 6-28). In some cases, the farmers told us that limestone boulders are piled back over the planted stalk, to prevent animals from getting at the root crops.

After describing this process, these farmers gave us some context for this practice. Planting occurs twice a year, in March and in October. These months occur just prior to the rainy seasons: the *masika* (long rains) from mid-March to early June, and the *vuli* (short rains) from mid-October to December. Farming happens in field plots owned by farmers who live at the village of Kandwi. Even though much of the landscape appears to be wild bush, no bit of land is unclaimed. Field boundaries are known by custom. Today, shifting cultivation (the practice of planting in different areas each season to allow regrowth) is not practiced since there is not sufficient land, but shifting cultivation was the norm earlier in the 20th century. It was not clear whether the farmers were describing the specific areas around Kandwi, or the entire part of the eastern region; it may be the case that shifting cultivation is still practiced in some regions further out from large villages like Kandwi.

A crucial detail was the description these farmers gave of the practice of moving one's family out into the field plots during certain times of the year. They remarked that especially during earlier days when shifting cultivation was common, farmers would camp in field plots with their families for several days while the work proceeded. The presence of aluminum cooking pots in some field plots that we observed attests to this practice continuing today (Figure 6-29). The ceramic artifact scatters in these field plots likely are evidence of this practice extending far back into the past, as early as the early second millennium.



Figure 6-29. Aluminum cooking pot in field plot, attesting to modern camping / cooking in these areas.

Finally, we were able to ask these farmers about the *mabigili*, or dry-stone walls built of coralline limestone (Figure 6-31). Oral histories describe *mabigili* as being used to keep out pigs, brought in the 16th century to the island by the Portuguese (although Zanzibar is also home to the

“bush pig”, *Potamochoerus larvatus*, endemic to east and southern Africa). Residents told us that today people still build *mabigili*, but out of wood and brush, to protect fields against cows. Most *mabigili* are piled stone features ranging from half a meter to a meter in height, though the ones at the site of Mvuleni are taller than this average and may have had defensive purposes (LaViolette and Norman, in press). In the past, *mabigili* were built out of stone, specifically to protect against pigs, but since pigs were eradicated on the island they are not built anymore. Both these men, in their mid-50s, did not recall anyone building stone *mabigili* in their own living memory.

The second group of farmers, two women and one man, also confirmed to us that they did not recall the construction of stone *mabigili* in their lifetimes. When we spoke to them, they were in the middle of weeding a field of *choko*, or lentils (Figure 6-30). They were farming in an area closer to Kandwi, where the soils were slightly deeper.



Figure 6-30. Second stony field plot, planted with lentils.

For lentils they do not use the method of *kupiga makongo* since lentils do not require deep holes. What lentils do require, however, is a field fully cleared of all vegetation; for this, they use burning to clear the field before planting. After clearing the area with fire and with an *mndu* (the billhook), they begin the process of planting. They dig small holes with an *mpai*, a simple long wooden pole that is used to press holes into the soil, into which they pour lentil seeds. Next, they use an *mtaimbo* (straight iron crowbar) to weed and smooth out the field, called *kupalilia*. Clearing land for lentils started in May, and planting occurs during June; the field we encountered in August had been planted for over a month. The harvest occurs just before the *vuli* (short rains) season, in October, producing around 50 kilograms of lentils. Following the lentil harvest, the field will then be planted cassava just prior to the rains. For planting cassava, these

farmers confirmed that they with also use the method of *kupiga makongo*, since cassava requires deeper holes. They also confirmed that they intend to plant banana trees (*migomba*).

From these discussions, we gained insight into the diverse strategies for agricultural production in a stony, marginal landscape compared to the fertile areas of the west. Farming involves the use of specialized tools for clearing brush, digging into coralline limestone bedrock, and planting. Clearing field plots may or may or may not include the use of fire, depending on the requirements of the intended crop. The technique of *kupiga makongo* is used for planting root crops like cassava but is not used for lentils. In the past the construction of stone walls for deterring pigs and the practice of shifting cultivation was more common due to the presence of pigs and the availability of land. Today, pigs have been eradicated and all land is occupied, so mobility is constrained. The practice of camping in field plots during certain parts of land clearing, planting, and harvesting continues, as evidenced by aluminum cooking pots found in fields and the statements of the farmers we spoke with.

The practice of digging or cutting holes in coral limestone bedrock (*kupiga makongo*) is especially important from a landscape archaeology perspective. This technique produces permanent holes in the stony landscape, which accumulate and conserve soil, a vitally important resource for farming in this rocky region. These holes are dug out and refilled seasonally, a practice that has likely been passed down through generations. The result is that field plots with *makongo* conserve more soil, retain more water, and are more productive than areas without *makongo*. Over a large area, generations of farmers have transformed this landscape by investing labor into the construction of field plots with *makongo*, in essence a form of landesque capital (Håkansson and Widgren 2014). The process of creating *makongo* may have also gone hand-in-hand with the construction of dry-stone field walls in the past. Since digging and cutting *makongo* produces large coral limestone boulders, it would make sense to use these stones as material for constructing stone walls around the same fields that one is digging in.



Figure 6-31. Short stone *mabigili* near Kandwi Kibokwa.

In the northeast where we were surveying, vegetation is too dense to see examples of *mabigili* or holes made by *kupiga makongo* by aerial drone imagery. However, in the south of Zanzibar, these features are quite visible from above. Figure 6-32 below shows an example from a stony field plot in the south of Zanzibar, near Makunduchi. In this image, many stone *mabigili* walls are visible as well as craters in the stone from the practice of *kupiga makongo*. Future research into these practices may shift to the south of the island, where greater visibility might permit more systematic attempts to map these features using aerial imagery.

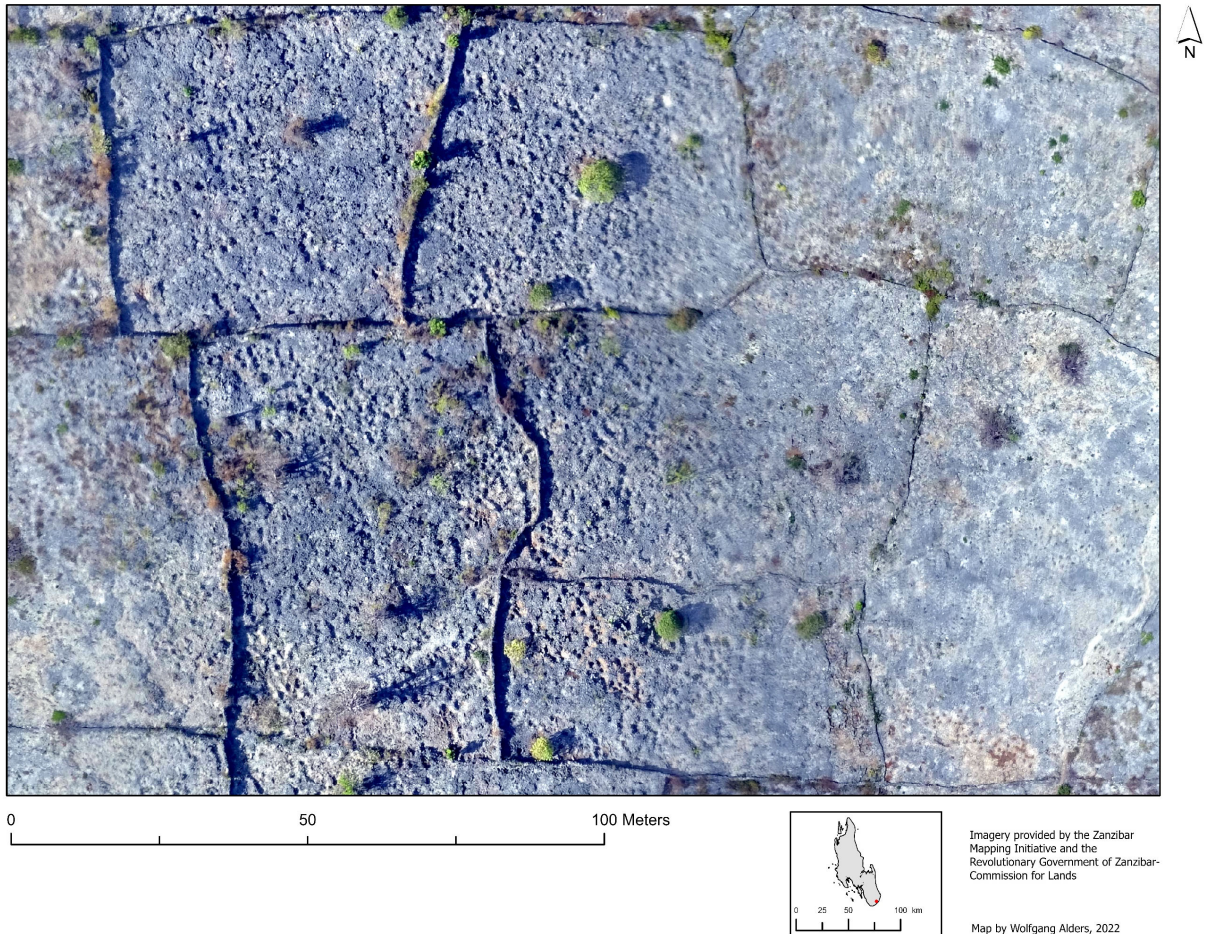


Figure 6-32. *Mabigili* and holes visible in drone imagery, from a field plot near Makunduchi.

These types of landscape modification were not planned systematically or organized at a centralized level. They are examples of *incremental* agricultural change, in which farmers do not set out to alter the landscape of their agricultural areas but accomplish it anyways through seasonal and generation practices of maintenance and gradual upgrading (*c.f.* Doolittle 1984). The combined activities of cutting and digging holes in the bedrock and creating stone walls out of the refuse has had the effect of gradually transforming a stony, marginal area into one capable of sustaining the populations of the eastern region through subsistence agriculture. Incremental landscape change for farming explains a paradox: how the eastern region can be characterized as marginal, inhospitable, and barren, and yet also produce the most continuous and long-term evidence for human occupation in the survey region, with sites from all periods from the early second millennium to the present. In contrast, fertile western areas show evidence for larger, more socially stratified settlement systems, but ones which appear and disappear in relation to

larger economic and political changes in the western Indian Ocean. Agricultural landscape transformations like *kupiga makongo*, the construction of *mabigili*, and the digging of stone wells may have been crucial adaptations that contributed to ensuring continuity in this region.

6.12 Conclusion

Survey data shows that Zanzibaris settled across diverse inland environments by at least the early second millennium, and possibly earlier. This chapter has presented regional land use descriptions, site descriptions, and summaries of interviews and research into rice farming in the western survey areas, and swidden farming in the eastern region of the survey area. These datasets form the basis for understanding long-term settlement pattern changes across different environmental zones. The following chapters (7, 8 and 9) summarize settlement pattern results for the precolonial period, the early colonial period, and the late colonial period. These chapters describe select sites of each period in more depth and present spatial statistics relating to site distribution.

Chapter 7: Sites and Finds of the Precolonial Period

7.1 Introduction

Our survey did not locate materials dating to the first or second periods of Zanzibar, from the terminal Pleistocene to the early first millennium. The oldest artifacts we located date to the third period in the long-term history of Zanzibar, the early Swahili or precolonial Swahili period (see Chapter 2). I refer to this era as the precolonial period as a shorthand from here on. One can divide the precolonial period in Zanzibar into three phases, which I describe in Table 7-1. At the start of this period, communities which practiced agriculture and ironworking traversed the Zanzibar Channel from the African mainland and settled on the island. This was a period of resettlement, after the island was abandoned by hunter-gatherers at the end of the Late Stone Age around 12,000 years ago. These people founded small village communities at Fukuchani and Unguja Ukuu in the 6th century CE (Fitton 2018). In the late first millennium, Unguja Ukuu developed into a large town, and early Swahili people founded other communities at Mkokotoni, Fumba, Pwani Mchumgumli, and likely elsewhere in places not yet located. Kuumbi Cave was reoccupied in this period as well (Sarathi 2018; Shipton et al. 2016)

Starting in the early second millennium, Unguja Ukuu declined in size or was abandoned before being reoccupied in the 15th century (Juma 2004: 154). Early Swahili people in the west founded a settlement on the Shangani peninsula, a small fishing village that would later grow into Zanzibar Stone Town. The sites of Mkokotoni and Tumbatu in the north also developed into an urban landscape from 1000 to 1400 CE (Rødland 2021). In the south, residents built the mosque of Kizimkazi in 1107, dated by a sandstone inscription (Kleppe 2001). Other sites of the early second millennium include Shungi in the east, where archaeologists discovered a buried Chinese coin hoard, and Shangani in the northwest, a settlement branching off from Mkokotoni.

The precolonial period ended around the year 1500, when Portuguese navigators and explorers began attacking sites in coastal East Africa in order to assert monopolistic control over the independent Swahili trading system. Settlement patterns in Zanzibar were likely affected by these events, but they cannot fully explain shifts in the settlement system. For instance, Tumbatu was abandoned prior to Portuguese incursions. Settlement reorganization across the island during this period was likely the result of processes internal to Swahili society, like the conversion to Islam, the development of social hierarchy and urbanism, and a shift toward rice production, as is the case on Pemba Island to the north (Fleisher 2010b; LaViolette and Fleisher 2018; Walshaw 2010). Understanding internal social processes requires a complete view of urban and rural settlement patterns, as investigated with this survey.

All sites previously known for the precolonial period in Zanzibar prior to this study are located on the coastal rim of the island. However, in 2019, our survey team documented precolonial sites and site components in the inland areas of the island, shown in Table 7-2. These sites are shown in association with their diagnostic ceramics and imported materials in Figure 7-2.

Our survey recorded seven sites of the precolonial period. Some of these sites may have first millennium (Phase 1) site components. Six of these sites belong definitively to Phase 2, from 1000-1400 CE. These sites include two large inland village communities at Mwanakombo and Kirikacha, and three surface scatters found in modern swidden plots in the east region. A fourth site is Kikobweni001, which has precolonial material but is of an indeterminate size, due to its presence on a steep hillslope. The seventh site is Pwani Mchangani, a site that dates to the second phase of the precolonial period, from 1400-1500, but may also have been occupied

earlier. This is a large coastal village in the east. In this chapter, I give an overview and description of these sites. I discuss the ceramics referenced in this chapter in Chapters 13 and 14. Figure 7-1 shows the location of these sites on the island.

Phase	Years	Description	Known sites	Sites / site components / dates recorded in 2019 by our team
1	550-1000 CE	The mid-to-late first millennium, when village communities were first founded on the coastal rim of the island, from 550-1000	Unguja Ukuu, Fukuchani, Fumba, Mkokotoni, Pwani Mchumgumli, Kuumbi Cave	A few sherds at Kandwi and Pwani Mchangani, radiocarbon dates at Kichangani002 and Kirikacha
2	1000-1400 CE	The period of increased urbanization in the north of the island around Tumbatu and Mkokotoni, from 1000-1400	Tumbatu, Mkokotoni, Shangani, Zanzibar Stone Town, Shungi, Kizimkazi	Mwanakombo, Kirikacha, Mwanampaji001, West_Kandwi001, West_Kandwi003, site components at Muembe Nambo and Kikobweni001
3	1400-1500 CE	the period following the abandonment of Tumbatu up until the beginning of Portuguese incursion	Uroa, Chwaka, Zanzibar Stone Town	Pwani Mchangani

Table 7-1. Phases of Period 3, the precolonial period in Zanzibar, with previously known sites and sites recorded in 2019.

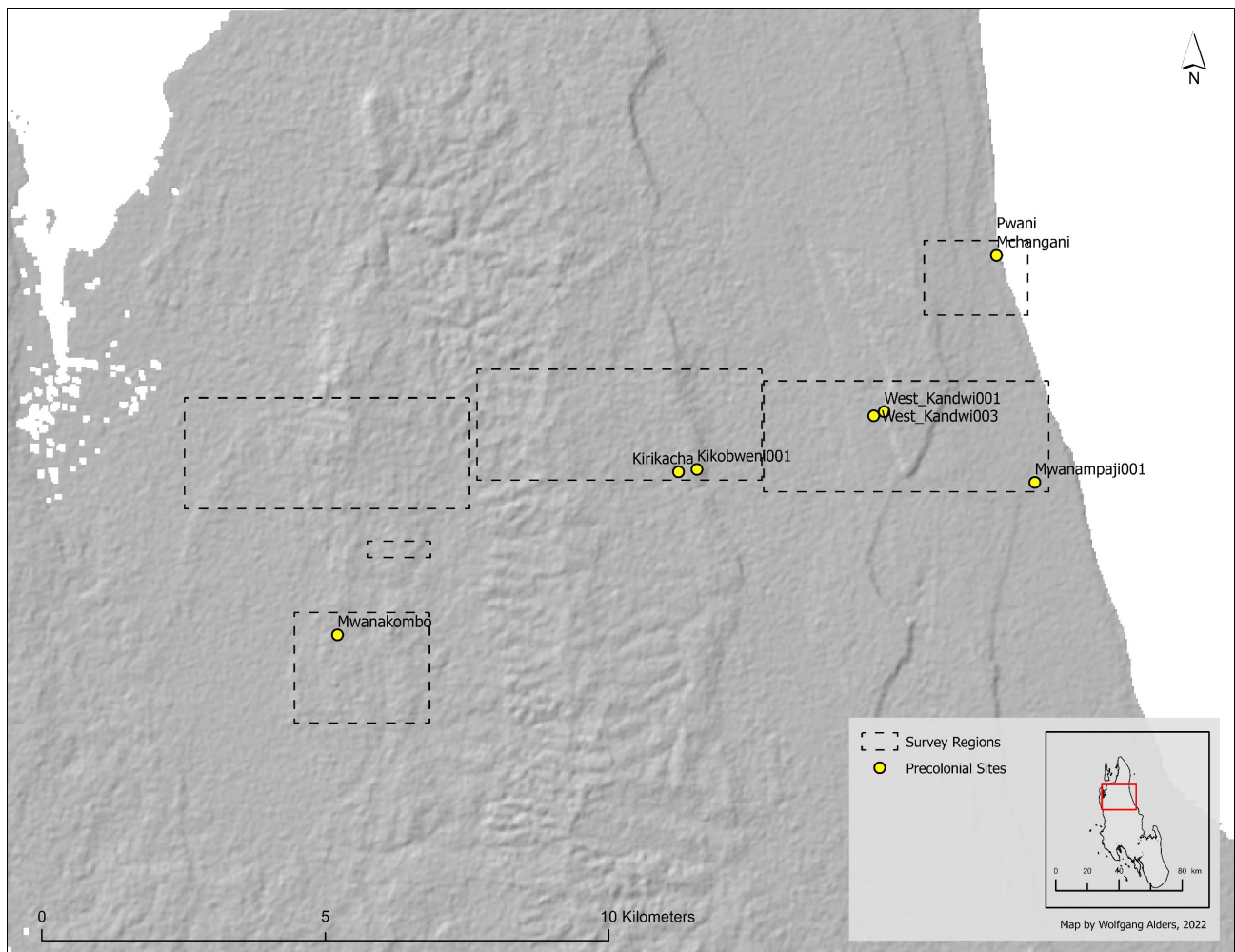


Figure 7-1. Precolonial sites of the 2019 survey.

Number	Site Name	Main Period	Date Range	Area (ha)	Site Type	Region
IZAS_0001	West_Kandwi003	Precolonial	1000-1400 CE	0.02	Swidden Plot / Surface Scatter	east
IZAS_0002	Mwanampaji001	Precolonial	1000-1400 CE	0.09	Swidden Plot / Surface Scatter	east
IZAS_0003	Kikobweni001	Precolonial	1000-1400 CE	0.9	Site on a hillslope, indeterminate size	central
IZAS_0004	West_Kandwi001	Precolonial	1000-1400 CE	0.9	Swidden Plot / Surface Scatter	east
IZAS_0005	Kirikacha	Precolonial	1000-1400 CE, with possible 7 th to 9 th century C14 date	1.67	Small Village	central
IZAS_0006	Mwanakombo	Precolonial	1000-1400 CE, also has 19th century components	4.24	Village	Mahonda
IZAS_0007	Pwani Mchangani	Precolonial	1400-1500 CE	5.56	Village	northeast

Table 7-2. Precolonial sites recorded during the 2019 survey.

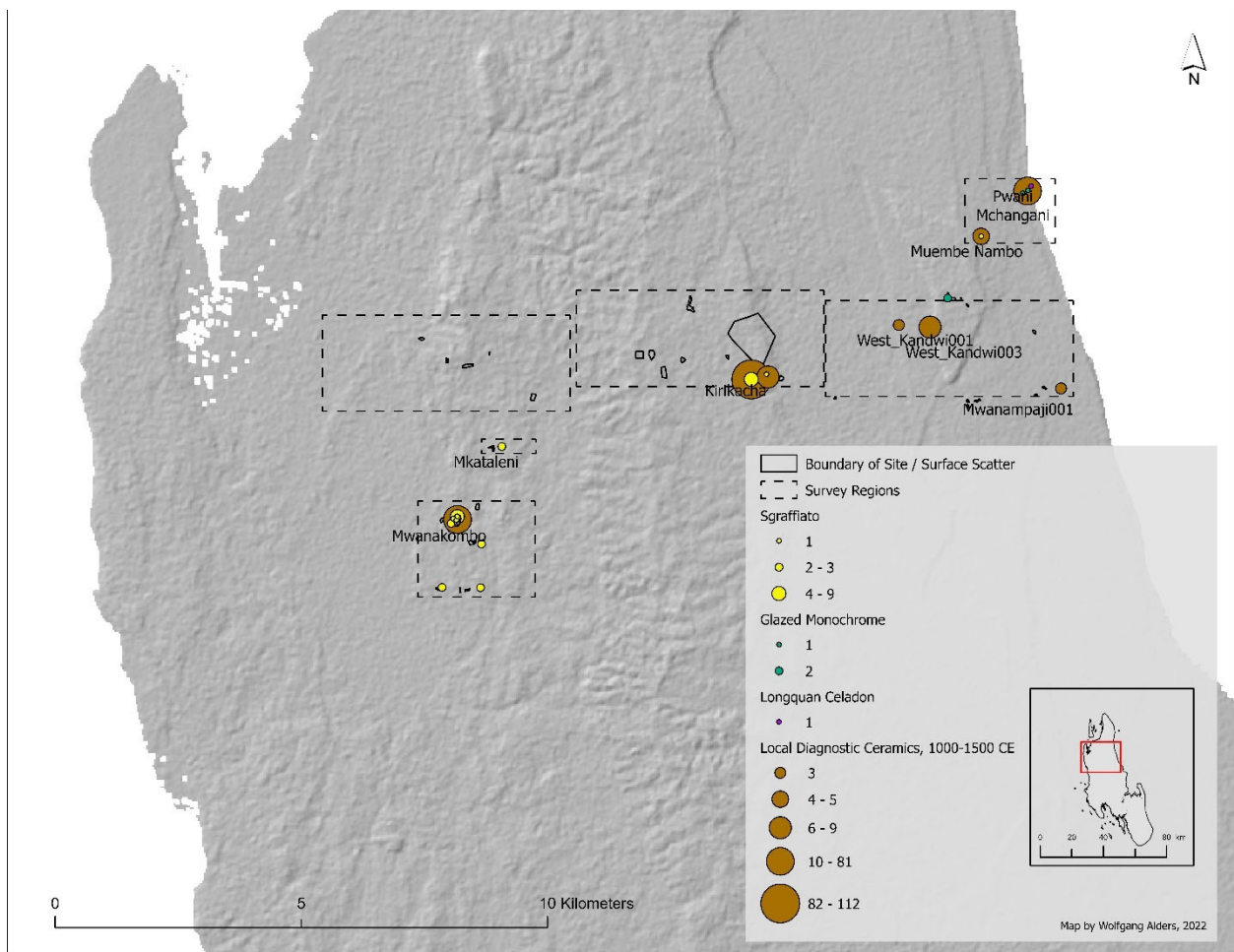


Figure 7-2. Precolonial sites recorded during the 2019 survey, along with diagnostic local ceramics and imported ceramics.

This chapter describes sites and site components for that we located in the inland areas during survey in 2019. The sections are divided by the phases outlined above in Table 7-1. In addition to these sites, as noted above in Table 7-2, the sites of Muembe Nambo and Kandwi are multi-component sites which have some precolonial materials. These sites are considered in this chapter as well.

7.2. 550-1000 CE

The primary means for identifying first-millennium occupation in Zanzibar is through the presence of Early Tana Tradition (ETT) ware, a widespread ceramic type that occurs across the coast from the 6th to 10th centuries CE (Fleisher and Wynne-Jones 2011). This ware is also called Triangular Incised Ware (TIW) (Chami 1998). I discuss these ceramics later in Chapter 12. Kandwi and Pwani Mchangani produced one or two ceramic sherds each with possible non-standard ETT/TIW forms (i.e., not triangular incised), and the fact that these sherds appear similar to later second millennium ceramics means that it is possible, but not clear, that these sites had occupations in the late first millennium. A comparable inland site known from other studies is Kuumbi Cave. In addition to late Pleistocene occupations this site has a thin stratified layer of ETT/TIW ceramics, some of which date to the late first millennium and later (Sarathi 2018; Shipton et al. 2016).

The other possible evidence for late first millennium occupation in the inland areas comes from a radiocarbon date for the site of Kichangani002 (Table 7-3, see also Appendix C). Kichangani002 is a 19th-century site on a ridge. While surface scatters produced standard artifacts for the 19th century, a single shovel-test pit produced a charcoal layer from 20 to 40 cm below the surface with undiagnostic, locally made earthenware sherds. A piece of charcoal touching the bottom side of a sherd returned a date from the 10th century. No other precolonial artifacts were found at the site, and no other shovel-test pits produced any evidence for nearby subsurface deposits. The 10th-century date for this sample was unexpected and does not fit with the ceramic evidence from the area. The date may be the result of post-depositional processes washing in older charcoal. It may correspond to some early phase of human activity in the area, but it the composition and extent of this site is not clear.

Mwanakombo and Kirikacha are two other sites from which we took radiocarbon samples (Table 7-3, see also Appendix C). These are village sites with local and imported ceramics that date them to a period between 1000 and 1400. Radiocarbon samples were pieces of wood charcoal, taken from the lowest layer where ceramics were present in shovel-test pits at each site with the aim of dating the earliest occupation period. Three samples from Mwanakombo place the earliest occupation between the 11th and 12th centuries, but one sample returned with a late 9th-11th century date. Meanwhile the single sample from Kirikacha dates from the late 7th to mid-9th century. I wanted to take more samples from Kirikacha, but our field season ended before I was able and then we were unable to return to the site due to the COVID-19 pandemic.

Site	Sample Name	depth (cm)	¹⁴ C age (BP) ± 15	Estimated Date Range (CE), 95.4% probability
Mwanakombo	001-Mwana	65	1035	994-1140, ±15
Mwanakombo	004-Mwana	82	960	1045-1183, ±15
Mwanakombo	005-Mwana	80	950	1046-1210, ±15
Mwanakombo	006-Mwana	70	1135	896-1015, ±15
Kichangani002	008-Kich	35	1145	895-994, ±15

Kirikacha	009-Kiri	75	1295	685-856, ±15
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Table 7-3. Radiocarbon dates of precolonial sites.

While the dates for Mwanakombo are feasible in relation to the ceramic evidence, the late first millennium date for Kirikacha is an outlier that may be the result of old wood, or post-depositional processes. These sites may yet yield evidence for late first-millennium ETT/TIW materials in their lowest layers. In the following sections, I describe sites from this period in more detail.

7.3 1000-1400 CE: Mwanakombo, Kirikacha, and Small Sites in the East

Our team recorded two large, permanent inland village communities in the north-central region of Zanzibar, in places known today as Mwanakombo (Figure 7-3, Figure 7-4) and Kirikacha (Figure 7-7, Figure 7-8). The local and imported ceramics suggest dates between 1000-1400 CE. Local diagnostics at these sites are similar those found to the north at Mkokotoni and Tumbatu (Rødland 2021: 103-149). Ceramics are also comparable to phase C Tana ceramics at Shanga (Horton 1996: 260) or comparable to Period 2 ceramics in northern Pemba which date from 1000-1400 CE. Many diagnostic sherds are specifically related to 11th-14th-century examples on Pemba, like neck punctating, rolled rim spherical pots (type 6 here, type 10b in Fleisher 2003: 254), or bowls with thickened carinations and hatch-marks on the neck (type 3 here, type 7 in Fleisher 2003: 251). Imported ceramics are entirely late sgraffiato wares, which date from 1000-1400 CE as well (see Chapter 14).

The dates for these sites also coincide with the founding and abandonment of the stone town at Tumbatu and the florescence of the urban landscape between Tumbatu and Mkokotoni (Rødland 2021), suggesting that these inland village communities were a part of this settlement system. Swahili people were more intensively using inland landscapes by this period for agricultural production in Pemba (Walshaw 2015), and they may have been doing similar things in Zanzibar at these sites. The early second millennium saw shifts in settlement across Zanzibar and Pemba, as first-millennium villages and towns like Unguja Ukuu and Tumbe declined in size or were abandoned while other settlements agglomerated into towns with elite residences, stone architecture, collective Islamic ritual practices, and social stratification (Fleisher 2010c). In Zanzibar, Unguja Ukuu was abandoned around the 10th century, and several other villages and towns were founded at Kizimkazi, Shangani (Zanzibar Stone Town), and at Tumbatu, where Swahili elites built large resident stone structures and a monumental communal mosque (Fitton 2018). Furthermore, the location of these sites in fertile areas which became centers of the northern plantation system suggests that similar environmental conditions which shaped the plantation landscape of the 19th century were already in existence by this time.

Prior to this survey, Tumbatu's rural hinterland was known to include Mkokotoni, Shangani, and Fukuchani, all of which are coastal sites lying directly across the Tumbatu Channel and which have materials indicating their relationships with the stone town (Fitton 2018: 241; Rødland 2021). However, the findings of this survey indicate that agricultural village communities existed further inland, and that the reoccupation of the island following settlement shifts in the 10th century may have been widespread in inland areas. The sites this survey located at Mwanakombo and Kirikacha appear to have been intensively and permanently settled between the 11th-14th centuries, corresponding to the occupation of the stone town on the island of Tumbatu.

At both Mwanakombo and Kirikacha, our team found sherds of *mofa* ovens, which indicate that the residents engaged in bread-baking. Bread-baking during this period suggests

agricultural production of pearl millet or sorghum. Agricultural production must have been a main source of food for residents at these sites since neither site shows evidence for shells or other marine faunal material that would suggest marine resource gathering as a primary mode of subsistence. However, we did not sample thoroughly and may have missed this evidence. At Mwanakombo, we also found a bead grinder, iron slag and a spindle whorl, suggesting that residents practiced craft production. Since our survey methodology was primarily focused on identifying sites regionally and measuring site size, we did not thoroughly sample either site, meaning that we may have missed further evidence for craft and subsistence activities.

We located both sites on raised bluffs, directly along small perennial streams (see predictive model for early inland villages, in Chapter 10). Further research to survey along other perennial stream systems in Zanzibar may uncover a network of similar village sites in the north. This discovery also potentially suggests that Unguja Ukuu and Zanzibar Stone Town in the southwest may have had relationships with similar local networks of rural villages.

In addition to Mwanakombo and Kirikacha, we also found evidence for ceramics dating from 1000-1400 in small surface scatters in the eastern region. These sites may represent areas of swidden farming, ritual practice around baobab trees, hunting camps, or simply small settlements that were briefly occupied. The clearest evidence is at Muembe Nambo, which has a small number of early second millennium ceramics, a piece of sgraffiato pottery, and early second millennium Dembeni ware from the Comoros. This site also has a dry-stone field wall at the site, though this was likely built later on.

In the following sections, I show maps for these sites and describe them in more detail.

7.3.1 Mwanakombo

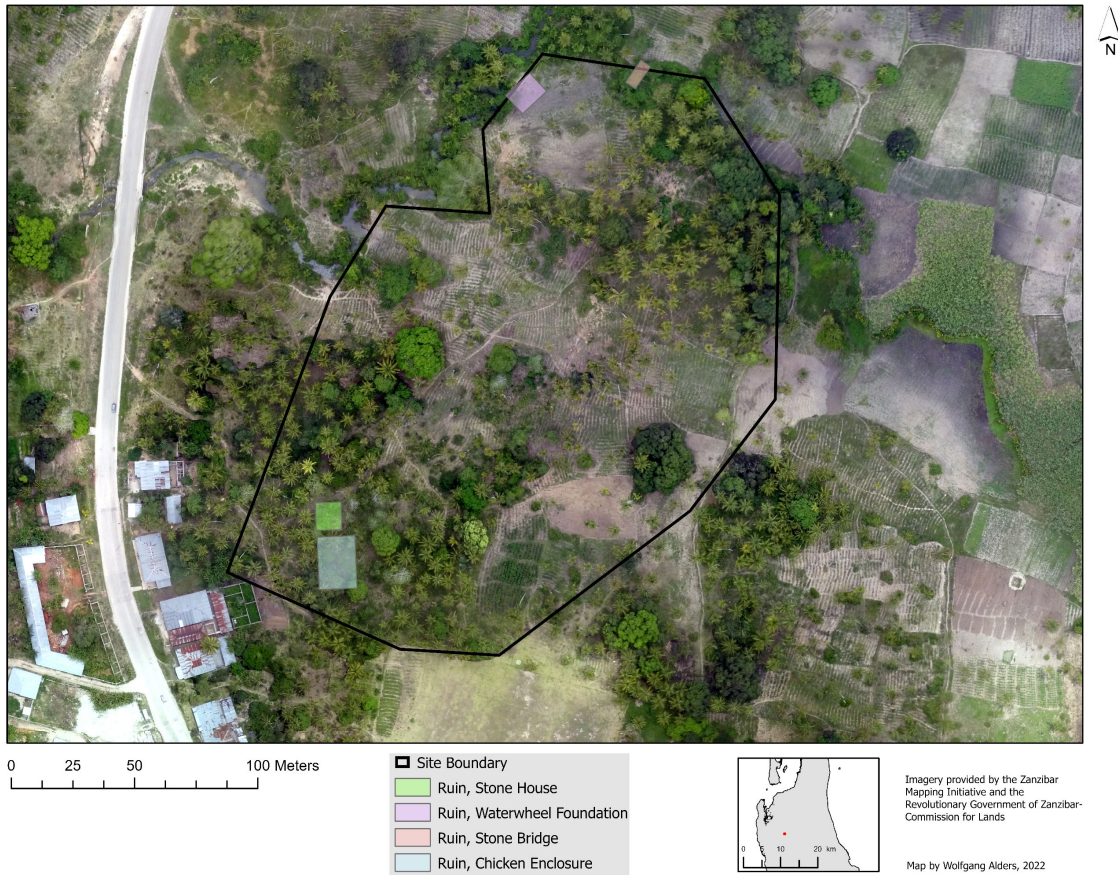


Figure 7-3. Mwanakombo, site context. Imagery provided by the Zanzibar Mapping Initiative.



Figure 7-4. Mwanakombo, on the ground context. Archaeologist Kombo Othman Juma taking a GPS point at a shovel-test pit.

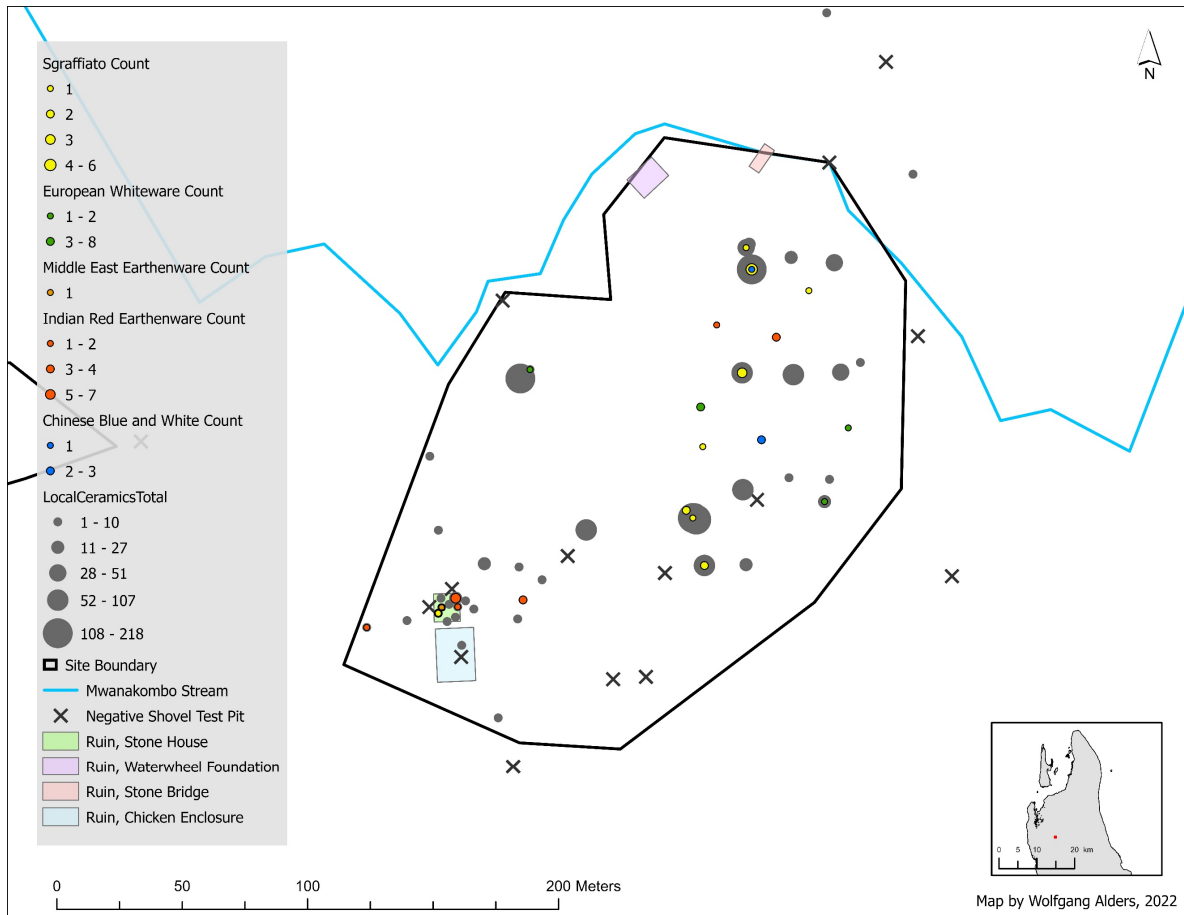


Figure 7-5. Mwanakombo, local and imported ceramics.

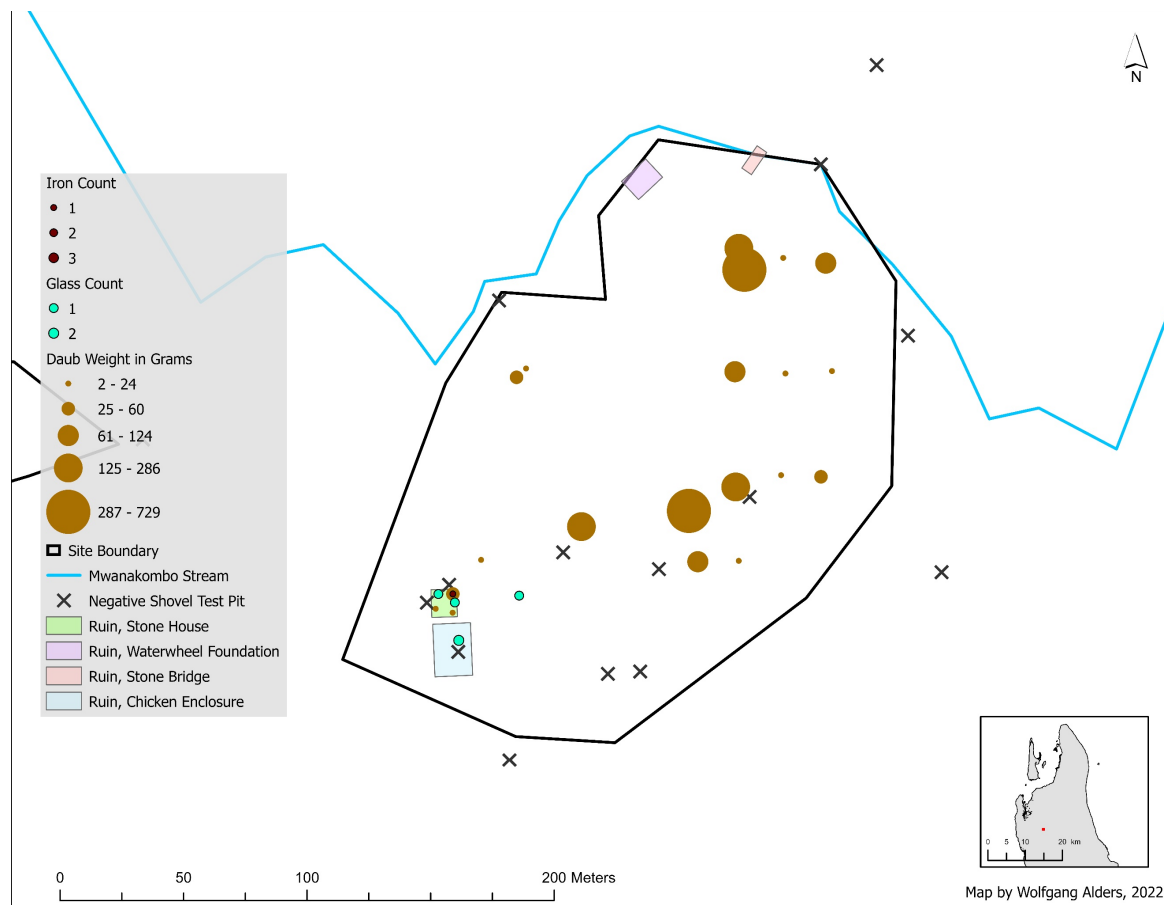


Figure 7-6. Mwanakombo, other artifacts including daub, glass, and iron.

Mwanakombo (Figure 7-3, Figure 7-4) is located just north of Mahonda in an open and recently tilled cassava field. The name refers to the Mwanakombo stream and Mwanakombo bridge, which is nearby. We located the site while we were walking from one transect to another at the end of a workday. The site covers 3.35 hectares. It has 19th and 20th century components, which I discuss more in Chapter 9. The site is most notable for large quantities of 11th-14th-century ceramic materials (Figure 7-5), which make it contemporary with Kirikacha in the central region, and the stone town of Tumbatu to the northwest. The dense artifact scatter (Type 3) containing the earlier materials is 2.37 hectares. Subsurface deposits of similar artifacts average ~50 cm in depth, and mainly occur in the open cassava field. STPs around and under the foundations of the 20th-century stone house in the southwest produced fragments of sgraffiato pottery, suggesting that the house was built on top of the earlier site, or that sediments from the site were used as filler or foundation for the stone house. Like at Kirikacha, evidence for marine resource exploitation is absent, suggesting that the inhabitants of the early village practiced agriculture or raised animals for subsistence. Artifacts beside ceramics include a *mofa* oven fragment, daub, a bead grinder, a spindle whorl, ground ceramic disks that may have been counters or game pieces, iron, glass, and iron slag. Daub is concentrated in the north and center areas, which may hold the remains of daub structures (Figure 7-6).

7.3.2 Kirikacha

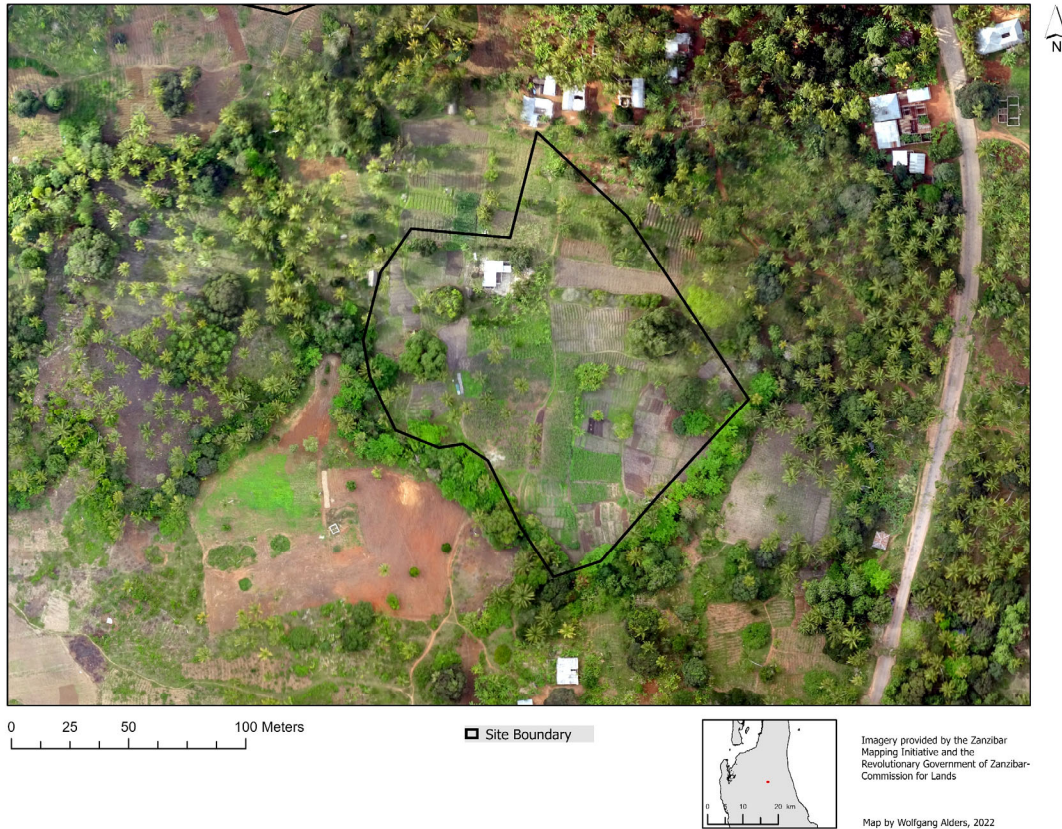


Figure 7-7. Kirikacha, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 7-8. Kirikacha, on the ground context. Archaeologist Hafidh Salum Muhammed in foreground.

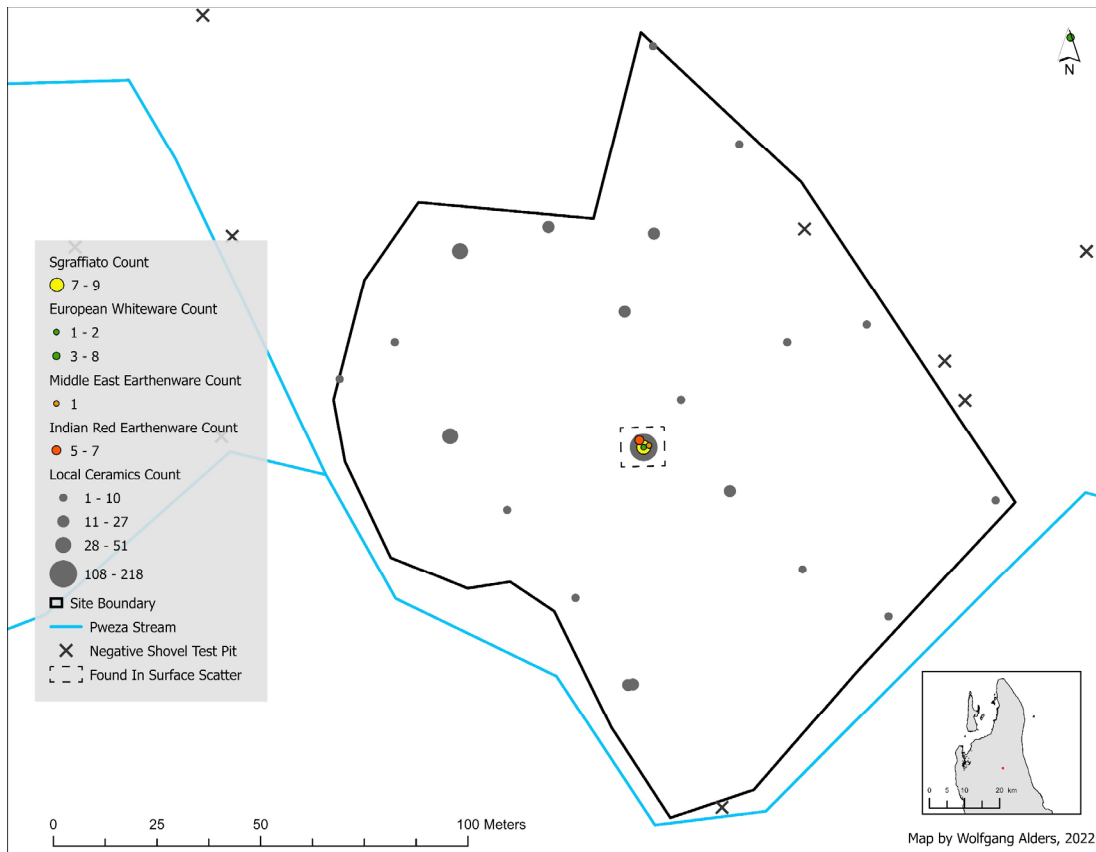


Figure 7-9. Kirikacha, local and imported ceramics.

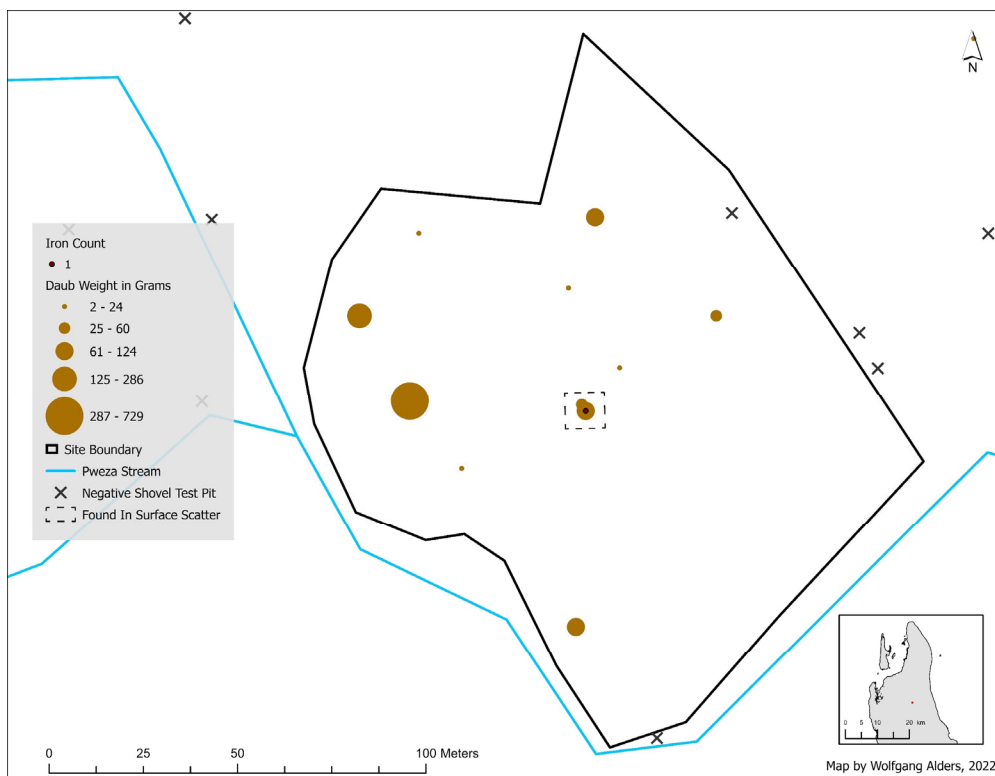


Figure 7-10. Kirikacha, other artifacts including daub, glass, and iron.

Kirikacha (Figure 7-7, Figure 7-8) is located just south of Chaani, in an open and recently tilled cassava field on a raised area overlooking the Pweza stream. The name of this site is a Swahili version of the English word agriculture; it is used to refer to the farming project in the area, which is distinct from traditional farming methods in that it uses irrigated water pumped from the stream. We discovered this site during the course of systematic survey. It measures 1.67 hectares, a small village. The site has large quantities of 11th-14th-century ceramics (Figure 7-9) like Mwanakombo, making it contemporary with the stone town of Tumbatu. Subsurface deposits are deeper than at Mwanakombo, reaching up to 80 cm. Local people have probably not hoed the area intensively, since the sherds we found were far larger and less broken than those at Mwanakombo. Artifacts beside ceramics include a *mofa* oven fragment, a piece of iron, and daub. Spatially, daub is concentrated in the western areas of the site, close to the Pweza stream (Figure 7-10). Daub concentrations here might represent an earth and thatch structure.

If the 7th to 9th century C14 date for this site is accurate, that would make this site one of the earliest sites in Zanzibar. This would be striking considering the inland location of Kirikacha, suggesting that early Swahili people were occupying inland areas on the island at the same time they were settling in coastal villages at places like Fukuchani and Unguja Ukuu. Current ceramic evidence does not support this early date however, and future research is warranted.

7.3.3 Small Sites in the East

Outside of the two inland village sites and the fishing community of Pwani Mchangani, there is a small amount of evidence for 11th-14th-century CE occupations at inland sites in the east region. Our surveys located neck punctating, rolled rim spherical pots, indicative of the 11th-14th centuries on Pemba (type 6 here, type 10b in Fleisher 2003: 254) in scatters at four small sites in cleared coralline bedrock areas of the East survey region: West_Kandwi001, West_Kandwi003, Mwanampaji001, and Muembe Nambo. Today, these sites are swidden plots, areas occupied temporarily by farmers for seasonal agricultural work. Farmers today camp and cook with aluminum pots in these fields. The same activities done earlier with rolled-rim necked pots may have produced the artifact scatters we encountered on survey.

The presence of early second millennium materials in these plots suggests that this practice may have a deep, continuous history in eastern Zanzibar, from the earliest periods to the present. Figure 7-11 shows the regional context for West_Kandwi001, West_Kandwi002, and West_Kandwi003, and Figure 7-12 shows Mwanampaji001. The overhead drone image of Mwanampaji is from 2016 and appears to have been taken prior to this area being cleared; when we encountered the area during survey in 2019 it had been freshly burned and cleared by farmers, exposing early second millennium ceramics (Figure 7-12, Figure 7-13). This suggests that our site sample in the eastern areas heavily depended on whether or not a plot was cleared. Without recently cleared plots, the land is virtually inaccessible and artifacts on the surface are nearly impossible to see. In general, we were not able to use shovel-test pit survey in these regions since soil is shallow and coralline limestone bedrock is present on the surface. Our surveys in these areas mainly consisted of surface survey.

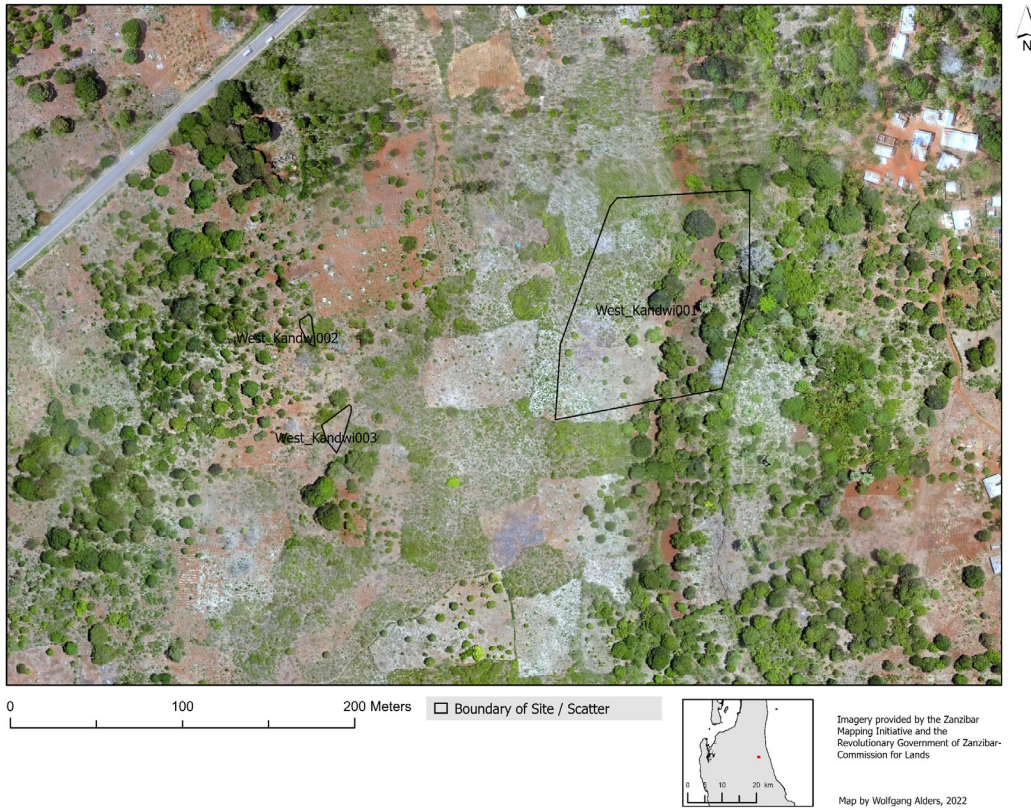


Figure 7-11. West_Kandwi001, 002, and 003.

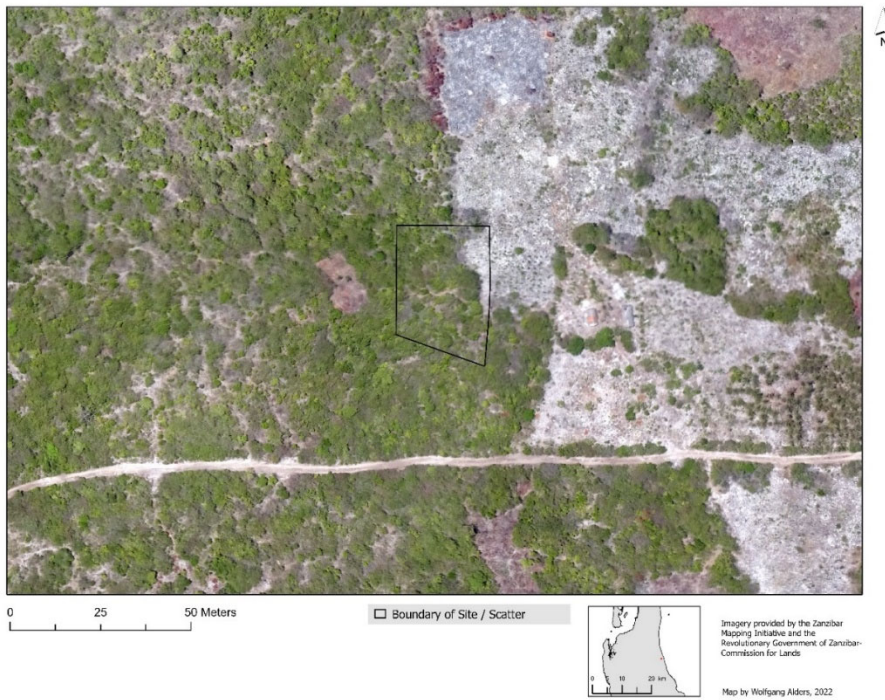


Figure 7-12. Mwanampaji001. The field plot in which we located artifacts was not yet cleared when this image was taken.



Figure 7-13. Mwanampaji001 on the ground, recently burnt and planted with banana trees. Museum official and archaeologist Ali Vuai surveys the ground for ceramics. Note the plastic water jug left by recent farmers. Ceramics from past centuries may have been used in similar ways, to carry water to the site or to cook and consume food.

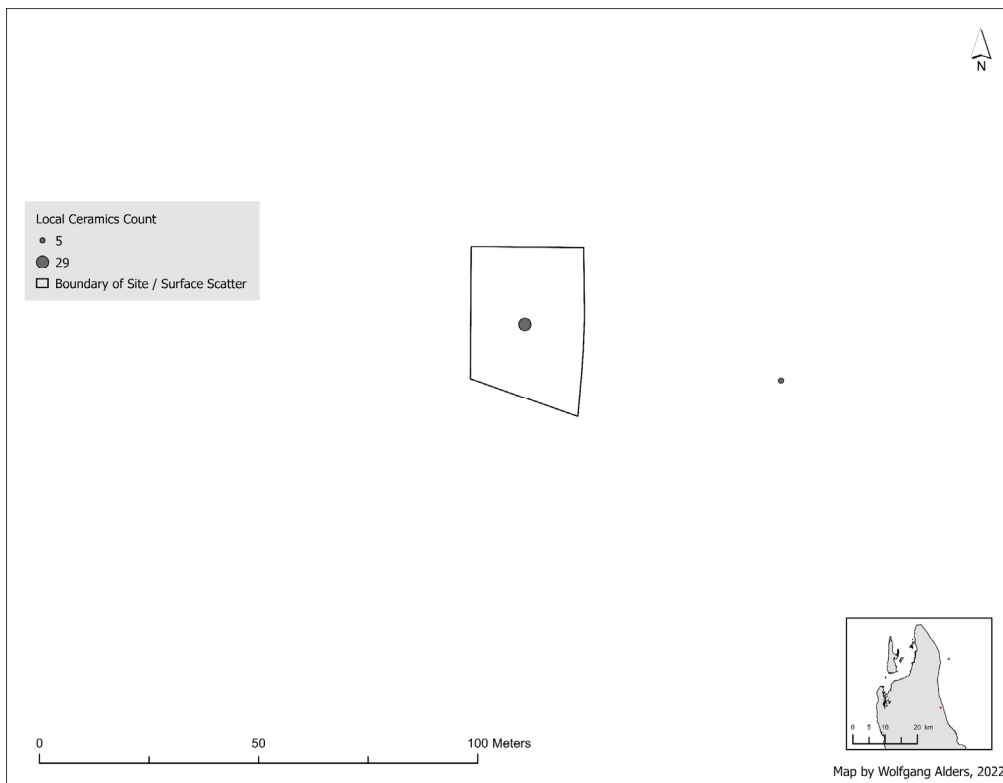


Figure 7-14. Mwanampaji001, showing local ceramic counts found within the scatter.

The site most illustrative of long-term swidden land use is Muembe Nambo (Figure 7-15) a site we recorded in the northeast survey region after noticing a large grove of baobabs by the road. This site is unique in that it lies among several large baobab trees, a stone wall (Figure 7-16), and a small limestone cave. Muembe Nambo is a multi-context site, with materials from the early second millennium, type 17 ceramics possibly indicating occupation in the early colonial period, and late colonial imported ceramics post-dating 1830. Today, farmers still use the site, growing banana, cassava, and lime. The baobab grove likely contributes to the site’s longevity, making it slightly more multi-faceted and productive than a typical swidden plot. The stone wall at the site may have been built at any point in the last thousand years, but oral traditions attest that the walls were built to keep out pigs, which were brought to the island by the Portuguese in the 16th century (see Chapter 6). We searched the limestone cave at the site briefly but did not find any artifacts that would indicate the cave was used for shelter or as a place for offerings. Figure 7-17 shows more of the site context on the ground. Figure 7-18 and Figure 7-19 show the ceramic and artifact distribution at the site, which we almost entirely gathered from surface collections due to the shallow soils.

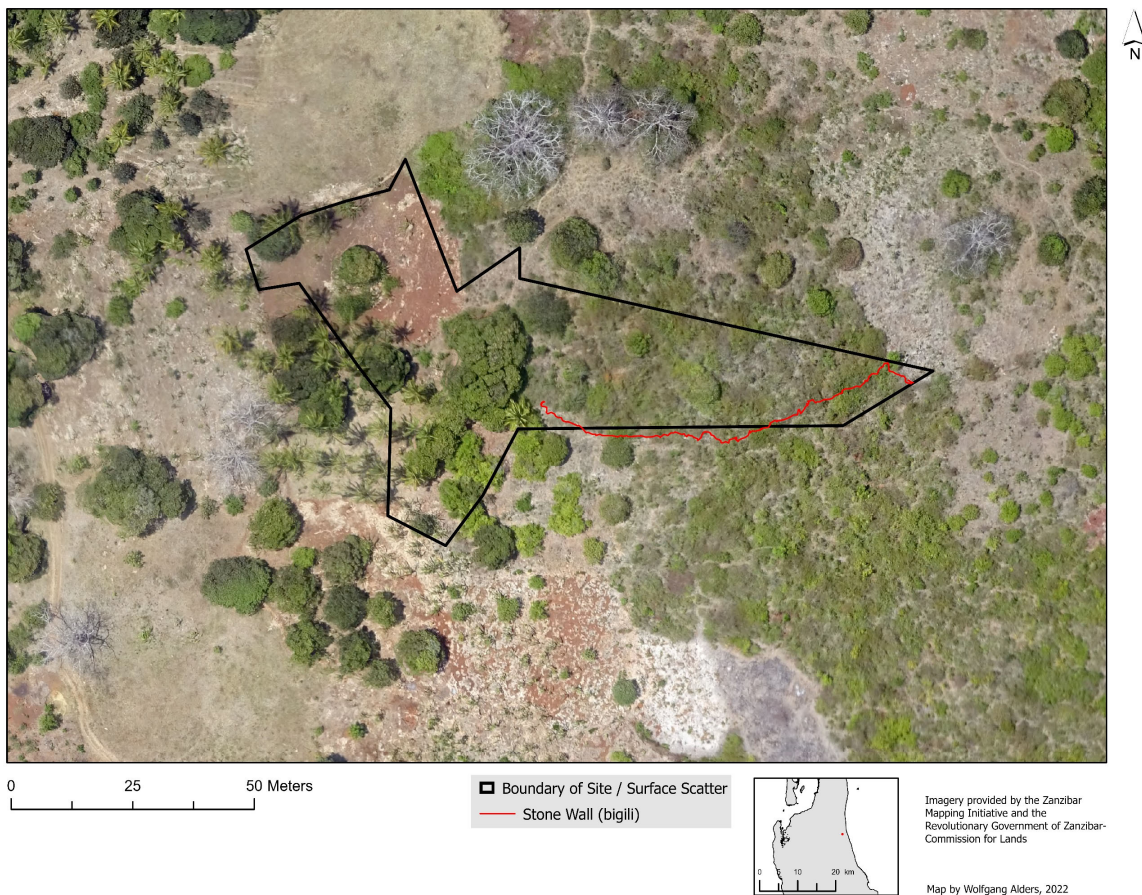


Figure 7-15. Muembe Nambo, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 7-16. Muembe Nambo, with stone wall (*bigili*). Notice the coralline limestone bedrock on ground, preventing shovel-test pits.



Figure 7-17. Muembe Nambo, on the ground site context, with baobab in the background. Imagery provided by the Zanzibar Mapping Initiative.

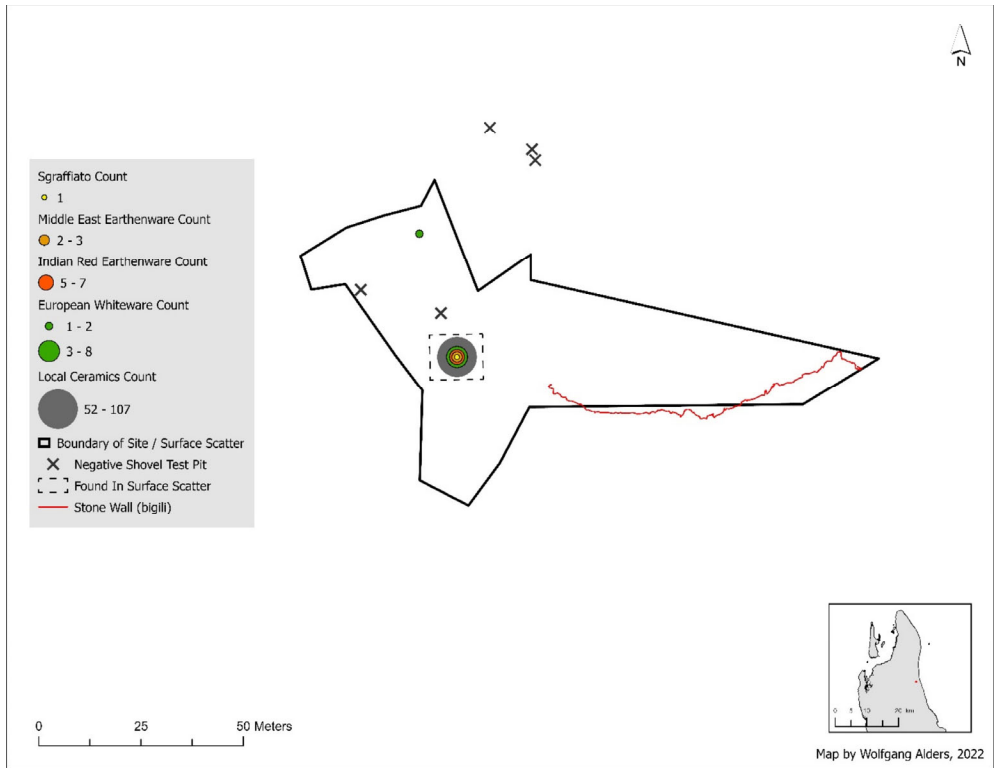


Figure 7-18. Muembe Nambo, ceramics. Almost all were collected in the surface scatter.

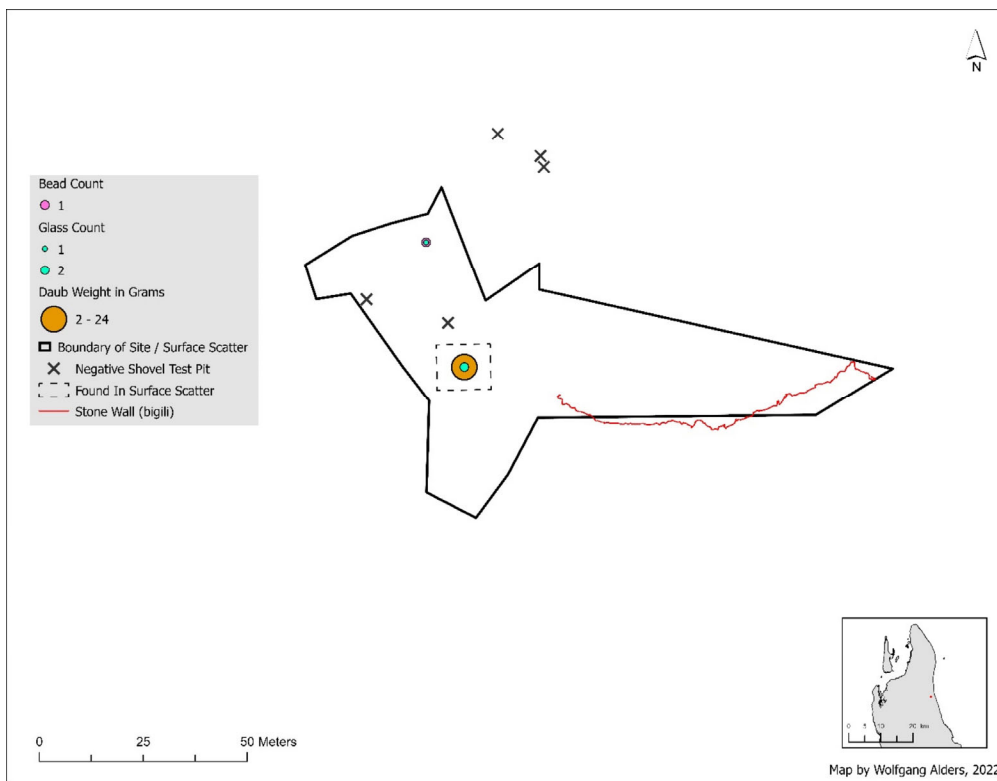


Figure 7-19. Muembe Nambo, other artifacts including daub and glass.

Unique early second millennium ceramics at Muembe Nambo are two sherds of Dembeni ware, which originates in the Comoros (Wright 1984). Coarser types of this ware date to the late first millennium (e.g., Horton 1996: 254; Wright 1984: 38), while Pawlowicz (2011: 228) describes a finer variety from the early second millennium which reached Mikindani on the southern Tanzania coast. Figure 7-20 shows an example of the sherds that our team found.



Figure 7-20. Possible Dembeni ware sherd from Muembe Nambo.

Overall, the precolonial sites in the east region attest to the long history of land use in this part of Zanzibar, despite the marginality of the soils compared to the west.

7.4 1400-1500 CE: Pwani Mchangani

In addition to the inland villages, we also recorded a coastal shell mound and village site just north of the modern town of Pwani Mchangani, in the eastern region. The mayor (*Sheha*) of Pwani Mchangani showed us the site while we were visiting there to plan a survey. We quickly realized that the site is large (5+ ha) and has complex stratigraphy relating to the shell mound there (Figure 7-21, Figure 7-22). We planned STPs in a small grid to assess the site boundaries, but stony bedrock prevented us from digging in several areas. We also assessed the site boundary based on the extent of the surface scatter. Within the shell mound, we dug three shovel-test pits to sample material. These produced a large quantity of marine shell, which we were not able to analyze prior to the end of the field season. These shell remains are currently in storage at the Zanzibar Museum. The large quantity means that this site is a good candidate for faunal analysis aimed at reconstructing marine resource subsistence. This site is located near to urban development and is likely in need of immediate conservation to prevent damage to the shell mound from any new construction.



Figure 7-21. Pwani Mchangani, context from above, showing the location of the well and shell mound.



Figure 7-22. Pwani Mchangani, context at site. Shell mound is to the right, in the background under trees.



Figure 7-23. Pwani Mchangani, archaeologist Asia Haji Ubwa with purported Portuguese well.



Figure 7-24. Pwani Mchangani, mortared stone rectangular structure for washing clothes, dating to the 20th century.

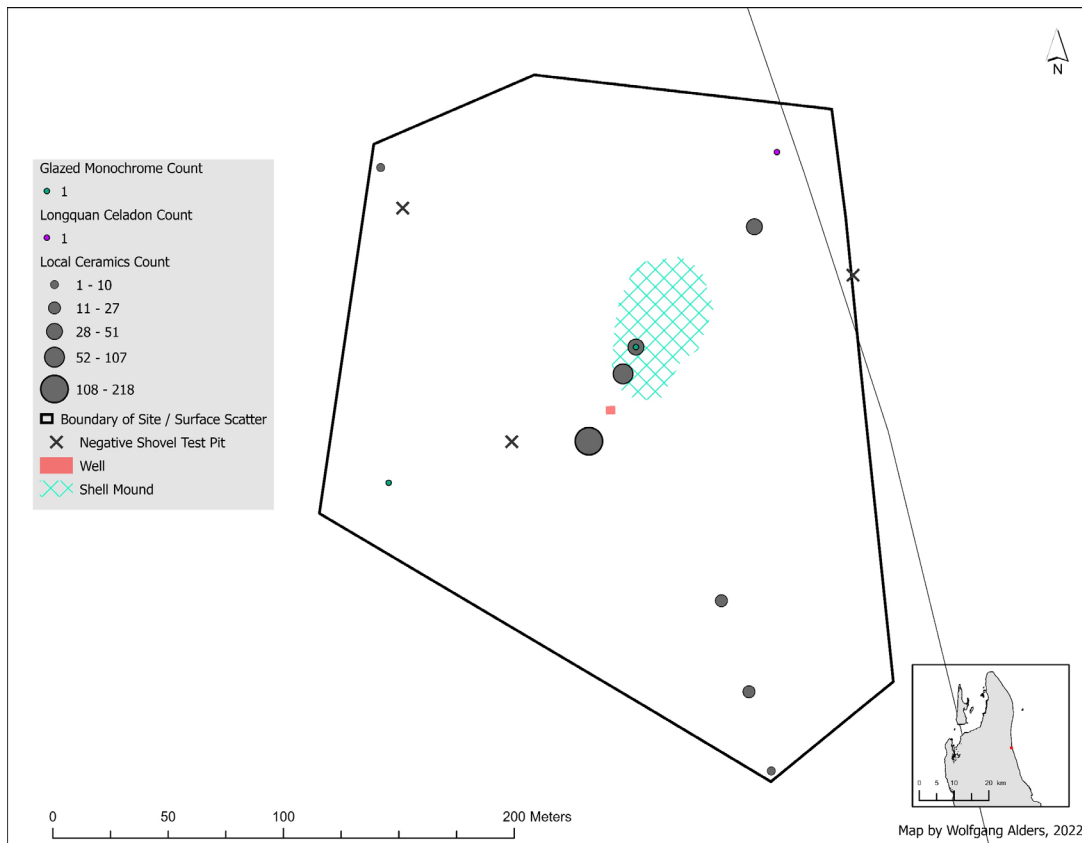


Figure 7-25. Pwani Mchangani, ceramics.

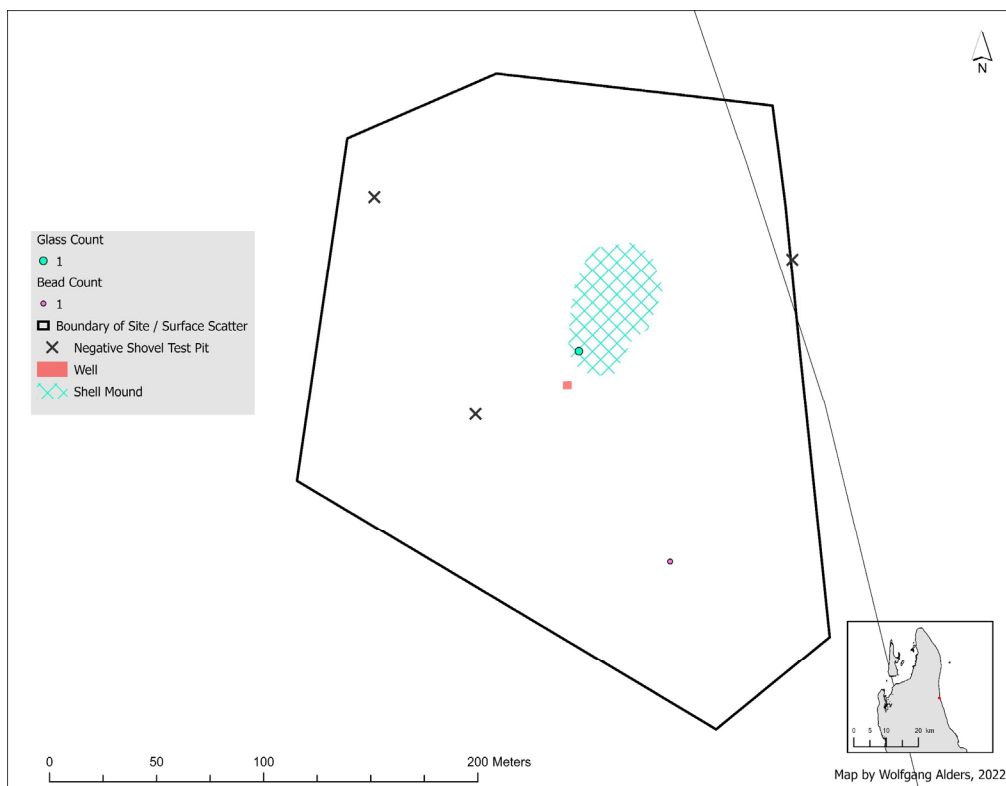


Figure 7-26. Pwani Mchangani, other artifacts.

Imported ceramics at the site that we recorded date from 1400 to 1500 CE, and a few 19th-century ceramics attest to reoccupation in the late colonial period. Imported ceramics are a few sherds of blue and green glazed monochrome pottery, a sherd of Husuni modeled ware, and a sherd of Longquan celadon (Figure 7-25). Also see Chapter 14 for descriptions of these ceramics). We did not find sgraffiato, or any earlier imported materials, which is the reason for dating the site to a period post-1400. The local ceramics are similar to Phase C and D at Shanga, suggesting similar dates or dates slightly earlier; in addition, we found a few sherds that appear like earlier ETT/TIW ware, but these were not conclusive enough since they circular punctates rather than the distinctive incised triangles of ETT/TIW. However, given the large size of the shell mound and the coastal location, it would not be surprising if future research reveals Pwani Mchangani to be an early coastal site, comparable in date to Fukuchani (6th-8th centuries). We found little daub at the site, reflecting the site's location in a stony area (Figure 7-26).

One stone feature at the site is a circular well that has been filled in, which the mayor told us dates to the Portuguese period (Figure 7-23). Another stone feature at the site is a large stone rectangular slab with grooves cut into it (Figure 7-24). Residents described this as a place for washing clothes; the grooves would allow water to run down from the surface. This structure was built in the 20th century and is currently unused. North of the site lie many modern and some possibly ancient graves; we avoided this area intentionally. To the west, some of the site may have been destroyed by the construction of a soccer field. Small pieces of ceramic can be found scattered within the tightly compacted earthen pitch. The site may also extend further south, but we were prevented from digging or testing in this area due to modern settlement.

We had hoped that Pwani Mchangani would provide uninterrupted ceramic evidence from the 11th to 19th centuries, but this was not the case. The artifact record for the early colonial period at this site is nonexistent. This lacuna suggests that the gap in the artifactual record for the early colonial period is the result of real social disruptions in the past, not just problems with preservation and recovery in the present. However, Pwani Mchangani is a large site with deep (1.5 m or more) deposits in some areas, and a more intensive sampling project might produce better evidence for social continuity at the site.

7.5 Conclusion: The Precolonial Period in Inland Zanzibar

Our team identified three different site types for the precolonial period: 1) inland village sites associated with perennial streams, 2) surface scatters associated with modern swidden plots in the eastern region, and 3) a coastal fishing village with a shell mound at Pwani Mchangani. These site types attest to the diversity of subsistence strategies that residents on the island pursued during the precolonial period. One anomaly is the lack of precolonial sites in the west region, which is theoretically far more agriculturally fertile than the east. Our team expected to find sites similar to Mwanakombo and Kirikacha in the west, since perennial streams also flow through this area and the environmental conditions are relatively similar. One possibility is that we simply missed a precolonial village site in this region due to our survey methodology. Another possibility is that modern land use has destroyed evidence for precolonial sites or made them more difficult to access. A large part of the far west is degraded by sand and gravel mining or covered with inaccessible sugar cane fields. Finally, it is possible that the western survey region was not settled during this period. Zonal statistics analyses in Chapter 10 describe why this may have been the case: the western zone is comprised of *mchanga* and *kinamo* soils, which are less favored for settlement than the *kinongo* soils found in other parts of the west and central areas of the island.

In a broader context, the presence of inland agricultural communities at Mwanakombo and Kirikacha may help explain settlement reorganization in the early second millennium. From 1000 to 1400, the main urban center in Zanzibar shifted from Unguja Ukuu in the south, to Tumbatu in the north. Unguja Ukuu was abandoned during this period, before being reoccupied again in the 15th century (Juma 2004: 154). Meanwhile, Tumbatu was founded sometime in the 12th century, and persisted into the 14th century. An important difference between Unguja Ukuu and Tumbatu was the environmental landscape of their respective hinterlands. Inland from Unguja Ukuu are coralline limestone bedrock areas, unsuitable for large scale agriculture. Conversely, inland from Tumbatu are fertile areas in the west and center of the island, where this survey has now established the existence of precolonial village communities directly adjacent to rice fields, practicing agriculture and baking bread. From Pemba, it is clear that rice production became increasingly important in the early second millennium, as communities converted to Islam and developed preferences for rice-based dishes associated with communal feasting (Fleisher 2010b; Walshaw 2010). The increased importance of rice production during the early second millennium may help explain why Tumbatu developed and grew while Unguja Ukuu declined starting in the early second millennium. Unlike Unguja Ukuu, Tumbatu was located close to the most fertile areas on the island, where this survey has recorded village communities. The presence of imported ceramics from the 11th-14th century at these village communities suggest that residents may have traded or gifted agricultural surpluses to residents at Tumbatu in exchange for imported ceramics.

Even while Swahili people were shifting to rice-based diets elsewhere on the coast, people pursued alternative subsistence strategies throughout this period. In the eastern regions, the presence of early second millennium ceramics in stony swidden field plots suggests the early origins of swidden agriculture, which would not have been used for rice production. This deep history of swidden farming in the east challenges common assumptions about this form of land use in Zanzibar or raises new questions. The dominant narrative suggests that indigenous island residents were forced into eastern areas in the 19th century when Omani clove planters seized fertile lands in the west from them (Glassman 2011: 32; Owens 2007). However, our surveys show that while precolonial Swahili people did inhabit the fertile western areas, they were present in the east as well from an early date. Were there earlier dynamics of dispossession and exclusion that predated the clove plantation system, perhaps related to rice farming and elite power in Tumbatu? Did Swahili people pursue swidden farming in the east for different, still unclear reasons, unrelated to calculations about agricultural productivity? As I show later in an analysis of environmental zones across the island, the eastern regions were closer to accessible near-shore reefs that may have made these areas attractive places for settlement despite the marginality of agricultural soil. Or was it simply the case that when Omani planters took the fertile land in the 19th century, dispossessed Swahili people drew on already long-established patterns of subsistence and settlement in the eastern region as a means of survival and refuge? Future research might use ceramic analyses to link different site types more concretely to specific social groups in that past, which might help address these questions.

Chapter 8: Sites and Finds of the Early Colonial Period

8.1 Introduction

The early colonial period spans the years from 1500-1830, with two phases related to Portuguese and then Omani rule on the Swahili Coast. Around the year 1500, agents of the Portuguese state began asserting economic and political control along the East African coast, ending the political autonomy of Swahili towns. Their goals were to gain control over the gold and ivory flowing out of East Africa, and to secure the coast with a series of forts to help them to ship spices and other products from Asia back to Europe to circumvent Ottoman control over trade routes on land. While they sacked several towns and stationed governors in East African cities until 1698, their ability to monopolize trade was limited by their own reliance on Swahili political elites and merchants, who often circumvented their authority. In 1698, the Yarubid dynasty of Oman expelled the Portuguese from the coast north of Mozambique. The Yarubid Omanis (and their Busaid successors after 1749) controlled the coast in a similar manner to the Portuguese—they stationed governors in towns and focused on monopolizing and taxing trade in gold, ivory, and enslaved people. Portuguese, Yarubid, and Busaid control during these periods was never complete—at different times, the cities of Mombasa, Pate and others asserted independence under the Mazrui and Nabahani dynasties. I discuss this history in more depth in Chapter 2. For the purpose of archaeology on Zanzibar, the period from 1500 to roughly 1830 constitutes one long early colonial period of similar political and economic conditions that can be divided into two phases. Known archaeological sites from this period are few. I summarize these details below in Table 8-1.

Phase	Years	Description	Known Sites in Zanzibar	Sites / site components / dates recorded in 2019 by our team
1	1500-1698	Portuguese rule over coastal towns to monopolize trade, and the abandonment of stone-built sites in Pemba and other parts of the coast	Fukuchani, Mvuleni, Uroa, Zanzibar Stone Town	Kandwi, Kandwi_Kibokwa003
2	1698-1830	Yarubid and then Busaid Omani rule to monopolize trade, prior to the development of the clove plantation system. Mosque at Kizimkazi renovated in this period.	Shakani, Kizimkazi, Zanzibar Stone Town	Njua Kuu, other late colonial sites with type 17 pottery

Table 8-1. Phases of period 4, the early colonial period in Zanzibar, with previously known sites and sites recorded in 2019.

Our survey identified four sites on Zanzibar dating to the early colonial period. Three of these sites lie in the eastern region and date to the first phase of this period, from 1500-1698. One is the village of Kandwi, on a plateau with fertile soil compared to the surrounding areas. The other two sites are Kandwi_Kibokwa002 and 003, which are surface scatters in swidden plots in the east. We dated these sites to Phase 1 of this period since they have evidence for Middle Eastern earthenware of the 16th-18th centuries. Kandwi has later glazed monochrome ware, while Kandwi_Kibokwa003 has the base of a piece of black speckled Bahla ware, dating to the 17th century (see Chapter 14). Kandwi_Kibokwa002, which lies near Kandwi_Kibokwa003, does not have imported materials but it does have local ceramics diagnostic of the 16th-18th centuries, comparable to finds at Fort Jesus. Most of the local ceramics at these sites also are distinct from both precolonial assemblages and late colonial assemblages. Kandwi also has late colonial material, and settlement in the area has persisted into the present day. Kandwi_Kibokwa002 and 003 are sites related to the long-term use of swidden plots in the eastern region from the

precolonial period to present. As such, they may have been periodically occupied from the early colonial period to the present.

The fourth site dates to the second phase of this period, from 1698-1830. This is the village site of Njua Kuu, in the central region. This site has local ceramics characteristic of the later colonial period and 18th-19th century Chinese blue and white porcelain, but no industrial European whitewares that appear in sites of the late colonial period, following the development of the clove plantation system around 1830. This site was likely occupied in the 18th or early 19th century and abandoned prior to the development of the plantation system. Other sites that were founded in this period may include many other hamlet-sized sites that persist into the 19th century, and which we have classified as late colonial sites on the basis of European whiteware. The development of many late colonial sites from previous settlements in the early colonial period may account for the relative lack of sites from this period in general across Zanzibar. Early colonial sites likely lay beneath 19th-century sites as well as beneath modern settlement (LaViolette and Norman, in press).

This chapter gives an overview of these sites. Figure 8-1 shows an overview of site locations. Table 8-2 summarizes the sites we recorded during the 2019 survey. Figure 8-2 shows these sites across the survey region with local diagnostic and imported sherd counts.

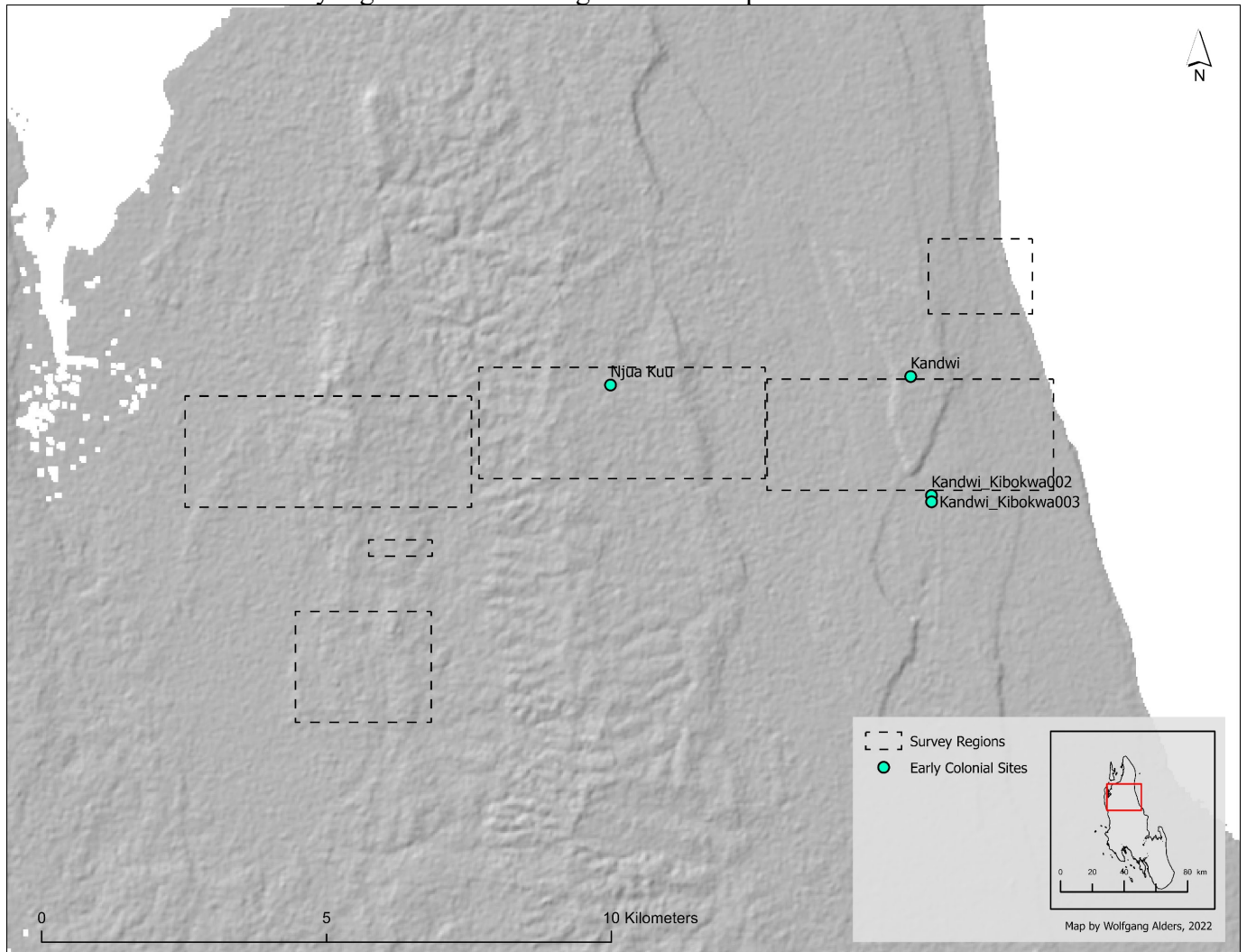


Figure 8-1. Early colonial sites of the 2019 survey region.

Number	Site Name	Main Period	Date Range	Area (ha)	Site Type	Region
IZAS_0008	Kandwi_Kibokwa002	Early Colonial	1500 CE to present	0.18	Swidden Plot / Surface Scatter	East
IZAS_0009	Kandwi_Kibokwa003	Early Colonial	1500-1830 CE	0.2	Swidden Plot / Surface Scatter	East
IZAS_0010	Kandwi	Early Colonial	1500-1830 CE, also has late first millennium site components	1.53	Small Village	East
IZAS_0011	Njua_Kuu	Early Colonial	18th or early 19th c.	1.77	Small Village	Central

Table 8-2. Early colonial sites recorded during the 2019 survey.

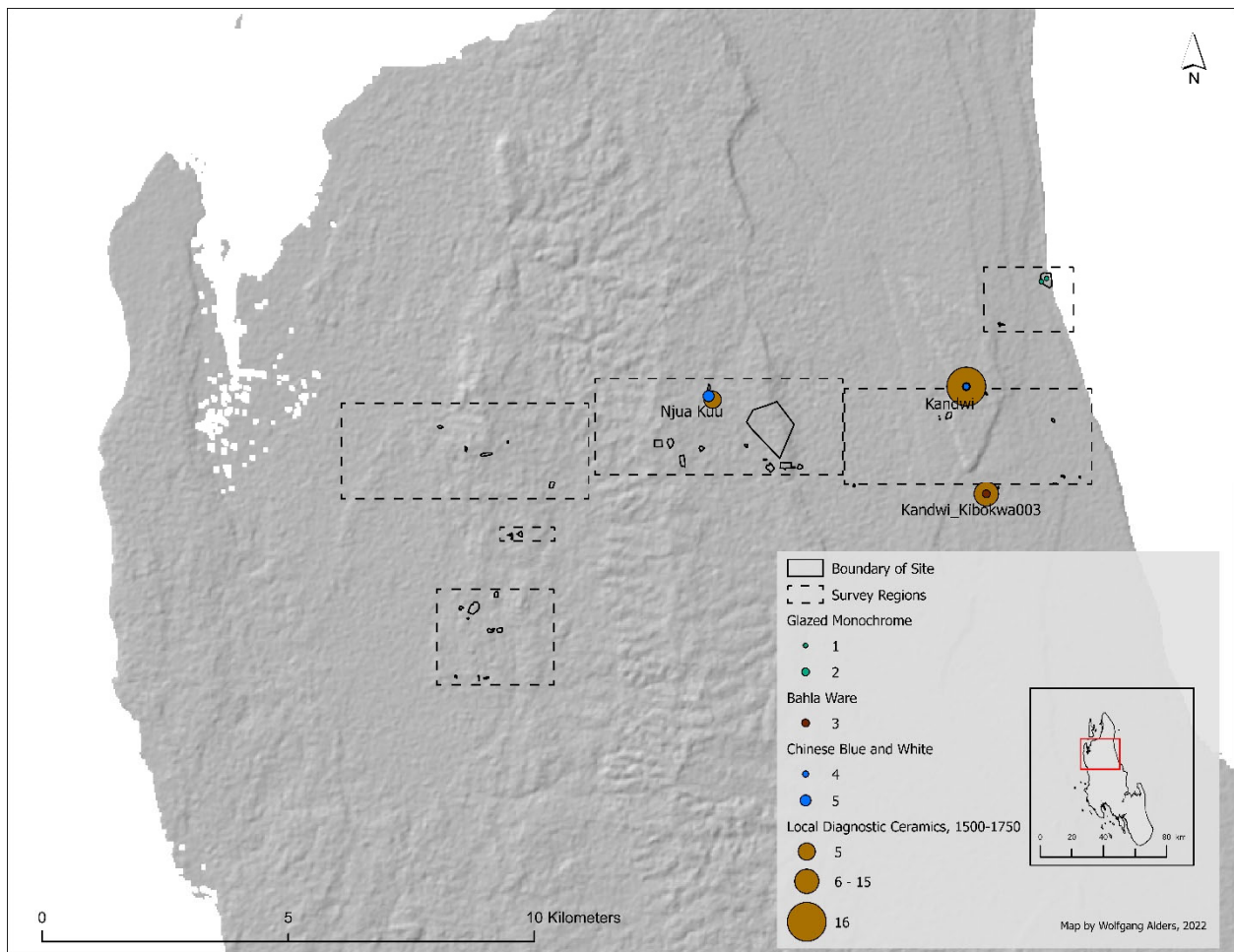


Figure 8-2. Early colonial sites recorded during the 2019 survey, along with diagnostic local ceramics and imported ceramics.

In the following sections, I describe the sites listed above in greater detail.

8.2 Kandwi

Kandwi is a site located near a modern village of the same name. It consists of an artifact scatter with limited subsurface deposits. Artifacts we recovered included a spindle whorl, imported glazed monochrome ceramics, Chinese blue and white porcelain, red Indian Earthenware, and early colonial local ceramic types. We also found two sherds of non-standard

ETT/TIW ceramics at the site, suggesting that it may have a longer history of occupation prior to the 16th century. Chapters 13 and 14 describe ceramics from this site in more detail. The presence of subsurface deposits in general also suggests a longer history of occupation in the area compared to late colonial sites elsewhere. Figure 8-3, Figure 8-4, Figure 8-5, and Figure 8-6 show the site context and associated artifacts.

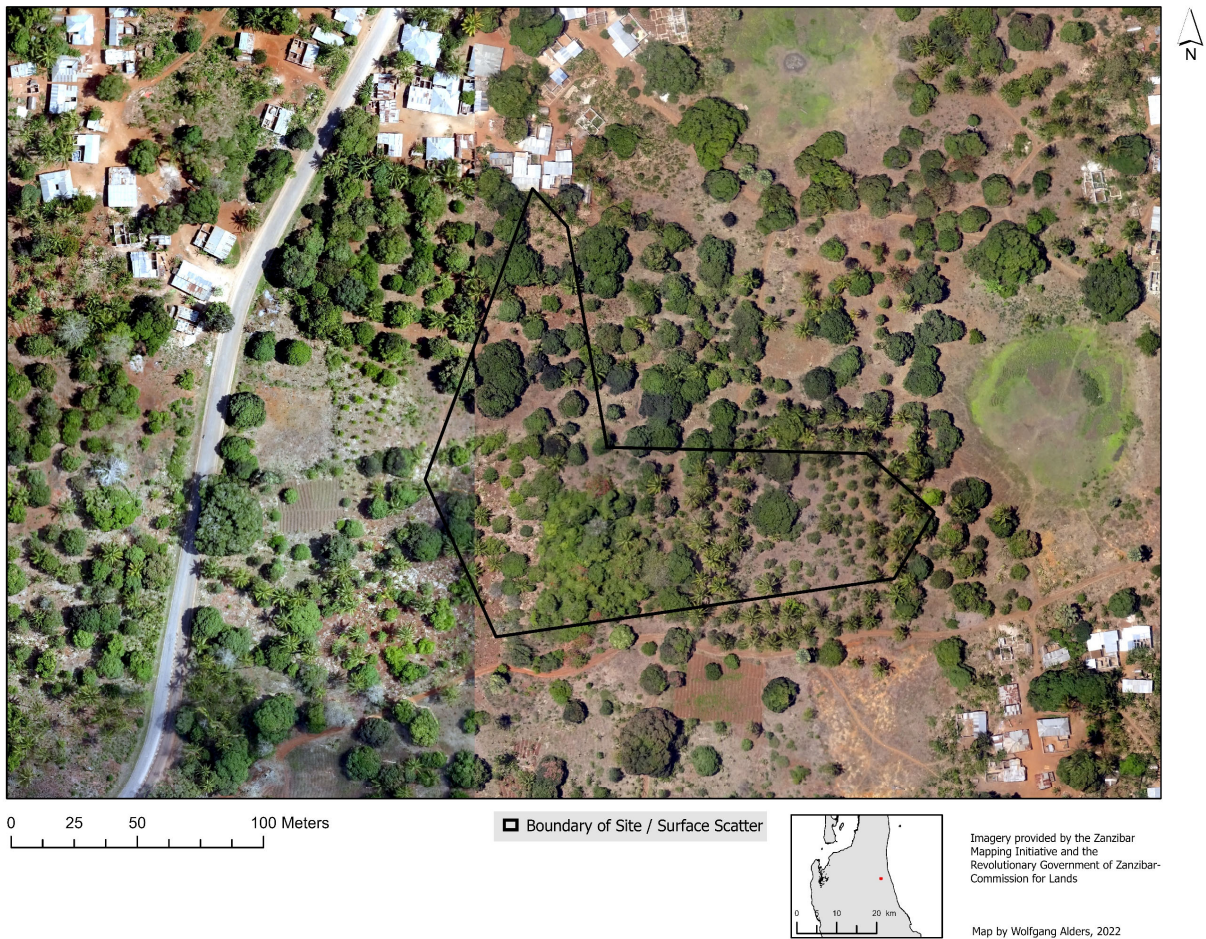


Figure 8-3. Site context at Kandwi from above. Imagery provided by the Zanzibar Mapping Initiative. A pond covered in algae is visible on the map, to the east. The modern village of Kandwi lies to the northwest.



Figure 8-4. Site context at Kandwi at the ground level, with a pond.

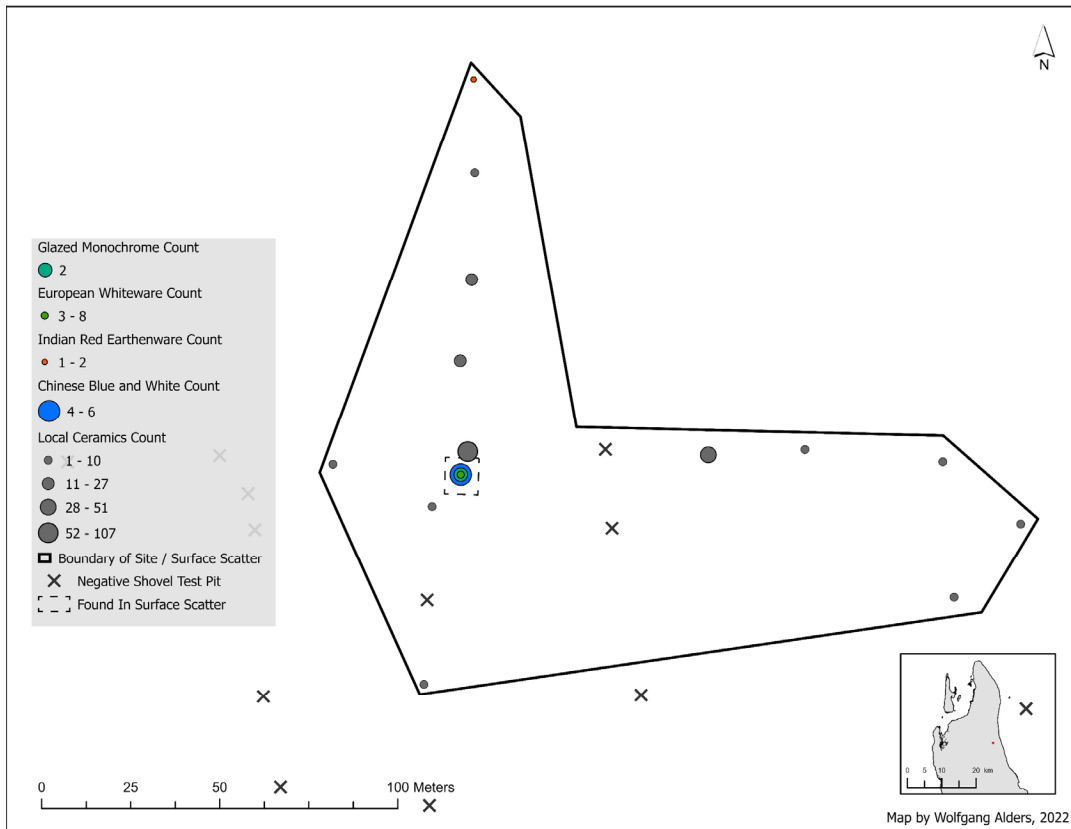


Figure 8-5. Local and imported ceramics at Kandwi.

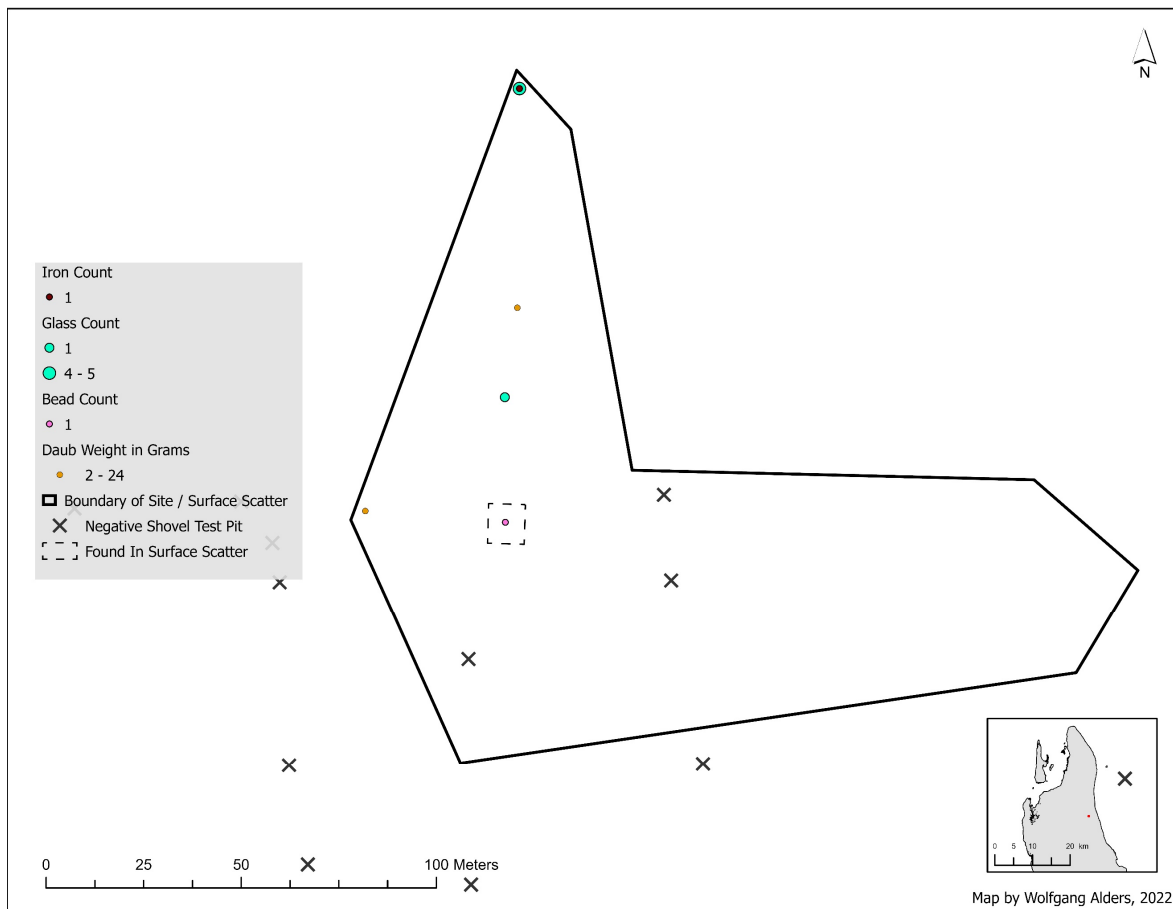


Figure 8-6. Other artifacts at Kandwi including daub, glass and iron.

Kandwi is the only site we located in the inland eastern survey region that is also listed on the 1907 Khan Bahadur map (see Chapter 11). This reflects the fact that the site was a permanent village by the late 19th/early 20th century, not an area of shifting swidden cultivation. The site is unique in the eastern region because it sits on a plateau of soil deep enough to support more intensive forms of agriculture and house construction. It also is located within a system of ponds, a rarity in Zanzibar in general, and a phenomenon especially rare in the east region where porous karstic limestone bedrock prevents most water from accumulating on the surface. This environmental context suggests a reason for why Swahili people settled permanently at Kandwi and virtually nowhere else in the inland eastern areas.

Good soil and above-ground water may not be the only reason Swahili people settled at Kandwi at the start of the 16th century. Kandwi is also located on a stony plateau (Figure 8-7), with a narrow path leading east to the sea that passes through hard, rocky terrain (Figure 8-8). Stone walls can be found at the base of the path. The defensive capabilities of Kandwi may have been a consideration for Swahili residents who founded the site, especially during the 16th and 17th centuries when Portuguese sailors and soldiers patrolled the coasts. This may be comparable to the Swahili community around Mvuleni in the northwest of the island, where residents also appear to have used high ground and rocky terrain as a defensive measure against Portuguese invaders (LaViolette and Norman, in press). Like at Mvuleni, Kandwi is also associated with dry-stone wall features, which are known throughout the eastern region as *mabigili* (singular *bigili*). The *mabigili* at Kandwi lie just east of the path down the plateau. Some appear to

designate field plots (Figure 8-9, Figure 8-10, Figure 8-11), but others are small walls constructed between naturally occurring limestone outcrops directly adjacent to the path leading to Kandwi (Figure 8-12). These walls do not appear to enclose a field plot. Instead, the residents of Kandwi may have built these features as defensive structures to help guard the entrance to Kandwi from the coast.



Figure 8-7. View of Kandwi plateau from the east.



Figure 8-8. Members of the field team prepare to descend the rocky path down the plateau, leading from Kandwi to the sea.



Figure 8-9. Stone walls at base of path leading down plateau, with archaeologist and museum official Ali Vuai.



Figure 8-10. Stone walls at base of path leading down plateau.



Figure 8-11. Stone wall at base of path leading down plateau, with archaeologist Kombo Othman Juma.



Figure 8-12. Stone walls that fill in gaps between natural rock outcrops at the base of the path leading to the plateau, suggesting defensive applications.

I created a viewshed model (Figure 8-13) to show the advantage of Kandwi's location. The site is one of the closest locations one can be to the coast, while still being concealed from the sight of a ship or landing party on the immediate shoreline. The model compares the locations of Pwani Mchangani and Kandwi. The abandonment of Pwani Mchangani and the founding of Kandwi both occurred around the start of the 16th century when the Portuguese landed in Zanzibar and established bases there. The Portuguese were quite active on the east coast of Zanzibar. Chwaka Bay was a port for Portuguese ships, and Ruy Lourenco Ravasco raided a settlement in Chwaka Bay in 1503. Archaeologists also found a large stone Portuguese inscription of the 17th century at Uroa, that would have been used as ballast for a ship (Gray 1957: 124). Pwani Mchangani, a village site directly on the shoreline, would have been much more vulnerable to Portuguese attack than Kandwi, which is perched high on a concealed plateau. The rapacious behavior of the Portuguese may have encouraged Swahili residents to abandon Pwani Mchangani and resettle at Kandwi during this time. The name of Kandwi itself suggests the settlement was historically considered a place of refuge: in the local dialect, the name means "stay in peace", or "stay without fear".

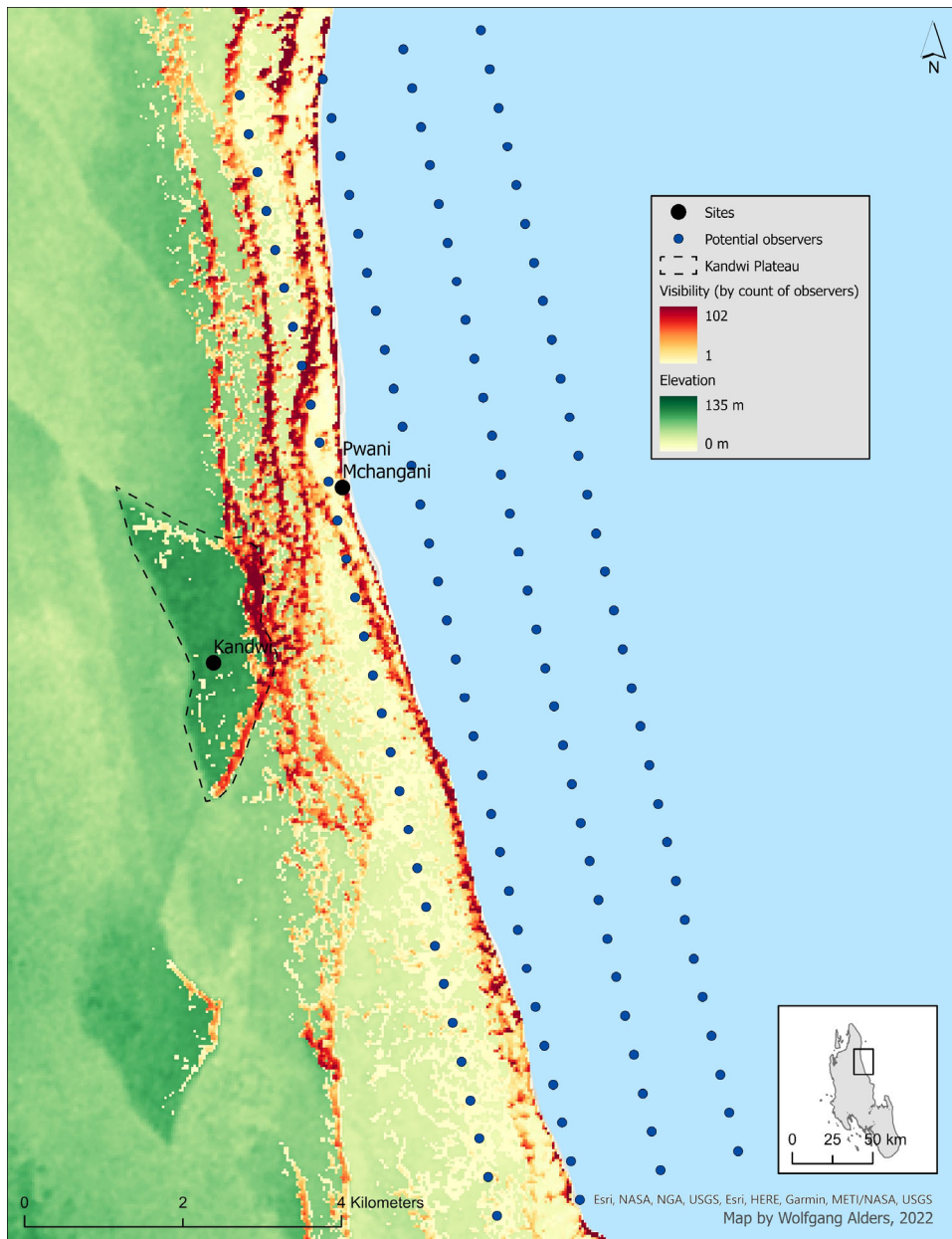


Figure 8-13. Viewshed showing the visibility into the inland areas from theoretical ships or landing parties on the immediate coast. Kandwi lies close to the shore while still being concealed. In comparison, Pwani Mchangani is quite visible.

8.3 Kandwi Kibokwa

Kandwi_Kibokwa001, 002, 003, and 004 are sites that our team located while on survey in the eastern region south of Kandwi, shown below in Figure 8-14. Two of these sites, Kandwi_Kibokwa002 and 003, date to the first phase of the early colonial period. Local ceramics at Kandwi_Kibokwa002 and 003 are characteristic of the early colonial period, with a mix of open bowls, spherical pots, everted rim bowls, and sherds of Bahla ware at Kandwi_Kibokwa003. Unfortunately, we lost the artifacts from Kandwi_Kibokwa002 before we could do more in-depth analysis, so this section focuses on Kandwi_Kibokwa003. Like precolonial sites in the vicinity, these sites are surface scatters of local ceramics across a rocky

field, cleared recently by modern swidden farmers in the area. Since the sites are in an area of coralline limestone bedrock, it was not possible to dig shovel-test pits.

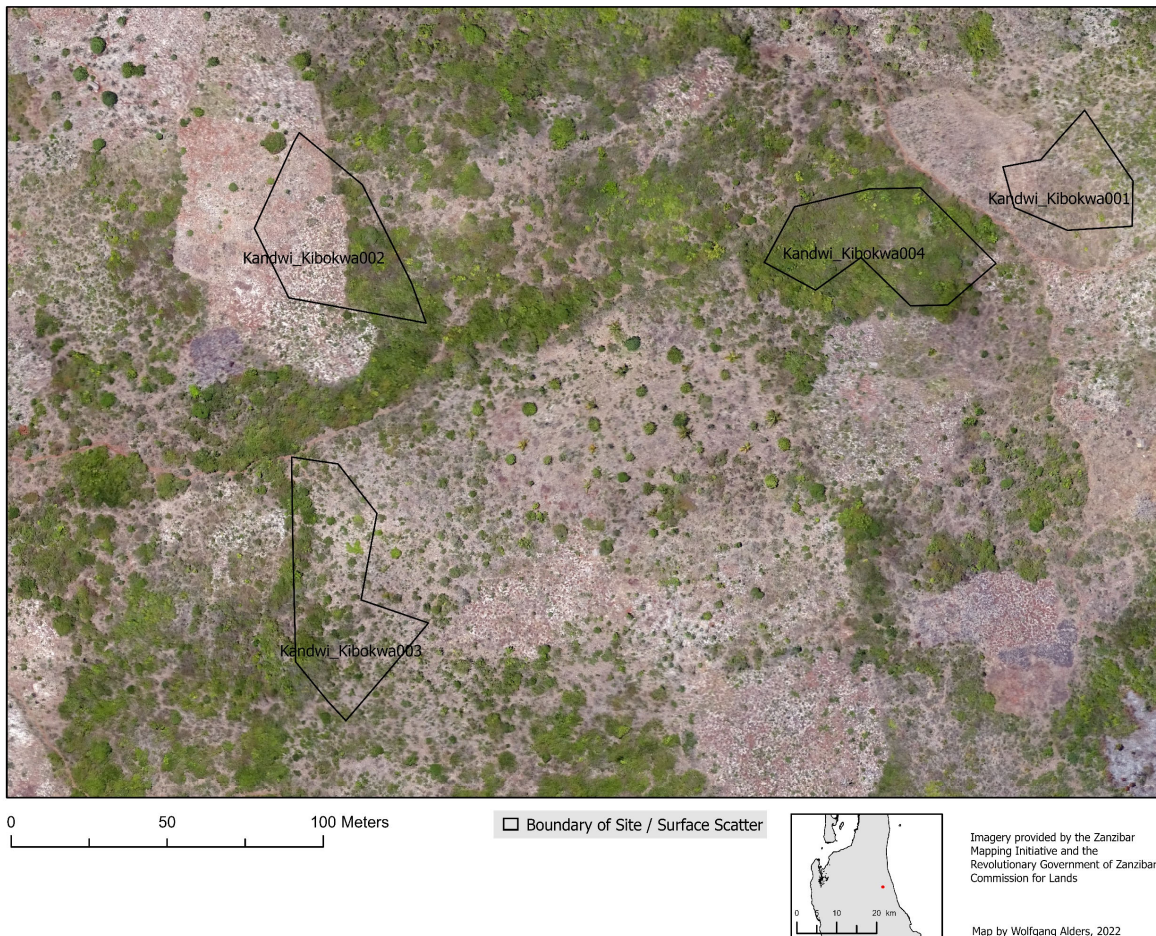


Figure 8-14. Kandwi_Kibokwa001, 002, 003, and 004. Site context from above. Imagery provided by the Zanzibar Mapping Initiative. Kandwi_Kibokwa001 has ceramics of the late colonial period, and Kandwi_Kibokwa004 has local ceramics of an indeterminate period; as such, I do not consider these sites here any further.

We dated Kandwi_Kibokwa003 to the early colonial period based on the presence of a broken bowl made of black-speckled Bahla ware, which is comparable to examples found at Fort Jesus and Gede in the 17th century (see Chapter 14 for further discussion). Like other sites located in modern swidden field plots in the east, we interpreted this site as evidence for the persistence of swidden farming practices over a long period in the eastern region. This site represents continuity from the precolonial period into the early colonial period. It is evidence for the fact that long-term land use practices continued to develop during the years following colonial incursion. Figure 8-15 and Figure 8-16 show the site context. Figure 8-17 shows the ceramics collected from the surface scatter. Our team did not record other artifacts besides ceramics. Other noticeable features at the site include coralline limestone with iron nodules (Figure 8-18), and boots (Figure 8-19) and an aluminum cooking pot (Figure 8-20) that were left by modern farmers. These latter examples suggest that similar practices may have resulted in ceramics being left in these field plots in earlier centuries.

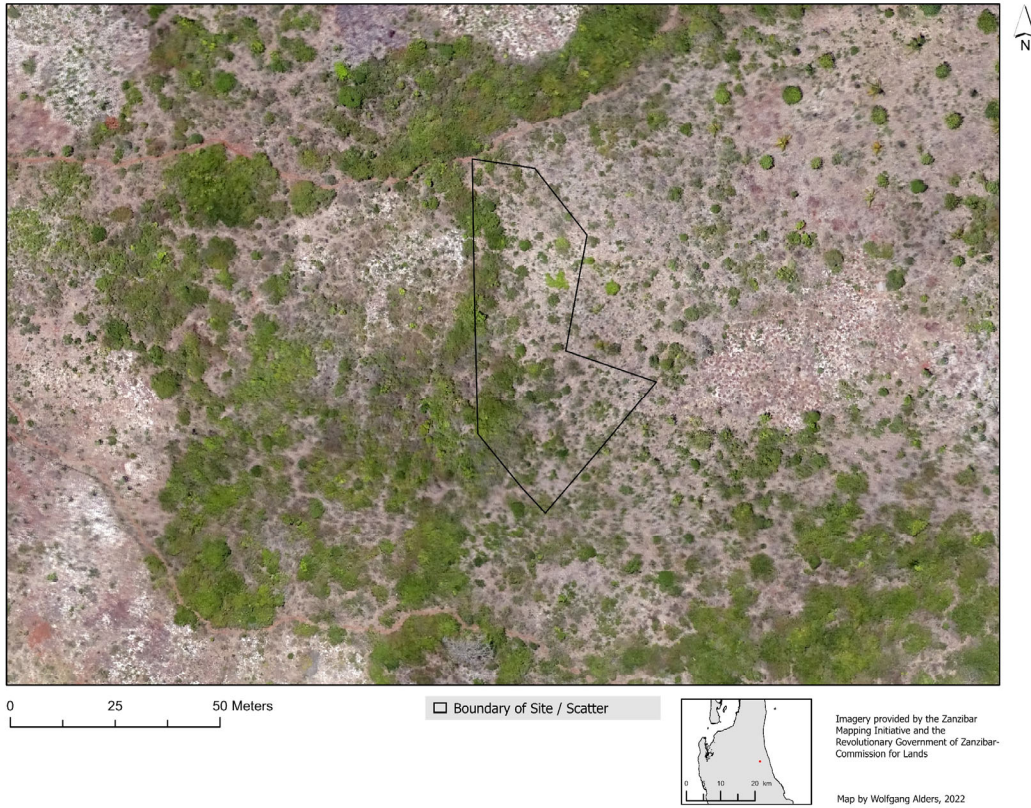


Figure 8-15. Kandwi_Kibokwa003, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 8-16. Kandwi_Kibokwa003, site context, on the ground.

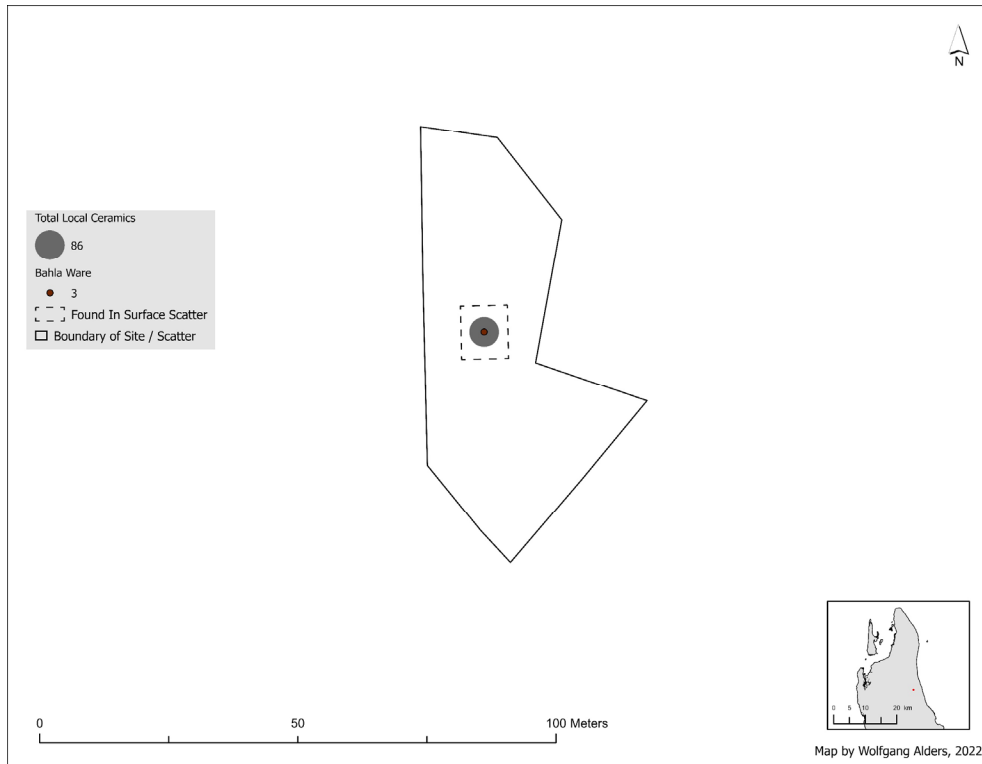


Figure 8-17. Kandwi_Kibokwa003, local ceramics.



Figure 8-18. Kandwi_Kibokwa003, iron nodules on limestone.



Figure 8-19. Kandwi_Kibokwa003, boots left by a modern farmer.



Figure 8-20. Kandwi_Kibokwa003, aluminum cooking pot left by a modern farmer.

8.4 Njua Kuu

In the central region, our team recorded a site comprised of three dense artifact scatters within a larger overall artifact scatter, in an area called Njua Kuu. The name means “main road” in the local dialect of Swahili. Local ceramics at Njua Kuu are later in date than those at Kandwi or Kandwi_Kibokwa003, featuring a larger number of everted rim pots compared to open bowl and spherical pot forms (see Chapter 13). These ceramics initially meant we classified the site as a late colonial site. However, one difference between this site and other late colonial sites was the total absence of European whiteware, which is the predominant imported ceramic across every other site with late colonial, 19th-century local ceramics. Instead, Njua Kuu has only a few sherds of Chinese blue and white porcelain and red Indian earthenware (see Chapter 14). This difference in imported ceramics indicates an earlier date for this site, suggesting that it was abandoned prior to the main period during which the clove plantation system developed and European whiteware became available, around 1830 (*c.f.* Croucher 2006: 172). These factors led us to date the site to the second phase of the early colonial period, from 1750-1830. This period falls after the assumption of Busaid rule in Zanzibar, but prior to the clove agriculture boom. Figure 8-21 and Figure 8-22 show the site context. Figure 8-23 and Figure 8-24 show the artifacts at the site.

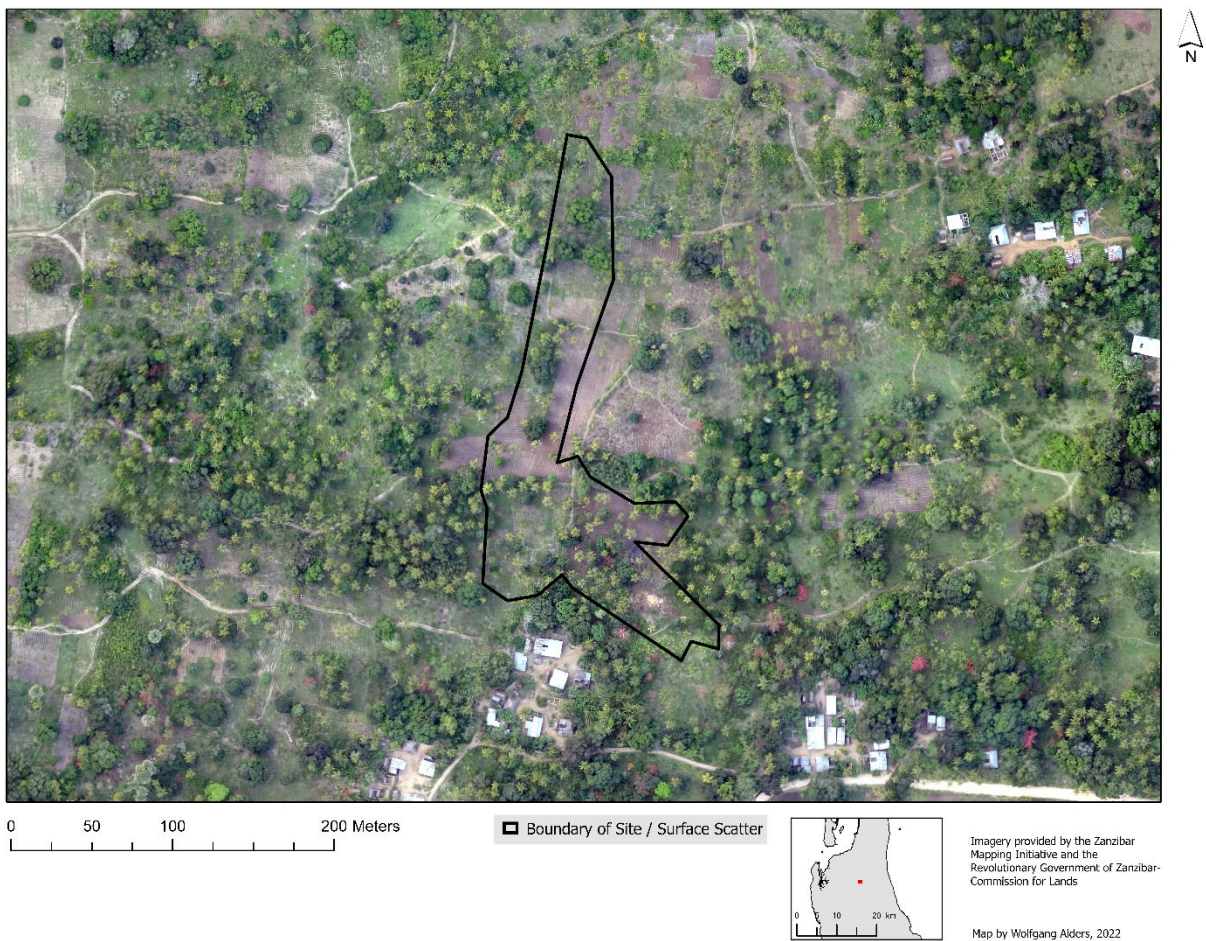


Figure 8-21. Njua Kuu, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 8-22. Njua Kuu, site context on the ground.



Figure 8-23. Njua Kuu, local and imported ceramics.

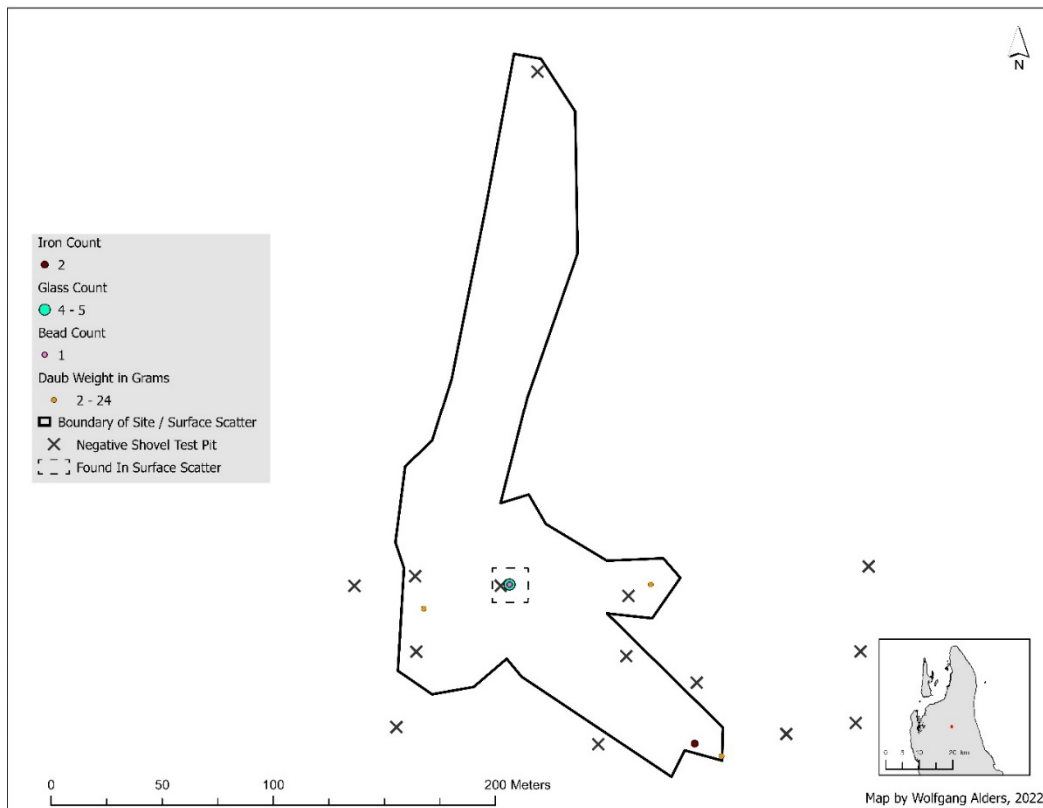


Figure 8-24. Njua Kuu, other artifacts including daub, glass, and iron.

Njua Kuu is significant for being the only site from this phase of the early colonial period. Other sites found in the survey region from the late colonial period (1830-1963) may also have been founded during this time, based on the presence of local ceramic decorations that may span multiple centuries (see discussion in Chapter 13). These chronological details are difficult to investigate without stratigraphic excavations, which we were not able to accomplish during this project. Njua Kuu is a unique site in that it was not overlaid with late colonial materials, making it identifiable as a late-phase early colonial site through shovel-test pit and surface survey methods alone.

8.5 Discussion: The Early Colonial Period in Inland Zanzibar

The settlement pattern presented here for the early colonial period differs from the one I reported previously (Alders 2020), which showed a far greater number of sites with early colonial, 16th-18th century components. This earlier study was based on interpreting type 17 ceramics as being diagnostic of the early colonial period. This idea was based on data from northern Pemba, where a similar ceramic called Type 13 occurred on 16th-18th century sites (Fleisher 2003: 258). The majority of type 17 ceramics we recorded across inland areas were found in association with European whitewares, which date to 1830 or later (see Chapters 13 and 14). This accords with Croucher's hypothesis that this type represented a conservative ceramic tradition that may have stretched from the 16th to 20th centuries in Zanzibar. Though we cannot rule out the idea that sites we recorded with type 17 ceramics in Zanzibar may have earlier origins in the 16th-18th centuries, the most parsimonious explanation is that sites with European whiteware post-date 1830 and spatially associated local ceramics like type 17 date to this period

as well. Nearly all sites with type 17 ceramics are surface scatters with no substantial deposits, supporting the idea that these ceramics were deposited more recently. This does not refute Fleisher’s contention that type 13 ceramics in Pemba are associated with 16th-18th century sites; rather, it points to regional diversity in ceramics of similar style on the coast.

Rather than using this ceramic type as the sole line of evidence to support the idea that certain late colonial sites stretched back to the 16th century (as I did in Alders 2020), it is more reasonable to simply rule out the use of type 17 as a diagnostic artifact for any temporal divisions in my survey region between the years of 1500-1890 CE, or possibly later. Instead, I have relied on imported ceramics to assign site dates, which has meant that the number of sites dating to the early colonial period is now quite small. Figure 8-25 shows the distribution of sites with type 17 ceramics that I previously categorized as dating to the 16th-18th centuries. This distribution now more strongly relates to the late colonial settlement pattern than to the early colonial one.

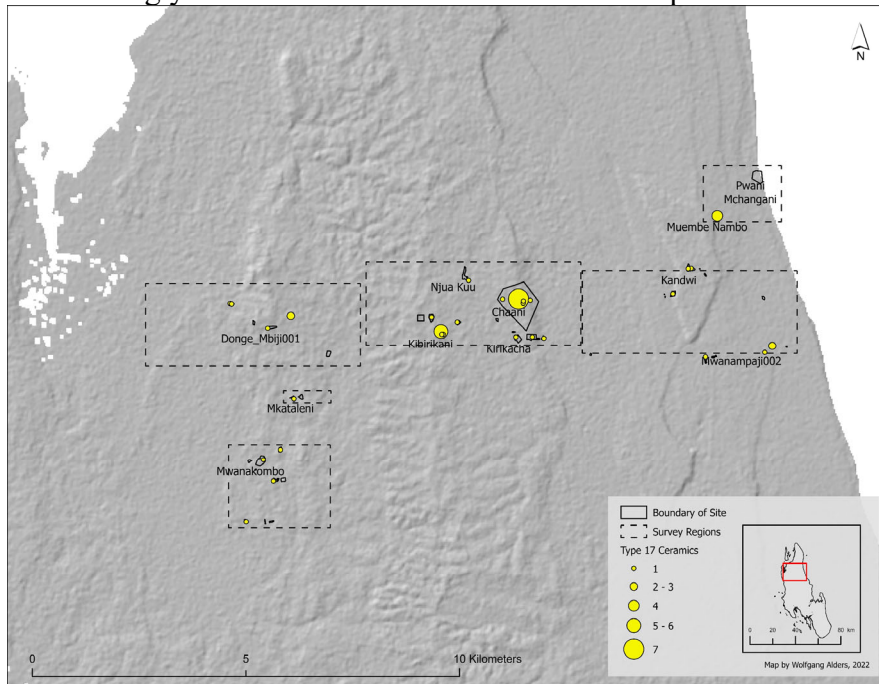


Figure 8-25. Distribution of type 17 ceramics.

Nevertheless, the four sites that I have described here that definitively date to the early colonial period paint a vivid picture of settlement during this time. During the first phase of this period, Portuguese settlers attacked Swahili settlements in Zanzibar, built a small fort and church in Stone Town, and constructed fortified “farms” in the north of the island (Fitton 2018; LaViolette and Norman in press). The retreat inland from Pwani Mchangani to Kandwi at the start of the 16th century may have occurred in response to incursions by the Portuguese, who stayed close to their ships on the coast and likely did not venture far inland.

The example of Pwani Mchangani and Kandwi is supporting evidence for the idea of an overall shift away from the immediate coast of the island and toward the interior by Swahili communities during this period. A later account from 1871 describes the trepidation that Europeans felt regarding the interior of Zanzibar and may be some indication of earlier Portuguese attitudes as well, which would hint at the relative security the inland areas offered to Swahili people: Major-General C.P. Rigby wrote that,

“...it is almost certain death for any white man to sleep in the plantations. Some years ago the commodore went with several officers and a boat’s crew to one of the Sultan’s country houses in the interior of the island, a distance of about fifteen miles; they only slept one night in the interior, and a few days afterwards the only one of the whole party alive was the one who had slept in the boat, the vegetation is so dense and rank”. (Nunez-Lyne 1905: 276-277)

There is also some historical evidence that Swahili political authority shifted inland during the Portuguese period. In 1528, Nunho da Cunha reportedly captured a fisherman in Zanzibar Stone Town to demand an audience with the “king” of Zanzibar, who was living inland (Strandes 1961 [1899]: 36). Perhaps taking a cue from his ancestors, the 19th-century Swahili ruler of Zanzibar, or the Mwinyi Mkuu, also took up residence inland at Dunga in the 19th century follow disputes with the Omani Busaid family. The inland areas, therefore, may have served as a refuge from domination since the Portuguese period. The founding of Kandwi in a fortified location may reflect this, along with the settlement inland from Mvuleni (LaViolette and Norman, in press). This may have also been the period when Swahili residents in the east region constructed *mabigili* on the landscape for the first time, in response to pigs released by Portuguese settlers. During this period, swidden agriculture in the eastern region also continued, at sites like Kandwi_Kibokwa003.

In Phase 2 of the early colonial, the site of Njua Kuu was founded in the central region, as a small set of hamlets or a small village. This site is less fortified than Kandwi but equally hidden inland. It represents early reoccupation of the fertile areas in the center and west of the island, prior to the development of the clove plantation system.

8.6 Conclusion

This chapter has presented evidence for four different sites of the early colonial period. Kandwi was a permanent village on a plateau in the eastern region, settled around 1500. It may have been preferred for settlement during this period because of its naturally fortified landscape compared to coastal villages like Pwani Mchangani, which were abandoned around the same time. Two other sites were ceramic scatters in swidden field plots, at Kandwi_Kibokwa002 and 003. These sites likely represent the continuity of swidden agriculture from the precolonial period into the early colonial era. Finally, Njua Kuu was a small village community settled in the second phase of the early colonial period, from 1699-1830. Its founding is evidence for the reoccupation of the central region after the end of Portuguese rule on the coast, but it appears to have been abandoned prior to the development of the clove plantation system. Nevertheless, it foreshadowed the widespread resettlement of the central and western areas of this region once again, starting around 1830. In the next chapter (Chapter 9) I discuss the sites of the late colonial period.

Chapter 9: Sites and Finds of the Late Colonial Period

9.1 Introduction

As outlined in Chapter 2, I have divided the late colonial period into two phases. Phase 1 is the period from 1830 to 1890, when Zanzibar developed a clove plantation system and was the capital of an independent Sultanate that controlled the East African coast. Phase 2 covers the years from 1890 to 1963, when a British protectorate ruled Zanzibar. Archaeological and settlement pattern analysis focuses on this first phase, though some sites likely continue into the second phase. In this chapter I discuss Phase 1 of the late colonial period and outline the 32 sites from this time that we recorded during the 2019 survey.

I define the late colonial period as starting around 1830 on the basis of convergent historical and archaeological lines of evidence. Historical sources attest that clove production on the island intensified during the 1830s. Clove agriculture went from a side project of the sultan alone to an island-wide system that changed the agricultural landscape of the rural areas in the west of the island. Sultan Seyyid Said moved the capital of the Empire of Oman to Zanzibar around the year 1840, solidifying this new phase of intensified colonial contact between the Busaid state, Omani elites and their retinues of enslaved people, and indigenous Swahili people on the island. By the mid-1840s, a landed aristocracy of mainly Omani elites had formed, controlling a plantation system that used the labor of tens of thousands of enslaved people (Cooper 1977; Vernet 2017). The second to last indigenous Swahili ruler, the *Mwinyi Mkuu* Muhammed bin Ahmed al Alawi, also profited from plantations at Dunga and Bweni during this period (Sheriff 1987: 51). From the 1840s to the 1850s, clove prices globally were still high enough to enable considerable profit. This expansion saw deforestation on Pemba and Zanzibar, and a shift away from subsistence agriculture to the extent that the island began to import food for the first time (Vernet 2017). While rice was not significantly displaced by cloves due to the fact that it is primarily grown in swampy lowland areas, coconut trees were cut down in large numbers to make way for clove tree cultivation and labor was drawn away from subsistence production. According to Sheriff, the French consul in Zanzibar in 1845 expressed concern about the declining exports in coconut oil and copra as a result of the clove boom (Sheriff 1987: 55).

Archaeological evidence from the 2019 survey also suggests that 1830 is an appropriate date for the start of the late colonial period. European whitewares, specifically transfer-printed ware, polychrome hand-painted whiteware, and sponge decorated ware, all become common export wares around 1830, replacing pearlware globally (Croucher 2014: 205-206; Majewski and O'Brien 1987; Samford 1997, also see Chapter 14). English and Dutch potteries developed decorative printed, painted or sponge-impressed designs by the late 18th century, but these decorations were used predominately on creamware and pearlware prior to the 1830s. These earlier wares are absent from the assemblage in Zanzibar. In contrast, whiteware abounds across the 2019 survey region, suggesting that large quantities of imported European ceramics did not enter Zanzibar's consumer markets until after creamware and pearlware had been phased out of circulation. This means that nearly every site with European whiteware that we recorded dates at least partially to the years after 1830. Considering that sites with European whiteware are more numerous and larger than any previous settlement type in the survey region, I have associated the presence of European whiteware with the period of clove expansion and intensification that began around 1830.

These two factors—the historical evidence for clove intensification, and the archaeological evidence for large-scale settlement expansion characterized by a horizon of

European whiteware—suggest that the decades following 1830 are the approximate periods when residents occupied most late colonial sites in the rural areas of our survey region. Certain dated artifacts corroborate this mid-to-late-19th century date for most sites we encountered. For instance, at the site of Kanisani001 we recovered a sherd stamped with a late 19th century maker’s mark (see Chapter 14), and at the site of Mwanakombo we collected a coin that dates to 1886 (see Chapter 16).

The late colonial period continued until independence in 1963, but Phase 1 ended in 1890 when the British forced the Zanzibari state to accept a protectorate. Artifacts did not immediately change. Painted, printed, and sponge-dabbed whitewares remained in circulation into the 1920s, and some sites identified during Phase 1 may also have continued into the early 20th century. In terms of settlement patterns, the mid-1890s is approximately when archaeological evidence becomes less useful for understanding regional trends compared to historical maps. For this reason, I have bracketed archaeological analyses at this date. For a discussion of settlement patterns in the late 19th and early 20th century, see Chapter 11, where I have analyzed the spatial patterns of settlements in the Khan Bahadur map, published in 1907.

Our survey identified 32 sites from the late colonial period. Figure 9-1 shows an overview of the site locations we recorded.

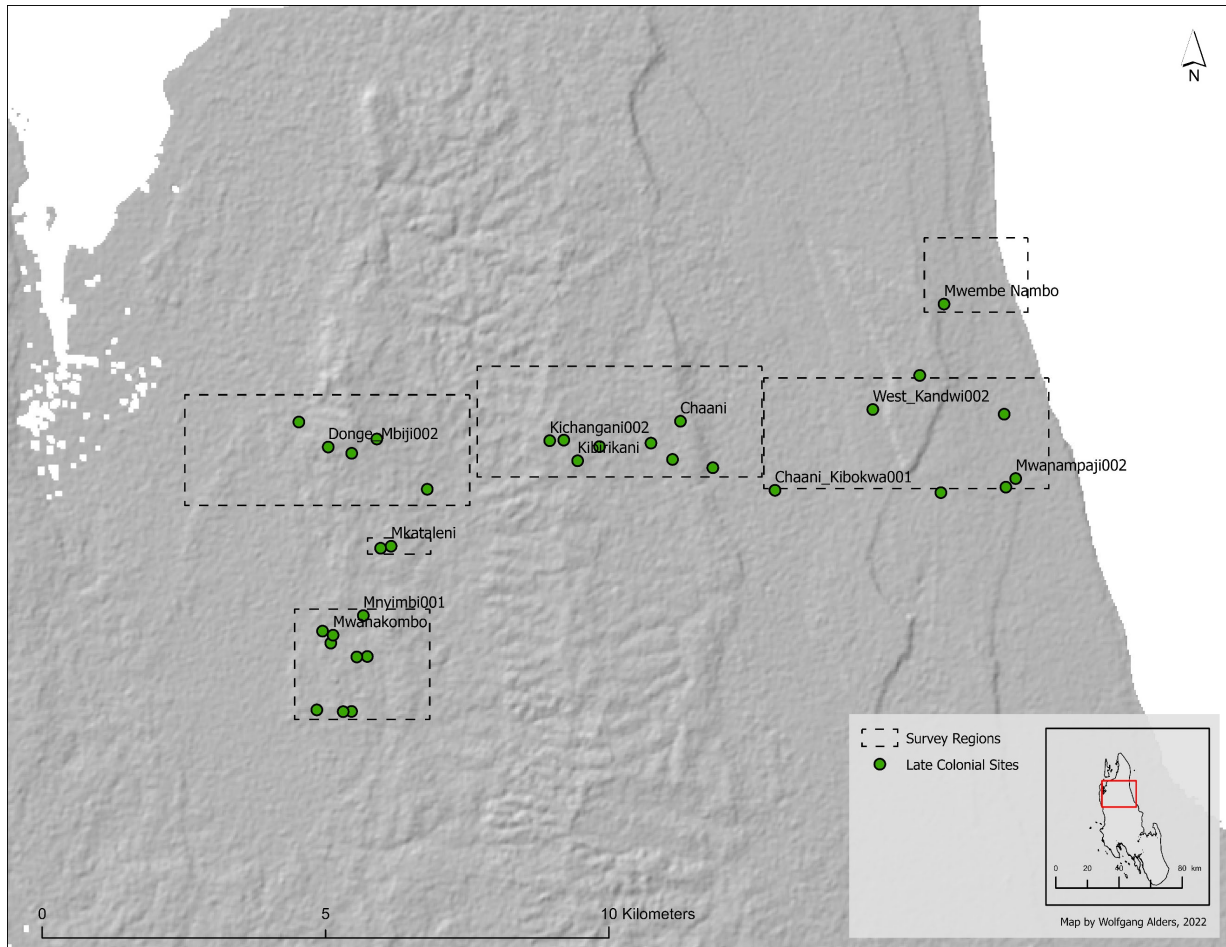


Figure 9-1. Overview of late colonial sites in the 2019 survey region.

A difficulty we encountered during this survey was determining site size and composition for the 19th century and later. Traditional site size parameters used to investigate the pre-colonial

settlement systems of the Swahili Coast do not translate well for the settlement forms of the 19th and 20th centuries. A 1.5 ha site from the 11th-15th century might clearly be a small village (*c.f.* Wilson 1982), but a site of this size from the 19th century might be nothing more than an artifact scatter over the same area. It is probably not correct to ascribe the label of “small village” to this site. It is clearly an area of past human occupation, but whether it represents domestic space is less certain. Given that this is a plantation landscape, this site type may represent activity areas or encampments for seasonal agricultural labor instead. Clove harvesting requires a large amount of labor over a short period. On the other hand, these areas of sparsely distributed artifacts may indeed represent short-lived hamlet or village communities, which were founded during the wealthy days of the mid-19th century and then were abandoned later as plantation owners grew increasingly indebted and clove prices fell. Such a short occupation period might leave only a handful of ceramics over a relatively large area. Site interpretation based on artifact scatters remains an unresolved challenge for archaeologists working in this period.

Another challenge was applying our survey methodology of cross-grid STPs to the large towns of the 19th century. The method for defining site size through STP grids was developed to assess settlements of the pre-colonial period, which is manageable given that most pre-colonial sites fall within the ranges of site types described by Wilson (1982) or Fleisher (2003). But the extensive and loosely distributed rural towns at Mahonda and Chaani were much more difficult to define using this methodology, given the size and capacity of our small survey team. For instance, our survey method defined multiple sites around Mahonda, though the historical map suggests that the entire area was a relatively large, but loosely distributed town by the early 20th century. In the case of Mahonda, we likely identified components of the town, but did not capture the town’s entire extent. We also failed to capture the extent of Chaani, given its size and spread along the ridge of the eastern plateau of the central region. An STP cross grid starts to leave out information once one gets past 50-100 meters from the start point, since spaces in between the arms of the cross begin to grow geometrically larger. Our solution to these problems was to assess the area as best as we could within a day, and then move on and rely on historical maps to refine the boundaries of the town. We felt this was an adequate solution given that our goal was to assess the entire history of the survey region, not just the settlements of the 19th century.

Despite these challenges, our method of random systematic sampling was able to capture many smaller 19th-century sites that were not listed on historical maps, providing a more comprehensive and detailed view of the 19th-century settlement system than would be acquired from historical sources alone. Table 9-1 shows the 32 sites we recorded for Phase 1 of the late colonial period.

Number	Site Name	Main Period	Date Range	Area (ha)	Site Type	Region
IZAS_0012	West_Kandwi002	Late Colonial	~1830 to present	0.01	Swidden Plot / Surface Scatter	East
IZAS_0013	Kandwi002	Late Colonial	~1830 to 1900	0.02	Field house / Surface Scatter	East
IZAS_0014	Kanisani001	Late Colonial	~1830 to 1900	0.06	Field house / Surface Scatter	Mahonda
IZAS_0015	Donge_Karange001	Late Colonial	~1830 to 1900	0.07	Field house / Surface Scatter	West
IZAS_0016	Mahonda002	Late Colonial	~1830 to 1900	0.09	Field house / Surface Scatter	Mahonda
IZAS_0017	Kandwi_Kibokwa001	Late Colonial	~1830 to present	0.1	Swidden Plot / Surface Scatter	East

IZAS_0018	Chaani_Kibokwa001	Late Colonial	~1830 to 1900	0.1	Field House / Surface Scatter	East
IZAS_0019	Kikobweni003	Late Colonial	~1830 to 1900	0.14	Hamlet / Surface Scatter	Central
IZAS_0020	Mahonda003	Late Colonial	~1830 to 1900	0.16	Hamlet / Surface Scatter	Mahonda
IZAS_0021	Mwanampaji003	Late Colonial	~1830 to present	0.17	Swidden Plot / Surface Scatter	East
IZAS_0022	Mwanampaji002	Late Colonial	~1830 to present	0.23	Swidden Plot / Surface Scatter	East
IZAS_0023	Kikobweni004	Late Colonial	~1830 to 1900	0.26	Hamlet / Surface Scatter	Central
IZAS_0024	Mahonda001	Late Colonial	~1830 to 1900	0.28	Hamlet / Surface Scatter	Mahonda
IZAS_0025	East_Kandwi001	Late Colonial	~1830 to present	0.31	Swidden Plot / Surface Scatter	East
IZAS_0026	Donge_Mbiji002	Late Colonial	~1830 to 1900	0.31	Hamlet / Surface Scatter	West
IZAS_0027	Muembe Nambo	Late Colonial	~1830 to present, also has early second millennium components	0.38	Hamlet / Surface Scatter	Northeast
IZAS_0028	Daraja_La_Mwanakombo001	Late Colonial	~1830 to 1900	0.4	Hamlet / Surface Scatter	Mahonda
IZAS_0029	Donge_Pwani002	Late Colonial	~1830 to 1900	0.4	Hamlet / Surface Scatter	West
IZAS_0030	Mkataleni002	Late Colonial	~1830 to 1900	0.49	Hamlet / Surface Scatter	Mkataleni
IZAS_0031	Kichangani003	Late Colonial	~1830 to 1900	0.65	Hamlet / Surface Scatter	Central
IZAS_0032	Mkataleni001	Late Colonial	~1830 to 1900	0.7	Hamlet / Surface Scatter	Mkataleni
IZAS_0033	Kikobweni002	Late Colonial	~1830 to 1900	0.71	Hamlet / Surface Scatter	Central
IZAS_0034	Mnyimbi001	Late Colonial	~1830 to 1900	0.74	Hamlet / Surface Scatter	Mahonda
IZAS_0035	Mahonda_Mkataleni003	Late Colonial	~1830 to 1900	0.78	Hamlet / Surface Scatter	Mahonda
IZAS_0036	Mahonda_Mkataleni001	Late Colonial	~1830 to 1900	0.8	Hamlet / Surface Scatter	Mahonda
IZAS_0037	Donge_Karange002	Late Colonial	~1830 to 1900	1.08	Small Village / Surface Scatter	West
IZAS_0038	Donge_Mbiji001	Late Colonial	~1830 to 1900	1.09	Small Village / Surface Scatter	West
IZAS_0039	Kichangani001	Late Colonial	~1830 to 1900	1.59	Small Village / Surface Scatter	Central
IZAS_0040	Kibirikani	Late Colonial	~1830 to 1900	1.99	Small Village / Surface Scatter	Central
IZAS_0041	Kichangani002	Late Colonial	~1830 to 1900, also has 10th c. C14 date	2.04	Small Village / Surface Scatter	Central
IZAS_0042	Chaani	Late Colonial	~1830 to present	~60	Town	Central

Table 9-1. Late colonial sites recovered during the 2019 survey, with approximate dates based on ceramic chronologies, site sizes, site type, and region of occurrence. See also Figure 9-1.

Four site types that we recorded characterize this period: 1) plantation sites with stone architecture, 2) large, emergent towns, 3) Field house, hamlet, and small village-sized surface scatters in the rural west and central areas of the island, and 4) surface scatters in swidden plots, in the eastern part of the island. Rather than describing all sites, I have selected examples which illustrate each of the four site types that I named above. Mwanakombo, Mkataleni, and Kibirikani are plantation sites with stone architecture in the west and central parts of the island. Chaani and Mahonda are two large emergent towns, that experienced large-scale demographic expansion in this period. Donge_Mbiji001 and Kichangani001 and 002 are exemplary surface scatter sites in the west and central areas, that may have been field houses or hamlets or zones of plantation labor. Finally, Mwanampaji002 and 003 are small surface scatters in swidden plots in the eastern part of the island, which evidence the continuity of shifting, slash and burn cultivation from earlier periods. This chapter gives an overview of these site types and describes relevant examples.

9.2 Plantation Sites: Mwanakombo, Mkataleni, and Kibirikani

Mwanakombo, Mkataleni, and Kibirikani are three sites we recorded that exemplify plantation estates. All three have stone architecture which, while not present at every plantation across Zanzibar, likely signified the presence of elite residents. All three sites also have evidence for varied imported ceramics. Kibirikani is the most artifactually-rich site, with the largest quantities of local and imported ceramics, as well as the high quantity of Chinese blue and white porcelain compared to any site in the region. Mwanakombo is comparatively poorer in late colonial ceramic finds, despite having the most stone architectural features. Mkataleni is an enigmatic site with a stone house that is still occupied today, that may have been a residence for enslaved people. I discuss all three below.

9.2.1 Mwanakombo

The 19th and 20th-century site at Mwanakombo presents the clearest spatial and artifactual view of a Zanzibari plantation from the survey area. In addition to being an important precolonial village site of the inland region, Mwanakombo also has substantial stone architectural remains. All these remains date to the 19th or early 20th century. At the north end of the site there is a large limestone feature that residents told us was the base of a water wheel, as well as a limestone and mortar bridge that has collapsed in the stream. At the southwest end, there are the remains of a ruined limestone house and large stone enclosure, which was purportedly built as a chicken *kiwanda*, or “factory”, which was a large chicken coop. Residents told us that the house was built in the early 20th century, but that the bridge was built earlier, before the memory of their grandparents. We also collected small amounts of 19th-century ceramics at the site.

Residents told us in 2019 that the landowner of the site lives in Stone Town and grew up in the stone house on the site in the early 20th century. We were not able to meet with this person, but we did discuss the details of the plantation with younger members of his family, who live at the site now. They attested that the site was occupied as a clove farm in the 19th century, but that the residents diversified into sugar cane production and chicken farming toward in the 20th century. The stone bridge may have been built in the 19th century, but the stone house, water wheel foundation, and large stone *kiwanda* for holding chickens were all constructed during this period of post-clove diversification. The transition from clove farming to sugar cane and chicken raising, and the permanent investments into production like the water wheel, bridge, and chicken *kiwanda*, are emblematic of the social and economic changes of the late 19th and early 20th centuries, as clove prices fell, labor became more expensive, and plantation owners fell into debt

(Bishara 2017). In response, plantation owners like those at Mwanakombo may have sought ways to maximize the productive capacity of their land by investing in infrastructure and shifting to diverse forms of production. According to residents, these schemes mostly did not work out. The *kiwanda* apparently never turned a profit on chicken production, and the stone bridge, water wheel, and house fell into ruin.

In addition to sampling the precolonial site of Mwanakombo with STPs, we also dug several STPs within the stone house and the stone chicken enclosure. One aim was to determine whether the house rested on top of earlier occupation levels. This seems to have been the case, as we recovered some precolonial ceramics, including a sherd of late sgraffiato, from under the house floor. Another aim was to acquire charcoal samples from the floor for radiocarbon dating.

Site	Sample Name	depth (cm)	¹⁴ C age (BP) ± 15	Estimated Date Range (CE), 95.4% probability
Mwanakombo	002-Mwana	80	160	1686-1921, ±15
Mwanakombo	003-Mwana	70	135	1698-1810, ±15
Mwanakombo	007-Mwana	35	135	1698-1810, ±15

Table 9-2 below shows the later dates from Mwanakombo, and Appendix C shows the full C14 graphs for these dates. The first two dates come from the deepest extent of ceramics and anthropogenic soil in shovel-test pits within the stone house. The third date comes from a shovel-test pit within the precolonial site. These dates suggest with 95.4% confidence that the area was occupied in the late second millennium. C14 graphs in Appendix C suggest that with a lower degree of confidence, these samples likely date to the 19th century, before the stone house or any other stone features were built in the early 20th century. It is not possible to know who the residents at this time were—was this an early colonial Swahili village or hamlet comparable to Njua Kuu, which Omani planters settled on top of during the clove boom in the mid-19th century? Or was this an early 19th century Omani estate from the beginning, founded on the unoccupied remains of a precolonial village site?

Site	Sample Name	depth (cm)	¹⁴ C age (BP) ± 15	Estimated Date Range (CE), 95.4% probability
Mwanakombo	002-Mwana	80	160	1686-1921, ±15
Mwanakombo	003-Mwana	70	135	1698-1810, ±15
Mwanakombo	007-Mwana	35	135	1698-1810, ±15

Table 9-2. Later period radiocarbon dates for Mwanakombo.

In Chapter 7 I already showed the site context for Mwanakombo, but I reproduce these figures here (Figure 9-2, Figure 9-3, Figure 9-4). Figure 9-7 shows the plan of the stone house and chicken coop. Figure 9-5, Figure 9-6, Figure 9-8, and Figure 9-9 show images of the house, chicken coop, waterwheel foundation, and bridge.

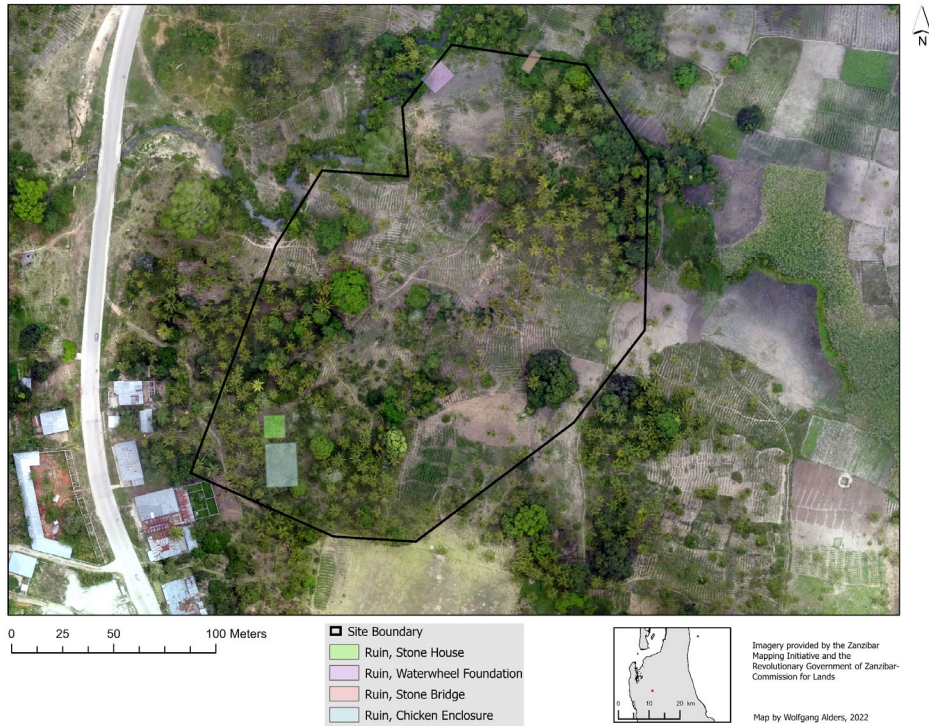


Figure 9-2. Mwanakombo, site context from above. Imagery provided by the Zanzibar Mapping Initiative.

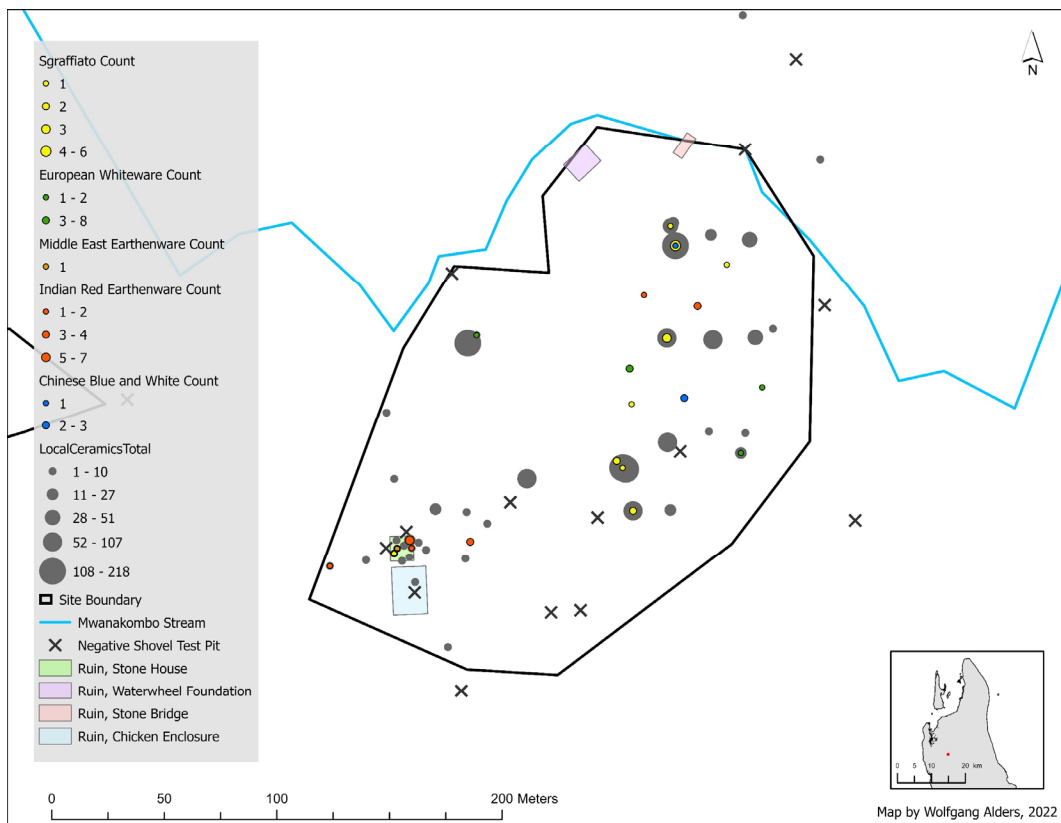


Figure 9-3. Local and imported ceramics at Mwanakombo

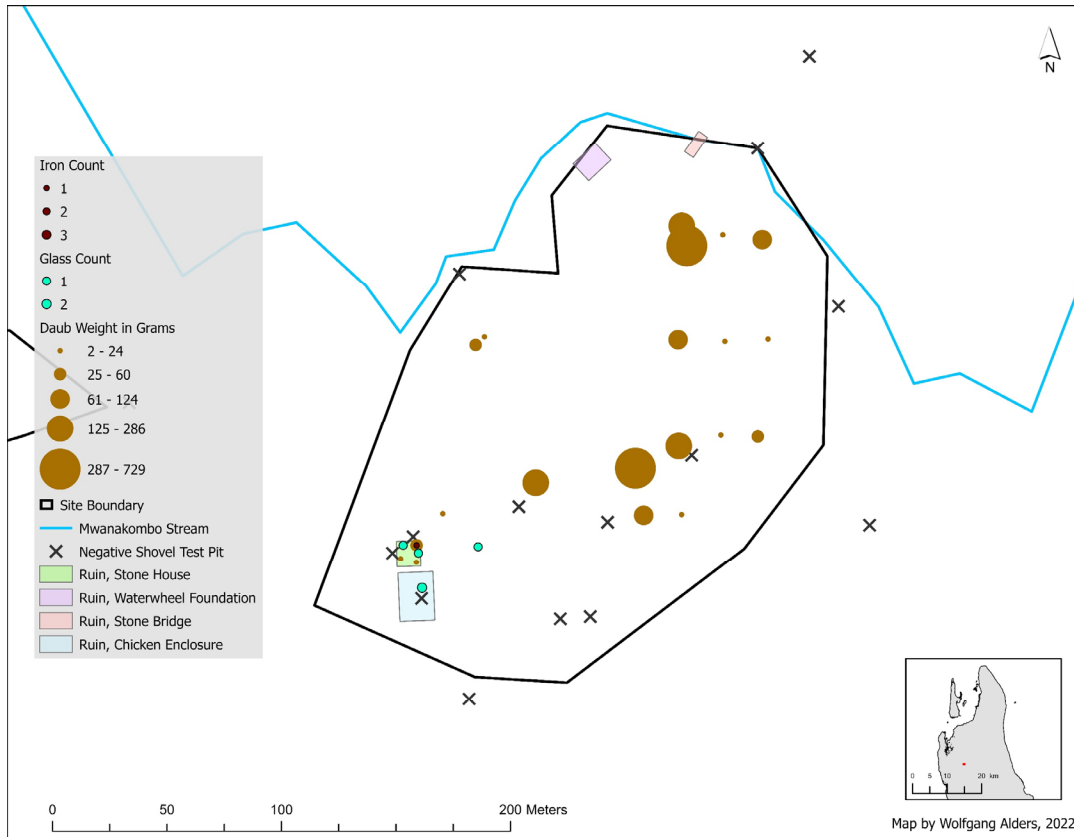


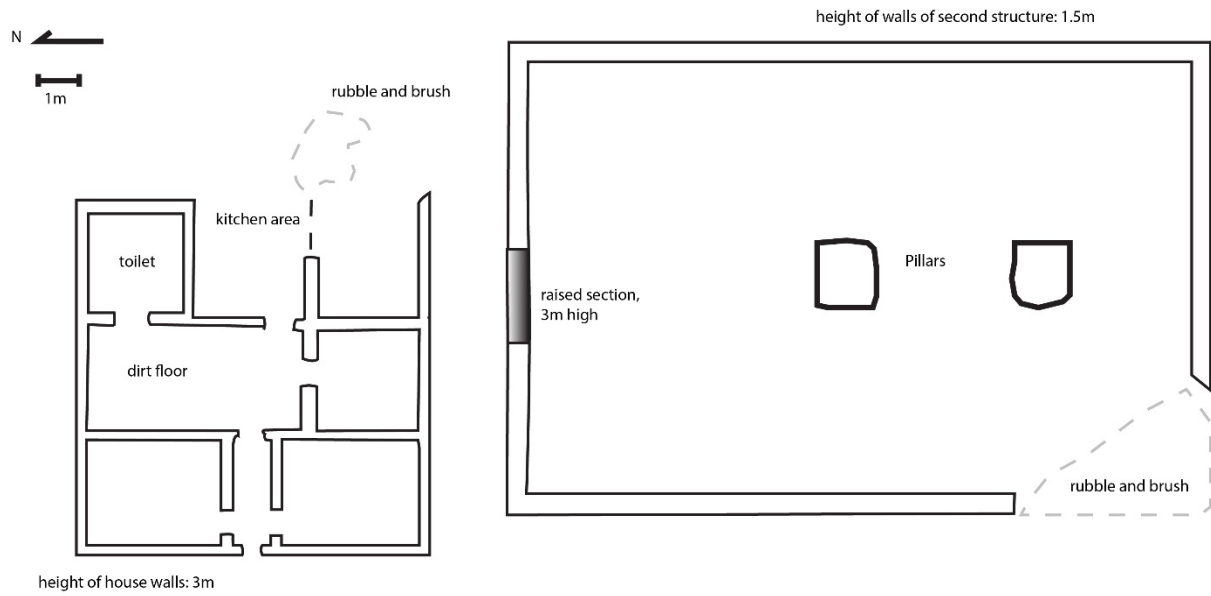
Figure 9-4. Other artifacts at Mwanakombo, including daub, glass, and iron.



Figure 9-5. Stone house at Mwanakombo, from the early 20th century.



Figure 9-6. Raised pillar on north end of chicken coop structure at Mwanakombo, from the early 20th century. The rest of the structure was difficult to photograph due to dense vegetation.



drawing by Mikidadi Hassan Mussa, July 4th, 2019

Figure 9-7. Plan of stone house and chicken coop structure at Mwanakombo.



Figure 9-8. Water wheel foundation. The machete points north, toward Mwanakombo stream.



Figure 9-9. Bridge ruin at Mwanakombo, with archaeologists Mikidadi Hassan Musa, Kombo Othman Juma, and Hafidh Salum Muhammed from left to right.

Overall, Mwanakombo is a complex site with unique features in several different periods. It is one of two inland precolonial village sites, in addition to being an example of a small-scale plantation in the late colonial period. Future research may further clarify phases of the site's occupation and shed light on the dynamics of colonial contact in this region.

9.2.2 Mkataleni

While working at Mwanakombo, we asked resident landowners about any other historical or archaeological sites in the area. They led us north to Mkataleni, where they showed us a large stone house, isolated in the countryside. They told us that plantation owners in the area owned enslaved people, who lived in the stone house at Mkataleni. We briefly investigated the site and found a 19th century artifact scatter around the house. Included in this scatter was a sherd of rouletted ware, which is not known to have been made in Zanzibar and was likely either brought from the East African mainland or made by someone who was (see Chapter 13).

We did not investigate the stone house further, as it is currently occupied. Since we were not able to speak to the residents of the house, I have not published identifying photos of the structure or the landscape besides an aerial view (Figure 9-10). But a view from outside indicates that the residence is unlike other houses found in the countryside. The house is far larger than any surrounding structure, or any other house we encountered in the rural areas. It has two stories, stone walls, and a stone foundation. If we had encountered this house during survey without any oral history as context, we might have assumed it was the residence of plantation

owner, not the residence of enslaved people. Figure 9-11 and Figure 9-12 show the artifacts at the site.



Figure 9-10. Mkataleni site context, from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 9-11. Mkataleni local and imported ceramics.

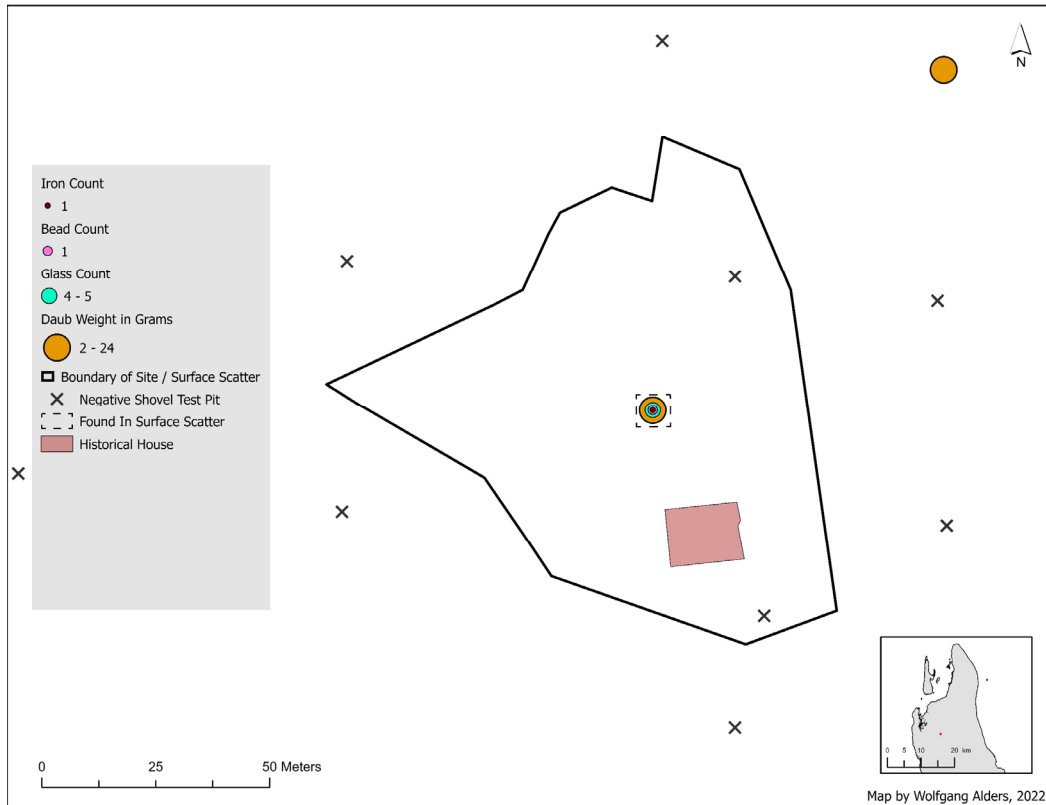


Figure 9-12. Mkataleni, other artifacts, including daub, glass, and iron.

Mkataleni is an interesting site related to the plantation system, but the site lacks subsurface deposits and the building is currently occupied as a modern residence. Further investigations related to the oral history of the site and area might be a more productive avenue for future research compared to archaeological prospection given these conditions.

9.2.3 Kibirikani

Southwest of Chaani in the central region, Kibirikani is a late colonial site with a large, dense artifact scatter and an enigmatic stone feature. We did not locate this site during survey, but residents brought us to the site during our survey of a nearby transect. The density of the artifact scatter and the depth of subsurface deposits suggests that the site's occupation history is older than the late colonial period; however, we did not record artifacts early than the 19th century during our prospections. The site may have simply been an intensively occupied area during the 19th century, or we may have missed earlier deposits. We investigated the site through surface survey and a grid of 9 STPs around the stone feature.

The stone feature at the site is made of coral limestone rag, mortared with lime, and is roughly the shape of a rectangle. The feature is 1.8 meters high, 2.2 meters long, and 1.5 meters wide at the largest points. The feature rests on a hill sloping east and is partially buried, so the eastern wall is taller than the western wall. All sides of the feature are covered with a relatively smooth, though degraded, lime plaster up to approximately 1.5 meters, with an overhanging ledge formed in the plaster approximately 1.1 meters off the ground surface. The sides of the wall above 1.5 meters are made of exposed coral rag limestone pieces that are mortared but not plastered over. The feature is apparently hollow, with an open top that is uncovered and filled in with rubble and debris. On the south wall, a rough hole approximately 50 cm in height that starts

at the base of the wall exposes a domed interior space, with preserved white plaster. The hole was likely made more recently after the abandonment of the structure, possibly by someone attempting to search for materials inside. The structure is enigmatic. One possibility is that it is some kind of large stone bread oven. It may have been part of a stone house, though no other architectural remains have been found, and stone chimneys are unheard of in historical Swahili architecture. Another possibility is that it may be a stone vertical updraft kiln (*c.f.* Roux 2019: 121) A final theory is that the structure might relate somehow to smoke-drying coconut, to produce copra. Local inhabitants confirmed that the structure was not made within the lifetime of anyone living, and no one we talked to was able to confirm the purpose of the structure or to whom it might have belonged.

Figure 9-13 and Figure 9-14 show the site context at Kibirikani. Figure 9-15 and Figure 9-16 show the artifacts found there. Figure 9-17, Figure 9-18, and Figure 9-19 show the stone feature, and hollow plastered inside.

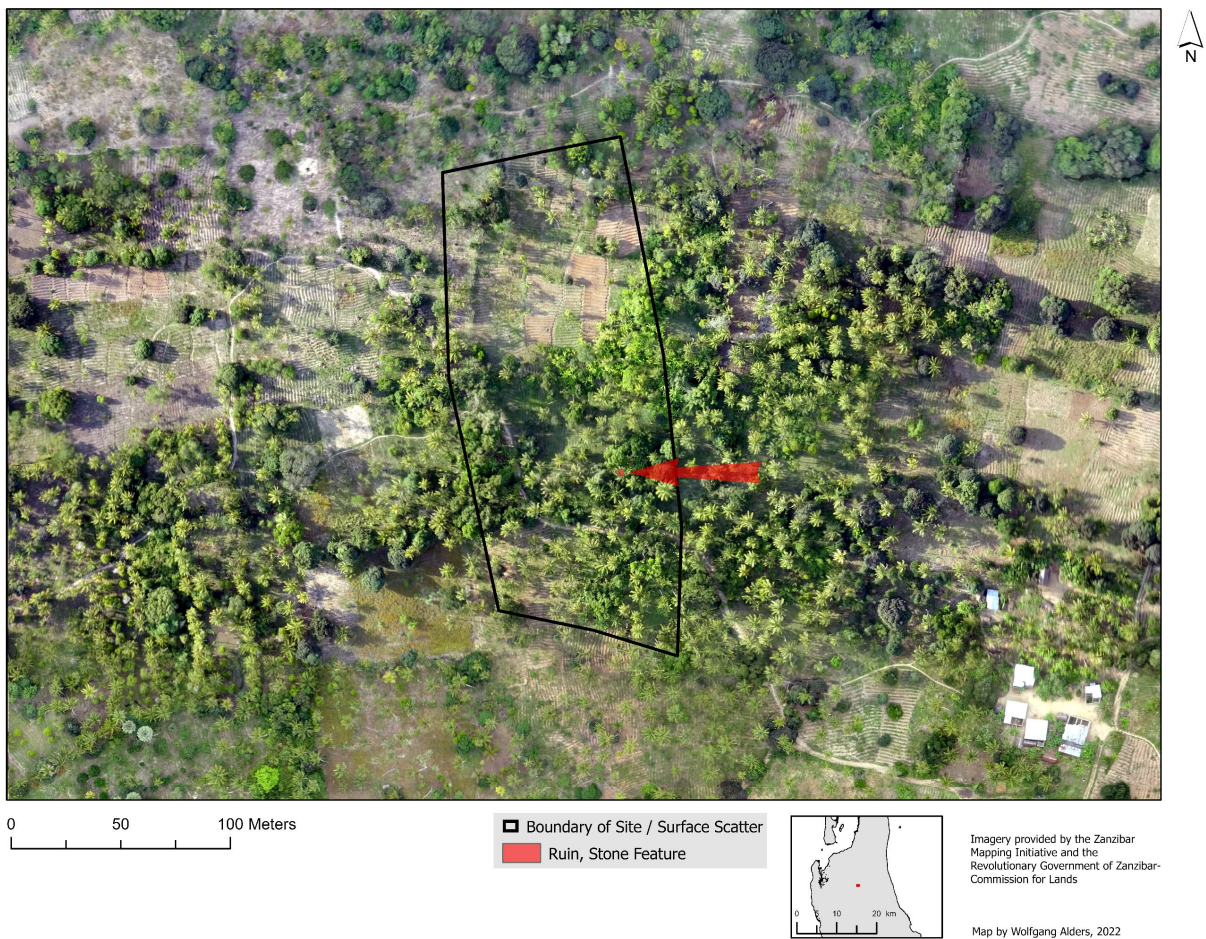


Figure 9-13. Site context at Kibirikani, from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 9-14. Site context at Kibirikani on the ground.

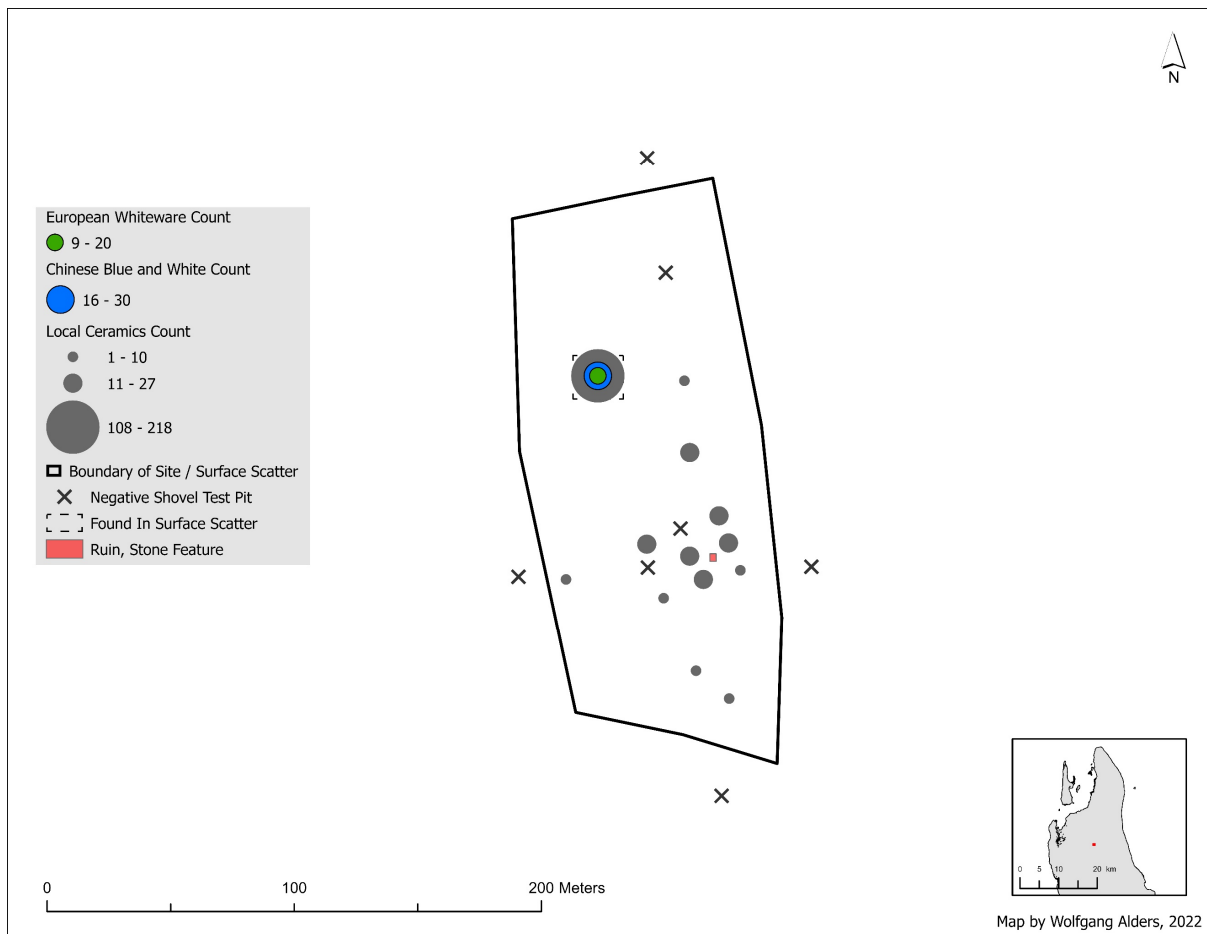


Figure 9-15. Local and imported ceramics at Kibirikani.

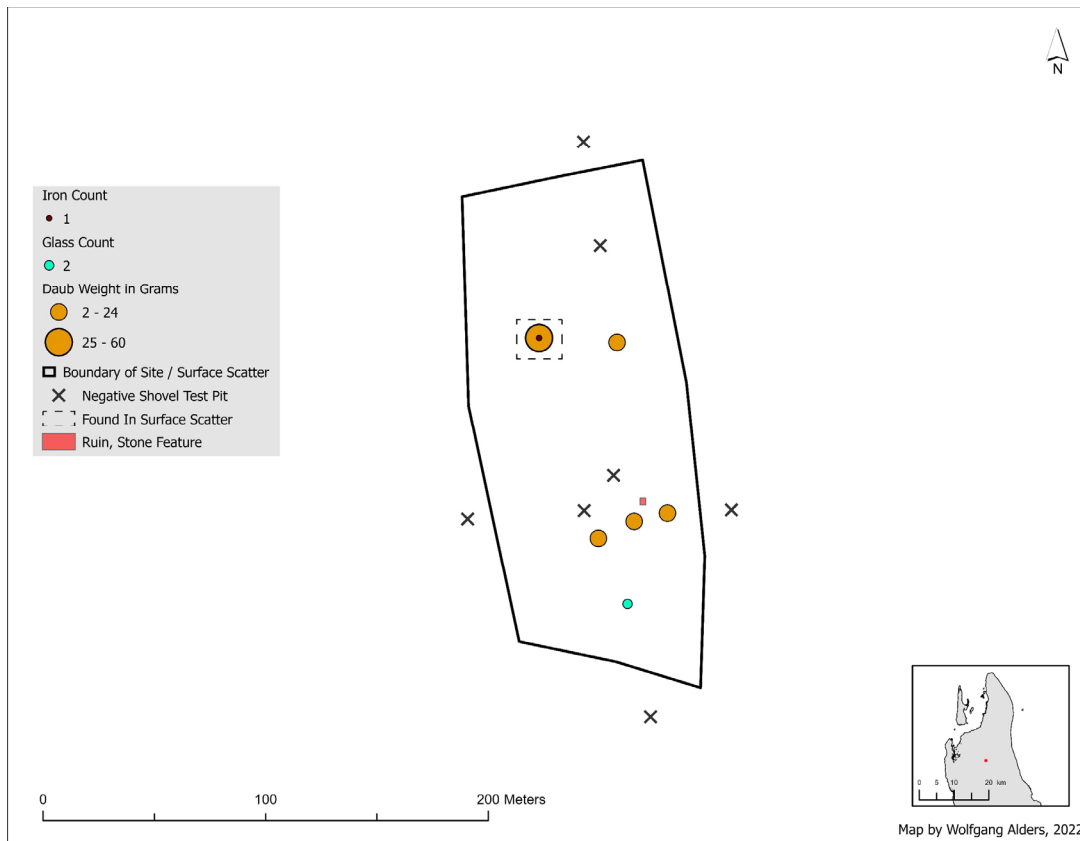


Figure 9-16. Other artifacts at Kibirikani, including daub, glass, and iron.



Figure 9-17. Stone feature at Kibirikani.



Figure 9-18. Stone feature at Kibirikani, top view, showing chimney-like opening.



Figure 9-19. Stone feature at Kibirikani, interior with plaster, exposed by hole.

Of the three plantation estates that we investigated, Kibirikani appears to have the largest quantity of materials that date to the late colonial period. It is also the only late colonial period site with significant sub-surface deposits. This suggests that this site was intensively and permanently occupied for much of the 19th century. It would be a good candidate for future archaeological research on domestic space and daily life in 19th century Zanzibar.

9.3 Surface Scatters of the Plantation Zone

Besides sites with stone architecture, we documented other late colonial sites in the west and central regions that represent settlement related to the plantation system. These sites are comprised of surface scatters with shallow or no subsurface deposits, no above ground architecture, and a diverse assemblage of local and imported 19th-century ceramics. Below, I describe some examples: the site of Donge_Mbiji001 in the west, Mnyimbi001 in the Mahonda region, and the sites of Kichangani001 and 002 in the center region. The intensity of occupation at these sites is difficult to discern. These sites may represent small villages or hamlets where small-scale plantation owners resided, or settlements of indigenous Swahili people or enslaved East Africans within the patchwork of the plantation system. This theory accords with what residents have told us—at Mnyimbi001, for instance, a local man described the artifact scatter we were investigating as the place where his ancestors had a homestead, despite the lack of subsurface deposits or standing architecture at the site. I describe these sites in more detail below.

9.3.1 Donge_Mbiji001

Donge_Mbiji001 is a surface scatter in the west survey region. It is located partially among modern houses. Figure 9-20 shows the context for this site. Figure 9-21 and Figure 9-22 show ceramics and other artifacts.

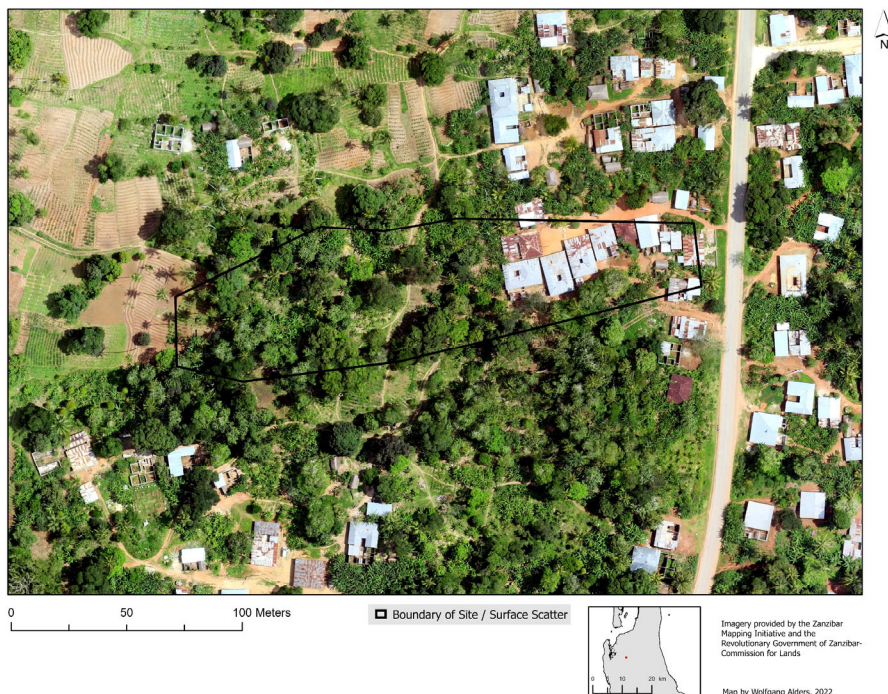


Figure 9-20. Donge_Mbiji001, site context from above. Imagery provided by the Zanzibar Mapping Initiative.

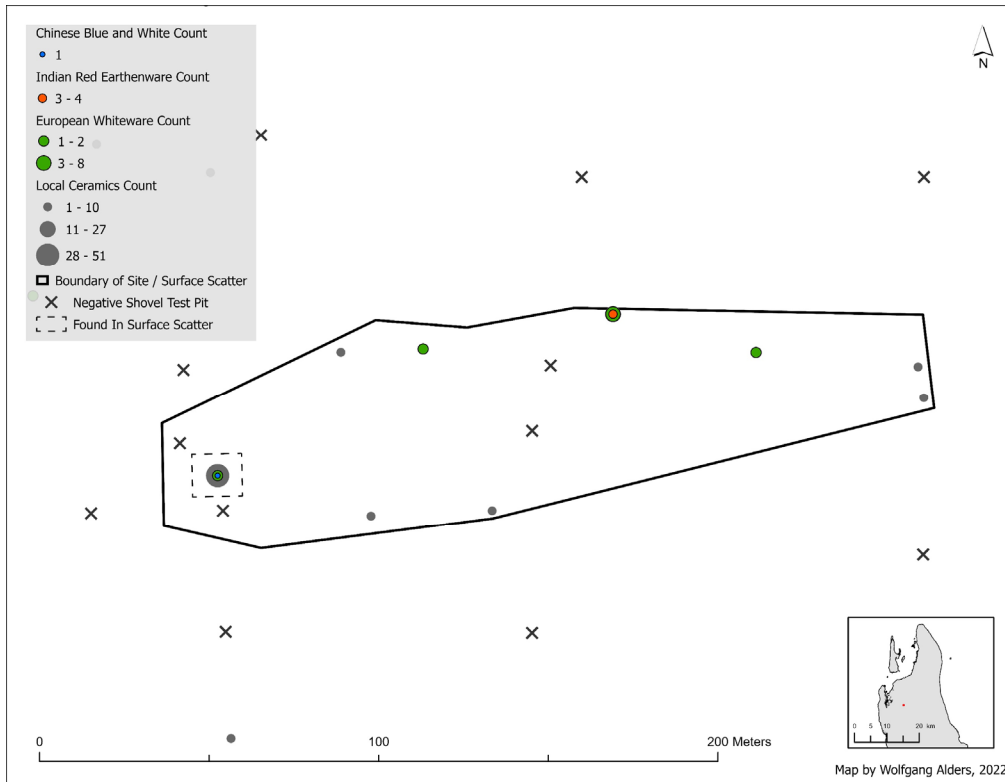


Figure 9-21. Donge_Mbiji001, local and imported ceramics.

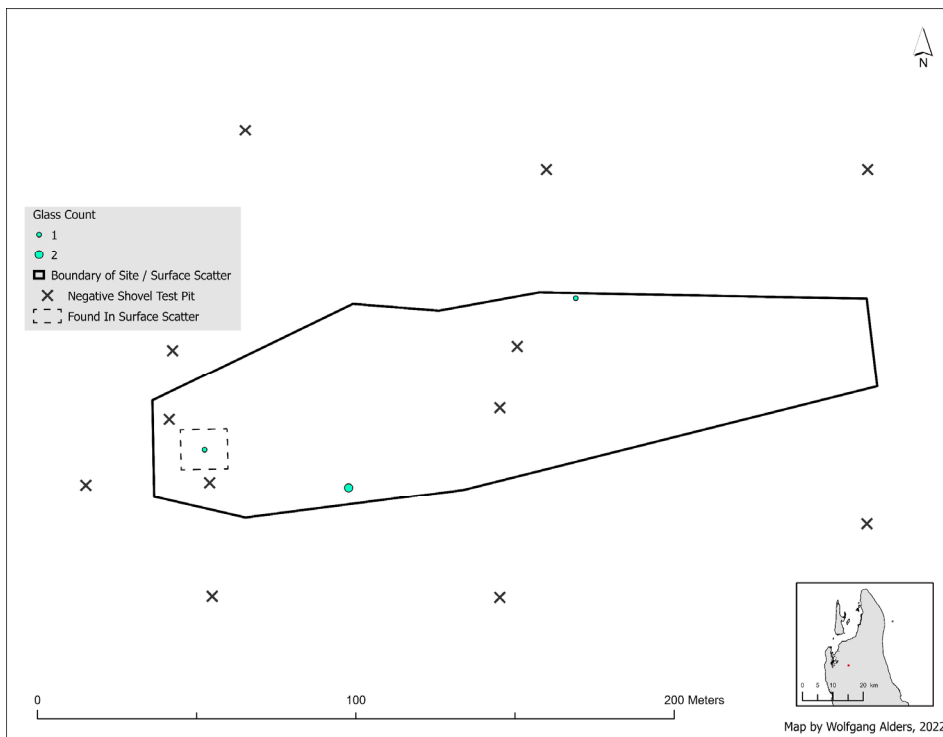


Figure 9-22. Donge_Mbiji001, other artifacts including daub, glass, and iron.

Like most sites in the west survey region, Donge_Mbiji001 has a small number of artifacts. The site likely represents a late colonial hamlet or small village near the modern village of Donge Mbiji.

9.3.2 Mnyimbi001

We recorded Mnyimbi001 on a slope east of Mwanakombo, in the Mahonda survey region. This site is a hamlet-sized artifact scatter of late colonial materials. Here, a local resident informed us that the site we were examining was the homestead of his family. He permitted us to sample this site but did not allow us to go further onto his land to complete the transect we were starting. Figure 9-23 shows the site context, and Figure 9-24 and Figure 9-25 show the artifacts at the site.



Figure 9-23. Mnyimbi001 site context, from above. Imagery provided by the Zanzibar Mapping Initiative.

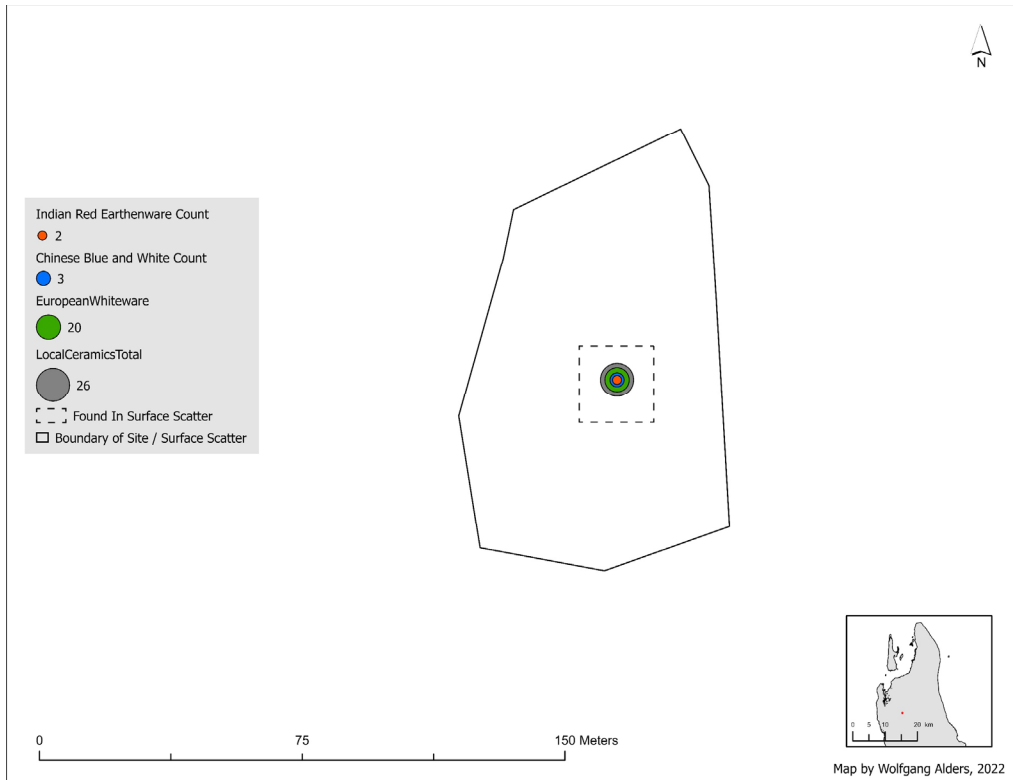


Figure 9-24. Mnyimbi001, local and imported ceramics.



Figure 9-25. Mnyimbi001, other artifacts including daub, iron, and glass.

9.3.3 Kichangani001 and 002

West of Kibirikani, we recorded two sites on the ridgelines of sloping hills within a modern pineapple plantation. These are rural sites, far from modern urban development. Both sites are surface scatters with local and imported ceramics from the late colonial period. Kichangani002 had a single subsurface deposit that we dated with radiocarbon analysis to the 10th century CE, but this is an outlier without support from other lines of evidence. The late colonial period occupation of these sites likely consisted of small villages or hamlets on the ridges of agricultural areas, where clove trees and rice are also still grown today. Figure 9-26 and Figure 9-27 show the site context, and Figure 9-28 and Figure 9-29 show the artifacts we collected.

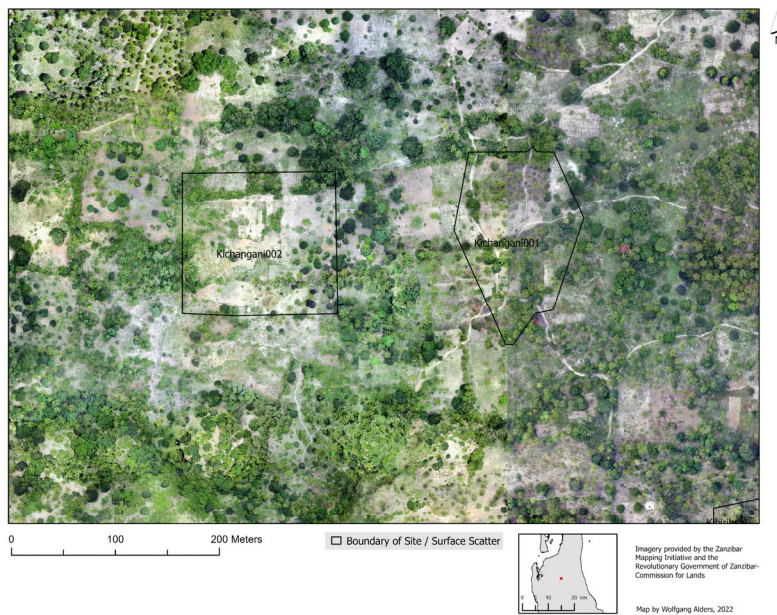


Figure 9-26. Kichangani001 and 002, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 9-27. Kichangani002 site context on the ground.

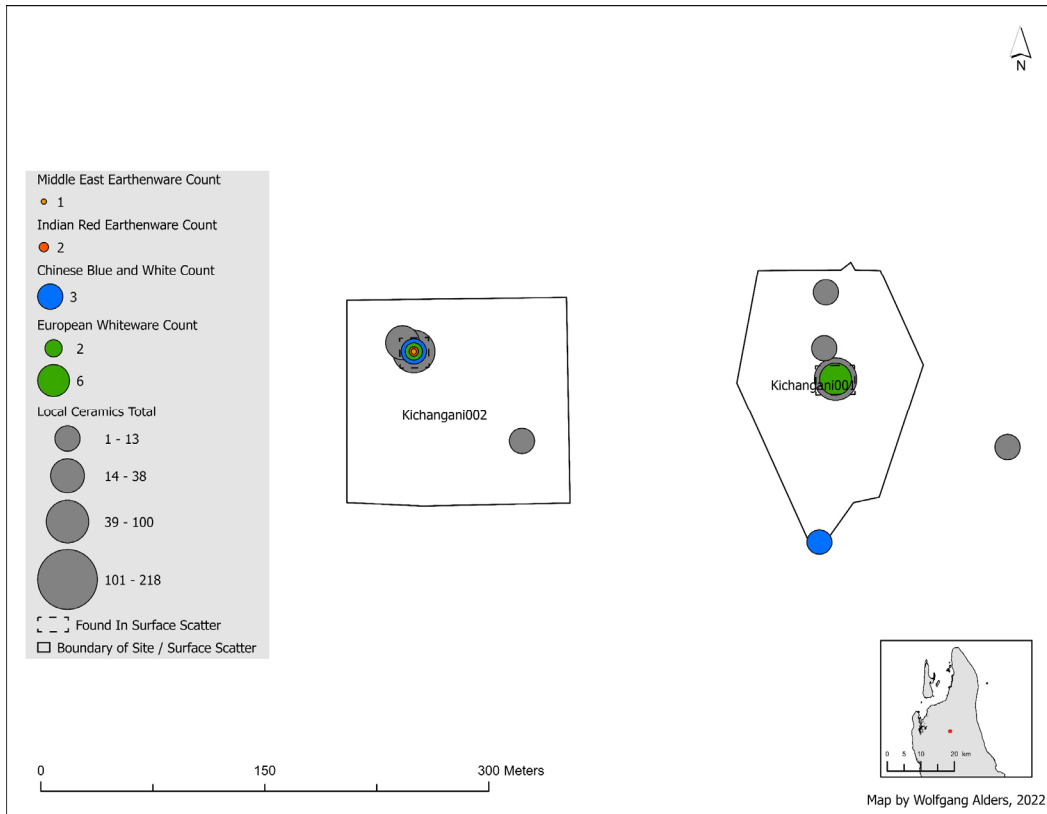


Figure 9-28. Kichangani001 and 002, local and imported ceramics.

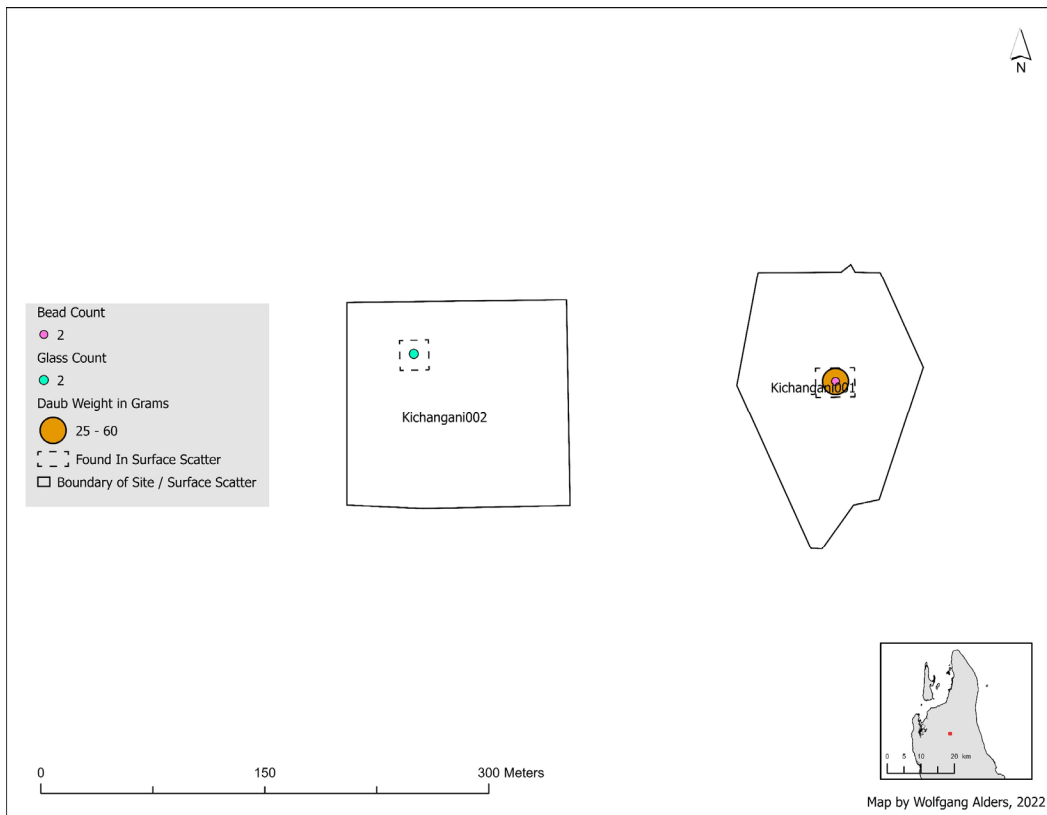


Figure 9-29. Kichangani001 and 002, other artifacts including daub, iron, and glass.

Overall, the sites of Donge_Mbiji001, Mnyimbi001, and Kichangani001 and 002 represent a common site type across the plantation regions during the late colonial period: a surface scatter with minimal to no subsurface deposits, with local ceramics and imported ceramics primarily consisting of European glazed whiteware and Chinese blue and white porcelain. The lack of subsurface deposits makes a deeper understanding of these sites difficult. The site types likely represent small villages, hamlets, or ephemerally occupied field houses for residents who participated in agricultural activities in the area, either as enslaved people, free Swahili laborers, or as small-scale plantation owners.

9.4 The Towns: Chaani and Mahonda

Some site also expanded in size during the late colonial period. One site, Chaani, was approximately ~60 ha during this time. The site lies on the same ridge facing a rice plain as Kirikacha, the early precolonial village site in the central region. The site of Chaani is comprised of a low-intensity artifact scatter with shallow subsurface deposits. Subsurface deposits do not extend the entire breadth of the site, but the surface scatter does. Artifacts and daub are concentrated in the north-central area of the site, which may indicate the earliest area of settlement. However, this is also the area where our shovel-test pit grid crosses, so it may simply have the best coverage. This site is large enough that the cross-grid STP method does not capture the full site, since as the grid arms extend, the space in between them widens geometrically. Figure 9-30 and Figure 9-31 show the site context. Figure 9-32, Figure 9-33 and Figure 9-34 show the artifacts at the site.

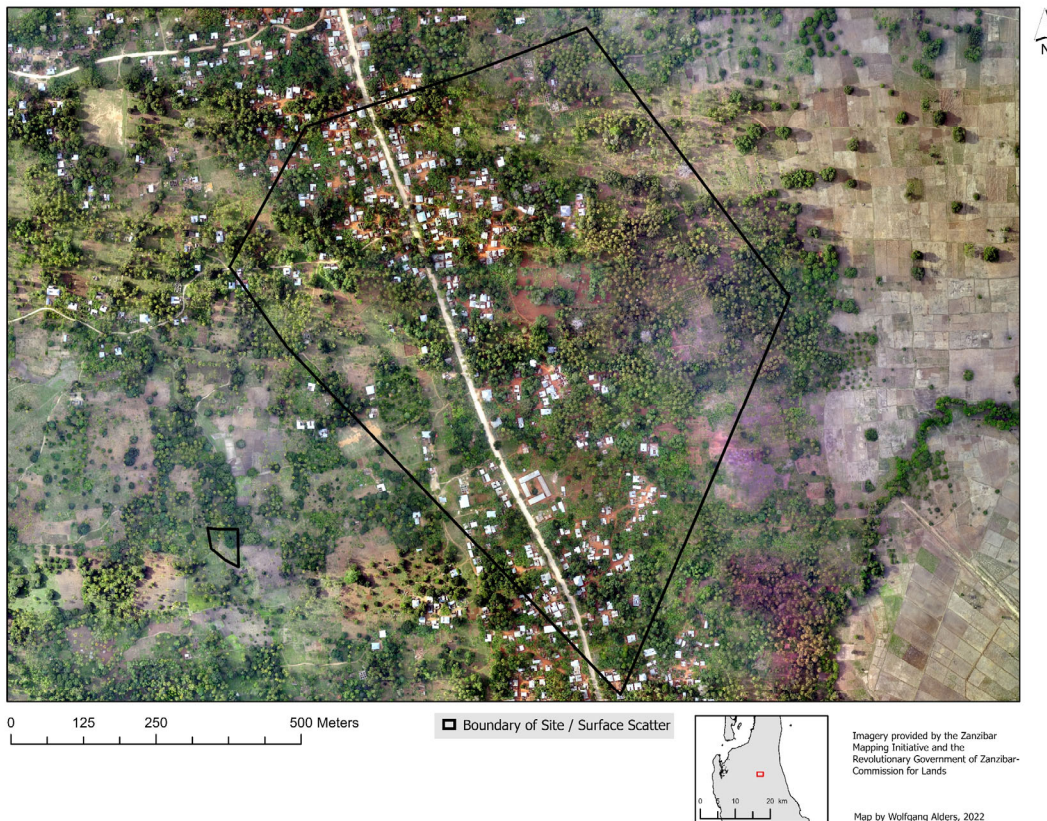


Figure 9-30. Chaani, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 9-31. Chaani, site context, on the ground. Make-shift pit for sawing logs in the foreground.

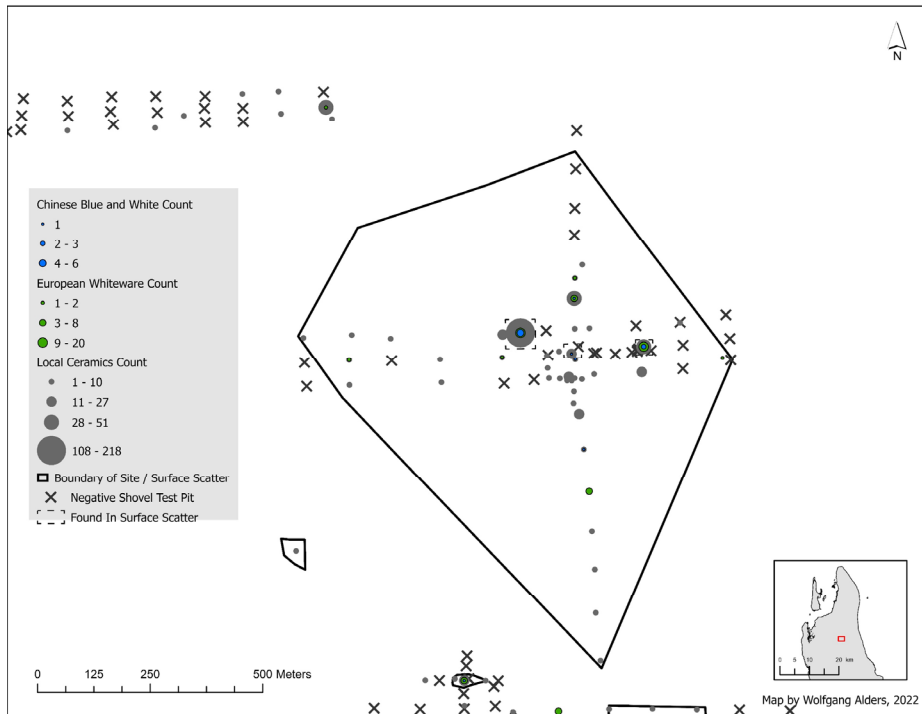


Figure 9-32. Chaani, local and imported ceramics.

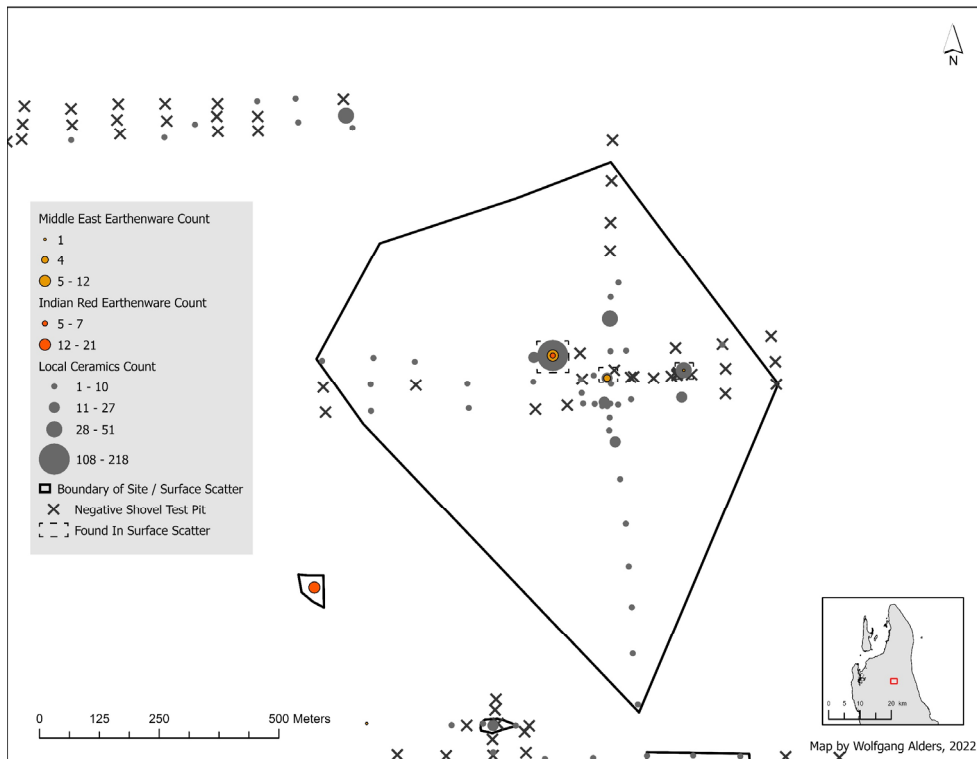


Figure 9-33. Chaani, local and imported ceramics.

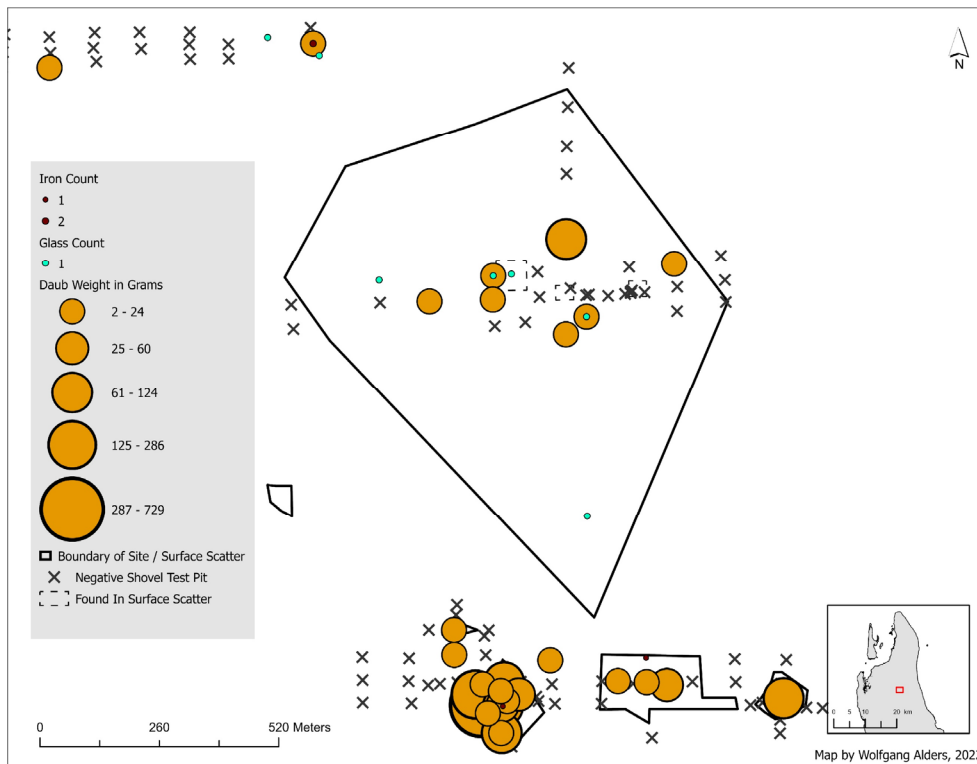


Figure 9-34. Chaani, other artifacts including daub, iron, and glass.

Another large settlement area was the town of Mahonda, in the Mahonda survey region. We did not survey the densest areas of modern habitation there, but we did record sites around

the outskirts of the town, as did Croucher (2006). The 1907 Khan Bahadur map shows Mahonda as a town by the late 19th century. The sites we recorded may have constituted part of the 19th-century townscape. Again, due to the constraints of our survey method, capturing such large settlement areas accurately with cross-grid STPs was problematic. Figure 9-35 shows the town of Mahonda with some sites we identified during survey. Mwanakombo lies to the north of the town.

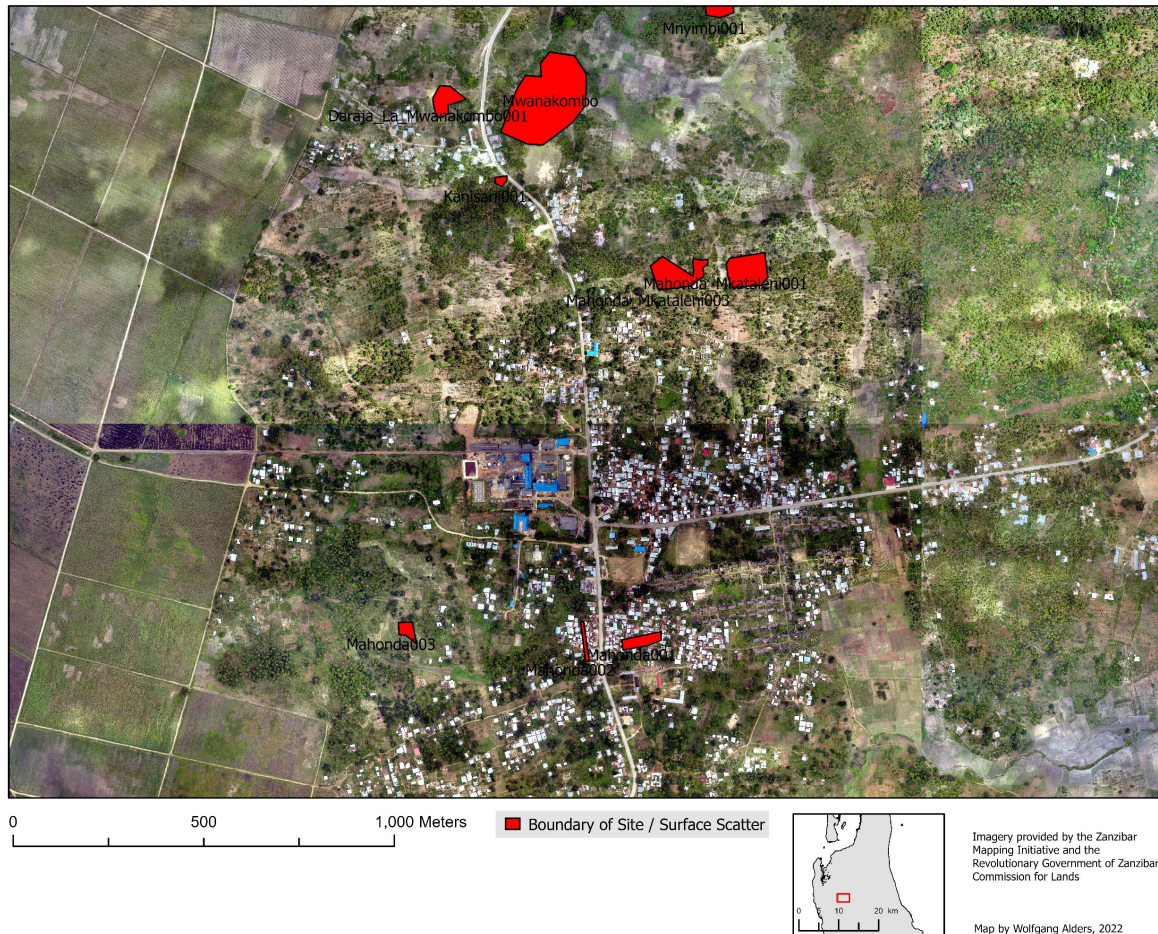


Figure 9-35. Mahonda townscape with sites from the 2019 survey.

Mahonda and Chaani are large enough to have constituted towns in by the mid-to-late 19th century, which reflect the demographic shifts of the late colonial period as enslaved people were brought to the island in large numbers. I discuss site size distribution and how it relates to demographic change more in Chapter 10.

9.5 Swidden Sites in the East

Finally, we identified late colonial sites in swidden plots in the eastern region, similar to sites of the same type from the precolonial and early colonial period. These sites are West_Kandwi002, Kandwi_Kibokwa001, Mwanampaji002, Mwanampaji003, and East_Kandwi001. Muembe Nambo, discussed earlier in Chapter 7, also has late colonial site components. As examples, I focus on Mwanampaji002 and 003. Figure 9-36, Figure 9-37, and Figure 9-38 show the context for these two sites. Figure 9-39 shows shell found at Mwanampaji003. Figure 9-40 and Figure 9-41 show the artifacts for these sites.

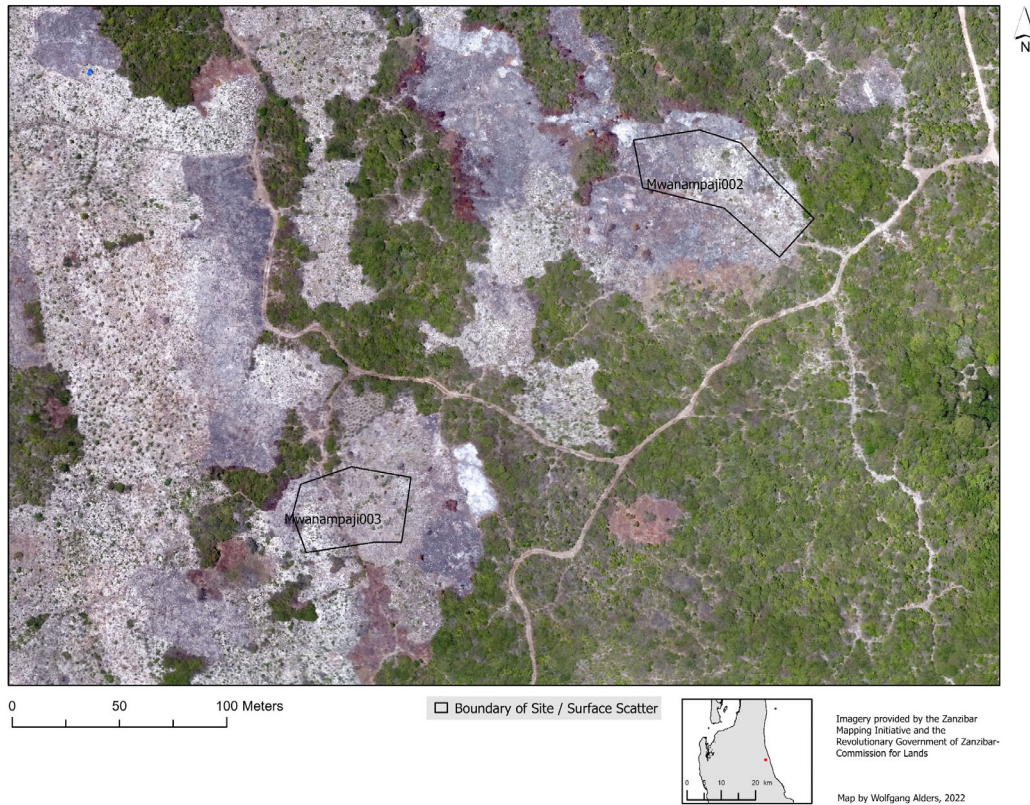


Figure 9-36. Mwanampaji002 and 003, site context from above. Imagery provided by the Zanzibar Mapping Initiative.



Figure 9-37. Mwanampaji002 site context. With the author, Hamad Suleiman, Kombo Othman Juma, and Mikidadi Hassan Musa, from left to right.



Figure 9-38. Mwanampaji003 site context, with the author and archaeologist Zaynab Makame Manzi.



Figure 9-39. Shell scatter at Mwanampaji003.

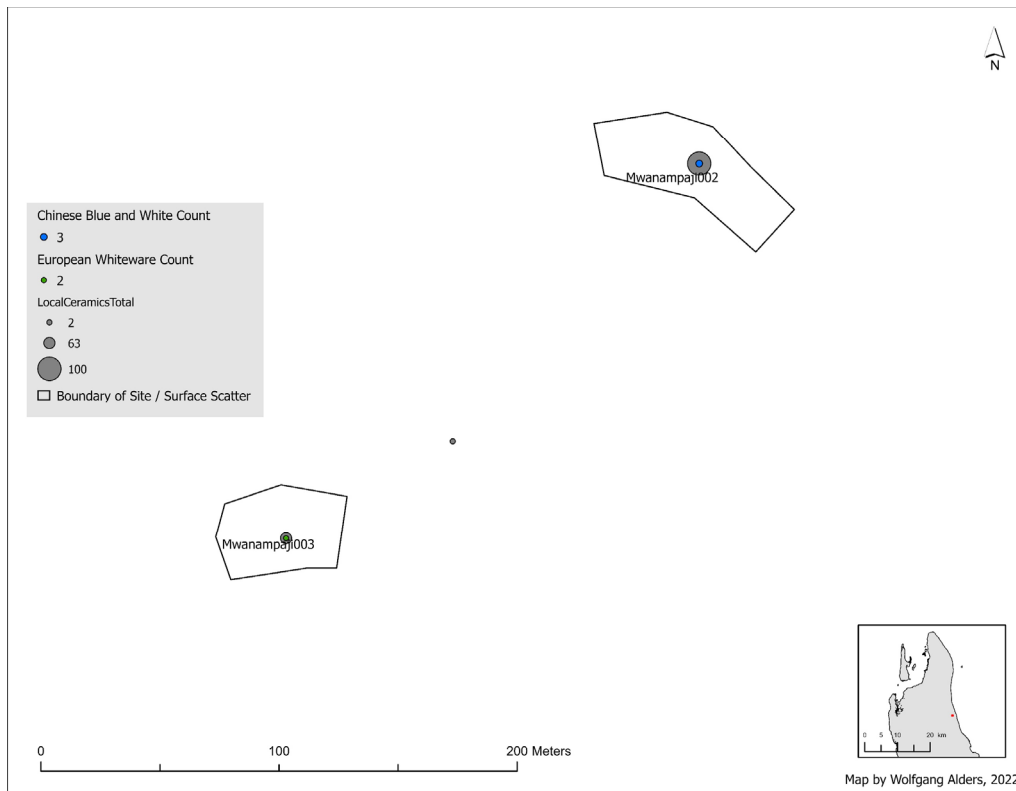


Figure 9-40. Local and imported ceramics at Mwanampaji002 and 003.

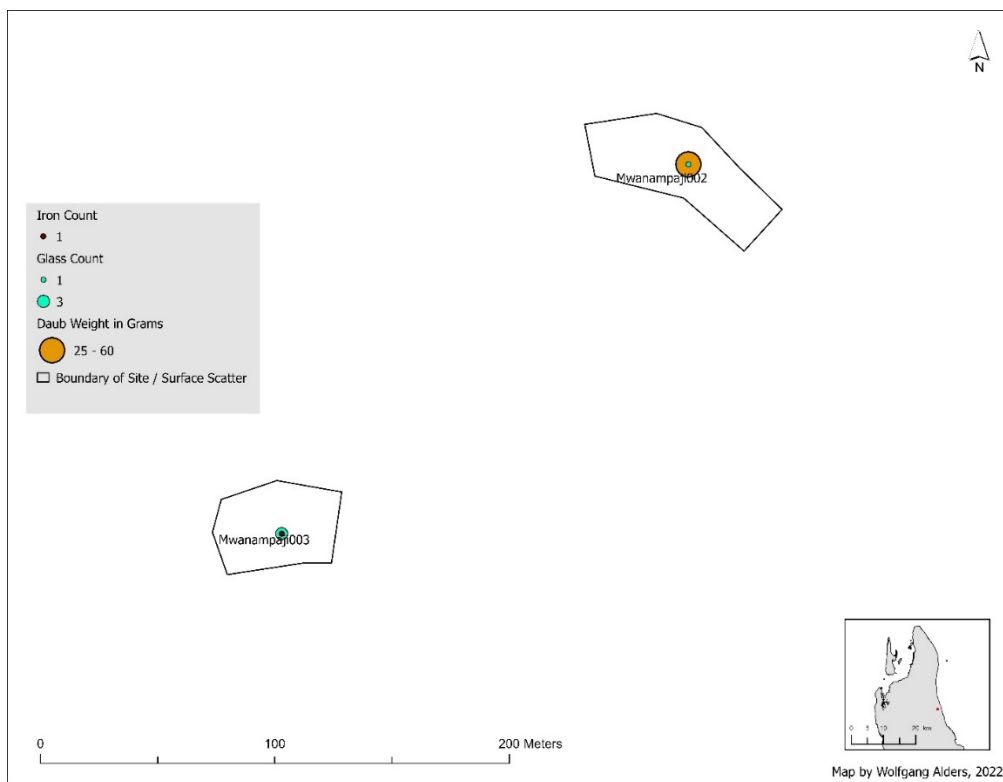


Figure 9-41. Other artifacts at Mwanampaji002 and 003, including daub, glass, and iron.

Mwanampaji002 and 003 are examples of a site type found throughout the eastern region, a surface scatter in a cleared modern swidden plot where people plant using the soil conservation technique of *kupiga makongo* (see Chapter 6). Like similar sites from the early colonial period and precolonial period, these sites likely represent continuity of swidden agricultural farming practices over the last millennium in this region. The shell at Mwanampaji003 reflects the proximity of the site to the near-shore reefs of the eastern coast of the island, where residents still gather marine resources for subsistence to this day. Being one of the only inland sites where we found shell, this example suggests that people may have favored the eastern region for its nearness to marine resources in spite of the relatively infertile and rocky agricultural conditions.

9.6 Conclusion: Late Colonial Period in Zanzibar

We recorded four settlement types for the late colonial period: towns, plantation estates, ceramic scatters in the west and central regions representing small villages or hamlets, and swidden field plot sites in the east region. The most prominent 19th-century settlement areas in the survey region lie directly on top of, or near to, the earliest Swahili village communities, at Mwanakombo and Kirikacha. In the case of Mwanakombo, a plantation house and field system for sugar cane processing lie directly over the early second-millennium village site. The town of Mahonda, also one of the largest 19th-century areas of the survey region, lies directly adjacent. The 19th-century town of Chaani lies just adjacent to the early site of Kirikacha, but along the same ridgeline and overlooking the same field system. The large site sizes of these two areas suggest a demographic increase during this period, centered around towns which have since become modern hubs in the north-central region. This apparent demographic increase is likely related to 19th-century slavery in Zanzibar, which is otherwise difficult to account for in a systematic way based on artifactual evidence alone. The sudden growth of two towns in the plantation region, coinciding with the development of clove agriculture and historical accounts of the slave trade in the early 19th century, suggests that this area saw a relatively large influx of newcomers who were likely enslaved people from mainland East Africa.

While settlements in the west and central regions expanded and the amount of imported ceramic materials increased, settlement systems remained unchanged in the east region. People reoccupied Pwani Mchangani during this time, based on a limited number of 19th-century imported ceramics found there. From the 16th century onward, Kandwi remained the central inland village of the east region, and swidden farming in cleared plots of bush in the coralline limestone bedrock areas continued as the mode of agricultural production. Residents of the east region likely continued to construct stone walls until pigs were eradicated under British and later Tanzanian rule in the mid-20th century, and they also developed and continued methods of soil conservation and swidden agriculture in the coralline limestone bedrock areas. Clove and coconut plantations were not developed in the east, and the relatively sparse numbers of imported 19th-century ceramics attests the relative poverty of this region in comparison to the rest of the island.

This chapter and the previous two chapters have given overviews of sites in the survey region for three periods. In the following chapter (Chapter 10) I analyze the spatial statistics and environmental zones of these sites.

Chapter 10: Spatial Analysis of Archaeological Sites

10.1 Introduction

This chapter analyzes the settlement patterns of the 2019 survey region. In the precolonial period, sites consisted of village communities across the island, and small ephemeral surface scatters found in modern swidden field plots in the eastern region. In Phase 1 of the early colonial period, eastern swidden field plot sites persisted alongside a small, fortified village at Kandwi. During the second phase of the early colonial period, a small village re-emerged in the central region at Njua Kuu. In the late colonial period, four different site types proliferated across the inland zones: 1) large, emergent towns, 2) plantation sites with stone architecture, 3) surface scatters representing small villages, hamlets, and field houses in the plantation zone, and 4) surface scatters in swidden field plots in the eastern region.

Understanding the settlement patterns that these site types constitute can help address the research questions that I posed in Chapters 1 and 4. Settlement pattern analysis is necessary for reconstructing archaeological and historical settlement in the inland areas of Zanzibar, as well as for understanding the social and environmental relationships which shaped human occupation in this region from the earliest period of settlement to the late colonial era.

The first section of this chapter is a summary and assessment of site patterning in each survey region: the west, central, and east systematic survey regions, as well as the judgmental regions around Mahonda, Mkataleni, and in the northeast. The second section investigates site patterning in a quantitative way, through an analysis of site sizes distribution and site cluster analysis.

To analyze site size distribution, I compare sites against the rank-size rule for different periods. For cluster analysis I use Ripley's K function, which shows clustering or dispersion at multiple spatial scales. I also compare sites across zonal rasters, made from historical and environmental geospatial data. This section produces statistics for site location, density, and distribution across a variety of environmental and historical zones, for three chronological periods. The final product of this zonal raster analysis is a predictive model that extrapolates for site locations across the island. In the following chapter (Chapter 11), I apply these same analyses to the late 19th and early 20th century, using historical settlement data from the 1907 Khan Bahadur map.

10.2 Settlement Pattern Trends by Region

The following sections describe settlement trends across all survey regions.

10.2.1 West Region Settlement Patterns

The 2019 survey located six sites and 43 site components in the western region (see Chapter 6). All sites are surface scatters without architecture, which we measured and assigned the labels of small village, hamlet, or field house. We located fewer artifacts in the western region than in any other region surveyed. This may attest to the relatively recent occupation history of the area. Most artifact finds date to the 19th century, and likely relate to the settlement systems within and around clove plantations.

Small villages: The oldest and largest site in this region is Donge_Mbiji001, which is located directly adjacent to and within the modern village of Donge Mbiji. This village has since grown much larger in the 20th and 21st centuries. We did not survey the entire modern village of Donge Mbiji, so it is possible that other components of the early village site that were not recorded may yet be found in other parts of the modern village, either south or north of

Donge_Mbiji001. The site developed into a small village sometime during the 19th century. The village of Donge Mbiji depicted in the 1907 Khan Bahadur map, which shows a village smaller in size than the modern extents of the current town. The fact that the archaeological site we identified is centrally located in the village that was marked in 1907 and has 19th-century materials suggests that this site was the original occupation area which developed into the modern town.

Hamlets: We located two other hamlets with similar date ranges to Donge_Mbiji001: Donge_Pwani002, and Donge_Mbiji002. Neither of these sites were included on the 1907 map, if they existed at all at the time. The sites have definitive 19th-century materials. These two sites represent a settlement type characteristic of the late second millennium, the small hamlet. Some of these hamlets developed into modern villages like Donge_Mbiji001, but these two did not.

Field Houses and Site Components: The rest of the evidence for human occupation in this region consists of field houses and findspots of ceramics from rural areas that we designated as site components, given that they were not found in association with any larger site.

Donge_Karange001 is the most definitive field house site, with a small (0.07 ha) but dense artifact scatter of primarily 19th-century materials. This site is found adjacent to 16 site components spaced evenly to the east, in and around modern fields. Site components like these are dotted on the landscape in and between the six sites identified in this region, and most likely represent the traces of seasonal agricultural labor, or refuse thrown away from activity areas. Site components originate in the 19th century, without exception. There were 43 site components in total.

The second field house we located was Donge_Pwani001 which is of an unclear date. Artifacts from this site consist of daub and local undiagnostic ceramics. Given the dates from the region, this site is most likely an ephemeral occupation area from the 19th century or later. The final site which fits into this category is Donge_Karange002. According to our survey's system for site designation, it would constitute a village site, over one hectare. However, it is nothing more than low density (Type 1) artifact scatter, comprised entirely of undiagnostic local ceramics. The occupation period for this site must have been short, given the ephemeral traces of human activity.

Summary: The first permanent residents of the western region constructed hamlet and field house-sized sites starting in the late second millennium. A single hamlet, Donge_Mbiji001, developed into a small village by the 19th century, which was first recorded as the village of Donge Mbiji on the 1907 map by Khan Bahadur. Throughout the 19th century, small field houses and other seasonal occupation areas outside of the main villages produced the distribution of site component findspots that are visible as traces today in fields and orchards. This low intensity, but widely distributed settlement pattern dating to the 19th century may be indicative of seasonal agricultural labor on coconut and clove plantations.

10.2.2 Central Region Settlement Patterns

The 2019 survey located 12 sites and 17 site components in the central region (see Chapter 6). Survey results suggest that the central region has been occupied in certain areas for the last millennium. The eastern part of the central region was densely inhabited, while the western parts were more sparsely occupied.

The largest site in the entire survey was Chaani, which fits the designation of "town" based on its size (~60 ha). It is possible that our survey methodology did not adequately capture the extent of the town, since its large size meant that it was logistically difficult to survey the entire area. Additionally, five sites are small villages: Kibirikani, Kichangani001,

Kichangani002, Njua_Kuu001, and Kirikacha. Four sites are hamlets: Kikobweni002, Kikobweni003, Kikobweni004, and Kichangani003. One site, Kikobweni001, lies on a slope and likely represents colluvial deposition from above—therefore, we did not place it in a site size category. Finally, 17 findspots were designated as site components and these may relate to field and agricultural activities. We did not identify any sites with a dense enough concentration of artifacts in a small enough area to be classified as a field house.

Towns: The survey uncovered an artifact scatter across the modern town of Chaani, with artifacts that primarily date to the 19th century. This site therefore seems likely to have been a town of similar size to the modern town, which developed in the 19th century as a central place within the north-central Zanzibar landscape. This is further suggested by the presence of a settlement on the 1907 map which roughly matches the surveyed area in size. It was the only town located during survey, though the combined sites of the Mahonda region may also constitute a late 19th-century town. The site is located on a plateau among foothills that overlook a large rice plain to the east, and clove and coconut orchards to the west. As such, it was embedded within the agricultural landscape, being simultaneously in a favorable position for subsistence farming in the rice valley as well as clove and coconut cash crop production to the west on hilly ridges. The size of this site and its sudden appearance in the 19th century attests to demographic shifts which began during that period, as enslaved populations were brought in large numbers.

Small Villages: Small villages were settled in the central and eastern areas of the central region. A common factor in their location seems to be a correlation with the higher elevation parts of the survey region. Small villages include Kibirikani, Kirikacha, Njua_Kuu001, Kichangani001, and Kichangani002. Kikobweni001 is the size of a small village (2.8 ha), but the subsurface deposits across this site are not *in situ* and are more likely the result of colluvial deposition from the village of Kirikacha which lies directly uphill. Three small villages, Kichangani001, Kichangani002, and Kibirikani are in the highest elevation areas recorded in the entire survey region, on the central spine of the island ridge. No small villages are found in the far west, where the foothills slope down lower, or the far east, where the elevation falls off beyond the plateau on which Chaani sits. Of these small village sites, Kirikacha is the earliest, with ceramic evidence dating from the 11th-14th century and a C14 date from the earliest deposits that dates to the 7th-9th century (see Chapter 7). A handful of type 17 and later 19th-century ceramics attests to a possible subsequent small-scale reoccupation of the site in later periods. Like Mwanakombo, Kirikacha lies on a raised bluff bordered by a perennial stream.

The small village sites at Kichangani001 and Kichangani002 lie along ridges separated by fields of a modern pineapple plantation. It is possible that the present-day expanse of pineapple fields did not exist when these villages were occupied. The date for the first instance of pineapple farming Zanzibar is unclear, but the earliest reference I have found of the fruit's presence in Zanzibar is from a travel monograph from 1907 (Nunez-Lyne 1907: 265). Ridges like these were also favored for clove production, which may have been the original impetus for settlement in this area.

Njua Kuu is a small village site that is unique in that it was apparently abandoned before the early-mid 19th century, when European industrial whitewares became widespread across every site on the island, during the main period of intensified clove tree farming. It is also unique in terms of its settlement location, which differs from other small villages. Unlike precolonial villages that developed around water (perennial streams in the case of Kirikacha or Mwanakombo, or ponds in the case of Kandwi) or late colonial villages that developed in areas

favorable for clove farming, Njua Kuu is relatively isolated. Its name (main road, in the Unguja dialect of Swahili) may offer a hint in explaining its location, as a stop along a road used for travel in the interior.

Hamlets: Hamlets in the central region include Kikobweni002, Kikobweni003, Kichangani003, and Kikobweni004. These sites are located across the central region, from the far west to the far east. The village site of Kirikacha was also reoccupied during the late second millennium, though likely not at its previous size; instead, the smaller reoccupation was likely hamlet sized. All hamlets have artifacts which date to the 19th century, and three out of five also have type 17 ceramics. Four out of five, plus the potential hamlet at Kirikacha, are located along perennial streams, suggesting the importance of easily available water for settlements of this type.

Field Houses and Site Components: We classified no site in the central region as a field house, since all detected sites were larger than 0.1 hectares. However, we identified 17 findspots, which we classified as site components. A single findspot consisted of daub, sherds from everted rim cooking pots, sherds from a rolled spherical vessel with neck punctates, and undiagnostic sherds. These artifacts, along with the findspot's proximity to the 11th-14th-century site of Kirikacha (~75m) suggests that the findspot is related to that site, either representing displaced artifacts from the site itself or another small and tangential occupation area from the same period. Two other findspots contain type 17 ceramics, as well as ceramic with motifs from the 19th century. The rest either date definitively to the 19th century or are indeterminate, based on ceramic finds.

Summary: Based on pockets of primary forest today and accounts of deforestation in the 19th century (Sheriff et al. 2016) in this region, it seems likely that the central region was more heavily forested in the first millennium CE. Early Swahili settlers may have arrived at Kirikacha by the first millennium based on the single C14 date for that site, but this date seems too early compared the ceramic evidence found and may be an anomaly related to post-depositional processes or the old wood problem. Swahili people first definitively settled in this region in the early second millennium on the ridge overlooking the valley to the east at the site of Kirikacha. These residents likely cleared the dense vegetation around the perennial stream of Mto Pweza. Given the artifacts and features documented at these sites, these villagers, like those at Mwanakombo in the west, baked bread in communal ovens, acquired luxury *sgraffiato* ceramics from the ports that traded with the western Indian Ocean world and, apparently, did not consume marine resources to a significant degree. Based on the similarity of artifacts found at Kirikacha with those at Tumbatu, and since Tumbatu, Mkokotoni, and Shangani (near Mkokotoni) remain the only other sites in the northern half of Zanzibar during this period, it seems likely that Kirikacha may have supplied the elite residents of Tumbatu with grain and other agricultural products. There may have been an overland route between Mkokotoni and Kirikacha, on which rice, millet, domesticated animals, and forest products from Kirikacha were sent to Mkokotoni in exchange for ceramics, beads, and textiles from Tumbatu. However, the lack of late material culture suggests that this village community was abandoned sometime in the late 14th century, along with Tumbatu and Mwanakombo, and presumably the entire rural settlement system. No major sites are found in this region that date from the late 14th and into the 15th century, and small village communities do not reappear until later.

During the latter phase of the early colonial period (from 1698-1830), a small village developed at Njua Kuu, which was then abandoned before 1830 when European industrial whiteware became common. This is the only early colonial site we located in this region.

The stream system running from the highland areas around Kichangani down toward the rice fields in the east may have been a corridor for settlement during late colonial period. Starting around 1830, small hamlets developed along the Mto Pweza stream on the ridge nearby where Kirikacha was initially founded, including directly over the site of Kirikacha itself. Further upstream, two small villages were also founded, at Kichangani001 and Kibirikani. A small village likely also developed around the northern part of the modern town of Chaani, which would grow into the modern town of the same name.

Except for Njua Kuu, these sites persisted into the mid-late 19th century, and one more hamlet was founded in this time, at Kikobweni004. The major development of the 19th century was the expansion of the town of Chaani, which grew from a small village in the north to a settlement which covered nearly the entire 3.5-kilometer ridgeline down past Kikobweni and toward Kinyasini by 1907. The expansion of Chaani was likely the result of demographic changes relating to the arrival of enslaved people for the clove plantation system. The town would have been a hub for agricultural labor during the plantation period as it was ideally positioned between the highland areas where clove, coconut and pineapple plantations were located, and the rice valley that is directly to the east.

The central region was the most densely populated segment of the survey universe, and it produced the largest number of artifacts and the highest number of sites. Interestingly, it also produced the smallest number of site components or findspots. This suggests that the environmental context of the central area might better preserve site constituents in comparison with other regions, resulting in a more complete archaeological record with fewer “site components” compared to elsewhere. The large physical size of artifacts found at Kirikacha in comparison to those at Mwanakombo further suggests that the central region is conducive to preserving more complete archaeological assemblages. Alternatively, this difference may simply be due to more intensive occupation over the last millennium.

10.2.3 East Region Settlement Patterns

Despite the difficulty in surveying this region due to the brush, forest cover, and rocky terrain, our project revealed past and present land use across a variety of environments. Though we were limited to surveying a small number of areas, every transect revealed the presence of multiple sites. We also found evidence for continuous settlement from the early second millennium onward through the early colonial period and into the late colonial period. Aside from Kandwi, most sites were surface scatters in cleared field plots. This suggests that the eastern survey region was intensively occupied and has been used for swidden farming for centuries. Continuous long-term land use in this area was enabled by specific agricultural adaptations for conserving soil in marginal environments, and by proximity to near-shore reefs for marine resource exploitation.

We identified 16 new sites in the region, and 36 site components (see Chapter 6). Most of the sites we located are in areas of cleared brush which were recently burned away and made accessible to walking survey by farmers practicing swidden agriculture in the area. On the one hand, the limitation of only being able to survey areas that were cleared by farmers has certainly biased the sampling of this region. Survey transects in the eastern region deviated the most of any region from the systematic sampling strategy that we set out to accomplish. On the other hand, the fact that so many of these recently cleared plots produced archaeological materials dating to the last millennium suggests that many more sites might remain covered in fallow field plots that have yet to be cleared. This indicates a high intensity of settlement in the eastern region relative to expectations and current stereotypes of the area that portray it as a barren and infertile

place. While the naturally occurring soils in the area are shallow and poorly developed, innovative methods of incremental landscape modification combined with swidden fallow methods and the strategic exploitation of marine resources facilitated settlement of this region from the early second millennium onward (see Chapter 6).

Of the 16 sites we identified, we classified 13 as sites of seasonal occupation for agricultural labor, irrespective of the site size. Farmers likely visited these areas to plant and harvest, camping for periods while this process occurred. These sites include East_Kandwi001, Kandwi_Kibokwa001, Kandwi_Kibokwa002, Kandwi_Kibokwa003, Kandwi_Kibokwa004, Kandwi003, Mwanampaji001, Mwanampaji002, Mwanampaji003, West_Kandwi001, West_Kandwi002, and West_Kandwi003. All these are low-density artifact scatters across coralline limestone bedrock, in areas recently burned and cleared by farmers practicing seasonal swidden agriculture.

The largest of these sites, West_Kandwi001, is 1.15 ha, and the smallest, West_Kandwi002, is 0.01 ha. Most range within the “hamlet” site type range, from 0.1 to 1 ha. While a general schema of field house – hamlet – village – small village – town makes sense for other areas where soil and water make permanent settlement possible, ethnographic observations, the 1907 historical map, and historical documentation of 20th-century occupation in the eastern areas (Middleton 1961; Pakenham 1948) suggest that artifact scatters in field plots in the eastern areas likely do not represent long-term or permanent settlements, but rather were temporary occupations by farmers in the process of yearly agricultural production. Ceramic vessels found in these field plots were likely left there by farmers who used them to cook meals while camping and working on field plots, a practice that can be observed today with aluminum pots (e.g., see Figure 6-29 in Chapter 6). The relatively low density of artifact remains supports this theory, although site deflation on the coralline bedrock and the lack of soil necessary to form deep stratified profiles may also play into the relatively low density of artifacts in sites in the eastern region compared to other areas.

Finding traces of temporary occupation related to seasonal labor from the 19th-20th centuries was an expected result of this survey, since farmers in the region today attest to their parents, grandparents, and great-grandparents farming in similar ways. What was less expected was finding similar sites in these areas dating much earlier. For instance, Mwanampaji001 produced a few sherds of pottery from the 11th-14th century, suggesting an early second-millennium presence in coralline limestone bedrock areas. The site of Muembe Nambo, in the northeast survey region (see below) also has pottery dating to the early second millennium suggesting an early presence in the coralline limestone bedrock environments. Furthermore, West_Kandwi001 and West_Kandwi003 produced neck punctating wares with rolled necks and spherical vessel shapes, characteristic of the 11th-14th centuries, in similar contexts. The presence of these earlier materials in rocky agricultural field plots suggests a deeper history of the types of land use traditionally associated with the eastern region.

Besides these temporary occupation sites in coralline limestone bedrock areas, we identified three other sites: Chaani_Kibokwa001, Kandwi, and Kandwi002. Chaani_Kibokwa001 was a typical field house found in the rice fields to the extreme west of the eastern region, dating from the late 19th or 20th century. It likely shares more in common with the settlement system of the central region than with the eastern region. Kandwi and Kandwi002 represent permanent settlements of the inland eastern region, around the modern village of Kandwi. The site of Kandwi is located on a raised plateau of good soil, around several small ponds that are filled from underground by aquifers. The site produced a few ETT ceramics, indicating that the area

may have been inhabited as early as the late first millennium. The main phase of occupation at the site is from the 15th century onward, as the site also produced several pieces of blue and grey Islamic monochrome wares, Chinese blue and white porcelain, European glazed whitewares, and type 17 ceramics as well as other local ceramics of the 19th century. The site's location within the modern town of Kandwi suggests that it has been occupied into the present day. Kandwi002 is a small area just east of the main village of Kandwi, that represents a 19th-century expansion out of the earlier settlement.

Low Stone Walls, Swidden Plots, and Wells: In addition to recording sites in the eastern region, we also recorded three distinct but related traces of ancient and modern land use practices. I detailed these practices in Chapter 6. The first type is the construction of low-lying *mabigili* stone walls. We recorded these walls incidentally as we encountered them during field survey, and in one case we dug three shovel-test pits at the base of a wall just outside of the village of Kandwi to locate diagnostic artifacts. None were found. The second phenomenon we investigated were cleared modern swidden field plots, which are cleared using fire and planted using a method called *kupiga makongo*, in which a farmer cuts out holes in the coralline limestone bedrock to plant crops and conserve soil (see Chapter 6). Finally, historical maps of rocky limestone bedrock areas on the island attest to the widespread digging of stone wells in areas without perennial streams (see Figure 3-7 in Chapter 3)

The 1907 map of the eastern region that shows Kandwi as the sole settlement likely reflects the deeper settlement history of the area, possibly as far back as the late first millennium CE or at least as far back as the 15th century. Kandwi has likely been the central and sole village community in this area since it was first settled. What the map does not reveal, however, is the extent to which people used and transformed the coralline limestone bedrock areas outside Kandwi and the plateau of deep and agriculturally productive soil where it developed. In every area surveyed, we recorded small sites representing temporary occupations related to shifting swidden cultivation that span the entire second millennium.

10.2.4 Mahonda Region Settlement Patterns

We recorded 11 sites and 16 site components during survey in the Mahonda region (see Chapter 6). These date to the 19th century, aside from the early village site at Mwanakombo. The site of Mahonda_Mkataleni001 also produced a single late sgraffiato sherd, suggesting that it too may have an early phase of occupation, but this is not clear. The sites of Daraja_La_Mwanakombo001, Kanisani001, Mahonda_Mkataleni001, Mahonda_Mkataleni003, and the 19th and 20th-century features at Mwanakombo all may have constituted settled areas that preceded the formation of the town of Mahonda, which is listed as a town by the early 20th century. This town would have been of comparable size to the town of Chaani in the central region, suggesting that these two areas may have been central areas of demographic expansion and population agglomeration resulting from the influx of enslaved mainland East Africans. Based on the density of artifacts and architectural remains, Mahonda may have been a wealthier and more intensively settled town than Chaani by the early 20th century.

To the south, Mahonda001, Mahonda002, and Mahonda003 all represent more recent mid-20th-century settlement areas, except for Mahonda003, which may have been a small 19th-century hamlet on the outskirts of the 19th-century town to the north. Similarly, Mnyimbi001 appears to have also been a 19th-century rural hamlet outside the main town area. The early village community at Mwanakombo appears to be contemporary with the stone town at Tumbatu, as well as with the village of Kirikacha, in the central region. I discuss Mwanakombo's early history more in Chapter 7.

10.2.5 Mkataleni Region Settlement Patterns

We located two sites within the Mkataleni region (see Chapter 6). This area does not appear to have been substantially occupied by settled agriculturalists prior to 1830. The Mkataleni002 hamlet site and the Mkataleni001 site, with the stone house, date unequivocally to the mid-late 19th century. The stone house may be related to the illegal slave trade of the late 19th century based on comments from the local landowner. I discuss the stone house at this site more in Chapter 9. Prior to these sites, there are no detectable traces of land use in the area.

10.2.6 Northeast Region Settlement Patterns

The northeast settlement region was surveyed briefly at the request of community members in Pwani Mchangani. We identified two sites in this region (Chapter 6), at Muembe Nambo and Pwani Mchangani. Muembe Nambo is intriguing because of the early second millennium Dembeni ware sherds, indicating a link to the Comoros (Horton 1996: 253). This link is difficult to explain but is inconsequential given that the evidence amounts to two sherds. The most intensive phase of occupation occurred in the late second millennium, when the *bigili* wall was likely built. The site remains in use today as a farm plot.

On the coast, the village of Pwani Mchangani likely developed in the 14th-15th centuries and probably earlier as well, along with other Swahili settlements of this time on Zanzibar like Shangani (Stone Town), Mkokotoni, Tumbatu, and Kizimkazi. Pwani Mchangani may have had some trade relationship with Kilwa based on the presence of Husuni ware at the site, which is only found at Kilwa Kisiwani (Chittick 1974: 326). The presence of a supposed Portuguese well at the site, and the lack of artifacts dating past the 15th century, suggests that a settlement rupture associated with the arrival of the Portuguese may have occurred in the late 15th or early 16th century (see Chapter 8). The 1907 map shows the village of Pwani Mchangani just south of the precolonial site, though it is unclear when the village was reconstituted based on the artifacts found.

10.3 Visualizing Regional Settlement

I used ArcGIS Pro to symbolize settlements across the three periods using heat maps to emphasize site clusters. I also weighted the heat maps to reflect site size in hectares. This creates a visual analogy for the way that site size can be used as a proxy for population. Sites clustered together intensify the colors of the heat map, but not as much as larger sites.

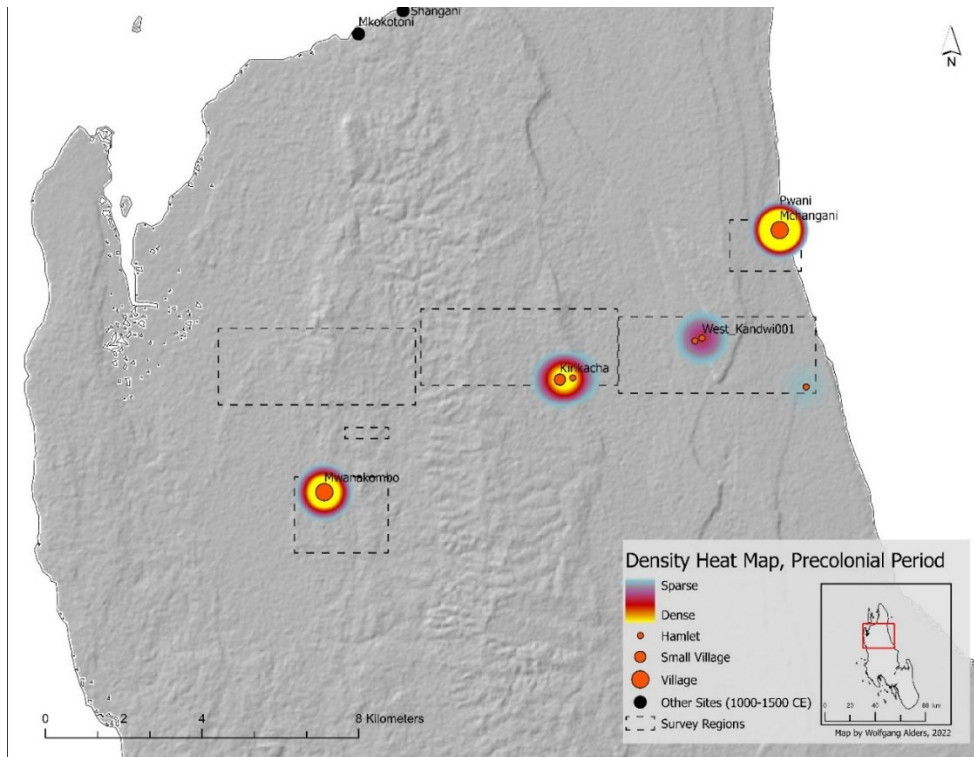


Figure 10-1. Heat map density for the precolonial period.

Figure 10-1 shows heat map density for the precolonial period. Though two precolonial sites are located in the eastern region, they represent hamlets which do not intensify the heat map colors nearly as much as the larger singular sites of Mwanakombo or Pwani Mchangani.

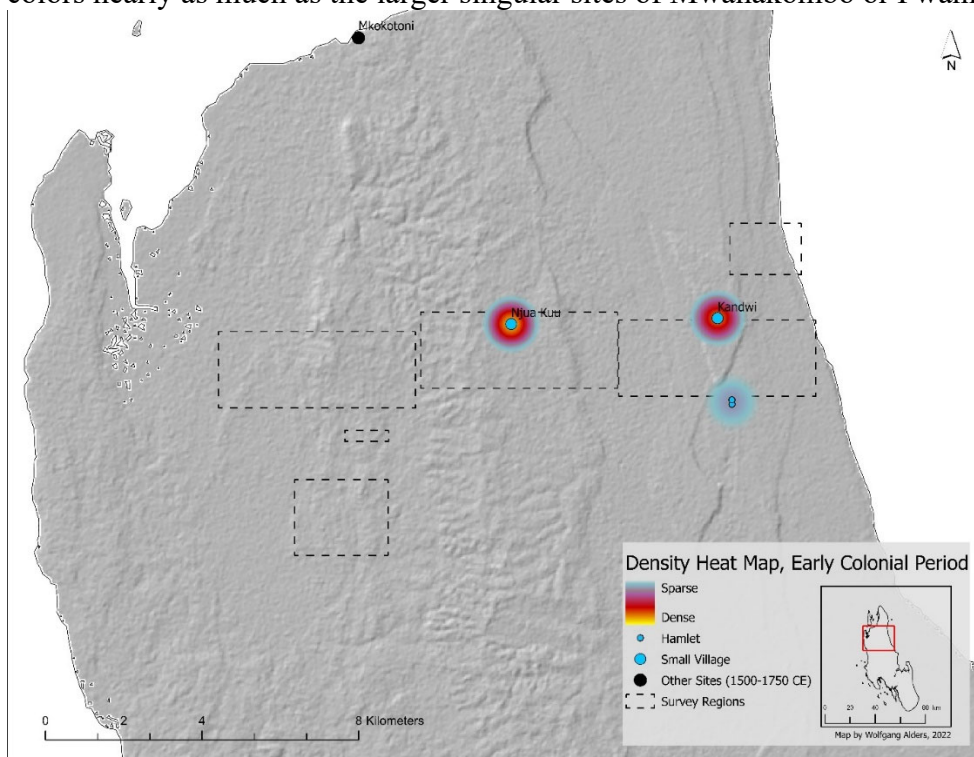


Figure 10-2. Heat map density for the early colonial period.

Figure 10-2 shows sites for the early colonial period by density. The heat map for the early colonial period reflects the overall smaller site size of this period, as well as the sparsity of the settlement pattern in general. Village-sized sites have disappeared, not to return. The small villages of Njua Kuu and Kandwi make up the only settlement in the inland survey areas apart from two small seasonally occupied hamlets in the southeast.

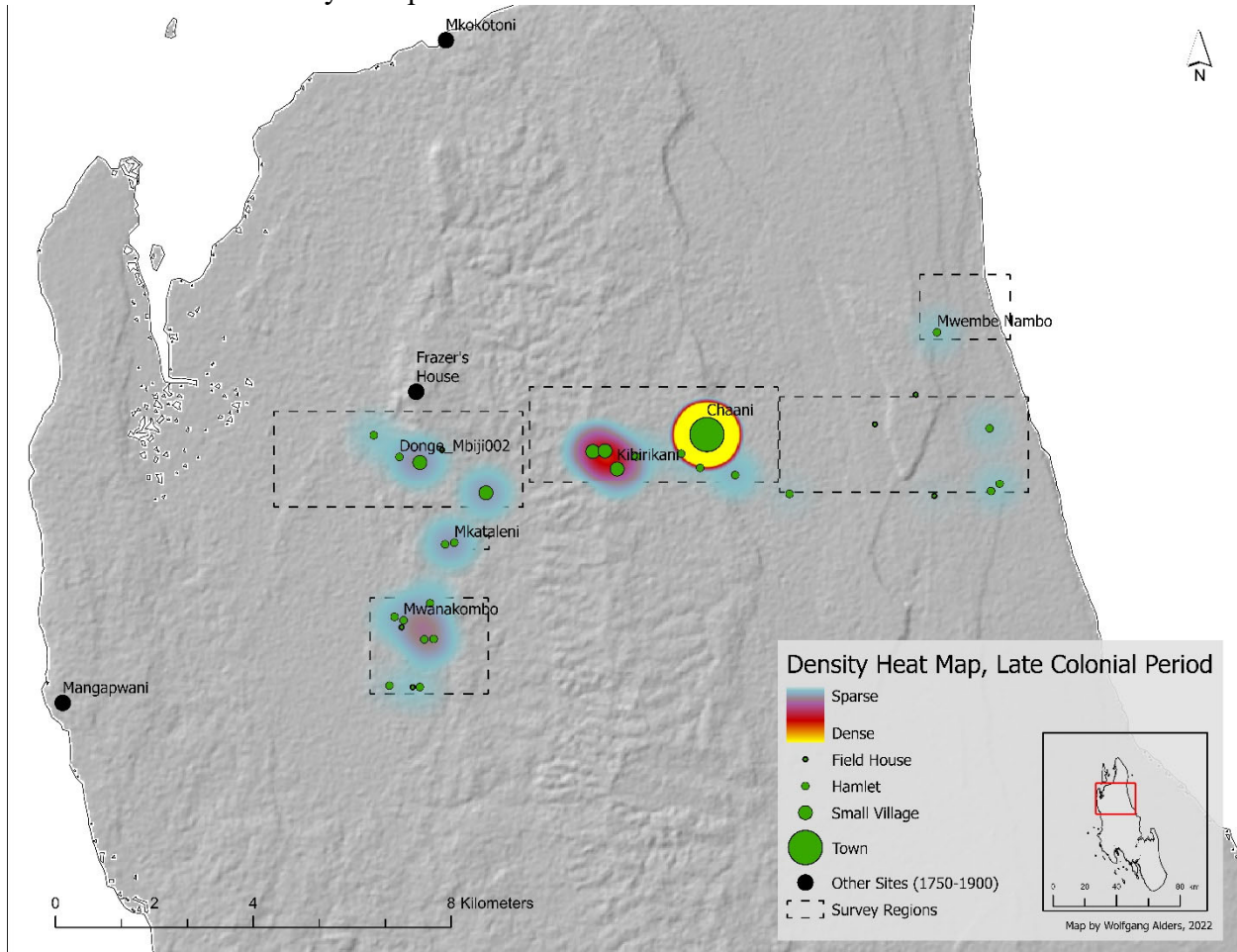


Figure 10-3. Heat map density for the late colonial period.

Figure 10-3 shows late colonial site density. Settlement count increased significantly in the late colonial period, and the distribution of settlement sizes changed. Village-sized settlements still do not reappear—instead the landscape is dominated by a single large town, the settlement of Chaani which overlooks the rice valleys to the east. In all other areas, small villages, hamlets, and even smaller field houses make up the landscape. The area around Kibirikani, comprised of three small villages, is the only other area of significant population density apart from Chaani. The modern town of Mahonda in the west, in the areas around Mwanakombo, may have formed by the mid to late 19th century, but in ways that our survey methodology was not able to adequately account for.

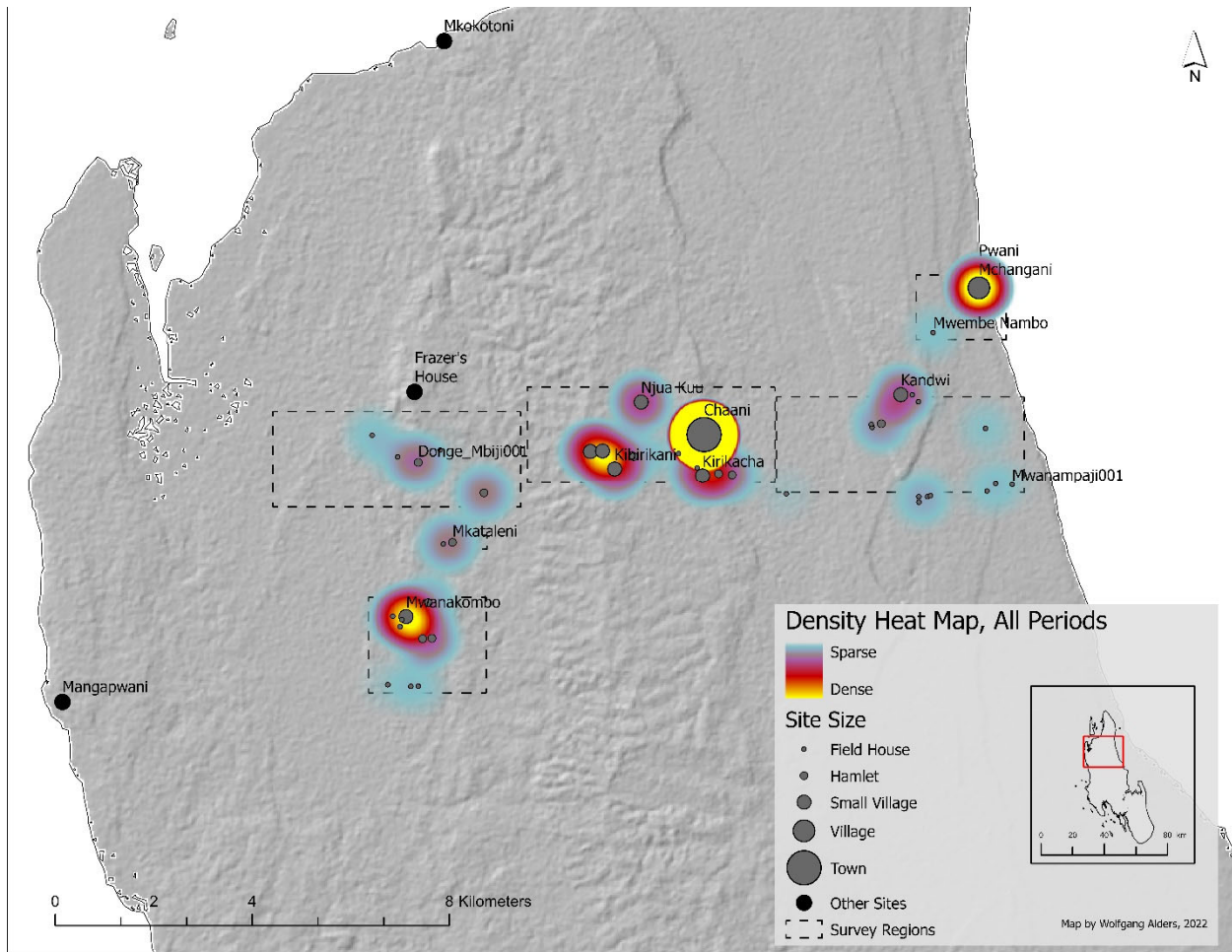


Figure 10-4. Heat map density across all periods.

Combining heat map visualization for all sites (Figure 10-4) recorded gives a perspective on the intensity of human land use and occupation over the last millennium. The center of the island (in the central survey region) is the most densely settled area, with four separate significant population nodes. The west and east regions of the inland area are more sparsely populated, with the exception of the precolonial village sites at Mwanakombo and Pwani Mchangani.

This overview of the sites and settlement patterns recorded during the 2019 survey demonstrates the long history of settlement and land use in diverse environmental contexts. The following sections explore these settlement trends using quantitative geospatial methods.

10.4 Overview: Geospatial Analysis

Geospatial analysis refers to a wide array of methods for assessing sites in relation to one another and to other features. On the Swahili Coast, archaeologists have mainly developed and applied geospatial techniques for high-density survey and analysis at the site level, using UAV photography, ground-penetrating radar, and geophysical mapping to assess site layouts (Fitton 2017; Fleisher and Sulas 2015; Wynne-Jones 2012). In contrast, regional geospatial analysis lags behind. Archaeological field survey and reconnaissance have a long history on the coast (e.g., Chittick 1969; Wilson 1978, 1980, see Wynne-Jones and Fleisher 2015: 529-531), but examples of regional spatial analysis are fewer and far between. Wilson (1982) published the first, and

only, spatial analysis of coastal settlements for the entire Swahili region. Fleisher's (2003) work in Pemba is a systematic survey of settlement in a region, which enabled him to use rank-sized analyses to investigate site agglomeration (Fleisher 2010c). Alders (2020), Chami (1992; 2004), Helm (2000), LaViolette and Fawcett (1990) Wynne-Jones (2007), Pawlowicz (2011) and Walz (2017) have also used regional survey to identify sites, but these studies are aimed at site identification and the collection of artifacts for analysis, not true spatial analysis.

I use three geospatial methods for analyzing settlement in Zanzibar: rank-size analysis, spatial clustering analysis with the Ripley's K function, and zonal statistical analysis. Settlement data comes from two sources: the sites I recorded during systematic survey in 2019, and the sites described by Khan Bahadur, in his 1907 map of Zanzibar. I analyze the 2019 sites in this chapter, and the 1907 Khan Bahadur sites in Chapter 11.

The spatial patterns that I analyze here are based on a small sample size, especially in the precolonial and early colonial periods. As a result, spatial patterns for these periods confirm trends that are plainly visible by eye. Nevertheless, I derived these samples from a systematic survey using the same methods that produced the sample for the late colonial period, so the patterns should be comparable.

10.5 Site Rank-Size Distribution

Borrowing from cultural geography (e.g., Berry 1961; Zipf 1949), archaeologists have long observed that the relative distribution of site sizes across a settlement system may reflect different systems of political integration (e.g., Harrower and D'Andrea 2014; Harrower et al. 2022; Johnson 1980; Savage 1997; Palmisano 2017; Pearson 1980). Archaeologists analyze this distribution by comparing settlement size and rank to the "rule" of rank-size. This rule predicts that in a well-integrated political system, site size and site rank are closely related, such that a logarithmic plot of all sites by rank and size forms a straight line (Johnson 1980). A settlement hierarchy that follows a log-normal distribution may indicate that the "forces of unification and diversification were well balanced" (Harrower et al. 2022: 22). This distribution portrays neither site hierarchy nor heterarchy on its own.

Other distributions may be concave, convex, or primo-convex. A concave pattern signifies that the highest ranked site is larger than the rank-size rule would predict, compared to sites of lower rank. This pattern is common in settlement systems with significant centralized hierarchies, where a "primate" urban center dominates smaller settlements economically and politically. Concave or primate settlement systems often appear in contexts of emergent urbanism. In contrast, convex distributions imply relative decentralization, disintegration, or parity between settlements, and are often considered markers of heterarchy (Harrower et al. 2022). A convex distribution shows that the highest rank sites are smaller compared to what the rank-size rule predicts, which indicates that populations might either equally attracted or equally compelled to dwell in multiple sites rather than just one. This suggests that political authority distributed across multiple settlements (Johnson 1980). Finally, a primo-convex pattern is one where lower-ranked sites are arranged in a convex pattern, but a single site maintains primacy over the whole settlement system. The causes for this can be more diverse, but the pattern likely suggests that power operated across multiple scales of social organization in different ways (Palmisano 2017; Harrower et al. 2022).

Rank-size analysis is useful for comparing continuity and change across settlement systems or between regions. In African contexts where models of urbanism and political stratification often defy normative assumptions developed elsewhere, it is a useful metric for thinking about social transformation and political complexity (e.g., Harrower and D'Andrea

2014; Harrower et al. 2022). Fleisher was the first to apply the rank-size rule to the archaeology of the Swahili Coast, for the settlement system in northern Pemba (Fleisher 2010c). He analyzed settlements by rank and size across three periods, from 750-1100 CE (period 1), 1100-1300 CE (period 2), and 1300-1500 CE (period 3). The results showed that size-class distributions shifted from concave to convex between periods 1 and 2. Combined with archaeological evidence for increasing urbanism at multiple sites during this period, Fleisher argues that this shift reflects a period of synoecism, whereby inhabitants of rural areas increasingly moved into towns that functioned as social and religious ritual centers following widespread conversion to Islam (Fleisher 2010c: 266). Given the geographical proximity of my survey region to Pemba, one aim of this project is to compare site-size distributions on Zanzibar with Fleisher's data.

Below, I compare settlement size-class distributions in my survey region against the rank-size rule, for the precolonial period as well as for the later colonial periods. The trends I depict below do not necessarily reflect settlement for the entire island.

10.5.1 Rank-Size: Early Second Millennium, the Precolonial Period

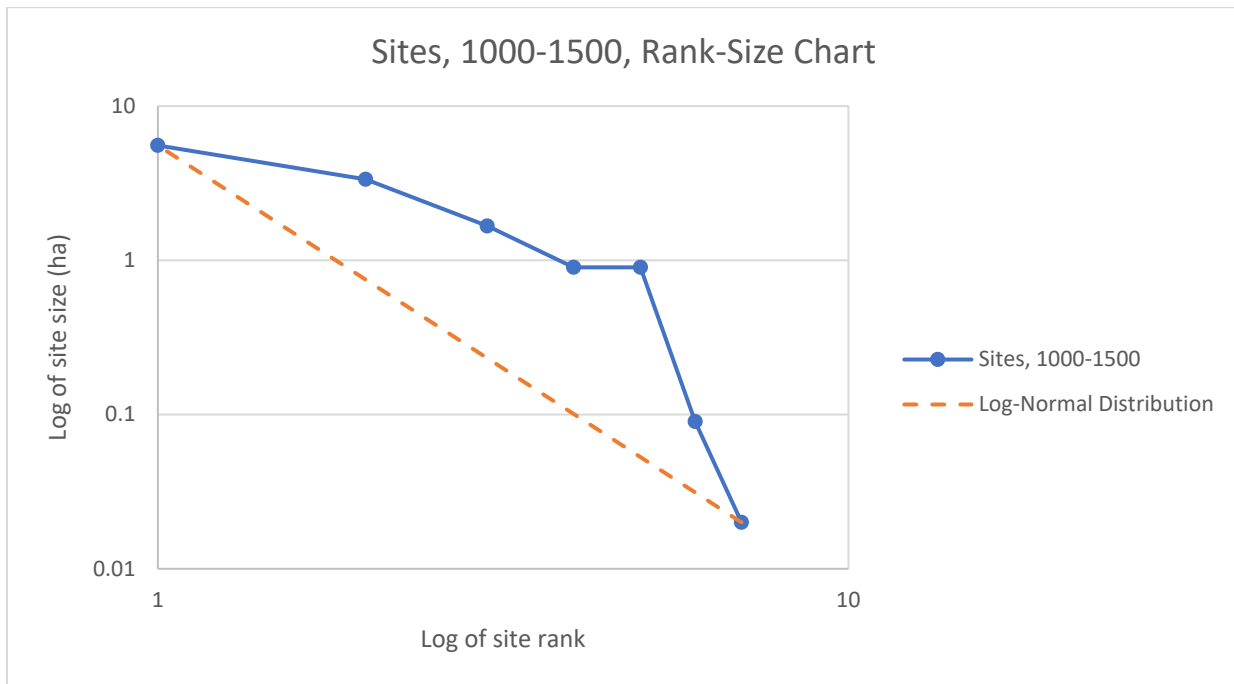


Figure 10-5. Rank-size data for sites of the early second millennium.

The early second millennium sites we recovered during the 2019 survey form a convex distribution (Figure 10-5), characterized at the top of the hierarchy by the villages of Pwani Mchangani, Kirikacha, and Mwanakombo. All these sites show evidence for imported ceramics and craft production, but none have stone architecture that might indicate the presence of an elite social class. Likely these villages were relatively egalitarian communities of subsistence farmers (and fishers, at Pwani Mchangani) who produced marginal surpluses to access certain commodities from the western Indian Ocean trade system.

The residents of Mwanakombo and Kirikacha, approximately 10 kilometers from Mkokotoni and Tumbatu, may have acquired their imported ceramics from the traders that visited these coastal towns. Another way to view site size distributions for the early second millennium, then, would be to model the inland village communities in relation to these more

well-known settlements (Figure 10-6). Mkokotoni was approximately nine hectares during this period, and Tumbatu was 25 hectares, making it the primate site (Rødland 2021: 51). Below, I have created a second rank-size graph for the early second millennium that includes these sites as well.

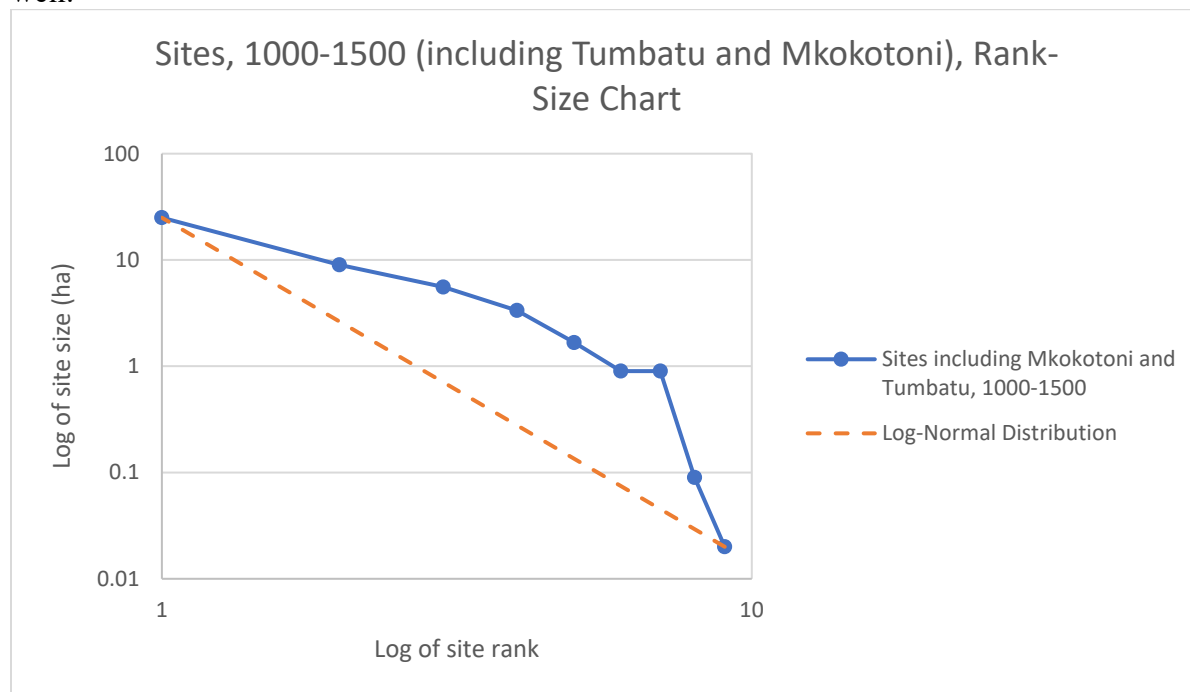


Figure 10-6. Early second millennium sites including Mkokotoni and Tumbatu.

The resulting graph shows that while settlement distribution is closer to log-normal, it remains a convex curve. While Tumbatu was an elite center during the early second millennium in northern Zanzibar, it did not meaningfully control population or labor in other inland village communities. The archaeological evidence for luxury ceramics, bread baking, and craft production at these village communities suggests a system of autonomous rural villages. These villages were connected through trade, gift exchange, or kin networks to the town of Tumbatu but nevertheless retained their independent positions within the island's hinterland. This convex pattern for the early second millennium is similar to the trend that Fleisher (2010) observed on Pemba. Although Pemba had a greater number of stone-built settlements compared to Zanzibar during this time, this distinction may be superficial in comparison to the deeper structural commonalities between both settlement systems.

This convex relationship is interesting considering the temporal span of the village sites of Mwanakombo and Kirikacha. Both appear to have been abandoned almost concurrently with Tumbatu, given the presence of late sgraffiato wares and the absence of any imports later in time than the 14th century. What is the causal or directional relationship between site abandonment at these villages and the abandonment of the town at Tumbatu? Did the rural village system collapse, cutting off the stone town from its supply of grain, livestock and produce? Or did the stone town and its promise of luxury items in exchange for agricultural produce fall first, removing the incentives for villagers to live so far inland to grow grain? These questions are beyond the scope of this project but may be a fruitful avenue for future research.

10.5.2 Rank-Size: Mid-Second Millennium, the Early Colonial Period

During the early colonial period, Portuguese incursions disrupted Swahili social systems on the coast. Village-sized sites like those of the precolonial era did not reappear in this period. Only a small number of sites were recovered from this period in general, making rank-size analysis less useful than for other periods. Though a handful of primarily 19th-century sites may have evidence for earlier occupation in the form of type 17 ceramics (see Chapters 8 and 13), only four sites can be definitively dated to the early colonial period (1500-1830). Two small villages, at Kandwi and Njua Kuu, represent the major inland settlements during this time. Two small sites, Kandwi_Kibokwa002 and Kandwi_Kibokwa003 were areas occupied for swidden farming.

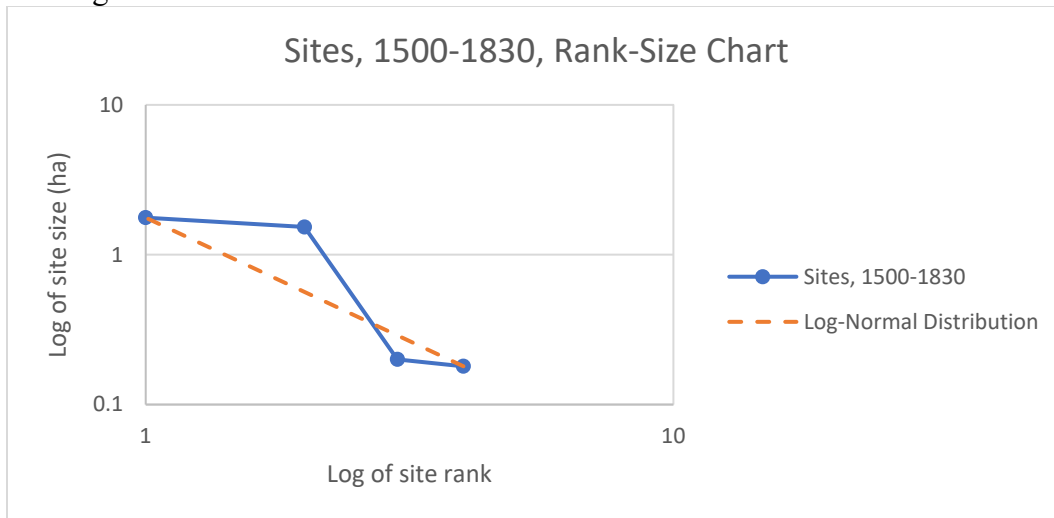


Figure 10-7. Early colonial period rank-size distribution.

Kandwi and Njua Kuu are similar in size, producing a convex distribution (Figure 10-7). Political power in Zanzibar at this time was concentrated in Stone Town with the Portuguese settlement there, at the fortified Portuguese farms in northern Zanzibar at Fukuchani and Mvuleni, and perhaps in other, underexplored towns in the east, like at Uroa and Chwaka. The dearth of sites for this period suggests an overall population decrease during this time, and a shift toward more mobile forms of subsistence, like swidden agriculture. Mobile swidden farming and smaller settlement forms may have been enabled by the presence of newly arrived American root crops and maize, but also incentivized by the desire to avoid congregating in large villages that Portuguese agents could easily raid (see Chapter 8).

10.5.3 Rank-Size: 1830-1890, the Late Colonial Period

During the first phase of the late colonial period, settlement sizes increased on some parts of the island due to demographic shifts, likely due to the arrival of enslaved people from the mainland of East Africa. The distribution of late colonial sites from this period forms a primo-convex distribution, with a large number of relatively evenly distributed small villages and hamlets, and a single large town that dominated the rural landscapes of the survey region (Figure 10-8, Figure 10-9). The town is Chaani, which grew rapidly in the 19th century to encompass over 60 hectares. Village-sized sites (3-6 ha), comparable to Mwanakombo and Chwaka during the precolonial period, do not reappear even during this phase of settlement expansion. Rather, the settlement types which predominated during the early colonial period—small villages (1-3

ha), hamlets, and seasonally occupied settlements dispersed across rural areas—persisted into the late colonial period and increased in number, while town sized sites also developed in parallel.

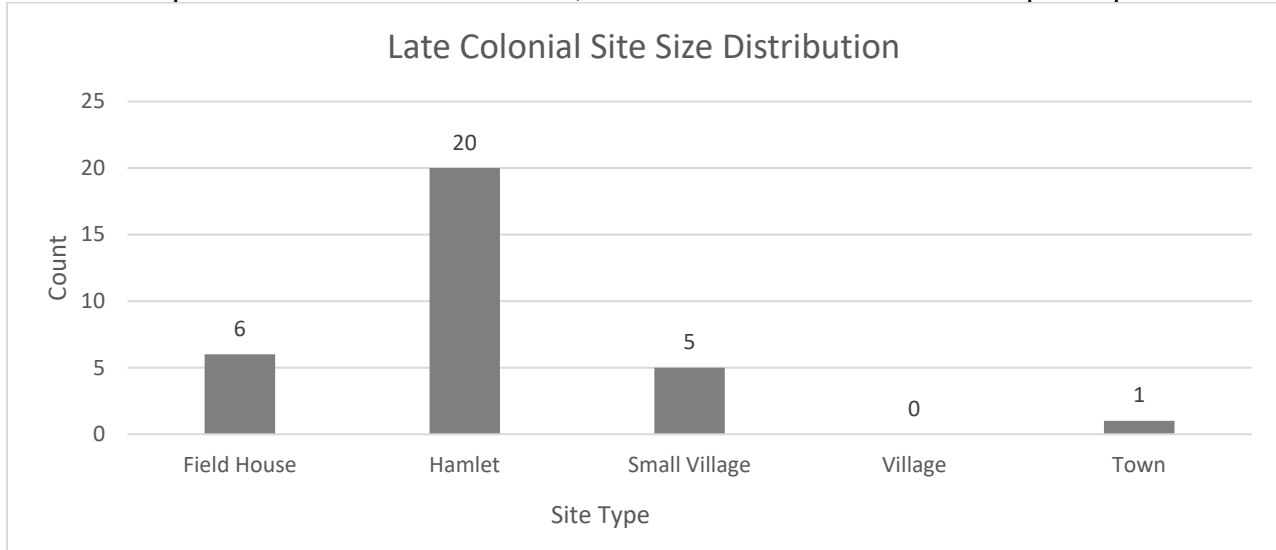


Figure 10-8. Late colonial site size distribution.

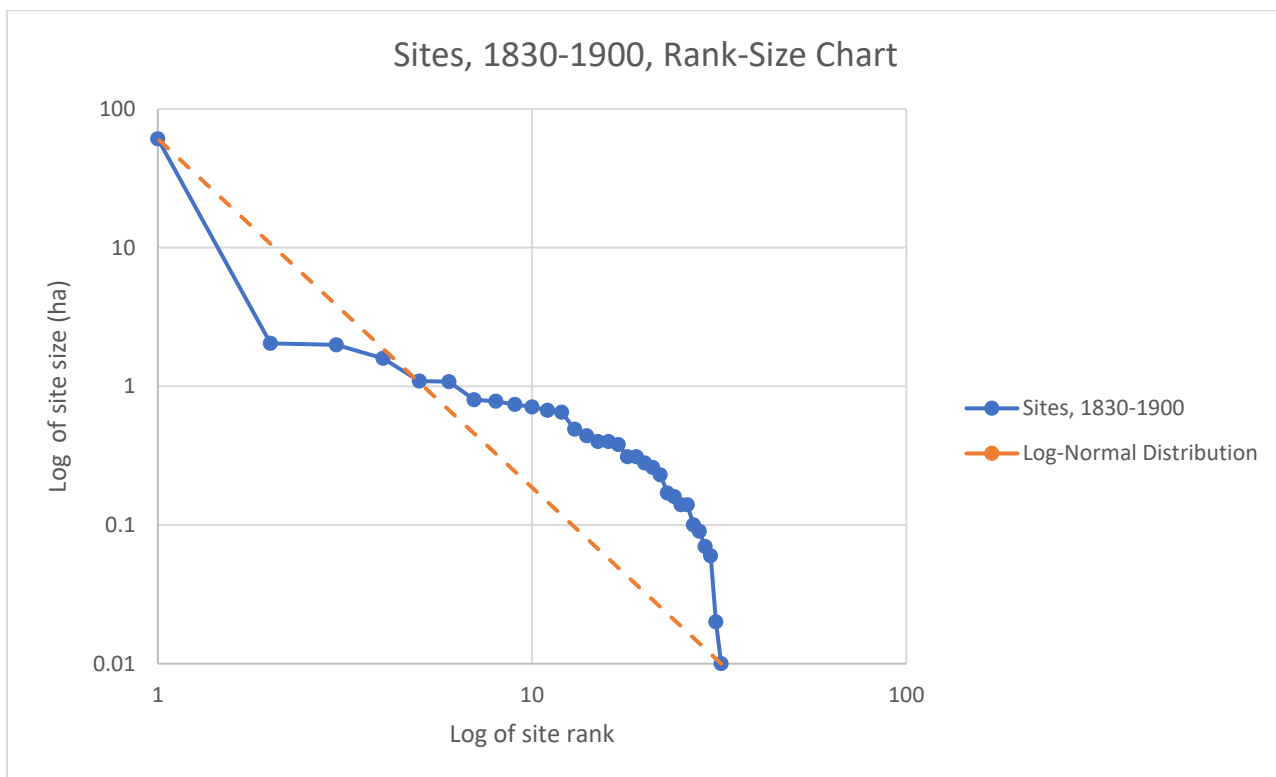


Figure 10-9. Rank-size graph of sites during the late colonial period.

Chaani was likely one town among many across the fertile areas of Zanzibar’s plantation zone, all of which would have been subordinated to Zanzibar Stone Town itself, forming another primo-convex distribution at a higher level (see Chapter 11). This survey also identified many sites around the Mahonda region, which likely began to constitute a town similar in size to Chaani by the end of the 19th century. Assuming Mahonda was a similar size to Chaani, this

would create a “pooled” distribution of two separate convex curves (Figure 10-10) (Fleisher 2003: 394; Paynter 1982), reflecting two settlement systems.

These two-site size distribution may reflect four different social systems, that map onto the four site types of the late colonial period that I mentioned in Chapter 9. Hamlets and field houses at the bottom of the convex curve, especially in the east, may reflect the settlements of indigenous Swahili people, who persisted in the same settlement pattern of evasion, swidden farming and mobility that they initiated in the early colonial period. Next, other small villages and hamlets in the west and central regions (at the top of the convex curve) may reflect small country estates and residences of Swahili, Omani, or Indian planters, who were integrated within the plantation system. Within this type are both stone-built plantation estates, and non-stone, smaller hamlet-sized settlements that may nevertheless have been related to the rural plantation system. Finally, towns like Chaani and Mahonda may reflect demographic changes associated the new arrival of enslaved East Africans, the plantation owners, and others involved in clove production.

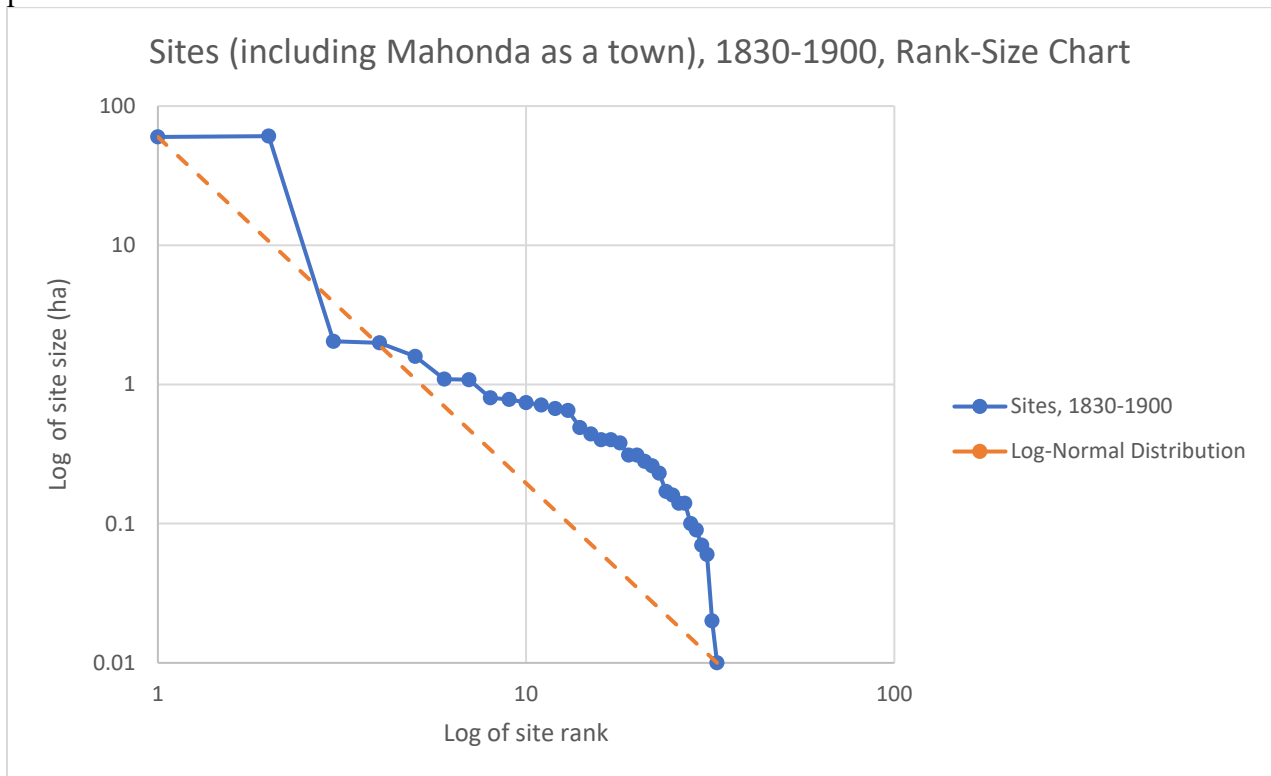


Figure 10-10. Rank-size graph of sites during the late colonial period, when including Mahonda.

Differences in material culture may give further insight into these differences. Small villages and hamlets with access to imported ceramics, specifically more expensive wares like Chinese blue and white porcelain, may represent the settlements of Swahili, Indian, or Omani planters in rural areas, who were well-integrated into the plantation system of the 19th century. At the top of this site hierarchy would have been sites like Kibirikani, Mwanakombo, and Mkataleni, plantation estates with stone architecture. Conversely, small villages (only one, Donge_Karange001), hamlets and field houses without these materials, especially in the eastern region, likely represent Swahili people who avoided or were dispossessed by the plantation economy. The distribution of Chinese blue and white porcelain is specifically informative here. It was found almost entirely in the west and central regions, and rarely in the east. While

European whiteware is more ubiquitous across the island (but still more common in the west and center), the presence or absence of Chinese blue and white may serve as the best proxy for determining integration or exclusion within the plantation system (see Chapter 14). Table 10-1 summarizes these social distinctions.

Settlement Type	Material Culture	Subjectivity / Identity	Example Sites
Hamlets, field houses (and possibly 1 small village, Donge_Karange002), ephemeral occupation areas, esp. in east	Predominately local ceramics	Indigenous Swahili people not integrated within the plantation system either as a choice (avoidance) or through dispossession.	East_Kandwi003, Mwanampaji003, Mwembe Nambo, Donge_Karange002
Small villages and hamlets, possibly representing small plantations or settlements, esp. in center and west	Imported European whiteware, Chinese blue and white porcelain, other imported wares, and local ceramics	Swahili, Omani, or Indian small-scale planters and dependents	Donge_Mbiji001, Daraja_La_Mwanakombo001, Mnyimbi001, Kichangani001, Kichangani002, Kichangani003
Plantation Estates in center and west	Imported European whiteware, Chinese blue and white porcelain, other imported wares, and local ceramics. Stone architecture.	Swahili, Omani, or Indian large-scale planters and dependents	Kibirikani, Mkataleni, Mwanakombo
Towns	Imported European whiteware, Chinese blue and white porcelain, other imported wares, and local ceramics	Enslaved mainland East Africans, plantation owners, and others within the plantation system	Chaani, possibly Mahonda

Table 10-1. Theorized division of social systems and identities within the plantation zone and survey areas. See Chapter 9 for discussions of these site types.

In summary, site-size patterns for the late colonial period diverged sharply from the convex, heterarchical patterns of earlier centuries. The arrival of enslaved East Africans and the development of the plantation system most readily explains the growth of towns in rural areas, and the primo-convex pattern that emerged.

10.6 Spatial Clustering and Dispersion with Ripley's K Function

Sites in space may be clustered or dispersed relative to a random distribution, and these patterns may be used to extrapolate about economic, social, and political relationships between settlements. In northern Pemba, Fleisher applied a Nearest Neighbor analysis to examine the relationships between first and second-order stone towns (Fleisher 2003: 412). The nearest neighbor index calculates the average distance from each site to its closest neighboring feature. This measure is a common tool in archaeological spatial analysis (Earle 2009; Hodder and Orton 1976). The index is also limiting in that it makes comparing spatial distributions at multiple scales an onerous task, involving multiple repetitions of the process in order to capture trends in clustering or dispersion at different scales of analysis. Spatial patterns of clustering or dispersion may be statistically significant at certain distances, but imperceptible at others. To capture multiple scales of spatial patterning in a single metric, archaeologists have increasingly turned to Ripley's K function (Bevan and Conolly 2006; Harrower et al. 2022; Sayer and Wienhold 2013). This function measures relative clustering or dispersion for a set of points against a random sample of points in the same study area, but at multiple distances.

I analyzed sites from the survey region using Ripley's K function for the precolonial, early colonial, and late colonial periods. I performed this analysis in ArcGIS Pro, using the Multi-Distance Spatial Cluster Analysis tool. I set the number of distance bands to 30, starting at 100 meters. This meant that I analyzed each site in relation to others starting at a distance from 100 meters to three kilometers, at 100 m intervals. I compared the distribution of site points against a random sample of points within the same survey universe, which I plotted and replotted 999 times using the permutation function in ArcGIS Pro.

Ripley's K graphs show two main lines that increase over distance: expected K (in blue) and observed K (in red). Expected K reflects the random distribution of site proximity at each distance interval. Observed K shows the actual measurements of site proximity for each distance interval. At distance intervals where the red observed K line is above the blue expected K line, this indicates relative clustering; at distance intervals where the red observed K line falls below the blue expected K line, this indicates relative dispersion. Only where the red observed K line falls outside of the lower or higher confidence envelope (the dashed black and grey lines) is clustering or dispersion statistically significant.

Since the sites of the 2019 survey are only a sample of sites in inland Zanzibar and do not constitute the full population of the inland area, this analysis is incomplete. However, the analysis still demonstrates certain patterns of clustering and dispersion which may shed light on social transformation across the last millennium in Zanzibar, in tandem with other lines of evidence. Like with rank-size analysis, I have modeled a small sample size of sites for the precolonial and early colonial periods. As such, these spatial trends only formalize what is visible with a cursory analysis for these periods.

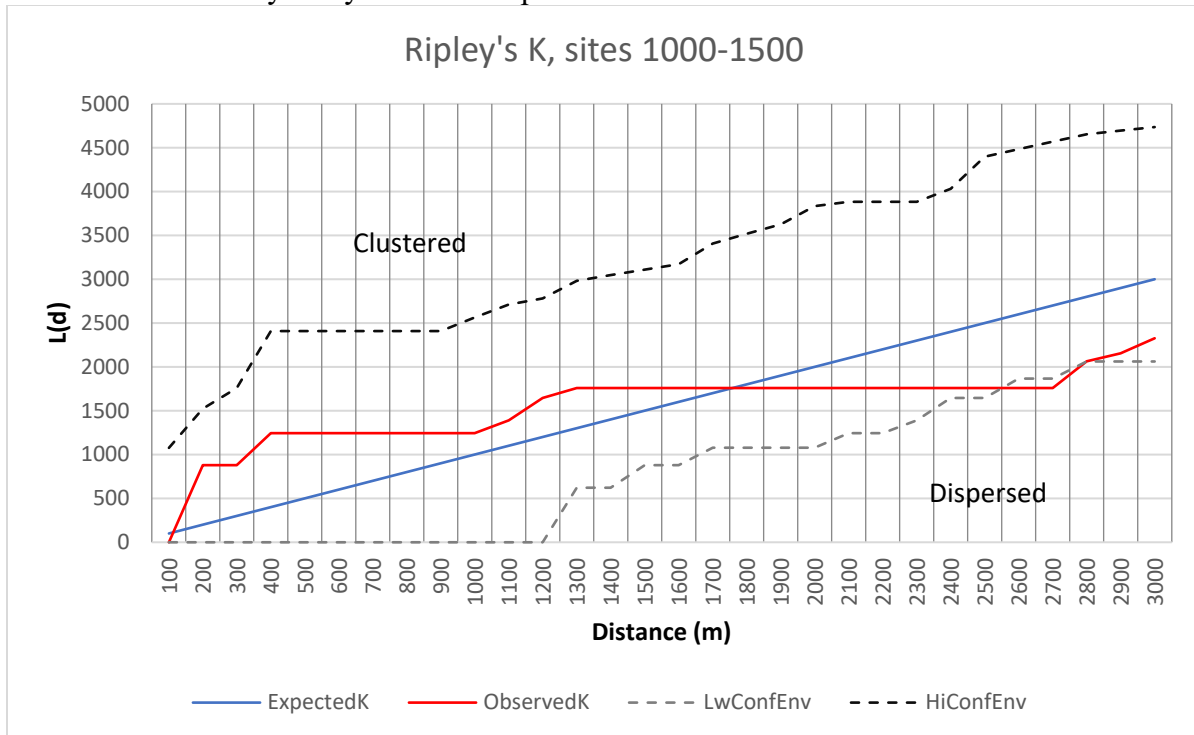


Figure 10-11. Ripley's K for sites dating from 1000-1500 in the 2019 survey region.

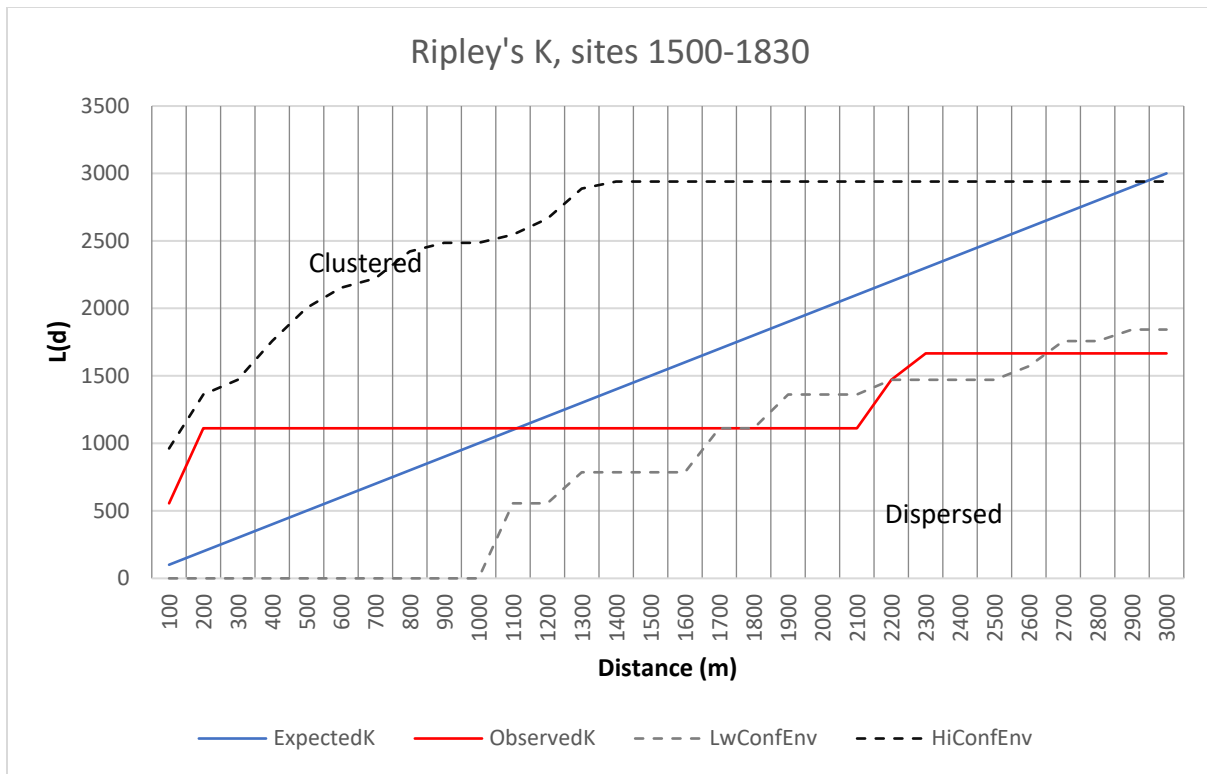


Figure 10-12. Ripley's K for sites dating from 1500-1830 in the 2019 survey region.

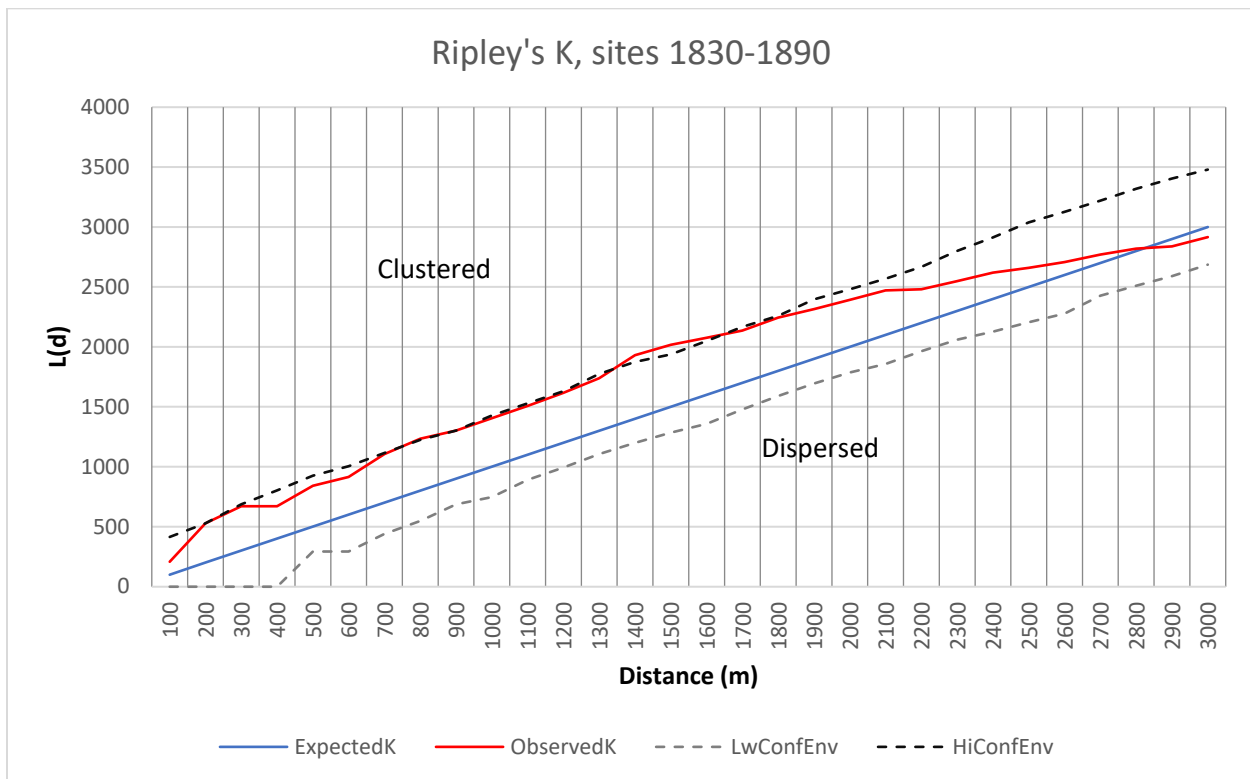


Figure 10-13. Ripley's K for sites dating from 1830-1890 in the 2019 survey region.

The overall trend shows a shift from a dispersed settlement pattern from 1000-1500 and 1500-1830, to a clustered settlement pattern starting in the late colonial period, from 1830-1890. The seven sites dating from 1000-1500 are slightly dispersed in a statistically significant way at 2.7 kilometers (Figure 10-11). The four sites dating from 1500-1830 also show a dispersed pattern, from 1.8 to 2.2 kilometers and again from 2.6 to 3 kilometers (Figure 10-12). The 32 sites of the late colonial period from 1830-1890 exhibit a clustered pattern that is statistically significant from 1.4 to 1.6 kilometers (Figure 10-13).

One should not overstate these results, as they are based on incomplete data and compare site populations of different sizes. However, the general trend that appears—a shift from dispersed settlements to clustered ones—accords well with the other trends in rank-size and site size that take place at the start of the late colonial period. Dispersion characterized the autonomous villages and hamlets of the precolonial and early colonial period, but social transformations related to the arrival of enslaved East Africans and the development of the plantation system also appear to have changed the settlement structure of the inland areas. A clustered settlement pattern, based around large towns and fertile agricultural areas, appears to characterize this later period.

10.7 Zonal Statistics and Predictive Modeling

The previous statistical analyses have evaluated sites in relation to one another spatially. Another aim of this research is to evaluate human-environment relationships, to reconstruct the socioecological system.

Though the perspectives of human eco-dynamics and historical ecology emphasize how human and natural systems are intertwined and form socioecological systems, Fitzhugh et al. (2019: 1083) state that understanding these dynamics paradoxically requires methodologies which conditionally separate environmental and social phenomena. Accordingly, this project compared site spatial locations across geospatial datasets to investigate the environmental contexts in which settlement developed across Zanzibar, from the earliest period to the late colonial era. The socioecological datasets in question are those shown in Chapter 3. They are raster maps of various environmental features, buffered and classified into zones to permit a statistical analysis of site locations within these zones. The aim of comparing site locations to environmental zones is twofold:

1. To understand the environmental factors which may have shaped or been shaped by human settlement and land use
2. To identify patterns in site locations across environmental zones that can be used to create a predictive model for settlement elsewhere on the island

The following sections describe the methodology for zonal statistical analysis and predictive modeling. Then, the next three sections describe predictive models for site locations across Zanzibar, for specific periods and site types.

10.7.1 Method: Creating the Zonal Rasters

The first step of zonal statistical analysis is to convert maps into zonal rasters. Rasters are spatial datasets where each pixel reflects a unique value, and where all pixels are grouped into meaningful zones. To convert historical and environmental maps into zonal rasters, I digitized the maps through a two-step process. First, I used Photoshop to normalize the colors within all zones—this was necessary because published versions of maps often contain different shades of color within zones, text, arrows, and boundary lines which would give different values when attempting to classify maps into zones. Next, I loaded these maps into ArcGIS Pro and

georeferenced them to an outline of Zanzibar. Then, I used supervised classification to turn the digitized maps into zonal rasters with assigned values based on the original maps. Finally, I converted the rasters into polygon vectors, in order to calculate the area of each zone, and for ease of publishing. These zonal rasters cover the entire island of Zanzibar, but for the analysis of zonal statistics in the 2019 survey region, I clipped these zones to the extents of the survey universe, an area of about 37 km². I have not reproduced these maps here-- see Chapter 3 for the raster zones of environmental and historical data.

The result was 15 zonal rasters of different socioecological systems:

- a zonal raster of historical clove plantations (based on Sheriff 1991: 108) divided into three zones
- a zonal raster of local soil types (based on Khamis et al. 2017: 120)
- a zonal raster of water infiltration speed into soil (based on Colbert et al. 1987; Hardy et al. 2015)
- a zonal raster of land use, based on 20m remote sensing data from the European Space Agency's Sentinel-2A satellite
- a zonal raster of geology (based on Colbert et al. 1987; Hardy et al. 2015)
- a zonal raster of elevation, generated from SRTM satellite imagery
- a zonal raster of hill slope degree, generated from SRTM satellite imagery
- a zonal raster of aspect, or orientation of hills by cardinal direction, generated from SRTM satellite imagery
- a zonal raster of buffered water flow, created from SRTM satellite imagery
- a zonal raster of rainfall (based on Juma 2004: 43).
- a zonal raster of buffered streams from the 1907 Khan Bahadur map
- a zonal raster of buffered wells from the 1907 Khan Bahadur map
- a zonal raster of combined buffered hydrology, showing the streams and wells of the 1907 Khan Bahadur map
- a zonal raster of distance from the sea, derived from an outline of the island produced from SRTM elevation data
- a zonal raster of distance from reefs, derived from data in Khamis et al. (2017).

10.7.2 Method: Zonal Statistical Analysis

I initially compared 42 sites from the 2019 survey area across 13 different zonal raster maps, excluding the rasters for distance to the sea and distance to reefs. Though I identified 44 sites across the survey region, two have indeterminate dates so they were left out of the analysis. I divided these sites into three groups, based on site period: early (precolonial), middle (early colonial), and late (late colonial). Since Mwanakombo is a distinctly multi-phase site, I counted it once as part of the early group of sites, and once as part of the late group. This means that the total count for sites adds up to 43. Using the 2019 site polygons and zonal rasters, I calculated zonal statistics as a table for each site period and for each zonal raster in ArcGIS Pro, using the Model Builder interface. This step measured which zonal raster cells constitute the majority of cells within a site polygon (the MAJORITY statistic). This is the best measure for assessing which zone best characterizes the terrain covered by a polygon feature across a given raster.

After calculating the majority statistic for each settlement, I exported this data to Excel and used functions to calculate the count, percent, and density of settlements for each size class in each zone of each raster. To calculate settlement density, I divided the number of settlements

per zone by the area of that specific zone, with the zone's area constrained by the survey region. This produced a value of settlements per km² for each zone within the survey area.

I computed three other values in Excel for analyzing site density in relation to zone. The "Highest density" value finds the zone with the highest density of settlement for each size class. This gives a measure of the most favorable zone for settlement for each settlement size class. The "std %" value is the standard deviation of settlement percentages for each zone, which calculates the percent by which settlement distributions differ from the mean settlement percent for each zone. The "CV" value stands for coefficient of variation, which reflects how evenly or unevenly settlements are distributed between zones. I calculated this by dividing the standard deviation of settlement percentage by mean settlement percentage for each zone.

Standard deviation is useful as a measure of relative distribution—lower std dev % values mean that a specific settlement type is more evenly distributed compared to other types. The coefficient of variation (CV) reflects relative distribution between settlement types, but it can also serve as a normalized absolute indicator of whether a site group is evenly or unevenly distributed. For the purpose of this study, a coefficient of variation between 0 and 0.5 indicates that site distribution is mostly even between zones. A coefficient of variation between 0.5 and 1 indicates that distribution is slightly uneven between zones. A coefficient of variation between 1 and 1.5 indicates that site distribution is strongly uneven between zones. I have used these measures as proxies to reflect whether the most favored zone is highly favored, or whether it is only slightly favored.

Initially, I calculated zonal statistics for each period in aggregate, and produced tables identifying the densest zones of occupation for each period. Upon inspection however, this proved misleading. For the precolonial and early colonial periods, the small sample size meant that the patterns of settlement I captured did not reflect the locations of the sites that are most relevant to this project. For instance, I identified seven sites for the precolonial period, but four of those sites are small artifact scatters in the rocky eastern areas. One, Pwani Mchangani, is a standard Swahili coastal village, and two, Mwanakombo and Kirikacha, are relatively large inland village communities in the clove plantation zone. Since zonal statistical analysis only considers site size and location and not site type, the four sites in the eastern region bias the predictive model. The same situation occurs for the early colonial period—two out of the four sites from this period are small artifact scatters, and their positions alter the statistics for all sites from this period.

Based on this exploratory analysis, I decided to limit my aggregated zonal statistical analysis to the late colonial period, where the larger sample size appears to reflect a generalizable settlement pattern, though with some differences from east to west. For the precolonial and early colonial periods, I have selected four sites of interest to compare across environmental zones. For the precolonial period, I analyze the inland villages of Mwanakombo and Kirikacha. For the early colonial period, I consider Njua Kuu and Kandwi. I discuss predictive modeling for each of the groups below.

10.7.3 Method: Predictive Modeling

The zonal statistical profile of site groups can be used to extrapolate toward a predictive model for site detection for each period or type, through the creation of weighted rasters. I created weighted rasters with the Reclassify tool in ArcGIS Pro, which allowed me to assign each zone a score based on how favorable the zone is for the particular settlement type in question. Favorability was determined using the zonal statistical calculations I performed earlier. Once each raster was scored, I combined all these datasets into a single raster that adds the score

for each pixel, to produce a total model of site location favorability. I performed this step using the Raster Calculator tool in ArcGIS Pro. The final step is to symbolize and reclassify the site location favorability raster. For each site type, I reclassified favorability statistics into three zones: areas of low probability, moderate probability, and high probability for site detection.

There were many possible ways to divide and categorize sites for comparison with zonal rasters, and for the purpose of producing a predictive model. I chose to create three predictive models, for site types that relate to the research questions of this project. The first predictive model shows site probability locations for inland villages of the precolonial period, using the zonal data for Mwanakombo and Kirikacha. The second model shows site probability for inland villages of the early colonial period, using the zonal statistics from Njua Kuu and Kandwi. The final model shows site probability for inland late colonial sites in general, using the zonal statistical analyses for the 32 sites identified for this period. Since inland sites are the focus, I intentionally excluded the distance to sea and distance to reefs rasters, and I scored coastal areas with negative values for each predictive model. The following sections describe the zonal statistics for these site groups, and present site probability models for each.

10.8 Modeling Precolonial Inland Village Sites

Mwanakombo and Kirikacha are two inland village sites of the precolonial period. I discuss them in more detail in Chapter 7. Their zonal statistical profile (Table 10-2) shows similarities in environmental contexts for both sites, suggesting that these locations may have represented favorable areas for settlement during the period when these sites were occupied, from approximately 1000-1400 CE.

Raster Type	Both	Mwanakombo	Kirikacha	Edge Effects
Island Zones	Clove Plantation Zone			
Elevation		31 to 48 m	48 to 69 m	
Soil Types	Kinongo			
Infiltration	Moderate			
Land Use		High Veg	Low Veg	Both near urban areas
Geology		Sandy Clay Marl	M1 Miocene Limestone	
Slope Degree	3 to 10 degrees			
Aspect		East	Southwest	
Rainfall	1500-2000mm			Both on periphery of 2000-2500mm rainfall zone
1907 Streams	within 100 meters			
1907 Wells	greater than 3 km from wells			
1907 Hydro	within 100 meters			
DEM flow	within 100 meters			

Table 10-2. Favored zones for precolonial inland villages.

The table shows a category in which both Mwanakombo and Kirikacha are environmentally similar, and categories where they differ. The fifth column, Edge Effects, describes similarities between the two sites that were not captured due to edge effects within zonal statistical analysis, but which may be consequential for determining site suitability.

This analysis of favorable site locations can be used to weight each zonal raster with a suitability score for each zone. Zones in which both sites fall are weighted with two points, and

zones within which one site falls are weighted with one point. Zones in the Edge Effects column are also weighted with one point. Zones into which neither site falls are given no points. Since the aim is to predict site locations within inland areas, land use and geology zones related to coastal environments were given a negative 10 score, removing these areas from consideration. Table 10-3 shows the zone weights for each raster. I have removed aspect, distance to the sea, wells, DEM water flow, and combined 1907 hydrology since the locations of the precolonial villages at Mwanakombo and Kirikacha do not relate to these features meaningfully. To combat the edge effect caused by both sites falling just on the border of the high rainfall zone, this area was given a score of 2. Similarly, the stream scores were ranked in descending order, to avoid the edge effect of scoring 500 meters from a stream as 3, but <100 meters to a stream as zero.

Raster Type / Zone	Score
Island Zones	Score
Within Clove Plantation Zone	2
Near Plantations	0
Far South	0
Soil Types	Score
Kinamo	0
Maweni	0
Mchanga	0
Uwanda	0
Kinongo	2
Land Use	Score
High Vegetation	1
Low Vegetation	1
Bare Earth	0
Sandy Coastal Environment	-10
Urban	0
Infiltration	Score
Slow	0
Moderate	2
High	0
Rainfall	Score
2000-2500 mm	2
1500-2000 mm	2
1000-1500 mm	0
Slope Degree	Score
0-3 degrees	0
3-10 degrees	2
>10 degrees	0
1907 Streams	Score
<100m	2
100-500m	2
500m to 1 km	1
1-3 km	0
>3 km	0
Geology	Score
M3 Sandy Clay Marl	1
Mangrove	-10
Q2 Coralline Limestone	0
M1 Miocene Limestone	1
Q2/M1 Mixture	0
Q1 Recent Deposits	0
Q2/Q3/M1 Mixture	0
Elevation Zones	Score
0-17 m	0
17-31 m	0
31-48 m	1
48-69 m	1
69-135 m	0

Table 10-3. Suitability scores for each raster.

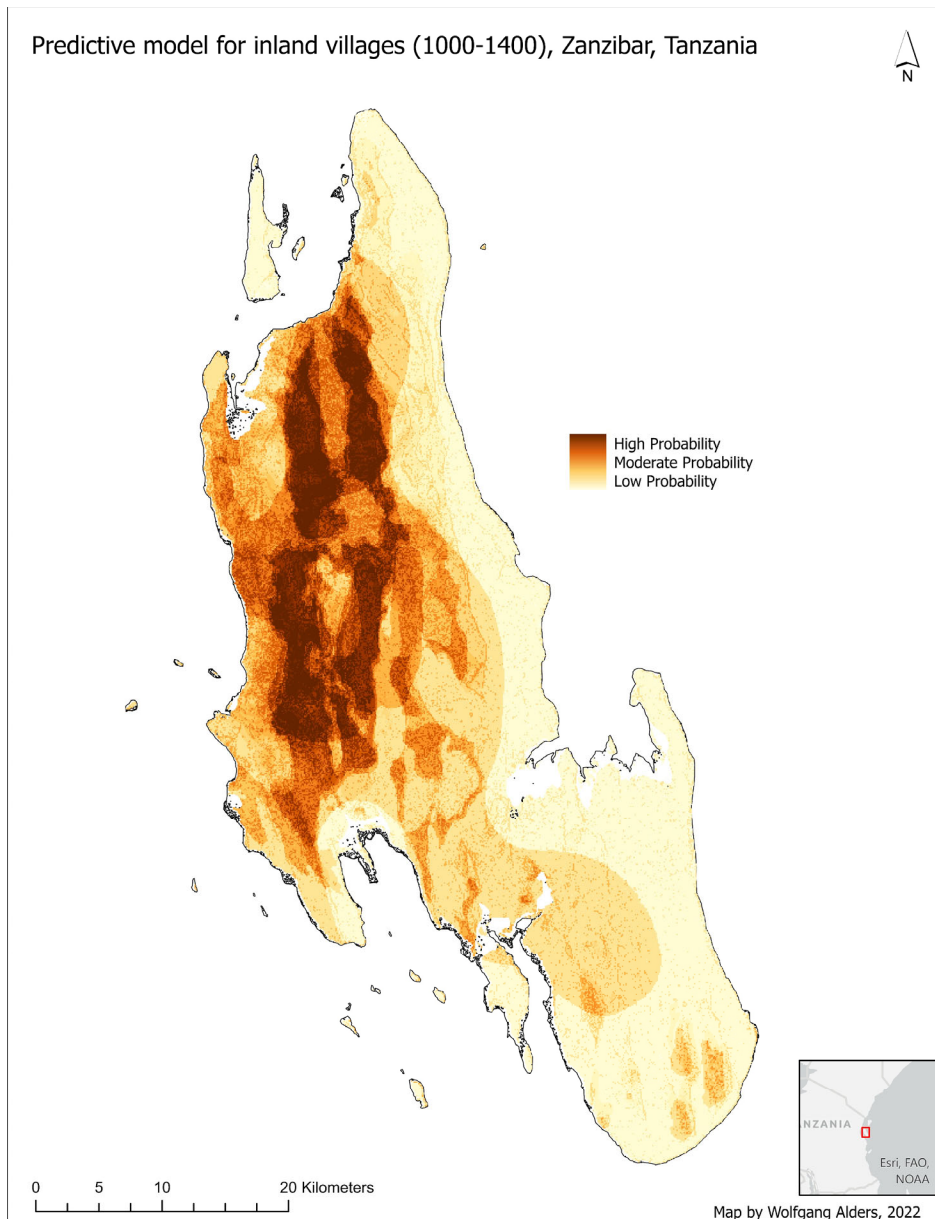


Figure 10-14. Predictive model for precolonial inland villages.

Figure 10-14 shows the predictive model for precolonial inland village sites. The first step in making a predictive model for this site type is to reclassify each zonal raster to reflect the suitability scores, derived from zonal statistical analysis. To do this, I used the Reclassify Tool in ArcGIS Pro. The next step is to make a single raster that depicts the most likely site locations for inland colonial village sites. This can be achieved by combining all weighted zonal rasters using the Raster Calculator tool. The resulting output will reflect pixels with the highest scores, which will indicate the areas of greatest probability for site detection.

This model emphasizes the areas in the west that lie within the *kinongo* soil zone, with moderate infiltration, and near the 1907 stream network. It also captures some other areas in the west, south and east with certain conditions that produce a moderate score; particularly notable are the areas around Makunduchi in the far south. Future survey for precolonial inland village systems should concentrate on the dark areas depicted in this map first and foremost.

10.9 Modeling Early Colonial Small Inland Village Sites

Njua Kuu and Kandwi are two sites of the early colonial period. I discussed these sites in more detail in Chapter 8. These sites lie in different environmental zones, so suitability scores are not as high for any specific zone and the predictive model is less precise. To assign zonal scores, I used eight of the 15 rasters which were relevant for understanding the locations of these sites. I excluded 1907 wells, combined 1907 hydrology, DEM water flow, distance to the sea, distance to reefs, island zones (since sites fell into two of the three zones, and the third zone was not tested in this survey), and aspect. For the land use raster, although both sites fell in the high vegetation zone, made the low vegetation zone equal in score since excluding it would produce edge effects. I did the same modifications for the 2000-2500 mm rainfall zone and the <100m stream zone. Table 10-4 shows the suitability scores for an early colonial model for site prediction, based on the zonal locations of Njua Kuu and Kandwi.

Raster / Zone	Score
Elevation Zones	Score
0-17 m	0
17-31 m	0
31-48 m	0
48-69 m	1
69-135 m	1
Soil Types	Score
Kinamo	0
Maweni	0
Mchanga	0
Uwanda	1
Kinongo	1
Infiltration	Score
Slow	0
Moderate	1
High	1
Land Use	Score
High Vegetation	1
Bare Earth	0
Low Veg	1
Urban	0
Sandy Coastal Environment	-10
Geology	Score
M3 Sandy Clay Marl	1
Mangrove	-10
Q2 Coralline Limestone	0
M1 Miocene Limestone	0
Q2/M1 Mixture	1
Q1 Recent Deposits	0
Q2/Q3/M1 Mixture	0
Slope Degree	Score
0-3 degrees	2
3-10 degrees	0
>10 degrees	0
Rainfall	Score
2000-2500 mm	1
1500-2000 mm	1
1000-1500 mm	1
1907 Hydro	Score
<100m	2
100-500m	2
500m to 1 km	1
1-3 km	0
>3 km	0

Table 10-4. Suitability scores for the early colonial period.

Using these scores, I combined the above rasters into a single raster showing total suitability score across the island using the Raster Calculator. I then symbolized this raster to reflect a predictive model for the early colonial period, which is shown below in Figure 10-15.

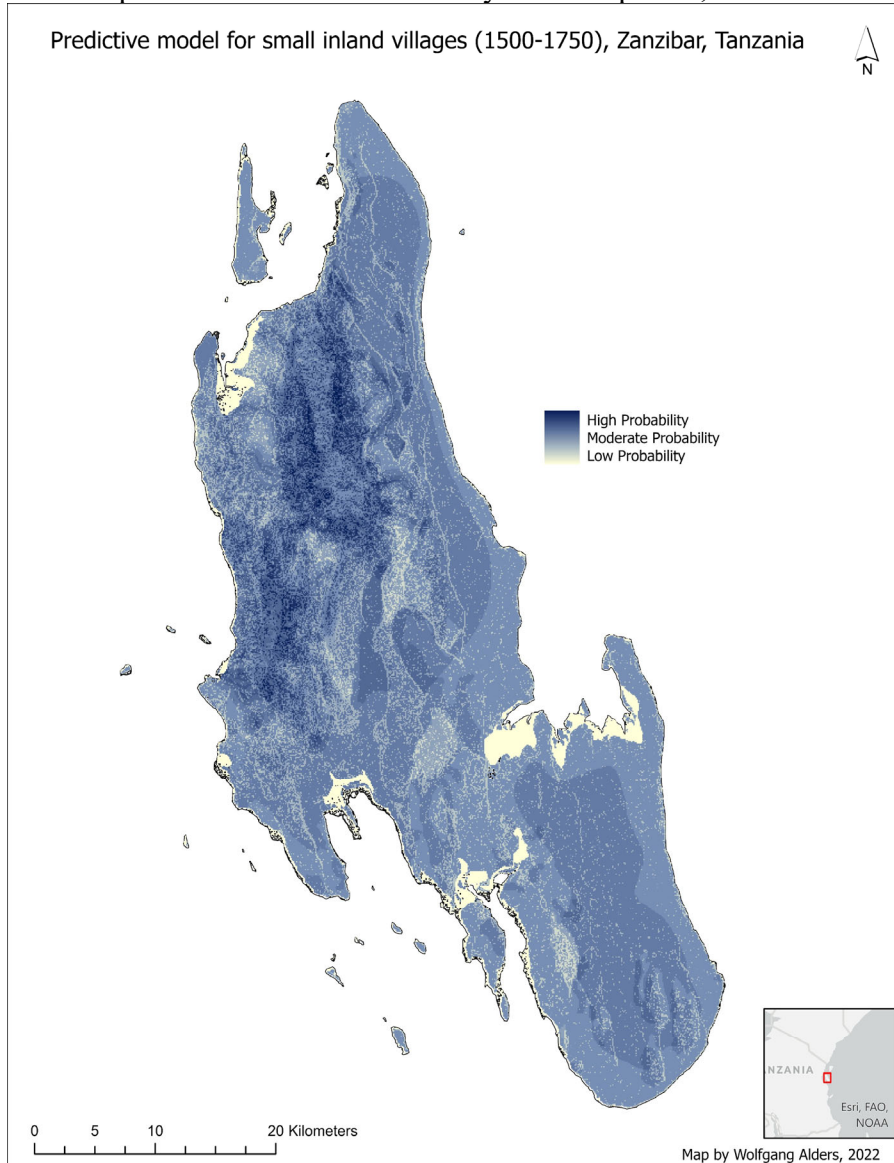


Figure 10-15. Predictive model for the early colonial period.

Compared to the precolonial model, this model reflects a wider range of environmental contexts. It still favors the northwestern areas, based on the combination of *kinongo* soil and above ground streams there, but also shows higher probabilities in the eastern regions, especially in areas of good soil.

10.10 Modeling Late Colonial Inland Sites

To create an extrapolative predictive model for late colonial inland sites, I first applied zonal statistical analyses to the 32 sites I recorded that date to the late colonial period. I then applied scores based on which zones were most favored for all sites, across the following rasters. The following sections describe the zonal statistics for late colonial sites across the zonal rasters.

10.10.1 Clove Plantations

Table 10-5 shows late colonial site distribution across the clove plantation zonal raster (Figure 3-14), based on a map made by Sheriff (1991: 108) and reproduced it in Sheriff et al. (2016: 20). Late colonial sites are most common within the clove plantation zones. This was expected, given that the clove plantation zone became an economically important region in the late colonial period.

	Clove Plantation Zone	Near Clove Plantation Zone	Total	Highest density:	CV:	std dev %
Area in survey region (km2)	17	19	36			
Late Colonial Sites (count)	22	10	32			
Late Colonial Sites (percent)	69%	31%	100%		0.53	26.52%
Late Colonial Sites per km2	1.2941	0.5263	0.8889	Clove Plantation Zone		

Table 10-5. Zonal statistics for late colonial sites and clove plantation zones.

10.10.2 Elevation

Table 10-6 shows the 2019 sites distributed across five elevation zones, created from a 30 m pixel elevation raster derived from SRTM satellite imagery (Figure 3-2). In the late colonial period, higher elevation zones are favored. The 69-135-m zone is most densely settled. This may be due to the fact that clove and coconut plantations of the later period were concentrated on ridges and in high elevation areas.

	0-17m	17-31m	31-48m	48-69m	69-135m	Total	Highest density:	CV:	std dev %
area in survey region (km2)	3	5	12	8	8	36			
Late Colonial Sites (count)	0	3	13	7	9	32			
Late Colonial Sites (percent)	0%	9%	41%	22%	28%	100%		0.79	15.87%
Late Colonial Sites per km2	0.0000	0.6000	1.0833	0.8750	1.1250	0.8889	69-135m		

Table 10-6. Zonal statistics for late colonial sites and elevation.

10.10.3 Soil Types

Five soil types are present on Zanzibar, but only four are shown in Table 10-7, along with late colonial sites. The soil zones that fall within the 2019 survey region are *kinamo*, *kinongo*, *uwanda*, and *maweni* soils (Figure 3-10). The fifth type, *mchanga* (sandy soil) is found elsewhere. Late colonial sites are unevenly distributed and seem to strongly be associated with *kinongo* soil types. This difference may reflect the soil preferences of clove and coconut plantation farmers of the late colonial period. Another pattern is lack of sites in the *kinamo* soils—though *kinamo* areas constitute the second largest soil type in the survey region, only two sites are found there. This may be because *kinamo* soils are found in low-lying swampy areas, which are less favorable for settlement.

	Kinamo	Kinongo	Maweni	Uwanda	Total	Highest density:	CV:	std dev %
area in survey region (km2)	11	16	8	2	37			
Late Colonial Sites (count)	2	23	6	1	32			
Late Colonial Sites (percent)	6%	72%	19%	3%	100%		1.28	31.97%
Late Colonial Sites per km2	0.1818	1.4375	0.7500	0.5000	0.8649	Kinongo		

Table 10-7. Zonal statistics for late colonial sites and soil types.

10.10.4 Soil Infiltration

Hardy et al. (2015) created a soil infiltration map based on the hydrogeology map of Zanzibar by Colbert et al. (1987). This map shows the rate of water infiltration into soil, classed as high, moderate, and slow (Figure 3-11). These differences reflect, but are not reducible to, differences in geology and soil types. In general, slow infiltration correlates to sandy clay *kinamo* soils, and moderate infiltration correlates to lateritic *kinongo* soils. High infiltration correlates to Q2/M1 mixtures of coralline and Miocene karstic limestone with *maweni* and *uwanda* soils, and to sandy *mchanga* soils. Table 10-8 shows the late colonial sites across these infiltration zones. Late colonial sites are concentrated in moderate infiltration zones.

	Slow	Moderate	High	Total	Highest density:	CV:	std dev %
area in survey region (km2)	10	17	9	36			
Late Colonial Sites (count)	2	23	7	32			
Late Colonial Sites (percent)	6%	72%	22%	100%		1.03	34.28%
Late Colonial Sites per km2	0.2000	1.3529	0.7778	0.8889	Moderate		

Table 10-8. Zonal statistics for late colonial sites and soil infiltration zones.

10.10.5 Land Use

The European Space Agency created a 20m resolution land use map of Africa from multispectral Sentinel-2A satellite imagery, which they classified by general categories in 2016. Using high-resolution drone imagery from the Zanzibar Mapping Initiative, I reclassified these categories to better reflect the specific conditions on Zanzibar (Figure 3-13). This map is comparable to the one produced by Khamis et al. (2017: 124) which was taken from a map made by the Department of Rural and Urban Planning in Zanzibar in 2015. Since the Sentinel-2A satellite captures a multispectral signature for vegetation, it is not able to distinguish between highly vegetated cultivated areas (like orchards) and natural forest, nor is it able to distinguish between low-vegetation cultivated areas (like mixed garden plots) and scrub brush. As such, these categories are combined. Other categories include bare earth areas comprising tilled fields and paddies, which represent more intensive forms of agriculture, urban areas, and sandy coastal environments. Table 10-9 shows the late colonial sites distributed across the land-use zones. Late colonial sites are densest in areas of modern settlement. This suggests continuity between areas of modern settlement and late colonial sites.

	High Vegetation	Bare Earth	Low Vegetation	Urban	Total	Highest density:	CV:	std dev %
area in survey region (km2)	13	2	19	1	35			
Late Colonial Sites (count)	17	2	9	4	32			
Late Colonial Sites (percent)	53%	6%	28%	13%	100%		0.84	20.89%
Late Colonial Sites per km2	1.3077	1.0000	0.4737	4.0000	0.9143	Urban		

Table 10-9. Zonal statistics for late colonial sites across land use zones.

10.10.6 Geology

Five zones from a geology map by Colbert et al. (1987, also see Hardy et al. 2015) fall within the 2019 survey region (Figure 3-9). These are catenas of M3 sandy clay marl, Q2 coralline limestone, M1 Miocene limestone, a Q2/M1 mixture, and Q1 recent deposits. Table

10-10 shows late colonial sites across these zones. Late colonial sites are most numerous and most dense in the M3 sandy clay marl areas.

	M3 Sandy Clay Marl	Q2 Coralline Limestone	M1 Miocene Limestone	Q2/M1 Mixture	Q1 Recent Deposits	Total	Highest density:	CV:	std dev %
area in survey region (km2)	13	2	4	7	11	37			
Late Colonial Sites (count)	14	0	4	7	7	32			
Late Colonial Sites (percent)	44%	0%	13%	22%	22%	100%		0.80	16.03%
Late Colonial Sites per km2	1.0769	0.0000	1.0000	1.0000	0.6364	0.8649	M3 Sandy Clay Marl		

Table 10-10. Zonal statistics for late colonial sites across the geology zones.

10.10.7 Slope Degree

Like the elevation zonal raster, I created the zonal raster of slope degree using free SRTM 30-m imagery from USGS (Figure 3-3). I divided slope degree zones into three categories: 0-3 degree slope, 3-10 degree slope, and areas with >10 degree slope. Table 10-11 shows the late colonial sites across these zones. No site is found on a slope of 10 degrees or more. Late colonial sites are found across both flat and moderately sloped areas, though they are most dense in 3-10 degree slope areas. It may be the case that slope degree zones correlate to elevation zones, but it remains unclear what the causal factors might be with respect to site location and slope degree.

	0-3 degree slope	3-10 degree slope	>10 degree slope	Total	Highest density:	CV:	std dev %
area in survey region (km2)	23	13	0	36			
Late Colonial Sites (count)	19	13		32			
Late Colonial Sites (percent)	59%	41%	0%	100%		0.91	30.35%
Late Colonial Sites per km2	0.8261	1.0000	0.0000	0.8815	3-10 degree slope		

Table 10-11. Zonal statistics for late colonial site locations and slope degree.

10.10.8 Aspect

I created a zonal raster for aspect out of the same SRTM imagery used to make the elevation and slope degree rasters (Figure 3-4). Table 10-12 shows the late colonial sites across these aspect zones. East-facing slopes have the highest site density as well as the highest site count. No other patterns are apparent. The pattern of eastern slopes as favorable site locations is replicated in the settlement data from the 1907 Khan Bahadur map (see Chapter 11). Along or near the equator, eastern-facing slopes receive the most solar radiation during the day. This makes them ideal for planting and agriculture, which may explain why they are preferred for settlement.

	N	NE	E	SE	S	SW	W	NW	Total	Highest density:	CV:	std dev %
area in survey region (km2)	4	5	6	4	4	4	5	4	36			
Late Colonial Sites (count)	4	5	10	3	2	2	2	4	32			
Late Colonial Sites (percent)	13%	16%	31%	9%	6%	6%	6%	13%	100%		1.00	8.35%
Late Colonial Sites per km2	1.0000	1.0000	1.6667	0.7500	0.5000	0.5000	0.4000	1.0000	0.8889	E		

Table 10-12. Zonal statistics for late colonial sites and aspect zones.

10.10.9 Rainfall

All three zones from Juma's (2004: 43) map of rainfall fall within the 2019 survey region. Zones are represented by increasing amounts of rainfall per year: 1000-1500 mm, 1500-2000 mm, and 2000-2500 mm (Figure 3-12). Table 10-13 shows the zonal statistics for late colonial sites across these zones. Late colonial sites, with a low coefficient of variation, are relatively evenly distributed between all zones, but are most dense in the 1500-2000 mm zone.

	1000-1500 mm	1500-2000 mm	2000-2500 mm	Total	Highest density:	CV:	std dev %
area in survey region (km2)	12	11	13	36			
Late Colonial Sites (count)	8	14	10	32			
Late Colonial Sites (percent)	25%	44%	31%	100%		0.29	9.55%
Late Colonial Sites per km2	0.6667	1.2727	0.7692	0.8889	1500-2000 mm		

Table 10-13. Zonal statistics for late colonial sites across rainfall zones.

10.10.10 1907 Streams

Table 10-14 shows the late colonial sites across the buffer zones of the Khan Bahadur stream map, in relation to these zones (Figure 3-6). Late colonial sites are most numerous and densest in the zone that lies between 100 and 500 meters from streams, suggesting that late colonial settlements favored areas near the 1907 stream system. This analysis is complicated by edge effects and the placement of the survey region itself within an area of high stream density. While most of Zanzibar Island lies within 1 to 3 km of the 1907 streams, most of the survey region lies within 500 meters of a stream on the 1907 map. Overall, more than half of the late colonial sites lie within 500 meters of a stream from the 1907 map.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density:	CV:	std dev %
area in survey region (km2)	6	13	9	5	3	36			
Late Colonial Sites (count)	4	15	6	4	3	32			
Late Colonial Sites (percent)	13%	47%	19%	13%	9%	100%		0.77	15.40%
Late Colonial Sites per km2	0.6667	1.1538	0.6667	0.8000	1.0000	0.8889	Within 500m		

Table 10-14. Zonal statistics for the late colonial sites across the 1907 stream buffer zones.

10.10.11 1907 Wells

Wells from the 1907 Khan Bahadur map (Figure 3-7) were not common in the 2019 survey region—only a single well is close enough to the region to affect the data in any way. Table 10-15 shows the zonal statistics for late colonial sites in relation to 1907 wells. Four late colonial sites lie within 3 km of wells, whereas all the rest of the sites lie beyond 3km.

	Within 3km	Beyond 3km	Total	Highest density:	CV:	std dev %
area in survey region (km2)	5	31	36			
Late Colonial Sites (count)	4	28	32			
Late Colonial Sites (percent)	13%	88%	100%		1.06	53.03%
Late Colonial Sites per km2	0.8000	0.9032	0.8889	Beyond 3km		

Table 10-15. Zonal statistics for late colonial sites across the 1907 well buffer zones.

10.10.12 1907 Combined 1907 Hydrology

Table 10-16 shows the late colonial sites across a combined zonal raster of hydrology represented on the 1907 Khan Bahadur map. This raster considers wells and streams together to

create buffer areas by distance from hydrological features (Figure 3-8). Given the lack of wells in the 2019 survey region, it is not much different from the zonal raster for streams alone; however, this zonal raster is the one I used to create a predictive model since it is the most complete record for historical hydrology across the island. The majority of late colonial sites lie between 0 and 500 meters from water features. Overall, more than half of the 2019 sites lie under 500 meters from a water source.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density:	CV:	std dev %
area in survey region (km2)	6	13	9	5	3	36			
Late Colonial Sites (count)	4	15	6	4	3	32			
Late Colonial Sites (percent)	13%	47%	19%	13%	9%	100%		0.77	15.40%
Late Colonial Sites per km2	0.6667	1.1538	0.6667	0.8000	1.0000	0.8889	Within 500m		

Table 10-16. Zonal statistics for late colonial sites across the combined 1907 hydrology raster.

10.10.13 DEM Water Flow

Using the same 30 m SRTM satellite imagery as I used to create elevation, slope, and aspect maps, I also derived water flow channels that model hydrology for Zanzibar in the present (Figure 3-5). These channels mostly match the stream systems represented in the 1907 Khan Bahadur map, but also represent areas of underground water flow and accumulation. As such, they present an alternative model for hydrology on the island. While the Khan Bahadur map shows where streams and wells were present in 1907, this map may indicate potential sources of water that could have been accessed in the past through caves or wells or may be used in the future. Table 10-17 shows the zonal statistics for these sites with respect to the DEM-derived hydrology model. Late colonial sites are distributed relatively evenly but sites within 100 meters of DEM-based water flow are densest, and more than half of late colonial sites are within 1 km of water flow.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density:	CV:	std dev %
area in survey region (km2)	3	12	11	10	1	37			
Late Colonial Sites (count)	4	10	11	7	0	32			
Late Colonial Sites (percent)	13%	31%	34%	22%	0%	100%		0.70	14.08%
Late Colonial Sites per km2	1.3333	0.8333	1.0000	0.7000	0.0000	0.8767	Within 100m		

Table 10-17. Zonal statistics for the late colonial sites across the DEM-based water flow zonal raster.

Scoring Zonal Rasters By Zonal Statistics

Like in the previous sections, Table 10-18 depicts the weighted scores for each zonal raster, based on the zonal statistics above. In this model I have also excluded distance to sea and distance to reef rasters since I aim to model inland settlement distribution rather than coastal sites. In general, the method for assigning scores was to give the highest score to the most favored zone (densest site distribution), a lower score to the second-most favored zone (second-most dense), and no score to other zones. When a zone is most-favored and the coefficient of variation for the zone exceeds 1, I assigned a score of 3, indicating that the zone is very strongly favored. If a zone is most favored but the CV is below 0.5, I reduced the score to 1, since this

indicates that the zone is only very slightly favored. For certain rasters, other special circumstances alter the assignment of scores, which I note below.

Raster / Zone	Score
Island Zones	Score
Within Clove Plantation Zone	1
Near Plantations	0
Far South	0
Elevation Zones	Score
0-17 m	0
17-31 m	0
31-48 m	1
48-69 m	0
69-135 m	2
Soil Types	Score
Kinamo	0
Maweni	1
Mchanga	0
Uwanda	0
Kinongo	3
Infiltration	Score
Slow	0
Moderate	3
High	1
Land Use	Score
High Vegetation	1
Bare Earth	0
Low Veg	0
Urban	2
Sandy Coastal Environment	-10
Geology	Score
M3 Sandy Clay Marl	2
Mangrove	-10
Q2 Coralline Limestone	0
M1 Miocene Limestone	1
Q2/M1 Mixture	0
Q1 Recent Deposits	0
Q2/Q3/M1 Mixture	0
Slope Degree	Score
0-3 degrees	1
3-10 degrees	2
>10 degrees	0
Aspect	Score
North	1
Northeast	0
East	2
Southeast	0
South	0
Southwest	0
West	0
Northwest	0
Rainfall	Score
2000-2500 mm	1
1500-2000 mm	1
1000-1500 mm	0
1907 Hydro	Score
<100m	1
100-500m	1
500m to 1 km	0
1-3 km	0
>3 km	0

Table 10-18. Suitability scores for sites from the late colonial period.

I describe some modifications to scoring below:

- The zone within clove plantations is favored, and since the survey did not test zones in the far south, it is weighted equally with the near plantation zone as a less favored area.
- Kinongo soils are very strongly favored (CV: 1.28) so I assigned a score of 3 rather than 2. Maweni is second most-favored.
- The moderate soil zone was also very strongly favored, so assigned a 3 (CV: 1.03).
- Urban land use was the most-favored zone for late colonial sites, after high vegetation areas. I assigned a score of -10 to sandy coastal environments, because I wanted the model to only capture inland areas rather than coastal ones.
- Similarly, I assigned a -10 to mangrove areas, to exclude them from the analysis.
- The 1500-2000 mm zone is the most favored zone, but the CV is 0.29 so I reduced the score to 1.
- The 100-500 m zone from combined hydrological features is most favored, but since the <100m zone lies entirely within this zone, I also gave it a score of 1 to reduce unwanted edge effects.

Figure 10-16 below shows the raster created through summing these scored rasters together. The result is a predictive model of site locations for the late colonial period.

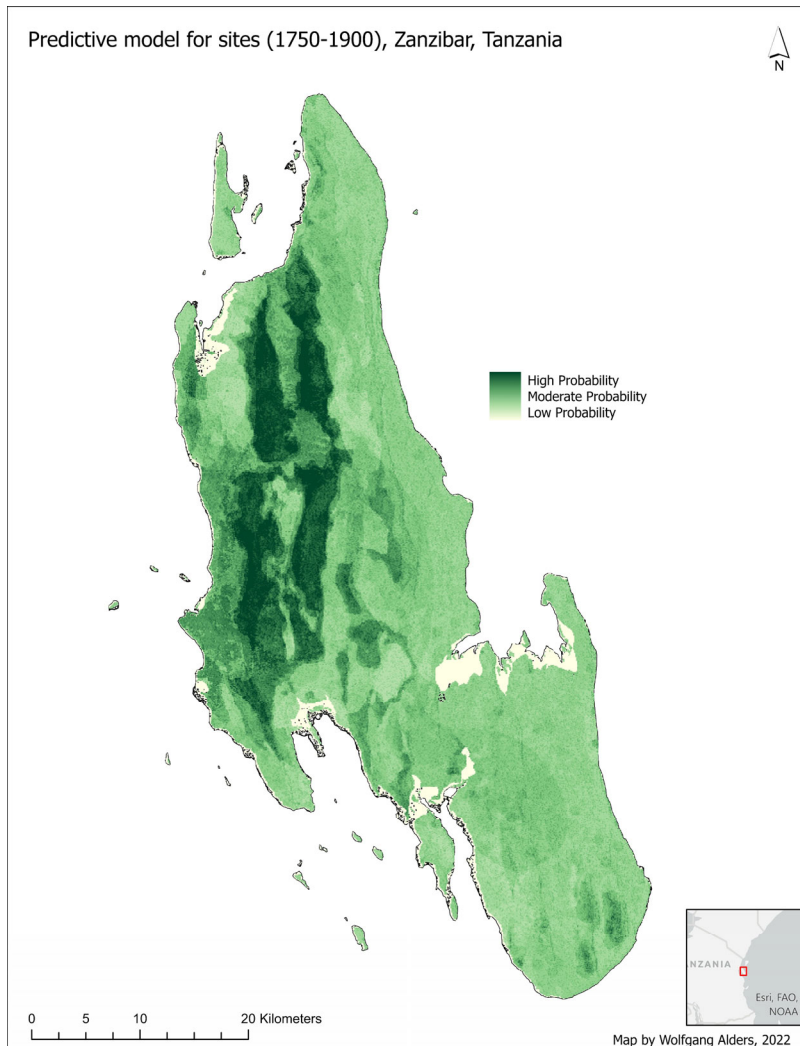


Figure 10-16. Predictive model for inland late colonial sites.

The predictive model for late colonial inland sites reflects areas with *kinongo* and *mchanga* soils, with moderate infiltration and near combined hydrological features. One way to assess the accuracy of this model is to compare it to known site distributions for the late 19th / 20th century, which come from an independent source. Figure 10-17 shows the late colonial site predictive model (based on archaeological sites recorded in 2019) in comparison to the settlement system recorded by Imam Sherif Khan Bahadur in the late 19th century, which was published in 1907. I discuss these settlements in greater detail in the next chapter. The results clearly show the tendency for late 19th-century settlements to lie within areas of high probability, demonstrating the accuracy of the model.

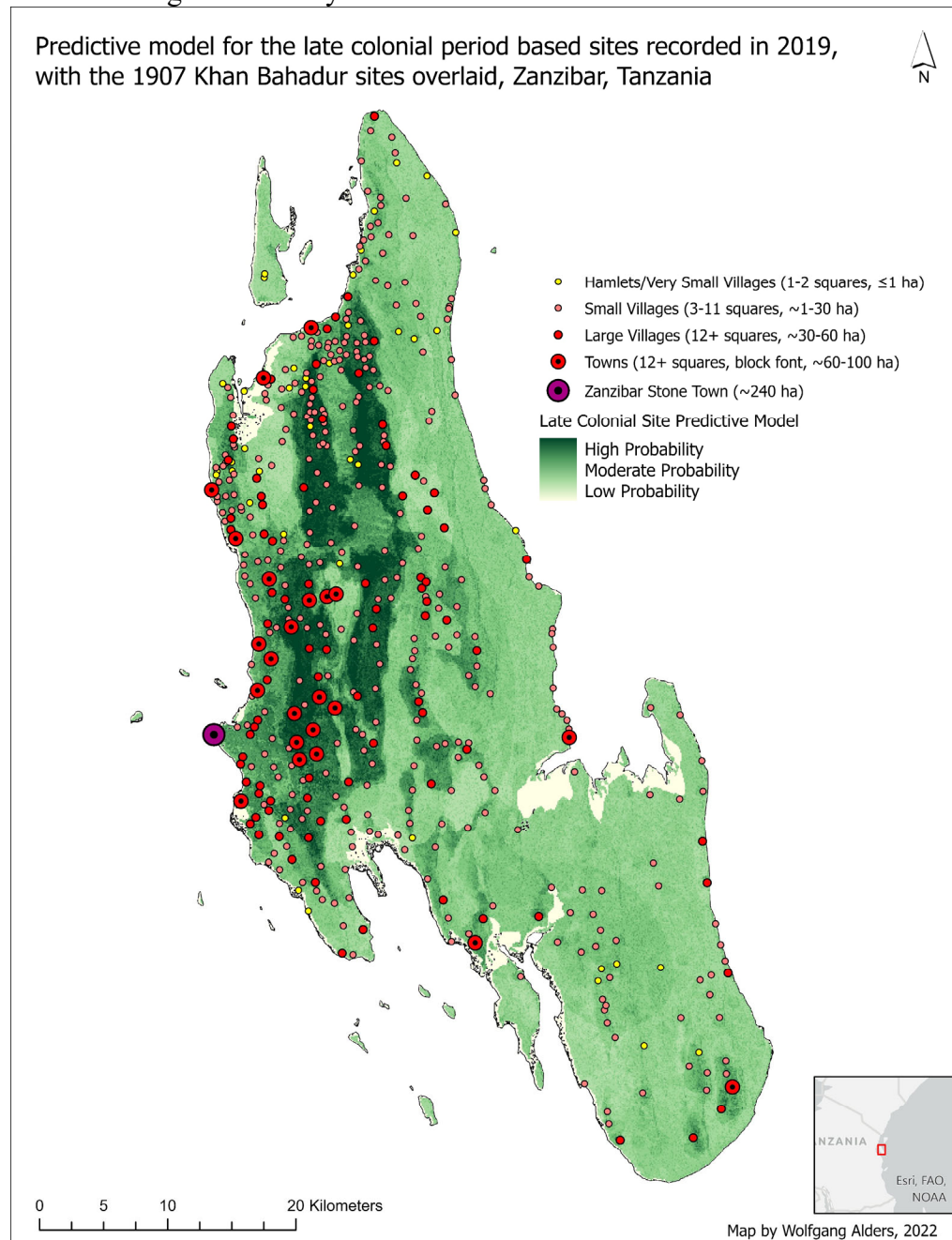


Figure 10-17. Late colonial predictive model compared with 1907 settlement.

Table 10-19 formalizes this conclusion, showing that 1907 settlements from the Khan Bahadur map fall most densely into the “High Probability” areas of the late colonial predictive model. The comparisons attest to the accuracy of the predictive model. Any future surveys seeking to investigate the late colonial landscape in Zanzibar should start by surveying the areas designated high probability.

	Low Probability	Moderate Probability	High Probability	Total	Highest density:	CV:	std dev %
area (km2)	942	492	158	1592			
All Settlement (count)	150	231	99	480			
All Settlement (percent)	31%	47%	20%	100%		0.42	13.64%
Settlement per km2	0.1592	0.4695	0.6266	0.3015	High Probability		

Table 10-19. 1907 sites across the zones of site detection probability based on late colonial sites recorded through archaeological survey in 2019.

Table 10-20 summarizes the zonal statistical analysis of the settlement system recorded through archaeological survey. These results are reflected in the predictive models listed above: Figure 10-14, Figure 10-15, and Figure 10-16.

Period / Dataset	Most Favored Zones
1000-1500 (precolonial inland village sites)	<i>Kinongo</i> soil zone, M3 sandy clay marl or M1 Miocene limestone areas, moderate soil infiltration, 3–10-degree hillslope, 31-69 m elevation zones, mid-high rainfall zones, within 100 meters of perennial streams, and in areas of low to high vegetation (not bare earth areas).
1500-1830 (early colonial sites)	<i>Kinongo</i> and <i>uwanda</i> soil zones, M3 sandy clay marl or Q2/M1 mixture areas, moderate or high soil infiltration, 0-3 degree hillslope, 48-135m elevation zones, all rainfall zones, within 500 meters of perennial streams or wells from the 1907 map, and in areas of low to high vegetation (not bare earth areas).
1830-1890 (late colonial sites)	<i>Kinongo</i> soil zones, M3 sandy clay marl areas, moderate soil infiltration areas, 3-10 degree hillslopes, 69-135m elevation zones, East facing slopes, mid-high rainfall zones, within 500 meters of perennial streams or wells from the 1907 map, and in areas of modern settlement.

Table 10-20. Most favored zones for settlement, based on archaeological sites recorded during survey.

10.11 Conclusion

Swahili people have occupied the inland areas in north-central Zanzibar since at least the early second millennium CE, when they founded village communities at Kirikacha and Mwanakombo in the west and central regions. They also established camps or seasonal activity areas in the eastern region, for swidden farming or hunting. They lived at the larger coastal village of Pwani Mchangani in the far east of the survey region, where they created large shell mounds through the consumption of marine resources. These early-second millennium people occupied independent and dispersed villages that coexisted within the social system along with residents at the stone town of Tumbatu and the coastal village of Mkokotoni in the northwest. When Tumbatu was abandoned sometime in the late 14th century, these inland village communities were abandoned as well. Was Tumbatu abandoned because the inland village communities collapsed, resulting in shortages of agricultural products? Or did Tumbatu fall first, eliminating the incentive to produce agricultural surpluses in the fertile inland regions of the island, which were exchanged for imported ceramics? This relationship is unclear and can be the subject of further research.

Pwani Mchangani, meanwhile, persisted through the 15th century and was only abandoned in the early 16th century. This may have been related to the arrival of the Portuguese, who sailed down the east coast of Zanzibar and would have likely sought to raid or impinge upon the villagers of the site. The early colonial period began around the year 1500, at which time the

site of Pwani Mchangani was abandoned, and the inland site of Kandwi was founded. It may be the case that the residents of Pwani Mchangani relocated inland to Kandwi as a defensive measure against Portuguese raids. Along with Kandwi, another small inland village was founded during this period at Njua Kuu. Njua Kuu appears to have been abandoned sometime in the early 19th century. Overall, the early colonial period saw a decrease in the number of sites as well as overall site size, likely as a result of the turbulence caused by Portuguese incursions on the island.

By the mid-19th century, settlements had spread across all regions and developed a clustered spatial pattern as opposed to the dispersed pattern that characterized the precolonial and early colonial era. Most settlements were small villages, hamlets, and field houses; village sized sites comparable to those of the precolonial period did not return. The town of Chaani's growth, and the growth of settlements throughout all regions, attests to the demographic changes that began in the early 19th century, as Omani planters started accumulating large numbers of enslaved East Africans for their estates in rural areas. I have correlated Chaani's growth during this period with the only other unprecedented social transformation recorded historically: the mass importation of enslaved people to the island, in numbers that rivaled the total population of indigenous Swahili people already living there (Vernet 2017). However, the idea of enslaved people occupying a town goes against historical accounts of slavery on the island, which attest to enslaved people living on the estates of their owners and being given garden plots to cultivate. It is possible, then, that the growth of Chaani was only caused tangentially by the importation of enslaved people and the development of the plantation system. It may be that as Omani planters dispossessed Swahili people from their estates in the fertile zones, landless Swahili farmers congregated in towns like Chaani. It may also be the case, however, that the idea of 19th-century Chaani as an integrated "town" might be overstated. The area still appears rural today, with many fields and garden plots interspersed between houses. Enslaved people may have congregated in this area, in ways that could still fit the historical descriptions of enslaved people as living on the estates of their masters.

Even at its height, the precolonial stone town of Tumbatu was less than half the size of this town in the 19th century even though Chaani has no elite architectural remains and does not appear to have been politically important during this time. The 1907 map (discussed in the next chapter) makes clear that sites of Chaani's size were common across the island during the late 19th and early 20th century. All this evidence together suggests that the demographic changes which occurred across the island during this period must have been immense and would have affected the social landscape.

Another thing that must be explained is the spatial proximity between the largest settlement areas of the 19th century, at Chaani and around Mahonda, and the early precolonial inland villages of Mwanakombo and Kirikacha. Both villages are located directly adjacent to, or, in the case of Mwanakombo, directly beneath, the largest areas of 19th century occupation. Since these villages were abandoned long before the advent of the plantation system, it does not seem to be the case that these communities were seized or captured by colonizing Omani planters. Rather, it may be the case that both precolonial Swahili people and enterprising slave owners of the 19th-century settled in the same areas because they were prioritizing the most fertile land, and the areas with the best suitability for agricultural production. Zonal statistical analysis has produced a predictive model for precolonial site locations in inland areas along with a predictive model for late colonial settlement, and the two models look similar. In comparison, the predictive model for settlement during the early colonial period shows a wider variety of

environments as suitable locations for detecting sites during this period. In contrast to the Swahili people of the precolonial period and the Omani planters of the late 19th century, agricultural fertility may not have been the highest priority for Swahili people during the early colonial period. Instead, mobility, and fortified locations hidden from Portuguese incursions may have been favored.

This view of settlement is incomplete, since it is only based on a sample of sites from a small region in the north-center of the island. However, given the depth of time it covers, this survey has drawn out important trends in the long-term history of Swahili occupation in inland, rural areas. In the following chapter (Chapter 11) I continue to analyze late colonial settlement trends, but for the whole island using a snapshot of settlement contained in the 1907 Khan Bahadur map.

Chapter 11: Spatial Analysis of the 1907 Khan Bahadur Map

11.1 Introduction

This chapter analyzes the settlement system of the early 20th century. While previous analyses use settlement data from archaeological surveys that our team carried out in 2019, this chapter uses settlement data derived from georeferencing the settlements of a map of Zanzibar made by Imam Sherif Khan Bahadur, for the British Survey of India. This map was produced from surveys carried out in the 1890s and published in 1907. Given its depth of detail, it is an invaluable source for understanding inland settlement dynamics during the final decade of plantation slavery on the island.

The late 19th to early 20th century on the coast was a period characterized by social unrest as a result of European colonialism, the end of the legal slave trade, and broader economic shifts that rendered the profits from cash crop economies marginal (Bishara 2017; Hopper 2015). The British forced Zanzibar to accept a protectorate in 1890, and slavery was officially abolished in 1897 (Cooper 1977: 222). Newly freed enslaved people adopted the social identity of “Swahili” during this period and integrated into coastal society. However, they continued to work on clove plantations, as tenant squatters making meager wages. Sheriff (1991) describes how the colonial state instituted taxes that required cash payments, to compel Swahili people as well as formerly enslaved people on the island to accept tenant farming on clove estates for meager wages. Slavery also continued covertly into the 20th century. Hopper (2015) estimates that slavery may have even expanded across the western Indian Ocean during this period as a result of increased demand by the burgeoning European and American middle classes for spices and dates.

The conditions that produced the racial strife and revolution of mid-20th century Zanzibar solidified during this period. The late 19th century saw the development of politics along racial and class lines. Zanzibari landowners, primarily Omani Arabs, looked to consolidate political power as they became increasingly indebted, and their economic power waned. Their chief opponents by the late 1950s were politically conscious anti-colonial pan-Africanists, who were either former enslaved people or descendants of former enslaved people from mainland East Africa. This group transitioned into a class of landless tenant farmers on the estates of clove plantations during the second phase of the late colonial period (1890-1963). This was a collective experience that brought them into close contact with the indigenous Swahili people of Zanzibar who were similarly dispossessed by clove farming landowners (Glassman 2011; Sheriff 1991).

When slavery was abolished in 1897, Omani Arabs sought to distinguish themselves from newly freed, African converts to Islam. This was achieved throughout the 20th century by the development of a discourse of racial and cultural difference, disseminated by Arab intellectuals. Glassman (2014) uses the term “creole nationalism” to refer to the ideology of mid-20th century Arab intellectuals in Zanzibar, who promoted a paternalistic vision of Zanzibar as multicultural and united by Islam, but with Arab society as the ruling class and Africans, mainland and Zanzibari alike, as a subservient group. The British protectorate government encouraged this dynamic since their aim was to develop Zanzibar as an “Arab state”. Simultaneously, formerly enslaved mainland Africans and indigenous Zanzibari people found themselves living in similar material conditions as dispossessed landless tenant farmers. They also shared the experience of racialization, as black Africans deemed inferior and less fit to govern compared to Arabs and Indians. These conditions produced class and racial solidarity which, combined with the global currents of pan-Africanism and anti-colonialism in the mid-20th century, led to an alliance of indigenous Zanzibari and mainland Africans in the Afro-Shirazi

Party (ASP). Their alliance would become crucial to the success of the ASP in the 1950s and 60s, which allowed victory over the pro-Arab Zanzibar Nationalist Party following independence in 1963. The racial and class dynamics that were born out of slave abolition in the late 19th century would lead to the intense racial violence against Arab and Indian minorities which characterized the weeks following the 1964 Zanzibar Revolution.

Settlement during this period is difficult to distinguish from settlement during the mid-19th century based on archaeological evidence alone. Sites that date to the late second millennium CE can be divided into two groups: those that lie before the horizon of European industrial whiteware, and those that lie beyond it. European industrial whiteware means that a site was at least partially occupied after 1830 and possibly into the early 20th century. Therefore, it is not possible to distinguish between early-mid 19th-century sites and late-19th / early-20th century sites, if European whiteware is present. Instead, historical sources become more useful than archaeological survey for understanding settlement distribution during this period. The most useful historical source in this regard is the Khan Bahadur map of Zanzibar, published in 1907. In this chapter, I describe Khan Bahadur and the map he produced, analyze the settlements on the map using cluster and rank-size analyses, and then compare settlement data from the map across environmental and historical datasets.

11.2 The Khan Bahadur Map

The first map based on a systematic survey of inland areas in Zanzibar was produced by Imam Sherif Khan Bahadur, working for the British Survey of India in the late 19th century (Figure 11-1). Khan Bahadur was a surveyor and soldier in the employ of the British Survey of India. His name and title suggest that he was a Muslim of Indian or Persian descent. Not much is known about his early life, but he is mentioned as traveling through Persia in 1891 with Captain W.D. McSwiney, a British intelligence agent and linguist involved in the “Great Game”, the power struggle between the British and Russian empires in Central Asia. The National Archives of India records an “award of gratuity to Imam Sherif Khan Bahadur for his service in East Africa in 1892/93”, which may have been the period when he was present in Zanzibar to either carry out survey himself or direct it. Khan Bahadur also produced a map of Hadramawt in Yemen, published in 1900. He is mentioned in the travel narrative *Southern Arabia* (1900), by Mabel Bent. Another person, Khan Bahadur Sher Jang, is also listed as a soldier and surveyor employed by the British Survey of India, around the same period; it is possible that these individuals are one and the same. Khan Bahadur Sher Jang was born in 1870 in Punjab, British India, and received numerous titles and awards for his service as a surveyor in Central Asia and the western Indian Ocean.

Khan Bahadur was employed by the British Survey of India. The British East India Company founded this organization in 1767, and the Survey developed from a private concern of the company to an imperial project of the British state in colonial India and across the Middle East. Edney (1997) argues that the maps produced by the survey in the colonial were part of the British imperial geographic imagination, that transformed “empty” territories into spaces that could be ruled and administered while also reinscribing an ideology of the British state as rational and ordered, as opposed to a mystical, irrational East. The notion of cartographic knowledge as an imperial tool parallels the implementation of early colonial anthropology, which was also concerned on using scientific investigations to better understand, and therefore control, subject peoples in Africa and elsewhere (e.g., Malinowski 1930). Nevertheless, Foliard (2017) has argued that this view of British cartography should be nuanced by investigating the specific circumstances and contexts of map production and distribution across time, rather than

portraying all British cartography as merely an imperial tool. Foliard argues for a “historicized approach to the various shades of imperialism to be found in the mapping of the Orient” (Foliard 2017: 4).

As one of thousands of maps produced by the British Survey, little information is available concerning this particular map. It was published in 1907 by Edward Stanford, a cartographer in London. In the bottom right corner, the map reads “Stanford’s Geographical Establishment, London”, and the legend gives the magnetic variation of north for the year 1907, but no official date is written. The legend (Figure 11-2) also reads “A Map of Zanzibar Island, from surveys made by Imam Sherif Khan Bahadur, Survey of India, under the direction of the late General Sir Lloyd William Mathews, K.C.M.G.”.

The context of this map’s production is the period shortly following the overthrow of the independent Zanzibari Sultanate and the imposition of a British protectorate in 1890, as well as efforts by the British to build roads linking parts of the island together throughout the 1890s (Owens 2007). A catalyzing event of the Anglo-Zanzibar War in 1896 (in which the British shelled and destroyed the Sultan’s Palace to instate a puppet ruler) was a clash on the road from Zanzibar Stone Town to Chwaka in the east. In 1895, while agents of the British police and surveyors were constructing the road, supporters of the rebellious anti-British Sultan Khalid bin Barghash confronted and attacked them (Owens 2007: 2). These events may have prompted Lloyd Mathews, who also ordered the bombardment of the palace in 1896, to sponsor the production of the map to help plan efforts to gain control over insurgent activities in the rural areas of the island.

At the time of this writing, semanticscholar.org shows that this map has been cited only twice since it was published, once in 1976 in an article on the composition of Jozani Forest (Robins 1976), and once in 1998, on a study describing a servaline genet on Zanzibar (Colyn 1998). Horton (in press) also mentions the map briefly, as the main cartographic source for Zanzibar prior to a more recent map created in 1984-85. Mostly though, the map appears to have been overlooked by both historians and archaeologists of the colonial period in Zanzibar, despite the wealth of information it contains regarding settlement, land use, and geography on the island during the late 19th and early 20th century. Despite (or perhaps because of) the map’s status as a tool of British imperial domination in Zanzibar, it records invaluable data for understanding the composition of rural areas of the island. Preserved in the map is a settlement system that was measured and surveyed while the plantation system was still fully developed, around the same time that slavery was being abolished, from 1896 to the early 1900s (Cooper 1977: 122).

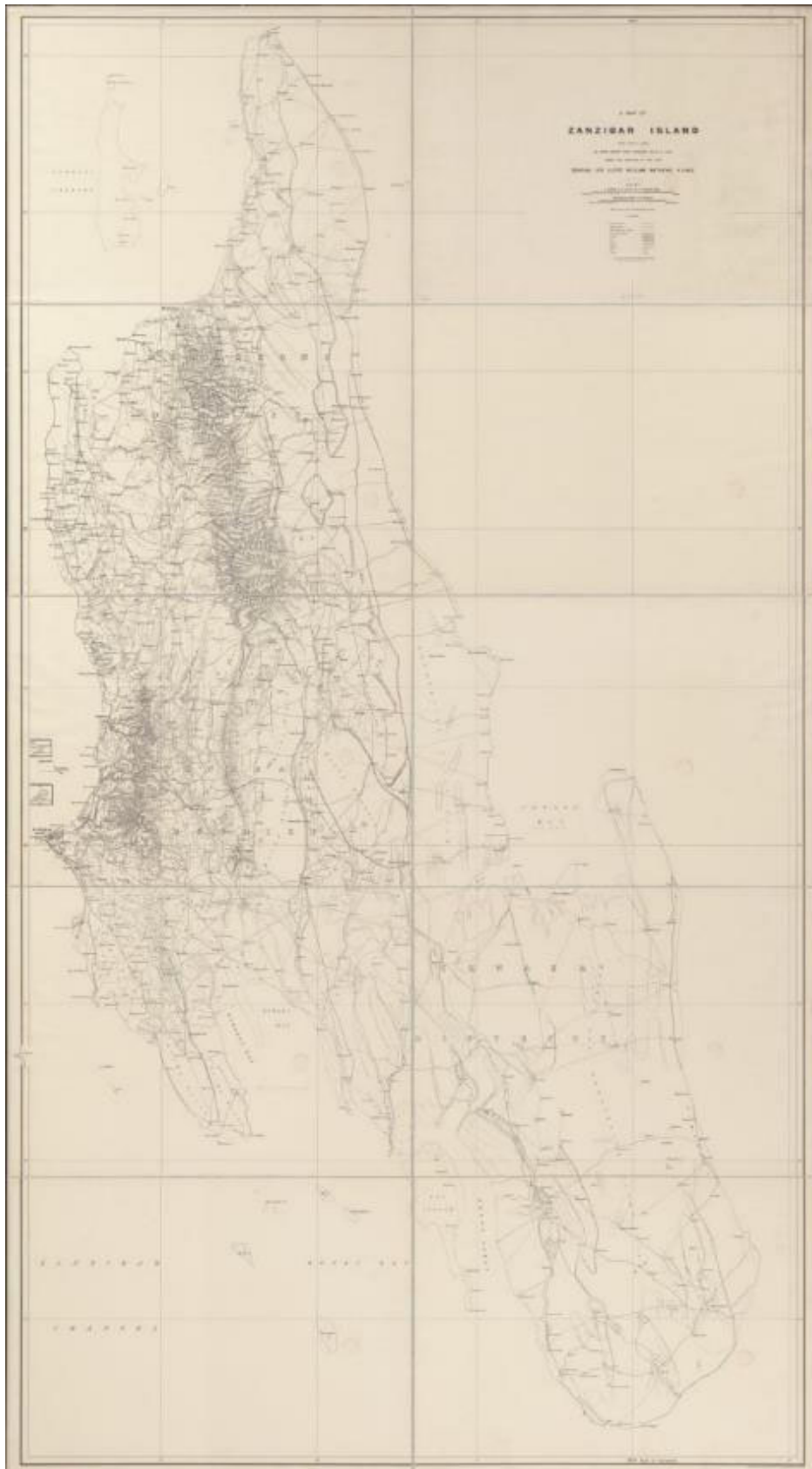


Figure 11-1. 1907 map of Zanzibar, by Imam Sherif Khan Bahadur.

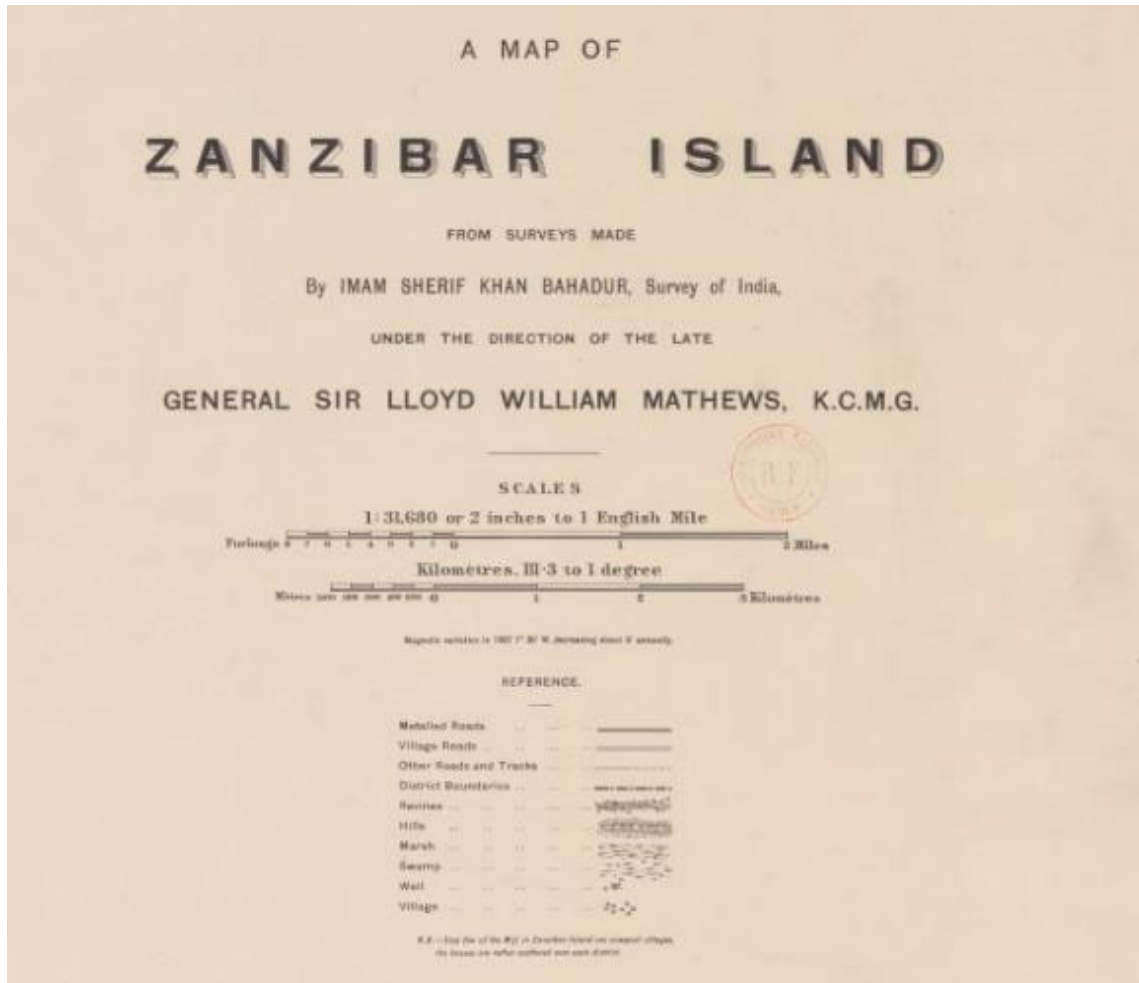


Figure 11-2. Legend of 1907 Khan Bahadur map.

Though the map was published in 1907, Imam Sherif Khan Bahadur or people under him may have carried out cartographic surveys of Zanzibar between 1892 to 1901. The most pertinent evidence for this is from the note kept in the National Archives of India, describing a gratuity to Imam Sherif Khan Bahadur for his service in East Africa in 1892/93. This is the best evidence to suggest that Khan Bahadur was present in East Africa during these years and may have executed the survey of Zanzibar then. However, this date is complicated by some details on the map, which suggest that the map could have been initiated by Khan Bahadur in 1892/3 but completed over the course of the decade. General Sir William Lloyd Mathews, who Khan Bahadur is listed as working under, died in 1901 of malaria, so it is likely that the surveys took place before 1901. But Marahubi Palace (built by Sultan Barghash in 1880) is listed on the map as a ruin, suggesting that Khan Bahadur or someone else surveyed that region after Marahubi Palace was destroyed by fire in 1899 (Rhodes et al. 2015: 350). Some other aspects of the map also suggest different dates. Frazer's sugar mill and Frazer's house are not listed as ruins, even though Fitzgerald (1898) described them as such during his travels through Zanzibar in 1898. Fitzgerald wrote then that the house and sugar mill were active 25 years before, in 1873 (Fitzgerald 1898: 521-523). The depiction of Frazer's sugar mill and house would seemingly contradict the depiction of Marahubi as a ruin if the map were representative of a single snapshot

in time. Khan Bahadur likely did not carry out surveys prior to 1890, but these details show that this map was made from a composite of surveys which were only finished in 1899 at the earliest.

The map is incredibly detailed for its age—in fact, it is difficult to find a modern map of Zanzibar with such detail and scale. Figure 11-3, Figure 11-4, Figure 11-5, and Figure 11-6 show some of the detail on this map. The map depicts 465 villages, with squares drawn in varying numbers to represent village size. It also depicts 25 larger towns, 7 palaces, and 153 additional place names. It shows in great detail streams, ravines, swamps, marshes, and hills, with contour elevation given in English feet. Additionally, it depicts “metalled roads”, village roads, “other roads and tracks”, district boundaries, and wells across the island.



Figure 11-3. Detail of Stone Town, in the southwest.

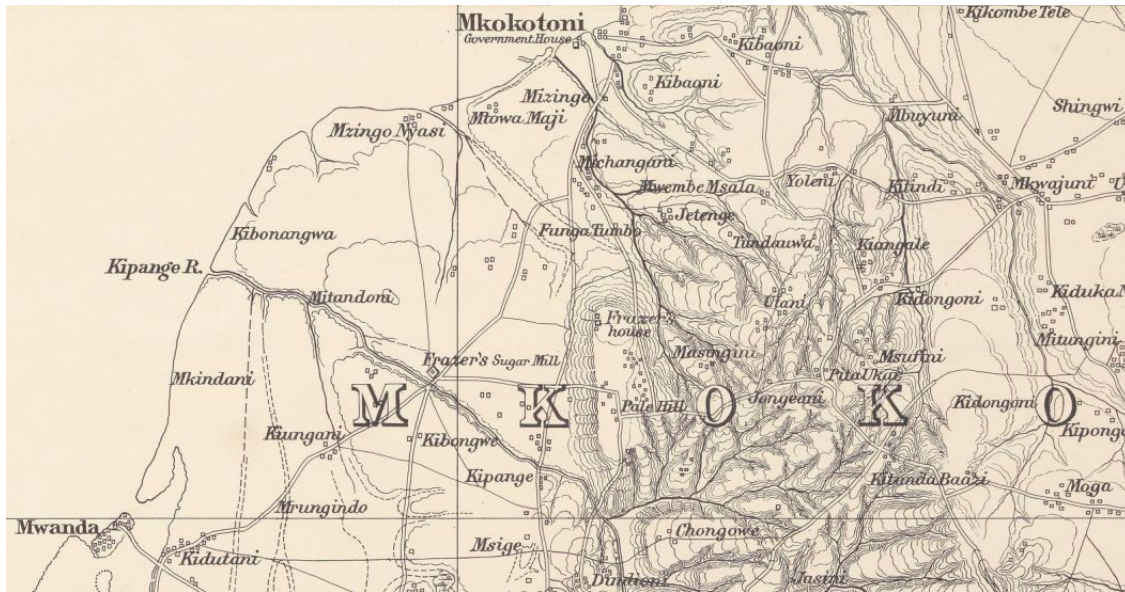


Figure 11-4. Detail of Mkokotoni, in the northwest.

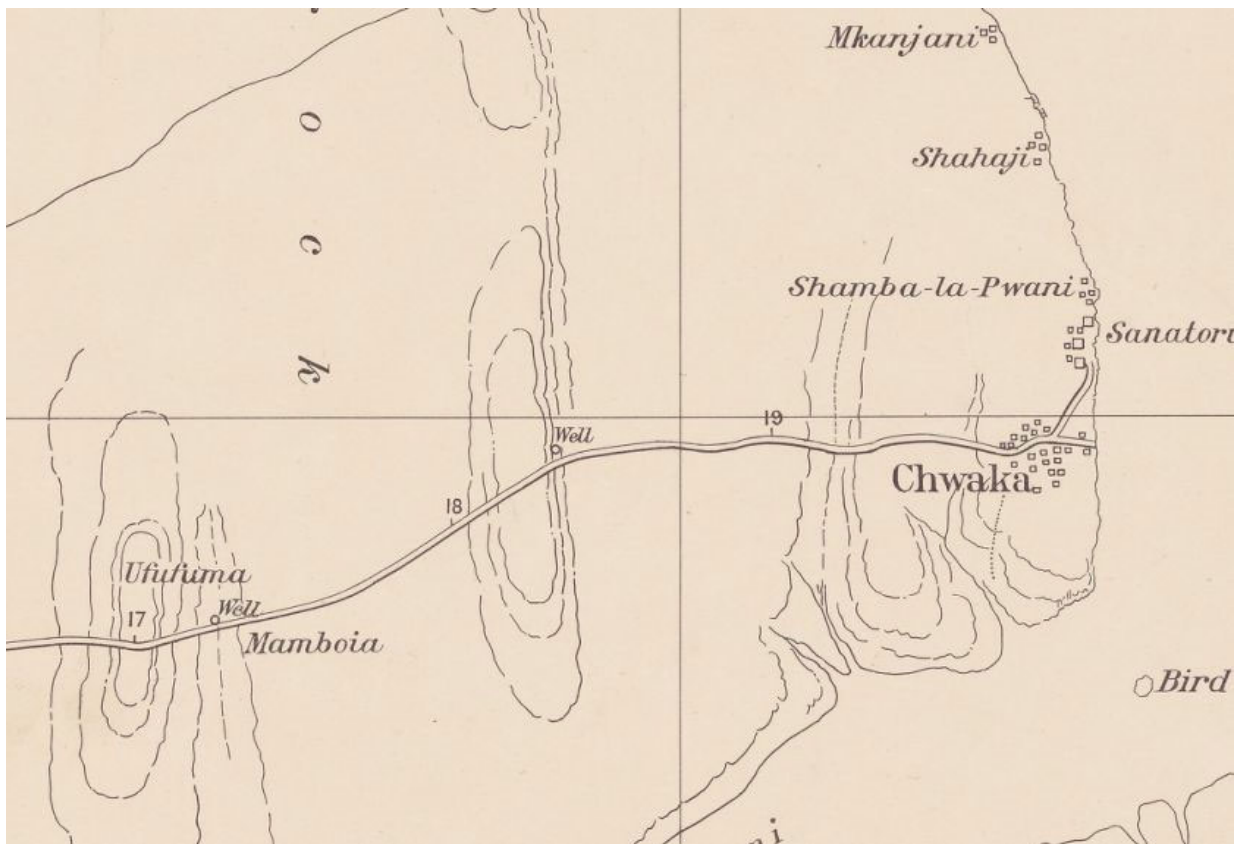


Figure 11-5. Detail of Chwaka, in the southeast, along with a “sanatorium”.

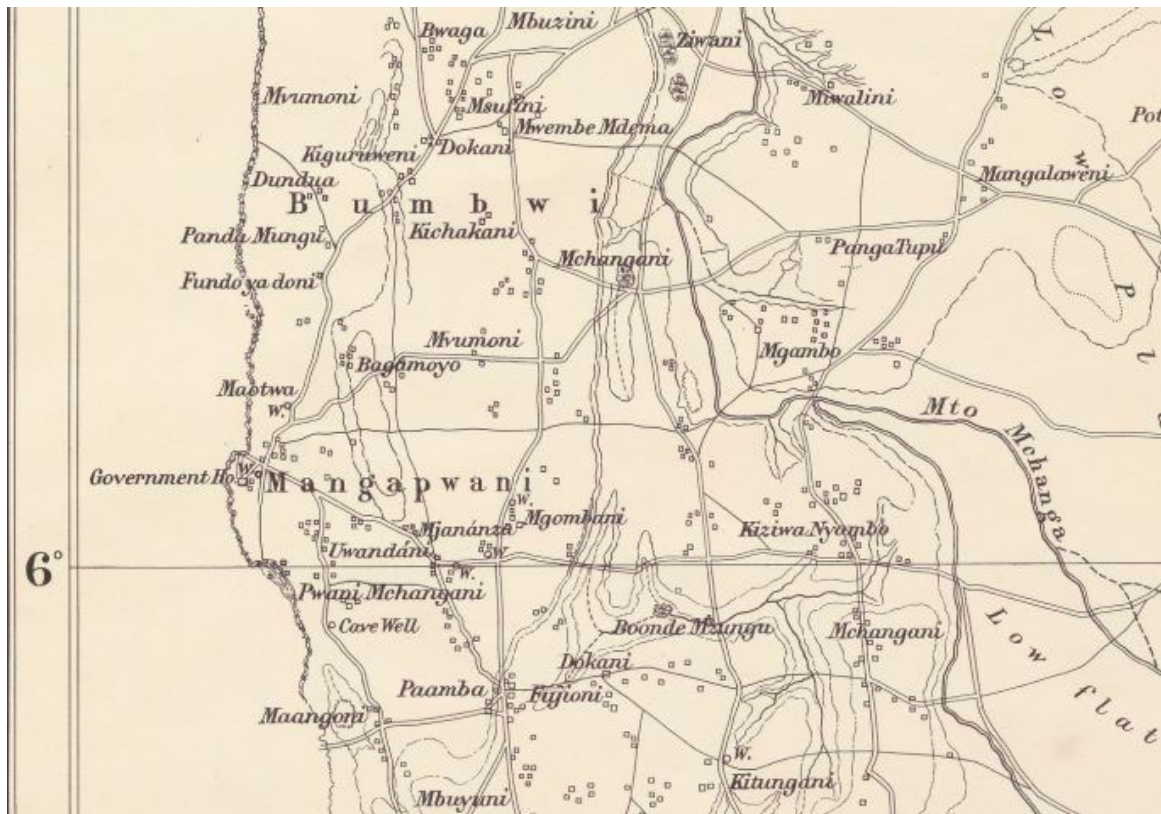


Figure 11-6. Detail of Mangapwani, in the west.

Khan Bahadur’s survey methodology is not apparent, but from the map it is likely that two methods were used to distinguish settlements in size and importance. The first method was through the illustration of squares, which represent settlement areas. Squares are not drawn to the scale of a Zanzibari house—by the scale of the map, the average square ranges from 600 to 1000 square meters. A house this size would be a veritable mansion. Rather than indicating the actual sizes of houses, it is more likely that overall settlement size was roughly estimated by Khan Bahadur and then indicated by the number of squares drawn. Officially, the legend of the map depicts a scatter of squares and describes this as a village, further suggesting that Khan Bahadur was drawing settlement squares with the aim of capturing settlement size as a whole, rather than individual households.

The second method for settlement is typographical—Khan Bahadur uses Latin letters in italics with capitalized first letters and additional lowercase letters to name the majority of settlements, as well as to indicate place names. Bolded, non-italic letters are used to name larger towns, also with capitalized first letters and additional letters in lower-case. Finally, bolded, non-italic, and all-capitalized letters are used for Zanzibar Stone Town, the largest settlement on the map. Figure 11-3 shows an example of all three types. Zanzibar Stone Town is a city, Mtoni is a town, and Gulioni, Mianzini, and Miwaleni are three of many villages. This is the same system used in Khan Bahadur’s map of Hadramawt (1900).

While Khan Bahadur’s legend described the squares mentioned above as representing villages, their placement and count in conjunction with typographical differences likely indicates a settlement hierarchy. Many of the sites represented by Khan Bahadur with squares (presumably, “villages”) are known historically to have been more than that—settlements like Mkokotoni, Mtoni Unguja Ukuu, and Chwaka were and are distinct from smaller village

communities on Zanzibar, and likely belong to a “town” size class. For analysis, I chose to divide the settlements into 5 size classes based on their typography and number of squares depicted. I then measured areas from a sample of each size class, to convert square counts into estimated average settlement size, in hectares. Table 11-1 shows these size classes. Figure 11-7 shows the distribution of site sizes by count. Figure 11-8 shows these size classes on a map of Zanzibar.

Size Class	Number of Squares	Font Example	Estimated Size	Count
Hamlet/Very Small Village	1-2	<i>Kongeni</i>	≤ 1 ha	42
Small Village	3-11	<i>Gamba</i>	1-30 ha	337
Large Village	12+	<i>Maangani</i>	30-60 ha	86
Town	12+	Mkokotoni	60-100 ha	23
City	n/a	ZANZIBAR STONE TOWN	~240 ha	1

Table 11-1. Size classes for settlement in the Khan Bahadur map.

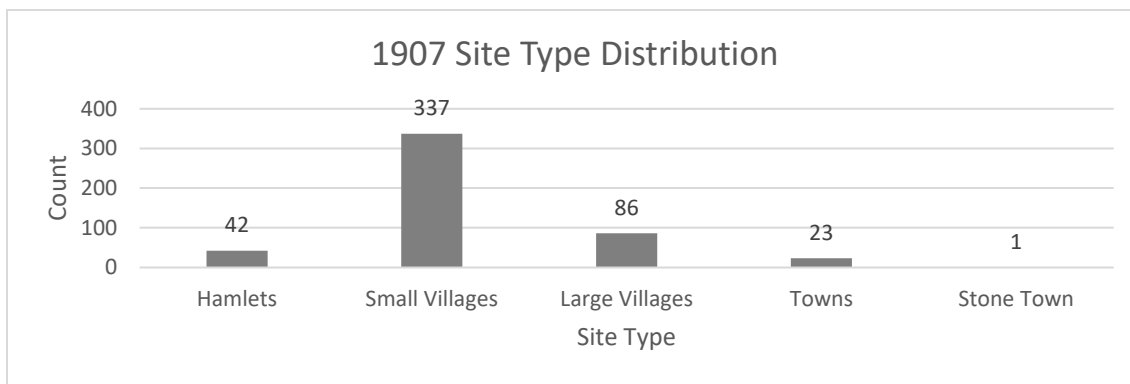


Figure 11-7. 1907 Khan Bahadur site type counts.

Settlement size classes from the 1907 Khan Bahadur map

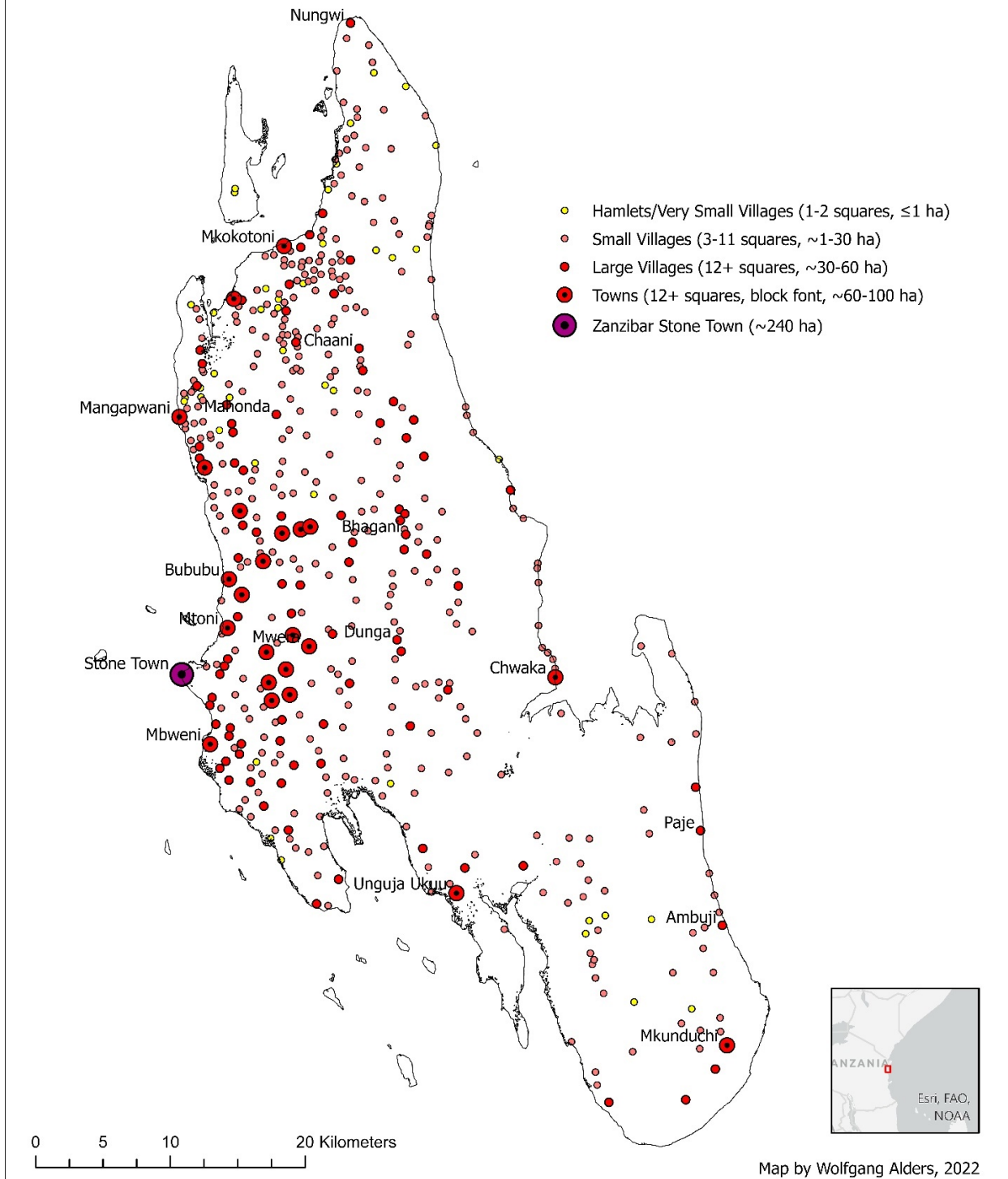


Figure 11-8. Settlement size classes from the Khan Bahadur map.

In addition to settlement, the Khan Bahadur map depicts roads and tracks, district boundaries, ravines, hills, marshes, swamps, streams, wells, European settlement, palaces, miscellaneous features, and other place names. I did not digitize roads, tracks, and district boundaries, but these may represent valuable areas for future study. Hill and ravines systems were similarly not mapped, considering that they have likely changed little since 1907 and are more easily studied through digital elevation models derived from SRTM data. Marshes and swamps similarly are better captured as hydrological data. I digitized the rest of the categories, which I describe below:

- A. *Streams*: Streams are drawn as black lines on the map and labeled in italic letters by their Swahili names. I digitized these streams by hand using a tracing tool in ArcGIS Pro. This stream map likely represents the oldest and most accurate model of hydrology on Zanzibar, existing prior to many landscape transformations which occurred during the latter half of the 20th century. The digitized historical map of streams shows some significant differences compared to the DEM hydrology map, discussed in the section below. It confirms that streams did not flow in the south, east and far north of the island. It also shows that the courses of the larger streams of the early 20th century (e.g., the Mwanakombo, the Mchanga, or the Zingwe Zingwe) were different than comparable streams in the modern DEM model. This may be due to variations in local geology, urban development, or changes in landforms that have altered the courses of streams between the period of the early 20th century when this map was made and the early 2010s, when SRTM elevation data was collected.
- B. *Wells*: Wells are indicated on the map by circles. Figure 11-9 shows the distribution of wells on the map. Their preponderance in karstic limestone areas far from the streams of the northwest region aligns well with what would be expected, suggesting that Khan Bahadur was able to sample and record wells in a detailed and systematic way. The distribution of the wells aligns inversely with the stream network depicted in the Khan Bahadur map—the wells are most common in places where streams are not shown above ground. The lack of wells in places with above-ground streams suggests that people in the early 20th century relied considerably on above-ground stream water for daily use where it could be found, and only dug wells in places where stream water was not available.
- C. *European Settlement*: Figure 11-10 shows the locations of different European settlements recorded on the island. Except for Frazer’s house and sugar mill, these sites are confined to the western coast and offshore islands.
- D. *Palaces*: The locations of palaces and large manor houses of Omani elite that Khan Bahadur depicted are shown in Figure 11-10. Rhodes et al. (2015) discuss Omani palatial complexes in greater detail.
- E. *Miscellaneous Features*: Figure 11-10 also shows miscellaneous features on the Khan Bahadur map. These features include lighthouses, “poor houses”, a leper colony, a sanatorium, a depiction of a building with a Christian cross, and several ruins listed by Khan Bahadur that I cannot find mentioned anywhere else, among other things. There are also several drawings of buildings that stand out from the settlement squares, having been drawn with a pointed roof; these are marked “Building” on the map.
- F. *Place names*: The Khan Bahadur map lists 153 place names that do not appear to be related to any settlement. The locations of these names are portrayed in Figure 11-10, though it is difficult to depict them all at once and properly label them, so their distribution alone is shown.

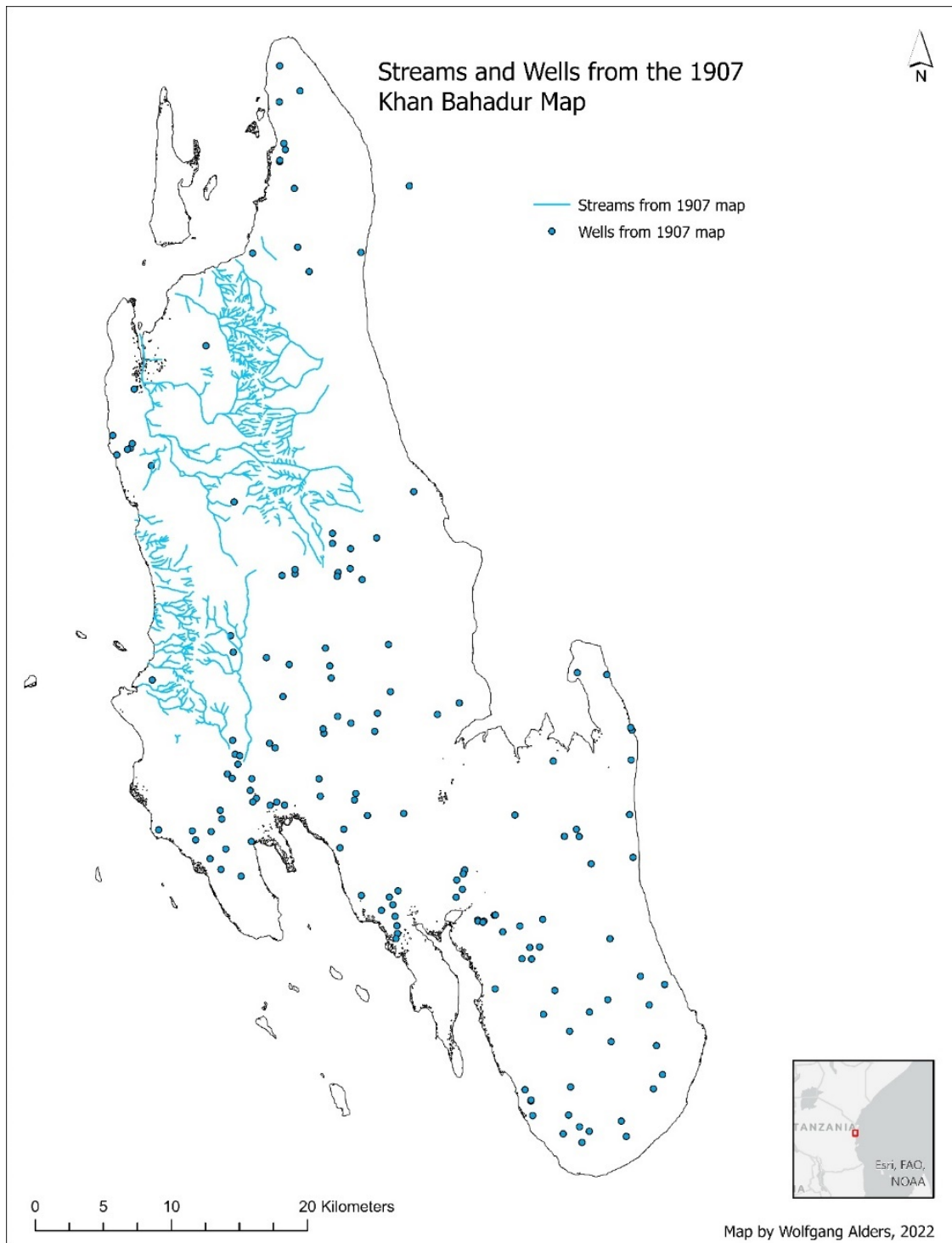


Figure 11-9. Streams and wells from the 1907 Khan Bahadur map.

Other features from the 1907 Khan Bahadur map

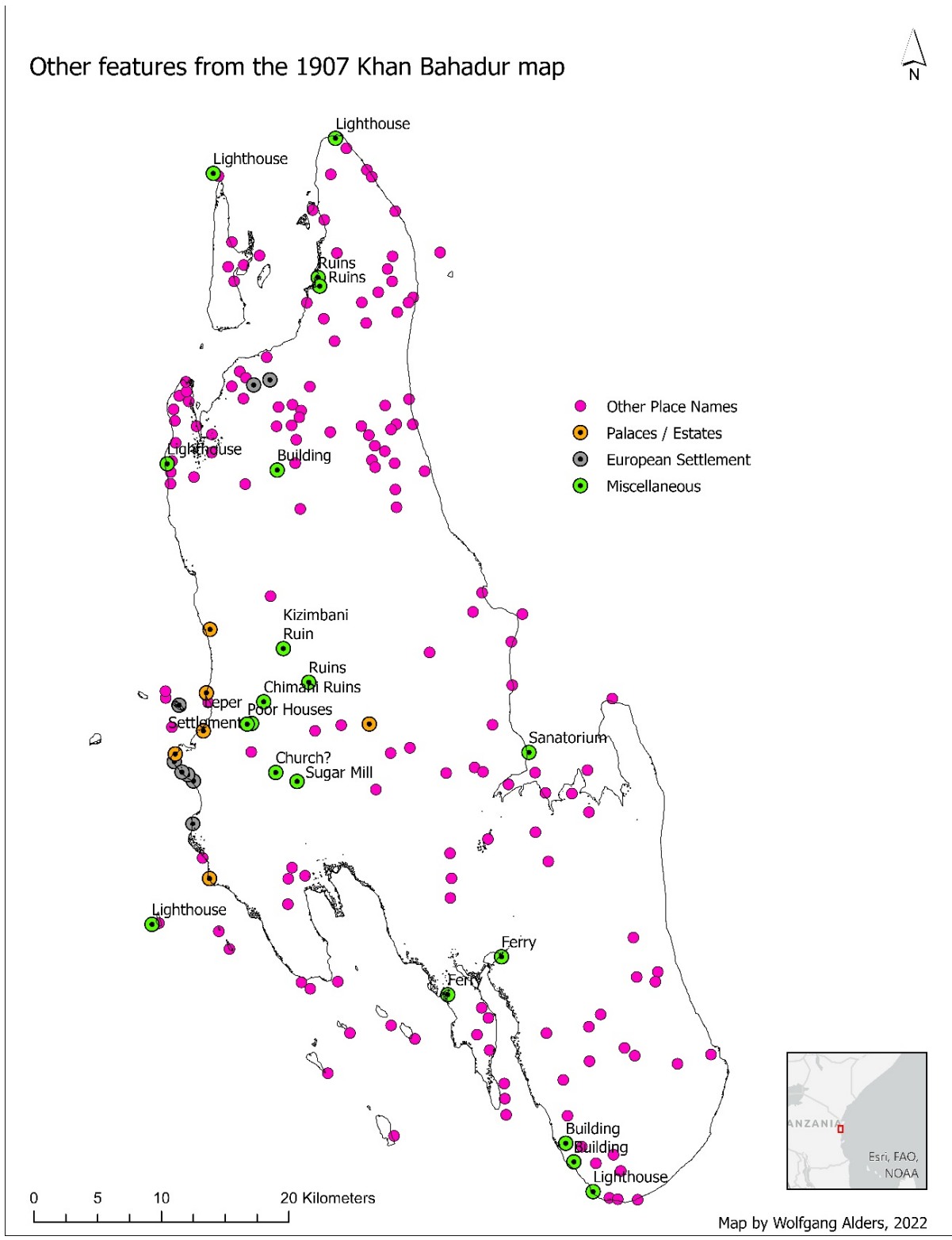


Figure 11-10. Miscellaneous features, European settlement, palaces, and place name locations on the 1907 Khan Bahadur map.

11.3 Visualizing Regional Settlement in the Late 19th / Early 20th Century

As with the 2019 survey sites in Chapter 10, I used heat map symbology for the Khan Bahadur sites in order to visualize site clusters and population centers.

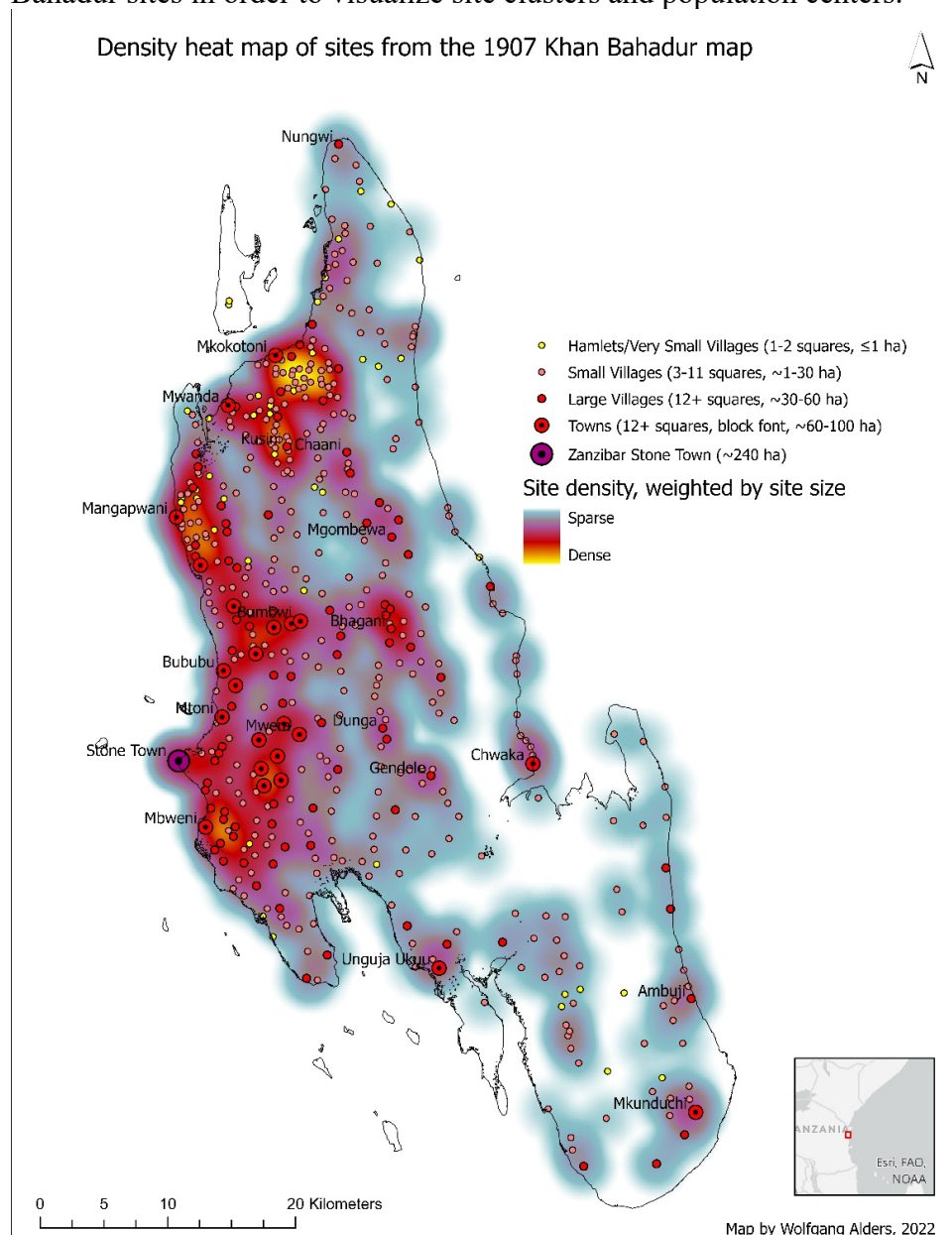


Figure 11-11. Heat map of 1907 settlement.

Figure 11-11 shows a heat map symbolizing local site densities in Zanzibar. The heat map is also weighted by average site size, meaning that large sites created more “heat” compared to smaller sites. This makes the map a visual proxy for population size across the island. Several hotspots become apparent when viewing the map in this way. Zanzibar Stone Town, while the largest site, does not overshadow other settlement clusters on its own. Most site clusters lie in the western part of the island, around the coastal towns of Mbweni, Bububu, Mangapwani, Mwanda, and Mkokotoni, and inland at Mwera, Bumbwi, and Kusini. Other notable inland clusters include smaller groups around Chaani, Mgombewa, Bhagani, Dunga, and Gendele. Finally, some

population clusters exist in the south and east of the island, at Unguja Ukuu, Chwaka, Ambuji, and Mkunduchi (modern Makunduchi).

11.4 Geospatial Analysis

The relationships between site size and site clustering can also be quantified through spatial analyses. Chapter 10 already introduced the methods of rank-size analysis and spatial cluster analysis with Ripley's K function. I apply these methods below to the early 20th century settlement systems depicted in the Khan Bahadur map.

11.4.1 Site Rank-Size Distribution

As stated in Chapter 10, the rank-size rule predicts a normative relationship between the logarithm of site size compared to the logarithm of site rank, which forms a straight line when graphed. Deviations from the log-normative line include convex, concave, or primo-concave distributions which may reflect differences in settlement integration. These differences can be used alongside other lines of evidence to theorize about site heterarchy or hierarchy.

Rank-size analysis was initially developed to theorize urban settlement distributions in Europe and the Americas (Berry 1961; Johnson 1980 Zipf 1949), not plantation societies in coastal East Africa. Therefore, standard interpretations about the meanings of convex, concave, primate, primo-convex, or log-normative distributions (see Chapter 10) may not directly apply. In the following analyses, I have tried to offer explanations for settlement distributions that consider the specific conditions of Zanzibar based on historical and archaeological research. The results not only inform understandings of Zanzibar's settlement history but may also provide insights for interpreting site-size hierarchies in other parts of the world.

One advantage of the 1907 site dataset is that it includes settlement for the entire island, meaning that rank-size distributions will reflect a complete site population. This is difficult to achieve through archaeological methods. I applied rank-size analysis to sites of the whole island, as well as across three geographical zones: the north, the center, and the south of the island. I modeled three different zones in order to test whether the rank-size distribution for all sites reflects a uniform pattern across the island, or whether different settlement systems might have been operating in different areas. Also, since site size was only estimable as a size class, this produced rank-size graphs that show angular curves, since all sites of the same size class are listed as having the same site size. To make the graphs easier to read, I used Excel to randomize site size between a specific range for each size class. This produces a more standard rank-size curve that is easier to read, while being no more or less accurate than the angular graphs. For clarity, I have represented both below.

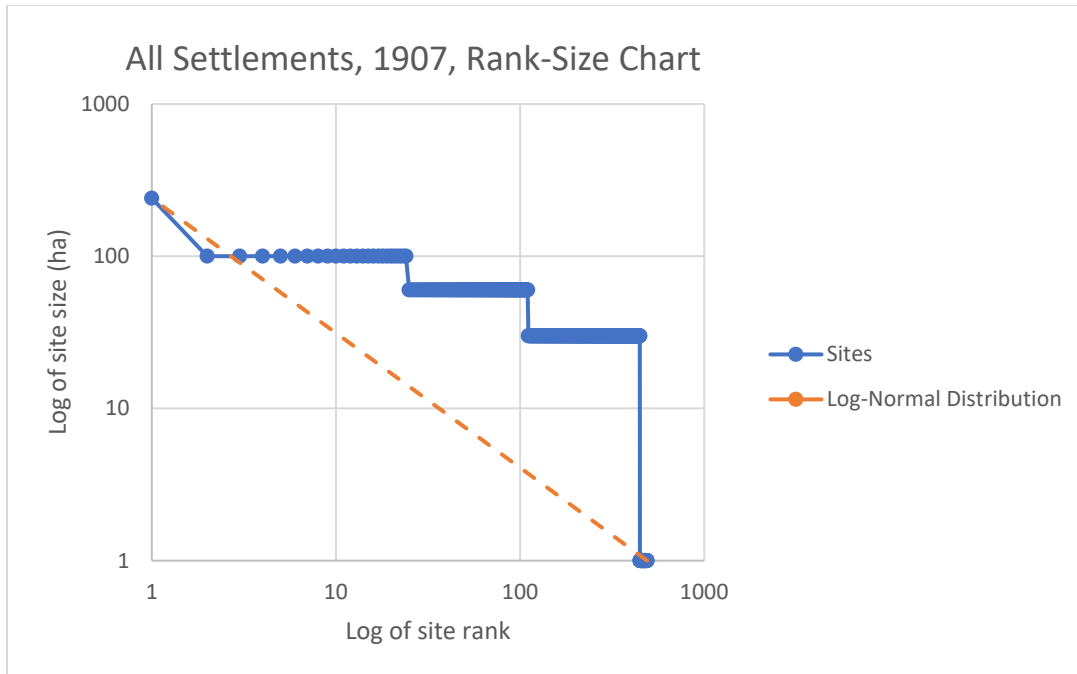


Figure 11-12. Rank-size distribution for the 1907 sites of the Khan Bahadur map.

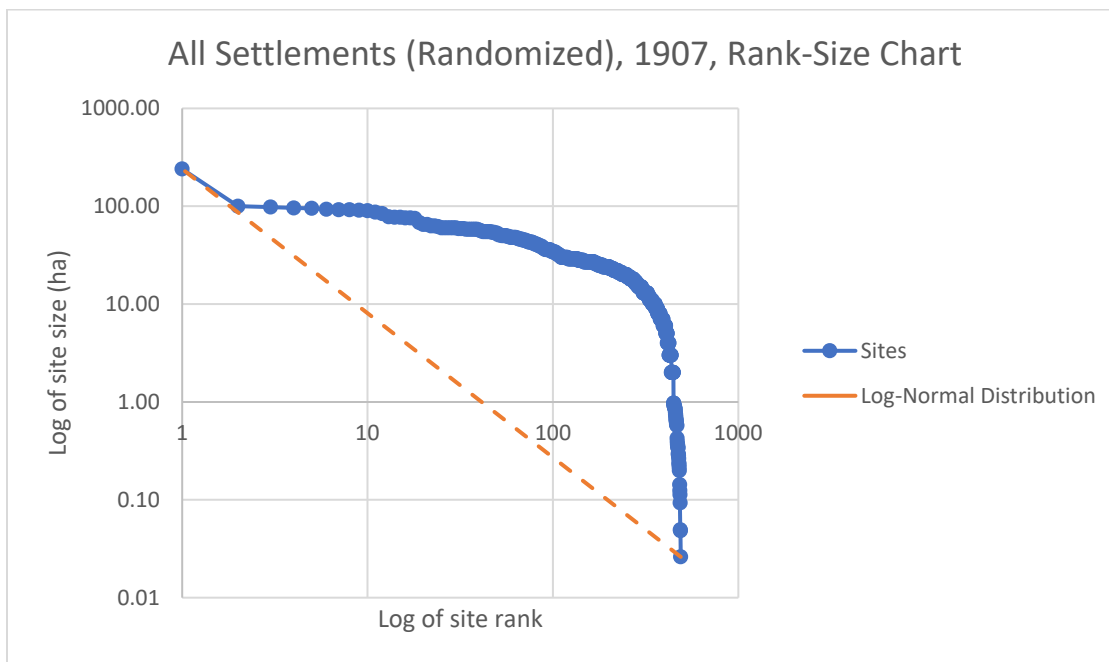


Figure 11-13. Rank-size distribution for the 1907 sites of the Khan Bahadur map, with randomized site sizes within a range for each site class.

The rank-size distribution for all 1907 sites forms a slight primo-convex distribution, or a convex distribution for most sites with an almost log-normal distribution at the top, for Zanzibar Stone Town (Figure 11-12, Figure 11-13). Stone Town is clearly the primate site, but it does not dominate the landscape in terms of size in a way that would produce a primate distribution. This is also visible in the heat map shown above in Figure 11-11. While Stone Town was the center of political and economic power by the early 20th century, it was not large in comparison to the

combined populations of towns on other parts of the coast and in the countryside. This likely reflects Stone Town's position for most of the 19th century as the capital city of a slave state. Under the conditions of plantation slavery, populations were not compelled to the urban center by opportunities for labor and trade. Rather, enslaved people, who may have made up around half of Zanzibar's population, were made by force to stay on agricultural estates in rural areas. As shown in previous chapters, the arrival of enslaved people produced many of the towns like Chaani, which had developed into a large settlement in the inland area by the mid-19th century. Furthermore, Swahili people in rural communities probably also did not migrate to Stone Town in significant numbers, preferring instead to acquire small amounts of cash by working on clove estates during the clove harvest (e.g., Glassman 2011). By the early 20th century, the formerly enslaved populations of the island had settled into squatter communities, especially in the western areas, where they continued to work on clove plantations. Overall, the economic and political forces on the island compelled people to remain in agricultural, rural areas, rather than to migrate to the city. This only changed in the late 20th century, as tourism overtook clove production as the primary economic source of income for Zanzibar, and Stone Town became the central hub for the tourist industry. Today, Stone Town and the surrounding suburbs make up a far larger proportion of settlement on the island than they ever did in the past (e.g., see the Land Use raster in Chapter 3, showing the extent of modern urban areas).

To see if different regions on Zanzibar exhibit a consistent rank-size distribution compared to all sites combined, I divided the island into three zones: north, central and south (Figure 11-14). These zones are roughly even in area, but edge effects may bias some interpretations. In the following sections, I present the rank-size distribution analysis for each zone.

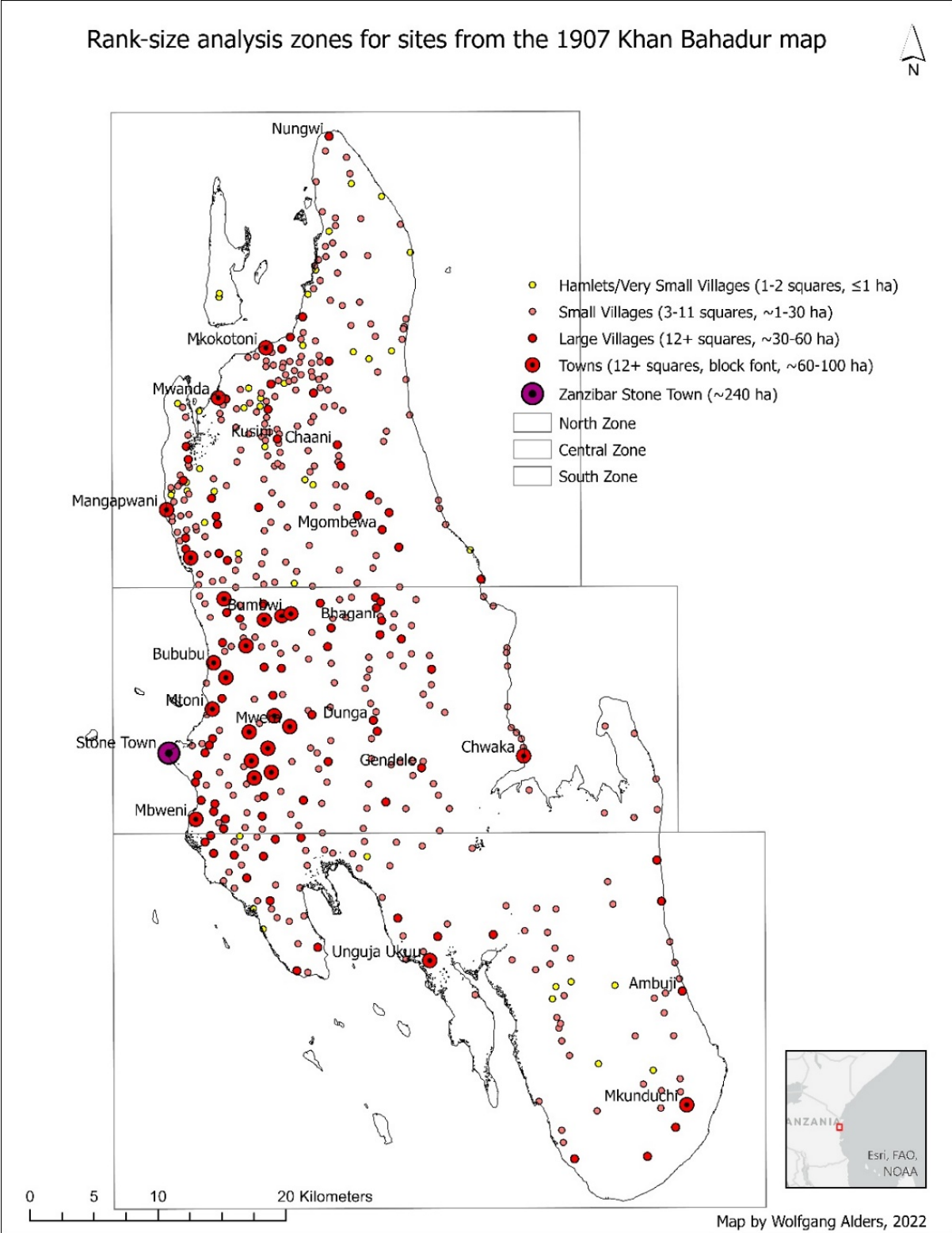


Figure 11-14. Rank-size analysis zones for Zanzibar.

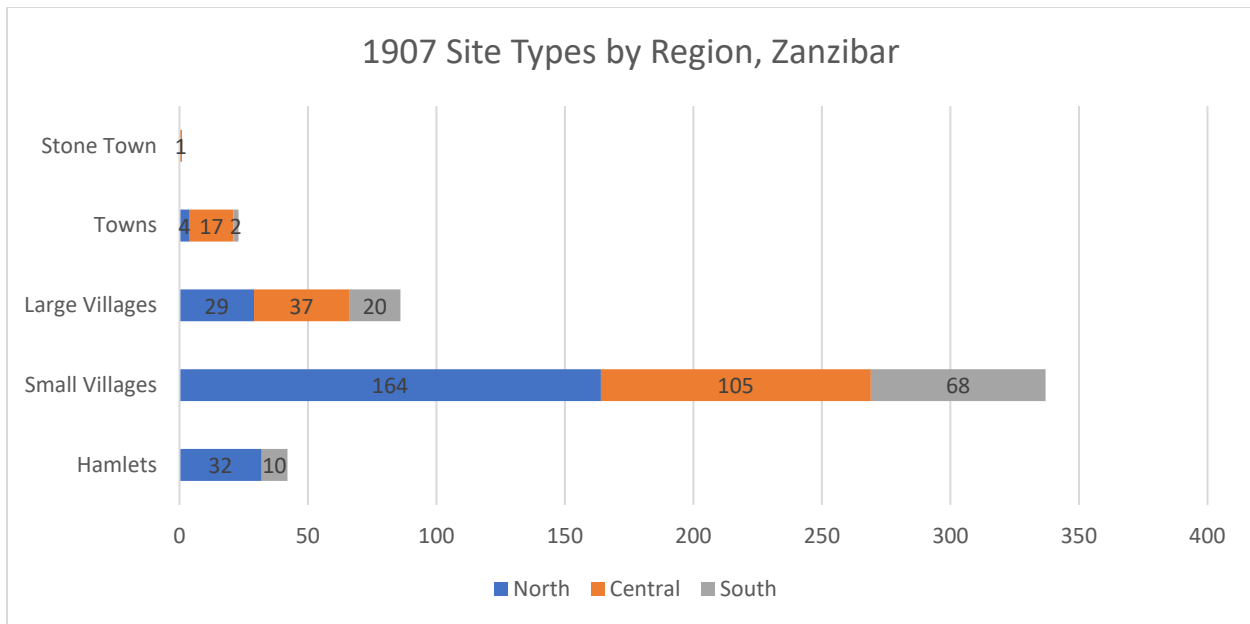


Figure 11-15. Relative distribution of site types across each zone.

Figure 11-15 shows some patterns that are immediately apparent when comparing site types between regions. Hamlets are found only in the south and north, suggesting that they were integrated into larger settlements in the central region, which is nearest to Stone Town and has the largest number of towns. Small villages and hamlets are most numerous in the north, which has the largest number of settlements in general. Large villages and towns are most numerous in the central region. The southern region has the fewest settlements in general and the smallest counts for all types, despite being roughly similar in area to the other zones.

In the following sections, I discuss site-size distributions for each region.

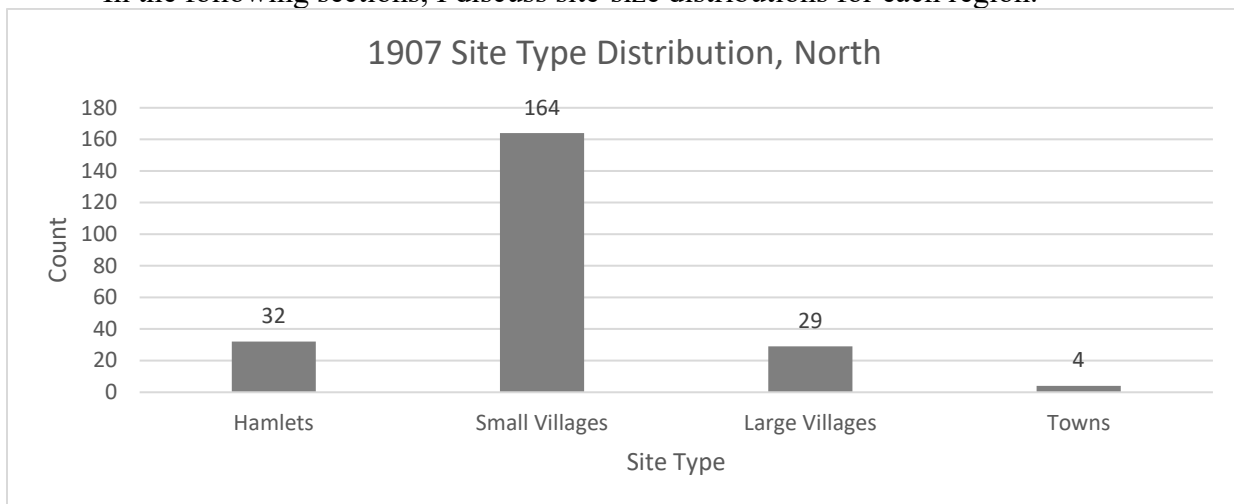


Figure 11-16. Site type distribution in the northern region, for the 1907 sites.

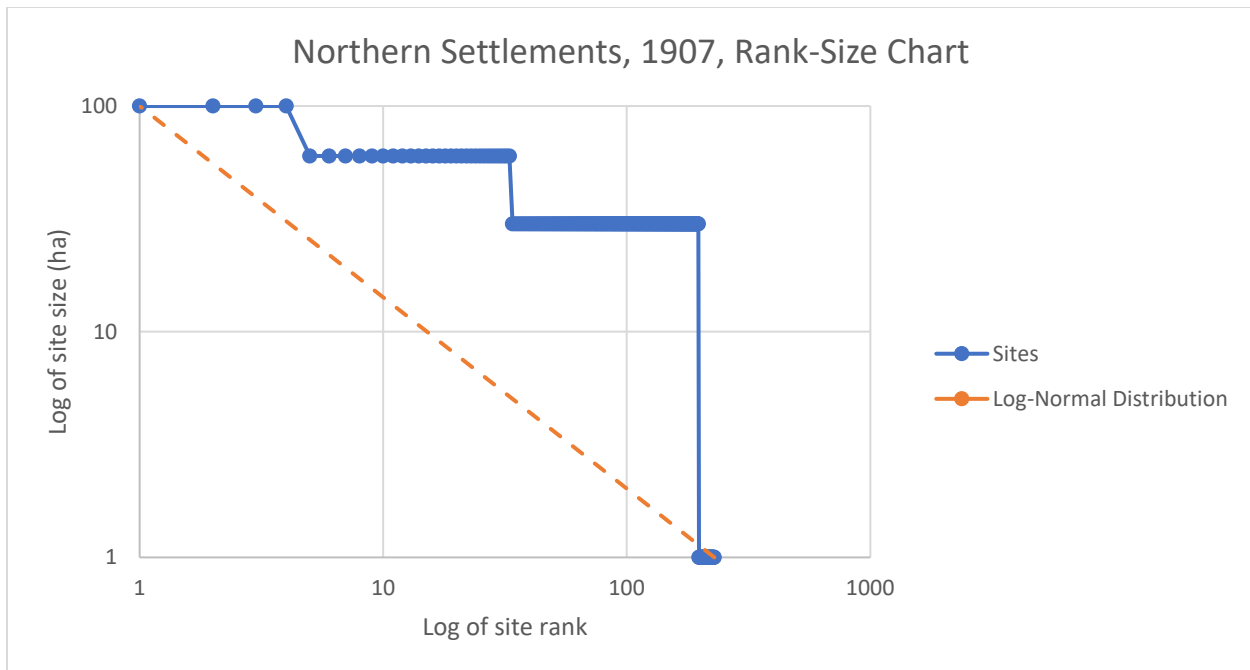


Figure 11-17. Rank-size graph for 1907 settlements in the north region.

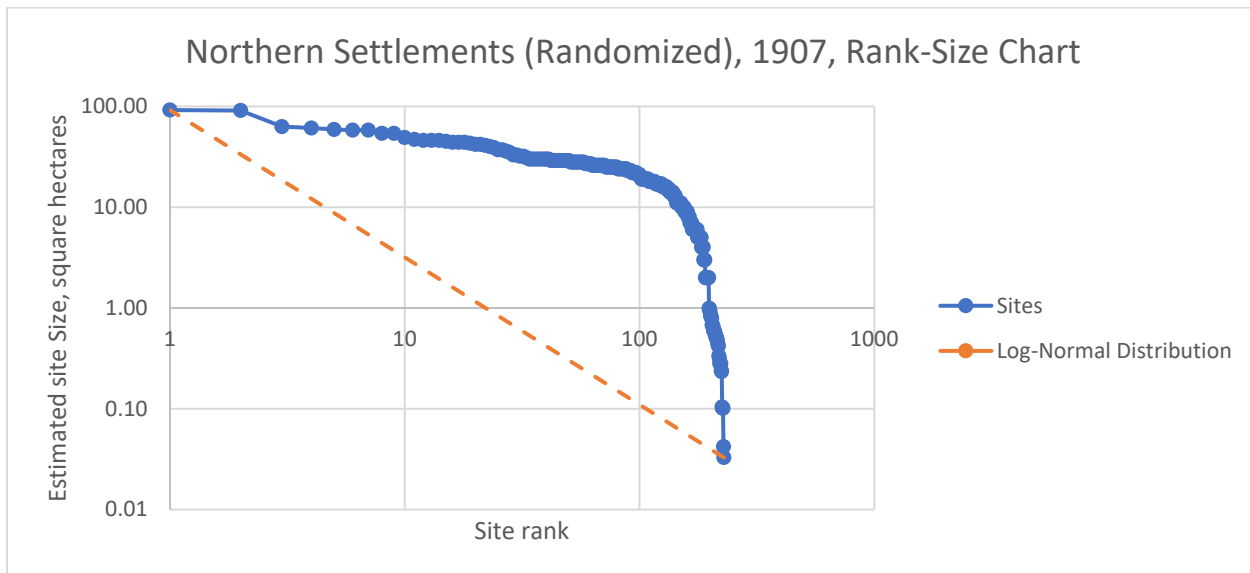


Figure 11-18. Rank-size graph for 1907 settlements in the north region, with randomized site sizes within each size class.

Figure 11-16 shows the distribution of site types across the northern region. Figure 11-17 and Figure 11-18 show the rank-size graphs for this region. The north shows a clear convex distribution. This pattern reflects the relatively large number of hamlets (32 out of a total of 42 depicted on the entire map), the large number of small villages in the inland areas, and the relatively small number of large villages and towns.

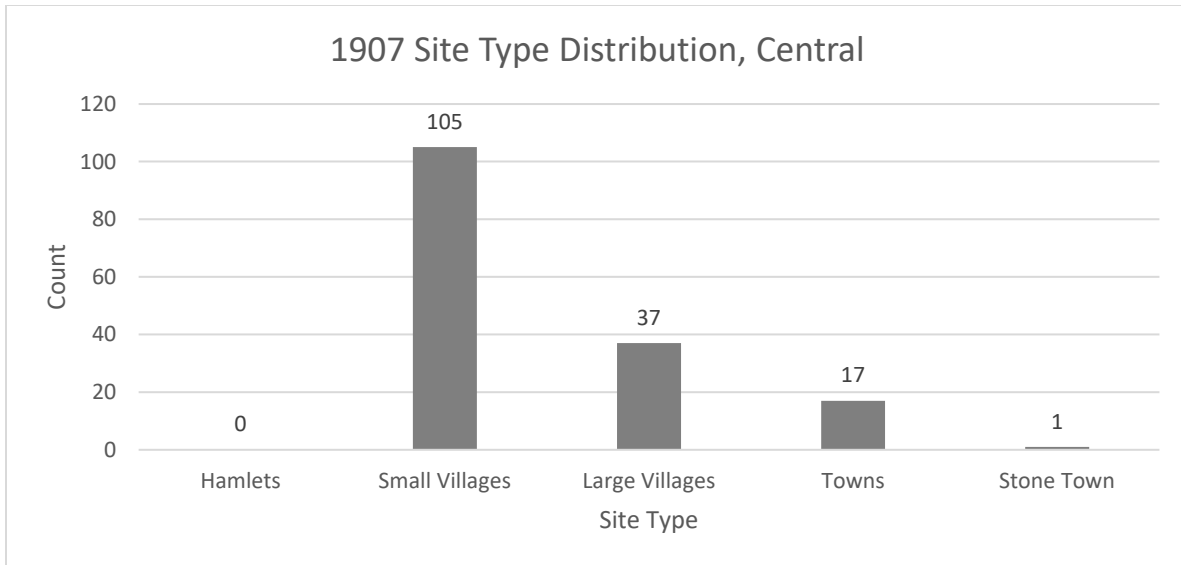


Figure 11-19. Site type distribution in the central region, for the 1907 sites.

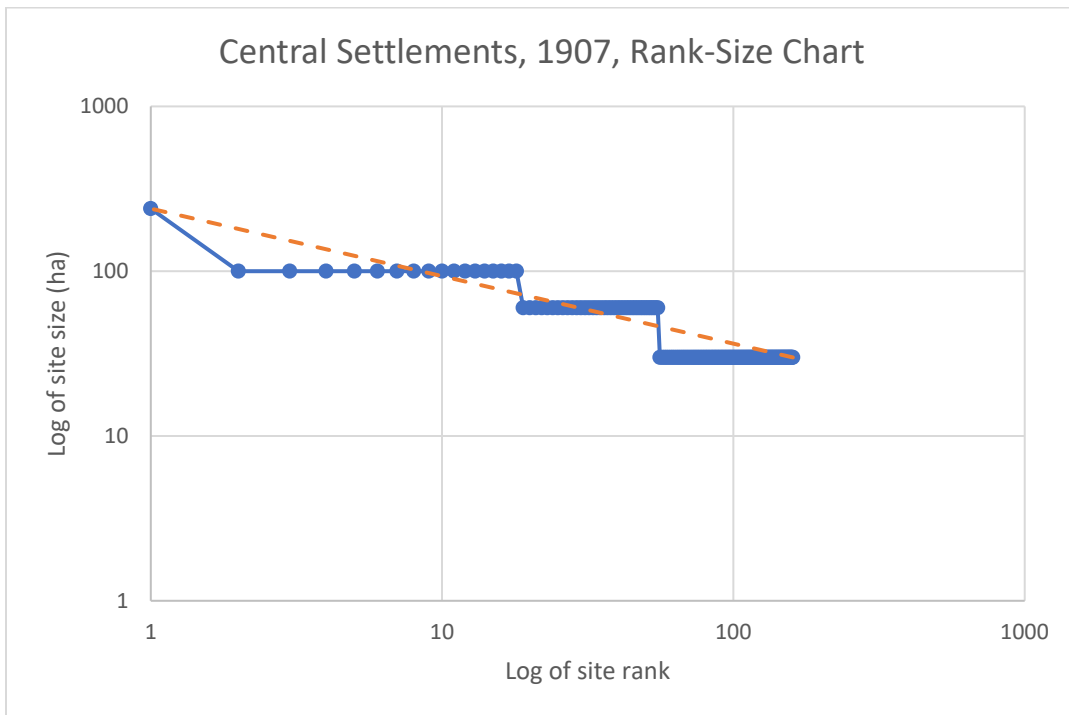


Figure 11-20. Rank-size graph for 1907 settlements in the central region.

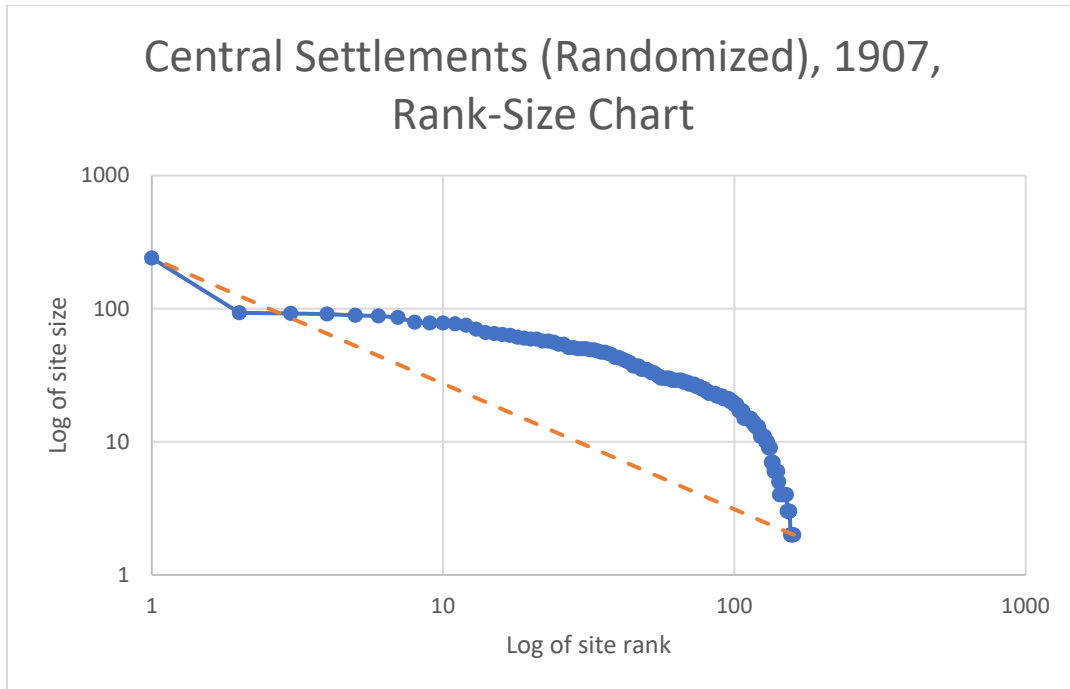


Figure 11-21. Rank-size graph for 1907 settlements in the central region, with randomized site sizes within each size class.

Figure 11-19 shows the site type distribution for the central region, and Figure 11-20 and Figure 11-21 show the rank-size graphs for this region. The rank-size distribution is a primo-convex curve, reflecting the presence of Stone Town among a relatively large number of towns and large villages in the inland areas, and a relatively smaller number of small villages. This distribution highlights the role of Stone Town as the primate settlement, but the lack of a concave distribution demonstrates the political and economic forces (namely, plantation slavery and the subsequent tenant squatter system) which kept people from migrating to the town.

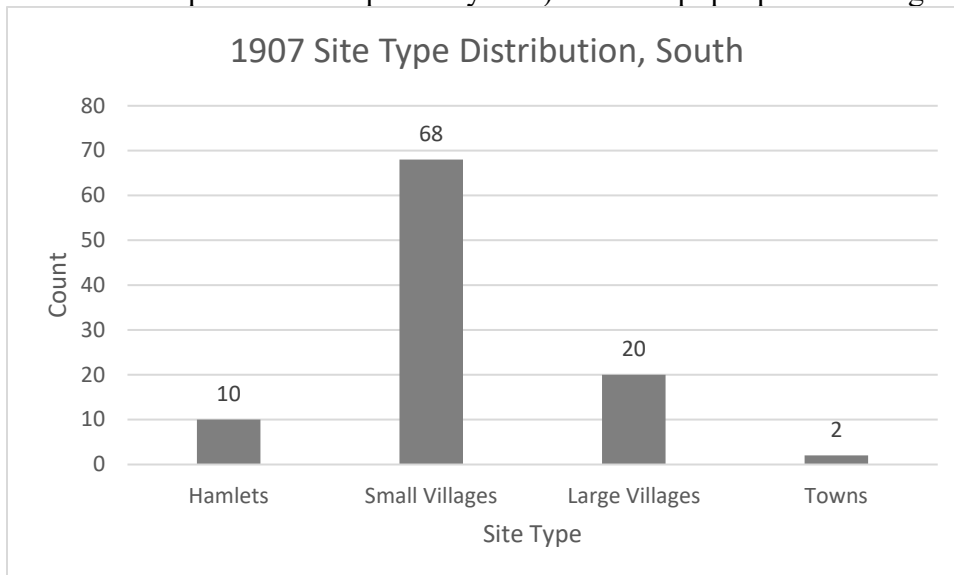


Figure 11-22. Site type distribution in the south region, for the 1907 sites.

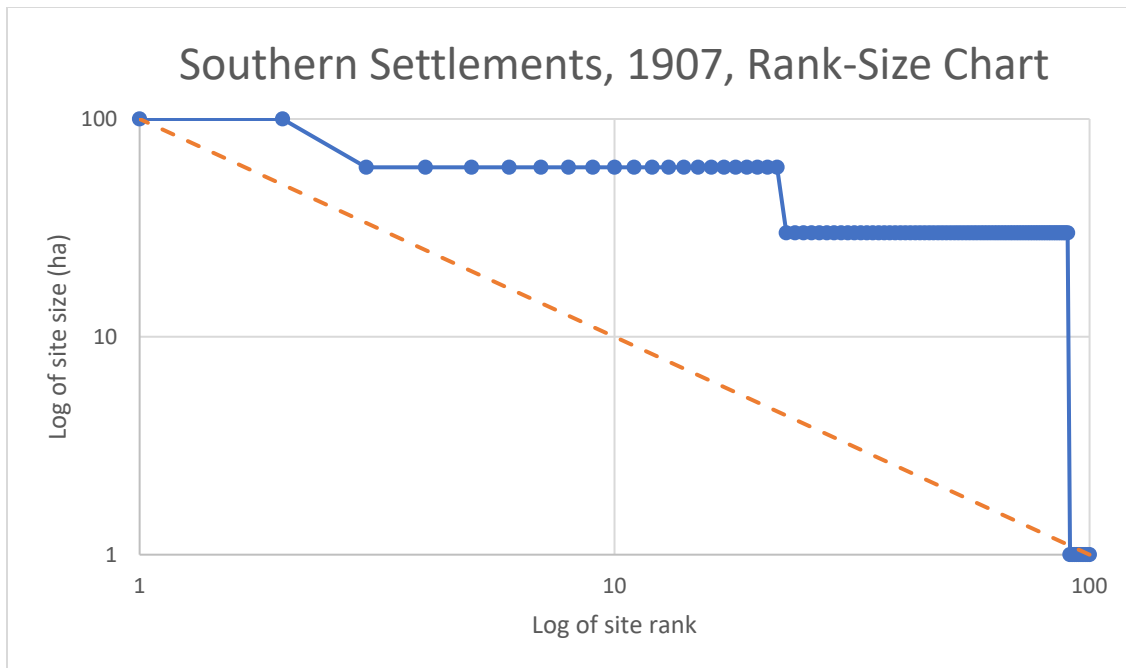


Figure 11-23. Rank-size graph for 1907 settlements in the south region.

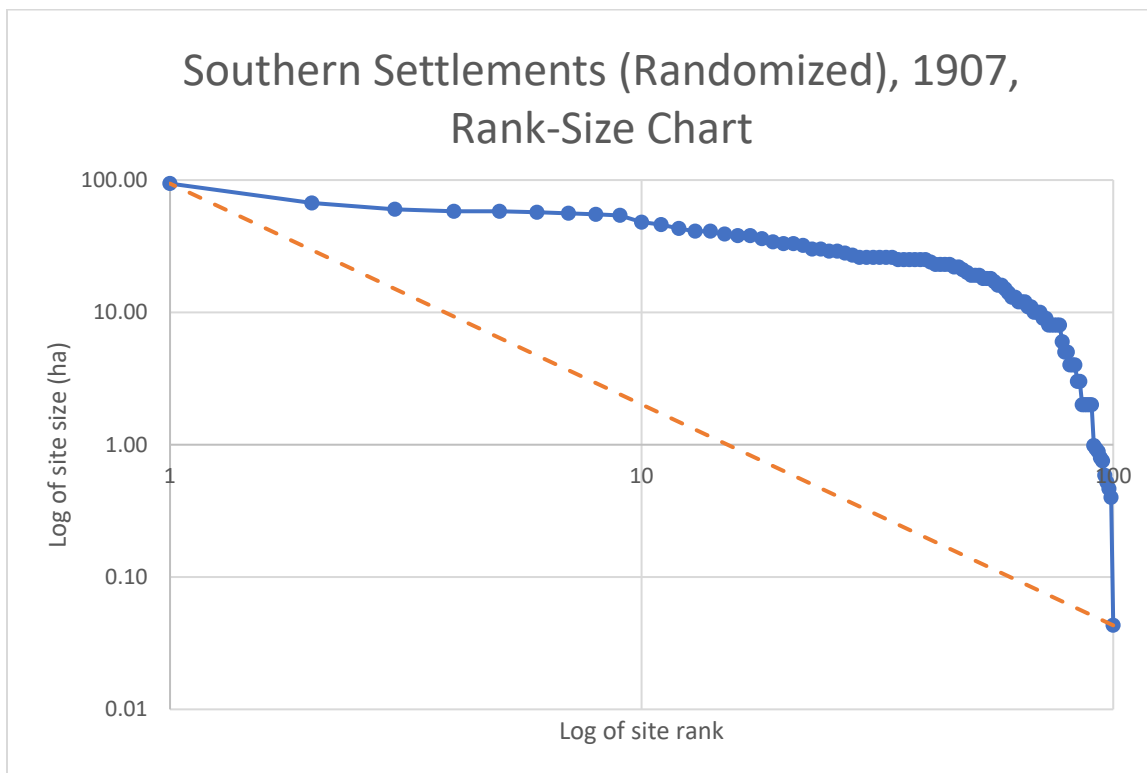


Figure 11-24. Rank-size graph for 1907 settlements in the south region, with randomized site sizes within each size class.

Figure 11-22 shows the site size distribution for the southern region. Figure 11-23 and Figure 11-24 show the rank-size graphs for the south. The southern region, like the north, has a convex rank-size distribution. More so than the central or north region, the south did not see the

development of plantation systems during the 19th century, and instead became a refuge for indigenous Swahili people who were dispossessed by Omani planters from more favorable farmland. The overall smaller number of sites reflects the relatively small number of East African enslaved people who ended up settling in this region compared to the center and north. The convex distribution reflects the fact that indigenous Swahili village communities retained a degree of autonomy and independence and were not dominated by any of the largest sites. The largest settlements in the region, Unguja Ukuu and Mkunduchi (today called Makunduchi) are smaller than the rank-size rule would predict, suggesting that they had limited influence over the rest of the settlement system.

In sum, the rank-size distributions for these three regions attest to the specific character of urban and rural development of the plantation system, which took place in Zanzibar over the 19th century. Zanzibar Stone Town became the wealthiest city in the western Indian Ocean by the mid-19th century, and while Stone Town was the economic and political center of power on the island, this did not produce a concave rank-size distribution as one might expect. Elites in Stone Town dominated the island, but they used their political and economic power to maintain a plantation system that required large numbers of people, enslaved and free, to live and settle in the rural areas. Migration to the city was curtailed, both because it would divert labor from the plantation system, and because it likely posed a threat to elite power to have too many enslaved and dispossessed people congregating around the center of wealth itself. Stone Town, then, was more like a “gated community” than a traditional primate urban center. Urban elites dominated the island politically and economically but used their power to keep most residents far from their mansions and warehouses in town. The villages and towns beyond the city formed a convex pattern because they could not develop their own local hierarchies to any real extent, equally subservient as they all were to the rulers in Stone Town.

This pattern persisted into the 20th century—it is telling that when Afro-Shirazi Party rebels overthrew the government in 1964, they planned and mobilized their actions in the rural countryside, and stormed into the city to seize power. The social base of the revolution was the rural peasant class comprised of indigenous Swahili and descendants of enslaved people, who by the 1960s had formed a shared identity as dispossessed African agricultural laborers.

11.4.2 Spatial Clustering and Dispersion with Ripley’s K Function

Another method for evaluating 1907 settlement is through spatial cluster analysis. As stated in Chapter 10, Ripley’s K function is an ideal method for evaluating spatial clustering at different scales. I analyzed the 1907 sites for all three geographical zones as well as for the total settlement population, using the Multi-Distance Spatial Cluster Analysis tool. As I did for the 2019 survey sites, I set the number of distance bands to 30, starting at 100 meters. This meant that I analyzed each site in relation to others starting at a distance from 100 meters to three kilometers, at 100 m intervals. I compared the distribution of site points against a random sample of points within the same survey universe, which I plotted and replotted 999 times using the permutation function in ArcGIS Pro.

In the following graphs, the red line shows the observed clustering in relation to the blue line, which is the expected clustering of a random sample at each distance interval. Only in places where the red line falls outside of the confidence envelopes (the dashed lines) is clustering statistically significant.

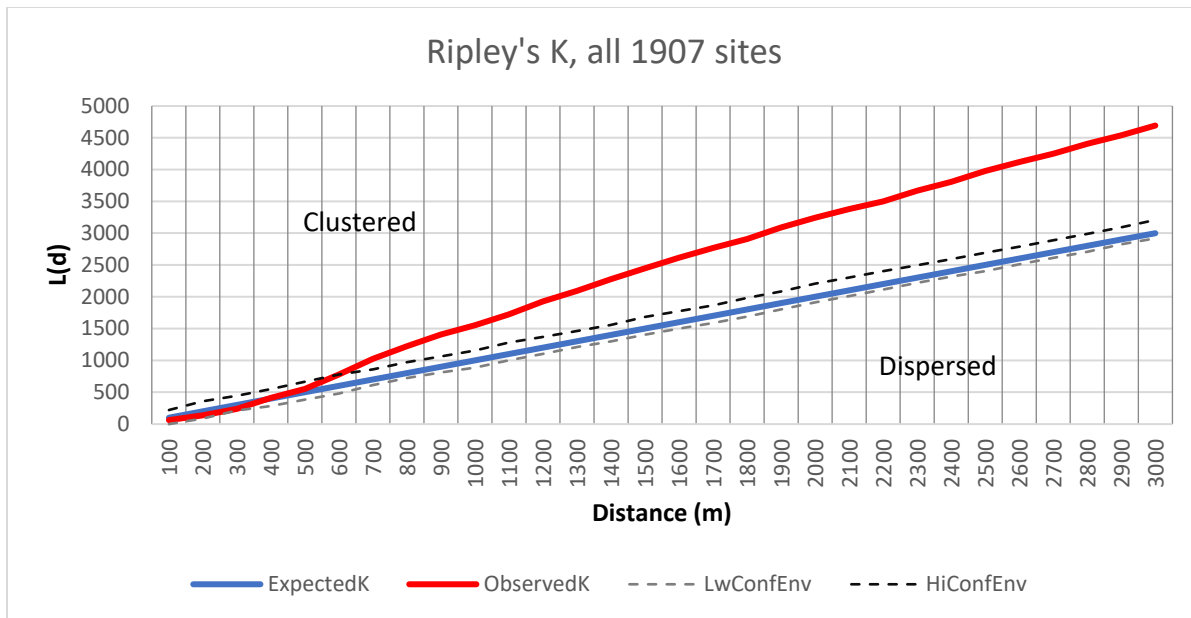


Figure 11-25. Ripley's K for all settlements in the 1907 Khan Bahadur map.

Ripley's K function for all settlements (Figure 11-25) shows significant spatial clustering at every distance interval past 600 meters. This is similar to the spatial pattern for the sites our survey identified for the late colonial period, which are also clustered.

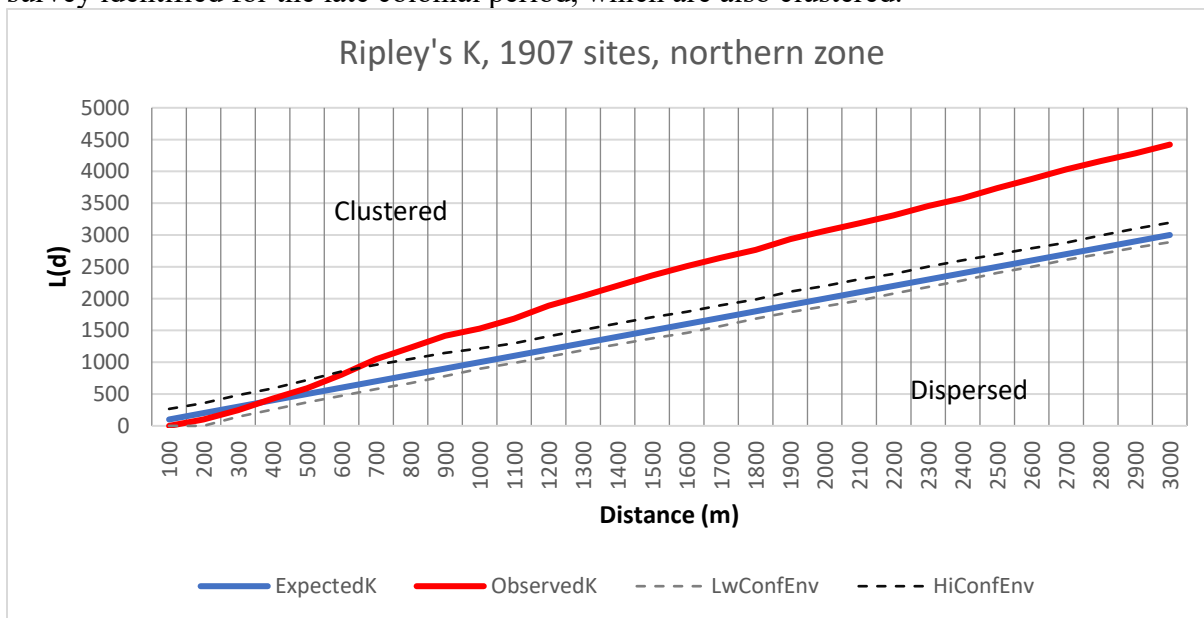


Figure 11-26. Ripley's K function for northern settlements in the 1907 Khan Bahadur map.

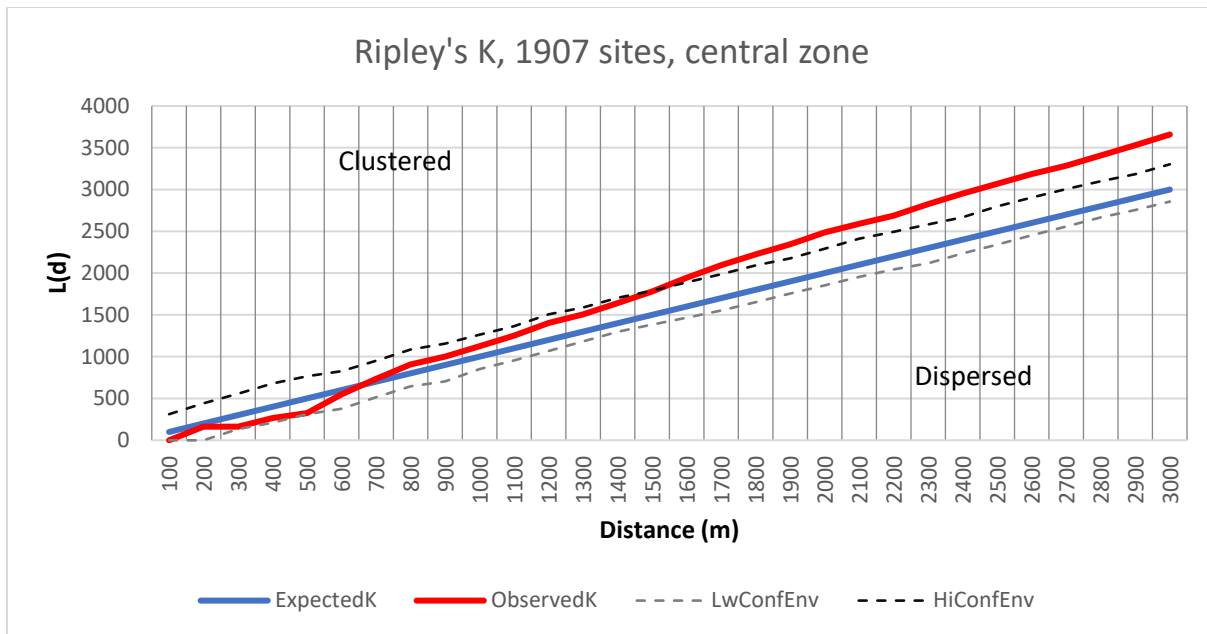


Figure 11-27. Ripley's K function for central settlements in the 1907 Khan Bahadur map.

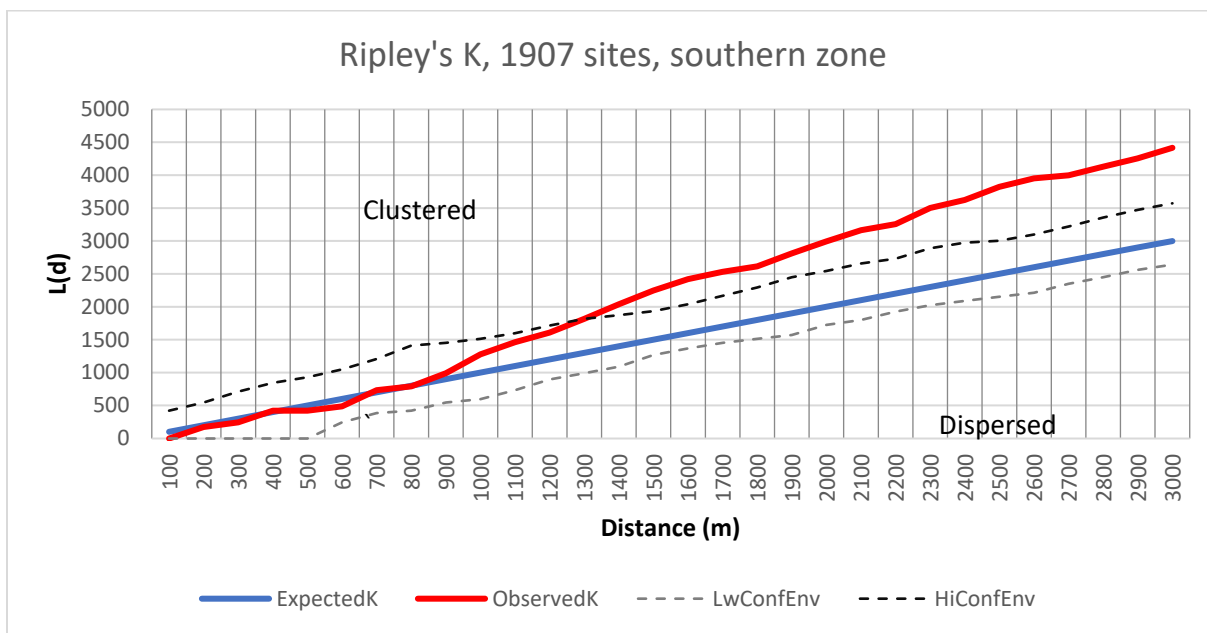


Figure 11-28. Ripley's K function for southern settlements in the 1907 Khan Bahadur map.

Overall, settlement is spatially clustered in statistically significant ways across all zones. However, it is more clustered in the south (Figure 11-28) and north (Figure 11-26) than in the central region (Figure 11-27). This likely reflects the large site size classes in the center, which, when represented as points, may appear more dispersed due to their greater size. In reality, populations are not well represented by points, and it may be the case that populations across the center landscape are just as clustered as elsewhere on the island.

Chapter 10 showed that archaeological settlements in the north-central part of the island shifted from a dispersed pattern in the early and mid-second millennium to a clustered pattern by the late colonial period, which is also reflected here for the complete population of sites for the

late 19th century. It is difficult to explain spatial clustering across the island without considering the broader context of Zanzibar’s rural settlement system. Spatial clustering at smaller-scales may be the result of indigenous Swahili kin-based land tenure systems that promote the settlement of younger members on the outskirts of the traditional land holdings of a clan (Middleton 1961). This theory might be supported by the fact that spatial clustering is strongest in the north and south, where kin-based Swahili land tenure systems were not fully supplanted by the plantation system and the arrival of enslaved East Africans. It is notable that spatial clustering became statistically significant at a closer distance interval in the north and south (between 600-900 meters), while it became statistically significant only at larger scales in the central region (around 1600 meters).

Spatial clustering at larger scales almost certainly occurred because of preferences for favored environmental zones. For instance, the predictive model for late colonial settlement that I created in Chapter 10, using site location data from the archaeological sites we identified and favored environmental zones for this period, quite accurately predicts the locations of the settlements recorded by Khan Bahadur in his 1907 map. I have reproduced this predictive model alongside the 1907 sites below, in Figure 11-29. Table 11-2 also quantifies this relationship and shows that the 1907 settlements from the Khan Bahadur map fall most densely into the “High Probability” areas of the late colonial predictive model. These two factors—the small-scale preference for settlement within a zone of kin-based Swahili land tenure, and large-scale preference for favored environmental zones, likely best explain the pattern of strong spatial clustering across the island during the late 19th century.

	Low Probability	Moderate Probability	High Probability	Total	Highest density:	CV:	std dev %
area (km2)	942	492	158	1592			
All Settlement (count)	150	231	99	480			
All Settlement (percent)	31%	47%	20%	100%		0.42	13.64%
Settlement per km2	0.1592	0.4695	0.6266	0.3015	High Probability		

Table 11-2. Settlements from the 1907 Khan Bahadur map across the zones of site detection probability based on late colonial sites recorded through archaeological survey in 2019.

Predictive model for the late colonial period based sites recorded in 2019, with the 1907 Khan Bahadur sites overlaid, Zanzibar, Tanzania

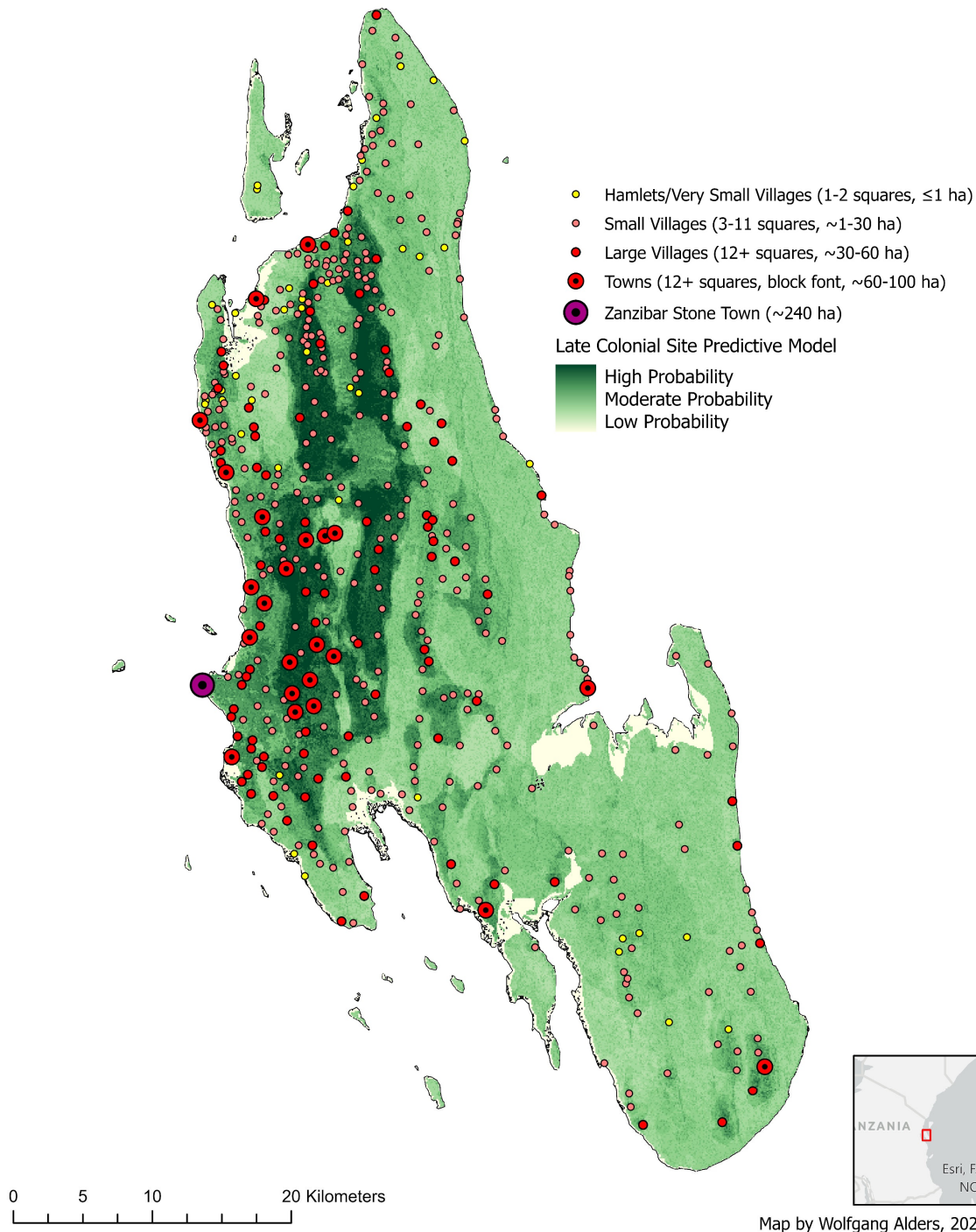


Figure 11-29. Predictive model for late colonial sites based on archaeological data, with 1907 settlements from the Khan Bahadur map overlaid.

To explore the relationships between environmental contexts and the settlement classes of the 1907 Khan Bahadur map, I turn to zonal statistical analysis in the following section.

11.5 Zonal Statistics of the Khan Bahadur Settlement Data

Zanzibar is environmentally diverse, far more so than its northern neighbor Pemba. The different environmental contexts across the island have influenced settlement systems since the initial colonization of the island. The environmental contours of the island also shaped the spatial development of the plantation system as well as settlement in the areas proximate to the clove plantations. Variable environments have in turn produced novel agricultural and subsistence adaptations by Swahili people, in response to a variety of factors.

Since the Khan Bahadur map represents a detailed record of settlement for the late 19th century, it is an invaluable resource for understanding the relationship between settlements and environmental contexts on the island. I used a method of zonal statistical analysis to assess the distribution of settlements in relation to social and environmental variables. This is the same method described in Chapter 10, that was used to assess the sites of the 2019 survey. The method involves converting historical and environmental maps into zonal rasters, and then assessing the pixel values of each zonal raster for the areas covered by settlement.

I used the same method described in Chapter 10 for converting historical and environmental maps into 15 zonal rasters. The zonal rasters reflect: 19th century plantation zones, elevation in meters, slope degree, aspect, or the orientation of hillslopes, a DEM derived water flow model, streams and wells indicated by Khan Bahadur on the 1907 map, a 20m land cover map from the European Space Agency's Climate Change Initiative project, a soil infiltration map by Hardy et al. (2015), a geology map by Colbert et al. (1987), a soil type map by Khamis et al. (2017), a map of distances to the sea that I created from SRTM DEM data, and a map of distance to reefs I created using data from Khamis et al. (2017).

Since settlements are not just points on a landscape but also cover an area, it was necessary to convert the 1907 settlement points into polygons to be queried against zonal rasters. Using size estimations based on square count and measurements (see Table 11-1) I created buffer polygons for each size class, which I then converted into unique values. The result was a polygon for each settlement, based on the average area of the size class to which it belongs.

Statistical Analysis: I used the same zonal statistical methods for late colonial sites described in Chapter 10 for the analysis here. For each zonal map, I compared the settlements of the Khan Bahadur map by count, percent, density, and evenness of distribution. Density is calculated by dividing the site count for each zone by the area for each zone. I calculated evenness of distribution by finding the standard deviation in percent, which can be used to compare the relative evenness of distribution between site types. I then calculated the coefficient of variation (CV) by dividing the standard deviation by the mean for all sites. This produces a measure of distribution. A coefficient of variation between 0 and 0.5 indicates that site distribution is mostly even between zones. A coefficient of variation between 0.5 and 1 indicates that site distribution is slightly uneven between zones. A coefficient of variation between 1 and 1.5 indicates that site distribution is strongly uneven between zones. The following sections show the results of my zonal statistical analysis.

11.5.1 19th Century Plantation Zones

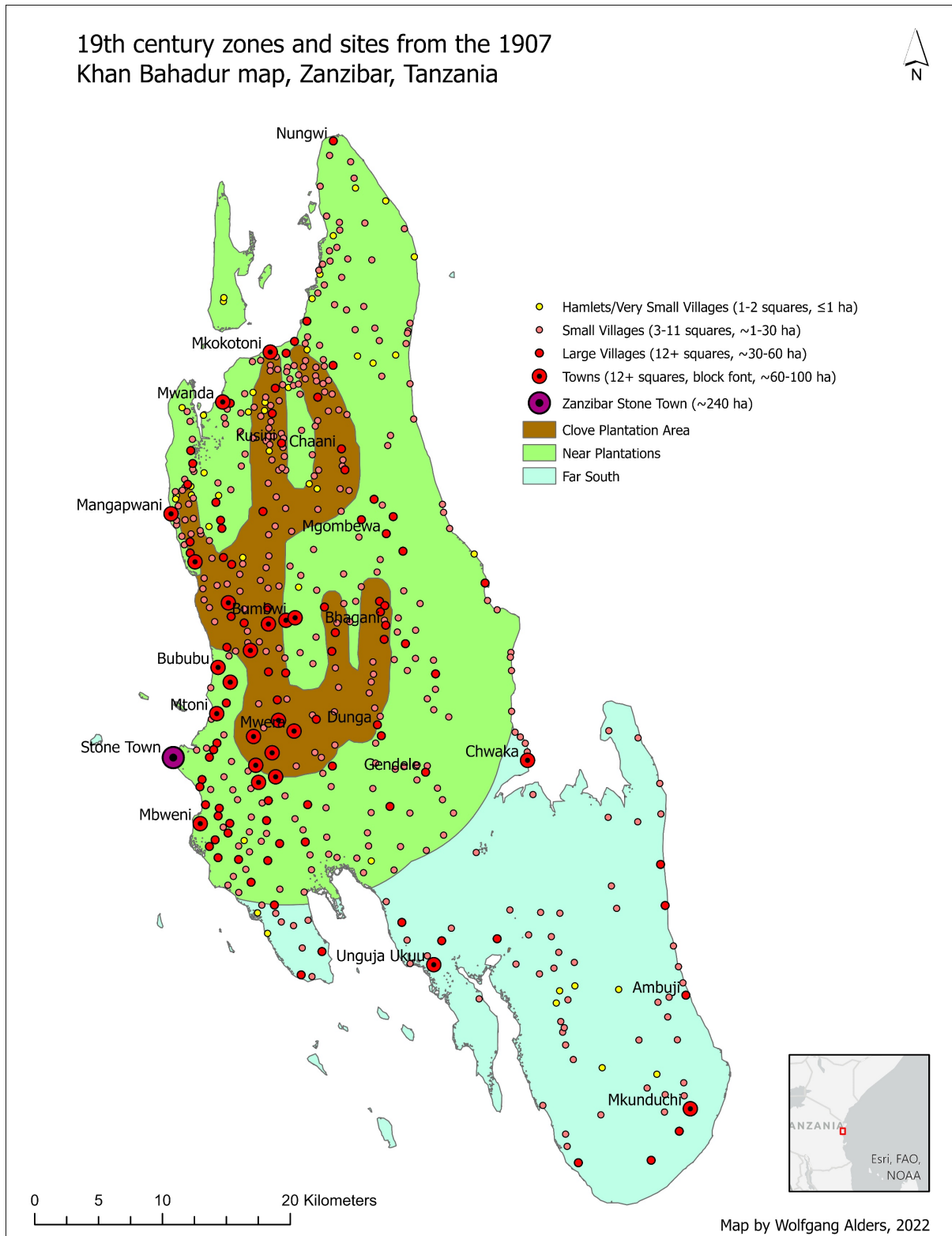


Figure 11-30. Island zones along with sites from the 1907 Khan Bahadur map.

I analyzed the settlement patterns from the 1907 map across the zonal raster for clove plantations (Figure 11-30). Zonal statistics for the settlements are shown below in Table 11-3. Settlement was densest in the clove plantation zone, moderately dense in the areas near the clove plantation zone, and least dense in the far south. The CV for all site size classes is relatively low, suggesting that while the clove plantation zone is the most favored location, it is not strongly favored compared to others.

	Clove Plantation Zone	Near Clove Plantation Zone	Far South	Total	Highest density:	CV:	std dev %
area (km2)	258	766	581	1605			
Hamlets (count)	9	25	8	42			
Hamlets (percent)	21%	60%	19%	100%		0.68	22.71%
Hamlets per km2	0.0349	0.0326	0.0138	0.0262	Clove Plantation Zone		
Small Villages (count)	108	169	60	337			
Small Villages (percent)	32%	50%	18%	100%		0.49	16.21%
Small Villages per km2	0.4186	0.2206	0.1033	0.2100	Clove Plantation Zone		
Large Villages (count)	27	47	12	86			
Large Villages (percent)	31%	55%	14%	100%		0.61	20.42%
Large Villages per km2	0.1047	0.0614	0.0207	0.0536	Clove Plantation Zone		
Towns (count)	10	10	3	23			
Towns (percent)	43%	43%	13%	100%		0.53	17.57%
Towns per km2	0.0388	0.0131	0.0052	0.0143	Clove Plantation Zone		
All Settlement (count)	154	251	83	488			
All Settlement (percent)	32%	51%	17%	100%		0.52	17.28%
Settlement per km2	0.5969	0.3277	0.1429	0.3040	Clove Plantation Zone		

Table 11-3. Zonal statistics for the clove plantation zones.

11.5.2 Soil Types

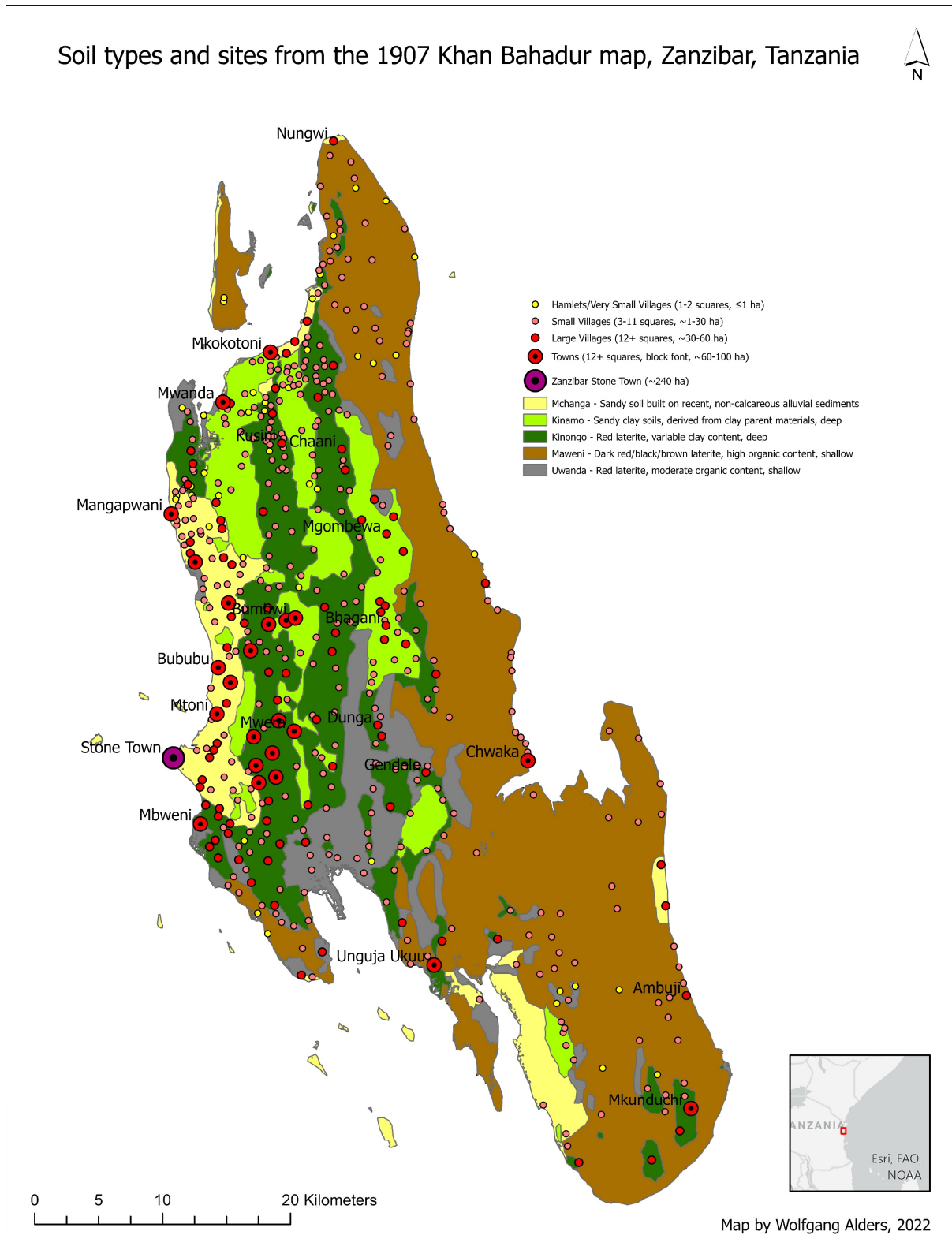


Figure 11-31. Soil zones along with sites from the 1907 Khan Bahadur map.

I describe soil types in greater detail in Chapter 3. Khamis et al (2017: 120) created a soil map of Zanzibar by digitizing soil maps produced in 1955 and 1971 by the Department of Rural and Urban Planning in Zanzibar (Khamis et al. 2017: 119). This map shows 5 soil types for Zanzibar: *mchanga* (lit. “sand”, sandy soil built on alluvial sandy sediment), *kinamo* (lit. “flexible”, sandy clay soils, derived from clay parent material), *kinongo* (lit. “mud” or “clay”, lateritic soils build on weathered coralline limestone), *maweni* (lit. “in stone”, dark or black subcategory of *kinongo* with a high organic carbon content, but traditionally distinguished as the shallow, dark topsoil found around coralline limestone bedrock), and *uwanda* (lit. field, open space, or coralline limestone area, another traditionally distinguished subcategory of *kinongo* that is red in color, has moderate organic content, and which lies shallow over coralline limestone bedrock). I compared settlement from the 1907 map to these soil zones (**Error! Reference source not found.**).

Table 11-4 below shows the zonal statistics for these zones. Overall, *kinongo* soils hosted the densest settlement concentrations on the island in the late 19th/early 20th century, likely due to the utility of *kinongo* for agriculture and for earth and thatch house construction. Hamlet and small village density is more evenly distributed over these soil types, while large village and town density is more concentrated in *mchanga* and *kinongo* soils. This suggests that *mchanga* and *kinongo* soils were the most favorable locations for settlement, which attracted people to agglomerate into larger settlements. It may also suggest that smaller settlements represent more recent occupation because of population growth that would have forced people into less desirable soil environments. Finally, this difference in distribution may suggest that smaller settlement forms were more sustainable in marginal soil environments through small-scale subsistence strategies like hunting, fishing, and agriculture using *kupiga makongo* methods (see Chapter 6). *Kinamo* soils appear to be the least favorable areas for settlement, perhaps since these soils are often found in low-lying areas used for rice fields.

	Mchanga	Kinamo	Kinongo	Maweni	Uwanda	Total	Highest density:	CV:	std dev %
area (km2)	145	206	338	761	164	1614			
Hamlets (count)	5	6	10	17	4	42			
Hamlets (percent)	12%	14%	24%	40%	10%	100%		0.63	12.67%
Hamlets per km2	0.0345	0.0291	0.0296	0.0223	0.0244	0.0260	Mchanga		
Small Villages (count)	42	59	121	88	27	337			
Small Villages (percent)	12%	18%	36%	26%	8%	100%		0.56	11.15%
Small Villages per km2	0.2897	0.2864	0.3580	0.1156	0.1646	0.2088	Kinongo		
Large Villages (count)	21	13	39	5	8	86			
Large Villages (percent)	24%	15%	45%	6%	9%	100%		0.79	15.82%
Large Villages per km2	0.1448	0.0631	0.1154	0.0066	0.0488	0.0533	Mchanga		
Towns (count)	6	3	13	1	0	23			
Towns (percent)	26%	13%	57%	4%	0%	100%		1.14	22.72%
Towns per km2	0.0414	0.0146	0.0385	0.0013	0.0000	0.0143	Mchanga		

All Settlement (count)	74	81	183	111	39	488			
All Settlement (percent)	15%	17%	38%	23%	8%	100%		0.56	11.10%
Settlement per km2	0.5103	0.3932	0.5414	0.1459	0.2378	0.3024	Kinongo		

Table 11-4. Zonal statistics for the soil types.

11.5.3 Soil Infiltration

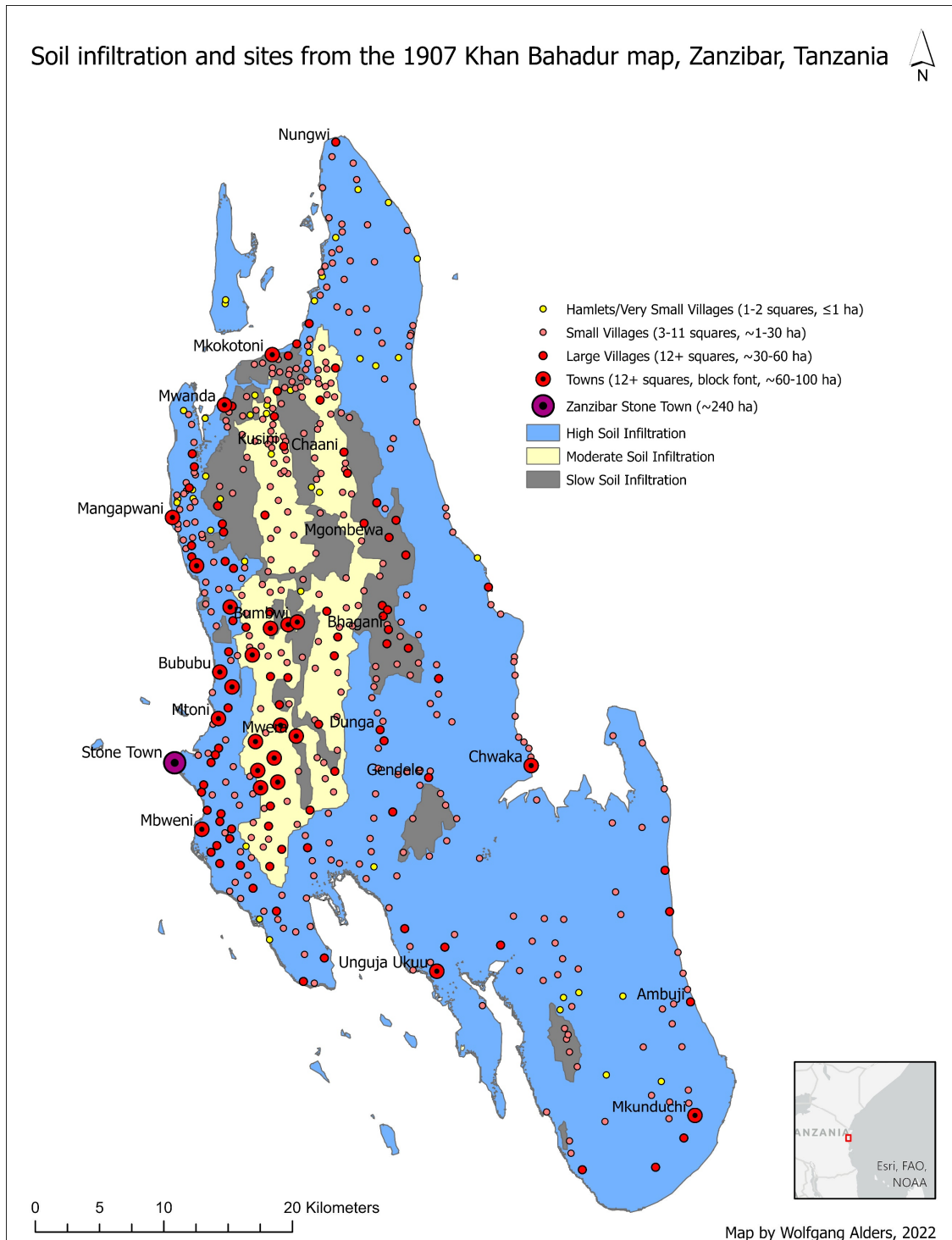


Figure 11-32. Soil infiltration zones along with sites from the 1907 Khan Bahadur map.

The soil infiltration zonal raster reflects differences in the speed of water infiltration in soil, which are categorized as slow, moderate, and high. Figure 11-32 shows the 1907 settlement size classes across these infiltration zones. Table 11-5 shows the zonal statistics for the settlement size classes. In the same way that areas of *kinongo* soil have the densest settlement,

areas with moderate infiltration also have the densest settlement. The exception is hamlets which are most dense in slow infiltration areas. However, hamlets also have most even distribution between areas, suggesting that no zone is particularly favored.

	Slow	Moderate	High	Total	Highest density	CV:	std dev %
area (km2)	201	224	1188	1613			
Hamlets (count)	7	4	31	42			
Hamlets (percent)	17%	10%	74%	100%		1.06	35.23%
Hamlets per km2	0.0348	0.0179	0.0261	0.0260	Slow		
Small Villages (count)	54	90	193	337			
Small Villages (percent)	16%	27%	57%	100%		0.64	21.41%
Small Villages per km2	0.2687	0.4018	0.1625	0.2089	Moderate		
Large Villages (count)	14	22	50	86			
Large Villages (percent)	16%	26%	58%	100%		0.66	21.98%
Large Villages per km2	0.0697	0.0982	0.0421	0.0533	Moderate		
Towns (count)	3	9	11	23			
Towns (percent)	13%	39%	48%	100%		0.54	18.10%
Towns per km2	0.0149	0.0402	0.0093	0.0143	Moderate		
All Settlement (count)	78	125	285	488			
All Settlement (percent)	16%	26%	58%	100%		0.67	22.24%
Settlement per km2	0.3881	0.5580	0.2399	0.3025	Moderate		

Table 11-5. Soil infiltration by settlement size class.

11.5.4 Land Use (ESA CCD)

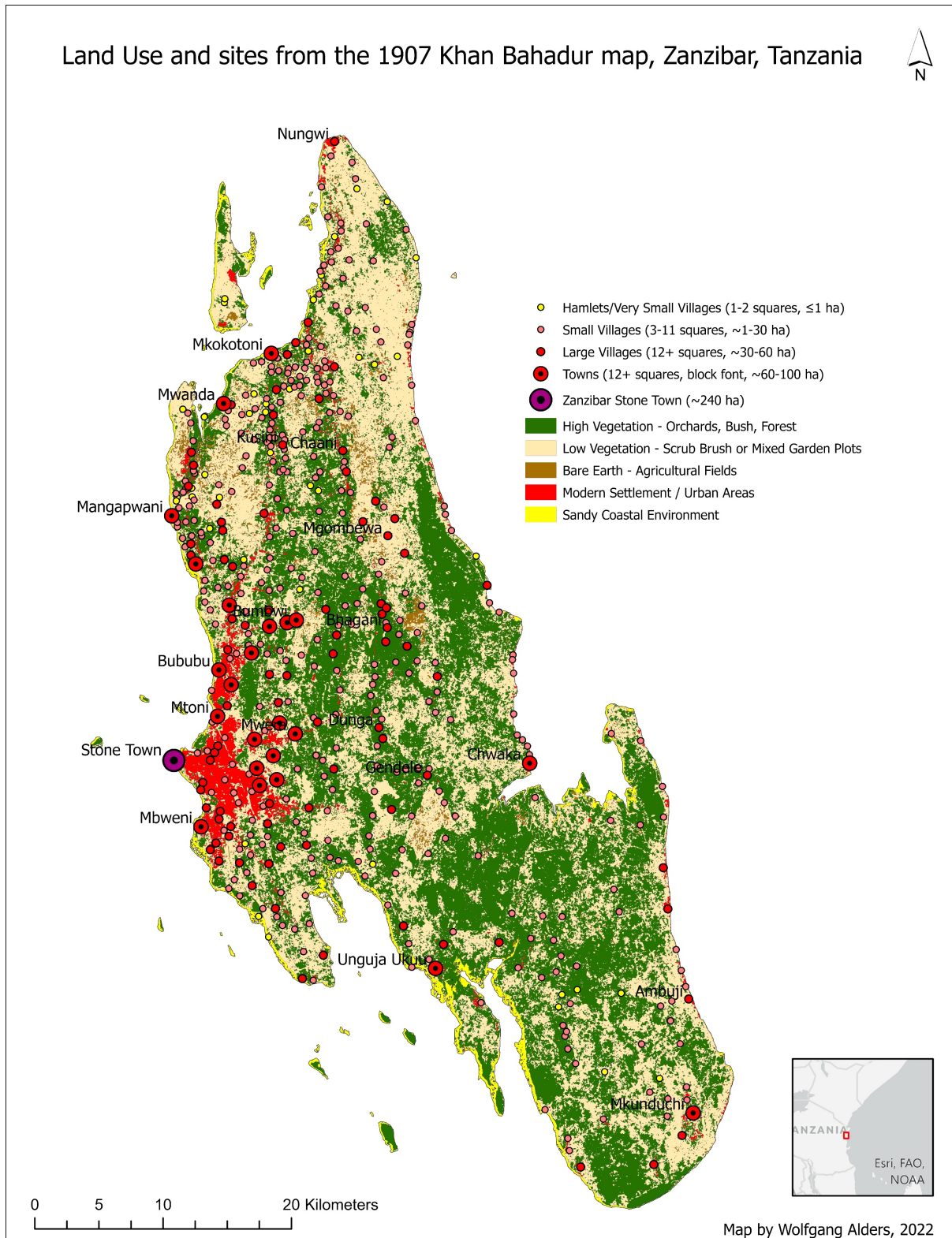


Figure 11-33. Land use along with sites from the 1907 Khan Bahadur map.

Figure 11-33 shows the 1907 settlement size classes across a land use zonal raster created from free 20m Sentinel-2A imagery, captured in 2016 by the European Space Agency (discussed in Chapter 3). Table 11-6 shows the zonal statistics for the 1907 settlement size classes. The results show that most settlements from 1907 are densest in places that are today urban areas. Hamlets are the exception, being most dense in sandy coastal environments, and not present at all in modern urban areas. These patterns have implications for archaeological site detection, suggesting that the modern distribution of intensive settlement may cover most evidence for large-scale occupation in the past, and bias an archaeological survey toward collecting evidence for hamlet-sized sites.

	High Vegetation	Fields and Paddies - Bare Earth	Low Vegetation	Urban	Coastal Environment	Total	Highest density:	CV:	std dev %
area (km2)	739	40	725	66	43	1613			
Hamlets (count)	22	0	16	0	4	42			
Hamlets (percent)	52%	0%	38%	0%	10%	100%		1.20	23.90%
Hamlets per km2	0.0298	0.0000	0.0221	0.0000	0.0930	0.0260	Sandy Coastal Environment		
Small Villages (count)	168	1	142	21	5	337			
Small Villages (percent)	50%	0%	42%	6%	1%	100%		1.20	23.99%
Small Villages per km2	0.2273	0.0250	0.1959	0.3182	0.1163	0.2089	Urban		
Large Villages (count)	46	0	26	14	0	86			
Large Villages (percent)	53%	0%	30%	16%	0%	100%		1.13	22.58%
Large Villages per km2	0.0622	0.0000	0.0359	0.2121	0.0000	0.0533	Urban		
Towns (count)	5	0	12	6	0	23			
Towns (percent)	22%	0%	52%	26%	0%	100%		1.08	21.65%
Towns per km2	0.0068	0.0000	0.0166	0.0909	0.0000	0.0143	Urban		
All Settlement (count)	241	1	196	41	9	488			
All Settlement (percent)	49%	0%	40%	8%	2%	100%		1.15	23.05%
Settlement per km2	0.3261	0.0250	0.2703	0.6212	0.2093	0.3025	Urban		

Table 11-6. Zonal statistics for land use.

11.5.5 Streams from Khan Bahadur Map

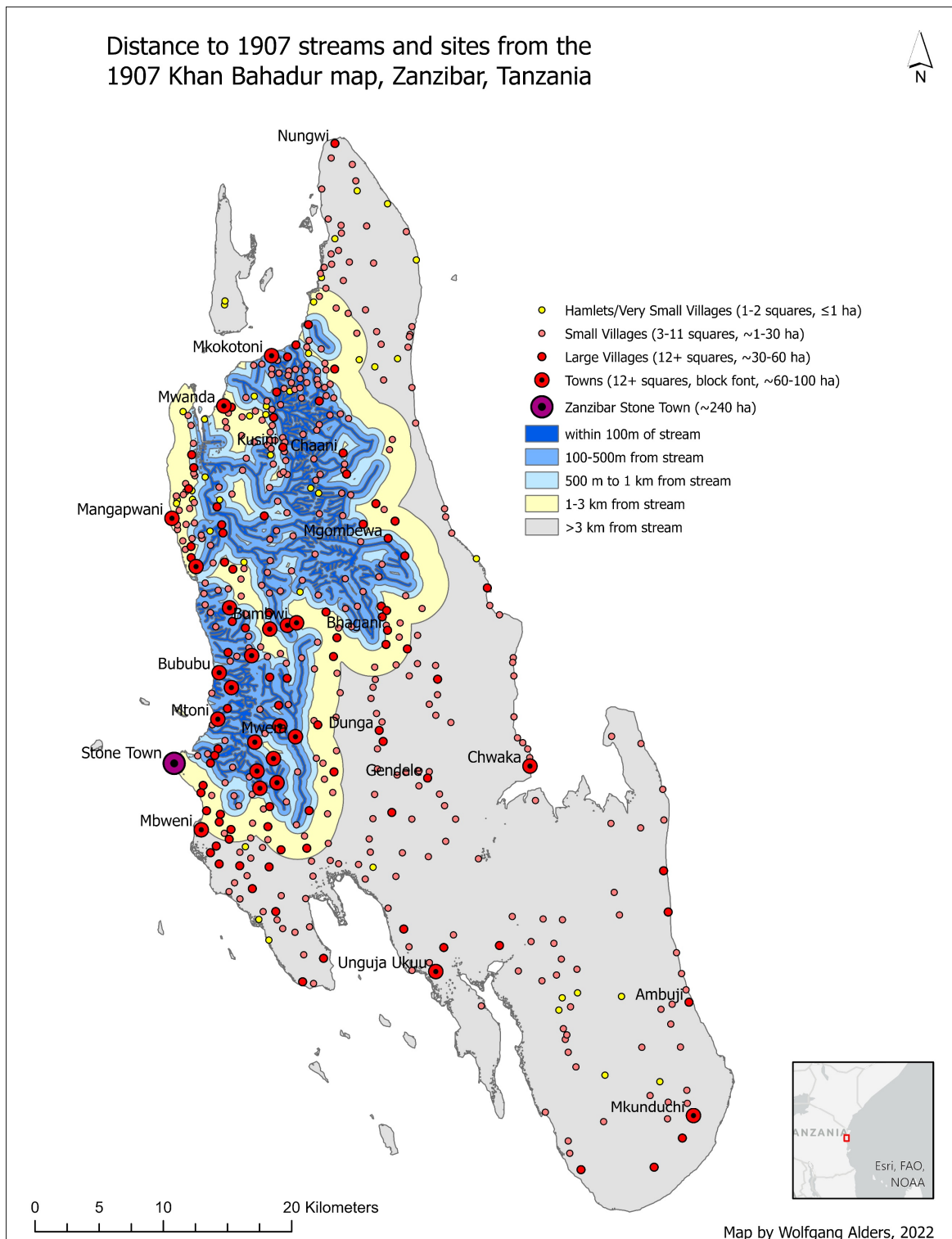


Figure 11-34. Distance to 1907 streams along with sites from the 1907 Khan Bahadur map.

The streams represented by Khan Bahadur on the 1907 map are an invaluable environmental dataset. These streams make up a hydrological system that existed prior to the

rural modernization schemes of the 1960s and 70s, which have altered Zanzibar's traditional agricultural landscape. I digitized these streams from the Khan Bahadur map, and then created a zonal raster with buffered zones reflecting distance from streams. Figure 11-34 shows the 1907 settlement size classes across these zones. Table 11-7 shows the zonal statistics for these zones. Overall, settlement is densest within 500 meters of streams, a statistic that conveys a preference for settlement near above-ground water sources. Towns are the most unevenly distributed across zones, with 13 out of 23 within 500 meters of a 1907 stream. Hamlets and small villages are most dense within 500 meters of streams, but they are also more evenly distributed across all distance zones. Large villages are the only size class that is densest within the zone that's 1 to 3 kilometers from streams, although large villages are also the most evenly distributed across all zones of any size class.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density	CV:	std dev %
area (km2)	91	190	108	201	1021	1611			
Hamlets (count)	1	9	4	8	20	42			
Hamlets (percent)	2%	21%	10%	19%	48%	100%		0.86	17.22%
Hamlets per km2	0.0110	0.0474	0.0370	0.0398	0.0196	0.0261	Within 500m		
Small Villages (count)	17	82	36	56	146	337			
Small Villages (percent)	5%	24%	11%	17%	43%	100%		0.74	14.87%
Small Villages per km2	0.1868	0.4316	0.3333	0.2786	0.1430	0.2092	Within 500m		
Large Villages (count)	2	20	11	28	25	86			
Large Villages (percent)	2%	23%	13%	33%	29%	100%		0.62	12.40%
Large Villages per km2	0.0220	0.1053	0.1019	0.1393	0.0245	0.0534	Within 3km		
Towns (count)	0	13	3	3	4	23			
Towns (percent)	0%	57%	13%	13%	17%	100%		1.07	21.43%
Towns per km2	0.0000	0.0684	0.0278	0.0149	0.0039	0.0143	Within 500m		
All Settlement (count)	20	124	54	95	195	488			
All Settlement (percent)	4%	25%	11%	19%	40%	100%		0.69	13.79%
Settlement per km2	0.2198	0.6526	0.5000	0.4726	0.1910	0.3029	Within 500m		

Table 11-7. Zonal statistics for the Khan Bahadur streams.

11.5.6 Wells from Khan Bahadur Map:

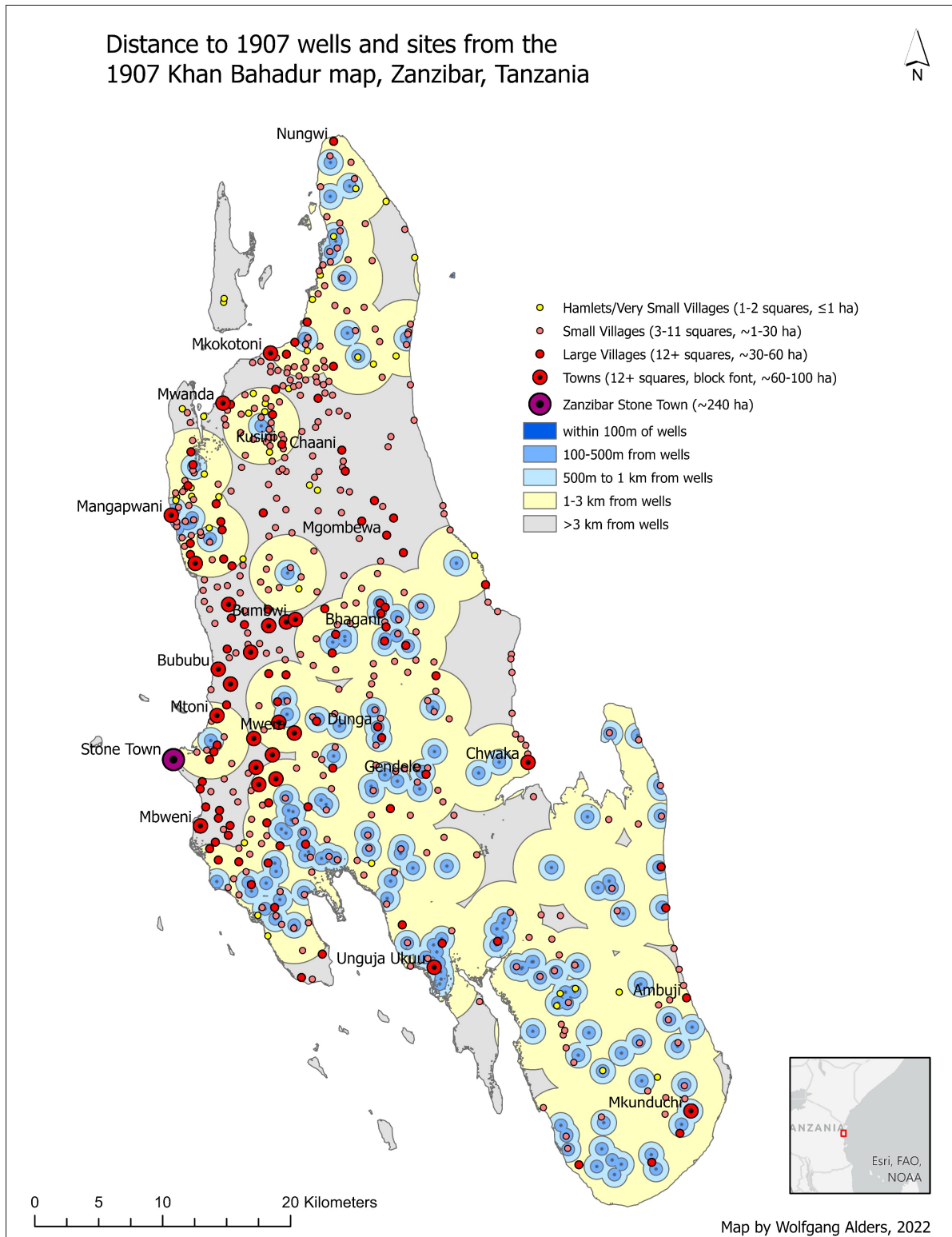


Figure 11-35. 1907 wells along with sites from the 1907 Khan Bahadur map.

Like the stream systems from the 1907 map, the wells drawn by Khan Bahadur represent a hydrological system from a time prior to rural modernization and the transformation of the Zanzibari agricultural landscape in the mid-20th century. Wells were dug in the south and east of the map where above-ground streams were not present, suggesting that they were an adaptation to the lack of above-ground water. I digitized these wells and created distance buffer rings around them as a zonal raster. Figure 11-35 shows the zonal raster of wells from the 1907 Khan Bahadur map in relation to settlement size classes. Table 11-8 shows the zonal statistics for settlement across this zonal raster. All settlement is densest within 500 meters of wells. Towns are most unevenly distributed across zones. 20 out of 23 towns lie more than 1 kilometer from wells, though 3 exist within 500 meters. Large villages, small villages, and hamlets are all most dense within 500 meters of wells.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density	CV:	std dev %
area (km2)	5	100	230	832	445	1612			
Hamlets (count)	3	3	6	19	11	42			
Hamlets (percent)	7%	7%	14%	45%	26%	100%		0.81	16.11%
Hamlets per km2	0.6000	0.0300	0.0261	0.0228	0.0247	0.0261	Within 100m		
Small Villages (count)	0	56	34	150	97	337			
Small Villages (percent)	0%	17%	10%	45%	29%	100%		0.86	17.23%
Small Villages per km2	0.0000	0.5600	0.1478	0.1803	0.2180	0.2091	Within 500m		
Large Villages (count)	0	16	12	33	25	86			
Large Villages (percent)	0%	19%	14%	38%	29%	100%		0.73	14.65%
Large Villages per km2	0.0000	0.1600	0.0522	0.0397	0.0562	0.0533	Within 500m		
Towns (count)	0	3	0	8	12	23			
Towns (percent)	0%	13%	0%	35%	52%	100%		1.15	22.92%
Towns per km2	0.0000	0.0300	0.0000	0.0096	0.0270	0.0143	Within 500m		
All Settlement (count)	3	78	52	210	145	488			
All Settlement (percent)	1%	16%	11%	43%	30%	100%		0.83	16.61%
Settlement per km2	0.6000	0.7800	0.2261	0.2524	0.3258	0.3027	Within 500m		

Table 11-8. Zonal statistics for the Khan Bahadur wells.

11.5.7 Combined Hydrology from Khan Bahadur Map

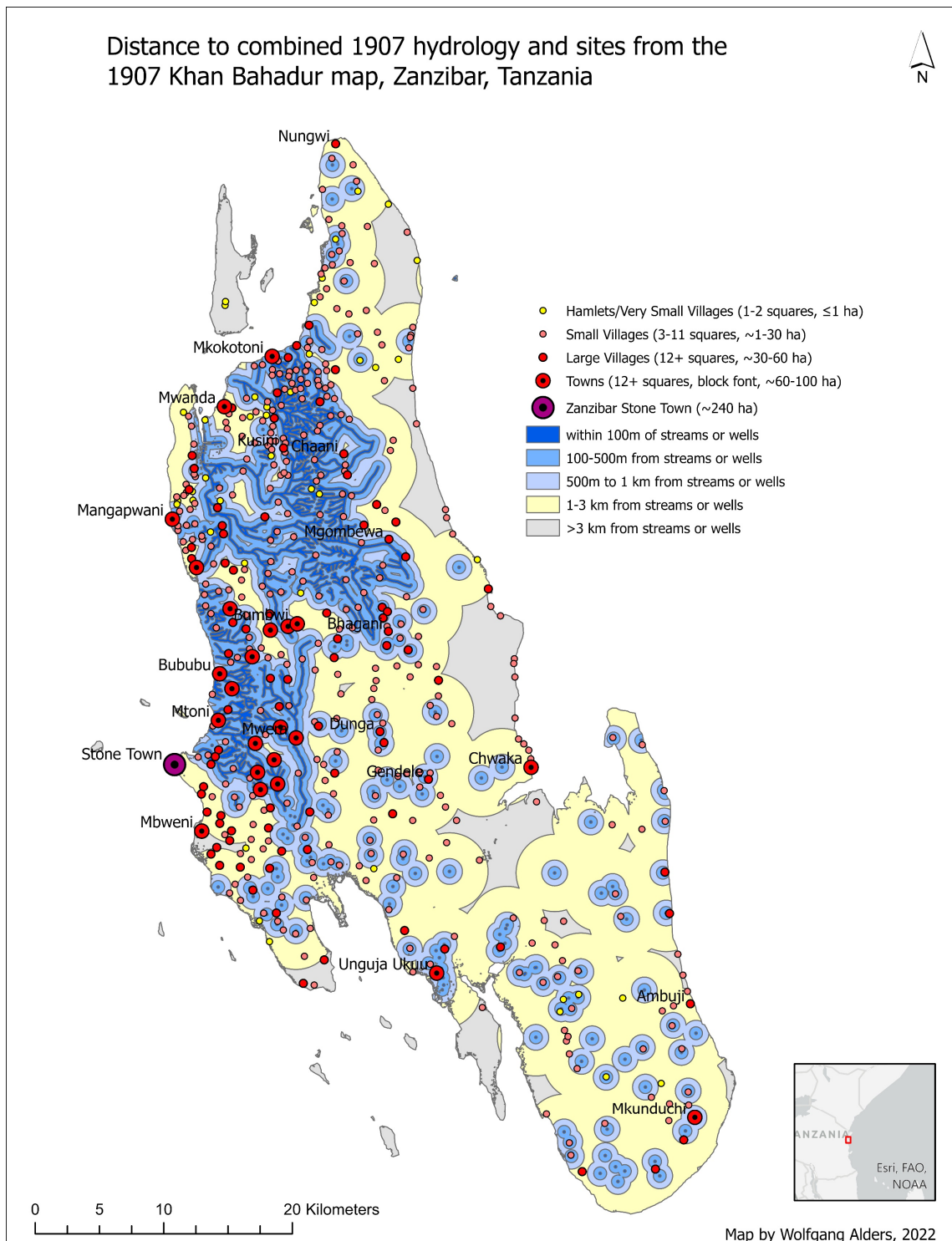


Figure 11-36. Combined 1907 hydrological features along with sites from the 1907 Khan Bahadur map.

In addition to measuring zonal statistics for 1907 streams and wells separately, I merged the two datasets into a combined hydrological system, since they existed at the same time and

would have fulfilled the same role as the source of water for inhabitants of Zanzibar in the late 19th and early 20th centuries. I created buffers for distance for this combined dataset and derived a zonal raster. Figure 11-36 shows the combined zonal raster for wells and streams, with the 1907 settlement size classes across it. Table 11-9 shows the zonal statistics for these zones. Every settlement size class is most dense within 500 meters of either a stream or a well. Hamlets, with a CV of 0.59, are the most evenly distributed between zones. Towns, with a CV of 1.41, are unevenly distributed, with 16 out of 23 falling within 500 meters of a well or stream. These results suggest a strong relationship between settlement and water sources.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density	CV:	std dev %
area (km2)	97	285	309	738	183	1612			
Hamlets (count)	4	12	7	15	4	42			
Hamlets (percent)	10%	29%	17%	36%	10%	100%		0.59	11.74%
Hamlets per km2	0.0412	0.0421	0.0227	0.0203	0.0219	0.0261	Within 500m		
Small Villages (count)	18	133	60	108	18	337			
Small Villages (percent)	5%	39%	18%	32%	5%	100%		0.77	15.48%
Small Villages per km2	0.1856	0.4667	0.1942	0.1463	0.0984	0.2091	Within 500m		
Large Villages (count)	2	36	16	29	3	86			
Large Villages (percent)	2%	42%	19%	34%	3%	100%		0.88	17.70%
Large Villages per km2	0.0206	0.1263	0.0518	0.0393	0.0164	0.0533	Within 500m		
Towns (count)	0	16	3	3	1	23			
Towns (percent)	0%	70%	13%	13%	4%	100%		1.41	28.28%
Towns per km2	0.0000	0.0561	0.0097	0.0041	0.0055	0.0143	Within 500m		
All Settlement (count)	24	197	86	155	26	488			
All Settlement (percent)	5%	40%	18%	32%	5%	100%		0.79	15.82%
Settlement per km2	0.2474	0.6912	0.2783	0.2100	0.1421	0.3027	Within 500m		

Table 11-9. Zonal statistics for the combined wells and streams from the Khan Bahadur map.

11.5.8 DEM Water Flow

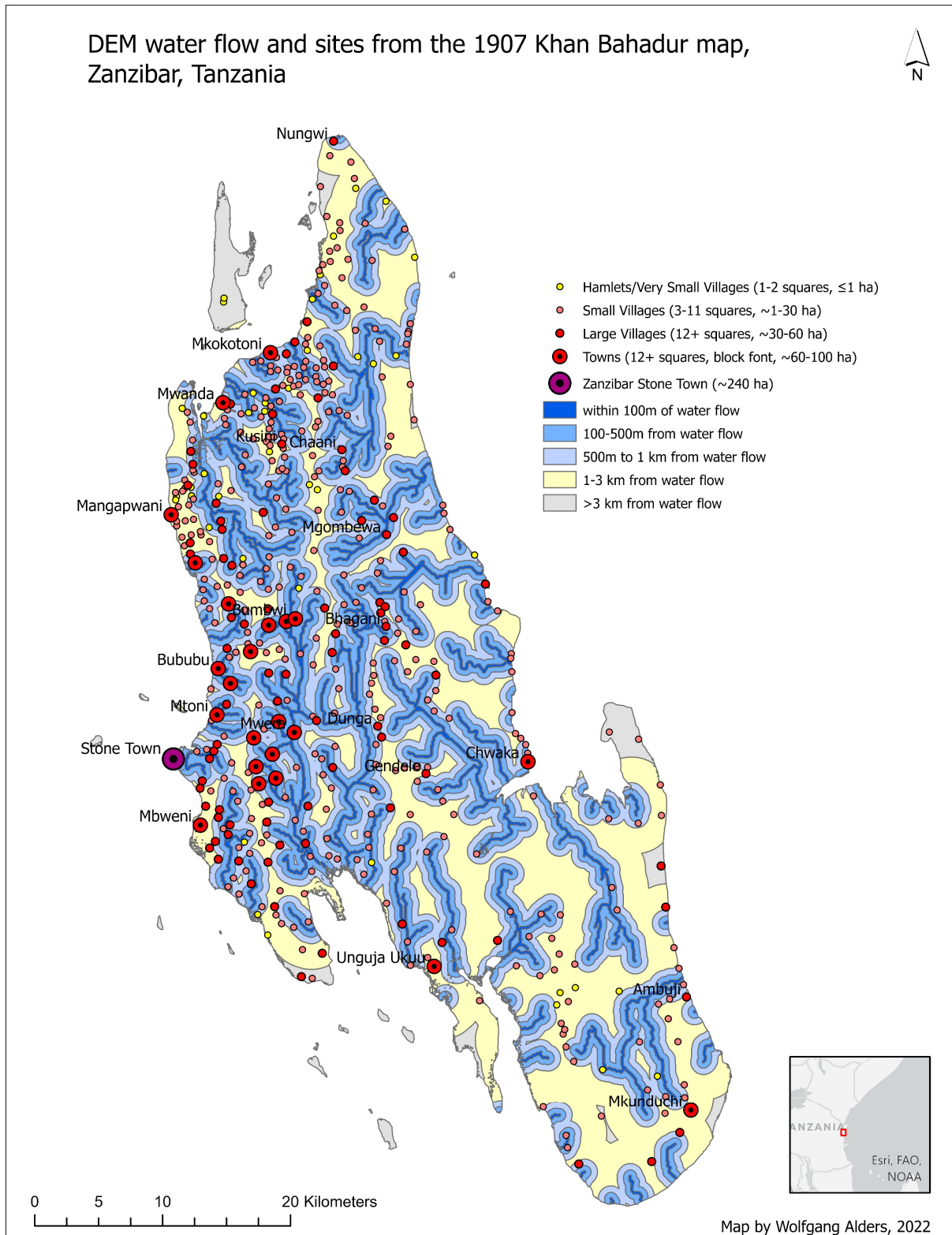


Figure 11-37. DEM water flow along with sites from the 1907 Khan Bahadur map.

Using 30m SRTM satellite imagery, I created a model of water flow that follows the contours of a digital elevation model for Zanzibar. Unlike the historical stream model from the 1907 Khan Bahadur map, this model represents water flow in all parts of the island, including areas where water passes underground due to karstic limestone bedrock. In the northwestern areas it aligns with historical stream systems, but in the south and the east it may instead represent areas where water accumulates underground. After creating this model of water flow, I made a distance buffer as a zonal raster. Figure 11-37 shows the 1907 settlement size classes across this raster. Table 11-10 shows the zonal statistics for settlement across these zones. Though this model may not reflect hydrological conditions on the ground, it is useful for comparison with the 1907 hydrological system. All settlements fall most densely into the zone that lies within 1 kilometer from the DEM-derived water flow areas. Hamlets are most dense beyond 3km, small villages and large villages within 1km, and towns within 500 meters. Overall, settlement is less spatially correlated to DEM-derived water flow than it is to the 1907 hydrological system, even though the DEM streams are more evenly distributed over the island. This suggests that the 1907 stream and well system depicted by Khan Bahadur likely represented an accurate model of pre-modern hydrology which correlates to historical settlement patterns.

	Within 100m	Within 500m	Within 1km	Within 3km	Beyond 3km	Total	Highest density	CV:	std dev %
area (km2)	121	441	468	525	56	1611			
Hamlets (count)	1	11	12	16	2	42			
Hamlets (percent)	2%	26%	29%	38%	5%	100%		0.78	15.67%
Hamlets per km2	0.0083	0.0249	0.0256	0.0305	0.0357	0.0261	Beyond 3km		
Small Villages (count)	23	81	121	107	5	337			
Small Villages (percent)	7%	24%	36%	32%	1%	100%		0.76	15.20%
Small Villages per km2	0.1901	0.1837	0.2585	0.2038	0.0893	0.2092	Within 1km		
Large Villages (count)	1	26	38	19	2	86			
Large Villages (percent)	1%	30%	44%	22%	2%	100%		0.92	18.45%
Large Villages per km2	0.0083	0.0590	0.0812	0.0362	0.0357	0.0534	Within 1km		
Towns (count)	0	14	3	6	0	23			
Towns (percent)	0%	61%	13%	26%	0%	100%		1.26	25.28%
Towns per km2	0.0000	0.0317	0.0064	0.0114	0.0000	0.0143	Within 500m		
All Settlement (count)	25	132	174	148	9	488			
All Settlement (percent)	5%	27%	36%	30%	2%	100%		0.77	15.43%
Settlement per km2	0.2066	0.2993	0.3718	0.2819	0.1607	0.3029	Within 1km		

Table 11-10. Zonal statistics for DEM water flow.

11.5.9 Geology

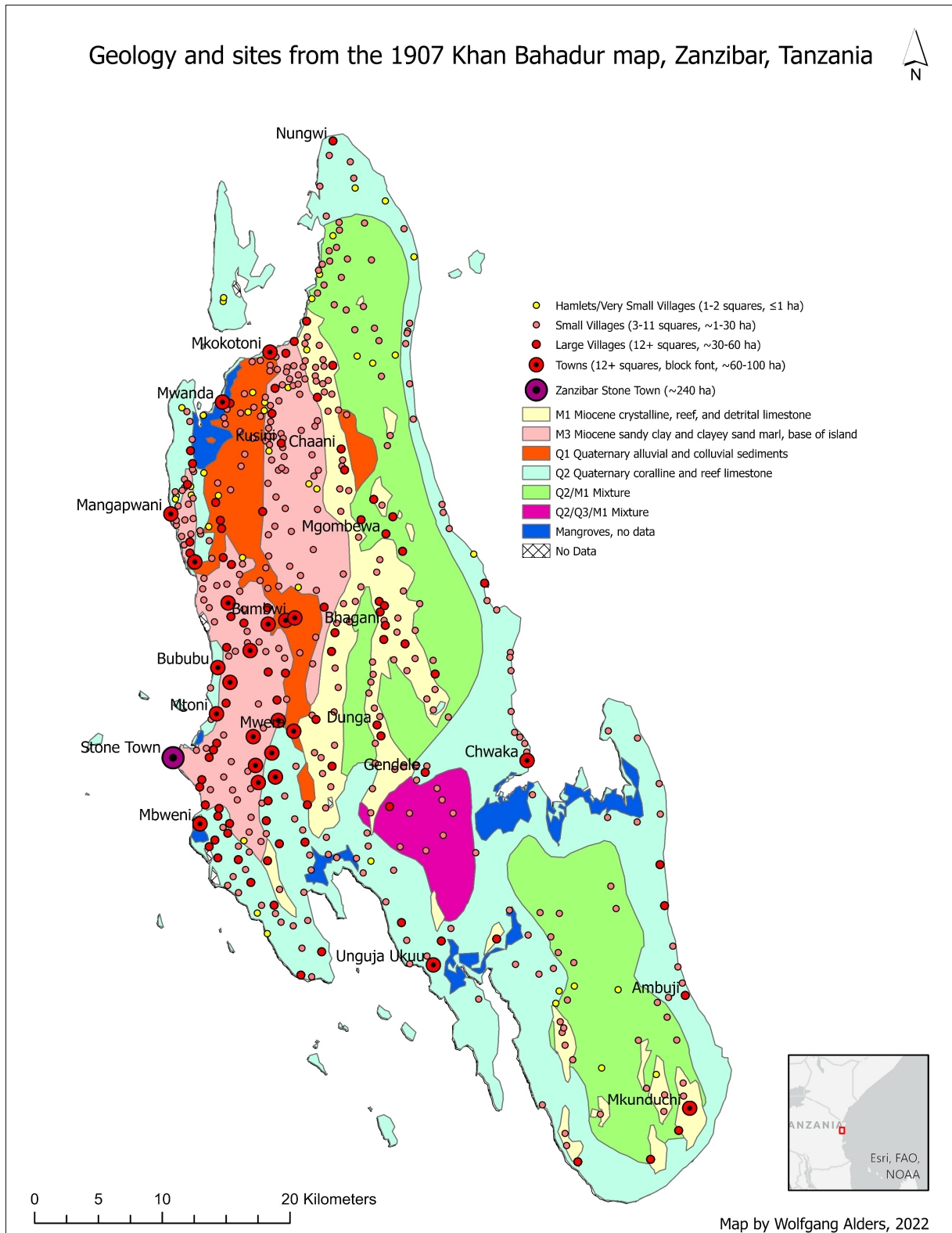


Figure 11-38. Geological zones along with sites from the 1907 Khan Bahadur map.

I digitized a geology map that is a composite of one made by Hardy et al. (2015: 4) and a hydrogeology map made by Colbert et al (1987). The map shows the underlying parent material across the island, which is related to soil geomorphology, hydrology, and soil infiltration. Figure 11-38 shows the 1907 settlement size classes across different geology zones. Table 11-11 shows the zonal statistics for the settlement size classes. Overall, settlement is densest in the M3 sandy clay marl areas. For hamlets and towns, settlement is densest in Q1 recent deposits. Small villages have the lowest coefficient of variance, meaning they are most evenly distributed across geology zones compared to other size classes. Towns have the highest CV, meaning they are most unevenly distributed, with the greatest density in Q1 recent deposits.

	M3	Mangrove	Q2	M1	Q2/M1	Q1	Q2/Q3/M1	Total	HD:	CV:	std dev %
area (km2)	218	47	612	188	409	102	59	1635			
Hamlets (count)	8	1	16	2	8	7	0	42			
Hamlets (percent)	19%	2%	38%	5%	19%	17%	0%	100%		0.93	13.26%
Hamlets per km2	0.0367	0.0213	0.0261	0.0106	0.0196	0.0686	0.0000	0.0257	Q1		
Small Villages (count)	93	3	94	73	40	27	7	337			
Small Villages (percent)	28%	1%	28%	22%	12%	8%	2%	100%		0.80	11.48%
Small Villages per km2	0.4266	0.0638	0.1536	0.3883	0.0978	0.2647	0.1186	0.2061	M3		
Large Villages (count)	25	0	27	20	7	6	1	86			
Large Villages (percent)	29%	0%	31%	23%	8%	7%	1%	100%		0.93	13.29%
Large Villages per km2	0.1147	0.0000	0.0441	0.1064	0.0171	0.0588	0.0169	0.0526	M3		
Towns (count)	8	1	8	1	0	5	0	23			
Towns (percent)	35%	4%	35%	4%	0%	22%	0%	100%		1.11	15.82%
Towns per km2	0.0367	0.0213	0.0131	0.0053	0.0000	0.0490	0.0000	0.0141	Q1		
All Settlement (count)	134	5	145	96	55	45	8	488			
All Settlement (percent)	27%	1%	30%	20%	11%	9%	2%	100%		0.81	11.63%
Settlement per km2	0.6147	0.1064	0.2369	0.5106	0.1345	0.4412	0.1356	0.2985	M3		

Table 11-11. Zonal statistics for geology.

11.5.10 Elevation

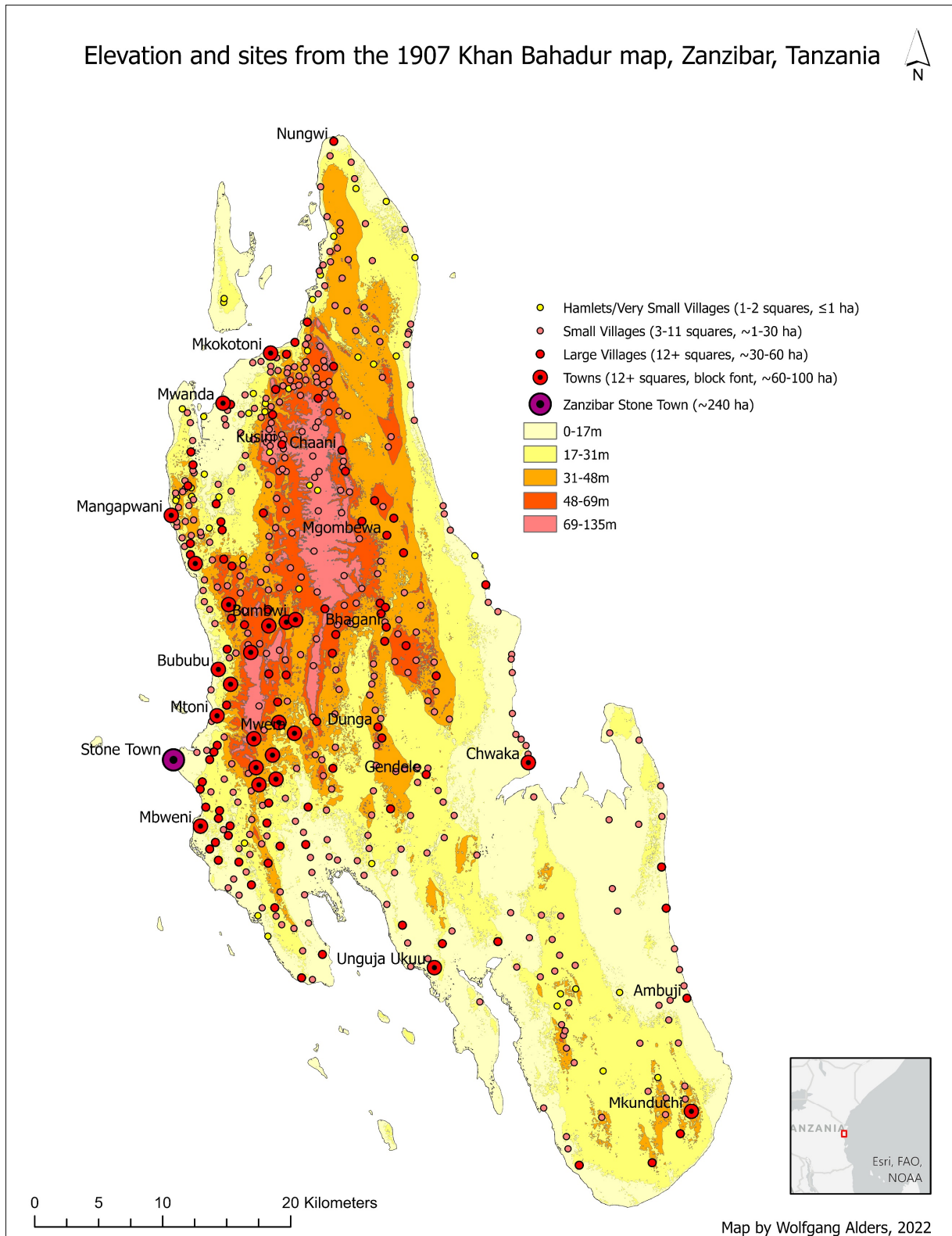


Figure 11-39. Elevation zones along with sites from the 1907 Khan Bahadur map.

I created an elevation map for Zanzibar using imagery from NASA's Shuttle Radar Topography Mission (SRTM), which captured 30 m resolution imagery globally. Two SRTM images cover Zanzibar, which I stitched together and then clipped to the outline of the island. Elevations range from sea level to 135 meters at the highest points, which are concentrated in Zanzibar's central northern hilly spine. Figure 11-39 shows the 1907 settlement size classes across Zanzibar's elevation, which I have divided into zones using the Natural Breaks setting in ArcGIS Pro. Table 11-12 shows the zonal statistics for these settlement size classes. Overall settlement is most dense in the highest zone, but this distribution has a CV of 0.34 meaning that the highest zone is not strongly favored. Results show that almost all size classes are most dense in the highest elevation area. Large villages are the exception, falling in the second highest elevation zone. Small villages are most evenly distributed across all elevations but still favor the highest elevation.

	0-17m	17-31m	31-48m	48-69m	69-135m	Total	Highest density:	CV:	std dev %
area (km2)	545	542	310	144	72	1613			
Hamlets (count)	13	16	7	3	3	42			
Hamlets (percent)	31%	38%	17%	7%	7%	100%		0.70	14.05%
Hamlets per km2	0.0239	0.0295	0.0226	0.0208	0.0417	0.0260	69-135m		
Small Villages (count)	82	81	86	56	32	337			
Small Villages (percent)	24%	24%	26%	17%	9%	100%		0.34	6.84%
Small Villages per km2	0.1505	0.1494	0.2774	0.3889	0.4444	0.2089	69-135m		
Large Villages (count)	16	31	20	14	5	86			
Large Villages (percent)	19%	36%	23%	16%	6%	100%		0.55	11.01%
Large Villages per km2	0.0294	0.0572	0.0645	0.0972	0.0694	0.0533	48-69m		
Towns (count)	8	3	8	2	2	23			
Towns (percent)	35%	13%	35%	9%	9%	100%		0.68	13.61%
Towns per km2	0.0147	0.0055	0.0258	0.0139	0.0278	0.0143	69-135m		
All Settlement (count)	119	131	121	75	42	488			
All Settlement (percent)	24%	27%	25%	15%	9%	100%		0.39	7.75%
Settlement per km2	0.2183	0.2417	0.3903	0.5208	0.5833	0.3025	69-135m		

Table 11-12. Zonal statistics for elevation.

11.5.11 Aspect

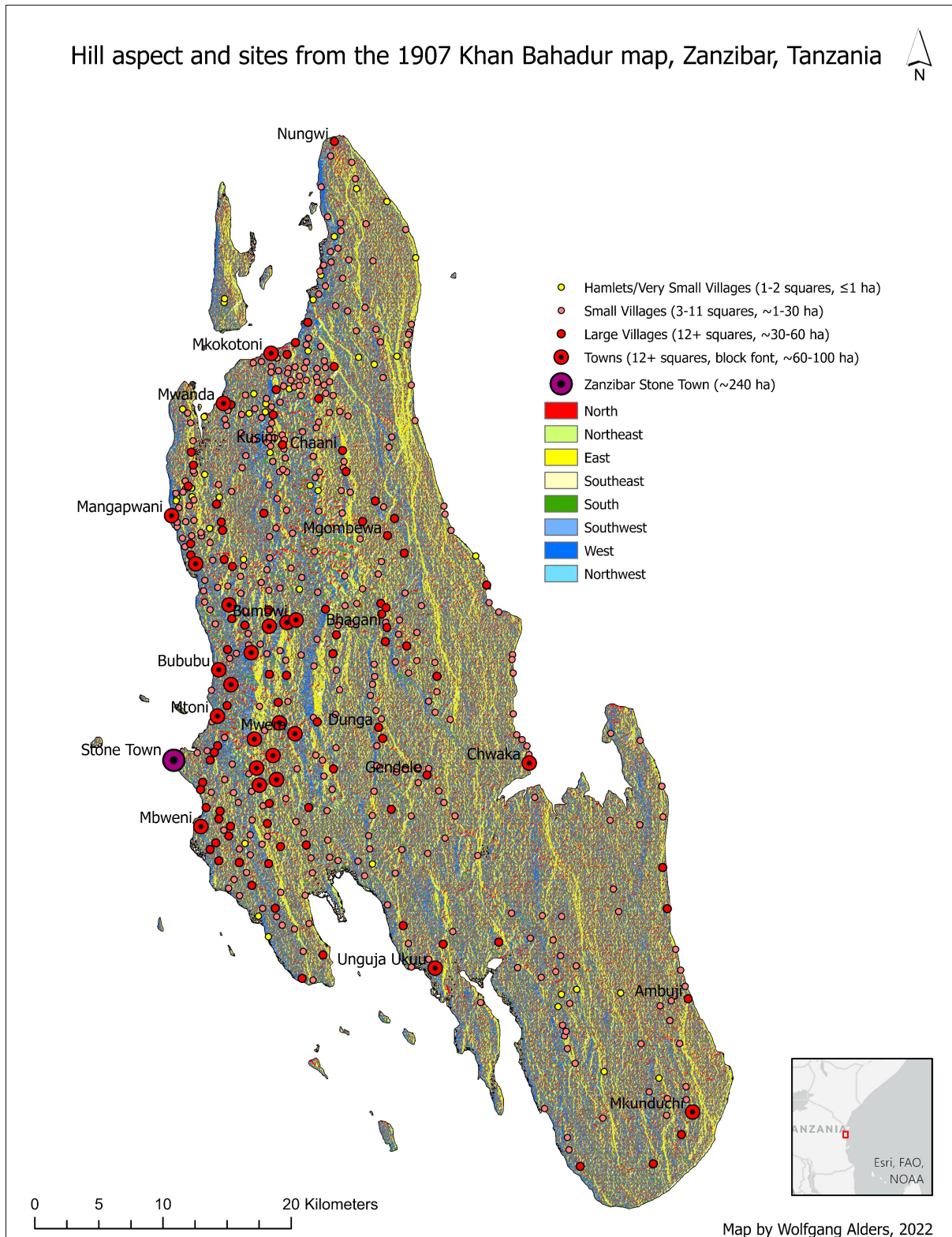


Figure 11-40. Aspect zones along with sites from the 1907 Khan Bahadur map.

Aspect refers to the orientation of hillslopes by compass direction. I created an aspect map of Zanzibar using the same 30m SRTM satellite imagery used for the elevation model (Figure 11-40). Table 11-13 shows the zonal statistics for 1907 settlement across the aspect map. East slopes are the most densely settled, with west slopes being second most dense; this may be simply due to the fact that the hill system in Zanzibar is primarily a spine across the middle of the island that travels north to south and slopes east and west. It may also relate to the fact that east-west slopes along the equator receive more solar radiation, making these slopes preferable for agriculture requiring lots of sunlight. Hamlets have the lowest CV and so are the most evenly distributed across aspect zones. Small villages and large villages are somewhat unevenly distributed. Towns most strongly favor east slopes. The cause of this might simply be because east slopes (and west slopes) are the most common across the island, so the larger settlements cover them more frequently than smaller settlements do.

	N	NE	E	SE	S	SW	W	NW	Total	HDW:	CV:	std dev %
area (km2)	190	195	223	193	177	199	223	195	1595			
Hamlets (count)	6	5	7	2	6	5	5	6	42			
Hamlets (percent)	14%	12%	17%	5%	14%	12%	12%	14%	100%		0.28	3.54%
Hamlets per km2	0.0316	0.0256	0.0314	0.0104	0.0339	0.0251	0.0224	0.0308	0.0263	S		
Small Villages (count)	29	34	84	34	21	34	67	34	337			
Small Villages (percent)	9%	10%	25%	10%	6%	10%	20%	10%	100%		0.51	6.40%
Small Villages per km2	0.1526	0.1744	0.3767	0.1762	0.1186	0.1709	0.3004	0.1744	0.2113	E		
Large Villages (count)	4	8	24	6	4	17	14	9	86			
Large Villages (percent)	5%	9%	28%	7%	5%	20%	16%	10%	100%		0.66	8.22%
Large Villages per km2	0.0211	0.0410	0.1076	0.0311	0.0226	0.0854	0.0628	0.0462	0.0539	E		
Towns (count)	1	1	8	2	0	1	7	3	23			
Towns (percent)	4%	4%	35%	9%	0%	4%	30%	13%	100%		1.04	13.03%
Towns per km2	0.0053	0.0051	0.0359	0.0104	0.0000	0.0050	0.0314	0.0154	0.0144	E		
All Settlement (count)	40	48	123	44	31	57	93	52	488			
All Settlement (percent)	8%	10%	25%	9%	6%	12%	19%	11%	100%		0.51	6.37%
Settlement per km2	0.2105	0.2462	0.5516	0.2280	0.1751	0.2864	0.4170	0.2667	0.3060	E		

Table 11-13. Zonal statistics for the aspect map.

11.5.12 Slope

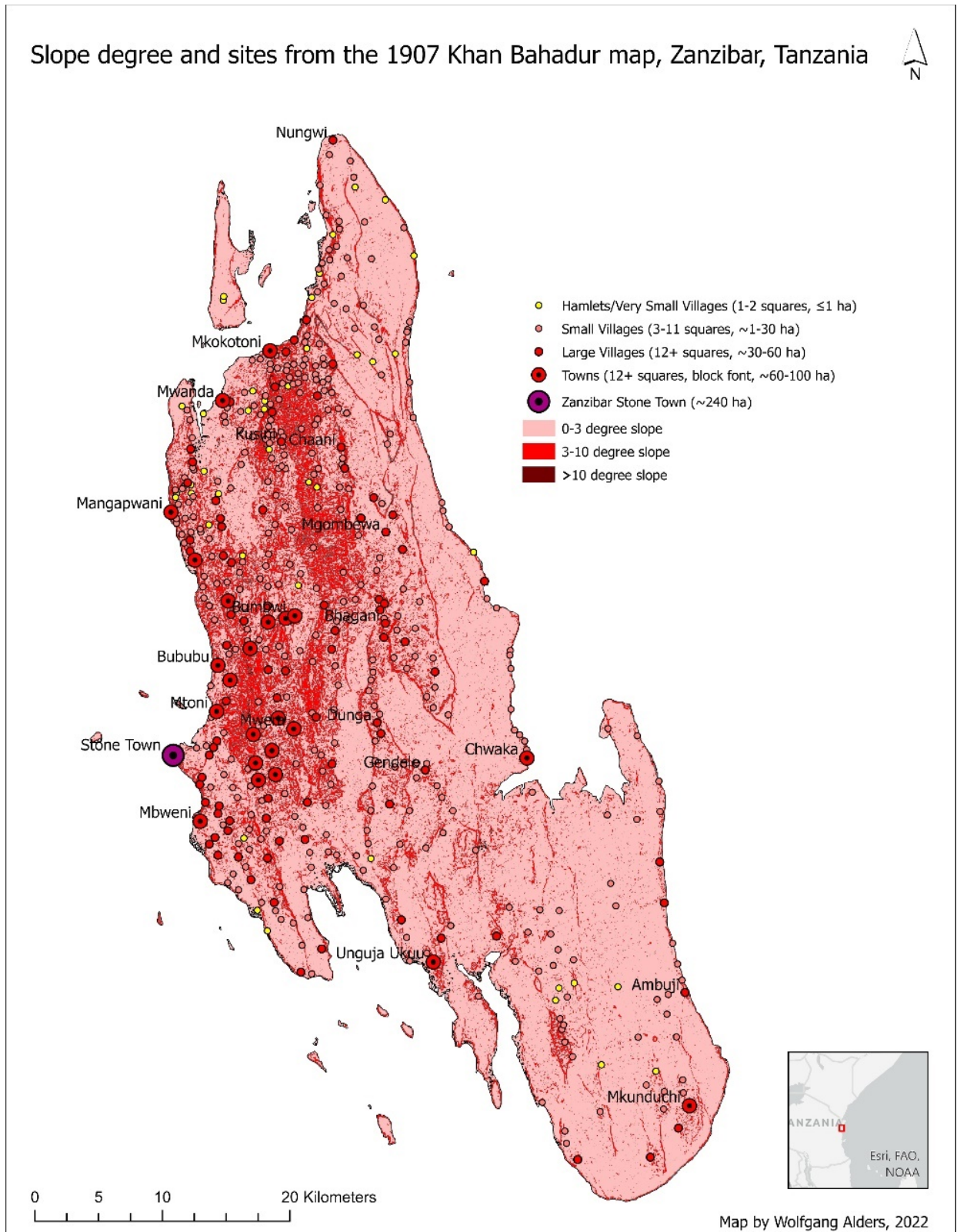


Figure 11-41. Slope zones along with sites from the 1907 Khan Bahadur map.

A slope map reflects the steepness of hillsides in degrees. I created a slope map using the same SRTM 30m imagery. I then reclassified this map to divide the map into three slope categories: slopes from zero to three degrees, slopes from three to ten degrees, and greater than 10 degrees. Figure 11-41 shows settlement size classes from 1907 across the slope degree map. Table 11-14 shows the zonal statistics for these settlements. Overall, the densest areas of settlement are in areas with three-to-ten-degree slope. All size classes except large villages follow this trend. No settlements are found in the steepest areas on Zanzibar, in places with greater than 10-degree slopes. The coefficient of variance between all size classes is close, suggesting that all size classes have similar ratios of distribution between low, medium, and high slope degree areas.

	0-3 degree slope	3-10 degree slope	>10 degree slope	Total	Highest density:	CV:	std dev %
area (km2)	1208	378	8	1594			
Hamlets (count)	30	12	0	42			
Hamlets (percent)	71%	29%	0%	100%		1.08	35.95%
Hamlets per km2	0.0248	0.0317	0.0000	0.0263	3-10 degree slope		
Small Villages (count)	227	110		337			
Small Villages (percent)	67%	33%	0%	100%		1.01	33.68%
Small Villages per km2	0.1879	0.2910	0.0000	0.2114	3-10 degree slope		
Large Villages (count)	70	16		86			
Large Villages (percent)	81%	19%	0%	100%		1.28	42.65%
Large Villages per km2	0.0579	0.0423	0.0000	0.0540	0-3 degree slope		
Towns (count)	14	9		23			
Towns (percent)	61%	39%	0%	100%		0.93	30.85%
Towns per km2	0.0116	0.0238	0.0000	0.0144	3-10 degree slope		
All Settlement (count)	341	147	0	488			
All Settlement (percent)	70%	30%	0%	100%		1.05	35.05%
Settlement per km2	0.2823	0.3889	0.0000	0.3061	3-10 degree slope		

Table 11-14. Zonal statistics for the map of slope degree.

11.5.13 Rainfall

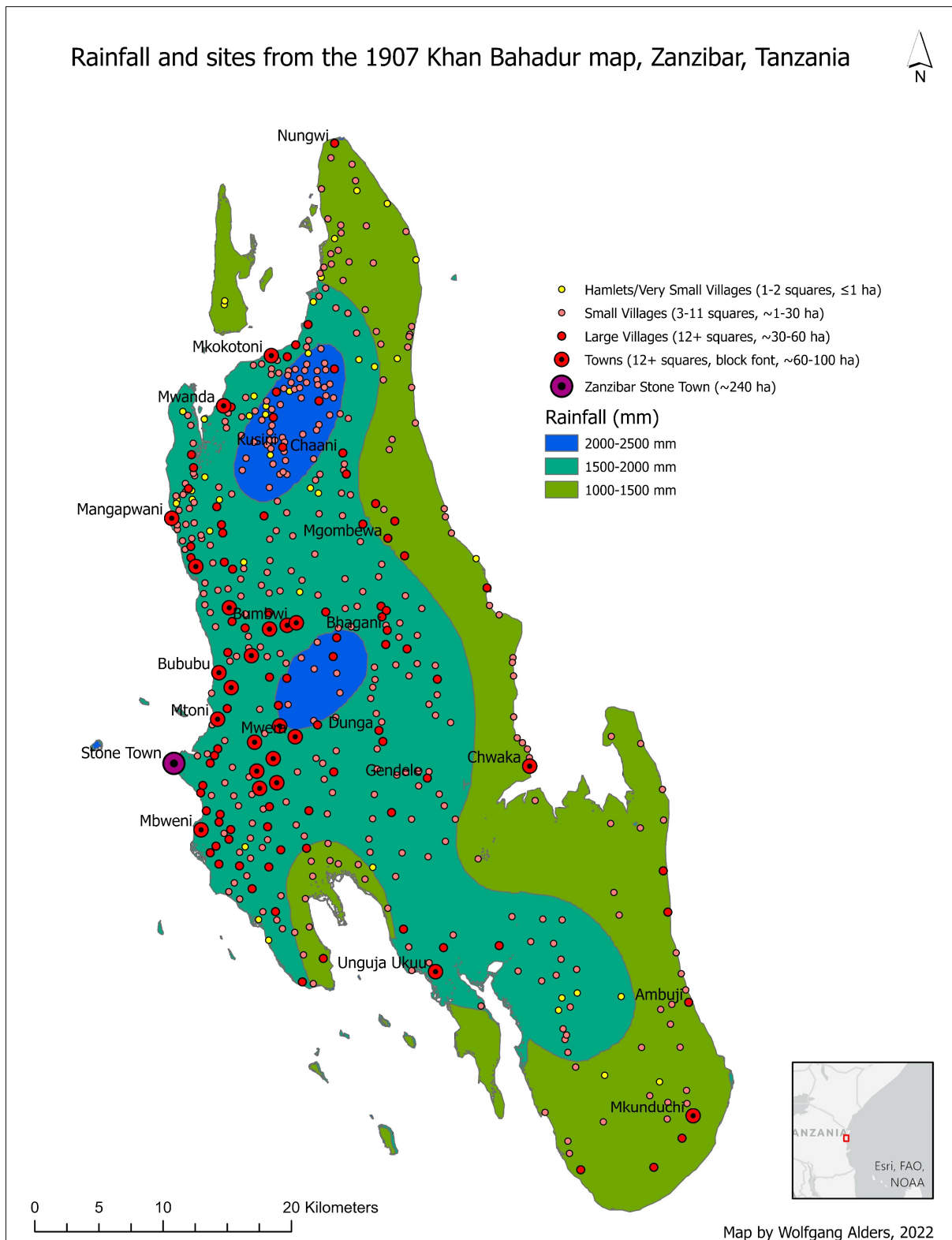


Figure 11-42. Rainfall zones along with sites from the 1907 Khan Bahadur map.

I reproduced a rainfall map from Juma's (2004) map of Zanzibar. Rainfall occurs at three different levels, and averages between 1000 to 2500 mm per year. Figure 11-42 shows the 1907 settlement classes across the rainfall map. Table 11-15 shows the zonal statistics for the 1907 settlements across this map. In all size classes except towns, settlement is most dense in the areas of highest rainfall on the island. Small villages and hamlets have the lowest CV, meaning they are the most evenly distributed settlement class across all rainfall zones compared to large villages and towns. Towns are the most unevenly distributed with almost all falling inside the 1500-2000 mm zone; this is likely because at the level of the town agricultural productivity in the immediate vicinity is less impactful as a factor of occupation than in smaller settlements compared to other variables. It is likely that towns were partially dependent on produce imported from higher rainfall areas.

	1000-1500 mm	1500-2000 mm	2000-2500 mm	Total	Highest density within	CV:	std dev %
area (km2)	666	843	104	1613			
Hamlets (count)	11	26	5	42			
Hamlets (percent)	26%	62%	12%	100%		0.77	25.75%
Hamlets per km2	0.0165	0.0308	0.0481	0.0260	2000-2500 mm		
Small Villages (count)	84	197	56	337			
Small Villages (percent)	25%	58%	17%	100%		0.66	22.15%
Small Villages per km2	0.1261	0.2337	0.5385	0.2089	2000-2500 mm		
Large Villages (count)	14	63	9	86			
Large Villages (percent)	16%	73%	10%	100%		1.04	34.70%
Large Villages per km2	0.0210	0.0747	0.0865	0.0533	2000-2500 mm		
Towns (count)	2	21	0	23			
Towns (percent)	9%	91%	0%	100%		1.51	50.39%
Towns per km2	0.0030	0.0249	0.0000	0.0143	1500-2000 mm		
All Settlement (count)	111	307	70	488			
All Settlement (percent)	23%	63%	14%	100%		0.78	25.96%
Settlement per km2	0.1667	0.3642	0.6731	0.3025	2000-2500 mm		

Table 11-15. Zonal statistics for rainfall zones.

11.5.14 Distance to Sea

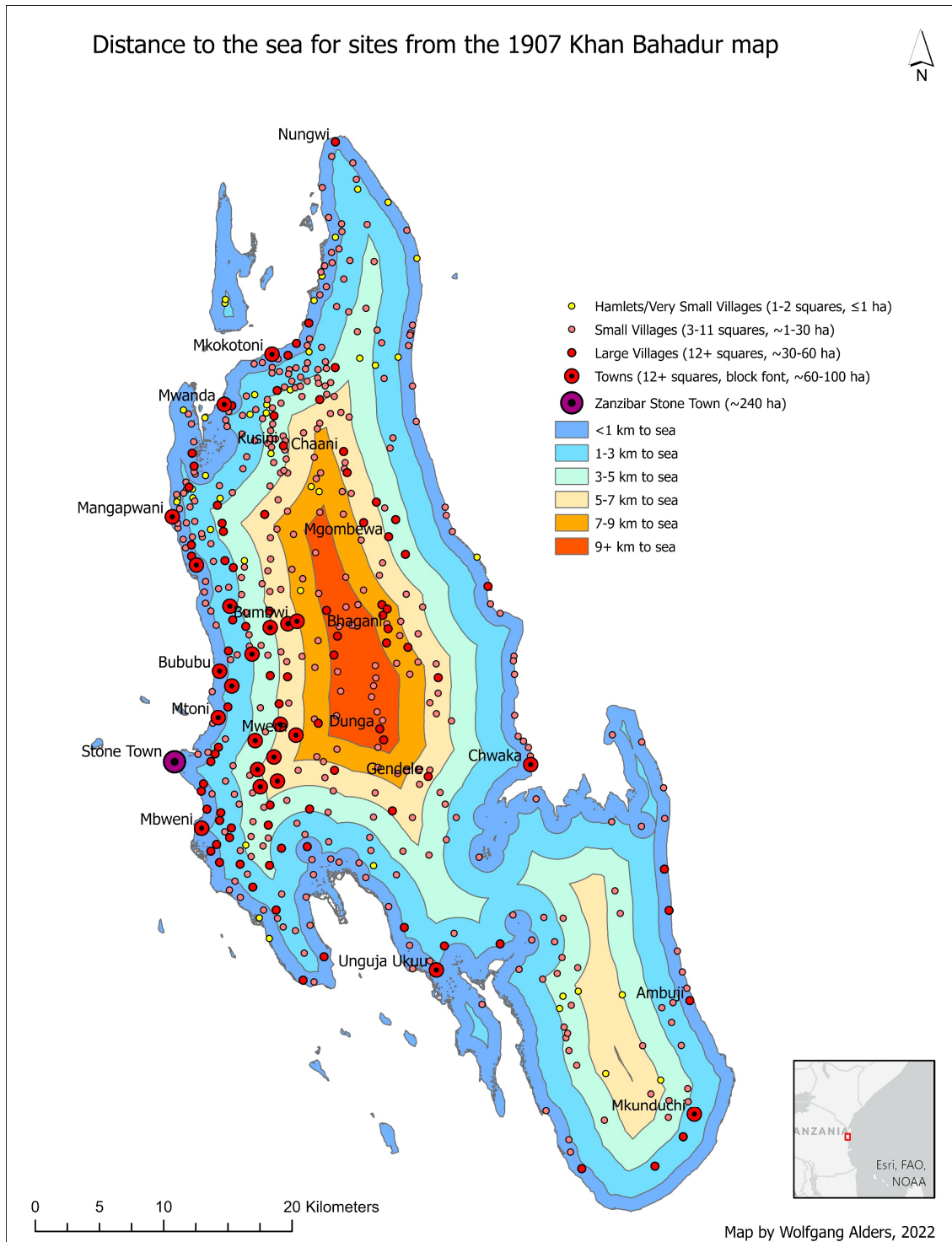


Figure 11-43. Distance to sea along with sites from the 1907 Khan Bahadur map.

I created a raster showing zones of increasing distance from the coast, using an outline of the island I created from the SRTM DEM and the multi-ring buffer tool in ArcGIS Pro. Figure 11-43 shows the 1907 settlements across these zones. Table 11-16 shows the zonal statistics for

the sites across these zones. Overall, settlements are most dense in the immediate coastal rim, in the zone that lies <1 km from the water. This reflects the orientation toward the sea and toward marine resources that still predominated even at the height of the clove plantation system. Hamlets are densest in the zone which lies directly on the coast, which makes sense since marine resources were and are an important and easily acquirable food source for small communities in Zanzibar. Meanwhile small villages and large villages are found along the coast and across all zones but are most dense in the zone that is furthest from the coast; this likely reflects their position within the agricultural system. Towns are most dense on the immediate coast, reflecting their role as harbors and ports.

	<1 km	1-3 km	3-5 km	5-7 km	7-9 km	9+ km	Total	HDW:	CV:	std dev %
area (km2)	387	481	348	217	112	68	1613			
Hamlets (count)	15	12	9	3	3	0	42			
Hamlets (percent)	36%	29%	21%	7%	7%	0%	100%		0.84	14.05%
Hamlets per km2	0.0388	0.0249	0.0259	0.0138	0.0268	0.0000	0.0260	<1 km		
Small Villages (count)	95	85	73	42	24	18	337			
Small Villages (percent)	28%	25%	22%	12%	7%	5%	100%		0.58	9.67%
Small Villages per km2	0.2455	0.1767	0.2098	0.1935	0.2143	0.2647	0.2089	9+ km		
Large Villages (count)	23	25	15	11	7	5	86			
Large Villages (percent)	27%	29%	17%	13%	8%	6%	100%		0.58	9.61%
Large Villages per km2	0.0594	0.0520	0.0431	0.0507	0.0625	0.0735	0.0533	9+ km		
Towns (count)	9	4	4	5	1	0	23			
Towns (percent)	39%	17%	17%	22%	4%	0%	100%		0.83	13.86%
Towns per km2	0.0233	0.0083	0.0115	0.0230	0.0089	0.0000	0.0143	<1 km		
All Settlement (count)	142	126	101	61	35	23	488			
All Settlement (percent)	29%	26%	21%	13%	7%	5%	100%		0.60	10.05%
Settlement per km2	0.3669	0.2620	0.2902	0.2811	0.3125	0.3382	0.3025	<1 km		

Table 11-16. Zonal statistics for distance to sea and the 1907 sites.

11.5.15 Distance to Coral Reefs

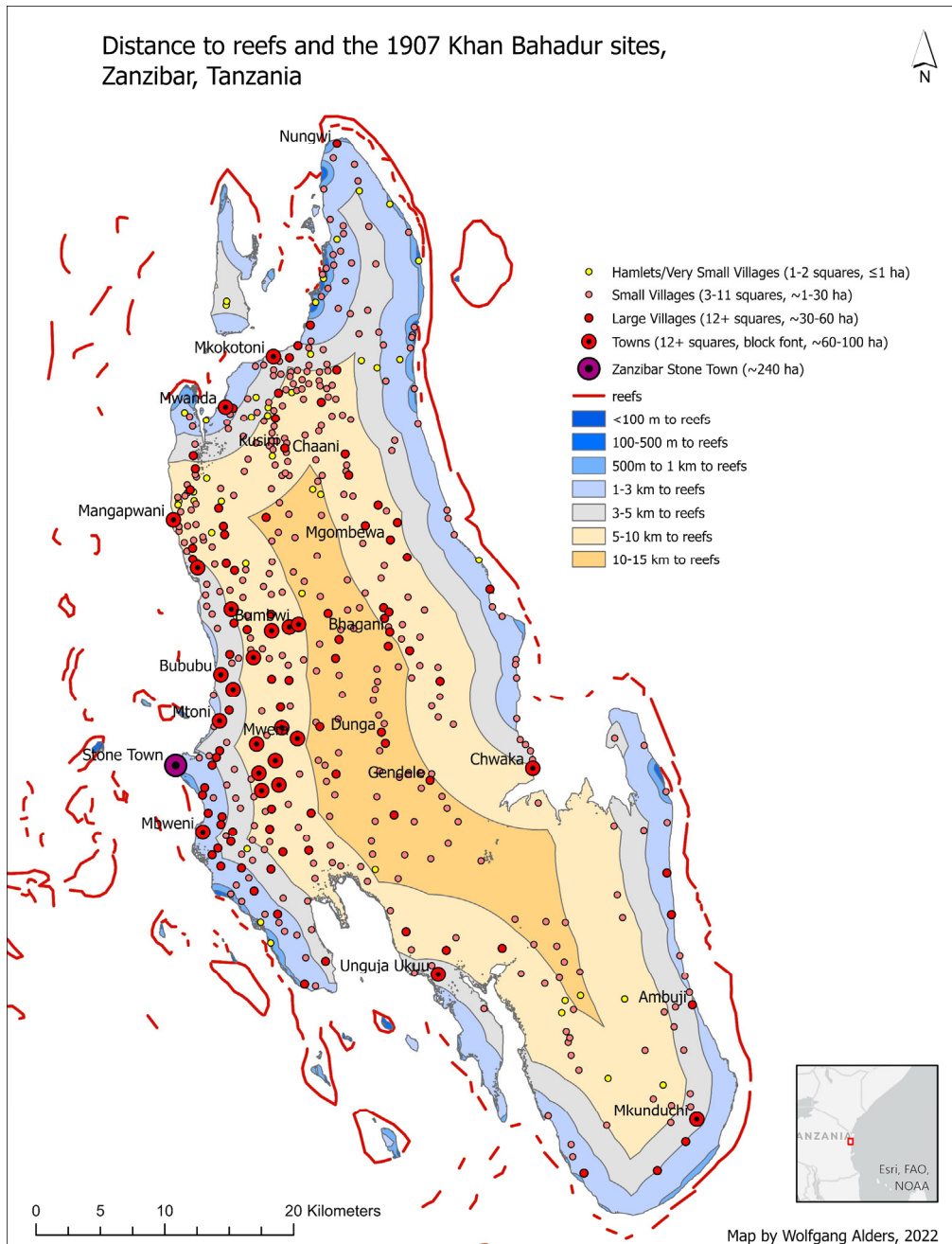


Figure 11-44. Distance to coral reefs with sites from the 1907 Khan Bahadur map.

A map of distance to reefs (Figure 11-44) was created by buffering a map in Khamis et al. (2017: 120) with the multi-ring buffer tool in ArcGIS Pro. While distance from the sea assumes similarity across all areas, a map of reefs shows important differences in the types of marine environments that were available to Zanzibaris. Still today, the uninterrupted near-shore reefs of the eastern region facilitate the majority of seaweed farming on the island, since they break up larger waves, creating calmer near-shore environments. Near-shore reefs in the east also make a greater diversity of fish species more readily available for small-scale fishing in canoes or on foot. Conversely, the lack of near-shore reefs in the west of the island and specifically near

Mkokotoni and Stone Town might explain the choice of those locations as ports, since larger ships can approach closer to shore in areas without coral reefs. Table 11-17 shows the zonal statistics for the sites across these zones. The coefficient of variation for all settlement types across these zones is relatively high and increases as site size increases. Both hamlets and small villages are densest in areas within 500 meters of offshore reefs, suggesting that access to marine resources was a strong factor in the location of small settlements on the island. Large villages are densest in areas within 3 km of reefs, and towns are densest in areas within 5 km of reefs, suggesting that for larger settlements, spatial proximity to reefs was not as important a factor. Whereas many hamlets and small villages may have had residents directly engaged in small-scale marine resource extraction, the residents of large villages and towns practiced deep-sea fishing with large ships, and also may have received fish and other marine food through trade.

	<100m	<500m	<1km	<3km	<5km	<10km	<15km	Total	HDW:	CV:	std dev %
area (km2)	1	6	29	287	318	671	300	1612			
Hamlets (count)	0	4	0	8	9	16	5	42			
Hamlets (percent)	0%	10%	0%	19%	21%	38%	12%	100%		0.94	13.40%
Hamlets per km2	0.0000	0.6667	0.0000	0.0279	0.0283	0.0238	0.0167	0.0261	500.0000		
Small Villages (count)	0	3	10	50	61	151	62	337			
Small Villages (percent)	0%	1%	3%	15%	18%	45%	18%	100%		1.10	15.68%
Small Villages per km2	0.0000	0.5000	0.3448	0.1742	0.1918	0.2250	0.2067	0.2091	500.0000		
Large Villages (count)	0	0	0	21	15	39	11	86			
Large Villages (percent)	0%	0%	0%	24%	17%	45%	13%	100%		1.18	16.79%
Large Villages per km2	0.0000	0.0000	0.0000	0.0732	0.0472	0.0581	0.0367	0.0533	3km		
Towns (count)	0	0	0	2	7	14	0	23			
Towns (percent)	0%	0%	0%	9%	30%	61%	0%	100%		1.64	23.38%
Towns per km2	0.0000	0.0000	0.0000	0.0070	0.0220	0.0209	0.0000	0.0143	5km		
All Settlement (count)	0	7	10	81	92	220	78	488			
All Settlement (percent)	0%	1%	2%	17%	19%	45%	16%	100%		1.11	15.79%
Settlement per km2	0.0000	1.1667	0.3448	0.2822	0.2893	0.3279	0.2600	0.3027	500.0000		

Table 11-17. Zonal statistics for the 1907 sites in relation to distance to coral reefs.

11.5.16 Conclusion to Zonal Statistics

Table 11-18 summarizes the results of the zonal statistical analysis in brief below. Each row describes the most densely settled zone for each site size class, as well as for all combined sites. The color scheme represents the coefficient of variation across each zone, which reflects how evenly or unevenly distributed across each zone the site group is.

Zone	Hamlets densest in:	Small villages densest in:	Large villages densest in:	Towns densest in:	All sites densest in:
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Island Zones	Clove plantation zone	Clove plantation zone	Clove plantation zone	Clove plantation zone	Clove plantation zone
Soil Types	Mchanga	Kinongo	Mchanga	Mchanga	Kinongo
Soil Infiltration	Slow	Moderate	Moderate	Moderate	Moderate
Land Use	Sandy coastal environment	Urban	Urban	Urban	Urban
1907 Streams	Zone within 500m	Zone within 500m	Zone within 3 km	Zone within 500m	Zone within 500m
1907 Wells	Zone within 100m	Zone within 500m	Zone within 500m	Zone within 500m	Zone within 500m
1907 Combined Hydrology	Zone within 500m	Zone within 500m	Zone within 500m	Zone within 500m	Zone within 500m
DEM Water	Zone beyond 3 km	Zone within 1 km	Zone within 1 km	Zone within 500m	Zone within 1 km
Geology	Q1 Recent deposits	M3 sandy clay marl	M3 sandy clay marl	Q1 Recent deposits	M3 sandy clay marl
Elevation	69-135 m (highest)	69-135 m (highest)	48-69 m (second highest)	69-135 m (highest)	69-135 m (highest)
Aspect	South	East	East	East	East
Slope Degree	3-10 degree slope	3-10 degree slope	0-3 degree slope	3-10 degree slope	3-10 degree slope
Rainfall	2000-2500 mm	2000-2500 mm	2000-2500 mm	1500-2000 mm	2000-2500 mm
Distance to Sea	<1 km	9+ km	9 + km	<1 km	<1 km
Distance to reefs	<500 m	<500 m	<3 km	<5 km	<500 m

Table 11-18. Summary of zonal statistical analysis for the 1907 sites. Grey indicates a CV of 0 to 0.5. This means that sites are relatively evenly distributed across zones, so the zone that is most dense is not strongly favored. Yellow indicates a CV of 0.5 to 1, showing that sites were somewhat unevenly distributed across zones. The densest zones in yellow are somewhat favored. Green indicates a CV of 1 or more, indicating that sites are strongly unevenly distributed between zones, which means that the densest zone is strongly favored for settlement.

Some overall trends are apparent from zonal statistical analysis. Proximity to high rainfall and easily available fresh water is a consistent factor for the location of all settlement types. Fresh water from streams and rain did not limit settlement however—the 1907 Khan Bahadur map shows clearly that people created wells in places where water was not available above ground.

Soil and geology were also important factors for settlement. The densest settlement across the island is concentrated in areas of *kinongo* and *mchanga* soil, over Q1 recent deposits or M3 sandy clay marls. *Kinamo* soils have a strong negative correlation with settlement, since they are located in low-lying, swampy areas.

Except for hamlet-sized sites, all site types correlate strongly to the areas of the historical clove plantation zone, and to areas of modern settlement. This shows the continuity of land use from the 19th century to the present. Hamlets likely represent areas not related to agricultural production within the clove plantation zone.

Hamlets and small villages are more evenly distributed across the island zones, soil zones, infiltration zones, hydrology zones, elevation zones and aspect zones compared to large villages and towns, which are more concentrated within the zones they favor. This can reflect two things: 1) the overall greater adaptability of small settlement forms across a wider variety of environments, and 2) population movements into more favorable areas which produced larger settlement forms in the first place.

Large villages are a unique settlement form that differs from general island-wide trends. Large villages are the only settlements that are not strongly associated with above ground streams in the northwest; instead, large villages are associated with wells in the central and southern regions. Large villages also are most dense in the second-highest elevation zone as

opposed to the highest elevation zone, where all other settlement types are most dense. Finally, large villages are also most dense on slopes of 0-3 degrees, instead of 3–10 degree slopes where all other site types are most dense.

Towns are most unevenly distributed between zones, compared to all other forms of settlement. This is because towns are found in the most favorable settlement areas. This can be for three reasons: 1) because their large size is not sustainable in more marginal parts of the island, 2) because they represent desirable places for people to move to, due to the favorable conditions, or 3) because towns were founded in places that political elites seized and populated with their retinues of enslaved people, due to the favorable conditions for plantations there.

Stone Town's location is not the result of particularly favorable environmental conditions for agricultural production, but rather due to its long-term political and historical significance as the capital of the island, and due to its proximity to the coast in an area free of reefs which enabled large-scale shipping. Mkokotoni and Tumbatu are also well-situated settlements for large-scale shipping since the channel between them is free of reefs as well. Near-shore reefs prevent large ships from coming near the shore, which likely prevented eastern parts of the island from developing ports for large vessels.

Distance to the sea, and especially to reefs, was an important factor for site location during the 19th century despite the influence of the clove plantation system. Overall, the <1 km coastal fringe of the island is most densely populated. Furthermore, the zone within 500 meters of near-shore coral reefs is most densely settled across the island. This reflects the continued importance of marine resources for subsistence. At one scale, the distance to sea raster shows that small villages and large villages are most dense in the interior of the island. However, when distance to coral reefs is calculated, small villages are densest within 500 meters of these reefs, along with hamlets. Large villages and towns are inversely associated with distance to reefs, suggesting that the residents of these places did not directly forage marine resources, or did so on a larger scale, with deep-sea fishing ships.

11.6 Conclusion

The Khan Bahadur map shows many features relating to Zanzibar's landscape that are of importance to archaeological and historical research. In addition to representing the entire settlement system of hamlets, small villages, large villages and towns, the map shows lighthouses, "poor houses", a leper colony, and a sanatorium, as well as areas marked as ruins that do not appear on any current archaeological gazette for Zanzibar (e.g., Horton and Clark 1985). The map also shows a historical stream network, which is probably the best model of hydrology for the island for any premodern period. Finally, it shows the locations of over a hundred wells in many remote areas, attesting to the types of landscape modifications that Swahili people carried out in areas where above-ground fresh water was scarce. The location of wells in many areas where streams are not present proves that while fresh above ground water was essential to settlement, the lack of springs or streams was not a barrier to settlement.

The analysis of the 488 settlements listed on the map shows spatial patterns that paint a vivid picture of the late 19th/early 20th century plantation landscape. The heat map shows large settlement clusters in the north, northwest, and west of the island, as well as smaller clusters in the south and east.

Settlements form a primo-convex site-size distribution pattern. Though Stone Town was the primary settlement on the island, it sat atop a relatively large and well-developed rural settlement system. Population did not flow into the primate urban center to the extent that one would expect for the wealthiest city in East Africa during the 19th century. The reason for this is

that while Stone Town was politically and economically dominant, elites used their power to maintain large populations of enslaved people living in the rural agricultural areas. Following abolition this trend continued, since the economic base of the island remained within the clove estates in rural areas. Stone Town was the seat of authority, but it was relatively small in relation to the settlement system that it presided over, and it functioned more like an elite “gated community” than a true capital city. Site-size distribution comparisons with other plantation societies might shed light on whether this settlement system is specific to Zanzibar, or characteristic of plantation societies elsewhere.

Spatial clustering is statistically significant at multiple scales across all zones in the island. At a small scale, the causes for this may relate to kin-based systems of Swahili land tenure (Middleton 1961), wherein younger members were permitted to clear land and found new settlements on the outskirts of their clan’s territory, thereby creating a spatially clustered pattern. At a larger scale, spatial clustering almost certainly relates to preferences for favorable agricultural zones on the island, the same zones that precolonial villagers settled in from the 11th-14th centuries (see Chapter 10).

In this chapter, I also assessed the spatial relationships between the 488 settlements of the Khan Bahadur map and different environmental zones, using zonal statistical analysis. This analysis produced clear patterns, discussed more above. Overall, the analysis shows that areas in proximity to fresh water with certain soil types and in certain geological zones were favored for settlement. It also showed that while all settlement types were densest in favorable areas, site size directly correlated to the unevenness of site distribution over different environmental areas. The smallest sites, hamlets, were most evenly distributed across all zones. Small villages were also well-distributed. Large villages had a peculiar settlement pattern, wherein they were more associated with wells than above ground streams, unlike other site types. Towns were most unevenly distributed, and occupied the narrowest distribution of zones, in the least marginal areas. This relationship between site size and distribution across favored zones versus environmentally marginal zones attests to the dynamics of rural and urban settlement, and the relationships between small rural communities and the centralized power of the Sultanate of Zanzibar. Small-scale communities may have sought independence from centralized control, but this meant accepting conditions in more marginal areas. Meanwhile, larger villages and towns supported higher populations in more environmentally favorable conditions for farming and subsistence, but this entailed a greater spatial and symbolic proximity to the center of power on the island.

This chapter has presented spatial analyses of rank-size distributions, spatial clustering, and zonal statistics for sites in relation to environmental zones. Synthesizing these lines of evidence allows for a more complete understanding of the social dynamics of urban and rural settlement across Zanzibar during the late 19th and early 20th centuries. I summarize this synthesis later, in the discussion and conclusion chapters (Chapters 17 and 18). In the following chapters (12-16) I turn to a discussion of the ceramic and artifactual evidence that we recovered during survey.

Chapter 12: History of Ceramic Research on the Swahili Coast

12.1 Introduction

Having described settlement patterns for Zanzibar from the precolonial period to the early 20th century, I now turn to a background discussion of ceramic research on the Swahili coast, before describing the main artifactual evidence we recovered during survey in 2019—local and imported ceramics across the precolonial period (Figure 12-1), the early colonial period (Figure 12-2), and the late colonial period (Figure 12-3).

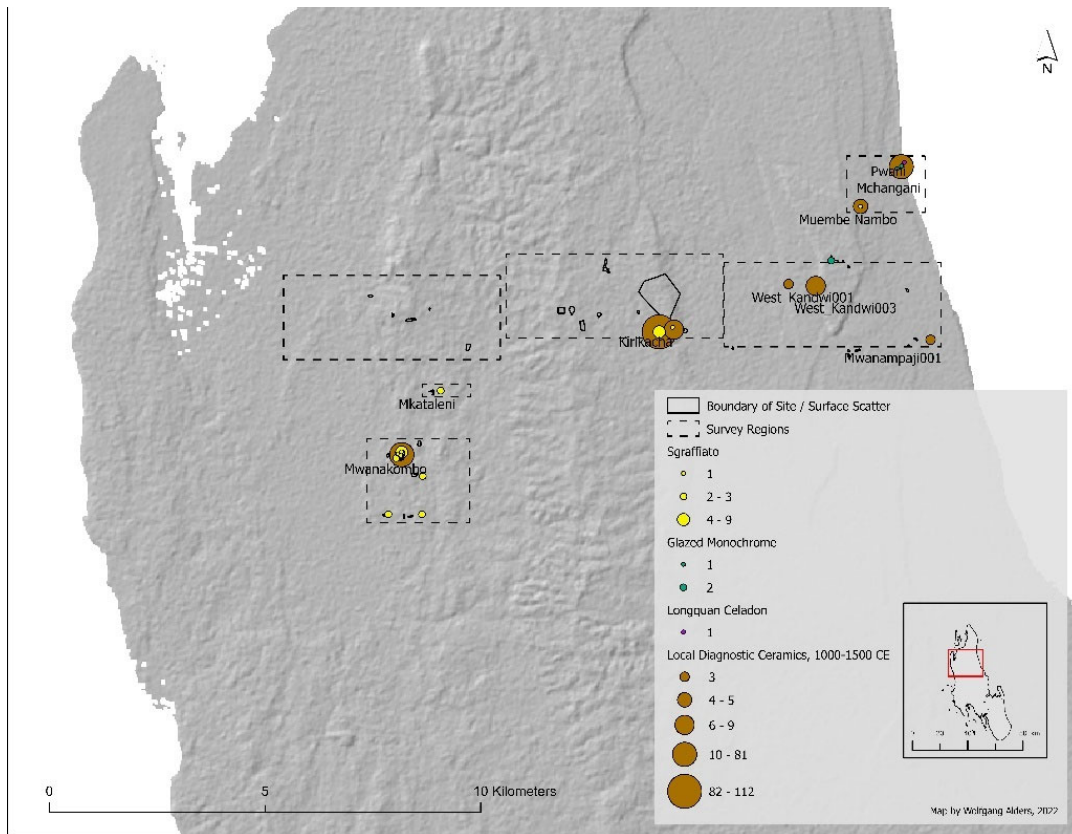


Figure 12-1. Local diagnostic and imported ceramics of the precolonial (early second millennium) period.

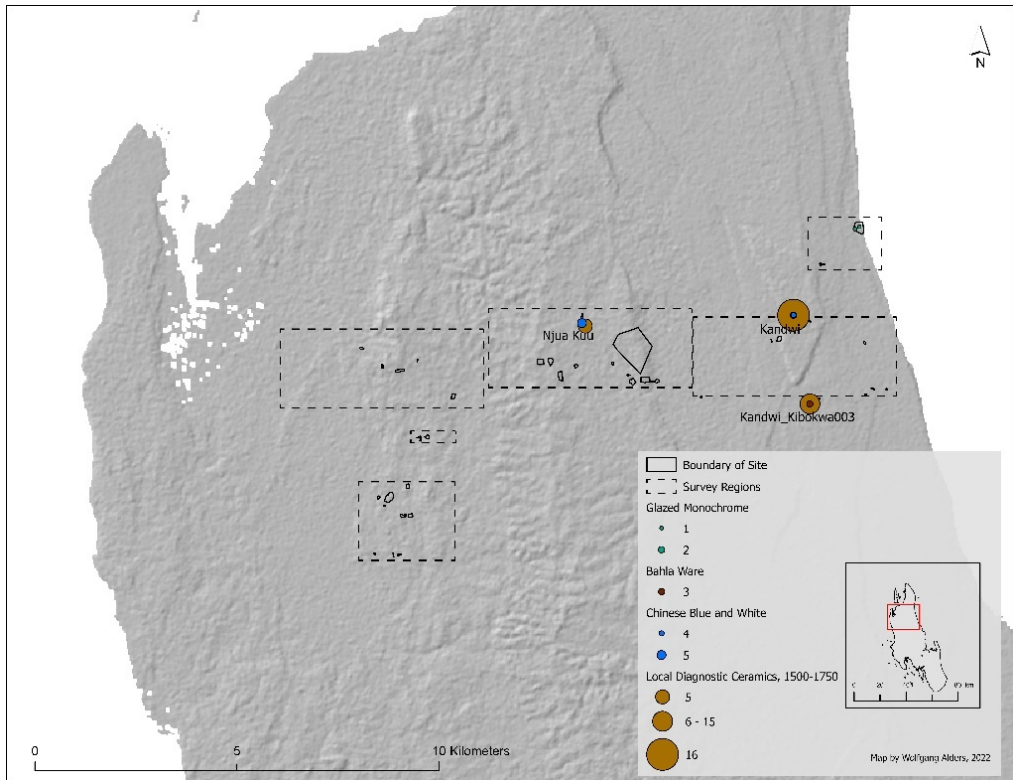


Figure 12-2. Local diagnostic and imported ceramics of the early colonial (1500-1830) period.

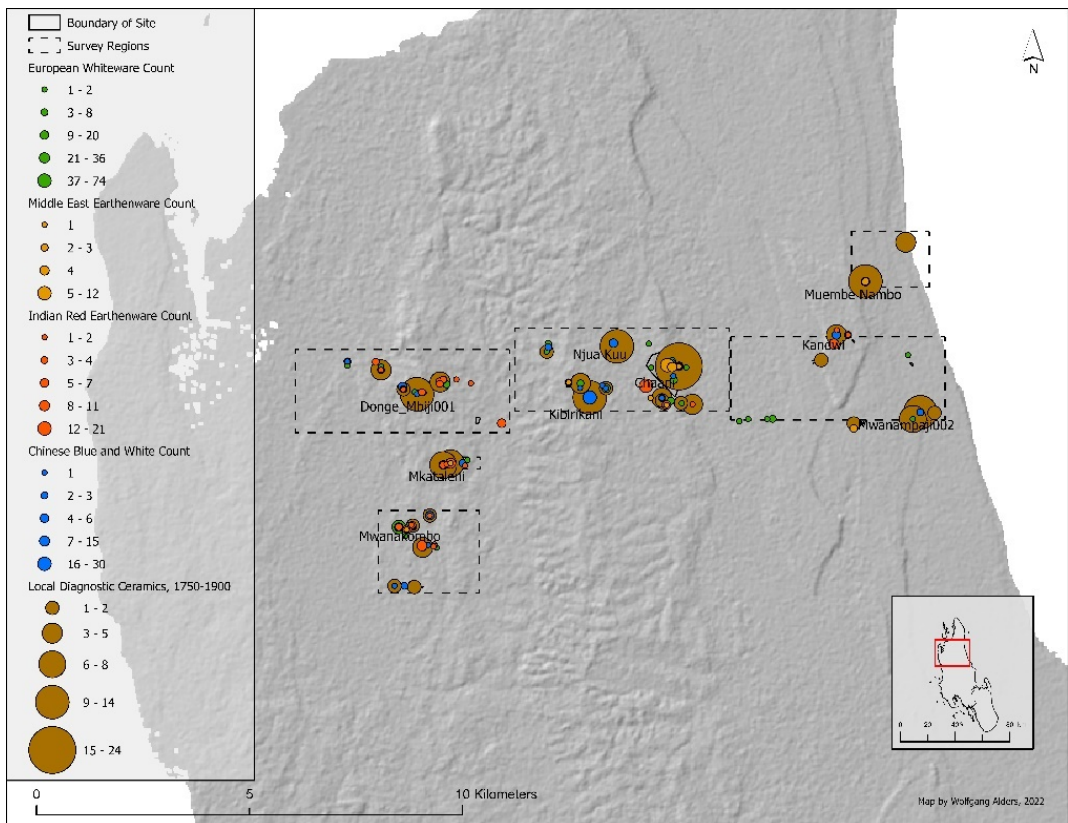


Figure 12-3. Local diagnostic and imported ceramics of the late colonial (1830-1963) period.

Ceramic production, use, and deposition are visible archaeological processes that relate to social transformations across the settlement system. Correlating ceramic trends to spatial settlement trends enables a richer understanding of the dynamics of social transformation in inland areas. The aim of this chapter is to describe the historiography of research on ceramics in coastal East Africa. The next two chapters (13 and 14) describe the local and imported ceramics that we recovered during survey.

Swahili people have produced and used ceramics on the East African coast since at least the 6th century CE, and they continue to make them as a craft today. Locally made ceramics are earthenware, made by drawing up vessel walls from a lump of clay (Wynne-Jones and Mapunda 2008: 5), or using a combination method that involves using a broken pot as a mold into which clay is pressed, with coils added and smoothed to finish the top (Fleisher 2003: 232; Wright 1984). M'Mbogori's ethnographic study of Swahili potters (2013) attests that these methods of ceramic construction were widespread on the coast and have remained consistent over many centuries.

Roux (2019) distinguishes two general methods for firing ceramics: enclosed methods and open methods. Enclosed firing involves the use of a variety of kiln types, none of which have been observed on the eastern African coast to date. In contrast, open methods are well attested on the coast historically, and in the present day. Open firing consists of burning a fuel load laid over the unfired ceramics in open hearths or pits. This method can also include the use of fuel structures like wood or bamboo frames that are set alight, and may or may not also include the use of insulation in the form of mud, wood, grass, or potsherds (Roux 2019: 112). With firing occurring as the fuel burns above the ceramics, open firing methods produce pots fired to low temperatures, below 900 degrees Celsius. This is the firing point at which clay minerals irreversibly harden and become ceramic, but do not lose their structure and vitrification does not occur (Sinopoli 1991: 29; Roux 2019: 110). This is consistent with the appearance of Swahili ceramics in general. Significant variation is present in modern open firing methods, resulting in differences in firing time, temperature achieved, and fuel efficiency. These differences, especially the differences between open-air firing and pit firing, may produce different oxidizing or reducing conditions, and thereby affect the final pot color. Oxidizing conditions produced in open-air hearths may result in tan, pink or red colored ceramics, while reducing conditions produced by pit firing and kiln firing may result in uniformly dark brown and black pots. Open-air firing was likely the most common method for coastal ceramic production in the past. Fleisher (2003: 232) suggests that on Pemba, a transition from open-air firing to pit firing and the overall darkening of vessels may coincide with the increased production of open bowls starting in the early second millennium. These firing methods are common today in East Africa as well as in many other parts of the world where ceramic production occurs within local communities.

Decorations on coastal ceramics consist of paint, slip, burnishing, the application of graphite and hematite, incised motifs, impressed marks, and plastic clay modeling, though many were also left plain. Notably absent is the use of rouletting, which is common on wares from mainland East Africa, outside of the coastal areas (Haour et al. 2010).

Since at least the 6th century CE, East Africans on the coast have supplemented locally made ceramics with small numbers of imported wares. The earliest known to date are late Roman-era trade ceramics of unspecified origin found at Unguja Ukuu and Fukuchani on Zanzibar (Fitton 2017; Juma 2004). Imported wares from the Arabian/Persian Gulf and the Middle East, India, Southeast Asia, and East Asia reached Swahili shores by the late first

millennium. Swahili people continued to consume imported wares from these places through the colonial period. For the precolonial period, imported ceramics made up roughly 1-5% of all ceramics at Swahili sites. As an example, Tumbatu and Mkokotoni in northern Zanzibar have imports that make up 3.6% and 2.9% of their total ceramic assemblages, respectively (Rødland 2021: 130). Overall, imported ceramics during the precolonial period were rare, especially in non-urban sites, and were related to high-status consumption and display. This trend continued into the early colonial period, but starting in the mid-19th century, European whitewares became ubiquitous across sites in Zanzibar, and constituted a far larger percentage of the ceramic assemblage compared to earlier periods (see Chapter 14).

Figure 12-4 shows examples of precolonial, early colonial, and late colonial local ceramics that our team recorded in 2019. Figure 12-5 shows examples of imported wares that we recorded.



Figure 12-4. Local ceramics from the survey region. Precolonial ceramics from Kirikacha on the left, and late colonial era ceramics from sites in the east region on the right.



Figure 12-5. Imported ceramics from the survey region. Late sgraffiato sherds from Kirikacha on the left, late colonial era ceramics from Daraja_La_Mwanakombo001 on the right.

12.2 History of Ceramic Research on the Swahili Coast

Coastal Ceramics of the First Millennium: Kwale Ware, TT/TIW, and Swahili Ethnogenesis: The early history of ceramic analysis in coastal East Africa highlights the relationships between ceramic assemblages, coastal Swahili settlement, the African hinterland, and the Indian Ocean trading system of the precolonial period. Initially, archaeologists and historians considered large Swahili stone-built sites to be colonial outposts of Arab or Persian colonists based on architectural forms that were different from African ones they observed in their present day (e.g., Ingrams 1920; Kirkman 1964). A breakthrough in Swahili ceramic analysis was the discovery that certain first millennium ceramic assemblages from coast and hinterland sites across modern Kenya, Tanzania, and Mozambique were related in form and construction (Chami 1998; Horton 1996). Along with the linguistic reconstruction of the Swahili and Sabaki languages (Nurse and Spear 1985), the synthesis of ceramic assemblages from coast and hinterland sites provided the evidence necessary to firmly refute a hypothesis that coastal cities were founded by outsiders and assert the fundamentally African character of Swahili society (Allen 1993; Ehret and Posnansky 1982; Horton 1996). The following section describes the development of ceramic analysis on the coast, and subsequent post-colonial debates around early coastal pottery and its relation to identity.

At the major urban site of Kilwa in southern Tanzania, Chittick interpreted locally made incised ceramic bowls, pots, and jugs of the late first and early second millennium as “Early Kitchen Ware” made by Africans living outside of the town and traded to the Persian inhabitants (Chittick 1974: 217). Chittick’s discovery of similar vessels at Manda in Kenya confirmed the idea that similarities existed between late first-millennium ceramics across a wide span of the coast, though Chittick (1984: 108) theorized that pottery was being brought to Manda from Kilwa, rather than being the result of a shared technological culture. Meanwhile, early archaeologists working inland from the coast in Kenya and Tanzania reported similarities in ceramics between different Early and Middle Iron Age sites. At the site of Kwale in southern Kenya, Soper found and described an Early Iron Age (CE 100-600) distinctive ceramic tradition he called Kwale Ware (Soper 1967). Soper (1967b) and Phillipson (1979) described a Middle Iron Age (CE 600-1000) ceramic tradition at other inland sites. This same Middle Iron Age ceramic tradition was described separately by archaeologists working on the coast, in Mozambique (Sinclair 1982), at Shanga in northern Kenya (Horton 1984), and in the Comoros Islands (Wright 1984).

After an analysis of the local ceramics at Shanga, Horton (1996: 243-270) was one of the first to recognize the similarities between Chittick’s so-called early kitchenware, the Middle Iron Age ceramics found at inland sites by Soper (1967b) and Phillipson (1979), and the assemblage of local ceramics excavated from early contexts at the coastal sites of Shanga (Horton 1984) and in the Comoros (Wright 1984). Horton proposed a sphere of cultural continuity between inland agro-pastoral groups and coastal dwellers at Shanga, based on this shared ceramic tradition that he called the Tana Tradition. He divided this Shanga assemblage into four chronological phases ranging from 750 to 1425 CE (Horton 1996: 244): Phase A (750-920 CE), Phase B (920-1050 CE), Phase C (1050-1300 CE), and Phase D (1300-1425 CE). These phases were not necessarily extended to other sites on the coast, but many researchers have observed broad similarities between these phases and changes in ceramic trends elsewhere. The commonalities between early Tana Tradition ceramics from the hinterland and those from the early periods of later towns like Shanga or Kilwa were a main line of evidence for asserting the fundamentally African character of coastal East African society (Fleisher and Wynne-Jones 2011: 247). Horton

hypothesized that the early inhabitants of the coast in the Middle Iron Age (CE 600-1000) who would go on to construct large stone-built cities were descended from Cushitic-speaking agro-pastoralist peoples, who migrated south from northern Kenya. These people would have adopted a proto-Swahili language and brought their ceramic technologies to Tanzania, Mozambique, the Comoros, and Madagascar (Chami 1998: 206; Horton 1996).

In Tanzania, Chami contested this model after excavating Early Iron Age sites on Mafia, Zanzibar, and on the African mainland. He discovered an earlier pattern of regional ceramic similarity based around Kwale ware (Chami 1998: 208; Crowther et al. 2016a: 217). Kwale ware refers to a thick bevel-edged ceramic found across coastal Tanzania and Kenya, that predates Tana Tradition pottery and dates from the 3rd to 6th centuries CE (Chami 1994; Håland and Msuya 2000; Helm 2000). The type-site for Kwale ware is Kwale Hill, where Soper (1967) first identified the form. Chami proposed that the ceramics which Horton called Tana Tradition developed out of Kwale wares among Bantu-speaking, iron-working agriculturalists who occupied the coasts of Tanzania and Kenya since at least the 1st century CE (Chami 1994, 1995; 1998; 1999). Arguing that the term Tana Tradition reflected the “northern origin” hypothesis, Chami renamed this ceramic tradition TIW, for triangular incised ware, as a more neutral term (Chami 1998), but it describes a smaller set of pottery than the Tana Tradition per se. Since then, other archaeologists have confirmed the development of Tana Tradition/TIW from Kwale ware on other parts of the coast (e.g., Helm 2000).

Tana Tradition occurred in many areas of the Swahili Coast and on offshore islands (e.g., Helm 2000; LaViolette and Fleisher 1995, 2018; Pawlowicz 2011). Archaeologists today refer to this type as either TT/TIW, Tana/TIW, or Early Tana Tradition (ETT) (Fleisher and Wynne-Jones 2011). Along with linguistic evidence, TT/TIW assemblages from the coast and hinterland formed the basis for asserting the African character of Swahili society. Recent studies of this ware suggest that geographical diversity within TT/TIW assemblages is more substantial than previously thought (Fleisher and Wynne-Jones 2011: 253). Though significant regional diversity exists, the assemblage coheres around a shared set of motifs, rim types, and vessel forms from the far south of Mozambique all the way to Manda in northern Kenya for 600 to 900 CE, which signify an intense sphere of cultural interaction during the late first millennium (Fleisher and Wynne-Jones 2011: 273).

Ceramics of the Early Second Millennium: The questions which animated the TT/TIW debate for ceramics of the first millennium—assemblage coherency, formal evolution, and the relationships between ceramics and identity—continue to frame discussions of ceramics and Swahili society through the precolonial period of the second millennium. In this period, many Swahili communities developed increasing social stratification within urbanized coastal towns. Elite Swahili residents expressed their status in part through the materiality of cosmopolitanism—the construction of monumental Islamic stone architecture, increased use of imported Middle Eastern and Chinese ceramics, access to international trade networks, and Islamic practice (LaViolette 2008; Fleisher 2010b; Fleisher et al. 2015).

Chittick’s typologies from Kilwa (1974) and Manda (1984) and Horton’s analysis of Tana phase C and D ceramics at Shanga remain the most in-depth sources for the types and decorative motifs of the early second millennium (Horton 1996: 260-270). Fleisher’s survey of northern Pemba draws heavily on Horton’s typology and affirms the ceramic sequence that he created with some distinct Pemban exceptions (e.g., Fleisher 2003: 250). Pawlowicz’s (2019) typology of ceramics at Gede, and Rødland’s (2021) typology of ceramics at Mkokotoni and Tumbatu also reference these types. The present research follows the type-variety frameworks of

these projects. An alternative framework for understanding ceramics of the second millennium is Chami's (1998; Chami et al. 2004) categories of Swahili ware (1000-1500 CE on the north coast, 1200-1500 CE on the south coast), post-Swahili ware (1500-1750 CE) and post-post-Swahili ware (1750-1900 CE). This typology uses distinctions that are based in cultural chronologies rather than specific ceramic forms.

The most noticeable change in ceramic assemblages from the first to the second millennium is the increased frequency of open bowls and spherical pots, and the relatively decreased frequency of TT/TIW necked jars. This change in frequency is apparent across almost every large site in the Swahili world. For example, it is readily observable in northern Pemba (Fleisher 2003: 264), on the Kenyan coast (Helm 2000: 237), and at Kilwa (Chittick 1974: 324-326), Gede (Pawlowicz 2019: 229), Tumbatu (Rødland 2021: 108) and Shanga (Horton 1996: 255-268). One explanation for the shift to open bowls is the increased importance of rice and rice-based dishes starting around the 11th century, both as foods used for daily consumption as well as communal feasting (Walshaw 2010).

In addition to the increased frequency of open bowls and spherical pots, pottery became plainer in terms of decoration. The hatched and incised triangles of the earlier TT/TIW wares at Shanga in phases A and B became less common and were replaced in phase C by a single line of punctates on the neck or shoulder of vessels, fingernail impressions or other crescent arc patterns. In many other cases, potters simply left vessels plain (Horton 1996: 264, 268). Increasing plainness in the second millennium is also noted at Kilwa (Chittick 1974: 324-327) and Manda (Chittick 1984: 114-133). Increasing plainness appears to be a feature of all ceramic assemblages on the coast, though archaeologists have not yet carried out a systematic comparison of second-millennium ceramics which might adequately address proposed categories like Plain Ware as a southern coast phenomenon (e.g., Chami 1998: 212).

In part this is due to the increasing regionalism of second-millennium ceramics, in contrast to the relative uniformity of Tana/TIW. Starting in the 10th or 11th century there appears to be greater overall diversity in ceramic forms, decorations, and relative frequencies of types across different sites. According to Chittick, the second-millennium ceramics at Kilwa differ significantly from those found on the Kenyan coast (Chittick 1974: 317). Second-millennium ceramics from Kilwa (Chittick 1974), Manda (Chittick 1984) Pemba (Fleisher 2003) Unguja Ukuu (Juma 2004), Shanga (Horton 1996), Pate (Wilson and Omar 1997) and Gede (Pawlowicz 2019) all exhibit greater variability compared to late first-millennium Tana/TIW ceramics. This may be due to the increasing regionalism of polities on the Swahili Coast (Fleisher et al. 2015). While the small coastal communities of the late first millennium were undifferentiated socially and do not appear to have exerted political influence beyond the level of the extended family, the polities of the second millennium developed social stratification and a capacity to project influence regionally (LaViolette and Fleisher 2005; Fleisher et al. 2015) The Swahili Coast appears to have been divided into spheres of influence that resulted in differential access to the Indian Ocean trading system. Kilwa exerted control over the gold trade in the south (Mapunda 2018: 307), Mombasa and Malindi appear to have been rival polities on the central coast by at least the start of the Portuguese period (Prestholdt 2018: 518), and Lamu, Pate, and Mogadishu variously controlled trade in the north, specifically the trade in enslaved people from eastern Africa and Madagascar during the early modern period and possibly earlier (Vernet 2009). Regional political competition may have produced different social spheres and thus increased regional diversity in ceramic assemblages compared to earlier periods.

Imported ceramics of the early second millennium are relatively well-understood and are found at most large Swahili sites. The chronology of imports from Shanga (Horton 1996) is corroborated by data from northern Pemba (Fleisher 2003), Kilwa (Chittick 1974), and Manda (Chittick 1984), and applies to the rest of the coast. Priestman's (2013) more recent reinvestigation of the imported ceramics at Manda corroborates this idea as well. The most common imports are early and late sgraffiato wares produced from 1000-1400 in the Arabian/Persian Gulf (Horton 1996: 281-290). These are followed by black on yellow pottery from the 13th and 14th century (Horton 1996: 291) and monochrome glazed wares from the 15th and 16th centuries (Horton 1996: 293-296). I discuss these imported types in greater detail in Chapter 14.

Swahili Ceramics of the Colonial Period: Ceramics continue to be an important line of evidence for Swahili cultural development in the colonial period as well, although research on this topic is still nascent. This section covers the later periods outlined in earlier chapters: the early colonial Portuguese period and its aftermath from 1500 to 1830, and the late colonial period during which the clove plantation system developed from 1830 to 1963.

The Early Colonial Period, 1500-1830: Portuguese colonialism produced structural changes in the urban Swahili societies of the 16th century (Prestholdt 2018). Many large sites greatly diminished in size or were abandoned for a time, like Gede, Chwaka, and Unguja Ukuu. Other towns developed into large cities from the 16th century to the present, like Lamu, Mombasa, Malindi and Zanzibar Stone Town. Diagnostic imported ceramics from this period are relatively scarce, either because of social and historical factors from the period in question, or due to a lack of focused research on this period. One possibility is that most sites from the 16th century to the early 19th century are to be found within the earlier stratigraphic layers of modern towns and villages, thereby masking their presence on the landscape (LaViolette and Norman in press).

For this period, a large number of sites have comparative material, though most have not been assessed in a comprehensive way. Useful sources are Chittick's ceramic typologies at Manda (1984) and Kilwa (1974) for the 16th-18th centuries, though these do not appear to cover the full range of ceramics for this period. Wilson and Omar's (1997) paper on Pate shows ceramic rim and shoulder forms for the 16th-18th centuries from the site, though types are not described in depth. Wilson's excavations at Takwa investigated occupation at the site from the 17th to 19th century, though Wilson argues that most of the ceramics likely date to the late 18th and 19th centuries (Wilson 2019: 78). Kirkman's early research on the coast investigated several sites with final ceramic phases in the 16th century that overlap with the early 17th-century ceramics at Fort Jesus. *Fort Jesus* (Kirkman 1974) is the most useful text for this period, since it provides detailed ceramic drawings for distinct contexts from the early 17th, late 17th, 18th, and 19th centuries (see Table 12-1). Reading Kirkman's work at Kilepwa (1952), Gede (1954), and Ungwana on the Tana (1966) side by side with his report on Fort Jesus (1974), it is clear that he was attempting to make sense of pottery seriation for the last thousand years of coastal history, from the 11th early 20th centuries. It is unfortunate that his type-methodology is relatively difficult to understand compared to Chittick's from Kilwa (1974) and Manda (1984). While Chittick created a series of unique type numbers that could be easily referenced alongside drawings, Kirkman numbered his drawings in a non-unique way so that referencing a drawing number requires citing both the drawing number and the page or plate number on which it is found. Only for the Great Mosque of Gede (1954) does Kirkman create vessel type categories with unique values, and even still, seeing the drawings of these forms requires flipping to the

back of the book to reference figures that are not labeled with the vessel type. Furthermore, while Chittick labels vessel types with chronological periods, Kirkman labels his vessels only with the stratum from which they originate, except for at Fort Jesus (1974). All this has meant that recent archaeologists of the coast have not used Kirkman’s work extensively so far, but archaeologists working on the colonial period may find it a useful comparative resource.

Imported ceramics diagnostic of this period on the East African coast are Ming and Kangxi blue-and-white porcelain and certain types of glazed earthenwares from the Arabian/Persian Gulf, notably manganese purple ware, Bahla ware, and green-glazed ware (Power 2015: 11). Ming and Kangxi pottery is common across the East African coast, while glazed wares are less common. Manganese purple earthenware is found at Kilwa (Chittick 1974: 305), Manda (Chittick 1984: 82), and Fort Jesus (Kirkman 1974: 94-98, 117-119), but it does not appear to be present on Pemba (Fleisher 2003) and we did not find it in Zanzibar.

Period and Ware	Deposits with Local Ceramics within Fort Jesus
Period I – Ming and Transition Ming blue and white porcelain, 1593-1670 CE	<ul style="list-style-type: none"> a. Make-up of the rectangular projection (1596 CE) b. Filling of S. Filipe, S. Matias, and the gun platform in S. Mateus (1634 CE) c. Make-up of elliptical bastion (1634 CE) d. Make-up of Cavalier St. Antonio (1648 CE) e. Filling over Passage of the Steps (1650 CE)
Period II – Kangxi, 1670-1730 CE	<ul style="list-style-type: none"> a. Gravel pit in S. Filipe b. Filling of Captain’s House c. Room of the stands d. Lower filling of court in S. Mateus e. Lower filling of Passage of the Arches
Period III Famille rose, 1730-1840 CE	<ul style="list-style-type: none"> a. Court on north side of Captain’s House b. Area of the main court, the west barrack block, and the church c. Upper filling of court in S. Mateus
Period IV “European china” (industrially produced European glazed whiteware), 1840-1895 CE	<ul style="list-style-type: none"> a. Upper filling of Passage of the Arches b. Area between Captain’s House and audience room of the Mazrui c. Area of south barrack block

Table 12-1. Contexts and periods of imported ceramic finds from Fort Jesus (Kirkman 1974).

A possible diagnostic local ceramic on Pemba for the 16th to 18th centuries is Type 13, a cooking pot with adjacent nicks or impressions on the shoulder (Fleisher 2003: 258, 307).

Fleisher did not excavate Type 13 ceramics but found them in association with Chinese blue and white porcelain in surface collections. The vessels that make up Type 13 are poorly understood since no rims were located. Fleisher dated Type 13 ceramics to the 16th-18th-century based on their association with Chinese blue and white porcelain dated to the same years. While only three sherds of Chinese blue and white porcelain were found in stratigraphic context in Fleisher’s survey from the upper levels of Mduuni, Chwaka, and Kaliwa (Fleisher 2003: 273), he located other sherds in surface scatters at the sites 99-03, 99-04, 99-08, 99-14, 99-23, and 99-25 (Fleisher 2003: 443-476). Type 13 ceramics were found at 99-03, 99-05 and 99-08, with many examples observed at 99-08.

Other examples of these type 13 ceramics come from Pujini, a site with confirmed dates from the 15th-17th century in southern Pemba (LaViolette 2000, pers. comm.). At Pujini, no imported pottery earlier than the 15th century was found, and most imports dating to the period of the site’s occupation were Chinese blue and white porcelains with designs characteristic of the 16th and 17th centuries. Later European whitewares were also collected on the site, though these might be more related to a brief reoccupation or reuse of the site as a dumping area in the 19th century, or possibly relates to the 19th-century phenomenon of “picnicking” (LaViolette 1989: 37). Most of the local pottery was undecorated, with some red painted and burnished wares

(LaViolette 1989: 36). Of the decorative motifs found at Pujini, many resemble the Type 13 ceramics that Fleisher found in northern Pemba.

Finally, a diagnostic feature of local ceramics dating to the 15th century and later is a potter's mark. These occurred on local pottery from the surface and subsurface levels at Gede and Ungwana, which Kirkman interprets as the 15th and 16th centuries at Gede, and only the 16th-century levels at Ungwana (Kirkman 1958: 156). Kirkman lists 25 of these marks, which are combinations of hash marks on the bodies of simple restricted pots, or what Kirkman calls hemispherical slightly incurved cooking pots (Kirkman 1958: 156): also known as hole-mouth pots, or spherical pots, see type 4 from Fleisher 2003: 245-246). Kirkman suggests that starting in the 15th century, an expansion of the urban population meant that ceramic production shifted from the household level to the urban center, where communal pits were used to fire pots from multiple households at once. Potter's marks came into use to distinguish pots of different households that were fired in the same place. While some potter's marks appear to be imitations of calligraphic potter's marks and seals found on Chinese blue and white porcelain, others are simple hatch marks. Chittick also describes potter's marks on simple restricted pots at Manda (type 24, Chittick 1984: 128), where he similarly writes that they only appear on pots made after around 1500 CE. During the 2019 survey, our team recorded a type 6 potter's mark on a sherd of a spherical pot, which is three vertical hatch-marks. This sherd was not found in a dateable context, but rather as a findspot on transect 20, in a field plot inland in the eastern region.

The Late Colonial Period: 1830-1963: By the early to mid-19th century, imported material culture became abundant in the form of mass-produced industrial European ceramics which were found throughout the 2019 survey region, and which are ubiquitous across Swahili sites. For this period, there are three comparative ceramic typologies: 1) Wilson's re-analysis of materials at Takwa (Wilson 2019), 2) Croucher's excavations at Mgoli (Croucher 2006, 2014) and 3) Kirkman's excavations at Fort Jesus (Kirkman 1974). Wilson dates Takwa from 1600 to 1900 CE but claims that the majority of the earthenware analyzed likely spans the late 18th to late 19th century (Wilson 2019: 78). Croucher analyzed a ceramic assemblage from Mgoli, a plantation house on Pemba. Kirkman's excavations at Fort Jesus (1974) provide ceramic assemblages from separate 18th and 19th-century contexts (see Table 12-1), and until Wilson's Takwa manuscript became available, the Fort Jesus excavation was the only detailed source for 19th-century ceramics.

The diagnostic local ceramic form of the late 18th-19th century and into the 20th century is the cooking pot with an everted rim, either plain or with incised motifs on the shoulder or carination. Kirkman described these decorative motifs in the assemblage at Fort Jesus (Kirkman 1974: 258-261). Croucher and Wynne-Jones (2006) suggest that the style of coastal ceramics in the 19th century is homogenous despite the diversity of social and ethnic groups present on the coast during the same time, which reflects the ways in which diverse ethnic groups in Zanzibar adopted a monolithic identity of Swahili following the abolition of slavery. Croucher's excavations at Mgoli particularly emphasized this: 98% of bowls were open, carinated vessels with rounded bases (Croucher 2014: 214). Nevertheless, regional diversity persisted across the coast during the 19th century. The assemblages at Takwa and Fort Jesus show that Swahili people also produced more significant quantities of open bowls, spherical pots, and other necked jars. The 2019 survey in Zanzibar also shows that a similar diversity of vessel forms can be found on 19th- and early 20th-century sites across inland regions.

Imported ceramics for the late 18th to early 20th century consist of later Chinese blue and white porcelain known as Qing (also spelled Ch'ing) Kitchenware, European painted and printed

glazed whitewares, and Middle Eastern and Indian unglazed earthenware types. These types are referenced and described at Fort Jesus, Mgoli, and Takwa, but more in-depth discussions of these ceramics are to be found in more recent investigations of sites from the Arabian/Persian Gulf, southeast Asia, Europe, and the Americas (e.g., Power 2015). I discuss these wares further and show images from our survey in Chapter 14.

12.3 Conclusion

This chapter has outlined the history of ceramic research in coastal East Africa. For the precolonial period, I draw on the early-second millennium descriptions of local and imported ceramics at Kilwa (Chittick 1974), Manda (Chittick 1984) Shanga (Horton 1996), in northern Pemba (Fleisher 2003), and at Tumbatu and Mkokotoni (Rødland 2021). For the early colonial period, I draw comparisons between ceramics recovered during this survey and assemblages from Fort Jesus (Kirkman 1974), the later levels of Kilwa (Chittick 1974) and Manda (Chittick 1984), Pate (Wilson and Omar 1997), the upper levels at Kilepwa (Kirkman 1952), Gede (Kirkman 1954), and Ungwana on the Tana (Kirkman 1966), Pujini (LaViolette pers. comm.) and assemblages from the Arabian/Persian Gulf (Power 2015). For the late colonial period, I similarly rely on assemblages from the Arabian/Persian Gulf (Power 2015) as well as assemblages from Takwa (Wilson 2019), Mgoli (Croucher 2006), and 19th-century assemblages at Fort Jesus (Kirkman 1974). While a considerable number of sites dating from 1500-1900 on the Swahili Coast have published ceramic material, these datasets have not been synthesized into a coherent framework to the same extent as ceramics of the precolonial period. This chapter and the one that follows attempt to perform some of this synthesizing work. Future research might more quantitatively assess ceramic assemblages from the colonial era and create a fully consistent schema for typological analysis. In the following chapters, I present the methodology for ceramics analysis that I used for this project, and the local and imported ceramics that we recorded during survey in 2019.

Chapter 13: Local Ceramics of the 2019 Field Season

13.1 Introduction

In this chapter I describe locally produced ceramics of the 2019 survey and analyze these by type and attribute in comparison to other sites on the Swahili Coast. We did not locate 1st-millennium ceramics during the 2019 survey besides a few tentative ETT/TIW sherds at Pwani Mchangani and Kandwi. Almost the entire assemblage dates from the early second millennium and beyond. For this period of the second millennium, I compared ceramics from the 2019 survey against well-established assemblages from across the Swahili Coast, which I outlined in Chapter 12. Chapter 12 described the history of ceramic research on the Swahili Coast, including the relationship between 1st-millennium ceramics and the debate over Swahili origins, and the state of research on second millennium CE ceramics. In this chapter I present the methodology used during the survey for ceramic collection, recording, and lab analysis. Then I describe the local ceramic types of the early second millennium (1000-1500), the early colonial period (1500-1830), the late colonial period (1830-1963), and finally local ceramics which do not fit into previous types. Next, I present the results of exploratory data analysis using the attributes for local diagnostic ceramics collected during the survey.

13.2 Methodology for Ceramic Analysis of the 2019 Field Season

During survey in 2019 we collected and analyzed ceramics from all contexts investigated. We collected 6515 ceramic sherds in total, with 5784 of these being local ceramic sherds (Table 13-1). The raw data for ceramic find frequencies can be found in Appendix B. The ratio of local to imported sherds here is high compared to precolonial sites, since it reflects the large numbers of imported wares that came to Zanzibar in the late colonial period. This may also reflect that our sampling strategy relied on spotting sherds while walking, which may have biased us toward selecting shinier, bright-colored imported sherds compared to earth-toned local sherds. These sherds are now housed at the Peace Museum in Zanzibar under the auspices of the Department of Museums and Antiquities. 1187 of these sherds are diagnostic, meaning that they have identifiable decorative motifs, rim forms, or base forms. This count is also relatively high since we favored the collection of diagnostic sherds over non-diagnostic sherds in most cases. Of these diagnostic sherds, we were able to link 753 to dateable sites, dated using imported ceramics (see Chapter 14). These 753 sherds form the basis of the type and attribute analyses below. The following sections describe how we collected, recorded, and analyzed these ceramics.

Total Sherds	Total Imported	Total Local	Total Analyzed Local Diagnostics
6515	731 (11%)	5784 (88%)	1187 in total (21% of local sherds), 753 linked to sites (13% of local sherds)

Table 13-1. Total summary of ceramics collected in 2019, including totals of imported and local ceramics.

13.2.1 Collection

Our team collected ceramic sherds in surface scatters, as singular findspots, and within sieved material from STPs. We placed all ceramic materials from findspots and STPs in plastic bags, and labeled them with the bag number, date, location, and context. In the case of ceramics found in surface scatters, we collected a sample of sherds. When encountering a surface scatter of ceramic sherds, our first step was to delineate the boundaries of the scatter. Once the boundaries were established, we would walk in a line across the widest part of the scatter and collect ceramics. Our aim was to collect diagnostic sherds but depending on the size of the

artifact scatter we also collected apparently undiagnostic sherds at fixed intervals of 5 meters in order to not miss diagnostic elements that dirt might have obscured. In contrast, we collected all imported sherds from STPs, findspots, and artifact scatters. Further testing with STPs permitted us to sample more ceramics from below the surface.

This method for collection does not produce as systematic a sample as one would achieve through controlled stratigraphic excavation. Certain statistics like the ratio of imported to local ceramics, or the frequencies of different ceramic types, are not as meaningful as similar statistics from excavated sites elsewhere on the coast. This is because the frequency of ceramic collection during survey was dependent on the ability of surveyors to spot and collect sherds on the ground while walking. Shovel-test pit grids across sites mitigated this problem, but the quantity and distribution of STPs varied for each site that our team encountered, meaning that ceramic assemblages between sites are not directly comparable in terms of artifact frequency either. Nevertheless, this methodology allowed the widest and most representative sample of diagnostic ceramics that was possible to achieve while still permitting for a time-efficient survey over a large archaeological region. Since the method of collection was applied in the same way at every site, comparisons between sites are still meaningful.

13.2.2 Ceramic Sorting and Counting

Our team did not sort ceramics in the field. Upon returning to our base each day, we scrubbed ceramics clean with water and toothbrushes, and laid them out to dry. Once dried, we divided ceramics into four categories: sherds less than 2 cm in length, undiagnostic locally produced sherds, diagnostic locally produced sherds, and imported sherds. Undiagnostic local sherds lack an identifiable rim, base, handle, or surface treatment like paint, burnishing, or decoration. We placed these in their own bag, though contextual information was retained. We counted the following aspects as diagnostic: rims, bases, handles, lids, interior paint, exterior paint, interior burnishing, exterior burnishing, interior slip, exterior slip, carinations, and decorative motifs. We placed diagnostic ceramics in a second bag of the same context. Finally, imported sherds included all examples of pottery produced outside of the East African coast for the historical period prior to and during the early to mid-20th century. We put imported sherds in a third bag of the same context. We made other bags from the same context for other artifacts like daub, glass, and iron (see Chapter 16). We did not collect modern plate and bowl fragments, likely dating from the mid-20th century and onward. Following the sorting, our team counted and weighed each bag of ceramics from every context, producing an overall count of the number of each type of ceramic from every context. We then tied each bag and placed it in a larger collection of sherds awaiting more detailed analysis.

13.2.3 Ceramics Field Analysis

Ceramic analysis proceeded in two stages: a preliminary period of analysis at the field house in Zanzibar, and a secondary period of analysis using the raw data and photographs of the ceramics upon returning to the United States. Our team weighed diagnostic ceramics and then placed them in storage. We weighed and counted imported ceramics, and sorted them by known types, or, when we did not know the types, described them. We photographed all imported ceramics for further analysis. Our crew sorted local diagnostic ceramics by size and discarded all ceramic pieces smaller than 2 cm due to the difficulty in accurately analyzing sherds this small, a recommended practice that is standard in Swahili archaeology (e.g., Fleisher 2003: 223; Rødland 2021: 104). This resulted in 1187 local diagnostic sherds (see Appendix B). We individually analyzed each one of these sherds by attribute, following protocols described by Rice (1996a,

1996b) and Hunt (2017). Our analysis described the following attributes for local diagnostic ceramics.

- a. Vessel part: The part of the vessel to which the sherd belongs. Options include the rim, neck, shoulder, body, base, handle, spout, lid, the entire vessel, or unknown.
- b. Vessel form: The type of vessel that each sherd represents. Options include the four main vessel classes that Fleisher describes (2003: 235-236; see also Sinclair 1982): a simple unrestricted vessel (an open bowl), a simple restricted vessel (a globular pot, also known as a hole-mouth pot, referred to here as a spherical pot), an inflected restricted vessel (a necked jar), and a composite restricted vessel (a carinated vessel, often with an everted rim). Other categories included a plate, a cup, a lamp, a platter, a vessel with an everted rim (which could be either an inflected or a composite restricted vessel), and unknown.
- c. Rim shape: The rim shape options were determined after analyzing several hundred rims and developing a typology in the field. A chart with all recorded rim types initially included over 50 options, which were combined and narrowed down as the research progressed. A rim undergoing analysis would be matched to a certain rim type with which it shared similarities. Most rims fell into the categories of rounded, pointed, squared, thickened outward, thickened inward, pinched, and rolled, with certain combinations of these types. There were also small numbers of less common rim types. For example, one rim type consists of an incised line on the top of a thickened, rounded rim.
- d. Rim profile: Options are vertical, slightly angled (left or right), and strongly angled (left or right).
- e. Construction: Options are coil made, paddle and anvil, slow wheel, wheel, pinched, or indeterminate. All locally made sherds appear to have been pinched and coil made.
- f. Fabric color: Fabric color refers to the color of the ceramic matrix found within the sherd wall. Fabrics can be 1) uniform dark, 2) light toward the exterior of the vessel and dark toward the interior, 3) dark toward the exterior of the vessel and light toward the interior, 4) mottled, 5) uniform light, 6) dark core with light sides, and 7) light core with dark sides.
- g. Temper: Temper refers to the materials which are added to clay to strengthen it prior to firing. Grit refers to sand, while grog refers to ground up ceramic sherds. Temper categories include 1) fine to medium sand with small quartz inclusions, 2) fine to medium sand with small quartz inclusions and vegetal spaces, 3) grog and fine to medium sand with small quartz inclusions, 4) grog and fine to medium sand with small quartz inclusions and vegetal spaces, 5) shell, 6) fine to medium sand with many larger quartz inclusions, and 7) fine to medium sand with small quartz inclusions and dark red slag or iron particles. The last category was created toward the end of the survey as we encountered ceramics from the eastern region, where sand sourced from coralline limestone bedrock has high levels of iron content, inclusions of which can appear in sherds.
- h. Exterior/interior vessel fired clay color: Clay color and the firing process determines the resulting color of fired ceramic objects. In general, oxidizing firing conditions are oxygen-rich and produce lighter colored ceramics (as iron oxidizes, or reddens the clay), while reducing firing conditions are oxygen-poor and produce dark and black ceramics (Roux 2019: 112; Sinopoli 1991: 30); however, these conditions can be

- controlled in various ways during firing to produce multi-colored vessels. Common vessel colors here include 1) pink/red, 2) tan, 3) black, 4) brown, 5) red and black, 6) tan and black, and 7) grey.
- i. Exterior/interior slip: Slip refers to a surface treatment in which the vessel is painted or submerged in liquid clay. Slip was indicated as present or absent on the exterior or interior, with the color options of red, brown, black, grey, or white.
 - j. Exterior/interior paint: Paint was a possible surface treatment for the interior or exterior. Possible colors included red, brown, black, grey, white, or red and black.
 - k. Exterior/interior burnishing: Burnishing is a surface treatment in which a piece of wood, stone, shell, bone, or other smooth object is used to smooth the surface of the ceramic vessel, aligning the platy clay particles on a leather-hard, unfired surface producing a shiny surface appearance. Burnishing was recorded on the inside and outside of some sherds. Another attribute option was the possibility of recording graphite burnishing, though no sherds with this feature were recovered.
 - l. Location of decoration: Options are on the rim, neck, shoulder, carination, body, interior of the neck, handle, interior of the body, interior and exterior of body, or unknown.
 - m. Decorative motif: Incised and applied decorative motifs were also assembled into a typology in the field, based on observations during analysis. When a decorative motif was encountered on a sherd, the analyst determined whether it constituted a new motif, or whether it was comparable to a motif already illustrated and described.
 - n. Thickness: Sherd thickness was measured at the thickest point of the sherd wall using a caliper. Rim or base sherds that did not have a measurable sherd wall were not measured.
 - o. Weight: We weighed each sherd in grams to one decimal place.
 - p. Rim diameter: Measured using a ceramic diameter chart, when applicable.
 - q. Sherd condition: The condition of each sherd was noted. Sherds could either be categorized as 1) broken during collection, 2) broken during or after deposition, 3) intentionally ground or modified in the past.
 - r. Base type: These include 1) applied ring bases, 2) disc bases that curve with the vessel bottom, 3) disc bases, flat with angled sides, 4) disc bases, concave, 5) disc bases, less than 4 cm in diameter, 6) disc bases, flat with molded/curved sides, and 7) incense burner vessel bases, with the appearance of a door handle.
 - s. Field type: In the field, I started developing a framework for vessel types based on a holistic association between attributes. These resulted in 30 field types, which I have not published here.

13.2.4 Ceramic Lab Analysis

Upon returning from the field, I transcribed ceramic field data from notebooks into an Excel worksheet. I investigated imported ceramics further based on published photographs, and I have used imported types to approximate site dates. I created local diagnostic ceramic types for the survey region based on comparisons with other assemblages from the Swahili Coast. I also plotted attributes and compared them along a variety of axes in order to investigate patterns in ceramic production and use across the survey region.

Type-Variety and Attribute Analysis on the Swahili Coast: Despite their initially incorrect assertion that urban centers on the East African coast were Arab or Persian colonies, the early British archaeologists James Kirkman and Neville Chittick produced detailed

descriptions and analyses of locally produced archaeological ceramics alongside imported ceramics that they used for dating. Kirkman (1954) carried out the first ceramic analysis on the East African Swahili Coast at the site of Gede, also the first site to be investigated in a modern archaeological way. Kirkman developed a type system and produced extensive illustrations of local ceramic rim and wall profiles. He continued to use this system during his research at Ungwana on the Tana (1966), Ras Mkumbuu (1959a), Kilepwa (1952), Mnarani of Kilifi (1959b), Takwa (1957), and Fort Jesus (1974). As mentioned before, his typological system is relatively confusing and laborious to reference. It does not use unique numbers for ceramic types; rather, it describes forms and references plates with numerous profile drawings that can be found toward the back of the text.

In contrast, Chittick's type-variety systems for Kilwa (1974) and Manda (1984) clearly juxtaposed ceramic descriptions with singular illustrations that make it easy to get a sense of each type. As a result, Chittick's system became the basis for type-variety systems in coastal East Africa. Horton's work at Shanga (1996) improved this system by adding better descriptions of ceramic paste, color, decorative motifs, and form, and by including frequency statistics for each type. Horton's (1996) type-variety system for Shanga remains one of the most comprehensive type systems for the precolonial Swahili period.

Other archaeologists experimented with quantitative attribute analysis for coastal Swahili ceramics (Håland and Msuya 2000; Helm 2000; Mutoro 1979; Radimilahy 1998; Wright 1984). These projects produced detailed analyses of attribute variation that modeled changes in ceramics over time (e.g., Helm 2000). These studies paved important ground for the development of attribute analysis in Swahili archaeology.

At roughly similar times, Fleisher (2003: 214-221) and Wynne-Jones (2005: 146-148) synthesized these attribute analysis approaches with Horton's (1996) modified type-variety system from Shanga. Their methodologies used attribute analyses to construct types quantitatively, which could be compared both within their own assemblages and to other archaeological regions on the Swahili Coast. This combination of quantitative measurements with a type-variety system that enabled regional comparison became a standard for research. Ceramic analyses since then have followed this paradigm (e.g., Pawlowicz 2011, 2019; Rødland 2021). Ceramic types are generalized groups of ceramic attributes that an archaeologist determines co-vary in a meaningfully distinct way. While formal and decorative attributes are the basis for creating a type, chronological elements are also important, and one can divide types of similar make by chronological period.

Between 2019 and 2020 I used a composite type-category system to analyze ceramics from this project based on Fleisher's typology for northern Pemba, which described an assemblage that was most like the one our team recovered. Since then, Rødland (2021) published a typology of ceramics at Tumbatu and Mkokotoni, and I have also integrated and referenced these types where applicable.

I have described 20 types here. Types 1 through 7 are precolonial (1000-1500 CE) forms found in association with early second-millennium imported materials, and include open bowls, spherical pots, carinated bowls, and necked vessels. Types 8 through 12 are forms found in association with sites from the early colonial period (1500-1830 CE), dated on the basis of later imported materials. Types 13 to 20 are forms found in association with the imported materials of late colonial period (1830-1963 CE), though it is likely that they more specifically date to Phase 1 of this period (1830-1890 CE) or a little after. Finally, I describe miscellaneous ceramics,

which include rare and unique types as well as rim and body forms that did not clearly belong to the aforementioned types.

Like the assemblages of Fleisher (2003), Helm (2000), Juma (2004), Pawlowicz (2011), Rødland (2021) and others, the ceramics I analyzed can be divided into four basic vessel categories: *simple unrestricted* open bowls, *simple restricted* bowls, also known as spherical or globular pots, *inflected restricted* jars, which have curved necks and a rounded shoulder, and *composite restricted* jars, which feature carinated shoulders. Figure 13-1 depicts these basic forms. Table 13-2 below shows all types, with brief descriptions. Figure 13-2 below shows drawings all incised, impressed, and applied clay decorations on ceramics. I reference these figures throughout the text.

Type	Period	Vessel Form	Description
1	Precolonial (1000-1500 CE)	Simple unrestricted	Open bowls, many with bases and thickened rims
2	Precolonial (1000-1500 CE)	Simple restricted	Spherical pots
3	Precolonial (1000-1500 CE)	Composite restricted	Carinated pot with thickened carination
4	Precolonial (1000-1500 CE)	Inflected restricted	Necked jar with a low shoulder and long neck
5	Precolonial (1000-1500 CE)	Inflected restricted	Necked jar with a high shoulder and short neck
6	Precolonial (1000-1500 CE)	Simple restricted	Spherical pot with a rolled everted rim
7	Precolonial (1000-1500 CE)	Inflected restricted	Necked jar with a low shoulder and long neck, and a raised lip just above the shoulder
8	Early Colonial (1500-1830 CE)	Simple restricted	Spherical pots
9	Early Colonial (1500-1830 CE)	Simple unrestricted	Open bowls with bases and thickened rims
10	Early Colonial (1500-1830 CE)	Composite restricted	Carinated vessel with thickened carination
11	Early Colonial (1500-1830 CE)	Inflected restricted	Necked jar with a low shoulder and long neck
12	Early Colonial (1500-1830 CE)	Inflected restricted	Necked jar with a high shoulder and short neck
13	Late Colonial (1890-1963 CE)	Simple unrestricted	Open bowls with bases and thickened rims
14	Late Colonial (1890-1963 CE)	Simple restricted	Spherical pots
15	Late Colonial (1890-1963 CE)	Inflected restricted	Necked jar with a low shoulder and long neck
16	Late Colonial (1890-1963 CE)	Simple restricted	Spherical pot with a rolled everted rim
17	Late Colonial (1890-1963 CE)	Composite restricted	Similar to Fleisher's "Type 13" (2003: 307), a carinated or shouldered vessel with an everted rim and adjacent nicks on the shoulder or carination
18	Late Colonial (1890-1963 CE)	Composite restricted	Carinated cooking pot with curved shoulder, everted rim
19	Late Colonial (1890-1963 CE)	Composite restricted	Carinated cooking pot with straight shoulder, everted rim
20	Late Colonial (1890-1963 CE)	Inflected restricted	Shouldered cooking pot with curved shoulder, everted rim

Table 13-2. Types identified from the ceramic assemblage of the 2019 survey. Yellow colors indicate precolonial wares, blue indicates early colonial wares, and green indicates late colonial wares.

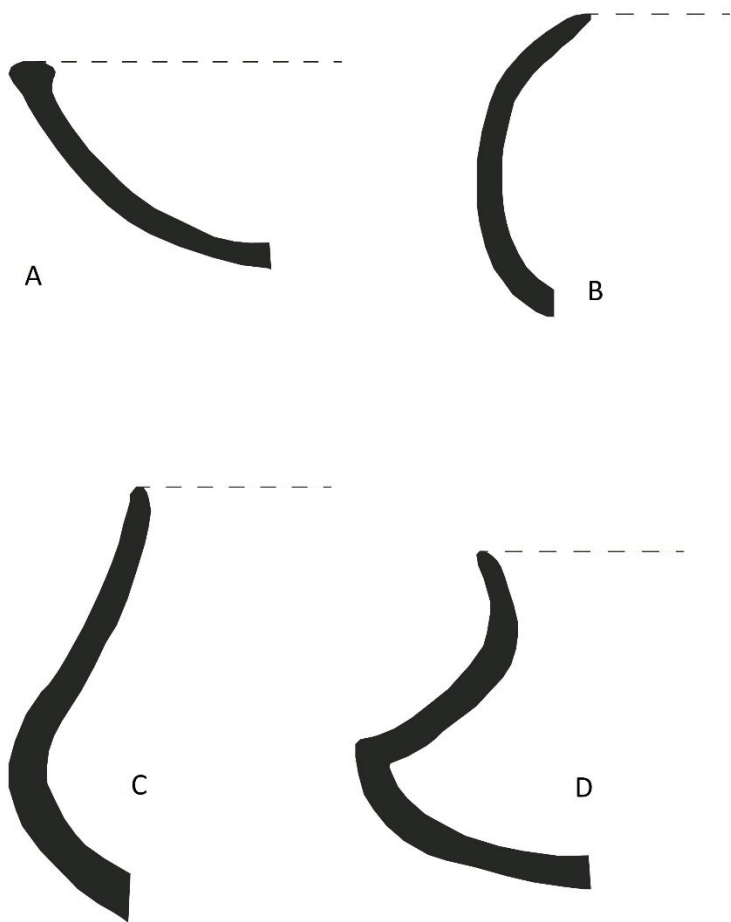
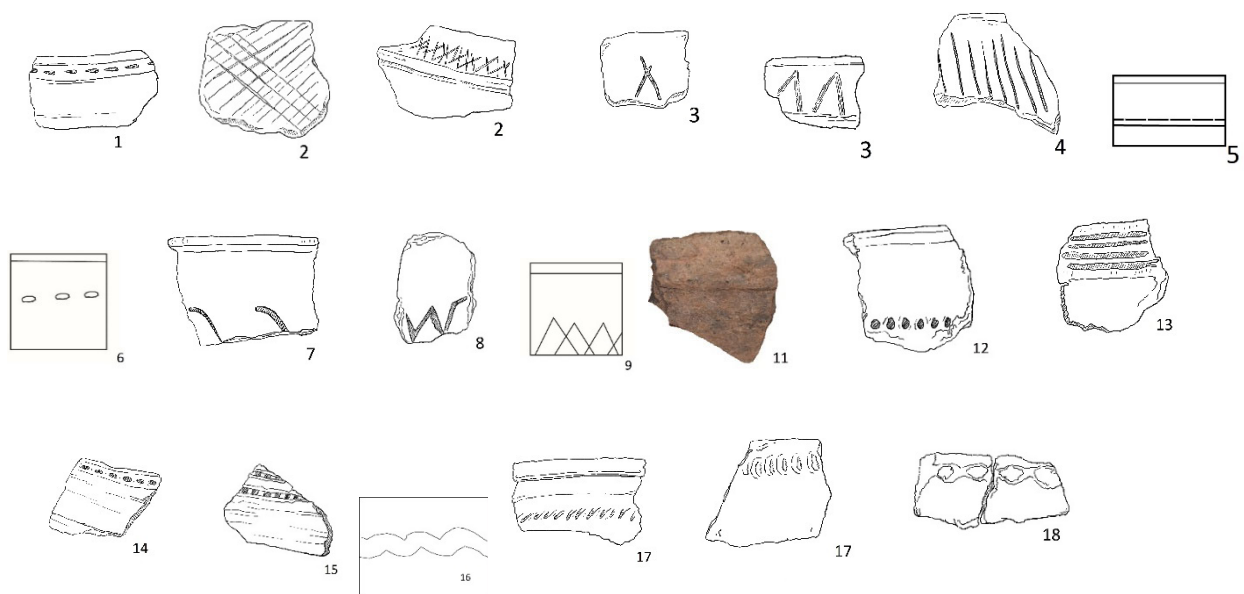


Figure 13-1. Unrestricted open bowl (A), simple restricted pot (B), inflected restricted jar (C), and composite restricted jar (D). These four categories constituted the basis of the assemblage.



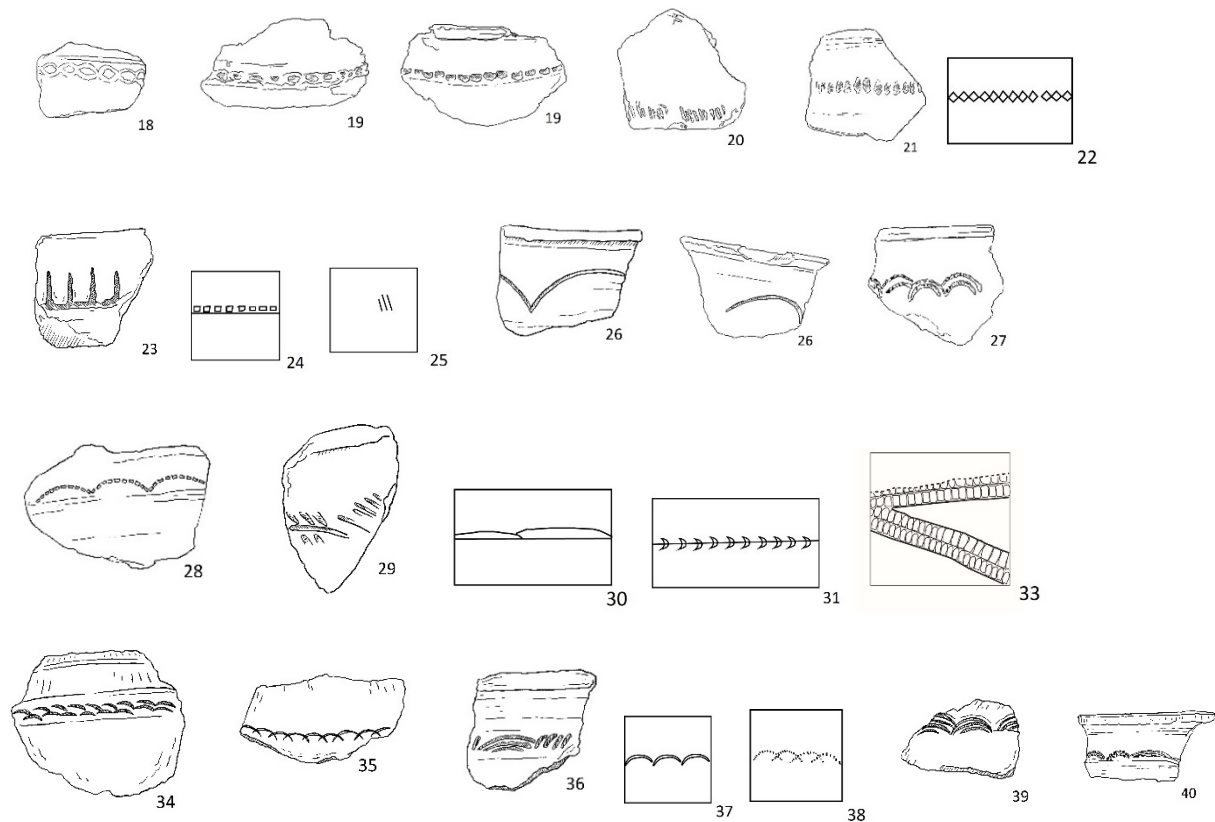


Figure 13-2. Drawings of incised, impressed, and applied clay decorations on sherds. Ava Alders did the more detailed drawings. One sherd, Husuni Modeled Ware (11) was not drawn, so I have added the picture instead.

13.3 Local Ceramics: 1000-1500 CE

For the 11th-15th centuries, comparative sources for ceramic typologies are Fleisher's (2003) survey of northern Pemba, Horton's (1996) excavations at Shanga, and Chittick's excavations at Kilwa (1974) and Manda (1984). These sources are the basis of Rødland's (2021) typology of ceramics at Mkokotoni and Tumbatu, which I also reference for each type. In some cases, I have also included comparisons to ceramics at Pate (Wilson and Omar 1997), the outer areas of Gede (Pawlowicz 2019), and the great mosque at Gede (Kirkman 1954). These sources are the most complete ceramic typology for the pre-colonial north-central Swahili Coast and offshore islands. Pawlowicz's typology for Mikindani Bay for this period is also thorough, though it is characterized by a shift away from coastal Swahili ceramic forms and toward mainland types like vessels found in Malawi and Mozambique (Pawlowicz 2011).

The following section describes the decorative motifs associated with ceramics from the 11th-15th centuries. Then, subsequent sections describe types 1 through 7.

13.3.1 Decorative Motifs of the 11th-15th centuries

Incised decorative motifs on vessels of the early second millennium follow the pattern present on Tana Tradition phase C ceramics at Shanga (Horton 1996: 260). Their punctates, triangular incisions, and hatch marks are related in form to earlier Tana/TIW decorations of the late first millennium but are plainer and limited to only a portion of vessel around the neck or

shoulder. Table 13-3 describes decorative elements found on vessels from this period and lists the types on which these motifs are found. I also reference these in type descriptions where applicable.

Decoration #	Description	Vessel Type
1	neck punctates	type 6
2	cross hatchings on neck	type 3
3	triangles on the neck	type 5
4	long vertical pointed triangles on neck	type 5
5	horizontal line below rim, and dashed lines on carination or shoulder	type 2
6	horizontal impressions or punctates on shoulder	type 6
7	incised L-shapes on carination	type 3
8	thick incised triangular lines on neck	type 3
9	overlapping incised triangular lines	type 5
12	circular punctates on shoulder	type 5
13	combed horizontal lines on neck	type 1
14	double row of punctates on either side of thickened shoulder	type 2
17	vertical punctates or dashes on the shoulder or carination	type 3
23	band of vertical incised lines, between two horizontal lines on shoulder.	type 2

Table 13-3. Decorative elements of the precolonial period. See Figure 13-2 for images.

13.3.2 Type 1

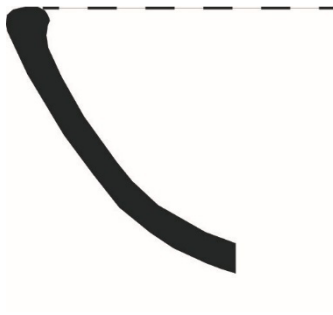


Figure 13-3. Type 1 ceramic profile, showing rim form and example of a base.

These vessels are a large class of simple unrestricted open bowls with plain round, pointed, thickened, or squared rims. Figure 13-3 shows the basic shape of this type, and a potential base. We collected 138 sherds of this type from Kikobweni001, Kirikacha, Mueembe Nambo, Mwanakombo, Pwani Mchangani, West_Kandwi001, and West_Kandwi003. Average sherd thickness is 9 mm. Average vessel diameter is 27 cm. 26% of sherds have a uniformly dark fabric, while 24% have a dark fabric core with light walls, 18% have a light-colored fabric toward the exterior to the sherd wall and dark toward to the interior, and 16% have a uniformly light fabric. Most examples have a temper of grit and fine to medium quartz sand, though 16 examples have mostly coarse quartz sand for temper. The two most common clay colors are black and brown, though pink, red, tan, and grey colors are also present. Seven examples have red paint on the interior and exterior. One example has only exterior red paint and six examples have only interior red paint. Red painted open bowls are characteristic of late first millennium and early second millennium coastal sites in East Africa (e.g., Fleisher 2003: 248). One final

example has interior black paint. Of these painted sherds, all but one is also burnished, either on the interior alone, or on the exterior and interior. One sherd has combed vertical markings on the interior of the neck, though this is not counted as a decoration as it is not clear if someone made these marks intentionally. Another example has a clearer incised decoration: combed horizontal lines on the exterior of the neck (decoration 13). Otherwise, no surface modifications were recorded.

I analyzed bases within this type, as nearly all bases produced in the pre-colonial period belong to open bowls. Without bases, the unpainted vessels in this category would appear most like type 3 vessels from northern Pemba (Fleisher 2003: 245), which are simple open bowls with plain rims and no bases, and which date to the late first millennium there. A similar type is also type 10 at Kilwa, which Chittick dates from 800-1100 CE (Chittick 1974: 324). Alternatively, open bowls without bases could be compared to some phase C (1100-1300 CE) Tana ceramics at Shanga, like types 27a or 30a, which are plain bowls with plain rounded rims and without applied bases (Horton 1996: 264).

Type 1 was found in association with late sgraffiato wares on Zanzibar, suggesting a date in the early- to mid-second millennium, from 1000-1400 CE. This date means these bowls are more likely similar to a variable form of type 5 from northern Pemba, which has a thickened rounded rim and an applied base, but which can also have plain rounded rims (Fleisher 2003: 246). Comparable examples include type 9 at Kilwa, an open bowl type with a wide and long-ranging distribution (Chittick 1974: 323), types 15 (rounded or squared rims) and 17 (pointed rims) at Manda (Chittick 1984: 123-124), types 1 (rounded rim), 2 (tapered rim) and 4 (flat rim) at Gede (Pawlowicz 2019: 231), and types 26-37 at Pate (Wilson and Omar 1997: 43). At Tumbatu and Mkokotoni, similar vessels are found in groups 1 and 2, where group 1 consists of shallow bowls and group 2 consists of deeper bowls (Rødland 2021: 119).

While it is not clear whether the plain rounded or square rimmed open bowls included here had attached bases, there are almost no examples of open bowls with rims that thicken inward that do not also have applied bases. These constitute 72 sherds out of the 138 total that I analyzed. Open bowls with applied bases and rounded, inwardly thickened rims have numerous parallels on the coast starting in the early second millennium. On Pemba, their increase in frequency from the early to mid-second millennium correlates with the widespread conversion to Islam, the adoption of rice-based diets, and the development of communal feasting practices (Fleisher 2010b; Walshaw 2010). On Pemba, similar pots include type 5a which is unpainted and 5b, which is painted (Fleisher 2003: 246-248).

13.3.3 Type 2

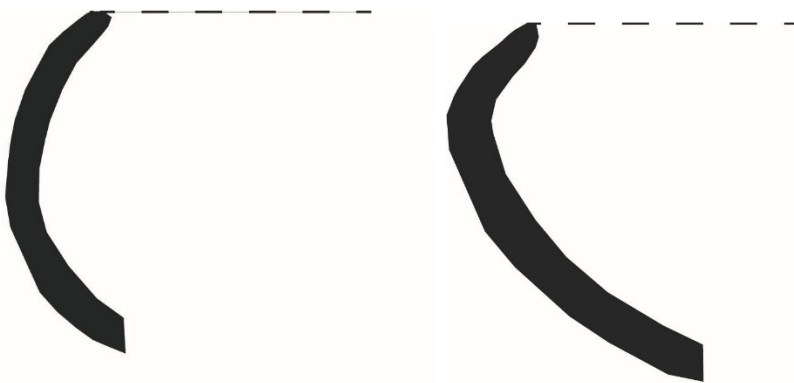


Figure 13-4. Type 2 ceramic profile, showing two alternate forms.

These are simple restricted vessels, also known as globular, spherical, or hole-mouth pots. I refer to them here as spherical pots. Figure 13-4 shows the basic shapes of this type. Common rim types are rounded, pointed, or rounded and thickened toward the interior. Eight examples had flattened or squared rims, and one example had a flattened and squared rim with an incised groove on the top of the lip. We recorded 79 sherds of this type, from Muembe Nambo (1), Kikobweni001 (3), Kirikacha (32), Mwanakombo (16), and Pwani Mchangani (27). Average sherd thickness is 8 mm. Average vessel diameter is 25 cm. The most common fabric color is a dark core with light walls (35.4%), with uniform light as another common color (25.3%). Grit and fine to medium quartz sand constitute temper for 67 examples, while coarse quartz sand is temper for 9 examples. Brown and tan were the two most common clay colors, though all clay colors were represented. Two examples have red paint on the interior and exterior of the rim. One example has red paint only on the interior. 5 examples are burnished on the interior or exterior. Three examples are burnished on the interior only, and 3 examples are burnished on the exterior only. One burnished example has a horizontal line below rim, and dashed lines on carination or shoulder (decoration 5). Another example which is otherwise undecorated has a band of vertical incised lines, between two horizontal lines on the shoulder (decoration 23). A final example has a double row of punctates on either side of thickened neck (decoration 14).

Spherical pots are common across early to mid-second millennium sites on the East African coast. The closest parallels are type 4 vessels from northern Pemba (Fleisher 2003: 245-246). The examples from northern Pemba also have dark cores with light walls as the most common fabric type, implying a similar clay quality and firing method. Pemban examples are most frequent from 1100 onward at Mduuni and Mkia wa N'gombe, though less common at Chwaka (Fleisher 2003: 246). At Tumbatu and Mkokotoni, these vessel forms make up group 3 (Rødland 2021: 119). Spherical pots are present in phase A of Shanga as part of the triangular-incised ware assemblage (Horton 1996: 253), but these examples are too early to compare with the samples here. However, later undecorated spherical vessels at Shanga are found in phases B (925-1050 CE, type 17) and D (1300-1425 CE, type 40) (Horton 1996: 260-266). There are also spherical vessels from phase C (1050-1300, types 18 and 20), but these are described as having incised decorations which do not match most sherds recovered in this survey.

Plain spherical vessels (type 24) are the most common vessel type (30% of the assemblage) at Manda in period IV, from 1400-1500 CE (Chittick 1984: 128), though decorated examples appear earlier, as types 21 and 22 (Chittick 1984: 126). At Kilwa, type 5 appears to be most similar, but it is shown with a vestigial neck which disqualifies it from being a true "hole-mouth" pot (Chittick 1974: 322). Type 11 at Kilwa is an open bowl with an in-curving rim, but one illustrated example shows the most resemblance to a hole-mouth pot design (Chittick 1974: 351, example D). Spherical pots are common at Gede as well, though undecorated types (24 and 25) make up a smaller percentage of the assemblage than vessels with incisions on the rim (types 23 and 26), which are the most common (Pawlowicz 2019: 232). At Pate, hole-mouth pots are not found in the first period (1a, 775-900 CE), but first emerge in period 1b (900-1000 CE) as undecorated wares, called type 10 of period 1b (Wilson and Omar 1997: 41-42). In period 2 (1000-1150), hole-mouth pots are both undecorated as well as incised with lines, called types 10, 11, and 12 of period 2 (Wilson and Omar 1997: 43-44). Undecorated hole-mouth pots continue through periods 3 (1150-1250 CE), 4 (1250-1600 CE) and 5 (1600-1900 CE), providing some of the best evidence for the long-term continuity of this vessel form at a single site (Wilson and

Omar 1997: 43-49). In general, comparative examples suggest that undecorated hole-mouth vessels tend to be later in age than decorated forms.

13.3.4 Type 3

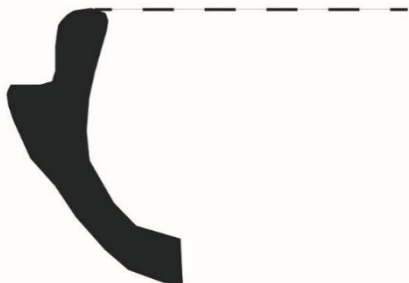


Figure 13-5. Type 3 ceramic profile form.

These are composite restricted (carinated) vessels with a thickened carination. We collected nine sherds of this type, at Kirikacha and Mwanakombo. Figure 13-5 shows the basic form of this type. Only two rims were recorded, one of which was vertical and flattened and the other vertical and rounded. Average sherd thickness is 10 mm. Average vessel diameter is 33 cm. 5 examples have uniform dark fabric color. 8 have grit and fine to medium quartz sand temper, while one example has mostly coarse quartz sand temper. The most common clay colors are tan and brown. Four different sherds have incised decorations on their necks. These decorative motifs are cross hatchings on the neck (decoration 2), thick incised triangular lines on neck (decoration 8), incised L-shapes on carination (decoration 7), and vertical punctates or dashes on the shoulder or carination (decoration 17). Otherwise, no surface modifications were recorded.

This is type 7 in northern Pemba (Fleisher 2003: 251). It is group 11, types 11a and 11b at Tumbatu and Mkokotoni (Rødland 2021: 122). Type 8d at Shanga is a similar form but is found in phase B (925-1050 CE) compared to type 4 at Kilwa, which Chittick dates from 1100-1300 CE and describes as characteristic of the period (Chittick 1974: 319). The examples of this type recorded at Mwanakombo and Kirikacha date to a similar period as the examples from Kilwa, based on their association with late sgraffiato wares. At Manda type 6 is equivalent (Chittick 1984: 118). Kirkman's types 10 and 11 may be these pots at Gede, but it is unclear due to the lack of detailed illustrations (Kirkman 1954: 81-82). Similarly, the data that Pawlowicz worked with lists only types 14 through 17 as carinated jars or bowls, but no illustrations are present of these types (Pawlowicz 2019: 231). This type does not appear to be recorded at Pate (Wilson and Omar 1997).

13.3.5 Type 4

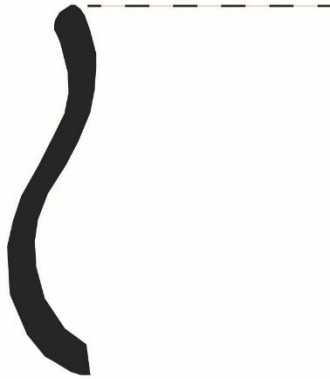


Figure 13-6. Type 4 ceramic profile form.

These are inflected restricted vessels with a low shoulder and long neck. We collected six sherds of this type at Mwanakombo, Mwanampaji001, and Pwani Mchangani. Figure 13-6 shows the basic form of this type. Rims are pointed or rounded. One rim is rounded and slightly rolled outward. Average sherd thickness is 8 mm. Only one vessel diameter was recorded, at 25 cm. Fabric color is distributed between sherds with dark cores and light walls, uniform light fabrics, and cores with light fabrics outward and dark fabrics inward, and vice versa. All six sherds have grit and fine to medium quartz sand for temper. Clay colors are pink/red, and brown. No surface modifications were recorded.

This vessel type appears similar to the wider-diameter versions of type 9 in northern Pemba, found at Kaliwa during periods 2 and 3, from 1100-1300 CE and 1300-1500 CE (Fleisher 2003: 253). At Tumbatu and Mkokotoni, these vessels are found in group 10, as jars with straight necks (Rødland 2021: 121). It resembles the form of 26c at Shanga, which is described as a robust type with evidence for mending holes (Horton 1996: 264). Type 2 at Kilwa includes some examples of “baggy pots” dated from 1100-1300 CE that resemble this type (Chittick 1974: 339). Other comparable examples are type 19 at Manda, dated from 1050-1300 CE (Chittick 1984: 125), type 20 at Gede (Pawlowicz 2019: 232), and type 4 of period 2, and 6 of period 3, from Pate (Wilson and Omar 1997: 45). Chittick suggests the vessel appears likely to have been used for storing and pouring water (Chittick 1984: 125).

13.3.6 Type 5

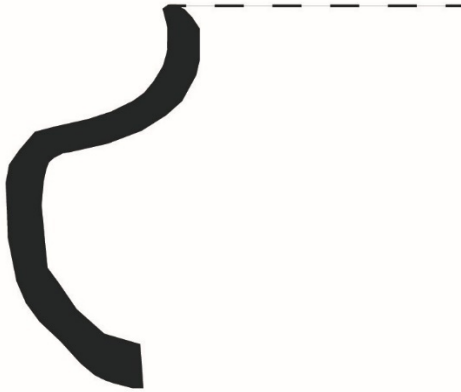


Figure 13-7. Type 5 ceramic profile form.

These are inflected restricted vessels with a high shoulder. We collected 57 sherds of this type, at Muembe Nambo, Kirikacha, Mwanakombo, Mwanampaji001, Pwani Mchangani, and West_Kandwi001. Figure 13-7 shows the basic form of this type. Rim types are primarily rounded or pointed. 47 have relatively vertical rims, while 10 have more everted rims. Average sherd thickness is 9 mm. Average vessel diameter is 25 cm. 29.8% of sherds have fabric with a dark core and light walls, while 22% have uniform dark fabric, and 19% have uniform light fabric. 42 examples have grit and fine to medium quartz sand temper, while 13 examples have mostly coarse quartz sand temper. Two examples have temper with iron or slag and quartz sand. The most common clay colors are brown and tan. Three examples have red paint on interior and exterior of the rim and are among the nine sherds total that are burnished on the interior and exterior of the rim. 11 sherds were decorated with incised motifs. These include triangles on the neck (decoration 3), long vertical pointed triangles on the neck (decoration 4), cross hatchings on the neck (decoration 2), overlapping incised triangular lines (decoration 9), and circular punctates on the shoulder (decoration 12).

This type is comparable to type 8a in northern Pemba, of which there were only four examples (Fleisher 2003: 253). It likely belongs to group 8 at Tumbatu and Mkokotoni (Rødland 2021: 121). This vessel type most resembles type 3 from Kilwa, which appears in the record there from around the end of period 1b through period 2, which ranges from approximately 1000 to 1300 CE (Chittick 1974: 321). Examples at Kilwa of type 3 can be either decorated or undecorated, as is the case with the sample here. The more everted rims of this type resemble type 22b at Kilwa, which date to the 14th century (Chittick 1974: 367). The relatively rare “shouldered jar” of Gede (type 18) might match this type, or the carinated jar with ticks on the carination (type 15) (Pawlowicz 2019: 233). The absence of this vessel type at Shanga and Manda, its relative rarity and Gede and in northern Pemba, and its relatively common presence in the survey here and at Kilwa may suggest that this form is more common on the southern Swahili Coast compared to the north.

13.3.7 Type 6

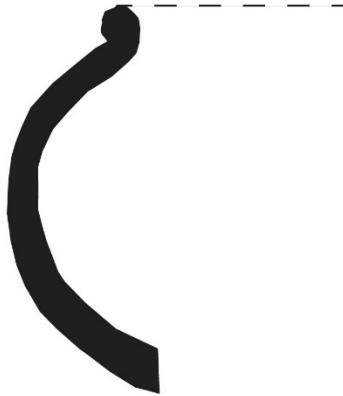


Figure 13-8. Type 6 ceramic profile form.

These are simple restricted vessels, also known as globular, spherical, or hole-mouth pots, with a rounded rim rolled outward. Figure 13-8 shows the basic form of this type. We recovered 20 sherds of this type, at Kirikacha, Mwanakombo, Pwani Mchangani, West_Kandwi001, and West_Kandwi003. Average sherd thickness is 9 mm. Average vessel diameter is 25 cm. 35% of sherds have uniform light fabric, while 25% have uniform dark fabric, and 20% have a mottled fabric. 18 sherds have grit and fine to medium quartz sand temper, while two have mostly coarse quartz temper. The most common clay color is tan or brown. While ten of these sherds are plain with no surface modifications, the other ten are decorated with diamond, square, oval, or triangular shaped punctates (decorations 1, and 6) just below the rim on the neck of the vessel. Two examples of these punctated vessels have burnishing on the neck.

Undecorated closed pots with rolled rims are type 10a in northern Pemba, while similar pots with punctates under the rim are 10b (Fleisher 2003: 254). At Tumbatu and Mkokotoni, this type might be found in either group 3 or group 4, which are described as closed bowls with rolled rims or collars (Rødland 2021: 119-120). This is type 5 at Kilwa (Chittick 1974: 345), type 5 at Manda (Chittick 1984: 116), and type 15 of period IV (1250-1600 CE) at Pate (Wilson and Omar 1997: 57). Type 21 of Shanga is probably also this type, specifically 21b which is described as having a bead rim, from 1050-1300 CE (Horton 1996: 262). None of the listed types at Gede appear to resemble this type (Pawlowicz 2019: 231-232). This is the “neck punctating” type that characterizes Swahili Ware on the coast from 1250-1500 for Chami (1998: 213), though Fleisher contests the idea that this type occurs on the coast after approximately 1300. Fleisher suggests that this type is diagnostic of the 11th-14th centuries only (Fleisher 2003: 256). Only Chittick (1974) and Fleisher (2003) have illustrated undecorated versions of this type.

13.3.8 Type 7

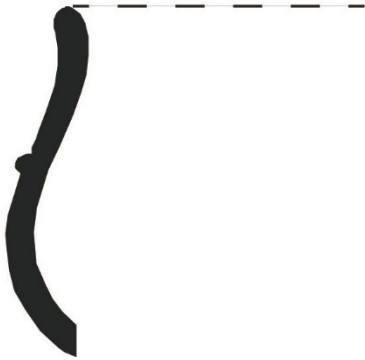


Figure 13-9. Type 7 ceramic profile form.

This type is represented by a single sherd that we collected at Mwanakombo. It is an inflected restricted vessel with a low shoulder and raised “lip” just above the shoulder. Figure 13-9 shows the basic form of this type. It has a rounded rim. It is 7 mm thick, and has a vessel diameter of 20 cm. The fabric has a dark core with light walls. The temper is grit and fine to medium quartz sand. Clay color is brown. No surface modifications were recorded. It does not appear as a type at Tumbatu and Mkokotoni. It most resembles vessel type 8b in northern Pemba which appeared after 1100 CE (Fleisher 2003: 253). Fleisher describes this as a rare type with no other coastal correlates.

13.4 Local Ceramics: 1500-1830 CE

The following types are vessel forms we found at sites dating from the early colonial period in inland Zanzibar. This period produced the least amount of imported material, consisting of only a few sherds of green, blue, and grey Islamic monochrome pottery, Bahla ware, and a few potential Ming or Kangxi blue and white porcelain sherds. Comparisons for ceramics from this period come from 16th-century levels at Kilepwa, Gede, and Ungwana on the Tana (Kirkman 1952, 1954; 1966), 16th-18th-century assemblages at Kilwa (Kirkman 1974) Manda (Chittick 1984), and Pate (Wilson and Omar 1997), 17th-18th-century assemblages at Fort Jesus (Kirkman 1974), and 17th-19th-century assemblages at Takwa (Wilson 2019). The types included in this category do not have decorative elements, but this is likely because the sample size was small.

13.4.1 Type 8

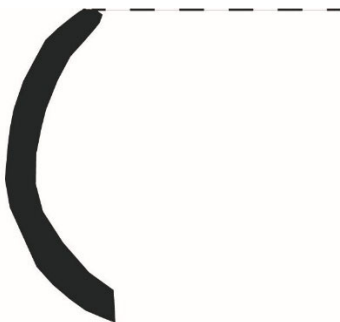


Figure 13-10. Type 8 ceramic profile form.

These are simple restricted vessels, also known as globular, spherical, or hole-mouth pots. We recorded two examples at the site of Kandwi. Figure 13-10 shows the basic form of this type. These two vessels have squared rims. Average sherd thickness is 10 mm. Vessel diameter was not recorded. One sherd is made of reddish clay with light interior fabric and has grit and fine to medium quartz sand temper. The other is made of brown clay, has a dark interior fabric, and temper comprised of sand, grit, and ferrous material. This sherd also has exterior and interior burnishing.

Spherical pots are found throughout the 17th (Kirkman 1974: 209, 217) and 18th (Kirkman 1974: 229, 235) centuries at Fort Jesus. At Manda, these vessels are called type 24 and constitute the most common vessel form in period 5, from 1550-1700 (Chittick 1984: 128). Chittick also claims they are common at Pate in the 17th and 18th centuries, and they are indeed present in the period 5 assemblage (Wilson and Omar 1994: 47-48). At Kilwa, type 37 consists of spherical pots of the 17th and 18th centuries, but these are heavily decorated (Chittick 1974: 330). Spherical pots are listed as occurring throughout the stratigraphic profiles from excavations beyond the walls of Gede, which may include 16th-century materials (Pawlowicz 2019: 232). There is no apparent record of these from the 16th-century levels at the Great Mosque of Gede (Kirkman 1954), but Kirkman's early typologies are difficult to understand from description alone. He refers to drawings of clearly spherical pots from 16th-century contexts at Ungwana on the Tana as merely "bowls" (e.g., Kirkman 1966: 84-85, drawing F), and at Kilepwa, he refers to a 16th-century spherical pot as a "semi-circular bowl with a rounded bottom" (Kirkman 1952: 184). At Takwa, types 1a, 1b, and 1c are called hole-mouth pots, though a few examples (1a12, 1a13, 1b6, 1b7, 1c3, 1c4, and 1d7) are not true hole-mouth pots due to their rolled rims (Wilson 2019: 82-84). All Takwa examples date from 1600-1900.

13.4.2 Type 9

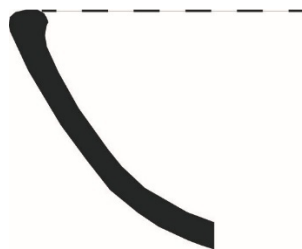


Figure 13-11. Type 9 ceramic profile form.

These vessels are simple unrestricted open bowls with round, squared, or rounded and thickened rims. Figure 13-11 shows the basic form of this type. They may or may not have bases, though no bases were found. We recorded 28 examples, 9 of which have thickened rounded rims. This type is found at Kandwi, Kandwi_Kibokwa003, and Njua Kuu. Average sherd thickness is 9 mm. Average vessel diameter is 25 cm. 25% of sherds have a fabric with a dark core with light walls. 21% have uniform light fabric. The remaining sherds vary in fabric type. The temper is primarily grit and fine to medium quartz sand. Sherds were found in a range of clay colors including black, brown, tan, red, and gray, though brown was the most common. Three examples are painted red, one of which also appears burnished.

Comparative sources suggest that bases on open bowls were almost ubiquitous in later centuries, suggesting that the sherds collected here may have been attached to bodies with bases that were not found. At Kilwa, a similar vessel form is type 18, a plain hemispherical open bowl

of the 16th and 17th centuries (Chittick 1974: 325). Similar open bowl forms are also recorded at Fort Jesus for the 17th century (Kirkman 1974: 215, 225) and the 18th century (Kirkman 1974: 237, 239), and these examples have bases as well. A comparative example without a base is the open bowl form 4 from stratum I at Gede (Kirkman 1954: 79). Form 9 in stratum I is a based version of the same form (Kirkman 1954: 81).

At Manda open bowls with bases from this period are type 18, where they constitute 30% of the assemblage for period V from 1550-1700. Chittick calls them the serving bowl of the later periods (Chittick 1984: 124). Based on the 16th to 18th-century examples at Kilwa, Manda, and Fort Jesus, it appears that plain rounded or squared rims are more common in the later period than thickened rims, which this survey also suggests. These bowls also appear in phase 7 (1550-1600) at Kilepwa (Kirkman 1952: 180), and in phases 5 (1500-1550) and 6 (1550-1600) at Ungwana on the Tana (Kirkman 1966: 87). At Takwa, types 2a, 3a, and 3b all fall within the range of this form, with distinctions being made on the basis of rim shape. These forms persist from 1600-1900 there, though they fall in the later range (Wilson 2019: 79-80). These vessels are also found at Pate in the same period (Wilson and Omar 1997: 47).

13.4.3 Type 10

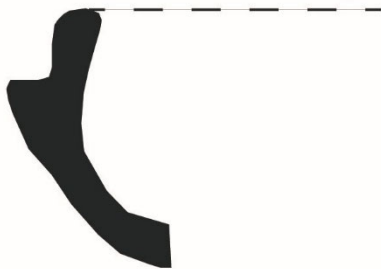


Figure 13-12. Type 10 ceramic profile form.

These are composite restricted (carinated) vessels with thickened carinations. We collected two sherds of this type at Njua Kuu. Figure 13-12 shows the basic form of this type. They have squared, vertical rims. Average sherd thickness is 15 mm, and average vessel diameter is 15 cm. No surface modifications are present. These two examples have uniform light fabric with grit and fine to medium quartz sand, and brown clay.

Vessels like this occur from the late 17th to 19th centuries at Fort Jesus. For the 17th century, some examples include fig. 35 numbers 25 and 26 (Kirkman 1974: 219) or fig. 36 numbers 1, 4, 9, 15, 24, 25, 26, or 28 (Kirkman 1974: 221). For the 18th century, fig. 41 numbers 7, 11 or 12 (Kirkman 1974: 231), and fig. 42 numbers 4, 8, 11, 12, 15, 17, and 18 (Kirkman 1974: 233). At Ungwana on the Tana, fig. 20 letter V depicts a pot with a thickened carination from the 16th century (Kirkman 1966: 92). At the Great Mosque of Gede, type 10, a carinated cooking pot with a short neck, includes some carinations that are substantially thickened, for instance fig. 15, letter p (Kirkman 1954: 160). There are no apparent examples from later periods at Kilwa, Manda, Kilepwa, Pate, or Takwa. These examples from Fort Jesus, Ungwana on the Tana, Gede, and the 2019 survey possibly represent several different variations on a vessel form of a carinated cooking pot with a short neck, of which there are many examples without a thickened carination as well as ones with it. It seems possible that this type may be a variant of longer necked carinated cooking pots (see below) where the thickened carination was a byproduct of shortening the neck.

13.4.4 Type 11

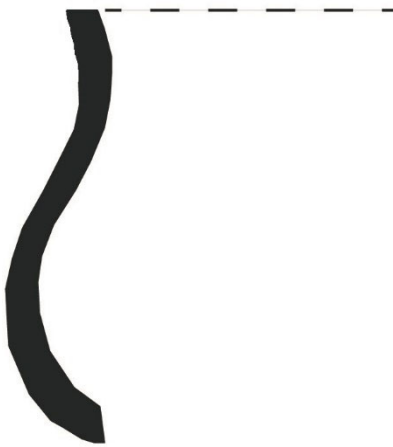


Figure 13-13. Type 11 ceramic profile form.

These are inflected restricted vessels with a low shoulder. We collected a single sherd of this type at Kandwi_Kibokwa003. Figure 13-13 shows the basic form of this type. This sherd has a flat vertical rim. The sherd thickness is 11, and the vessel diameter was not recorded. It has uniform dark fabric with grit, quartz, and shell inclusions. The exterior clay color is black, and the interior is tan. This sherd has no surface modifications.

Comparable types are 17th-century water pots from Kilwa, which are types 34 and 35 (Chittick 1974: 329), type 19 (fig. 16, I) from the 16th century at the Great Mosque at Gede (Kirkman 1954: 88), type 29 (flared neck jar) from outer-lying contexts at Gede (Pawlowicz 2019: 232), and fig. 19 G or H from Ungwana on the Tana, from the 16th century (Kirkman 1966: 19). No similar examples are recorded from Manda for the later periods. At Fort Jesus the type is common in all periods from the 17th to 19th century, as a “jar with slightly flared neck” (e.g., fig. 32 number 6, Kirkman 1974: 213). Most of types 5a and 5b at Takwa are similar, for instance 5a4. These date from 1600-1900 (Wilson 2019: 93). Fig. 6 letter D, from the 16th century at Kilepwa, is comparable (Kirkman 1952: 184). Fig. 7 numbers 37 and 38 from 1600-1900 at Pate may be similar (Wilson and Omar 1997: 47).

13.4.5 Type 12

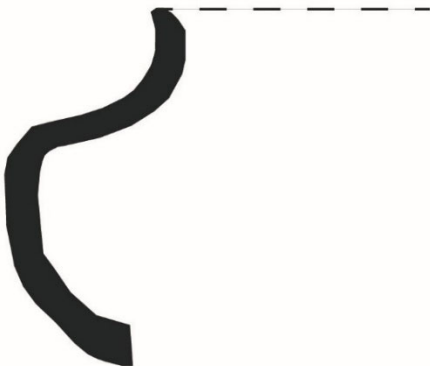


Figure 13-14. Type 12 ceramic profile form.

These are inflected restricted vessels, with a high shoulder and short neck. We collected three sherds of this type from Kandwi_Kibokwa003 and Kandwi. Figure 13-14 shows the basic form of this type. Rim types are rounded or rounded and slightly pointed or rounded and thickened toward the exterior. Average sherd thickness is 10 mm, and average vessel diameter is 24 cm. Two examples have a uniform dark fabric, while one has a dark core with light walls. All have grit and fine to medium quartz sand as temper. Clay colors include red, tan, brown and grey. No surface modifications were recorded.

High shouldered inflected pots like this are somewhat similar to the high-shouldered examples of type 34 or 36 from 17th and 18th-century contexts at Kilwa, although the Kilwa examples are decorated. Chittick calls these water-pots (Chittick 1974: 329-330). There are no apparent examples from later periods at Gede (Kirkman 1954) Ungwana on the Tana (Kirkman 1966), Manda (Chittick 1984), Takwa (Wilson 2019), nor Pate (Wilson and Omar 1997). Figure 6, letters D and E at Kilepwa appear similar, from the 16th-century level (Kirkman 1952: 182). Some examples from 17th-century Fort Jesus appear similar (e.g., fig 32 number 5, or fig 37 number 6, Kirkman 1974: 213, 223) but the type does not appear to be common.

13.5 Local Ceramics: 1830-1963 CE

The following types represent ceramics collected during the survey at sites that date from the late colonial period. This period is from 1830-1963. We dated sites through the presence of specific types of imported European glazed earthenware and Chinese porcelain that circulated in Zanzibar from the 19th century to the early 20th century, which I discuss more in Chapter 14. Comparisons for ceramics from this period come from 19th-century assemblages at Fort Jesus (Kirkman 1974), surveys in Zanzibar and the excavation of the 19th-century plantation at Mgoli (Croucher 2006; 2014), and 19th-century assemblages from Takwa (Wilson 2019).

13.5.1 Decorative Motifs of the Late Colonial Period

Table 13-4 describes the decorative motifs associated with ceramics from the late colonial period, and references which types are decorated. Then, subsequent sections describe types 13 through 20.

Decoration #	Description	Vessel Type
1	neck punctates	type 16
7	incised L-shapes on carination	type 19
15	two incised parallel bands with punctates within	type 20
17	vertical punctates or dashes on the shoulder or carination	type 17
18	raised / moulded impressed circles on the carination	type 17
19	horizontal impressions or braid marks on the shoulder or carination	type 17
20	diagonal dashes on shoulder, with blank spaces between groups of dashes	type 17
21	shell impressed diagonal dashes	type 17
22	diamond punctates on shoulder or carination	type 17
24	square punctates on carination	type 17
26	single incised arcs on carination	type 19, type 20
27	multiple incised arcs on the carination	type 18
28	single arcs on shoulder, made of dotted lines	type 19
34	overlapping double row of small crescents / fingernail impressions	type 20

35	overlapping incised arcs on carination	type 18
36	double incised arcs, flanked by vertical shell impressions	type 18
37	downward facing horizontal crescents on shoulder	type 20
38	overlapping arcs on shoulder, made of tick marks	type 20
40	stacked shell-impression check marks	type 18

Table 13-4. Late colonial decorative motifs. See Figure 13-2 for images.

13.5.2 Type 13



Figure 13-15. Type 13 ceramic profile form, and base.

These are simple unrestricted vessels (open bowls) with bases and rounded rims that are thickened toward the interior of the vessel. Figure 13-15 shows the basic forms of this type. We collected 24 of these vessels, at Donge_Mbiji001, Kibirikani, Mwanampaji003, Chaani_Kibokwa001, Chaani, Donge_Kichangani001, Kikobweni003, Mkataleni001, and Mkataleni002. Average sherd thickness is 12 mm, but this is likely inflated due to 16 of the 24 sherds being bases. Non-base average thickness is 10 mm. Average vessel diameter is 30 cm, suggesting that these bowls were larger than earlier open bowls. Bases are applied clay rings, some concave, while others are flat. 29% of sherds have uniform dark fabric, while 25% have mottled fabric. The rest of the sherds range in fabric color: light outward, dark inwards; dark outward, light inward; uniform light; dark core with light walls; and a light core with dark walls. 22 have grit and fine to medium quartz sand temper, while two have grit and fine to medium quartz sand with iron particles as temper. Clay colors are diverse, and include pink and red, tan, black, brown, and grey. A single vessel from Chaani has black paint on the interior, and one other is burnished. No other surface modifications were recorded.

These open bowl forms are similar to the 16th to 18th-century open bowls described above as Type 9. For the 19th century, there are comparative examples at Takwa called types 2a, 3a, and 3b (Wilson 2019: 79-80), as well as at Pate, called types 30, 31, and 48-50 in period V (Wilson and Omar 1997: 47). At Fort Jesus, there is a large class of open bowls with bases from 19th-century contexts (Kirkman 1974: 252-257).

13.5.3 Type 14

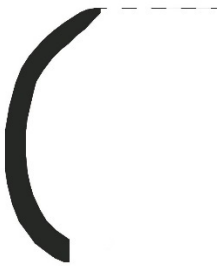


Figure 13-16. Type 14 ceramic profile form.

These are simple restricted vessels, also known as globular, spherical, or hole-mouth pots. Figure 13-16 shows the basic form of this type. We recovered four of these vessel types from Donge_Mbiji001, Kichangani001, and Kikobweni002. Rim types are rounded or pointed. Average sherd thickness is 11 mm. Average vessel diameter is 24 cm. Fabric colors include light toward the exterior, dark toward the interior, mottled, and uniform light. Three vessels have grit and fine to medium quartz sand temper, while one has temper that is mostly coarse quartz sand. Three vessels are red/pink in clay color, while one is black. No surface modifications were recorded.

At Takwa, spherical pots are type 1a, while large spherical pots are types 1b, 1c, and 1d (Wilson 2019: 78). I did not make this distinction during the survey, but the rim diameters of the larger spherical pots at Takwa more closely fit the samples gathered here. Kirkman (1974) does not appear to depict spherical pots for the 19th century, but some illustrations appear similar (e.g., fig 46. numbers 1 or 8, pg. 241), and Kirkman does not recognize spherical pots as a class separate from “rounded” or “hemispherical” pots in general, across all his work. Croucher writes that spherical bowls of this type may be represented at Mgoli but the sherds representing them are fragmentary (Croucher 2006: 286).

13.5.4 Type 15

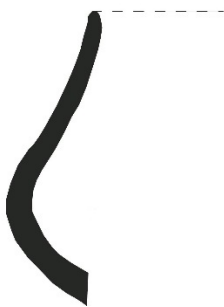


Figure 13-17. Type 15 ceramic profile form.

These are inflected restricted vessels with a low shoulder and a long neck. Figure 13-17 shows the basic form of this type. We collected four examples of this type, at Donge_Mbiji001, Mwanampaji002, and Mkataleni001. Three have rounded or pointed plain rims, while one has an everted, pinched rim. Average sherd thickness is 8 mm. Average vessel diameter is 25 cm. Two examples have uniform dark fabric, while one has mottled fabric, and another has uniform light fabric. Temper for all four is grit and fine to medium quartz sand. Clay colors vary from

red/pink, to black, to brown and tan. One example, from Mwanampaji002, has red paint on the interior rim. No other surface modifications were recorded.

At Takwa, these vessels are called type 5a1 (Wilson 2019: 80). At Fort Jesus, fig 46. numbers 7 and 11 appear similar (Kirkman 1974: 241).

13.5.5 Type 16

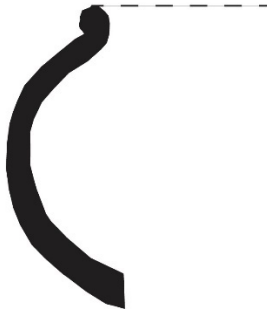


Figure 13-18. Type 16 ceramic profile form.

These are simple restricted vessels, also known as globular, spherical, or hole-mouth pots, with a rim rolled outward. Figure 13-18 shows the basic form of this type. We collected eight examples, at Donge_Mbiji001, Donge_Mbiji002, Kibirikani, Kikobweni003, and Chaani. Most have rounded rims rolled outward, though one example has a squared or flattened rim, rolled slightly outward, and another has a pinched rim, rolled outward. Average sherd thickness is 9 mm, while the average vessel diameter is 21 cm. Three have uniform dark fabric, while three have mottled fabric, one has a dark core with light walls, and another has a light core with dark walls. Seven have grit and fine to medium quartz sand for temper, while one has grit and spaces indicating vegetal matter. Clay colors range from pink/red to black, black and red, brown, and tan. One example has grey paint on the exterior shoulder, and red paint on the interior of the rim. Another has black paint on the interior of the rim. One sherd is decorated with diamond-shaped punctates (decoration 1) just below the rim.

Types 1a12 and 1b7 at Takwa are comparable forms (Wilson 2019: 82-83). At Fort Jesus, figure 46 numbers 5 and 10 appear similar, though it is difficult to tell if the rim is rolled or just pinched (Kirkman 1974: 240). The example here with punctates under the rim may have been made prior to the 19th century, as it appears similar to the neck punctating wares of the 11th-14th centuries, and there is no comparative example from the later periods.

13.5.6 Type 17



Figure 13-19. Type 17, sherd drawings of different decorative types that form adjacent nicks and impressions on the shoulder. Drawings by Ava Alders.

This type is a large variable class of jars with punctates, impressions, nicks or dashes on the carination. Figure 13-19 shows examples of these decorations. This type is based on

Fleisher's (2003) "Type 13", which he defined by its decorations, which include impressed or incised adjacent nicks, or a braided pattern. We collected 50 examples in total. Rims were universally everted, though with some variation in shape. Two examples are squared and everted, while four are pinched and everted, and six are round and pointed and everted. Average sherd thickness is 8 mm. Average vessel diameter is 24 cm. Most sherds have either uniform dark (19) or mottled (13) fabric color, with the rest spread among all other fabric color categories. 46 have grit and fine to medium quartz sand temper. The predominant exterior clay color is black (25), while interior clay colors are spread between black, brown, tan, grey, and pink/red. Five sherds have red paint on the interior of their rims. Two sherds are burnished, on the interior rim. One sherd has black paint on the interior rim, and one has brown or tan paint on the exterior rim. All sherds have incised or impressed adjacent nicks on the shoulder (decorations 17, 18, 19, 20, 21, 22, and 24), which resemble the impression of a twisted rope braid.

The closest parallel for this type is Fleisher's Type 13 from northern Pemba, which dates to the 16th-18th centuries due to its association with Chinese blue-and-white pottery dating from that period (Fleisher 2003: 258). On Zanzibar, it appears that this motif is more common on sites which date to the 19th century, on the basis of their association with European glazed whitewares and specific types of 19th century Chinese blue and white porcelain.

Of the 50 sherds of this type, we collected 37 examples from sites of the late colonial period, from Donge_Karange001, Donge_Mbiji001, Donge_Pwani002, Kibirikani, Kichangani001, Kichangani003, Kikobweni002, Mahonda_Mkataleni003, Mahonda003, Mahonda_002, Mwanampaji002, Mwanampaji003, Mnyimbi, and Chaani. Comparative 19th examples are shown photographed at Takwa (Wilson 2019: 42, 52), and are described for 19th-century contexts at Fort Jesus (Kirkman 1974: 259). This motif is also recorded on the 19th-century carinated cooking pots from Mgoli (Croucher 2006: 458).

We collected three sherds of this type from Kandwi and Njua Kuu, sites dating to the early colonial period. For these centuries, this type is attested in Fleisher's survey of northern Pemba, where it co-occurs with Chinese blue and white porcelain (Fleisher 2003: 258). It is found as well at Pujini (LaViolette, pers. comm.). Similar decorative elements appear across the 17th and 18th-century contexts at Fort Jesus (Kirkman 1974: 259). This motif is found in 16th-century contexts at Kilepwa (Kirkman 1952: 181-182) and from 16th-century surfaces and upper stratum contexts at the great mosque at Gede, where it is labeled Type 13 in the most recent stratified contexts (Kirkman 1954: 85) or type 15 as a single example from the surface (Kirkman 1954: 87). Punctates appear in the 17th-19th-century assemblage at Pate, though not necessarily on similar vessel forms (Wilson and Omar 1997: 47). It is possible that some of the carinated vessels with circular punctates from the 16th-century levels at Kilepwa are this type (Kirkman 1952: 181-182).

Finally, we collected six examples from the precolonial sites of Mwanakombo, Pwani Mchangani, Kirikacha, Kikobweni001, and West_Kandwi001, though these sites all have some later materials on the surface, which these sherds may be. We also collected four examples from Muembe Nambo, a site with mixed early and late materials. As a comparison, similar decorative motifs can be found on type 2 vessels from period 2 at Kilwa, from 1100-1300 CE (Chittick 1974: 339), which would accord with the contexts in which these vessels were found. Similar vessels are not found at Shanga, or Manda. Type 2 ceramics are found in the Kilwa hinterland as well, which Wynne-Jones (2005: 161) characterized by nicks on the shoulder or the rim.

13.5.7 Type 18

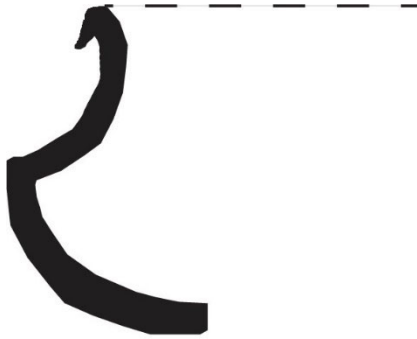


Figure 13-20. Type 18 ceramic profile form.

These are composite restricted (carinated) vessels with inflected shoulders and everted rims. Figure 13-20 shows the basic form of this type. We collected 35 examples, at Donge_Mbiji001, Kichangani001, Kikobweni002, Mahonda_Mkataleni003, Mahonda003, Mkataleni002, Mwanampaji002, Mwanampaji003, Kikobweni003, Mahonda002, Mnyimbi001, Pwani Mchangani, Kikobweni001, Mwanampaji001, Njua Kuu, and Muembe Nambo. 25 examples come from sites of the 19th-20th centuries. Rim types are either pointed/rounded and everted, squared and everted, pinched and everted, or thickened. Average sherd thickness is 8 mm. Average vessel diameter is 25 cm. Uniform dark is the most common fabric color, though other fabric types are present as well. 31 have grit and fine to medium quartz sand for temper, while four sherds have mostly coarse quartz temper. A sherd made with coarse quartz temper also has a thickened rim. Colors are variable, though black and brown are the most common. One example is burnished on the interior and exterior. One example has red paint on the interior of the rim, and incised stacked shell-impression check marks on the shoulder (decoration 40). One vessel, which has a pinched rim, has red paint on the interior of the rim. Another, with a rounded rim, has painted grey horizontal lines on the exterior neck (decoration 10). Another has red and black paint on the interior of the rim. Four more incised decorations were recorded: one sherd has overlapping incised arcs on carination (decoration 35), and another has double incised arcs, flanked by vertical shell impressions (decoration 36). Two sherds have multiple incised arcs on the carination (decoration 27). No other surface modifications were recorded.

This is a form of what Croucher calls a carinated cooking pot (Croucher 2006: 448). At Takwa, type 7b may include this carinated vessel form as well as type 19 (see below), with the only difference being that this form has a curved shoulder while type 19 has a straight shoulder (Wilson 2019: 97). At Fort Jesus, Kirkman refers to this vessel type as a carinated pot with a concave neck, e.g., fig. 47. number 8 (Kirkman 1974: 243). Other examples include fig. 50 numbers 3, 13, or 14 (Kirkman 1974: 248).

13.5.8 Type 19

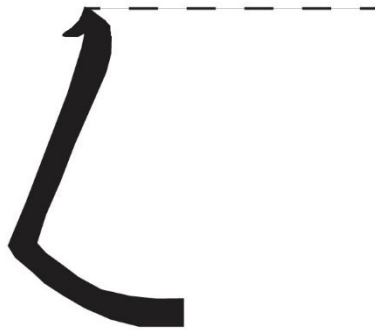


Figure 13-21. Type 19 ceramic profile form.

These are composite restricted (carinated) vessels with straight shoulders, and an everted rim. Figure 13-21 shows the basic form of this type. We collected 21 examples, at Donge_Pwani002, Mahonda_Mkataleni003, Mwanampaji002, Mwanampaji003, Daraja_La_Mwanakombo001, Kikobweni003, Mahonda002, Mkataleni001, Mwanakombo, Mwanampaji001, Pwani Mchangani, Njua Kuu, and Muembe Nambo. Nearly all recorded rims are everted, and rounded or pointed. Two are vertical and squared. One rim, from Muembe Nambo, is squared and pinched. Average sherd thickness is 8 mm. Average vessel diameter is 24 cm. The most common fabric color is uniform dark (12 sherds). 18 sherds have grit and fine to medium quartz sand temper, though three have a temper of mostly coarse quartz. The most common clay colors are black or brown. Three examples have burnishing on the exterior and interior rim. Two other examples are decorated with incised marks on the shoulders. One has incised “L” shapes over the carination (decoration 7), while another has incised single arcs on the carination, made of dotted lines (decoration 28). One more sherd has single incised arcs on the carination (decoration 26). No other surface modifications were recorded.

This is one form of the carinated cooking pot that Croucher describes (2006: 448). It is similar to the carinated 7b types from Takwa, especially the ones with more evenly distributed thickness (Wilson 2019: 81). Many examples at Fort Jesus resemble this type, including fig. 48, number 3, fig. 49, numbers 2 and 3, fig. 50 numbers 12, 23-26, 28, and 31, and fig. 51, numbers 7 and 8 (Kirkman 1974: 244-251). Type 33 of period V at Pate resembles this vessel (Wilson and Omar 1997: 47). It is similar in form to type 18 above, with the main difference being the curve of the shoulder above the carination. Out of any vessel recorded, it appears most similar to modern clay cooking pots, found throughout Zanzibar Stone Town. It may be the most recent form, dating from the late 19th and early to mid-20th century.

13.5.9 Type 20

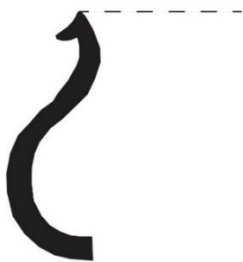


Figure 13-22. Type 20 ceramic profile form.

These are inflected restricted vessels with independent everted rims. Figure 13-22 shows the basic form of this type. The wall of this vessel in profile forms an “S” curve shape. We collected 13 of these vessels at Kandwi, Njua Kuu, Donge_Mbiji001, Mkataleni002, Mwanampaji002, Mwanampaji003, and Donge_Kichangani001. Rims are either rounded/pointed and everted, or squared and everted, or pinched and everted. Average sherd thickness is 9 mm. Average vessel diameter is 24 cm. 38% have uniform dark fabric, while 30% have fabric with a dark core and light walls. The majority have grit and fine to medium quartz sand for temper. Brown is the most common clay color. Other colors include black, tan, red/pink, and grey. Six sherds are decorated with incised motifs. Motifs include two sherds with single incised arcs on the shoulder (decoration 26), one sherd with overlapping double row of small crescents or fingernail impressions (decoration 34), one sherd with downward facing horizontal crescents on shoulder (decoration 37), one sherd with overlapping arcs on shoulder, made of tick marks (decoration 38), and one sherd with two incised parallel bands with punctates within, on the shoulder (decoration 15). No other surface modifications were recorded.

Though this vessel does not have a carinated shoulder, it likely served the same function as carinated cooking pots (e.g., Croucher 2006: 448). At Takwa, some of the necked jars like 5a1, 5b2, and 5b3 appear similar, but it is difficult to tell whether these forms are larger necked bowls or are more squat cooking pots. At Fort Jesus, Kirkman refers to this vessel type as having a “swan neck”, or a deep concave neck, e.g., fig. 50 numbers 9, 10, or 11 (Kirkman 1974: 249).

13.6 Local Miscellaneous Ceramics

The following sections refer not to types, but to categories that encapsulate parts of the assemblage that did not fit into the type-varieties listed above, but which are still meaningful as categories. Table 13-5 shows the decorative motifs for these groups, and then subsequent sections describe each group and reference decorative elements where applicable.

Decoration #	Description	Sherd Group
11	plastic bumps on carination, modeled	Group A (Husuni)
16	double wavy lines	Group A (Wavy)
26	single incised arcs on carination	Group F Group H
27	multiple incised arcs on the carination	Group F, Group H
28	single arcs on shoulder, made of dotted lines	Group H
29	single arcs on shoulder, made of an incised line with "eyelash" dots	Group D, Group F
30	long, flat, horizontal arcs on shoulder	Group F
31	vertical crescents on shoulder or carination	Group F
33	rouletted pattern	Group A (Roulette)
34	overlapping double row of small crescents / fingernail impressions	Group F
35	overlapping incised arcs on carination	Group F
37	downward facing horizontal crescents on shoulder	Group F
39	stacked crescents on shoulder	Group F

Table 13-5. Decorative elements on miscellaneous sherd groups. See Figure 13-2 for images.

13.6.1 Group A: Miscellaneous Sherds



Figure 13-23. Dembeni ware, early second millennium. Drawing by Ava Alders.

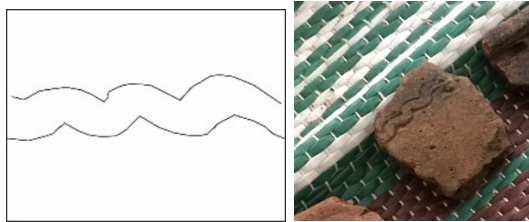


Figure 13-24. Wavy line decorative motif, early second millennium.



Figure 13-25. Husuni Modeled ware.

This category refers to miscellaneous vessels that do not fit elsewhere. We recovered six sherds for the early second millennium that are included in this category. Two sherds appear to be examples of second millennium Dembeni ware (one photographed, Figure 13-23), which is more refined than late first-millennium examples (Pawlowicz 2011: 228, see also Wright 1984: 38), from Muembe Nambo. One sherd from Kirikacha is a “wavy line” type (Figure 13-24), familiar as type 10a at Shanga, which Horton associates with pastoralist communities around the river Tana (Horton 1996: 257-258). One sherd from Pwani Mchangani is an example of Husuni Modeled Ware (Figure 13-25), from 14th-century Kilwa (Chittick 1974: 326). Finally, two sherds are thick pieces of *mofa* ovens, recovered from Mwanakombo and Kirikacha (*c.f.* Fleisher 2003: 330). I discuss these more in Chapter 16.

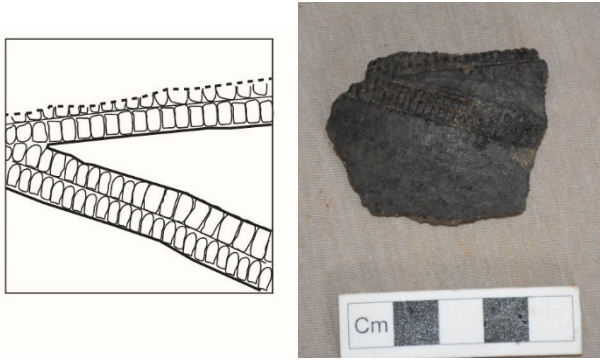


Figure 13-26. Rouletted ware.

For the late colonial sites, only one sherd fits this category (Figure 13-26). It is a body sherd with uniform dark fabric, grit and fine to medium quartz sand temper, black clay color on the exterior, and grey clay color on the interior. This sherd is 7 mm thick. It is decorated with a roulette pattern, which appears like two strips of textured bumps converging in a triangular shape. It seems like a potter rolled a small seed or pinecone across wet clay, to produce evenly spaced bumpy marks. Roulette wares are not known in Zanzibar but are relatively common inland and around the Great Lakes Region of East Africa during later centuries of the second millennium (Haour et al. 2010). Croucher writes that roulette decorated ceramics dominated the assemblages at the 19th-century Tanzanian caravan sites of Ujiji and Kwa Fungo, but not a single sherd with roulette decoration was found on Zanzibar during her 2006 survey and excavation at Mgoli (Croucher 2014: 223). The presence of this rouletted sherd suggests that either the pot or the potter had their origin somewhere on a Tanzanian caravan route through mainland East Africa. Given the presence of this sherd at a 19th-century site associated in oral history with slavery (Mkataleni), it may be that this sherd represents the translocation of an enslaved potter from the East African mainland, who continued to make pots in a mainland style.

13.6.2 Group B: Carinated Body Sherds (1000-1500 CE)

This category refers to carinated body sherds without rims that we collected during the survey. This group may include sherds from vessel types 18 or 19. We collected 10 examples, from Kikobweni001, Kirikacha, Mwanakombo, and Pwani Mchangani. Sherd thickness is 9 mm. Uniform dark is the most common fabric color. Temper is primarily grit and fine to medium quartz sand. Clay color is primarily brown and black. One sherd is burnished on the interior and exterior rim, while another has black paint and is burnished on the exterior rim. Otherwise, no surface modifications were recorded.

13.6.3 Group C: Everted Rims (1000-1500 CE)

This group has everted rims that could not be reliably assigned to another type. This group may include sherds from vessel types 17, 18, 19, or 20. We found five examples at Kikobweni001, Kirikacha, and Mwanakombo. Rim types are everted and rounded, pointed, or pinched. Average sherd thickness is 8 mm. Uniform dark is the most common fabric color. Three examples have grit and fine to medium quartz sand temper, while two examples have mostly quartz sand temper. Black and brown are the most common clay colors. One rim is burnished on the interior and exterior. Another has red paint on the interior rim and is burnished on the exterior. Otherwise, decorations were recorded.

13.6.4 Group D: Carinated Body Sherds (1500-1830 CE)

This type refers to carinated body sherds without rims that we collected during the survey. This group may include sherds from vessel types 18 or 19. We found five examples at Kandwi_Kibokwa003, and one at Njua Kuu. Average sherd thickness was 9 mm. Vessel diameters could not be recorded. Three have uniform dark fabric, while two have dark cores with light walls, and one has a mottled fabric. All six have grit and fine to medium quartz sand temper. Clay colors range are tan, black, brown and grey. One sherd has incised arcs on the shoulder with “eyelash” dots around each incised line (decoration 29). No other surface modifications were recorded.

13.6.5 Group E: Everted Rims (1500-1830 CE)

This type refers to everted rims that could not be reliably assigned to another type. This group may include sherds from vessel types 17, 18, 19, or 20. One sherd of this type was located at Kandwi_Kibokwa00. It is a squared everted rim. It has uniform dark fabric, grit and fine to medium quartz sand temper, and the clay color is black and tan. No surface modifications were recorded.

13.6.6 Group F: Carinated Body Sherds (1830-1963 CE)

This type refers to carinated body sherds without rims that we collected. This group may include sherds from vessel types 18 or 19. We collected 35 examples, from Donge_Mbiji001, Donge_Pwani002, Kibirikani, Kichangani001, Kichangani003, Mahonda_Mkataleni003, Mwanampaji002, Mwanampaji003, Chaani, Donge_Karange002, Donge_Kichangani001, Kandwi002, Kichangani002, Kikobweni003, Mkataleni001, Muembe Nambo, and Mnyimbi001. Average sherd thickness is 8 mm. Vessel diameter was not recorded, as these are body sherds. 17 of these sherds have uniform dark paste, with the rest distributed relatively evenly between all other color options. 31 have grit and fine to medium quartz sand for temper, while four examples have coarse quartz sand temper. The predominant clay color is black, though all possible colors are represented. One example is burnished on the interior and exterior. Another is burnished only on the exterior. One example has red paint on the interior, and one example has black paint on the interior. Several examples have incised decorative motifs. Motifs include single incised arcs on carination (decoration 26), single arcs on shoulder, made of an incised line with "eyelash" dots (decoration 29), long, flat, horizontal arcs on shoulder (decoration 30), vertical crescents on shoulder or carination (decoration 31), multiple incised arcs on the carination (decoration 27), overlapping double row of small crescents / fingernail impressions (decoration 34), overlapping incised arcs on carination (decoration 35), downward facing horizontal crescents on shoulder (decoration 37), and stacked crescents on the shoulder (decoration 39). Many of these decorative elements can be compared to 18th and 19th-century decorative motifs at Fort Jesus (Kirkman 1974: 258-261).

13.6.7 Group G: Everted Rims (1830-1963 CE)

This type refers to everted rims that could not be reliably assigned to another type. This group may include sherds from vessel types 17, 18, 19, or 20. We collected 70 sherds of this type, at Donge_Karange001, Donge_Mbiji001, Donge_Mbiji002, Kibirikani, Kichangani001, Kichangani003, Mahonda_Mkataleni003, Mwanampaji002, Mwanampaji003, Chaani, Kandwi002, Kikobweni003, Mahonda002, Muembe Nambo and Mkataleni001. Average sherd thickness is 8 mm. Average vessel diameter is 25 cm. Uniform dark is the most common fabric

color, with 26 examples. Other common fabrics are mottled, or ones with a dark core with light walls. All 70 have grit and fine to medium quartz sand temper. Black is the most common clay color, with brown and pink/red as the next most common. Four sherds have exterior burnishing. Nine sherds have interior burnishing. One sherd is burnished on the interior and exterior. One sherd has red paint on both sides of the rim. Two sherds have red paint on the exterior of the rim. Seven examples have red paint on the interior of the rim. Two of these sherds with red interior paint also appear to have red slip on the interior. Otherwise, no surface modifications were found.

13.6.8 Group H: Decorated Body Sherds (1830-1963 CE)

This category refers to decorated body sherds of inflected restricted vessels with independent everted rims. The wall of this vessel in profile forms an “S” curve shape. This group may include sherds from vessel type 20. We collected four sherds at Kichangani003 and Chaani. Sherd thickness and vessel diameter were not recorded. Fabric was mottled in three examples, and uniform light in one example. Three examples have grit and fine to medium quartz sand temper, while one example has mainly coarse quartz sand as temper. Clay colors are black, pink/red, brown, and tan. One example has black paint on the exterior shoulder. All four examples are decorated with incised motifs. Motifs include single arcs on shoulder, made of dotted lines (decoration 28), single incised arcs on carination (decoration 26), and multiple incised arcs on the carination (decoration 27). No other surface modifications were recorded. Many of these decorative elements can be compared to 18th and 19th-century decorative motifs at Fort Jesus (Kirkman 1974: 258-261).

The previous sections have outlined ceramic types and groups that we recorded and identified during the 2019 survey. In the following sections, I describe the attribute analyses that I completed using these same ceramics.

13.7 Local Ceramic Attribute Analysis, by Period and Region

The follow attribute analyses are based on a sample of diagnostic sherds selected from sites across the survey region. I recorded 1187 individual sherds during the 2019 survey, of which 753 belong to sites which can be clearly dated. Each diagnostic sherd was analyzed according to a set of attributes (see section 13.2.3). These data are the basis of the attribute analysis, which aims to understand how different features of ceramic use and construction may have varied between periods, regions, and site groups. In addition, this section considers variation between sherds collected above ground and sherds collected in subsurface deposits.

13.7.1 Attributes by Period

This section considers attributes across the three periods of this project: the latter phases of the precolonial period (1000-1500), the two phrases of the early colonial period (1500-1830), and the earlier phase of the late colonial period (1830-1963). I discuss overall patterns in fabric color, temper, ceramic clay color, sherd thickness, vessel diameter, and vessel form below.

Fabric Color: Overall, fabrics become darker over time. Three fabric types were most common for the precolonial period: a uniformly dark fabric (25%), a fabric with a dark core that is lighter toward the interior and exterior walls (25%), and a uniformly light fabric (21%). For the early colonial period the three main fabric colors were the same, but uniformly dark fabrics increased to 31%, while fabrics having a dark core with light walls were 21%, and fabrics that are uniformly light were 21%. For the late colonial period, uniformly dark fabrics made up 35% of the assemblage. Fabrics with dark cores and light walls stayed roughly the same as in previous

periods, constituting 21% of the assemblage. In the late colonial period, ceramics with a “mottled” fabric made up 18% of the assemblage, likely taking their share from uniformly light fabrics, which constituted only 10% of the assemblage. Mottled fabrics were darker than uniformly light fabrics. The drop in the percentage of uniformly light ceramics and the increase in uniformly dark fabrics and mottled fabrics suggests that overall, ceramic fabrics became darker through time.

Temper: In general, fine to medium sand particles with quartz inclusions made up the temper for the majority of sherds in analyzed, though the amount increased slightly over time: 85% in the precolonial period, 88% in the early colonial period, and 91% in the late colonial period. The number of sherds with coarse quartz fabric went from 13% in the precolonial period to 4% in the early colonial period and 6% in the late colonial period.

This difference was not made up entirely by the increase in fine to medium sand temper. A temper consisting of fine and medium sand, quartz, and a ferrous particle increased from 1% in the precolonial period, to 6% in the early colonial period, and then returned to 2% in the late colonial period. The actual percentage of this temper type may be higher, since it was not identified until our team was part-way through temper analysis for the whole assemblage. Some sherds counted as having fine to medium sand temper may have also had ferrous particles, which were missed due to this being an unfamiliar type on the East African coast. The ferrous particles are likely pieces from naturally occurring iron deposits visible today on the surface of coralline limestone bedrock outcrops, which are common throughout the eastern region. The increase in this temper type in the later periods most likely is caused by the fact that most sites recorded in the east date from the 16th to 20th centuries. The presence of ferrous particles in the temper of some sherds suggests that at least some ceramic production was occurring locally in the coralline limestone bedrock region.

One further pattern is the overall lack of sherds with shell temper. Shell temper is rare in ceramics collected in the inland region. We collected only a single sherd with shell temper, from a site dating to the early colonial period, though it is possible that we missed or misidentified some shell tempers in other sherds. This pattern aligns with the lack of shell found at inland sites.

Average Ceramic Clay Color: We recorded interior and exterior ceramic colors for all periods. For each period, I averaged interior and exterior colors together to create a synthetic value called average color, which will be used for analysis here.

Average color darkens over time, especially starting in the 19th century. For the precolonial period, 31% of sherds have an average color of brown, 20% are tan, 17% are black, and 15% are pink or red. 6% are grey, 6% are a mix of red and black, and 6% are a mix of tan and black. For the early colonial period, 26% are brown, 17% are black, 17% are pink or red, and 16% are tan. 8% are grey, 7% are red and black, and 9% are tan and black. For the late colonial period, 28% are black, 18% are brown, 18% are pink and red, and 12% are tan. 7% are grey, 8% are black and red, and 9% are black and tan.

The early colonial period saw a slight increase in the number of black, black and red, and black and tan sherds, and during the late colonial period, black overtook brown as the dominant color. Overall, ceramics get darker through the centuries. Along with the darkening of vessel fabric, this may relate to a greater percentage of ceramics being produced in enclosed environments that create a reductive, oxygen-reducing environment, as compared to open firing methods which expose more of the pot to air, creating an oxidizing environment that results in lighter ceramic colors (Roux 2019: 112).

Sherd Thickness: Average sherd thickness is 9 mm for each period, with most sherds occupying a range between 6 to 11 mm. This reflects a relatively constrained standard for the construction of vessels during the second millennium. While mid to late first millennium ceramics tended to be thicker and more robust, by the 11th century Swahili potters had developed more delicate forms of ceramic production for cooking, eating, and storage. These standards have persisted into the 21st century, appearing on modern vessels.

Vessel Diameter: Average vessel diameter also remained constant through all periods, at 25 cm. This is a less useful statistic across time periods since vessel diameter depends greatly on the type of vessel and its intended use.

Vessel Form: To consider vessel form across all three regions, I have aggregated vessel types into four attribute categories: open bowls, spherical pots, inflected necked pots, and everted rim cooking pots. Then, the percentages of these forms were compared through all periods. These percentages are shown in Table 13-6, Table 13-7, and Table 13-8.

	Open bowls	Spherical bowls	Inflected jars	Carinated cooking pots, with everted rims	Miscellaneous
Count	137	99	64	23	20
%	40%	29%	19%	7%	6%

Table 13-6. Vessel type percentages across precolonial sites.

	Open bowls	Spherical bowls	Inflected jars	Carinated cooking pots, with everted rims	Miscellaneous
Count	28	2	4	19	7
%	47%	3%	7%	32%	12%

Table 13-7. Vessel type percentages across early colonial sites.

	Open bowls	Spherical bowls	Inflected jars	Carinated cooking pots, with everted rims	Miscellaneous
Count	24	12	4	88	110
%	10%	5%	2%	37%	46%

Table 13-8. Vessel type percentages across late colonial sites.

In the precolonial period, open bowls, spherical pots, and inflected jars dominated the assemblage with open bowls being the most numerous. This is a trend among other early second-millennium sites on the coast. During the early colonial period, open bowls remained the dominant vessel form and increased in percentage, but the percentage of spherical pots and inflected jars decreased significantly. The gap was made up by the emergence of everted-rim cooking pots, with carinated or rounded shoulders. These cooking pots went on to dominate the assemblages of late colonial period sites. Much of the “misc” category in this period consists of fragmentary carinated shoulders or everted rims, which likely belong to everted cooking pots. Combining these two categories would possibly boost the percentage of everted rim cooking pots to over 80% of the late colonial assemblage.

These everted cooking pots constitute the majority of locally produced ceramics made today in Zanzibar as well. Though this form became dominant starting in the 19th century, other forms still persisted and did not entirely cease to exist. Potters still made open bowls in small numbers, for the consumption of rice-based dishes. However, readily available imported European glazed earthenware vessels in the 19th century, followed by modern whiteware and metal vessels in the 20th century, replaced the majority of them. The rapid decline of locally produced open bowls starting in the 19th century coincides neatly with the proliferation of industrially produced European glazed whitewares at the same time, suggesting that these

imported materials replaced kitchen ware for most Swahili people during this time, and would have linked households into cash economies and networks of globalized exchange.

13.7.2 Attributes by Region

This section considers the distribution of measured attributes across the survey region. The aim of this analysis was to see whether environmental or social differences across the island may have influenced production and consumption. Due to similarities in environmental contexts, the transects of Mkataleni and Mahonda were included in the west region, and the northeast transect around Pwani Mchangani was included in the east region. As I did above, I have used the 753 dateable diagnostic sherds for analysis here.

To give a sense of variation across the region, I use a metric of percent difference. For each attribute, the percentages of the whole assemblage were subtracted from the percentages of the regional assemblage. This produces either a positive or negative number. The value of the percent difference greater than zero indicates the extent to which an attribute of a certain regional assemblage is higher than the average of the whole assemblage, and vice versa for a percent difference value that is less than zero. This difference allows a visualization of distinct regional trends relative to the whole assemblage. The following sections describe regional variations in fabric color, temper, ceramic clay color, sherd thickness, and vessel diameter. Vessel form was not considered since it co-varies with period, meaning regional differences do not reflect much more than the chronological distribution of sites across different regions.

Fabric Color: The two fabric color types with the greatest diversity across the survey area are uniformly light fabrics and mottled fabrics. Mottled fabrics are most common in the central region at 19% of the assemblage, which is 6% higher than average. Mottled fabrics are least common in the east region, where they are 8%, which is 5% lower than average. In the west region, mottled fabrics are roughly average. Uniformly light fabrics have the inverse distribution—they are most common in the east region (8% higher than average), least common in the central region (7% lower than average), and similarly average in the west region. Uniform dark fabrics are roughly average across all regions. The last significant fabric type is one with a dark core and light walls toward either side. This fabric type is overrepresented in the west (5% higher than average), average in the central region, and underrepresented in the east (4% below average). These differences in fabric types across regions may relate to variable clay deposits or differences in firing techniques across regions, patterns which need to be explored further.

Temper: While the large majority of sherds have fine to medium sand and quartz inclusions for temper, the percentage of this type increases from west to east. The west region has the lowest percentage of sherds with fine to medium sand and quartz temper, at 82%. 86% of sherds in the central region have temper with fine to medium sand and quartz, while 94% of sherds in the east region have this temper. Making up the difference, the west region has the highest number of sherds with coarse quartz as the primary source of temper, at 15%. The central region has 11% of sherds with coarse quartz temper, and the eastern region has only 2% of sherds with this temper.

This distribution correlates with geological zones across the island. The western region is primarily an alluvial sandy plain, with sandy particles that are larger on average than anywhere else. These alluvial sandy conditions decrease as one heads east. The central region is less sandy than the west, and the east region is less sandy still, primarily having silty sediments. If temper corresponds to local geological conditions, this suggests that ceramic production across inland Zanzibar occurred at a local rather than regional level.

Sand and quartz tempers with ferrous inclusions were also mostly found in the eastern region, further suggesting that those sherds were from vessel produced locally. This ferrous temper almost certainly comes from sediments that lie adjacent or over naturally occurring iron deposits that are found on the coralline limestone bedrock of the eastern region. Eight sherds with temper of this type were found in the east, while only two sherds of this type were found in the central region, and one sherd in the west.

Average Ceramic Clay Color: We recorded ceramic color for the exterior and interior of all sherds, and these values have been combined into an average color value using a method described in the previous section. Tan colored ceramics appear to be distributed unevenly, being overrepresented by 6% in the west region and 2% in the central region. Tan ceramics are underrepresented by 8% in the eastern region. This spectrum correlates with the distribution of coarse quartz tempers described above, which possibly suggests that the presence of tan colored pottery is related to the relative sandiness of the areas where clay and temper are procured. The east, which is the least sandy region, has the lowest incidence of tan ceramics, while the west has the highest, and is the sandiest region.

Brown and black colored ceramics are overrepresented in the eastern region by 7% and 2% respectively, while they are underrepresented in the west and central regions. This pattern is the inverse of the tan color distribution. It may also relate to the relatively sand-free soils of the east, which may produce darker ceramic colors during firing. The relative darkness of ceramic color in the east may also relate to the fact that eastern areas were settled later; in general, ceramic color darkens over time.

Sherd Thickness: Due to an unnoticed problem in ceramic analysis, only 13% of sherds from the central region were measured for thickness. 96% of sherds from the west and 98% from the east were measured. No major differences were found. In the west and east, the majority of measured sherds range from 6 to 10 mm.

Vessel Diameter: No significant differences were observed in terms of vessel diameter between regions. In all regions vessels averaged around 25 cm, similar to the average for the entire survey region.

13.8 Local Ceramic Attribute Analysis: Other Categories

In the following sections, analyses compare ceramics attributes across more constrained categories, in order to draw some conclusions about ceramic production and use in varying periods. Whereas previous sections compared attributes across the entire assemblage, this section compares attributes only within certain categories. For example, ceramic attributes from early second-millennium site clusters are compared only against all other early second-millennium ceramics, and ceramic attributes of open bowls from a specific period are only compared against open bowls of other periods. Finally, I compare ceramic attributes by collection location, between ceramics found in STPs and ceramics found on the surface.

13.8.1 Attributes Between Precolonial Regional Site Groups

This section compares ceramics collected at regional site clusters of the precolonial period. In the west, Mwanakombo is the only site of this period. In the center, Kirikacha and Kikobweni001 make up one cluster. In the east, Pwani Mchangani, Mwanampaji001, West_Kandwi001, and West_Kandwi003 make up the eastern site cluster. Also included in the eastern cluster are identifiable early second-millennium ceramics from Muembe Nambo. The aim of this analysis is to investigate ceramic production and use across different regions on Zanzibar, exclusively during the earliest period of occupation in the survey region. The same

measure of percent difference (described above) is used to visualize the deviation of each group from the overall average. In the following sections I describe regional variations in fabric color, temper, ceramic clay color, sherd thickness, vessel diameter, and vessel types for sites groups of the precolonial period.

Fabric Color: The percentage of sherds with uniform light fabric differs across the three groups for the early second millennium. While 20% of sherds from Mwanakombo have uniformly light fabric, only 11% from the central Kirikacha group do. In contrast, 31% of sherds from the eastern Pwani Mchangani group have uniformly light fabric, the largest category, with uniform dark fabric being the second most common. In the central Kirikacha group, uniform dark fabrics and fabrics with a dark core and light walls are the two most common values. In the west, fabrics with dark cores and light walls were the most common, with uniform light and uniform dark fabrics being second and third most common.

Temper: Early sites from the west and central regions similarly have a relatively high percentage of sherds with coarse sand and mostly quartz temper, at 22% and 19%, respectively. Roughly 75-80% of the sherds in these regions have fine to medium sand with fine quartz temper. In contrast, the early sites of the eastern region almost entirely have fine to medium sand with fine quartz temper (97%). This difference is reflective of the differing geological conditions between the east and the center and west. The central and western areas have large amounts of alluvial sandy clay, while the east has almost no alluviation due to the lack of water on the surface. Instead, sediments in the east consist of iron-rich soils that erode directly off karstic limestone bedrock. This difference in temper further suggests local clay sourcing.

Average Ceramic Clay Color: Average ceramic clay color differs significantly between the east and west regions in the early second millennium. Most sherds from the east region are black, red, or brown, with tan sherds being underrepresented compared to the whole (-14%). Meanwhile, tan sherds are the most common sherd in the west region, at 34%, along with brown and red sherds. Black sherds in the west are underrepresented (-10%). In the center, tan, black, and brown sherds are relatively evenly represented, while red sherds are slightly underrepresented (-6%). This difference in color correlates to differences in temper coarseness between regions.

Sherd Thickness: Sherd thickness is the same between the west and east groups, between 6 and 11 mm. Thicknesses for the central group were not recorded (see above).

Vessel Diameter: Diameters averaged around 25 cm for all groups, and do not appear to be regionally significant.

Vessel Types: The three most common types across all three site groups were open bowls (type 1), spherical pots (type 2), and inflected neck vessels with high shoulders (type 5). Open bowls were the most common form in all three regions, comprising almost half of all finds in the west and east. The Kirikacha group in the central region had the least open bowls relative to other categories, at 32%. This difference was made up for by the relatively high number of spherical pots with rolled rims in the central region, which made up 10% of the assemblage there, compared to 2% in the west and 4% in the east. The central region also generally had the largest relative percentage of spherical pots (at 26%, compared to 18% in the west and 22% in the east) and inflected necked pots (21%, compared to 18% in the west and 10% in the east).

13.8.2 Attributes Between Early Colonial Regional Site Groups

This section compares ceramic attributes between Njua Kuu in the central region, and Kandwi_Kibokwa00 and Kandwi in the eastern region. These are sites that date between the 16th

and 18th centuries. Included with the eastern assemblage are some early colonial sherds from the multi-period site of Muembe Nambo. Only 67 sherds in total make up this assemblage.

Fabric Color: Fabric color for sherds from Njua Kuu in the central region is lighter in color than fabric color for sherds from the east. 29% of sherds have uniform light fabric, 29% have uniform dark fabric, and 18% have a dark core with light colored wall. In comparison, 32% of sherds from the eastern region have uniform dark fabric, 24% have a dark core with light walls, and 18% have uniform light fabric.

Temper: Similar to the trends of the early second millennium, sherds from eastern sites also have finer-grained temper with less quartz. 12% of sherds from Njua Kuu have coarse sand and mostly quartz temper, while only 1% of eastern sherds have coarse temper.

Average Ceramic Clay Color: 35% of sherds from Njua Kuu are brown, and 21% are red. 12% are tan, 12% are black, and 12% are tan and black. 9% are black and red, and no sherds are grey. In contrast, sherds from the east are 23% brown, 19% black, 17% tan, 16% red, 11% grey, 8% tan and black, and 6% black and red. Overall, eastern sherds are darker, following the trend of the earlier period.

Sherd Thickness: Thickness between sherds from Njua Kuu and the eastern sites ranged between 6 and 10 mm on average.

Vessel Diameter: Vessel diameter appears to average around 25 cm for sherds from all sites.

Vessel Type: 57% of diagnostic vessels in the eastern sites were open bowls, with the rest being inflected necked pots (7%), spherical pots (5%), or cooking pots with indeterminate body forms and everted rims, often decorated (roughly 26%). At Njua Kuu, these everted rim cooking pots made up 69% of wares. 19% of wares were open bowls, and 13% were carinated vessels with a thick, protruding carination. The eastern sites appear to exhibit a relative ceramic frequency similar to sites of the early second millennium, where open bowls dominate the assemblage, whereas Njua Kuu has type frequencies much more similar to 19th-20th-century sites, where cooking pots with everted rims dominate the assemblage. This may be because Njua Kuu was founded in phase 2 of the early colonial period (1698-1830), while the eastern sites were founded in phase 1 of this period (1500-1698).

13.8.3 Attributes Between Late Colonial Regional Site Groups

This section compares ceramic attributes for diagnostic sherds between groups of sites dating from the late colonial period. Sites are grouped geographically. To the southwest is the Mahonda group, consisting of sites in the vicinity of the town of Mahonda: Daraja_La_Mwanakombo001, Mahonda_Mkataleni001, Mahonda_Mkataleni003, Mahonda002, Mahonda003, Mkataleni001, Mkataleni002, and Mnyimbi001. In the northwest is the Donge group, consisting of the sites of Donge_Karange001, Donge_Karange002, Donge_Kichangani001, Donge_Mbiji001, Donge_Mbiji002, and Donge_Pwani002. In the central region there is the Kichangani group, consisting of the sites of Kibirikani, Kichangani001, Kichangani002, and Kichangani003. In the eastern half of the central region there is the Chaani group, consisting of Chaani, Kikobweni002, and Kikobweni003. Finally, in the eastern region, there is the Mwanampaji group, consisting of the sites of Mwanampaji002 and Mwanampaji003. These site groups represent potential areas of ceramic production and distribution. They are compared against the whole assemblage of late colonial diagnostic ceramics using the percent difference measure (see above). In the following sections I describe

fabric color, temper, average ceramic clay color, sherd thickness, vessel diameter, and vessel types across these regional groups.

Fabric Color: Diagnostic sherds from all groups except the Kichangani group have uniform dark fabric as the dominant type. The Mwanampaji group, the only group fully in the eastern region, has the highest percentage of uniform dark fabric sherds, with 49%. The Kichangani group has only 15% of sherds with uniform dark fabric, with its dominant fabric types being mottled fabric (27%) and fabric with a dark core with light walls (19%). A dark core with light walls is the second most dominant fabric type among all sites except the Chaani group, where mottled sherds make up 31%, after uniform dark fabric which is 36%. Darker fabric colors are likely the result of reducing atmosphere within firing pits. The anomaly of the Kichangani group is likely related to ceramic color in general (see below), and probably the result of specific clay types used in the Kichangani region.

Temper: All groups except the Mahonda group have over 90% of sherds with fine to medium sand grit temper with fine quartz inclusions. The Mahonda group has 84% of sherds with this temper type, and 15% with coarse sand and larger quartz inclusions. This is likely due to the sandiness of clays used around the Mahonda group of sites. The Donge group is also in the western alluvial areas but 19th/20th-century sherds from there do not appear to have much coarse sand or quartz, suggesting that the overall claim that the western areas produce sandier and coarser tempers due to alluvial sands in clay might be biased for all periods by the data from Mahonda alone. 5% of the sherds from the Mwanampaji site group have iron inclusions in the temper, a result of local clay sources from areas in the eastern region in which iron nodules form on coral limestone bedrock.

Average Ceramic Clay Color: Black and brown colors dominate the assemblages of the Mahonda, Donge, and Mwanampaji groups. The Chaani group has black as the dominant color (32%), with red as the second most common color (19%). Like with fabric color, the Kichangani group is again the outlier, having 41% of sherds with red or pink coloring. Tan coloring is the next most common color, at 18%, followed by tan and black (16%) and black (16%). Dark colors in the later periods might be explained by the increased presence of reducing environments during firing. The Kichangani outlier signifies that local variations in clay type may have influenced the final color of the pots, or that Swahili potters there used other firing practices, like the older open air pit firing method.

Sherd Thickness: Sherds from 19th/20th-century site groups all average between 8 and 10 mm, which is roughly similar for other periods.

Vessel Diameter: Vessel diameter for all sites groups from this period average between 24 and 29 cm. Average diameter is slightly larger than it is in earlier periods, perhaps due to the predominance of cooking vessels with everted rims.

Vessel Types: The dominant vessel types at all late colonial sites are cooking pots with everted rims, with either curved or straight necks and either rounded or carinated shoulders. This category includes types 17, 18, 19, and 20, as well as several miscellaneous groups of everted rims and decorated shoulders. The main differences between the site groups are in the percentages of open bowls. While the open bowls make up 12%, 13%, and 14% percent of the assemblages in the Donge, Kichangani and Chaani groups, they make up 8% of the assemblage at in the Mahonda group, and only 3% of the Mwanampaji group. The low number of open bowls in the Mwanampaji group likely reflects the fact that this collection of sites is comprised of a series of seasonal agricultural camps in clearings of thick brush, where more formal settings for consumption with open bowls likely did not often take place.

13.8.4 Attributes by Collection Location

This section briefly compares the attributes of sherds we collected on the surface versus sherds in shovel-test pits. The most apparent pattern is between early and late period sites. Of sherds found on the surface, 53% were from the late colonial period, 11% are from the early colonial period, and 36% are from the precolonial period. Of sherds found in STPs, 26% are from the late colonial period, 6% are from the early colonial period, and 68% are from the precolonial period. This may be due to site depositional processes on Zanzibar, which resulted in the stratification of earlier materials while keeping later period materials on the surface. All early second millennium sites located during this survey showed evidence for early materials above ground as well as below, suggesting that the degree to which early materials are stratified in sub-surface deposits on Zanzibar does not appear to be as extreme as on Pemba, where early materials could be found in deep deposits with no surface indications (Fleisher 2003: 131).

13.9 Conclusion

This chapter has described a typology for locally produced ceramics that we recorded during survey in 2019, and also analyzed the assemblage by attributes across a variety of axes. Below, I describe conclusions for ceramic type analysis and ceramic attribute analysis separately.

13.9.1 Conclusion: Ceramic Types

The typological analysis of the ceramics we recovered produced 20 different types, reflecting formal differences in ceramics across the second millennium. In the precolonial period of the early second millennium, ceramic forms were similar to second millennium assemblages recorded at Tumbatu and Mkokotoni (Rødland 2021: 103-129), in northern Pemba (Fleisher 2003: 236-259), at Shanga (Horton 1996: 243-270), and at Kilwa (Chittick 1974: 317-394). The ceramics were derived Tana/TIW forms which correspond to Horton's (1996: 244) Phase C (1050-1300 CE) and Phase D (1300-1425) types. The dominant ceramic form was the open bowl, either with a plain or thickened rim and a rounded or applied base. This bowl form was the dominant ceramic type across the East African coast during this period. Research on Pemba suggests that it was associated with a shift away from millet consumption toward the predominance of rice-based dishes, which were associated with Islamic cultural norms (Walshaw 2015). Some archaeobotanical evidence is now available from Mkokotoni and Tumbatu that suggests a similar shift took place in Zanzibar (Rødland 2021: 188). This is supported by the prevalence of open bowl forms during this period that we recovered during survey.

Ceramics during the early colonial period (1500-1830) continued to follow these trends. The ceramic types from this period were derived Tana/TIW forms, similar to examples from the upper levels of Kilepwa (Kirman 1952), Gede (Kirkman 1954), and Ungwana on the Tana (Kirkman 1966), as well as ceramics from the 17th and 18th century levels at Fort Jesus (Kirkman 1974). One result of this research has been to synthesize some of the ceramic types from these various post-1500 CE assemblages. Also, this research shows that open bowls remained the predominant vessel type, suggesting that similar patterns of consumption prevailed despite changing social conditions. Njua Kuu, a site from the second phase of this period (1698-1830), showed evidence for increasing quantities of carinated everted rim cooking pots that came to predominate later on.

Starting in the 19th century there was a significant shift across all sites where open bowls became less common, and carinated everted rim cooking pots became the most common vessel form. This is corroborated by the excavations at the 19th century plantation estate of Mgoli on

Pemba (Croucher 2006) but does not necessarily reflect a coast-wide pattern for the 19th century. 19th-century assemblages from Takwa in northern Kenya (Wilson 2019) and Fort Jesus (Kirkman 1974) do not reflect this trend. This shift likely relates to the replacement of locally made open bowls with imported European whiteware bowls within the plantation system in Zanzibar specifically. It may reflect changing foodways and new modes of food production caused by the arrival of enslaved East Africans in Zanzibar or the introduction of cassava to the island in 1799 (Hillocks 2002).

13.9.2 Conclusion: Ceramic Attribute Analysis

Table 13-9 summarizes the attribute trends across different regions and periods, for the regional site groups that I described in sections 13.8.1, 13.8.2, and 13.8.3.

	West	Central	East
Precolonial Temper, Highest %	22% Coarse	19% Coarse	2% Coarse
Early Colonial Temper, Highest %	n/a	12% Coarse	2% Coarse
Late Colonial Temper, Highest %	15% Coarse	5% Coarse	5% Coarse
Precolonial Fabric Color, Highest %	30% Dark Core, Light Walls	29% Dark Core, Light Walls	31% Uniform Light
Early Colonial Fabric Color, Highest %	n/a	29% Uniform Dark / Light (tie)	32% Uniform Dark
Late Colonial Fabric Color, Highest %	39% Uniform Dark	36% Uniform Dark	49% Uniform Dark
Precolonial Clay Color, Highest %	34% Tan/Buf	28% Brown	35% Brown
Early Colonial Clay Color, Highest %	n/a	35 % Brown	23% Brown
Late Colonial Clay Color, Highest %	27% Black	32 % Black	33% Brown

Table 13-9. Ceramic attribute values across regions and periods, showing a shift toward darker clay and fabric colors and finer tempers over time.

Two trends can be concluded from ceramic attribute analysis. The first is that prior to the start of the late colonial period around 1830, ceramic temper, fabric color, and clay color corresponded to the relative sandiness of local geological and soil zones on the island. Ceramics were finer in temper and darker in fabric and ceramic clay color the further one went east across the survey region. The relative sandiness of soils on the island increases in a way that correlates to these patterns—the west is sandier than the central region, which is also sandier than the east. This correlation between temper, fabric color, and ceramic clay color with the relative sandiness of each region suggests that local soil conditions may have influenced ceramic production in each region. Accordingly, this suggests that production was localized, and that ceramics prior to 1830 were deposited within a few kilometers of the places where they were produced. This corroborates other theories of localized ceramic production on the Swahili coast. This trend also correlates with spatial trends in precolonial settlement patterns, which consisted of dispersed, autonomous village communities.

The second trend is that around 1830 at the start of the late colonial period, ceramics became uniformly darker in clay color and fabric, and developed a uniformly finer temper. This corresponds to the development of the clove plantation system, and to changes in spatial trends. This result suggests that as settlements became clustered and integrated, ceramic production also became more regionally integrated. Ceramics from a smaller number of production centers may have circulated more widely, or ceramic production itself may have become more centralized. This may relate to demographic changes, like the arrival of East African enslaved people, whose

descendants on the Swahili coast are known to comprise potter communities (Wynne-Jones and Mapunda). I discuss this shift more in Chapter 15.

In Chapter 14, I describe the imported ceramics that we collected. In Chapter 15, I summarize the findings from these two Chapters, to summarize long-term patterns in ceramic production and consumption in the survey region.

Chapter 14: Imported Ceramics of the 2019 Field Season

14.1 Introduction

Durability, ubiquity, and unique diagnostic features make foreign imported pottery on the East African coast an accessible form of data for understanding site chronology and connectivity with trade networks outside of Africa. Chronological and geographical information about pottery production in Europe, the Middle East, and Asia is relatively well-established, in some cases down to specific kiln sites which operated for hundreds of years. On the Swahili Coast, the earliest documented imported ceramics are 6th-century late Roman ceramics at Unguja Ukuu and Fukuchani (Fitton 2017). Imported ceramics continued to flow into East African coastal settlements from that period onward, with examples documented for each century up until the present. As is the case with locally made ceramics, the best references for imported pottery in coastal East Africa come from large-scale excavations at abandoned Swahili stone towns like Kilwa (Chittick 1974: 302-316), Manda (Chittick 1984: 65-106), Shanga (Horton 1996: 271-310), Pate (Wilson and Omar 1997: 49-58) Unguja Ukuu (Juma 2004: 107-118) and Gede (Kirkman 1954: 94-130; Pawlowicz 2019: 223-228). Other comparative examples come from the northern Pemba survey (Fleisher 2003: 265-281), Rødland's surveys at Tumbatu and Mkokotoni (Rødland 2021: 130-148), Pawlowicz's survey of Mikindani Bay (Pawlowicz 2011: 376-416), and Walz's survey of sites in the Pangani River Basin (Walz 2017, 2018).

Like with pottery of local East African manufacture, imported pottery on Swahili sites from the precolonial period has also been more widely published and discussed than imported pottery from later periods. However, unlike locally made pottery, imported pottery of the colonial period is well understood in terms of form, construction, and provenance. This is thanks to decades of research on ceramics of the colonial and industrial periods, specifically in Europe and North America. Due to increasing globalization, Chinese export porcelains and European industrial pearlware, creamware, and whiteware spread around the globe beginning in the 18th and 19th centuries, meaning that similar types can be found from Maryland to Zanzibar to New Zealand to Norway (e.g., Brooks et al. 2015; Madsen and White 2009; Majewski and O'Brien 1987; Mazrim 2013; Miller 1980; Mullins et al. 2013). Particularly useful with regards to colonial and 19th-century ceramics is the Jefferson Patterson State Museum of Archaeology's Diagnostic Artifacts in Maryland database, an online resource that compiles images and publications related to historical ceramics (<https://apps.jefpat.maryland.gov/diagnostic/>). Other useful catalogs for understanding ceramics that are particular to the Indian Ocean trade routes of the 16th-20th centuries are Power's chronology of ceramics for the late Islamic Arabian/Persian Gulf (Power 2015), and the catalog of ceramics at the Qatar Museum (Carter 2011).

Since imported ceramics are well understood in terms of their form, construction, and provenance, they are useful for dating archaeological sites where they are found. Imported ceramics were a primary line of evidence for dating sites for this survey. This also has meant that the key questions for research related to imported ceramics on the coast are ones concerning their local use and consumption, rather than questions related to typology, which are settled. These topics have been a focus of Swahili archaeology since its inception and continue to be a focus of research on the coast.

Since imported ceramics were collected during the survey to date sites, they are primarily presented here in terms of presence and absence. The following sections describe the imported ceramics encountered during the survey and note some general patterns about their geographical and chronological distribution. Since no 1st-millennium imported ceramics were found, the

discussion below is divided into two sections: imports of the early second millennium, and imports of the late second millennium.

14.2 Imports of the Early Second Millennium

Just to the north of the 2019 survey region Rødland (2021) uncovered a range of ceramics from the 8th to 14th centuries at Mkokotoni and Tumbatu, representative of many other large sites on the coast during the early second millennium. The most common types by far were Yemeni yellow (i.e., black-on-yellow), late sgraffiato, martaban jars, and longquan celadons; other types included Yue ware, moulded white ware (gudulia), early champleve sgraffiato, and Dusun green glazed stoneware (Rødland 2021: 131). Additionally, Rødland recorded some late first-millennium ceramics like turquoise alkaline glazed ware (also called Sasanian-Islamic ware).

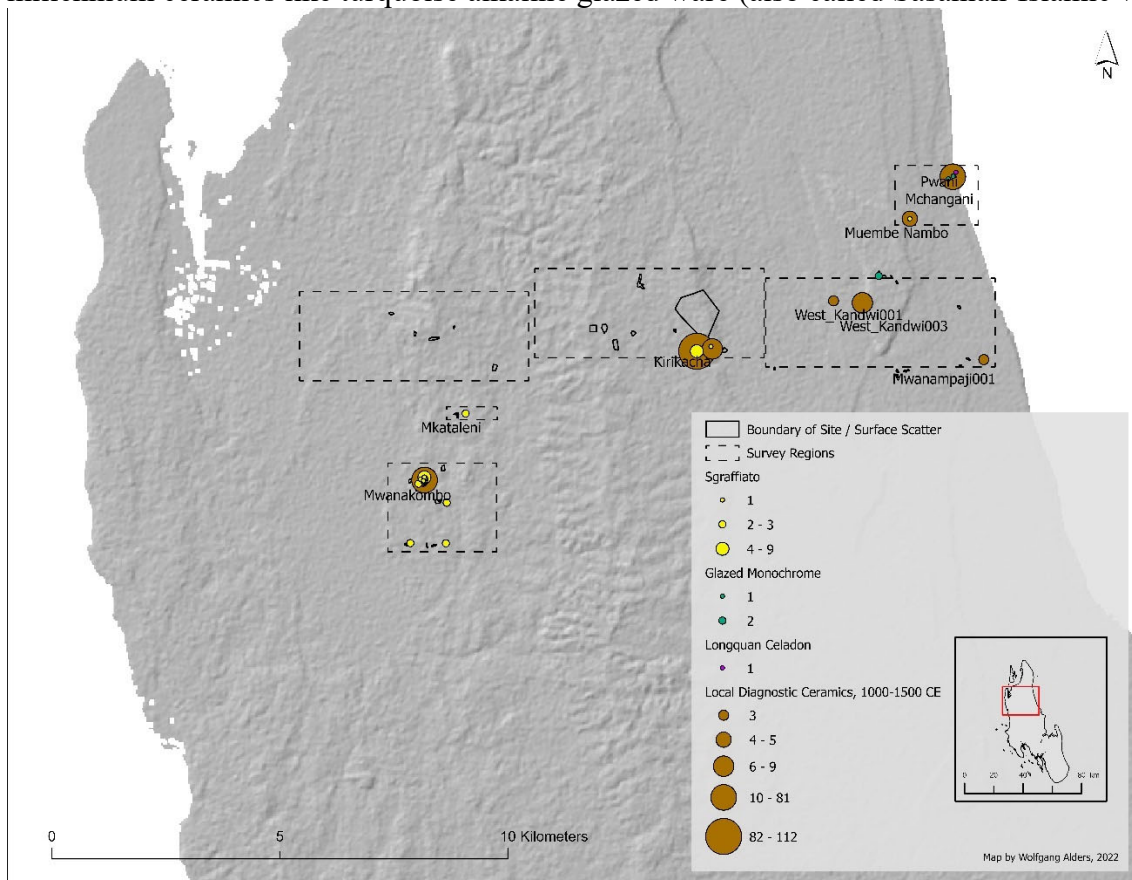


Figure 14-1. Local diagnostic ceramics and imported ceramics of the precolonial period.

Figure 14-1 shows the distribution of precolonial ceramics across the 2019 survey region, along with local diagnostic ceramic counts. The village sites of Mwanakombo and Kirikacha, contemporary with Tumbatu and Mkokotoni from the 11th-14th centuries, produced only evidence for one imported ceramic type: late sgraffiato. Other than this, imported ceramics from the precolonial period are scant. The only other example is a single sherd of Longquan celadon found at Pwani Mchangani. We found several pieces of blue, green, and white glazed monochromes at Pwani Mchangani and Kandwi, but these appear to be examples of what Chittick calls “standard” monochrome, which dates from the late 15th and 16th century and might better be considered early colonial ceramics. They are included in this section nonetheless due to

their typical association with precolonial trade networks prior to the Portuguese and Omani periods. The following section describes these types and their occurrence in the 2019 survey.

14.2.1 Late Sgraffiato

Late Sgraffiato is the term given to the later iterations of glazed and slipped imported ware made in the Arabian/Persian Gulf, known as sgraffiato ware. Late sgraffiato sherds found during the 2019 survey through shovel test-pits and surface collections at Mwanakombo and Kirikacha are from green, dark green, light “apple” green, and yellow open bowls with dark green or brown incised lines. One shovel test-pit at Mwanakombo produced brown glazed sgraffiato. Figure 14-2 and Figure 14-3 show some examples, which are more degraded at Mwanakombo and retain less glaze than at Kirikacha. At both sites, we found repaired late sgraffiato sherds, attesting to the value that the residents of these village communities placed on the ware. At Mahonda_Mkataleni001 and Kikobweni, shovel-test pits produced sgraffiato identified on the basis of the fabric alone, with the glaze and slip eroded.



Figure 14-2. Late sgraffiato sherds from Kirikacha, with a repaired sherd (left).



Figure 14-3. Late sgraffiato sherds from Mwanakombo, with a repaired sherd (left). The sherds in the picture on the right were found directly beneath the late colonial stone ruin on the site.

While earlier sgraffiato types (hatched, champlévé, and simple, see Chittick 1974: 303) date to the 11th and 12th centuries, later green, yellow and brown glazed sgraffiato is one of the most common imported ceramics on the coast for the period between 1100-1300. This was apparent at Shanga (Horton 1996: 284-288), as well as in northern Pemba, where hatched and champlévé types were only found at Bandarikuu and Chwaka from 1000-1100, but Late Sgraffiato green, yellow and brown glazed wares date from 1100 to 1300 (Fleisher 2003: 269). Of the sgraffiato sherds found at the sites identified during this survey, none are hatched or champlévé. The 11th-14th-century date based on late sgraffiato matches well with the locally produced wares like late TIW and neck punctating jars, also found at these sites.

Late sgraffiato is wheel-turned and was often made in open bowl forms for food consumption and display, though some examples of jars and beakers exist (Horton 1996: 282). It has a light pale pink or pale orange fabric, a fine sand temper, white specks, and small or few airholes. It also has a white slip applied over the inner surface of bowls and the top edge of the exterior, which potters cut with a stylus to produce incised decorative lines. Over this, a lead glaze was applied which created yellow, green, and brown polychrome colorations. The pottery was likely produced in southern Iran, specifically around Siraf and Sirjan (Horton 1996: 281). Sgraffiato is a characteristic ware of early Swahili Indian Ocean trade with southern Iran prior to the 13th century, before imports from the Red Sea, Southern Arabia, and East Asia became more common (Horton 1996: 291). The ware is found at virtually all large stone-built sites along the coast, for example at Manda (Chittick 1984: 79), Shanga (Horton 1996: 284-288), Gede (Pawlowicz 2019: 226), Chwaka, Bandari Kuu, Mkia wa Ngombe, Mduuni, and other sites identified in northern Pemba (Fleisher 2003: 269), Kilwa (Chittick 1974: 304), Tumbatu (Rødland 2021: 132), and in the Comoros (Wright 1984: 41).

14.2.2 Glazed Monochrome

Power (2015) used the term glazed monochrome pottery to refer to what Chittick and Horton have called Islamic monochrome. It is dated from the 14th century onwards and is found in continued use as late as the 18th century at some sites on the East African coast. These wares are glazed small, medium, and flanged bowls that are green or blue, with rarer examples of clear or pale grey glaze. The ware is common in East Africa but relatively rare in western Asia, suggesting that it was an export intended for trade. Based on its presence at the Mamluk levels in Quseir al-Qadim and at Julfar in the Arabian/Persian Gulf, it seems likely that the pottery has a Red Sea or southern Arabian origin (Horton 1996: 293). Chittick divided monochromes at Kilwa into three categories: early, standard, and late. The early type has an exclusively tan or buff paste and a light green glaze, and dates from the 14th to early 15th centuries, while the standard type has a red paste and dark green, blue, or grey glaze and is later, from the late 15th to 16th centuries (Chittick 1974: 304). The change from earlier buff pastes to later red pastes is also reflected at Shanga (Horton 1996: 296).



Figure 14-4. Glazed monochrome from Kandwi.



Figure 14-5. Glazed monochrome from Pwani Mchangani.

During the survey, two monochrome sherds with buff paste were found: a dark blue or black glazed example, and a grey-glazed example from Pwani Mchangani (center and far right of Figure 14-5). Examples with red paste were also found at Pwani Mchangani and at Kandwi. The earlier, buff paste monochromes at Pwani Mchangani accord with the 14th-century date indicated by Longquan celadon at the site, whereas the standard red monochromes found at Kandwi suggest the site was occupied slightly later. Figure 14-4 and Figure 14-5 show these sherds.

14.2.3 Longquan Celadon

This ware is a common import from China to the East African coast during the early second millennium and was the first Chinese import to match Middle Eastern ceramics in quantity on the East African coast (Horton 1996: 307). Its name derives from the port of Longquan in southern China, where these vessels were produced (Priestman 2013: 664). The vessel fabric is fine and “sugary” with few airholes, with a greenish glaze. Longquan celadons have been found at sites in northern Pemba (Fleisher 2003: 273), at Tumbatu and Mkokotoni (Rødland 2021: 138) and at Unguja Ukuu (Juma 2004: 108). One sherd of this type was found at Pwani Mchangani in a test pit. Figure 14-6 shows this sherd.



Figure 14-6. Longquan celadon sherd from Pwani Mchangani.

14.3 Imports of the Mid to Late Second Millennium

Materials from the 19th to the early 20th century represent most imported ceramics found during the 2019 survey, though a few examples from the Arabian/Persian Gulf may also date from the 16th to 18th centuries, and the glazed monochrome from Kandwi and Pwani Mchangani may also date to the beginning of the early colonial period. Figure 14-7 shows early colonial (1500-1830) imported ceramics, and Figure 14-8 shows late colonial (1830-1963) ceramics.

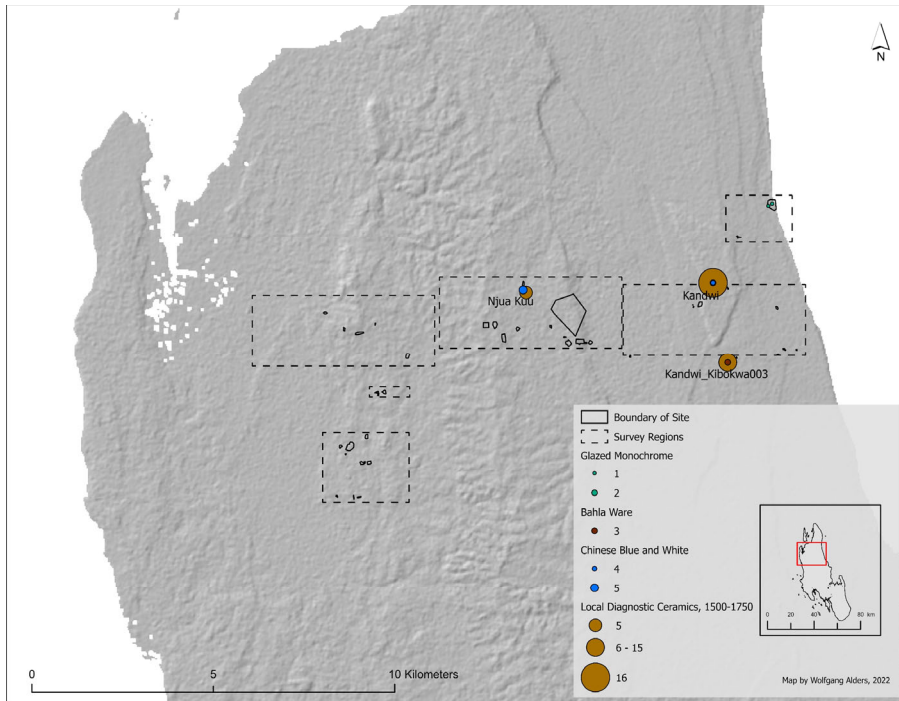


Figure 14-7. Early colonial ceramics, along with diagnostic ceramics of the early colonial period.

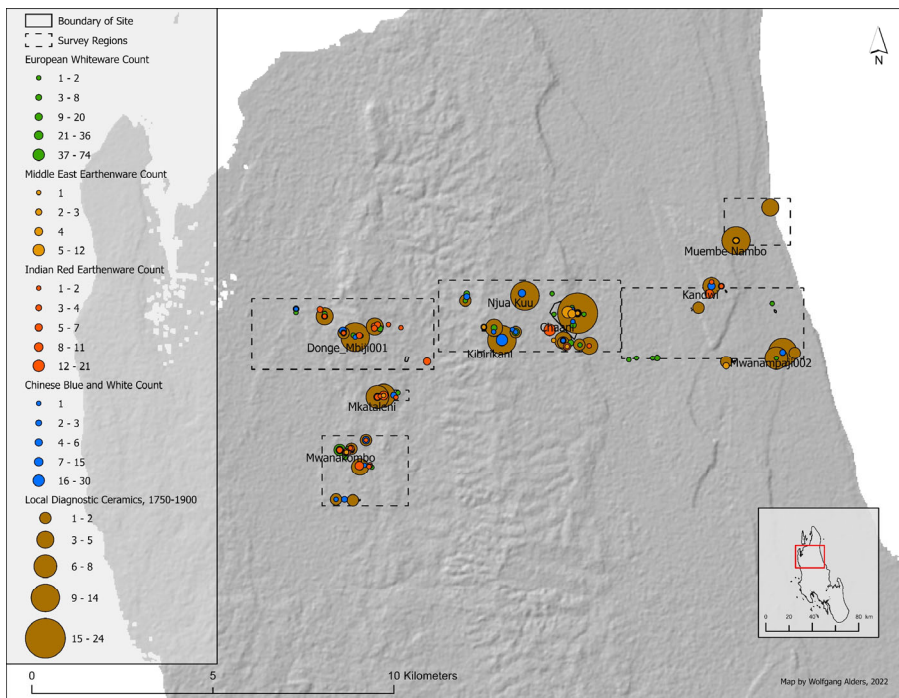


Figure 14-8. Late colonial ceramics, along with diagnostic ceramics of the late colonial period.

Though the manufacturing dates for many of these ceramics can be dated to specific decades, it was difficult to determine the actual dates of deposition due to the deflated landscape and the nature of shovel-test pit survey. Except for the early colonial ceramics, a conservative estimate would posit that the majority, if not all the late colonial ceramics were deposited after

1830, following the relocation of the capital of the Sultanate of Muscat to Zanzibar Stone Town and the expansion of the clove industry into more northern areas of Zanzibar Island.

Croucher (2006) argues that while wealth differentiation was a feature of Zanzibar's plantation society, imported ceramics were evenly distributed across sites, suggesting relations of reciprocity and gift exchange between rich and poor, and free and enslaved, in which social status was still maintained through the ties of dependency created by lending (Croucher 2014: 199-203). Relations of reciprocity and exchange may have structured social relationships in the precolonial period as well, for instance between Tumbé and Kimimba on Pemba Island (LaViolette and Flesher 2018: 395). Since the 2019 survey systematically characterized an archaeological region in Zanzibar, it is well suited for addressing questions about the distribution of imported sherds in Zanzibar. The map of imported sherd distributions for the late colonial period (Figure 14-8) suggests that this form of material culture was indeed ubiquitous across sites of all sizes. This supports Croucher's theory of a relatively even distribution for imported ceramics in the 19th century. However, the map also shows a difference between the western plantation regions and the eastern areas, where plantation agriculture did not exist. In these eastern regions, the home of indigenous Swahili people, imported materials from the 19th century are less present, despite the widespread presence of 19th-century sites. This suggests a degree of sociopolitical marginalization between the eastern and western areas, which accords with historical narratives of the east being a poorer region and a refuge of Swahili people following their dispossession from western lands (Owens 2006). This may also be due to the types of sites found in the east. The majority of sites are ceramic scatters in field plots. These were campsites and areas for seasonal agricultural production, where one might not expect to find fine imported wares.

In the following sections, I discuss types of late second millennium imported ceramics that our team found during survey: Chinese and East Asian porcelain, European glazed earthenware, Indian unglazed earthenware, Middle Eastern glazed earthenware, and miscellaneous wares.

14.3.1 East Asian Porcelain and Stoneware

This category refers to Chinese blue and white porcelain, which was the main type of East Asian porcelain encountered during the 2019 survey. A few examples of southeast Asian grey porcelain or stoneware were also recorded. I discuss these below.

Chinese Blue and White Porcelain: A white or grey-white hard sugary fabric with hand-painted blue decorations under a clear glaze characterize this porcelain. It is made through high firing of felspathic kaolin clay. The blue paints are derived from cobalt. Chinese blue and white porcelain spans the 14th to the 20th centuries. Most well-known blue and white porcelain was made during the Ming and Qing dynasty, primarily at the kilns of Jingdezhen in southeastern China. This led to a remarkable degree of similarity in construction and decoration over a large period of time (Madsen and White 2009: 11). The earliest Chinese blue and white sherds found on the East African coast come from Shanga in poorly stratified contexts near the surface. Horton suggests these sherds date to the 14th century, based on when similar examples reached the cities of Siraf, Hormuz, and Aidhab. These early Chinese blue and white ceramics have speckled blue glazes (Horton 1996: 310). Chinese blue and white was a characteristic late import to precolonial stone towns on the East African coast from the 14th to 16th centuries, at places like Gede (Kirkman 1954: 125), Chwaka (LaViolette 2008: 36), Kilwa (Chittick 1974: 310), or in small amounts at Manda (Chittick 1984: 12).

While much of the fine Chinese blue and white porcelain found in Europe and the east coast of the United States during the 17th-20th century was still made at the famous Ming and Qing kilns of Jingdezhen, the wares which reached the Arabian/Persian Gulf and coastal East Africa in the later colonial period were likely made elsewhere at lesser-known kiln sites in East Asia, possibly in the provinces of Fujian, Guangdong, or in Vietnam (Power 2015: 12-13). This porcelain was a cheaper, mass-produced variety designed for export to the Islamic world, with bare ring impressions on bowls and plates created by stacking in kilns during mass production (Power 2015: 12). During the 19th and 20th centuries, Chinese blue and white porcelain was also called Ching Kitchenware, although these two categories are terms from antique collectors and are still part of a single overarching class of blue and white porcelain (Power 2015: 13).

Archaeologists in coastal East Africa have relied on several sources to make sense of Chinese blue and white export wares when they encountered them during survey and excavation. These sources are Kirkman’s (1974: 98-110) descriptions of later Chinese blue and white porcelain at Fort Jesus (see Table 14-1), Chittick’s discussion of Chinese blue and white in the later levels of Kilwa (Chittick 1974: 312), and Sassoon’s (1978) description of other Chinese ceramics in coastal Kenya. For instance, Croucher used Kirkman’s work Chinese blue and white porcelain in her surveys around Dunga and Mahonda in Zanzibar, and she argued that sites with Chinese blue and white likely represent the earliest areas of plantation activity due to this pottery preceding European glazed painted earthenware (Croucher 2006: 172). Fleisher drew on Sassoon and Chittick to characterize the blue and white porcelain found on Pemba (Fleisher 2003: 274).

For the 17th and early 18th century, the ceramic sequence at Fort Jesus seems to match other areas on the East African coast. For example, Ming, Transitional Ming, and Kangxi (also spelled K’ang Hsi) ware porcelains there are comparable to the examples that Fleisher identifies as Chinese blue and white sherds (Fleisher 2003: 25). Ming and Kangxi Chinese blue and white pottery on Pemba also coincide with a phase of mosque construction on Pemba’s east coast in the 17th and 18th centuries and the Mazrui occupation in northern Pemba from 1698 to 1823 (Horton, pers. comm.). Finally, these types are also among the imported Chinese blue and white sherds found at Pujini from the 15th to 17th centuries (LaViolette 2000, pers. comm.). These wares would have been made at Jingdezhen and were comparable to exports reaching Europe at the same time.

Period and Ware	Deposits with Local Ceramics
Period I – Ming and Transition Ming blue and white porcelain, 1593-1670 CE	f. Make-up of the rectangular projection (1596 CE) g. Filling of S. Filipe, S. Matias, and the gun platform in S. Mateus (1634 CE) h. Make-up of elliptical bastion (1634 CE) i. Make-up of Cavalier St. Antonio (1648 CE) j. Filling over Passage of the Steps (1650 CE)
Period II – Kangxi, 1670-1730 CE	f. Gravel pit in S. Filipe g. Filling of Captain’s House h. Room of the stands i. Lower filling of court in S. Mateus j. Lower filling of Passage of the Arches
Period III Famille rose, 1730-1840 CE	d. Court on north side of Captain’s House e. Area of the main court, the west barrack block, and the church f. Upper filling of court in S. Mateus
Period IV “European china” (industrially produced European glazed whiteware), 1840-1895 CE	d. Upper filling of Passage of the Arches e. Area between Captain’s House and audience room of the Mazrui f. Area of south barrack block

Table 14-1. Kirkman’s (1974) divisions of imported ware at Fort Jesus.

For the later colonial period, the assemblage of Chinese porcelain at Fort Jesus includes some blue and white export wares with decorative motifs found in Zanzibar (Croucher 2006, and this survey) and elsewhere on the coast, like at Takwa (Wilson 2019: 49). However, other examples of 18th and 19th-century Chinese porcelain from Fort Jesus appear to be rare on the rest of the coast and are similar to the finer export wares from Jingdezhen that were reaching Europe and the east coast of the United States in the late 18th and 19th centuries. For example, The Fort Jesus collection has examples of *famille rose* porcelain, a style using red and pink pigments popular in Europe and North America in the 18th and early 19th centuries, as well as other motifs that were common in the northern Atlantic world, like the fish roe pattern, the Nanking landscape pattern, and the trellis and spray (Kirkman 1974: 100-101; *c.f.* Madsen and White 2009: 95-98, 106-110). Except for a single sherd with a trellis pattern found at Chaani, none of these motifs were recovered during the 2019 survey, and they have not been found elsewhere on the coast at the date of this writing. Therefore, for the late 18th through 20th centuries, the Chinese export porcelain examples at Fort Jesus should not necessarily be considered a characteristic typology for the rest of the coast. Rather, they may depict a sequence of consumption by the Mazrui and British rulers that occupied the fort after the expulsion of the Portuguese. These elites may have had access to luxury materials that were more consistent with patterns of consumption in Europe and North America.

In contrast, the majority of Chinese blue and white porcelains recovered during the 2019 survey are similar to the export wares produced in Fujian and Guangdong, which were the coarser Chinese blue and white export porcelains that reached the Arabian/Persian Gulf (e.g., Carter 2011; Grey 2011; Mansor et al. 2021; Naranjo-Santana and Carter 2010; Power 2015; Ruibal et al. 2021), southeast Asia (Willems and Lim 1981; Witkowski 2015), and parts of western North America (Thompson 2002) during the 18th-20th centuries. These export wares were not the focus of a book on Chinese export porcelains by Madsen and White (2009: 146), but the above-mentioned sources provide comparative examples that are far more similar to finds from the 2019 survey in Zanzibar than examples found in Europe and the east coast of the United States. Though these wares were made for export to foreign markets, the motifs were not tailored to foreign tastes and consisted of elements developed during the late Ming period in China (Grey 2011: 353; Witowski 2015: 232)

The following sections describe the different types of Chinese blue and white porcelain recovered during the 2019 survey. In addition to the sources listed above I used some non-academic sources, including Ebay and antique dealer websites. Also helpful was personal communication with Hannah Parsons-Morgan, a PhD student at the Exeter University who is working on Chinese porcelain in the Indian Ocean at the time of this writing.

Chrysanthemum and Scroll: Plates and bowls with this pattern feature several chrysanthemum flowers with spiked petals and circular interiors, spaced apart. The white space between the flowers is filled with curved and wavy lines reminiscent of Arabic cursive script, which is why this style is sometimes referred to as the “Allah pattern” by antique dealers. Another common motif on bowls of this kind is the “conch” shape, a billowing rounded triangular shape. The pattern is recorded in southeast Asia, and dates from the late 18th and early 19th centuries, though Maastricht potters copied it beginning in 1877 on glazed European earthenware and renewed it as a transfer print until 1897 (Harrison 1995: 75). An example of this motif on a late 19th-century European ware is depicted in Power’s report on ceramics from the United Arab Emirates around Al ‘Ain (Power 2015: 14). There, 18-20th-century Chinese blue and white and Kitchen Qing wares were found, but no examples of chrysanthemum patterns are

shown (Power 2015: 13). Chinese chrysanthemum motifs and later European copies were found at Rubayga in Qatar (Grey 2011: 354), at ‘Amara in Bahrain (Naranjo-Santana and Carter 2010: 115), at Makutani at the site of Kilwa in southern Tanzania (Chittick 1974: 212) and on plates and bowls from Fort Jesus in Mombasa from 18th and 19th-century contexts (Kirkman 1974: 100). It was also common in the Russian settlement at Sitka in Alaska, where it was called “Sino-Islamic” and dated to the early 19th century (Thompson 2002: 91). Thompson writes that this porcelain has also been found at Spanish mission sites but is absent from American colonial sites, which may indicate direct evidence for trade between Russian and Spanish California, or a shared supply source (Thompson 2002: 106). The pattern was one of the most common motifs found on Chinese blue and white porcelain sherds from the 2019 Zanzibar survey, where it appears to feature on both plates and small bowls. Its wide distribution from East Africa to Russian Alaska and Spanish California in the early 19th century speaks to a globalized, but specific, trade network. Figure 14-9 shows examples of this ware found during survey.

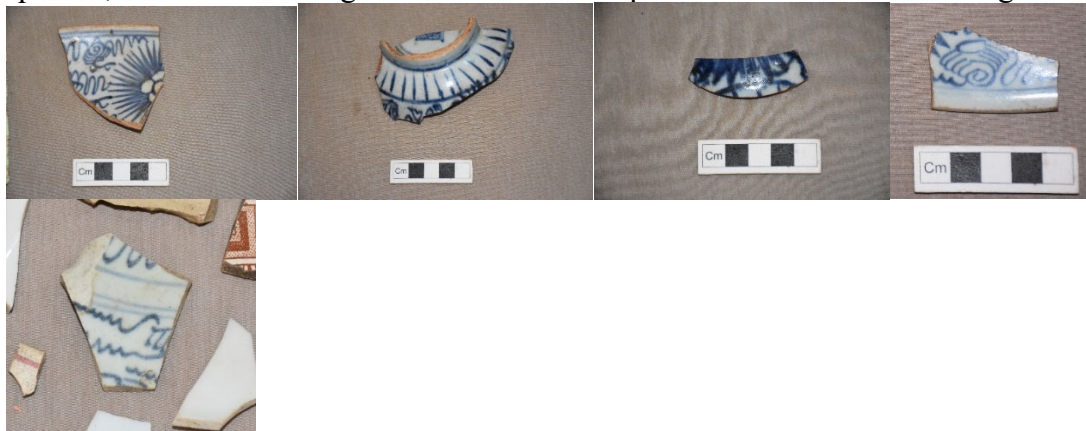


Figure 14-9. Chrysanthemum and scroll decorations on Chinese blue and white porcelain. The bottom image shows the conch motif.

Comb, Key, or Sino-Sanskrit Motif: This motif shows a large number of evenly spaced, evenly sized rectangular “combs”, arranged vertically along the exterior of the bowl. The comb features may be more or less defined, with some examples appearing only like rectangular shapes. Kirkman lists comb motifs as 18th and 19th-century designs on bowls and plates, where they are referred to as “over-all comb or character patterns” (Kirkman 1974: 100-101, 109). This style was apparently part of the assemblage of late Chinese export trade wares that were shipped to the Gulf (Grey 2011: 353), though it is difficult to find examples. The motif was found in Russian Alaska where it is referred to as a Sino-Sanskrit (*sic*), since the motif can be interpreted as a stylized form of the Sanskrit word for *Om*; the idea being that one could rotate the vessel slowly and read the words as a prayer (Thompson 2002: 91; Willets 1981: 2-7). Examples of the comb design also occur in Pemba (LaViolette 2008: 36). While blue and white porcelain plates and bowls with chrysanthemum motif are common on antique dealer websites and Ebay, comb motif patterns are much rarer. There are also fewer examples of this motif in literature from the Arabian/Persian Gulf compared to the chrysanthemum pattern. The relative lack of evidence for this ware in published literature suggests that it was a less common late Chinese trade ware. Figure 14-10 shows some examples of this ware.

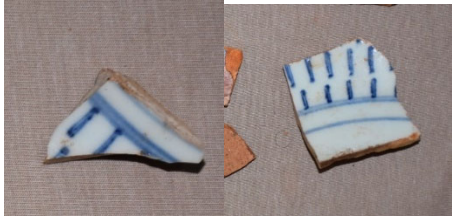


Figure 14-10. Comb, key, or Sino-Sanskrit motif on Chinese blue and white porcelain.

Trellis: The trellis pattern is the most common variation on a longstanding Ming and Qing dynasty border motif, also known as the lozenge and trellis border, the trellis and spray, the diamond border, or the juxtaposed lozenge and trellis border. Lally (2008: 70) writes that the motif has existed since the Yuan dynasty, but it was primarily produced during the Jiajing period in the Ming Dynasty. It was found on several shipwrecks from 1600, 1690, 1723-35, and 1822, as well as in the Dube collection from Nehalem Bay. In their seriation chart of blue and white motifs from sites in Europe and North America, Madsen and White place the blue trellis from 1690-1800 (Madsen and White 2009: 57). Examples are found in 18th-century contexts at Fort Jesus (Kirkman 1974: 100). There are no examples of this motif in collections of later Chinese export wares from the Arabian/Persian Gulf (e.g., Carter 2011; Grey 2011; Naranjo-Santana and Carter 2010; Power 2015). A single sherd with a trellis motif was found at Chaani during the 2019 survey. Figure 14-11 shows this sherd.



Figure 14-11. Trellis motif on Chinese blue and white porcelain, found on survey.

Blue Monochrome: Several sherds were identified with a solid dark cobalt blue color and a white or light hard gray paste. The glaze looks comparable to white salt glaze stoneware vessels produced in England between 1750 and 1765 and glazed with a solid blue known as Littler's Blue (Skerry and Hood 2009: 121), but the paste suggests that the ware is Chinese porcelain. A single comparative example was recorded at the site of the Jahan Nama Palace in Farahabad in Iran, which was labeled Blue Monochrome. This ware was dated from the mid-17th to early 18th century and was made in the Jingdezhen kiln. (Mansor et al. 2021: 19). Figure 14-12 shows two examples of this ware.



Figure 14-12. Blue monochrome decorations on Chinese blue and white porcelain.

Vegetative Pattern, Dehua Ware: This category refers to plates and bowls with vegetal / floral patterns made of blue and white porcelain that is different from the brighter, more uniform

blue and white underglaze of the Jingdezhen and Fujian kilns. Instead, the paste of these ceramics is greyer, and the underglaze blues are dark and more variable in shade. The paint strokes tend to be thick and feature “heap and pile” marks, or places where the brush rested and added more ink, making a darker effect. These examples are likely from the Dehua or Raoping kilns in Guangdong. The city of Dehua is noted for a kiln which produced most of the wares recovered from the wreck of the Tek Sing, a merchant ship that sank in 1822 and was carrying over 350,000 blue and white porcelain vessels. Most Dehua wares date to the Qianlong and Daoguang periods, or the late 18th and early 19th centuries. A single large plate found at Chaani is similar to Dehua plates found on the 1822 Tek Sing wreck. It appears even more similar to plates produced in the Guangdong Raoping kiln in southern China, in imitation of the Dehua style, according to Koh (2010). It was likely made in the early 19th century at the latest. Figure 14-13 shows a plate sherd with this decoration.



Figure 14-13. Vegetative pattern, Dehua ware.

Unidentified Blue and White: This category is for the remainder of the sherds recovered during the 2019 survey, which are too fragmentary to identify by motif. Some of these may be from older wares of the Kangxi or Ming period, based on slight differences in paste and the style of the blue cobalt paint strokes, which appear more speckled. Horton (1996: 310) suggests that speckled blue glazes suggest earlier dates on Chinese blue and white porcelain. Figure 14-14 shows some examples of these types.

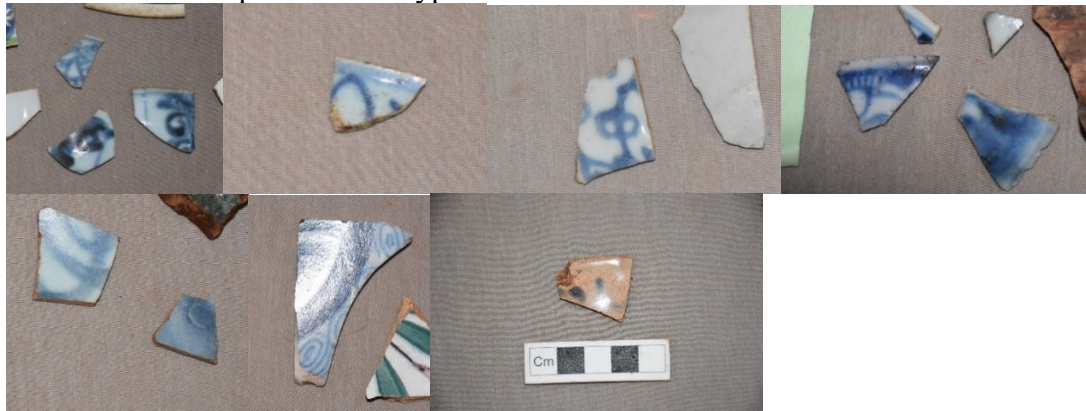


Figure 14-14. Some unidentified blue and white porcelain designs.

East Asian Grey Porcelain or Stoneware: At Fort Jesus, 19th-century examples in the style of Chinese blue and white porcelain are often in fact grey bodied with black paint (Kirkman 1974: 109). These wares have bare ring marks, indicating that they were likely produced in the 19th century. A few sherds of this type were found during the 2019 survey, along with a plain grey porcelain base. These wares may come from southeastern China or may have also been produced in Vietnam or another part of southeast Asia (Willetts 1981). Examples of this type do not appear common in Arabian/Persian Gulf sites, although it is possible that sherds of this type may have been lumped in with generic Chinese blue and white or Kitchen Qing ware assemblages. Figure 14-15 shows some examples of this ware.



Figure 14-15. Grey porcelain. The left image shows a bare ring circle on the interior of the bowl, produced by stacking in kilns. This sherd is also stained red from the soil.

Coffee Cup – Two examples of nearly complete coffee cups were found. We found one on the surface at Mkataleni001, and a second in a subsurface deposit at Daraja_La_Mwanakombo001. Both appear similar to the East Asian COFFEE type, which belongs to the Late Islamic 2c period from 1920 to 1970 (Power 2015: 13). Unlike western coffee cups, this style is smaller, thinner, without a handle, and can be found throughout the Middle East and many parts of Africa and Central Asia today. Figure 14-16 shows one example.



Figure 14-16. Coffee cup, early to mid-20th century.

14.3.2 European Refined White Earthenware

Industrially produced glazed refined earthenware developed in three chronological stages from the mid to late 18th century onward, as creamware, then pearlware, then whiteware (Miller 1980; Samford and Miller 2012). Steam power and the emergent commercial networks of the British empire meant that by the 1790s, English wares dominated the ceramic trade across Europe, North America, and the East and West Indies (Miller 1908; Samford 1997; Samford and Miller 2012).

The large majority of sherds that were collected in Zanzibar in 2019 are whiteware, meaning that it is unlikely they date earlier than 1830, and likely date more to the middle of the 19th century. This coincides with the intensification of the clove plantation system in Zanzibar from 1830 onward, and the subsequent increase in wealth and prestige among the landowning

class. Most of this whiteware was decorated with either hand-painted polychrome designs, sponge decorations, or transfer printing. Croucher noted this pattern in Pemba at Mgoli and across the sites she documented during her survey in Zanzibar. Her study showed that there were Zanzibari consumer preferences for large open bowls with bright printed and painted decorations, forms which are rare in North American and European contexts but similar to other areas of Africa and the Indian Ocean (Croucher 2014: 193-199). This study corroborates this view since hand-painted polychrome whitewares with floral designs were the most common imported sherd type. In addition to whiteware, the survey also recorded a few examples of white granite pottery, and European or North American stoneware. In the following section, I describe European late colonial types that we collected and recorded: edged ware, dipped ware, transfer printed ware, hand-painted polychrome floral ware, sponge-decorated ware, white granite, and stoneware.

Edged Ware: This refined earthenware has scalloped, ribbed, or impressed edges. The edges are often colored blue or green. These wares were called “shell-edge” in the 18th century but were simply called “edged” in the 19th, or they were additionally known as feather edge ware (McAllister 2001). All have a clear lead glaze. They were considered some of the least expensive colored ceramics in the early to mid-19th century (Hunter and Miller 1994). It is possible to date edged wares by the design of the rim—the earliest rims have an asymmetrical rim with impressed curves, and date to the late 18th century. The early 19th century saw embossed designs, while the mid to late 19th century saw symmetrical rims with simple impressed patterns painted almost always in blue. The latest designs have no impressions at all—blue brush strokes created the illusion of impressions (Hunter and Miller 1994). Only two sherds of edged ware were found during the 2019 survey, at Chaani and Kibirikani. Both suggest a mid-19th-century date, based on their simple impressed lines and blue paint. These sherds likely represent large open plates or platters. Figure 14-17 shows an example.



Figure 14-17. Edged ware, with blue impressed feathered rim.

Dipped Ware: This term refers to a range of slipped decorations for European refined whiteware. Slip made from clays with added minerals to change their color were used as dips or poured in bands prior to firing. These ceramics were given a variety of names in the 18th and 19th-century, which include dipped, “dipt”, mocha, fancy, and banded. Another term collectors use is annular, which best describes the majority of the dipped ceramics found in Zanzibar, on account of their annular rings. Solid slips and banded decorations were made from the 1770s to the early 20th century, meaning that the wares found in Zanzibar of this type are not particularly diagnostic of a certain phase within the later period. However, dipped wares became simpler and uniform after 1840 (Miller 1991: 22). All the dipped wares found during the 2019 survey are banded types, with simple solid patterns in blue, red, green, black, yellow, and brown. Some examples have sponge-dabbed decorations or hand-painted decorations inside the dipped rings.

Unlike many North American and European examples, the Zanzibari dipped wares were predominantly platters or large bowls, instead of individual vessels and cups. Dipped ware sherds were recovered at ten separate 19th-century sites during the survey. Figure 14-18 shows examples of this ware.



Figure 14-18. Dipped ware, found on survey.

Transfer Printed Wares: English pottery factories developed and refined transfer printing as a process by the late 18th century. This technique continued until the mid-19th century when it was replaced by simpler hand painted and stenciled designs, or plain wares (Majewski and O'Brien 1987). Samford's (1997) study of transfer printed ware production shows that the number of potters producing transfer printed wares in England grew from 10 in 1790 to 52 by 1850, and then declined throughout the latter half of the 19th century (Samford 1997: 4). The process uses tissue paper to transfer ink from a copper plate onto an unglazed refined earthenware, which is then given a clear glaze to seal in the color. It was a simple and economical way to produce elaborate decorations on ceramics. Blue transfer prints were the most common, as imitations of intricate Chinese blue and white porcelain designs.

Samford (1997) looked at over 3000 marked transfer printed vessels from the Staffordshire pottery factory in England and analyzed trends in transfer printing colors and motifs that give clues useful for dating. Decorative motifs are categorized by the central theme and by the border design, and by color. The earliest central designs depict Chinese motifs and British and American landscapes, while the later central designs use pastoral, classical, Romantic, Gothic, and Japanese motifs (Samford 1997: 6). The "Willow" pattern central motif was first developed in the late 18th century, and it became one of the most enduring and widespread transfer print patterns, becoming almost synonymous with transfer printing itself (Samford 1997: 8). Several transfers printed sherds in Zanzibar were identified as having a Willow pattern.

Borders designs tended to be continuations of the main scene in the earliest transfer prints, repeating geometric, linear, or floral patterns during the mid-19th century, and comprised of "vignettes", or small oval cartouches, during the latter half of the 19th century (Samford 1997: 18). Finally, the mean color of transfer prints also varied in consistent ways through time. Early 19th-century transfer prints tended to be blue, black, and brown on white. Mid-19th-century prints were often green, red, purple, lavender, mulberry, or pink. Finally, late 19th-century transfer prints tended to be dark, with black or brown colors on an ivory, or light tan background instead of the usual white (Samford 1997: 20). Another dating method uses the presence of field dots (tiny circles which create a negative pattern). These were produced between 1810 to 1846. Negative space printing methods date between 1821 and 1840. "Flow" coloration, wherein blue colors flow beyond their engraved lines to create a halo effect, has a mean period of production roughly between 1840 and 1860, and 1890 to 1907 (Samford 1997: 23).

We recorded a number of transfer-printed sherds were recorded during the 2019 survey. Transfer printed sherds were found in light, medium and dark blue, black, green, and brown,

with willow patterns, geometric borders, and field dots visible on some examples. Other sherds have Flow blue coloration. Figure 14-19 shows some examples we found on survey.



Figure 14-19. Transfer-printed wares found during survey.

Hand-Painted Polychrome Floral Ware: This is a whiteware with hand-painted decorative motifs, commonly flowers, in multiple colors. This was the most common type of refined European whiteware across all sites where 19th-century imported ceramics were found. East and southern Africa and other parts of the Indian Ocean world appear to have been a target area for this ceramic type, and it is not found in Europe or North or South America in any great quantity (Croucher 2014: 205-206). While this type is referred to elsewhere as Gaudy Dutch, *boerenbont*, or Maastricht ware, this pottery was also made in England as well as the Netherlands. Dating hand-painted ware relies on a few chronological markers. Examples with blue paint tend to be older than those without, since cobalt was required to make blue paint and the availability of cobalt in Europe declined after the 1820s. Examples with substantial amounts of blue paint using large brush strokes date from 1815 to 1830. The “chrome” colors of pink, green, red, and yellow were made by the addition of borax into glazes, and first became common after 1830 in the Staffordshire potteries in England. These colors can indicate a date from the 1830s to the early 20th century. “Sprig” painted wares, with small and delicate floral designs, also became more common in the mid to late 19th century (Samford and Miller 2012). We found blue, pink, green, red, and orange colors on survey, with a few notable all-blue or all-pink examples. Figure 14-20 shows some examples of this ware that we recovered during survey. The majority of polychrome wares likely date to the mid-19th century, but the few examples with all-blue paint and broad-brush strokes date to the earlier part of the 19th century.

One sherd (Figure 14-21) is also an example of the chinoiserie style, having painted blue motifs that mimic the Sino-Sanskrit comb pattern of Chinese blue and white porcelain (Samford and Miller 2012).

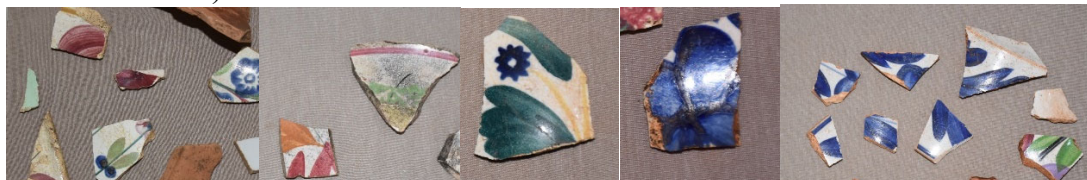


Figure 14-20. Hand-painted polychrome whiteware, with floral decorations.



Figure 14-21. “Chinoiserie” hand-painted European whiteware, made with motifs used on Chinese blue and white porcelain.

Sponge-Decorated Ware: Decorations that are made using either unshaped or cut sponges for applying paint characterize this ware. This decorative style was developed in the early 19th century and is most associated with whiteware. Like hand-painted polychrome ware, it was similarly quite common in Zanzibar during the 19th century, both in our 2019 survey and on Croucher’s project (Croucher 2014: 205). Much sponge decorated ware was produced in England as well as in the United States, in New Jersey and Ohio. A considerable volume was exported to Africa, South America, and East Asia (Dietz 1980; Liebknecht 2001; Majewski and O’Brien 1987).

Sponge decorated ware can be divided into three chronological categories. Dabbed sponge decoration is the oldest, dating from the 1820s to the 1860s. It uses an unshaped sponge to dab ink in a solid pattern to create a background on a plate or bowl (Majewski and O’Brien 1987: 162). Cut sponge decoration became popular between the 1840s and 1870s. This method uses hand painting in addition to a shaped sponge to impress geometric or floral patterns (Earls 2000). Finally, open sponge decorations were popular in the late 19th and into the 20th century. This method uses a sponge to create a background pattern with open voids rather than with a solid pattern (Ketchum 1983: 178). The majority of sponge decorated sherds found in the Zanzibar 2019 survey appear to be cut-sponge decorations with associated hand painting, though a few early solid sponge patterns were recorded. Figure 14-22 shows some examples of dabbed sponge ware, while Figure 14-23 shows cut-sponge decorations.



Figure 14-22. Dabbed sponge decorated ware, found on survey.



Figure 14-23. Cut sponge decorated ware, found on survey.

White Granite: The majority of sherds found in the 2019 survey are whiteware. However, a small number are what is called white granite (Majewski and O’Brien 1987: 123). Other names include ironstone, imperial granite, or stone granite. These are denser and harder wares than

whiteware, with vitrified fabric and bright glaze meant to provide the appearance of Chinese porcelain. Prior to 1870, this ware was made in England, but it became popular in the United States and Canada in the latter half of the 19th century (Miller 1991). It was valued for its durability, and so it was used in restaurant and hotel settings. The popularization of white granite coincided with the shift toward increasingly minimalistic decorative elements in the late 19th century. The majority of ironstone is plain white. Earlier examples of ironstone from the mid-19th century have molded shapes, reliefs, and ribbed patterns, while later examples from 1870 to the early 20th century are plain and rounded (Wetherbee 1996). The 2019 survey recovered a fair number of white granite sherds. The majority of these were the plain rounded type, suggesting that they were deposited after 1870. One example has a molded pattern which may date it to the mid-19th century. One final example was printed with a maker's mark, which is broken but the complete mark reads: Ironstone China, J&G Meakin Hanley. The mark dates to the late 19th century. Figure 14-24 shows different examples of white granite, including the piece with a maker's mark.



Figure 14-24. White granite sherds, found on survey. The bottom right image is a “molded” example.

Stoneware: A final pottery type recovered during the 2019 survey was stoneware. While some 19th-century East Asian, grey-bodied porcelain resembles stoneware, we found two examples of stoneware that were not of East Asian origin. The first is a sherd with a tan paste and salt glaze, with some dark speckled inclusions. It appears similar in fabric and color to the second example, which is a nearly complete whiskey jug broken into three pieces, with transfer printed lettering that reads “The Greybeard”, and an incomplete rendering of the words Heather Dew. Heather Dew Scotch Whiskey is a brand of whiskey to this day, and their own website says that it began to be bottled in ceramic jugs in the mid-1930s. The example found in the 2019 Zanzibar survey has a rounded shoulder, which is less common than the squat, square-shouldered examples that can be found for sale by vintage online vendors and collectors today. The presence of this scotch whiskey jug in a remote rice field suggests secretive alcohol consumption, consistent with the Islamic prohibition on alcohol in Zanzibar (Turner 2009). Figure 14-25 shows some examples of European stoneware.



Figure 14-25. European stoneware found on survey, including a whiskey jug.

14.3.3 Middle Eastern Earthenware

A small number of late second-millennium sherds recovered are similar to ceramics produced in the Arabian Peninsula, the Levant, and the Arabian/Persian Gulf. These wares are understudied in Swahili archaeology, due to the lack of systematic studies regarding their origin and dispersal, and the fact that they make up a small percentage of recorded finds. In most cases, the sherds described here were recorded only once during the 2019 survey. Their identification is based on comparisons with descriptions and photos from the ceramic chronology of the Late Islamic period for the Arabian/Persian Gulf by Power (2015), and the catalog of ceramics at the Qatar Museum (Carter 2011). The following types were recorded:

Combed Earthenware Jug: We found parts of a large, thick-walled jug with a robust handle attached to the neck at Chaani. The fabric is an unglazed earthenware, hard and concrete-like, and porous with stone inclusions. The exterior is marked with straight combed lines, and the unmarked places are colored with black paint or slip. We found these sherds in association with 19th-century materials. They appear most similar to examples of utilitarian water jugs found in Bahrain and the UAE, which were made and used from the late 18th to the mid-20th century. These jugs belong to a category called ‘Ali Ware, which originated in Bahrain (Carter 2011: 5). Figure 14-26 shows this ware.



Figure 14-26. Combed earthenware jug.

Khunj or Bahla Ware: This ware has tan, orange, or dark grey fabric with a tan, orange, or brown glaze, often with speckled black particles. It was made in open bowl forms. It was produced throughout the latter half of the second millennium, disappearing sometime in the early to mid-20th century (Power 2015: 11). Carter (2011) and Power and Al-Kaabi (2010) follow Kennet’s (2004: 54) decision to lump Bahla ware and Khunj ware together, based on their extreme similarities and uncertainty over the place of production, which may have been in Khunj, Iran, or Bahla, Oman. More recently, Power (2015) differentiated between Bahla Ware and Khunj ware. He argues that Khunj ware, Manganese Purple ware, Green Glazed ware, and Red-Yellow ware all fall under Carter’s category of “Gulf Glazed Ware”, which has its origins on the Iranian or Iraqi coast, while Bahla ware is a separate type produced in the interior of Oman. A more recent study supports this hypothesis (Zivkovic et al. 2019), suggesting that Bahla ware was produced in a consistent way from the mid-17th century until the 1970s in the town of Bahla, Oman. Research into construction and provenance is ongoing and may contribute to a deeper understanding of late second-millennium trade networks between the Arabian/Persian Gulf and the East African coast.

For simplicity, this project lumps together examples that could be either Khunj or Bahla ware, according to Power’s (2015: 15) distinction. The 2019 survey recorded a handful of sherds with light brown or tan fabric and a speckled light orange-brown glaze, as well as a nearly complete open bowl. The bowl has a brown glaze, an angular connection point between the foot

ring and the base, a wheel-made dimpled interior, black specks in the glaze, and a dense, hard grey fabric, which has been stained more reddish from the soil. This bowl was found in a cleared farming plot in the eastern region. Comparable examples on the East African coast are bowls found in 17th-century contexts at Gedi (de Cardi and Doe 1971: 267), which de Cardi and Doe describe as a Far Eastern ware, but which Zivkovic et al. (2019) argue is an example of Bahla ware. Other examples are also present in the 17th-century levels in Fort Jesus (Kirkman 1974: 287). Figure 14-27 shows examples of this ware.



Figure 14-27. Khunj or Bahla ware. The open bowl fragments on the left are similar to a 17th century black-speckled type, also found at Gede. It is also stained red from soils in the eastern region.

14.3.4 Indian Earthenware

Indian earthenware is the name given to a broad range of thin-walled, red-orange, coarse-fabric sherds found across Zanzibar and the East African coast, sometimes with black or red paint. The examples found with black paint appear to have coarser fabric and are more friable and brittle than the unpainted or red-painted examples. A common diagnostic feature of this type of pottery is a large, thick, everted rim with grooves in the neck, linking the sherd type to historically known 19th and 20th-century examples of the *mtungi*, or water jar. Water jars were also made locally on the coast, but imported Indian vessels appear to have also been common. Indian vessels of similar water jar forms are found as far back as the 17th century at Fort Jesus (Kirkman 1974: 275-277). Fleisher (2003) does not report sherds of this type on Pemba, and Wilson (2019) similarly does not mention it for Takwa. Croucher reports this type from her survey in Zanzibar and at Mgoli, suggesting that it is an import of the 19th century (Croucher 2006: 391), or that it may have been particularly traded to Zanzibar. Many sherds of this type were found in the 2019 survey. They were most often found in association with other 19th-century materials. Figure 14-28 shows an example of this ware.



Figure 14-28. Indian earthenware water jug neck, and associated sherds.

Types 39 and 41 at Kilwa are comparable Indian unglazed earthenware types from earlier centuries, which Chittick says almost certainly came from Gujarat (Chittick 1974: 330). In his typology of ceramics from Ras Al-Khaimah, Kennet describes several red-bodied, thin-walled vessel types with or without black paint that likely originate in India; the most similar types to

the examples found in Zanzibar are Painted Indian Earthenware and Unclassified Indian Ware (Kennet 2004: 90-91). These types come from the site of Kush which was abandoned in the 17th century, meaning that the sherds there likely represent earlier versions of Indian wares found at 19th-century sites in Zanzibar. Figure 14-29 shows examples of these black painted sherds.



Figure 14-29. Black painted red earthenware.

It is possible that these wares were also made locally by Indian potters, though the uniformity of the clay and the differences in fabric and color with local sherds suggests that these were imported. The trade network relating to the production and distribution of Indian water jars in Zanzibar is a topic for future research.

14.4 Miscellaneous Imports

The following section describes singular sherds found on the 2019 survey that we could not identify. The names given are those that were used in survey notes to describe the find. Figure 14-30 through Figure 14-41 show these sherds, and captions give basic descriptions and describe provenance.



Figure 14-30. Pin-Pricked Ware. A single sherd was recovered with a light pink-tan fabric, small sand inclusions, and incised motifs that appear like pin pricks next to incised lines. The fabric appears similar to other pottery from the Arabian-Persian Gulf, but no comparative examples have been identified. This sherd was found in an artifact scatter at Chaani.



Figure 14-31. Stoneware nozzle, and hard white earthenware with grey or silver glaze. Found alongside 19th-century European imported ceramics and local coarse earthenware, on a site just below a modern road.



Figure 14-32. Chinese “ginger jar”. Earthenware. Found at Mkataleni001, around the large stone house, in an artifact scatter with many other 19th-century materials. May be a late 19th or early 20th-century Chinese ginger jar (Horton, pers. comm.).



Figure 14-33. Bright green glaze on hard white refined paste, with raised dots. Found in a subsurface deposit at Mkataleni001.



Figure 14-34. Green or turquoise glaze on white earthenware. Found in an artifact scatter at Mkataleni001.



Figure 14-35. White glaze with white paste, brown exterior paint, blue interior printing. Likely a transfer print on white refined earthenware. May be a maker’s mark on the unglazed bottom of a vessel, but it is not clear. The unglazed exterior is unlike other transfer printed wares. Found at Mwanakombo.



Figure 14-36. Thick, hard-fired earthenware, with black painted bands on rim. Found in the artifact scatter at Muembe Nambo.



Figure 14-37. Thick red-tan earthenware with lavender and red paint. Found in the artifact scatter at Muembe Nambo.



Figure 14-38. Imported white earthenware with bumpy dark green glaze. Found at Mwanakombo.



Figure 14-39. Imported earthenware with bumpy white and green glaze, and brown interior paint. Imported earthenware with bumpy white and green glaze, and brown interior paint. Found as a findspot that is not part of any site, in transect 7. This sherd may be from a green stoneware vessel made in Shiwan from late 19th or early 20th century (Harrison 1995: 101).



Figure 14-40. White earthenware paste with cracked blue glaze. Found at the Daraja_La_Manakombo001 site.



Figure 14-41. White paste with brown/black solid glaze. Found at the Daraja_La_Manakombo001 site.

14.6 A Note on Dating Imports of the Late Second Millennium

In the Arabian/Persian Gulf, excavations at the sites of the Bin ‘Ātī House in Qaṭṭāra Oasis (QAT09) and Ḥarrāt al-Khrays (KHR11) have shown that refined European whitewares were relatively rare during the early to mid-19th century, but became ubiquitous between 1870 and 1920, Late Islamic 2b period (Power 2015: 24). The late 19th to early 20th century was a high point in economic production in the Arabian/Persian Gulf, when political stability and increased shipping capabilities brought by the British empire resulted in an increase in the importation of enslaved workers to meet the demand for pearl-diving and date production, despite the official ban on slavery (Hopper 2015: 224). These industries collapsed in the 1930s due to the development of farmed pearls in Japan and date production in the Coachella valley of California (Hopper 2015: 234). While these industries boomed, European glazed whitewares appear to have dominated the imported ceramic assemblages at sites in the Arabian/Persian Gulf that Power (2015) investigated.

Does this pattern hold as well for the East African coast and Zanzibar? If so, it would mean that sites found on the 2019 survey with substantial quantities of refined European whiteware should be dated to the late 19th and early 20th century. However, ceramic and historical evidence suggests that many 19th-century sites with refined whitewares in Zanzibar can be more accurately dated to the early and mid-19th century, without necessarily ruling out continued occupation into the early 20th century. For one, many of the decorative motifs found on refined European whiteware have average production dates from the early to mid-19th century. These motifs include polychrome hand-painted whitewares with thick, solid blue paint, dark blue transfer prints with field dot patterns, spatter-sponge decorated wares, and impressed edged wares, all of which date from the early to mid-19th century. The early to mid-19th century in Zanzibar, like the late 19th century in the Arabian/Persian Gulf, also saw an economic boom; indeed, the period from 1830 to 1850 saw the greatest profits from clove production (see Chapter 2). The decision by Seyyid Said to relocate the capital of the Omani Empire from Muscat to

Zanzibar in 1840 reflects this. By the mid-19th century, Zanzibar was far wealthier than Muscat (Bishara 2017: 51). If refined whitewares became ubiquitous in the late 19th century in the Arabian/Persian Gulf due to pearl-diving and date farming, they may have also become ubiquitous in Zanzibar earlier, during the height of clove intensification. Earlier access to European refined whitewares in Zanzibar compared to the Arabian/Persian Gulf makes sense in this context.

14.7 Conclusion

In this chapter, I have described the imported ceramics that our team recorded. Imported ceramic analyses show that from around 1100 to 1400, village communities in inland areas acquired a small number of late sgraffiato vessels, likely through trade links with the coastal towns of Mkokotoni or Tumbatu. Imported wares did not appear to reach inland areas in this region prior to this date. After these village communities were abandoned, some glazed monochrome ware vessels and Longquan celadon ware vessels reached the eastern village of Pwani Mchangani between the 14th and 15th centuries. During the early colonial period (1500-1830), diagnostic ceramics included a small quantity of glazed monochrome ware vessels, a Bahla ware vessel, and a few Ming or Kangxi Chinese blue and white porcelain vessels, at Kandwi and at sites in the east. Overall, the quantity of imported ceramics in the early colonial period was even less than in the precolonial period. Starting around 1830, this trend changed, as Zanzibar's inland areas transformed into a plantation system and became entrained within global commodity flows. During the first phase of the late colonial period (1830-1890), European whitewares (primarily with hand-painted floral designs, transfer printed designs, or sponge-dabbed designs) and late Qing Chinese blue and white porcelains appeared in sites across all regions, though more substantially in the central and west regions than in the east. This new trend coincided with spatial changes in the settlement system and changes in the form and construction in local ceramics. I discuss these trends more in Chapter 15, where I tie together and summarize the local and imported ceramics data to make conclusions about long-term patterns in ceramic production and consumption in Zanzibar.

Chapter 15: Trends in Ceramic Production and Consumption

15.1 Introduction

In the previous two chapters, I discussed the results of ceramic analysis for the 2019 survey. These analyses produced a detailed record for local and imported pottery in Zanzibar. In this chapter, I draw conclusions about long-term trends in ceramic production and consumption in Zanzibar and on the East African coast.

15.2 Long-Term Patterns of Ceramic Consumption and Production

Collecting substantial amounts of ceramic data was a secondary aim for this project, contingent on the primary aim of site identification. Nevertheless, our collection strategies for ceramics were applied across all sites, meaning that the trends identified in this chapter are meaningful. The following sections summarize the conclusions of my ceramic analysis, across three periods.

15.2.1 The Early Second Millennium, 1000-1500 CE

Local and imported ceramics from the precolonial period evidence that the social and economic relationships which structured ceramic production and consumption on the Swahili Coast during the early second millennium extended to the inland areas of Zanzibar as well. Our surveys at the village sites of Mwanakombo, Kirikacha and Pwani Mchangani located nearly all of the well-attested ceramic types of the early second millennium that can be found at Mkokotoni and Tumbatu (Rødland 2021: 119-127) and at sites in northern Pemba (Fleisher 2003: 236-265) even though our survey method was focused on site detection and size, and not full-coverage sampling of ceramic deposits. One exception was the overall lack of graphited wares found. We did not find a single sherd with graphite burnishing. While this type of local pottery is considered rare, it was found throughout northern Pemba as types 6a and 6b (Fleisher 2003: 248-250) and was also located at Mkokotoni and Tumbatu as groups 22 and 23 (Rødland 2021: 123). Rødland suggests that it may have been imported to Tumbatu and Mkokotoni from Pemba where it was produced (Rødland 2021: 253; Fleisher 2003: 250). While the inland villages of the second millennium had access to sgraffiato pottery through local trade networks, graphited wares do not appear to have reached these communities.

15.2.2 The Early Colonial Period, 1500-1830 CE

The early colonial period saw an overall decrease in the number of sites and the amount of ceramic material. In the east, the sites of Kandwi and Kandwi_Kibokwa003 were established sometime in the 16th century, inland from the coast near the older precolonial village of Pwani Mchangani. The imported material from these sites amounted to only a few sherds, of late glazed monochrome ware from Kandwi and Bahla ware from Kandwi_Kibokwa003. The local ceramic types found at these sites are roughly similar to those found in the precolonial period, with open bowls, spherical pots, and inflected jars dominating the assemblage—derived late Tana/TIW forms. The similarities in local ceramics suggest continuity between the inhabitants of these later sites of the rugged inland areas and the earlier coastal occupants of Pwani Mchangani who may have moved inland to avoid Portuguese naval patrols but maintained their social and economic networks to some degree.

Later on, the site of Njua Kuu appears to have ceramics that were transitional between the early colonial period of the 16th-19th century and the late colonial period of the 19th century. The local ceramics were partially of the 19th-century type—everted rim cooking pots dominated the

assemblage, but not as dramatically as at other sites of the 19th century. At Njua Kuu, open bowls still made up 20% of collected sherds. The European imports of the 19th century that appeared in other sites occupied during or after 1830 were not present all—not a single European sherd was found. A few sherds of unidentified Chinese blue and white porcelain were found, as were some of red Indian earthenware. These finds suggest that Njua Kuu was not just a 19th-century site cut off from imported ceramics, but that it was occupied and abandoned in the late 18th or early 19th century, prior to the period when European industrial ceramics became widely available. The relatively large variety of locally made open bowls suggests that European glazed whiteware bowls had not yet displaced these local wares for serving and eating.

15.2.3 The Late Colonial Period, 1830-1963

The late colonial period saw a general increase in site size, diversity, and count, and the integration of social and economic networks for the importation and distribution of ceramics. European glazed whiteware and Chinese blue and white porcelain were found covering every site of this period. European glazed wares included hand-painted polychrome ware, transfer printed ware, dipped ware, edged ware, and sponge decorated ware. Chinese blue and white porcelain of the early 19th century in Zanzibar was characterized by the chrysanthemum pattern and the comb pattern. This horizon of mass-produced European and Chinese ware coincided with major changes in local ceramic forms. Open bowls fell off in frequency and gave way to everted cooking pots as the dominant type-class beginning in the 19th century. These everted rim cooking pots are also called *vikaango* (sg. *kikaango*) and were used to cook stews and rice-based dishes over charcoal stoves or open fires. They are common on the coast today (Wynne-Jones and Mapunda 2008). These everted rim cooking pots are discussed more below.

15.3 Change and Continuity in Local Ceramics

In the following sections, I outline changes that my analysis revealed with regard to fabric color, clay color, and temper, changes in vessel form over time, and continuities across time in vessel production.

15.3.1 Fabric Color, Average Clay Color, and Temper

Fabric color, average clay color, and temper all appear to co-vary between different regions of the survey area for the precolonial and early colonial periods. These attributes varied regionally in a consistent way, suggesting localized and communal methods of clay sourcing and ceramic production. Regional factors of clay sourcing appear to be the most impactful cause of differences in fabric color, average clay color, and temper across the survey region. Prior to the 19th century, fabric colors and average clay colors were dark brown and black in the east, brown and red in the central region, and light brown and tan in the west. Similarly, sand tempers were finest in the east, and grew coarser the further west one went, with the greatest percentage of coarse tempers being found in the west.

The trend in temper aligns with the geological and soil conditions of the survey region. The eastern region has almost no sand outside a narrow strip of beach and consists of dark red silty clays and clayey silts over coralline limestone bedrock. The central region consists of hilly lateritic sandy clays, red and brown in color. The western region is comprised of alluvial sandy clay and clayey sand, washed over large floodplains off the hills of the central spine and into the rice valleys in the west by biannual monsoon rains. The consistent association between coarser tempers and lighter colored ceramics (as well as the inverse—darker colors are associated with finer temper) suggests that these factors might have been causally related. A ceramic vessel

might end up lighter in color if a greater ratio of its mass was light-colored and clear quartz minerals and light brown sand. At least in terms of temper, this suggests that clay was sourced and fashioned into pots near to settlements where the pots were ultimately consumed and deposited. Table 15-1 shows the majority percentages of temper, fabric color and clay color across different regions for the precolonial and early colonial periods, illustrating this trend.

	West	Central	East
Precolonial Temper, Highest %	22% Coarse	19% Coarse	2% Coarse
Early Colonial Temper, Highest %	n/a	12% Coarse	2% Coarse
Precolonial Fabric Color, Highest %	30% Dark Core, Light Walls	29% Dark Core, Light Walls	31% Uniform Light
Early Colonial Fabric Color, Highest %	n/a	29% Uniform Dark / Light (tie)	32% Uniform Dark
Precolonial Clay Color, Highest %	34% Tan/Buff	28% Brown	35% Brown
Early Colonial Clay Color, Highest %	n/a	35 % Brown	23% Brown

Table 15-1. Temper, fabric color, and average clay color for each region, for the precolonial and early colonial periods.

In their study of an assemblage ETT ceramics from multiple sites along the Swahili Coast, Fleisher and Wynne-Jones (2011) assert the localized character of ceramic production across many regions of the Swahili coast, citing petrographic studies at ETT sites (e.g., Lindahl 1994; Msuya 1997; Vince 2010). These studies have compared fabric and inclusions across disparate Swahili sites from a regional perspective. The results here add to this conclusion by presenting a comparison of ceramics across a continuous geographical area where gradual differences in geology and soil geomorphology can be referenced against the fabric and temper of the ceramic assemblage. The scale at which the 2019 survey was carried out allows it to build on this field of research by explicitly linking trends in ceramic temper, fabric color, and clay color to geological changes, i.e., to increasing sandiness from east to west in the survey region. The result is to clarify how “local” this localized production was, within inland Zanzibar. For this survey region, many ceramics may have been produced, used, and deposited all within an area of less than 10 kilometers.

Starting in the 19th century, the localized character of ceramic production changed. Darker fabric colors and darker average clay colors are dominant across all sites of the late colonial period, and differences in temper appear slightly less stark (Table 15-2). Two direct factors may explain increased uniformity. It may be the case that clay started being sourced more intensively at a more regional level, with preference for clays with fewer sandy occlusions. Given the correlation between finer tempers and darker clay colors, this preference for finer clays may have also produced darker vessels in general during firing. Another possible factor might have been changes in the firing method itself. If ceramics were being produced in larger quantities, it is possible that they were fired in deeper pits than previously. This may have produced reducing conditions that would have resulted in darker vessels. These new firing techniques might also have meant that less sand temper was needed to prevent breakage, resulting in finer tempers overall.

	West	Central	East
Late Colonial Temper, Highest %	15% Coarse	5% Coarse	5% Coarse
Late Colonial Fabric Color, Highest %	39% Uniform Dark	36% Uniform Dark	49% Uniform Dark

Late Colonial Clay Color, Highest %	27% Black	32 % Black	33% Brown
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Table 15-2. Temper, fabric color, and average clay color for each region, for the late colonial period.

These two factors might be explained by changing social and labor conditions related to ceramic production starting in the 19th century. One factor may have been the increased availability of labor and the increased demand for ceramics to provision newly arrived enslaved workers. Alternatively, these factors may relate to methods for ceramic construction brought by potter communities among enslaved people, newly arrived on the island. On Mafia, potters today are descendants of formerly enslaved people, from mainland groups like the Makonde (Wynne-Jones and Mapunda 2008), who also came to Zanzibar both as enslaved people in the 19th century and as free laborers in the 20th century. While newly arrived mainlanders abandoned the pottery forms of their homeland and adopted coastal Swahili forms to serve consumer markets (Wynne-Jones and Mapunda 2008: 10), they may have nevertheless sourced clay and produced pots in slightly different ways. This, in theory, might account for the observed regional changes to ceramic temper, and clay and fabric color, which all correspond to the start of the late colonial period when mainland groups arrived on the island in large numbers.

One final possibility is that the trend toward darker ceramics relates to the process of deforestation on the island during the 19th century, as land was cleared of trees for plantations. Open hearth firing, which produces oxidizing conditions and lighter colored ceramics, is less fuel efficient than pit firing, which produces reducing conditions and therefore darker ceramic colors (Sinopoli 1991: 30; Roux 2019: 112-121). It is possible that a lack of abundant fuel necessitated the shift to a more efficient type of firing, thereby creating darker ceramic colors in general.

15.3.2 Shifts in Vessel Form

The attribute changes in fabric color, average clay color, and temper coincide with an overall shift in vessel form starting in the early 19th century. Sites of the early colonial period maintained the precolonial pattern of open bowls as the dominant vessel form. However, starting in the late 18th or early 19th century, everted cooking pots displaced open bowls as the main type of ceramic being consumed and used. By the mid-19th century, these forms possibly constituted up to 80% of ceramics found on sites in the inland region.

The first cause for this shift may have related to the new widespread availability of European glazed hand-painted whiteware bowls starting in the late colonial period, leaving everted rim cooking pots as the dominant locally made ceramic form. Since open bowls were the main serving dishes and were meant for public display, they likely would have been replaced first by finer wares while local wares continued to be used for cooking and food storage in more private spaces.

A second factor that could explain this shift was a change in consumption practices caused by the arrival of cassava to the island. Cassava was introduced to Zanzibar 1799, and it quickly became a widespread crop that sustained enslaved populations and rural Swahili communities (Hillocks 2002). Today, it is still associated with slavery, poverty, and hardship on the Swahili Coast (Kinshella 2014). The adoption of cassava correlates chronologically with the period when everted rim cooking pots become the dominant local ceramic form and may have something to do with the increased need to stew cassava.

A final possible cause for the shift to everted rim cooking pots as the dominant ceramic form may have been the new requirement to feed and sustain enslaved people and itinerant laborer in contexts outside the domestic household. This is how everted rim cooking pots are

used today—they can be seen in the alleys of Stone Town in Zanzibar, where they are used on mobile carts to make *urojo*—a stew of potato, cassava, fried lentil balls, and meat. Today, the mobile carts that purvey *urojo* are frequented by groups of working Zanzibari men and women who leave their homes in the outer-lying neighborhoods of the city to work in the city center. Away from the sit-down meals of home, they seek a quick and cheap lunch that is eaten on the go in plastic bowls. Everted rim cooking pots play a key role in the production and distribution of this food, since they can be kept on a charcoal fire all day, and ingredients can be added to the stew as it is consumed. They are wide mouthed, meaning that a cook can rapidly ladle servings to many people at once. Metal stew pots also exist, but local people express a preference for *urojo* cooked in a ceramic vessel.

Everted rim cooking pots today are also present in domestic contexts, but their use today for cooking in public spaces to quickly and cheaply provision workers with a meal away from home might suggest things about their context of use in the 19th century. Clove farming in the 19th century also involved itinerant labor, for the young men of the east and south who migrated to the fertile regions to work on clove farms as tenant farmers following the abolition of slavery in the late 19th and 20th centuries (Middleton 1961). For the enslaved East Africans of the early and mid-19th century, they were perpetually away from home, and the conditions of their labor meant that they were likely eating in large groups away from their living quarters, which are still poorly understood. Across both periods, both enslaved and free tenant clove pickers would have been fed or cooked for themselves in more mobile and less formal ways than ever before. It is not clear whether workers or enslaved people on clove plantations would have used ceramic bowls and plates or more disposable vessels like wooden plates or banana leaves, but it seems likely that the increase in everted rim cooking pots during the 19th century somehow related to the new forms of labor that would have required a way to cook and serve many workers at once, outside of a domestic context.

Overall, these changes in types and attribute patterns suggest that ceramic production was imbricated in the broader social and economic changes of the 19th century, as enslaved workers from mainland East African communities were brought in large numbers to work clove plantations for the nascent export economy of the Sultanate of Zanzibar and Muscat. While everted cooking pots evolved out of derived late Tana/TIW Swahili ceramic forms, their proliferation and use in the 19th century was an innovation produced in the exploitative dynamism of 19th-century Zanzibar and its integration into global systems of capitalist production.

15.3.3 Continuity

While the second millennium saw some changes in ceramic form, a few factors remained consistent through time. Though tempers grew finer toward the 19th century, the use of quartz sand as temper remained a constant from the earliest period to the present. Shell temper was found on only a few sherds, suggesting that it was relatively rare. Sherd thickness and vessel diameter also remained static from the 11th century to the present, with almost all sherds found being between 6 to 11 mm in thickness, and vessel diameters averaging between 20 and 30 cm for all periods. Continuity of vessel thickness and vessel diameter points to a specific *habitus* (Bourdieu 1977) for ceramic construction on the coast, a deeply ingrained sensibility about the proper and correct ways to make a pot regardless of its form, reinforced through daily practice. This framework remained a feature of ceramic construction from at least the 11th century even as other attributes changed.

15.4 Conclusion

Below, I have summarized the following conclusions from the preceding discussion:

1. The ceramic types of the early second millennium that are known from other coastal Swahili sites were also found at precolonial village sites in the inland areas of Zanzibar, with the notable exception of graphited ware. The presence of imported late sgraffiato and glazed monochrome ware at these sites suggests that the inland areas were linked into broader Indian Ocean trade networks.
2. Swahili people of the early colonial period continued to make pottery according to the norms of later derived Tana/TIW, even as some settlements were impacted by Portuguese colonialism.
3. The late colonial period saw the reorganization of clay sourcing and ceramic production on a more regional level. Ceramics from the earlier periods showed a trend of fabric color, average clay color, and temper aligning with local geological conditions across the three survey regions, with coarser tempers and lighter-colored fabrics correlating spatially with sandier geological conditions in the west compared to the east. This trend suggests that pre-19th-century ceramics were deposited in the same general area that they were produced. In contrast, by the 19th-century ceramics from all regions are darker and have finer tempers with less quartz. This suggests that clay sourcing may have taken place on a larger, regional scale in a few central locations resulting in more uniform attributes, and that ceramic firing technologies may have developed to produce reducing conditions more frequently, resulting in darker colors. These changes in temper, fabric and clay color may reflect the arrival of new mainland East African potter communities from the mainland, who adopted Swahili forms but may have introduced slightly different methods for clay sourcing, processing, and production.
4. The late colonial also saw a substantial shift in the forms of locally made pottery. There was an increase in the number of everted rim cooking pots, while open bowl, spherical pot, and inflected jar forms decreased. These changes were accompanied by the rapid proliferation of industrially produced European glazed wares, the mass importation of enslaved East African mainland people to work clove plantations, and the integration of Zanzibar's inland region into globalized networks of capital accumulation.
5. Everted rim cooking pots may have become the most common locally produced form in the late colonial period due for several reasons: 1) the replacement of locally produced open bowls with imported open bowls, 2) changing foodways associated with the widespread adoption of cassava on the island, to provision enslaved people (Hillocks 2002), and 3) the need, for the first time, to feed large numbers of itinerant enslaved and free workers on clove plantations and other job sites, outside of domestic contexts.
6. Changes in ceramic fabric color, average clay color and temper in the 19th century coincided with shifts in vessel form, toward the production of everted rim cooking pots. This correlation, combined with the mass proliferation of European glazed whiteware and late Qing Chinese blue and white porcelain occurring at the same time, attests to the impact that emergent capital accumulation through slave-based clove farming and caravan trading may have had on systems of ceramic production, consumption, and valuation during the 19th century.

Chapter 16: Glass, Daub, Iron, Beads, and Other Artifacts

16.1 Introduction

This chapter presents the spatial distribution of other artifact types within the survey region. Since the primary aim of this survey was to identify sites across a wide area, we did not analyze these materials in-depth, apart from basic identification, count, and weight in the case of daub. In the following sections, I present maps showing the count and distribution of glass, daub, iron and slag, beads and shell across the survey region, with pictures of common examples. Then I discuss rarer miscellaneous finds from particular sites, including coins, ground sherds, spindle whorls, bead grinders, sharpening stones, repaired sherds, lamp fragments, an incense burner, a door lock, and *mofa* oven fragments.

16.2 Glass

During survey we collected dark green, light green, olive, clear, and brown bottle glass, which dates from the late colonial period (1830-1963) or later. Figure 16-1 shows glass finds across the survey region. Figure 16-2, Figure 16-3, and Figure 16-4 show different examples of bottle glass. Figure 16-5, Figure 16-6, and Figure 16-7 show other glass shards and bottles we encountered. Glass occurred in almost every artifact scatter of the late colonial period, especially in the west and central regions. Glass bottles were part of an assemblage of newly available consumer goods, along with European whiteware, that began circulating through Zanzibar following the development of the plantation system.

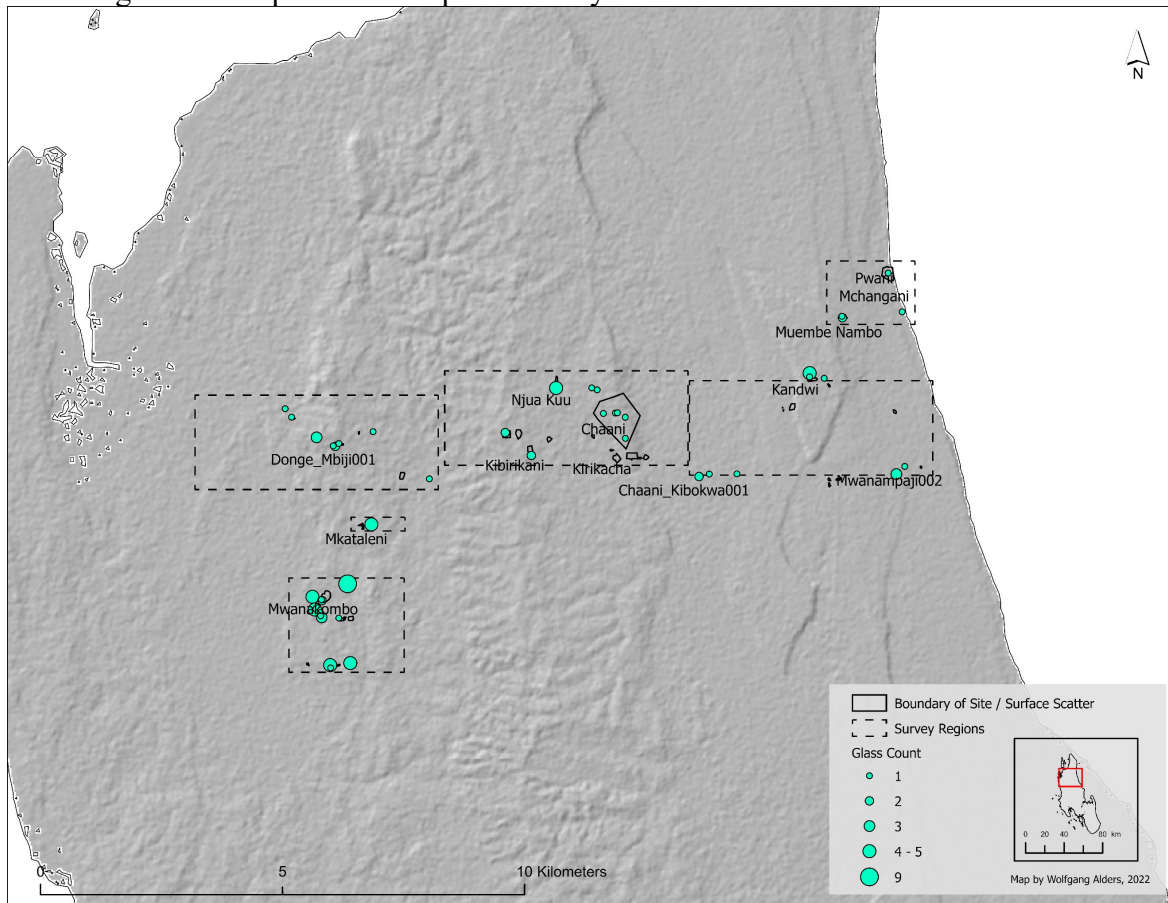


Figure 16-1. Glass counts across survey areas.



Figure 16-2. Clear and dark green glass, from the site of Mnyimbi.



Figure 16-3. Brown, clear and light green glass from Kandwi002.



Figure 16-4. Brown and olive colored glass from Muembe Nambo.



Figure 16-5. Small glass bottle and clear glass from Mwanampaji003.

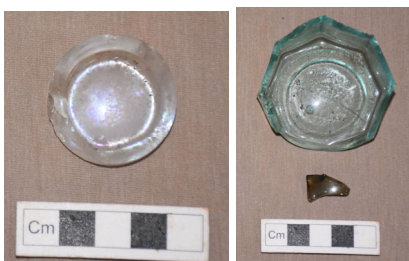


Figure 16-6. Clear glass bottle bottoms from the 19th/20th century stone house at Mwanakombo.



Figure 16-7. Iridescent painted glass from a shovel-test pit near Njua Kuu.

16.3 Daub

Many Swahili people in rural areas make their houses today from thatch (also called wattle), a woven matrix of wooden poles, sticks or strips of bamboo, and daub, a mud mixture made from *kinongo* (lateritic sandy clay) soil. When deposited archaeologically, earthen parts of structures are referred to as daub in this dissertation. Figure 16-8 shows a thatch structure before earth is applied, and Figure 16-9 shows another building where both thatch and earth are visible. Daub is preserved archaeologically when pieces are fired, by accident or in the course of clearing land after abandoning a daub structure. Without fire hardening, daub disintegrates and is no longer detectable through shovel-test pits or excavations (Fleisher and LaViolette 1999); however, geochemical methods and GPR can be used to detect areas where daub houses previously stood (Fleisher and Sulas 2015; Sulas et al. 2019).



Figure 16-8. House frame, with thatch before earth is applied.



Figure 16-9. House with thatch and earth both visible.

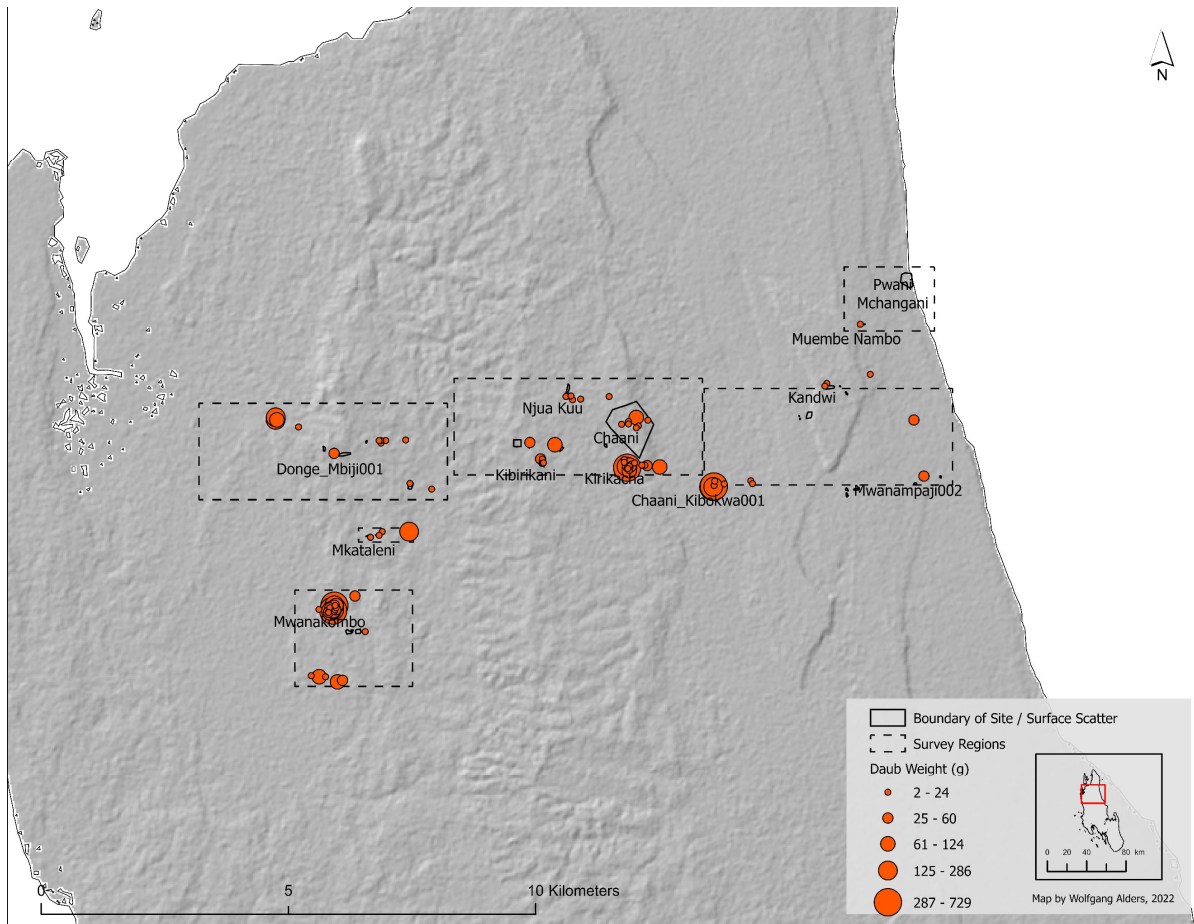


Figure 16-10. Daub weight in grams across the survey region.

Figure 16-10 shows daub weight across the survey area. Daub was most heavily concentrated in the survey areas at the precolonial sites of Mwanakombo and Kirikacha, which have the longest histories of permanent occupation compared to late colonial sites, and which are also located in areas of *kinongo* soil. Furthermore, there were two large concentrations of daub in the west, and at the field house site of Chaani_Kibokwa001 in the western part of the east region; both these areas have late colonial sites located in rice fields. Rice fields are burned seasonally, which may account for a higher-than-average amount of daub being preserved there. Daub is noticeably less common in the east and northeast regions, where permanent settlements only existed at Kandwi and Pwani Mchangani, and where deep *kinongo* soils from which daub is made are not present. Even in these villages today, houses are made of cement blocks rather than earth. It is unclear what materials were used for house construction in these places in the past since we did not locate coralline limestone architectural remains. It is possible that people in these areas built primarily in wood, or in stone which has since been repurposed. Future research might seek to better understand the architectural forms of the eastern coast of the island, where numerous modern villages are made of concrete and limestone.

16.4 Iron and Slag

Zanzibar has abundant iron rich soils, since iron deposits occur within the matrices of the coral rag limestone bedrock that forms the basis of the entire island. Figure 16-11 shows examples of iron forming on coral limestone in the east, at the site of Kandwi_Kibokw003.



Figure 16-11. Iron nodules on coralline limestone bedrock in the east region, at the site of Kandwi_Kibokwa003.

Furthermore, the sandy clay marl and lateritic clays of the western region are sediments that have eroded from the bedrock below, and they contain high amounts of iron. In rice fields throughout the western region, seasonal changes in the water table create a mottled, gleyed effect in the soil, producing nodules of iron-manganese that accumulate around sandy clays. Figure 16-12 shows an example of a trench that I dug in 2016 in a rice field at Bumbwisudi, and a micromorphology thin-section that I took, which shows dark black iron-manganese nodules.³

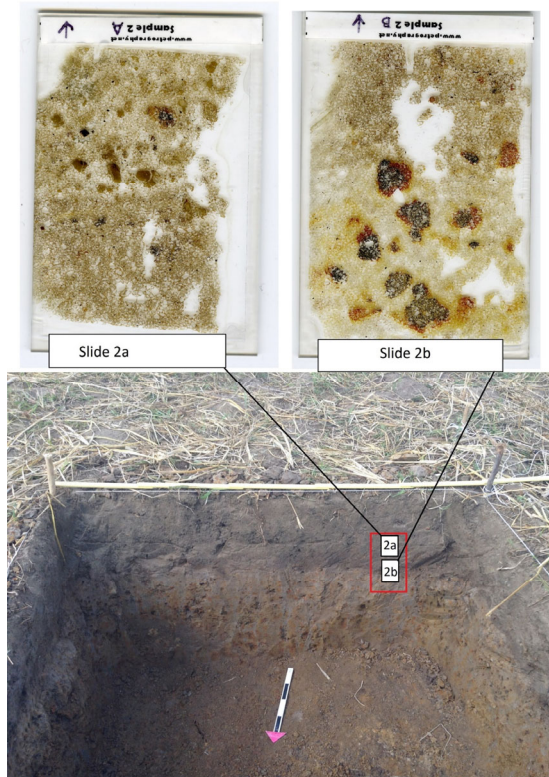


Figure 16-12. Iron-manganese nodules in a sandy clay rice field at Bumbwisudi, produced by seasonal water movement.

³ These micromorphology slides come from an earlier phase in my research. In 2016, I produced 12 different micromorphology slides from five different contexts in upland, midslope, and valley contexts related to rice farming. These slides related to my original plan for research, which aimed to reconstruct field systems related to rice production in Zanzibar. I analyzed these slides, but they do not appear in this dissertation, except for the two here. As I stated in Chapter 1, I realized this research aim was not feasible without first reconstructing the settlement histories of agricultural areas. This realization led to the development of this project.

It is unclear whether the iron deposits I observed, or the iron rich soils found in the western areas, would have been sufficient for the production of iron implements in the past. However, Baužytė (2019) showed that iron smelting was taking place on Zanzibar at Fukuchani and Unguja Ukuu as early as the 6th century, and that iron production at a domestic level continued to occur throughout the precolonial period.

During STP survey, we located several pieces of slag at the sites of Mwanakombo, Muembe Nambo, Chaani, Njua Kuu, Kibirikani, and Daraja_La_Mwanakombo001. Slag pieces can be differentiated from iron-rich ores and deposits by the fact that they appear more uniformly metallic, while exhibiting a morphology which suggests their production in an iron-smelting kiln. Figure 16-13 shows some pieces of slag from Mwanakombo, which come from the southwest side of the site, near the 19th/20th century occupation areas. These areas also produced precolonial ceramics, so it is not clear to which period these slag pieces belong.



Figure 16-13. Slag from Mwanakombo.

Beyond slag, we found fashioned iron objects across all survey regions, which likely date from the late colonial period to the present. Figure 16-14 below shows the counts of iron objects that we collected. Iron objects were diverse, and many are heavily rusted, making identification difficult. The largest number of iron objects were located in transect 25 of the Mahonda region (south of Mwanakombo), which may be the most recently settled area in the entire survey region, on the basis of ceramics found there.

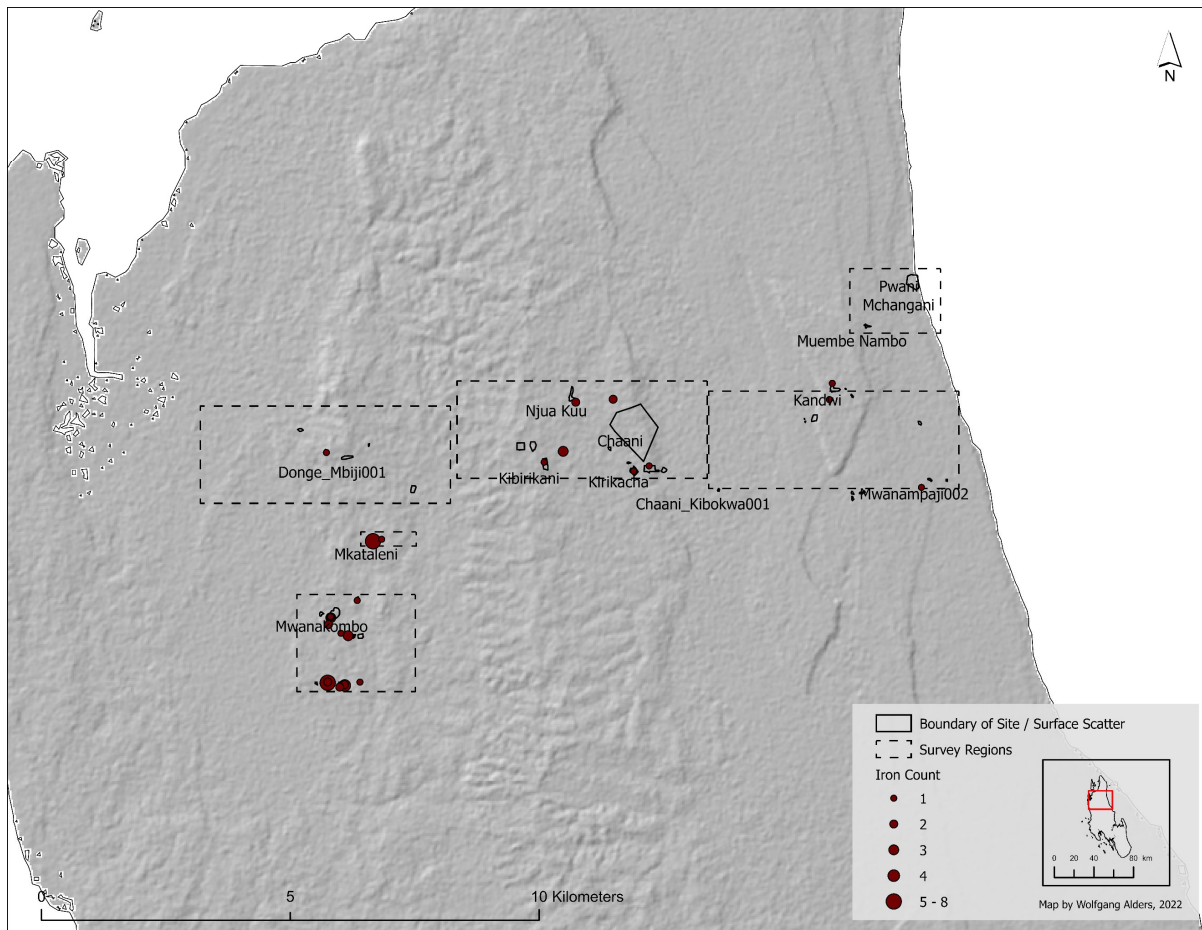


Figure 16-14. Iron objects found across the survey regions.

Table 16-1 attempts to categorize the objects we found. Figure 16-14 through Figure 16-24 show these types.

Type	Sites / Region
Nails	Transect 25, south Mahonda region
Barbed Wire	Transect 25, south Mahonda region
Washer or Ring	Kandwi / east region
Billhook	Mwanampaji003 / east region
Linked Object	Kanisani001 / Mahonda region
Padlock	Mahonda Mkataleni003 / Mahonda region
Pulley wheel, with lead center	Kichangani003 / Central region
Knife Blade	Kirikacha / Central region
“Figure 8” ring	Kibirikani / Central region
Indeterminate	Many

Table 16-1. Iron object types.



Figure 16-15. Nails, from transect 25 in south Mahonda.



Figure 16-16. Barbed wire, from transect 25 in south Mahonda.



Figure 16-17. Washer or ring, from Kandwi, in the east region.



Figure 16-18. Billhook from Mwanampaji003 in the east region, with modern examples. Called an *mndu* in the local Swahili dialect, or also known as a *kotoma*. It is used for clear brush.



Figure 16-19. Linked object, from Kanisani001 in the Mahonda region.



Figure 16-20. Padlock, from Mahonda_Mkataleni003, in the Mahonda region.

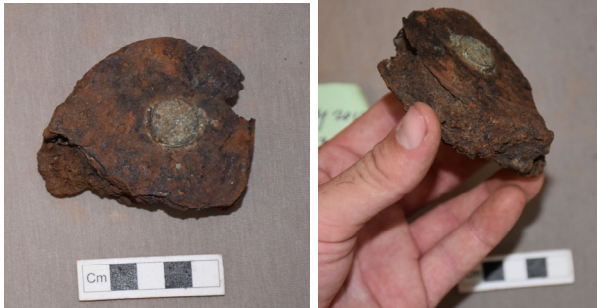


Figure 16-21. Pulley wheel, with lead center, from Kichangani003 in the central region.



Figure 16-22. Figure 8 ring, possibly also related to a pulley system. From Kibirikani, in the central region.



Figure 16-23. Knife blade and tang, from Kirikacha in the central region.



Figure 16-24. Indeterminate example, from Njua Kuu in the central region.

Many identifiable iron objects may relate to agricultural work, including the billhook, knife blade, barbed wire, and pulley wheel.

16.5 Beads

We located a small number of beads across sites in the survey region. All beads we found are glass or stone. One bead at Donge_Pwani002 is a quartz bead, which may have been produced locally. Otherwise, the beads were most likely imported and acquired through trade. One bead from southern Mahonda in transect 25 is plastic, suggesting a recent date. Since we screened STP sediments with 1 cm mesh to prioritize speed, we may have missed beads in many contexts. Figure 16-25 below shows the locations and counts of beads we found. Figure 16-26 through Figure 16-37 show pictures of every bead found, by site.

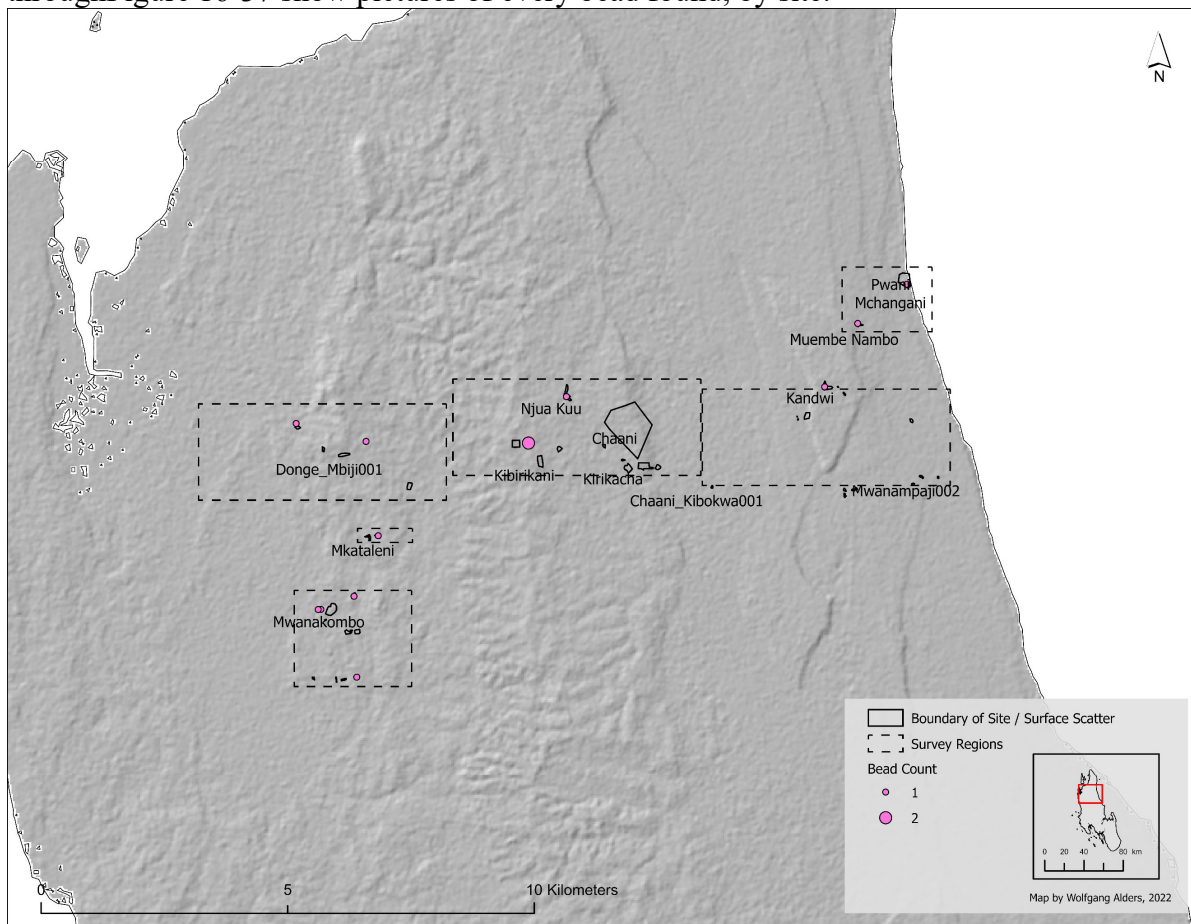


Figure 16-25. Bead count across survey region.



Figure 16-26. Bead from near Donge_Pwani002, west region.



Figure 16-27. Beads from Donge_Pwani002, west region.

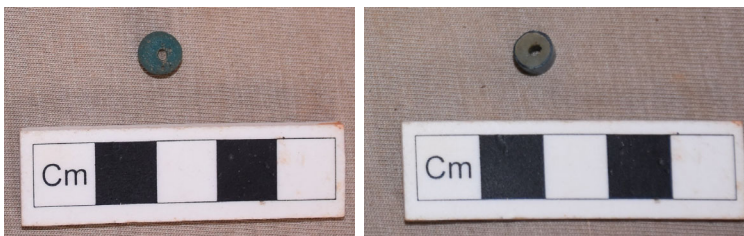


Figure 16-28. Beads from Daraja_La_Mwanakombo001, Mahonda region.



Figure 16-29. Bead from Donge_Karange001, west region.



Figure 16-30. Bead from Kandwi, east region.



Figure 16-31. Beads from Kichangani001, central region.



Figure 16-32. Bead from Mkataleni, Mkataleni region.



Figure 16-33. Bead from Mnyimbi, Mahonda region.



Figure 16-34. Bead from Muembe Nambo, northeast region.



Figure 16-35. Bead from Njua Kuu, central region.



Figure 16-36. Bead from Pwani Mchangani, northeast region.



Figure 16-37. Plastic bead from transect 25 in southern Mahonda.

Despite the more intensive STP grids that we performed at Mwanakombo and Kirikacha and the presence of a bead grinder at Mwanakombo, we did not find any beads at these precolonial sites. Rather, nearly all the beads we collected come from sites of the late colonial period, except for those at Pwani Mchangani, Njua Kuu, Kandwi, and possibly Muembe Nambo. This is likely due to sample size, mesh screen size, and chance. Mwanakombo and Kirikacha would likely produce beads if they were subject to stratigraphic excavations with fine-mesh screens. Future research might further investigate bead trade networks and local bead production and consumptions in Zanzibar during the late colonial period, as has been done for the precolonial era (e.g., Rødland 2022).

16.6 Shell

We did not collect shell, since the main goal of our survey was to record, map, and date new sites in the inland regions, and shell does not provide information related to those aims. The exception was at the site of Pwani Mchangani, where we sampled a shell mound with test pits, and collected a large quantity of marine shell that is currently stored at the Zanzibar Museum. We were not able to analyze these shells before the end of the field season.

Even though we did not collect it, a qualitative assessment of the prevalence of shell in inland areas suggests that it was quite rare. The precolonial inland village sites of Mwanakombo and Kirikacha produced no shell in shovel-test pits, suggesting that marine resources were not a part of the diet of people in the inland areas during this time. We encountered almost no shell materials in all regions except the northeast, where Pwani Mchangani lies directly on the coast. The other place we found shell was at the site of Mwanampaji002, a surface scatter in a swidden plot. This surface scatter contained a large number of shells. Along with the ceramic finds at the site, this paints a picture of farmers bringing shellfish to the site to consume while working and camping there, before moving back to their permanent residences, either on the coast or in the village of Kandwi. Figure 16-38 shows the shell scatter at Mwanampaji003.



Figure 16-38. Shell at Mwanampaji003.

16.7 Miscellaneous Finds

In addition to the artifacts described above, we found a small quantity of the following items: coins, ground sherds, spindle whorls, bead grinders, sharpening stones, repaired sherds, lamp fragments, an incense burner, a door lock, and *mofa* oven fragments. In this section I show pictures of these items and briefly describe them. Unfortunately, we did not take a picture of the bead grinder we found at the site of Mwanakombo.



Figure 16-39. Copper coin from Mwanakombo, in the Mahonda region.

Figure 16-39 shows a coin that a landowner at the site of Mwanakombo showed us. He told us he found it at the site. This copper coin was minted in 1886 or 1887, during the reign of Sultan Barghash. It is a 1 Pysa coin. The rim is decorated with clove sprigs. The front has the word زمخيا written in Arabic, for which I have not found a clear translation. A coin dealing website shows that phonetically it spells z-m-kh-ī-ā. The back depicts a measuring scale. Between the scale is the date, which is not legible on this coin. Figure 16-40 below shows a legible version of this coin, from the coin dealer website colnect.com.



Figure 16-40. 1 Zanzibar Pysa, 1886-7, from colnect.com.

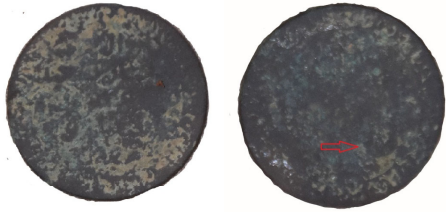


Figure 16-41. Copper coin from Mkataleni, in the Mkataleni region. Red arrow indicates what is likely a cup from the measuring scale on the obverse of the coin (see below).

Figure 16-41 shows another coin we found during survey. It is less legible than the Mwanakombo coin, but it has a few elements that can be made out which date the coin to 1882. Clove sprigs around the rim of the coin are faintly visible, as well as markings in the center that are likely Arabic script, in a smaller font than the Mwanakombo coin but with more words. On the obverse, a single cup from a measuring scale is faintly visible. The only late colonial Zanzibari coin that has 1) small Arabic font in the center with a measuring scale on the obverse and 2) clove sprigs on the rim, is an 1882 1 Pysa coin, minted under Sultan Barghash. The Arabic script at the top reads الله, Allah. The three lines in the center read: سلطان سعيد, سلطان سعيد بن برغش بن سلطان, Sultan Sa'id bin Barghash bin Sultan. The bottom line reads: حفظه, which translates to Allah Guards, the Sultan's motto. Figure 16-42 shows an example of this coin from colnect.com.



Figure 16-42. 1882 1 Pysa coin from Zanzibar, picture from colcnet.com.



Figure 16-43. Coin from Kichangani002, in the central region.

Figure 16-43 shows a final coin we found. This coin is not legible, but it appears to have a higher copper content compared to the previous two coins since it has corroded more.



Figure 16-44. Ground circular ceramic disks, from Mwanakombo.

We collected three sherds that appear to have been ground into disks, at Mwanakombo (Figure 16-44). Horton (1996: 342) describes similar finds at Shanga, Fleisher (2003: 325) describes these objects in northern Pemba, and Rødland describes examples at Tumbatu and Mkokotoni (Rødland 2021: 184). They appear to have been widespread on the coast. They may have been counters, game pieces, or unfinished spindle whorls, discarded before they were completed.



Figure 16-45. Spindle whorl, from Kandwi.

Figure 16-45 shows a simple spindle whorl from Kandwi, used for weighting a short stick used for spinning fibers into thread. It is a ground circular ceramic piece with a hole drilled in the middle. Horton (1996: 337) reported comparable simple spindle whorls made from rubbed or ground sherds with drilled holes. Rødland (2021: 174) also reports similar simple ground whorls at Tumbatu and Mkokotoni, and Fleisher (2003: 326) reports similar types from northern Pemba. Fleisher argues that the light weight of Swahili spindle whorls indicates that they were used to spin light fabrics, like cotton, which is historically attested as early as the 13th century (Horton 1996: 337).



Figure 16-46. Sharpening stones.

We collected two sharpening stones for honing the edges of blades and agricultural tools, at the sites of West_Kandwi002 and Kandwi, both in the east region (Figure 16-46). Fleisher (2003: 331-332) reports similar implements from northern Pemba and Horton (1996: 353) describes the same from Shanga. The examples they report come from precolonial sites, but they both mention that sharpening stones continued to be made into the present day. Since the examples collected here do not come from stratified contexts, it is difficult to assign them a date. These stones are made from ground and polished sandstone. During survey we also observed a man sharpening a knife using an innovative method: he poured fine sandy grit over the hard, dried base of coconut frond, and used this surface to sharpen his knife blade.



Figure 16-47. Repaired sherds. A red-painted local sherd from Kandwi (left), and late sgraffiato sherds from Kirikacha (center) and Mwanakombo (right).

We recovered three repaired sherds with drilled holes for vessel repair with wire or thread (Figure 16-47). One is a local sherd found at Kandwi, and the other two are late sgraffiato sherds found at Kirikacha and Mwanakombo. Repaired local sherds are rarer than imported sherds, since local ceramic vessels were easily replaceable.



Figure 16-48. A lamp spout, from Pwani Mchangani.

Figure 16-48 shows a lamp spout, recovered from Pwani Mchangani in the east region. Locally made ceramic lamps are found after 1000 CE. They are rare, though this may be because they are easily mistaken for normal ceramic plates or bowls, like the ones which Fleisher (2003: 323) identified in northern Pemba. Horton (1996: 354) also found lamps with similar spouts at Shanga, and Rødland (2021: 180) found lamps at Tumbatu.



Figure 16-49. The base of an incense burner, from transect 22 near Pwani Mchangani.

Near Pwani Mchangani in the indeterminate artifact scatter of transect 22, we found the base of an incense burner (Figure 16-49). It is shaped like a doorknob, and it is wheel-turned based on markings on the bottom. It is a base which would have had a cup with perforations on the sides and a lid, where incense like Zanzibar copal could be burned. Ceramic incense burners like this one are still produced today in Zanzibar, so it is difficult to discern the age of this object. Horton (1996: 353-354) found incense burners with comparable bases at Shanga.



Figure 16-50. A brass or copper door chain fastener, from Daraja_La_Mwanakombo (left), and a modern example (right).

At the site of Daraja_La_Mwanakombo, a local resident showed us a copper door chain fastener that he found at the site several years prior (Figure 16-50). Comparable fastener types can be seen on doors in Zanzibar Stone Town today.



Figure 16-51. Mofa oven fragment, from Mwanakombo.

We collected *mofa* oven fragments from Mwanakombo and Kirikacha (Figure 16-51). These are thick-walled sherds made from local clay with regular wave-like striations. They would have been part of a *mofa* oven, a large terra cotta pot used to bake unleavened millet cakes, a food referenced in Zhongli's 12th-century account of the East African coast (Duyvendak 1949; Horton 1996: 353). Fleisher's find of a complete *mofa* oven at Bandarikuu in northern Pemba was the first example outside of a stone town context (Fleisher 2003: 331). The fragments from these two inland precolonial village sites would be the second and third examples, as far as I can tell. Other examples come from Shanga (Horton 1996: 353), Kilwa (called a *gai*, Chittick 1974a: 25) and Manda (Chittick 1984: 153).



Figure 16-52. Gum copal from Mwanakombo.

We periodically found pieces of gum copal in shovel-test pits throughout the west, central and Mahonda survey regions. Figure 16-52 shows an example. Horton mentions gum copal at Shanga (Horton 1996: 351), where he says it may either have been harvested from the copal tree (*Trachylobium verruscolum*) or found in the ground as a mineralized deposit. Crowther et al. (2015) showed that a 7th/8th century incense burner from Unguja Ukuu was used to burn local Zanzibar copal from the tree *Hymenaea verrucosa*, which can be found in local soil deposits on the island. Rødland (2021: 180) reports small amounts of this at Mkokotoni and Tumbatu. Most of the gum copal we found was in isolated contexts without other artifacts, suggesting that these were natural mineralized deposits. However, a small quantity of gum copal came from the site of Mwanakombo, from STPs with artifacts dating between 1000-1400 CE. This may indicate that gum copal was collected and burned as incense at the site or traded; however, this is inconclusive without stratified contexts.

16.8 Conclusion

We did not extensively analyze or describe the artifacts listed in this chapter, but some trends are immediately apparent from juxtaposing these artifacts in relation to settlement across the survey region and over time. For one, these objects help clarify chronology in places where ceramic evidence is scant. Transect 25 in the southern part of the Mahonda survey region was likely recently settled (mid-late 20th century), since European whitewares and local ceramics are scant, but iron objects and glass are common, along with a plastic bead. Throughout the survey region, assemblages of modern iron agricultural implements and glass may indicate the tail-end of settlement at many of these sites toward the end of the late colonial period, or reoccupation and continued land use from the mid-20th century onward.

Other objects are more definitively associated with the late colonial period, like the two identifiable coins from the late 19th century. Beads are also associated with sites of the late colonial period, an understudied assemblage compared to beads of the precolonial Swahili world (e.g., Rødland 2022). Finally, the small quantity of slag pieces that we recovered come from late colonial sites: Muembe Nambo, Chaani, Njua Kuu, Kibirikani, and Daraja_La_Mwanakombo001, in addition to Mwanakombo.

Materials associated with the precolonial or early colonial period include daub, shell at Pwani Mchangani, ground sherds, spindle whorls, repaired sherds, lamps, incense burners, *mofa* oven fragments, and gum copal. These items point to the potential for understanding local craft production beyond ceramics in the inland rural areas. These objects may be useful as comparisons for future research.

Chapter 17: Discussion

17.1 Introduction

Table 17-1 shows an overview of results for this research project, incorporating archaeological and historical settlement reconstruction, geospatial analysis, and ceramic analysis.

Period (CE)	Settlement Trends in Inland Areas	Environments	Ceramic Trends
Period 1 550-1000	Seasonal camps, mobile hunting and foraging, and possible early settlements developed at Kirikacha and Mwanakombo	n/a	n/a
Period 2 1000-1500	Permanent agricultural communities at Mwanakombo and Kirikacha, with trade links to the stone town of Tumbatu. These were dispersed, autonomous villages. Swidden farming also began in the east in this period. and seasonal or ephemeral swidden farming or camping in east. Inland villages were abandoned by 1400, along with stone town of Tumbatu. Pwani Mchangani persisted to 1500.	Villages developed on <i>kinongo</i> soils near perennial streams, in higher elevation areas. Sites in the east were found in rocky, coralline limestone bedrock areas, with scrub brush.	Local production of ETT/TIW phase C and D ceramics across all sites; trade for late sgraffiato ware at permanent village sites.
Period 3, Phase 1 1500-1698	Inland villages did not reappear. Retreat inland from Pwani Mchangani to the fortified village on the plateau of Kandwi, as the Portuguese raided the coast. Swidden farming in small plots in the rocky east persisted. Stone <i>bigili</i> walls were constructed in the east region.	Kandwi lay in an area of good soil in the otherwise rocky and barren eastern landscape.	Localized ceramic production of later derived Tana/TIW continued.
Period 3, Phase 2 1698-1830	The small village of Njua Kuu was founded in the central region, possibly along with other sites that developed into hamlets and villages by the 19 th century. Swidden field plots in the east persisted.	Njua Kuu residents reoccupied <i>kinongo</i> soils in the central region.	Localized ceramic production of later derived Tana/TIW continued. At Njua Kuu, a shift toward the predominance of everted rim pots began in this period.
Period 4, Phase 1 1830-1890	Towns or large villages developed at Chaani and Mahonda, likely as a result of the arrival of enslaved East Africans brought by Omani planters. Field houses, hamlets and small village proliferated across the survey region. In the west and central regions, these sites likely represented small estates or farmhouses owned by small-time Omani, Indian or Swahili planters, or areas occupied seasonally by clove harvesters. In the east, small sites continued swidden field plot agriculture, likely practiced by indigenous Swahili people. Sites were clustered in statistically significant ways and formed a primo-convex size class distribution that reflected the growth of towns within a landscape of small hamlets and field houses.	All soil and environmental zones were occupied, though settlement was still concentrated in <i>kinongo</i> soils, near perennial streams, in higher rainfall zones, and in higher elevation areas.	Local ceramics became more uniform in temper and darker, suggesting a shift toward larger, more efficient kilns and more regional sourcing of clay. Everted rim cooking pots dominated assemblages. This reflected new modes of labor, related to cooking for and serving large numbers of workers and enslaved people away from domestic contexts. Open bowl forms were replaced by European and Chinese imported bowls for the first time. European whitewares appeared in sites of the late colonial period, indicating the extent to which the western and central areas were integrated within globalizing trade networks. These imported ceramics were rarer in the eastern region, suggesting that this region was less well-integrated.
Period 4, Phase 2 1890-1900	The 1907 Khan Bahadur map showed a snapshot of settlement across the entire island for the period between 1895 and 1900. Site size classes can be divided into hamlets, small villages, large villages, and towns. These sites were clustered in statistically significant ways. They formed a primo-convex size-class system reflecting the unique circumstances of Zanzibar Stone Town as the capital of a plantation society. More local settlement systems in the north and south reflected the relatively autonomous status of many of the small villages and hamlets in relation to the larger towns and villages.	Zonal statistical analysis for these settlements shows that they conform to expected site distributions based on a predictive model for late colonial sites. Settlements were patterned within <i>kinongo</i> soil areas, in areas of high rainfall, in high elevation zones, and in areas that correspond to modern urban settlement.	Late colonial ceramic trends continued into the 1920s or later.

Table 17-1. Overview of research project results.

This research project has recorded settlement in the rural inland areas of northern Zanzibar from the period of earliest settlement to the late colonial period and analyzed the spatial and ceramic patterns related to the settlement system. It is now possible to evaluate and answer the questions that motivated this research. I have reproduced the table of research questions below (Table 17-2).

Theoretical Framework	Landscape Archaeology	Historical Ecology	Social Transformation
Research Question	Research Question 1: What are the settlement patterns in rural inland Zanzibar from the period of earliest occupation to the present, and how do they compare to other regions of the East African coast?	Research Question 2: How did different environmental contexts mediate Swahili social development and the development of the clove plantation system?	Research Question 3: How were rural inland Swahili communities impacted by, and how did they negotiate with, social transformation and political reorganization in the precolonial, early colonial, and late colonial periods?
Method	Systematic survey, judgmental survey, and historical map analysis, along with C14 dating and imported ceramic analyses for dating sites	Zonal statistical analysis of settlement in relation to environmental zones; opportunistic survey of agricultural field systems and land use practices	Spatial statistical analysis of settlement, and local ceramic type and attribute analysis to investigate changes in ceramic production

Table 17-2. Research questions, methods, and theories, reproduced from Chapter 1.

In the following sections, I attempt to answer each of these research questions, using evidence from previous chapters.

17.2 Framework 1: Landscape Archaeology

Question 1: What are the settlement patterns in rural Zanzibar from the period of earliest occupation to the present, and how does this compare to other regions of the East African coast?

This project investigated landscapes inside and outside of historically attested plantation zones on Zanzibar and revealed a millennium of settlement across the island. The first research question focused on reconstructing these settlement patterns and comparing them to other regions of the East African coast.

In Chapter 7, I showed very scant evidence for first millennium land use in inland areas, for instance at the site of Kichangani002 on a ridge in the central region, on the Kandwi plateau in the east, or by a perennial stream at Kirikacha. Kichangani002 and Kirikacha are sites with ceramics from later periods, but radiocarbon dates of anthropogenic layers from the late first millennium. Kandwi is an inland site with a few early Tana/TIW ceramics that might indicate ephemeral occupation during this period. Speculatively, this form of land use may have occurred in woodlands, the naturally occurring vegetation in the inland areas prior to clearing and cultivation (Prendergast et al. 2016). Modern practices in similar environments on the island analogically suggest that first millennium material traces could represent the camps of shifting cultivators, hunters, or people accessing forest products like timber, medicine, or copal. Overall, the evidence for first millennium land use and occupation in inland Zanzibar is very slim and cannot be fully supported without further investigations.

I showed that Mwanakombo and Kirikacha emerged in the early second millennium as permanently settled village communities, in agriculturally fertile zones. I discussed our discovery and analysis of these sites in Chapter 7, and their position within the island's precolonial settlement system in Chapter 10. Around the year 1000, settlement systems changed all over the East African coast, as Swahili communities began a transition to urban settlement forms, social hierarchies, and increased maritimity (Fleisher et al. 2015). On Zanzibar, these processes also occurred, initially at Tumbatu and Mkokotoni in the northwest (Rødland 2021). The village communities of Mwanakombo and Kirikacha that we identified likely grew and expanded concurrently with the urban landscape there. The imported ceramics at these village communities

indicate that their residents had some contact with Indian Ocean traders, probably through middlemen at Mkokotoni or Tumbatu. The *mofa* oven fragments found at both sites (see Chapters 7 and 16) also indicate that these communities baked bread. This suggests an orientation toward cereal agriculture, likely of sorghum or millet. Residents of both sites may have also farmed rice as well, though no evidence for this exists yet besides the close proximity of both sites to rice fields and the predominance of open bowls at these sites, which reflects a shift toward rice in Pemba (Walshaw 2010, 2015). The abandonment of these early village communities does not coincide with the beginning of Portuguese colonialism, but with the abandonment of the stone town of Tumbatu between 1350 and 1400. Neither inland village site has artifacts dating to later than this period, suggesting that the fates of all three sites were intertwined. While these villages were founded as independent communities, they became increasingly integrated within the social system of Tumbatu during the 13th and 14th centuries, to the extent that they were abandoned alongside the town.

The most continuous settlement system is in the east region, where small-scale subsistence and swidden farming activities developed in the precolonial period and continue to this day, based around the village community of Kandwi. I discussed Kandwi in Chapter 8, and these eastern swidden sites across all periods in Chapters 7, 8, and 9. This area is the only part of the survey region where activities on the landscape did not appear to cease or diminish between the 15th and 19th centuries, as is the case in the rest of the survey area, and as is the case across many parts of the Swahili Coast. Though primarily a site of the early colonial period, Kandwi may have been occupied from the late first millennium to the present.

Kandwi's main phase of occupation began in the 15th or 16th century, around the same time that the coastal village of Pwani Mchangani was abandoned. This abandonment may be due to Portuguese attacks along the coast. I discuss this theory, and the relationship between Pwani Mchangani and Kandwi, in Chapter 8. Compared to Pwani Mchangani, Kandwi is secluded within dense bush, not visible from the coast, and it lies high on a steep-walled plateau that is accessible from the coast by a single stony path up a narrow gorge. The sides of this path are surrounded by dry-stone walls called *mabigili* that may have had a defensive purpose. The name Kandwi itself hints at its significance as a place of refuge: Kandwi means "stay here in peace" in the local Swahili dialect.

In the late 18th or early 19th century Swahili people reoccupied the central area of the survey region at Njua Kuu, which I discussed in the second part of Chapter 8. Starting around 1830, Omani planters brought large numbers of enslaved East Africans into the area, which caused site counts and site sizes to increase. The clove plantation system transformed agricultural landscapes, leading to deforestation and the permanent occupation of many areas in the west for the first time, as evidenced by survey results that I detailed in Chapters 6 and 9. The recovery of 32 late colonial sites across all survey regions (see Chapters 9 and 10) combined with an analysis of settlement between 1890 and 1900 from the Khan Bahadur map (Chapter 11) gave a complete view of Zanzibar's plantation system at different scales. While the Khan Bahadur map presents the settlement system for the whole island and only displays sites as large as hamlets or small villages, the archaeological record revealed fine-grained details of agricultural activities within the interstices of the settlement system. Our survey recorded four types of sites for this period, which I discussed in Chapter 9: town systems, at Chaani and possibly Mahonda, small plantation estates, at Kibirikani, Mwanakombo, and Mkataleni, surface scatters in the west and central areas that represent hamlets or areas of ephemeral agricultural activity, and surface scatters in the east, which represent continuity from earlier periods of swidden farming.

These settlement trends persist to this day in the northern part of the island. Most village settlements in the north clustered around the two arms of the clove plantation zone (see the juxtaposition of modern settlement derived from 2016 land use imagery and the arms of the clove plantation region, Figure 3-14 in Chapter 3). Spatial analyses of settlement patterns for this survey region (described in Chapter 10) show a shift from dispersed, autonomous settlement patterns in the precolonial and early colonial period, to a clustered and integrated pattern of settlement in the late colonial period, when the plantation system fully developed. Cluster and rank-size analyses of the complete settlement system for the island between 1890 and 1900 (described in Chapter 11) reflect the same patterns that we recorded archaeologically for the late colonial period, though scaled up in size.

Regional Comparisons: The most salient comparative examples for precolonial settlement come from Pemba, where surveys have also revealed centuries of precolonial settlement in the northern rural inland areas (Fleisher 2003; LaViolette and Fleisher 2018). Pemba is also perhaps the best comparison to Zanzibar because it is also a large island with similar environments, although overall it is hillier and wetter, with soils more evenly distributed throughout all geographic zones. For a true comparison, however, it is necessary to expand beyond the results of survey regions and consider both islands as whole systems.

The earliest settlements in Zanzibar were founded around the mid-6th century CE at the site of Fukuchani on the northwest coast and at the town of Unguja Ukuu on the southwest coast (Fitton 2018; Juma 2018). In contrast, the earliest recorded settlement on Pemba is at Kimimba, which was founded in the 7th century (Fleisher 2018). Village communities developed on both islands during the late first millennium, at Bandarikuu, Tumbe, and Kimimba in northern Pemba (Fleisher 2018; LaViolette and Fleisher 2018) and at Mkokotoni, Fumba, Pwani Mchumgumli, Fukuchani and Fumba on Zanzibar (Horton and Clark 1985). In all cases, village communities and the town of Unguja Ukuu developed directly on the coast. However, in northern Pemba, hamlets and smaller villages developed in inland areas as well (Fleisher 2010c: 275). In contrast, our survey did not reveal any significant late first millennium settlements. Rather, we recovered a few ETT/TIW sherds at Kandwi and Pwani Mchangani, and we dated some charcoal deposits at Kichangani002 and Kirikacha to the late first millennium. These sites need further investigation, but from data collected so far it appears as though Pemba was more densely settled during the late first millennium in the inland areas of Fleisher's (2003) survey region, in comparison to our survey region in north-central Zanzibar. While Pembans settled in hamlets in inland areas during this time, Zanzibaris may have only used inland areas as places to hunt, farm, or camp seasonally.

For the period from 1000 to 1500 CE, survey data from northern Pemba showed multiple towns with stone architecture, at Mduuni, Chwaka, and Mkia wa Ngombe (Fleisher 2010c; LaViolette 2018). These towns were the result of a process of synoecism that emptied the countryside, as residents left rural villages to agglomerate within larger social formations and participate in Islamic communal rituals (Fleisher 2010b; 2013). In Zanzibar, my evidence suggests that urban-rural dynamics did not proceed in the same way. The village communities of Mwanakombo and Kirikacha did not disappear or shrink as the townscape of Mkokotoni/Tumbatu developed, but rather grew alongside it and shared in some of the imported late sgraffiato ceramics that arrive by ship from elsewhere. These village communities were founded before Tumbatu but became linked to the townscape of Tumbatu in some way, since they appear to have been abandoned almost concurrently with the town between 1350 and 1400 CE. The political relationship between these sites is not clear, but spatial and rank-size analyses

suggest that the village communities were dispersed, autonomous settlements. Tumbatu was smaller in comparison to these villages than the rank-size rule would predict, suggesting that population did not flow from these communities to the town.

Furthermore, small ceramic scatters in the eastern region of Zanzibar suggested the development of swidden field plot agriculture during this time. The farmers of the eastern region were likely more cut-off from economic relations with Tumbatu than the residents of village communities since no imported artifacts are recovered from these sites. As far as I can tell, swidden field plot agriculture and its associated agricultural adaptations does not occur anywhere else on the coast, though this may just be due to a lack of investigation. Pemba has similar coralline limestone environments in the far east of the island, which may produce evidence for similar types of land use. Finally, Pwani Mchangani is a precolonial village that was occupied during the early second millennium, though diagnostic artifacts point toward a 14th-15th century date. The residents of this village produced a large shell mound, several meters deep. This may be somewhat rare on the East African coast or at least underreported; I can find no reference to such a feature in surveys from northern Pemba (Fleisher 2003) or elsewhere.

During the period of Portuguese rule on the coast, there are relatively few sites with which to compare results from our survey region. Many “stone towns” were abandoned or destroyed on the coast at this time, like Gede (Pawlowicz 2019), Kilwa (Wynne-Jones 2005), and Kaole (Pollard 2008), while other towns like Pate, Malindi, Zanzibar Stone Town and Mombasa grew and developed (Prestholdt 2018). On Pemba, towns like Chwaka, Mduuni, Mkia wa Ng’ombe, Mtambwe Mkuu, and Ras Mkumbuu were abandoned, and Pemba ruralized (LaViolette and Fleisher 2009). Overall, the dearth of evidence for this period and the small number of sites that we located suggests that Zanzibar underwent a similar episode of ruralization. For the site of Kandwi, the best comparison is the landscape around the Swahili village of Mvuleni in the northwest of Zanzibar. This village was positioned upland from the Portuguese estates of Mvuleni and Fukuchani and it appears that the residents of this community fortified these areas with dry-stone walls (LaViolette and Norman, in press). In a similar fashion, the site of Kandwi that we located in the eastern region may have also been occupied at this time to take advantage of a naturally fortified stony plateau.

For the second phase of the early colonial period, from 1698-1830 our survey revealed one small village in the central survey region that was founded during this time, at Njua Kuu. Additionally, we continued to locate swidden field plots in the eastern region, which date between 1500 and 1830. These small surface scatters in field plots represent the best evidence for social continuity through the early colonial period, when other precolonial settlement systems in the west were abandoned.

The late colonial settlement system that I have reconstructed through archaeological and historical evidence has no real parallel elsewhere on the coast. Croucher’s (2006) surveys around Dunga and Mahonda documented 19th century sites in inland Zanzibar previously but did not investigate sub-surface deposits with shovel-test pits. Other previous research has focused on specific sites like 19th century Vumba Kuu (Wynne-Jones 2010, 2015), Takwa (Wilson 2019), or Mgoli (Croucher 2014). Fleisher’s (2003) survey of northern Pemba, Pawlowicz’s (2011) surveys at Mikindani Bay, and Walz’s (2018) surveys of the Pangani river basin revealed 19th-century sites, but these areas were not the focus of research. Furthermore, few other regions of the Swahili Coast have such extensive historical evidence for late colonial settlement systems like the Khan Bahadur map; it was only through the synthesis of this source with systematic

archaeological survey that I have been able to reconstruct and model 19th-century settlement systems for the entire island.

In terms of ceramics, data was also limited, but ceramic analyses for the late colonial period confirm Croucher’s (2006) assertion that everted rim cooking pots became the dominant local ceramic form during this time. Imported ceramics were characteristic of specific ceramic export trade routes that reached the Middle East, Africa, southeast Asia and western North America during this time, and are similar to imports found elsewhere on the 19th century coast, like at Fort Jesus (Kirkman 1974) or Takwa (Wilson 2019).

17.3 Framework 2: Historical Ecology and Human Eco-Dynamics

Question 2: How did different environmental contexts mediate Swahili social development and the development of the clove plantation system?

Normative historical understandings of Zanzibar divide the island into a fertile west and barren south and east (e.g., Middleton 1961). However, the western areas were not uniformly suitable for agricultural production, and the east was not uniformly barren or agriculturally marginal. Zonal statistics with a variety of datasets showed evidence for diverse settlement trends across microenvironments relating to soil, geology, elevation, rainfall, proximity to water, and vegetation, among other things (see zonal maps in Chapter 3). I showed that these environmental zones shaped settlement from the earliest period to the late colonial period, and into the present. I have also demonstrated that they correlated to precolonial and early colonial ceramic temper and color, prior to increased standardization in the 19th century (Chapter 13). Finally, they inform predictive models for archaeological settlement that are confirmed by the 1907 map. Below I address the research questions related to environmental zones and the socioecological systems they constitute in Zanzibar.

Settlement data compared with environmental datasets present a paradox: the fertile western areas (with higher rainfall, deeper and more varied soils, and more access to freshwater) have more erratic and less continuous histories of settlement, though with larger and more abundant sites. In contrast, the supposedly barren eastern region did not experience the same settlement disruptions over time. Though settlements there were smaller, occupation in the east persisted relatively unchanged from early second millennium to the present day, with similar land use practices based around shifting swidden field plot agriculture. The eastern region has been settled for so long possibly because of the less quantifiable properties of eastern environments, despite their agricultural marginality: difficult terrain which makes them more secluded and more difficult to access by outsiders, as well as proximity to near-shore reefs that would have made marine resource subsistence for small-scale fishers and gatherers easier. Furthermore, the adaptive agricultural practices which enable shifting cultivation in these areas would have helped Swahili communities resist the negative effects of social transformation. These long-term continuous practices are *kupiga makongo*, for soil conservation, the construction of *mabigili*, or stone walls, and the digging of wells to access underground freshwater aquifers.

Zonal statistical analyses of settlement across different environmental contexts showed certain patterns which persisted from the earliest period of occupation to the early 20th century when settlements were recorded across the island in detail for the first time in the Khan Bahadur map. I summarized the trends showing most favored zones for archaeological sites in Chapter 10 (Table 17-3), and for the settlement of the 1907 Khan Bahadur map in Chapter 11 (Table 17-4).

Period / Dataset	Most Favored Zones
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1000-1500 (precolonial inland village sites)	<i>Kinongo</i> soil zone, M3 sandy clay marl or M1 Miocene limestone areas, moderate soil infiltration, 3–10-degree hillslope, 31-69 m elevation zones, mid-high rainfall zones, within 100 meters of perennial streams, and in areas of low to high vegetation (not bare earth areas).
1500-1830 (early colonial sites)	<i>Kinongo</i> and <i>uwanda</i> soil zones, M3 sandy clay marl or Q2/M1 mixture areas, moderate or high soil infiltration, 0-3 degree hillslope, 48-135m elevation zones, all rainfall zones, within 500 meters of perennial streams or wells from the 1907 map, and in areas of low to high vegetation (not bare earth areas).
1830-1890 (late colonial sites)	<i>Kinongo</i> soil zones, M3 sandy clay marl areas, moderate soil infiltration areas, 3-10 degree hillslopes, 69-135m elevation zones, East facing slopes, mid-high rainfall zones, within 500 meters of perennial streams or wells from the 1907 map, and in areas of modern settlement.

Table 17-3. Most favored zones for settlement, based on archaeological sites recorded during survey.

Zone	Hamlets densest in:	Small villages densest in:	Large villages densest in:	Towns densest in:	All sites densest in:
Island Zones	Clove plantation zone	Clove plantation zone	Clove plantation zone	Clove plantation zone	Clove plantation zone
Soil Types	Mchanga	Kinongo	Mchanga	Mchanga	Kinongo
Soil Infiltration	Slow	Moderate	Moderate	Moderate	Moderate
Land Use	Sandy coastal environment	Urban	Urban	Urban	Urban
1907 Streams	Zone within 500m	Zone within 500m	Zone within 3 km	Zone within 500m	Zone within 500m
1907 Wells	Zone within 100m	Zone within 500m	Zone within 500m	Zone within 500m	Zone within 500m
1907 Combined Hydrology	Zone within 500m	Zone within 500m	Zone within 500m	Zone within 500m	Zone within 500m
DEM Water	Zone beyond 3 km	Zone within 1 km	Zone within 1 km	Zone within 500m	Zone within 1 km
Geology	Q1 Recent deposits	M3 sandy clay marl	M3 sandy clay marl	Q1 Recent deposits	M3 sandy clay marl
Elevation	69-135 m (highest)	69-135 m (highest)	48-69 m (second highest)	69-135 m (highest)	69-135 m (highest)
Aspect	South	East	East	East	East
Slope Degree	3-10 degree slope	3-10 degree slope	0-3 degree slope	3-10 degree slope	3-10 degree slope
Rainfall	2000-2500 mm	2000-2500 mm	2000-2500 mm	1500-2000 mm	2000-2500 mm
Distance to Sea	<1 km	9+ km	9+ km	<1 km	<1 km
Distance to reefs	<500 m	<500 m	<3 km	<5 km	<500 m

Table 17-4. Most favored zones for different settlement size classes, based on the settlement system of the 1907 Khan Bahadur map. Green means the zone is strongly favored, yellow means moderate favored, and grey means only slightly favored.

This comparison of zonal statistics for each settlement phase helps explain the clustering of late colonial sites around the areas of most intensive precolonial settlement. Precolonial and late colonial sites clustered around areas conducive to agricultural production, in *kinongo* soil zones. I have also shown that early colonial sites, and eastern sites of the late colonial period, have locations that appear less directly related to agricultural production. The residents of these sites may have valued other factors, like seclusion or proximity to near-shore reefs on the eastern shoreline for fishing and gathering.

In comparison, sites from the settlement system of the 1907 Khan Bahadur map mostly map onto the favored zones for both precolonial and late colonial settlement, and also present a more detailed perspective, since the dataset is far larger and draws from sites across the entire island. Below, I reproduce some of the trends from my zonal analysis of sites from the 1907 map, which I described earlier in Chapter 11:

- Proximity to high rainfall, easily available stream water, or constructed wells recorded in the 1907 map are consistent predictive factors for the location of all settlement types.
- Certain soil and geology zones were important for settlement. The densest settlement across the island is concentrated in areas of *kinongo* and *mchanga* soil, over Q1 recent

deposits or M3 sandy clay marls. *Kinamo* soils have a strong negative correlation with settlement, since they are located in low-lying, swampy areas.

- Except for hamlet-sized sites, all site types correlate to the areas of the historical clove plantation zone, and to areas of modern settlement. This demonstrates the continuity of land use from the 19th century to the present.
- Hamlets and small villages are more evenly distributed across the island zones, soil zones, infiltration zones, hydrology zones, elevation zones and aspect zones compared to large villages and towns, which are more concentrated within the zones they favor. This can reflect two things: 1) the overall greater adaptability of small settlement forms across a wider variety of environments, and 2) population movements into more favorable areas which produced larger settlement forms in the first place.
- Large villages are a unique settlement form that differs from general island-wide trends. Large villages are the only settlements that are not strongly associated with above ground streams in the northwest; instead, large villages are more associated with wells in the central and southern regions. Large villages also are most dense in the second-highest elevation zone as opposed to the highest elevation zone, where all other settlement types are most dense. Finally, large villages are also most dense on slopes of 0-3 degrees, instead of 3–10 degree slopes where all other site types are found.
- Towns are most unevenly distributed between zones, compared to all other forms of settlement. This is because towns are found in the most favorable settlement areas. This can be for three reasons: 1) their large size is not sustainable in more marginal parts of the island, 2) they represent desirable places for people to move to, due to the favorable conditions, or 3) towns were founded in places that political elites seized and populated with their retinues and dependents, due to the favorable conditions for plantations there.
- Stone Town's location is not the result of particularly favorable environmental conditions for agricultural production, but rather due to its long-term political and historical significance as the capital of the island, and due to its proximity to the coast in an area free of reefs, which makes large-scale shipping easier. Mkokotoni and Tumbatu are also well-situated settlements for large-scale shipping since the channel between them is free of reefs as well. Near-shore reefs prevent large ships from coming near the shore, which likely prevented eastern parts of the island from developing ports for large vessels.
- Distance to the sea, and especially to reefs, was an important factor for site location during the 19th century despite the influence of the clove plantation system. Overall, the <1 km coastal fringe of the island is most densely populated. Furthermore, the zone within 500 meters of near-shore coral reefs is most densely settled across the island. This reflects the continued importance of marine resources for subsistence. At one scale, the distance to the sea raster demonstrated that small villages and large villages are most dense in the interior of the island. However, when distance to coral reefs is calculated, small villages are densest within 500 meters of these reefs, along with hamlets. Large villages and towns are inversely associated with distance to reefs, suggesting that the residents of these places did not directly forage marine resources, or did so on a larger scale, with bigger fishing ships in open ocean.

Agricultural Change: Zonal statistical analysis combined with survey data and comparisons to historical sources allows me to theorize four periods of agricultural change which occurred over the last millennium in inland Zanzibar: 1) grain agriculture intensification based around precolonial villages, from 1000-1400 CE, 2) long-term landscape modification and the

development of swidden farming methods, from the early second millennium to the present, 3) clove and cash crop agricultural across the west and central regions during the late colonial period as plantations developed, and 4) agricultural diversification, as clove prices fell and plantation owners fell further into debt. In the following sections I discuss these changes and relate them to findings from this research.

1. Grain Intensification, 1000-1400 CE: Given the rich marine resources of Zanzibar's coastal reefs, why would Swahili people living in coastal sites during the early second millennium venture inland, to live so far from the sea? In Chapter 6, I showed that around the year 1000 CE, this movement inland occurred permanently for the first time, at the village communities of Mwanakombo and Kirikacha. These sites were both located in rich agricultural areas, near perennial streams, and both have evidence for bread-baking, based on the presence of *mofa* oven sherds. Furthermore, marine shell or fish bone was not found at these sites, suggesting that their residents did not appear to be reliant on marine resources.

How could we explain the shift inland? Population pressure in the coastal zone would not have been a factor, since only a handful of sites are known to exist in the coastal areas of Zanzibar around the year 1000 CE. The location of these precolonial villages in the same environmental zones as later plantation areas suggest that Swahili residents may have started to settle permanently inland in order to grow grain crops, to satisfy changing dietary preferences related to Islamic cultural norms of the western Indian Ocean. This is the case in Pemba, where evidence for this comes from changes in the archaeobotanical record around the year 1000 to reflect a "conversion to rice" (Walshaw 2010). There was also a shift in ceramic forms that reflects the increased use of open bowls for rice-based dishes (Fleisher 2010b). This change to favor rice was associated with the conversion of coastal people to Islam, and a phase of social stratification in which Swahili elites began hold elaborate communal feasts (Walshaw 2010).

At Mkokotoni and Tumbatu, recent archaeobotanical research has produced evidence for rice and millet consumption, and open bowls dominate assemblages there for this period (Rødland 2021). Open bowls are also the dominant local ceramics at the sites of Kirikacha and Mwanakombo (see Chapter 13). An increased social demand for grain at all levels of Swahili society may have encouraged some Swahili residents of Zanzibar's coastline to move inland and adopt farming full time. The late sgraffiato ware found at both Mwanakombo and Kirikacha (see Chapter 14) suggests that the residents of these inland villages must have been able to trade products from the inland region to the coast in exchange for imported goods. Rice or other agricultural products may have been a trade good.

Another pattern suggesting that demand for grain at Tumbatu was the driving cause for permanent settlement in inland villages is the fact that when Tumbatu was abandoned, these village sites were abandoned as well. It may have been the case that without the demand for rice and the potential to trade it for luxury ceramics, there was no longer any incentive for Swahili people to remain so far inland, away from easily accessible marine resources in the reefs and at sea. Future research, specifically in the form of archaeobotanical studies at Mwanakombo and Kirikacha, may clarify whether rice was indeed produced or consumed at these sites.

2. Long-Term Incremental Landscape Change in the East: At the same time that Swahili people were settling permanently in inland rice-farming areas, our survey showed that they were also beginning to occupy the eastern region, where rice cannot be grown except in a few limited areas. Several sites from the eastern region that our survey located in modern swidden field plots date to the early second millennium (see Chapter 7), suggesting that by this period, Swahili

people had begun practicing swidden agriculture in this area. Factors other than the demand for grain crops may have compelled residents to occupy these zones.

Why did people move inland to the east, to farm swidden plots with shifting cultivation? These regions were as far from the sea as sites like Mwanakombo and Kirikacha but did not offer the same benefits that could be found in the center and west of the island, like deep *kinongo* soil, above-ground water, or higher rainfall. One answer may be the fact that these regions were closer to specific marine resources on the coast. While the west and north of the island have offshore reefs that are less accessible and require larger ships and greater coordination to fish, the eastern coast of the island has large reefs running along its entire length, directly off the beach. These reefs prohibit large ships from approaching close to shore, but also break up waves, and make the biodiversity of the sea accessible to small fishers in canoes or from land. Early swidden farmers in the eastern regions may have simply been coastal residents primarily engaged in marine resource exploitation, who desired to supplement their diets with crops that could be grown using swidden methods in the brush and forests of the east. Routes into the eastern inland landscape may have already been known for centuries prior, carved out by hunters and gatherers looking for forest products.

While cassava was a staple crop of choice during the late colonial period as it is today, it remains uncertain what crops early swidden agriculturalists would have cultivated prior to the introduction of this tuber. One possibility is that other root crops were cultivated, like taro and purple yam. These tubers are grown today in this region and may have arrived with precolonial Austronesian voyagers from Madagascar and the Comoros, who may have also introduced Southeast Asian varieties of rice to the Swahili Coast (Crowther et al. 2016b). Another possibility is that swidden fields were used for banana, millet, or cowpea, other crops known to have been available on the coast at this time (Crowther et al. 2016b) that do not require deep soils like rice.

This research project has uncovered evidence for long-term landscape modification practices in the east that were crucial to the longevity of swidden subsistence agriculture over the course of the second millennium. I discussed these practices in Chapter 6, and revisited them in Chapters 7, 8, and 9. I have shown that modern root crop farming requires the process of *kupiga makongo*, or the digging and cutting of coralline limestone bedrock to produce holes for planting tubers as well as fruit trees. This process has incrementally altered the coralline limestone bedrock landscape (*c.f.*, Doolittle 1984), making it better at holding and conserving water and soil. The long-term effect of many generations of farmers cutting and recutting coral holes, or *makongo*, has been to create field plots that are productive enough to sustain populations in rocky, infertile areas. Cutting or digging *makongo* also produces stone waste that would have been readily available for constructing *mabigili*, stone walls used to keep out pigs and other pests. Both these features of the eastern landscape were constructed incrementally and without centralized coordination, but they have produced a landscape capable of sustaining agricultural production.

Additionally, the construction of wells in the eastern and southern regions enabled Swahili communities to access fresh water in areas without perennial rain-fed streams. Well construction is less clearly tied to specific sites that we recovered during survey, but the Khan Bahadur map showed wells clearly aligned with villages in the eastern and southern regions by the late 19th century.

3. Clove Intensification and the Late Colonial Plantation System: Agricultural intensification occurred in the west and central areas of Zanzibar once again during the late

colonial period, when Omani planters began to grow cloves and coconuts for export as cash crops with slave labor. Actual physical evidence for clove and coconut orchard farming is scant, due to the ephemeral nature of the materials used in the harvest of both these crops. The only materials needed to harvest cloves are wood ladders to climb the trees, and straw mats for drying the cloves. For coconuts, even less is needed—a fibrous climbing strap for the feet and a sharp knife or machete are the only tools necessary to harvest coconuts, though copra, an industrial product made from coconut oil, was milled and dried in facilities. Historical sources are necessary for understanding the extent to which Omani planters transformed Zanzibar’s landscape (e.g., Bishara 2017; Cooper 1977; Sheriff 2010; Vernet 2017). Despite the lack of direct evidence for agricultural production, there are three lines of material evidence that our survey uncovered which attest to the effect of cash crop intensification on the inland areas: settlement system change, the development of stone architecture in plantation estates, and the horizon of European industrial whiteware that appeared in the survey region starting around the same time as the plantation system intensified (see Chapters 14 and 15).

In Chapter 10, I showed that the most significant impact of the clove plantation system was the growth in both site size and site count starting around the year 1830, when clove production intensified. Our survey recorded 32 sites from the late colonial period across the survey region, in contrast to only four in the early colonial period, and seven in the precolonial period. Furthermore, one of these sites, Chaani, became a large village or town during this period, dwarfing even the apex settlements of the precolonial period on the island. Chaani, it seems, was nothing special—the Khan Bahadur map depicting settlement at the end of the 19th century depicts 86 other settlements across the island of roughly similar size, in addition to 23 towns that were even larger than Chaani. In Chapter 9, I divided these 32 sites into towns, plantation estates with stone architecture, field houses, hamlets, and small villages of the western and central regions, and swidden field plots of the eastern region.

This large increase in site size and count is most likely related to the arrival of enslaved East Africans in the inland regions, brought in increasing numbers to the island starting in the early 19th century (Vernet 2017). By the mid-19th century, these new arrivals nearly outnumbered the free Swahili population of the island. The explosion of settlement size and settlement count that I recorded was a result of the rapid demographic changes that were produced by this new labor force. Behind these changes was the cassava plant, first planted in Zanzibar in 1799. This tuber appears to have supported these large slave populations since its cultivation has low labor requirements in relation to the calories it provides. Even today, cassava is associated with poverty and dependency in coastal East Africa (Kinshella 2014). Though clove intensification was more historically visible, the intensification of cassava on the island may have been more impactful in shaping the settlement system of the rural areas.

Another impact of clove intensification that is visible on the archaeological landscape was the development of plantation estates. Chapter 9 details three of these sites, at Mwanakombo, Mkataleni, and Kibirikani. All have stone architecture dating to the 19th century. This was the first time that residents of the inland region built in stone, which differentiated them socially from Swahili people building in earth and thatch and linked them to the elite mercantile class that resided in stone buildings in Zanzibar Stone Town. These stone structures in inland areas are evidence for the plantation aristocracy, but sites with stone architecture were not the only sites where plantation owners lived. We identified several other sites that residents told us were former plantation settlements with no stone architecture, like the sites at Daraja_La_Mwanakombo001, Donge_Pwani002, Donge_Mbiji001, or Donge_Mbiji002. It is

likely that many smaller plantation owners lived at sites like these in modest earth and thatch houses, not overly distinct from the residences of enslaved people. This accords with historical British sources, which express confusion over the disparity between the wealth of the region and the relative material austerity of many plantation owners. These owners did not value opulence or grand architecture like plantation owners in other parts of the world that the British were familiar with (Bishara 2017: 225). Instead, many plantation owners were satisfied with living lives of leisure and religious devotion, subsisting off the produce that enslaved people farmed on their estates.

Another impact of intensification that we documented was the proliferation of imported ceramics, specifically European industrially produced whitewares and Chinese blue and white porcelain (see Chapter 14). These ceramics, along with red Indian earthenware and glass, appear in sites dating to the late colonial period. They replaced locally made open eating bowls, which were still produced but were far less common in this period. The widespread availability of European whiteware in the west and central areas of Zanzibar attests to the wealth produced by clove production, in addition to the increasing cheapness of European industrial wares for global export. Both these processes became entangled in the global flow of commodities during the nascent period of industrial capitalism. The relative absence of European whiteware and Chinese blue and white porcelain in the eastern region attests to the fact that this zone was not enriched by clove production in the same way, since plantations did not develop there.

Finally, we documented local ceramic changes starting in the late colonial period, which likely related to the intensification of clove production and its effects on the social system of the island (see Chapter 13). Attribute analysis showed that across the survey region, local ceramics became more uniform in fabric, temper, and color. This signaled a shift away from the localized domestic contexts of ceramic production in earlier centuries. Ceramic vessels may have had clay sourced regionally rather than locally and appear to have been increasingly produced in reducing conditions, which may signify production in larger communal kilns or firing pits. This may have been an effect of demographic changes, reflecting new conditions in which large numbers of people were living more densely and in broader social systems than ever before.

Agricultural Diversification: The last phase of agricultural change that I theorize is a period of agricultural diversification. Bishara (2017) and Cooper (1977) both describe how slavery abolition and the falling price of cloves globally meant that by the late 19th and early 20th century, plantation owners became increasingly indebted to their financiers. The site of Mwanakombo is an example of how plantation estates may have dealt with this problem by attempting to diversify their sources of income to increase revenues. At Mwanakombo, this meant investing into permanent installations by the early 20th century, like the stone bridge, a waterwheel for processing sugar cane, and a stone “factory” for raising chickens. These features may have reflected attempts by late 19th and early 20th century plantation owners to divest from clove and coconut production alone, in the period after clove intensification receded. Oral histories at the site attest that these schemes were not profitable, and the increasingly indebted status of the plantation class partially produced the conditions for social upheaval in the mid-20th century that resulted in revolution in 1964.

In conclusion, while certain zones facilitated agricultural production better than others, Swahili agricultural adaptations also permitted settlement and land use to persist in more marginal areas. These zones mediated the patterns of land use and settlement in inland Zanzibar for over a millennium and shaped the contours of settlement during the development of the clove plantation system.

17.4 Framework 3: Social Reorganization and Transformation

Question 3: How were rural inland Swahili communities impacted by, and how did they negotiate with, social reorganization in the precolonial, early colonial, and late colonial periods?

Based on a synthesis of historical and archaeological sources, I aimed to investigate four episodes of social reorganization in Zanzibar. As stated in Chapter 1 and restated in Chapter 4, these phases are 1) the initial recolonization of the island by early Swahili agriculturalists from the 6th to 10th centuries CE, 2) the development of social stratification and urbanism in the early second millennium, associated with the conversion to Islam and increasing maritimity 3) the reorganization of village life following Portuguese and Omani incursions in the early colonial period from 1500-1830, and 4) the transformation of rural society during the development of the plantation economy starting in 1830, and the formation of the Omani (1749-1856) and Zanzibari (1856-1890) states in the 19th century. I addressed this research question through spatial statistical analysis of settlement, and local ceramic type and attribute analysis to investigate changes in ceramic production. In this section, I discuss the results of these two methods in relation to the periods described above.

Episode 1, 6th-10th century recolonization of the island: During this period, there was limited to no settlement evidence in the inland areas of Zanzibar that would shed light on social change during this period. We located a few sherds of ETT ceramics from the sites of Kandwi and Pwani Mchangani in the eastern area of the survey region. These sherds alone only indicate that their makers shared the same set of cultural norms for ceramic construction as other early Swahili communities across the coast. We did not find imported wares from the late first millennium, reflecting the limited degree of trade at this time. The presence of these wares in inland areas only suggests that residents of the coast may have begun venturing into the inland region at this time, perhaps to hunt or obtain forest products.

Episode 2, 11th-15th century social stratification and urbanism: Spatial and ceramic attribute analyses indicated that precolonial inland residents lived in autonomous communities and maintained sporadic trade with urban centers but were not socially or politically dominated. Our survey showed that Swahili people settled inland permanently for the first time in this period at the sites of Mwanakombo and Kirikacha. Cluster analysis of the seven inland sites showed a dispersed settlement pattern, and rank-size analyses show a convex settlement pattern (see Chapter 10). Both of these trends are associated with political and social autonomy of sites within the settlement system. Though villagers at Mwanakombo and Kirikacha had trade goods that they acquired through foreign trade, they do not appear to have been politically or socially dominated by elites elsewhere. Furthermore, local ceramic attribute analysis from these sites and from precolonial sites in the east reflects localized production. Clay color, fabric color and temper all reflect soil and geological conditions of the regions in which they were found (see Chapter 13). Craft objects like spindle whorls and slag at Mwanakombo, and *mofa* oven fragments at both sites, further paint a picture of self-sufficient and autonomous communities (see Chapter 16).

Imported ceramics at these sites may indicate some level of internal social stratification that distinguished these villages from other small settlements in the inland areas. While the quantity of late sgraffiato at these settlements is small, it is only present at these village communities, and we did not recover it in similar quantities at sites in the east (see Chapter 14).

The villages themselves were not large—Kirikacha was 1.67 hectares, while Mwanakombo was 4.24 hectares. These villages were likely residences for extended kin groups. We recovered no evidence for Islamic practice at either of these sites, although we did not

thoroughly investigate site layouts, so it is possible that we missed something like a small earth and thatch mosque structure. The presence or absence of Islamic practice at these sites is unresolved. Finally, we recovered no evidence for increasing maritimism at either of these sites. This was expected due to their inland locations, but it was also striking to find almost no shell or marine faunal remains that would suggest marine resource consumption. Larger-scale excavations may reveal if we missed the presence of marine resources at these sites, but currently evidence points toward a reliance on grain farming.

The one line of evidence that contradicts a picture of early inland village communities as autonomous and self-sufficient is the fact that both these villages were abandoned almost simultaneously with the town of Tumbatu (see Chapter 7). This suggests some degree of political and social integration, which goes against the spatial and artifactual evidence we recovered. Alternatively, the simultaneous collapse of all three sites may point to an external factor which caused abandonment that has yet to be identified.

Episode 3, Portuguese and Omani incursions in the early colonial period: Spatial clustering and rank-size analyses (see Chapter 10) indicate the continuity of dispersed and autonomous village communities during this time, though the overall dearth of settlement during this period suggests an overall demographic decrease related to initial Portuguese colonial incursions. While settlement disappeared in the west and central parts of the island during the Portuguese era, it persisted in the east where swidden field plot systems continued to show evidence for ceramic surface scatters indicating seasonal agricultural activity. Furthermore, the eastern village of Kandwi (see Chapter 8) was the only permanent community that persisted through this period. This may have been due to the secluded and fortified location of the plateau on which Kandwi lay. In Chapter 8, I showed that Kandwi was hidden when viewed from the coast, while the site of Pwani Mchangani was visible and therefore vulnerable to attack from the sea. Additionally, the natural stony landscape around the single path leading to the village of Kandwi would have offered extra protection, and it appears to have been fortified with stone *mabigili* walls. The lack of settlement in fertile agricultural areas to the west compared to in the stony east suggests an overall preference for security and stability in this period as opposed to intensification and expansion. Only at the end of the period, after the Portuguese were forced out of the Swahili world, was the central region reoccupied at the site of Njua Kuu (see Chapter 8)

Ceramics from early colonial sites reflected continuity from late derived Tana/TIW forms, and continuity in localized production on the basis of temper, fabric color, and clay color (see Chapter 13). Imported ceramics were rare in this period in the inland area with only a few sherds recovered compared to the precolonial or late colonial period (Chapter 14). This indicates a decline in trade and overall wealth. While assemblages from Kandwi and two other swidden field plot sites from Phase 1 of this period continued to reflect the importance of open bowl forms, Njua Kuu was a Phase 2 site where everted rim bowls characteristic of the 19th century were predominant, foreshadowing changes to come in the late colonial period.

While settlement intensity during this period appears to have reversed from precolonial trends, it may also be the case that these processes simply shifted south—after 1500, Zanzibar Stone Town became the principle urban center of the island, as well as the main base of the Portuguese and later Omani governors. It may be the case that our survey regions appear bare during this time because of population movement away from the north and toward a different social system in the south around Zanzibar Stone Town.

Episode 4, state formation and the development of the 19th century plantation system: For this period, I have shown how late colonial settlement patterns and trends in ceramic production

and consumption in the inland areas reflected rural adaptations to the specific contours of power within then plantation system, which tied subjects to the land and excluded them from urban centers. First, I discuss patterns for the sites I recovered during survey, and then I discuss settlement trends related to the settlement system of the late 19th century as recorded in the 1907 Khan Bahadur map.

Within my archaeological survey regions, spatial clustering analysis showed site clustering at multiple scales, which reflects population growth within favored environmental zones and possibly the effects of kin-based land tenure systems that produced settlement systems in land adjacent to already established settlements. Rank-size distribution analysis showed Chaani at the top of the settlement system, and the 32 sites of this period form a primo-convex curve.

Ceramic evidence for the late colonial period demonstrated a shift away from localized production, as temper, fabric color, and clay color all became more uniform. Temper became uniformly finer across all zones, and color uniformly darker (see Chapter 13). These changes indicate social integration for craft production at a wider regional scale, suggesting a shift away from localized domestic production. Changes in ceramic attributes and form correlated to the emergence of the plantation system, when enslaved East Africans were brought to the island in large numbers for the first time. While enslaved East African potter communities left their own vessels forms behind when they arrived on the coast, they may have produced pots using different methods that produced the changes observed in temper, fabric color and clay color during this period.

Furthermore, everted rim cooking pots replaced open bowls as the dominant ceramic type in this period. This may reflect the replacement of open bowls with imported wares, the arrival of cassava as a staple food to the island in 1799, or changes in consumer demand based on new social arrangements which necessitated feeding large numbers of people outside of domestic households, e.g., itinerant, and enslaved workers on plantation estates and in towns (see Chapter 15).

Imported ceramic analysis showed the arrival of large quantities of European whiteware and Chinese blue and white porcelain, especially in the settled regions of the west and central zones of the island where the plantation system linked rural residents into global commodity flows (see Chapter 14).

Analyzing the settlement patterns from the 1907 Khan Bahadur map, a similar trend in spatial clustering is present for all sites, which is statistically significant at multiple scales. Like the sites of the survey region, this reflected settlement preferences for specific environmental zones. Additionally, the settlement system in the 1907 map also produced a primo-convex pattern when analyzing it against the rank-size rule. When comparing different regions against the rank-size rule, the north and south produced simple convex patterns, but the central region near Stone Town produced a primo-convex pattern. This arrangement of site sizes across the landscape reflected the specific contours of the plantation system. It was relatively unintegrated, with many large villages in relation to an urban center that was smaller than the rank-size rule would predict. Nevertheless, the island was unified under a centralized state by this period and elites in the town and on plantation estates controlled all the wealth of the island's cash crop system. Unlike a normative urban center and hinterland which might exhibit a log-normal or primate distribution, the primo-convex pattern of late colonial Zanzibar reflected a socio-political system in which elites monopolized wealth and power and used this power to keep people tied to the land and to the rural areas. People did not agglomerate within the urban center of Stone

Town, partially because they were kept out by force. Reiterating from Chapter 11, Stone Town functioned less like a normal urban center during this time, and more like an elite gated community. In this system a select few enjoyed the wealth of the island, produced through slave and itinerant labor on plantation sites.

Despite the evidence for social stratification, my spatial analysis of Zanzibar's urban and rural settlement system in the late 19th century suggests that state formation, the integration of communities in Zanzibar within the state, and state power projection during the late 19th century was weak and constrained by heterarchical forces. These "infrastructures" (see Chapter 4) existed on the island and across the East African coast. They included enslaved people, indigenous Swahili communities, merchants, caravan traders, Omani plantation owners, the traditional Swahili patrician class, Indian financiers, religious scholars and holy men, mercenaries, and hinterland groups like the Wanyika.

The lack of state integration explains the relative autonomy and parallel authority of the Mwinyi Mkuu, the Swahili ruler of Zanzibar, at his estate in Dunga into the 1860s. It also explains the tenuous grip that the Busaids had over the whole coast, which relied on payments and power-sharing agreements with local governors and hinterland groups. It similarly explains the ease with which the British were able to seize the government and make it a protectorate in 1890. Mass popular resistance did exist in Zanzibar and on the coast; however, resistance did not exist at the level of an integrated state. The Abushiri Revolt of 1888 against German rule, for instance, was organized by patricians at the level of towns and communities. Finally, the failure of the Busaid state to integrate Swahili and enslaved communities in Zanzibar explains the effectiveness of racial discourse as a political factor in the mid-20th century. The state made no attempt to assimilate various ethnic groups; rather they maintained a rigid, racialized caste system that produced the conditions for racial violence in 1964 following the Zanzibar Revolution.

17.5 Conclusion

This chapter has discussed the three research questions initially posed at the start of this dissertation, answering all using evidence from archaeological survey, historical map analyses, ceramic analysis, spatial analysis, and zonal statistical analysis. Addressing the question of landscape history, I have outlined how this project has reconstructed the settlement system from the earliest period of occupation to the early 20th century, using archaeological field survey and historical map analysis. To address questions related to historical ecology and socioecological systems, I have discussed how this project used zonal statistical analyses of settlement over time in relation to different environmental contexts. Finally, to address questions of social transformation and its effect on rural inland communities, I have given an overview of how spatial analyses and ceramic analyses reflect long-term sociopolitical and demographic changes on Zanzibar.

In the following Chapter, I summarize the results of this project, and suggest avenues for future research.

Chapter 18: Conclusion

18.1 Introduction

This research has addressed long-term social transformation in Zanzibar, Tanzania. The discussion chapter preceding this one has addressed each of the research questions posed in Chapters 1 and 4. Here, I summarize and restate overall conclusions. Then I discuss avenues for future research.

18.2 Overall Conclusions

Reconstruction of the Inland Settlement System of North-Central Zanzibar: Using systematic survey and geospatial methods, I have reconstructed regional settlement in an area of north-central inland Zanzibar. My surveys (outlined in Chapters 5 and 6) revealed 44 sites across the inland regions, representing over a millennium of settlement. The precolonial period was characterized by two village communities in agriculturally fertile zones, a coastal village on the eastern shoreline, and small-scale surface scatters in the rocky eastern regions that represent seasonal occupations for swidden farming as early as the 11th century. The two precolonial villages (Mwanakombo and Kirikacha) date from the 11th to 14th centuries. They produced evidence for early trade links to the Indian Ocean world, suggesting that they may have had economic relationships with middlemen at the urban center of Tumbatu to the north.

During the early colonial period the coastal village of Pwani Mchangani was abandoned, and a single small village was founded at Kandwi on a stony plateau in the east. Swidden field plots also persisted in the eastern areas. Villages in the western and central areas did not reappear. This settlement pattern likely related to an increased emphasis on security and seclusion, during a politically turbulent period following the incursion of the Portuguese into the western Indian Ocean.

In the late colonial period, fertile areas in the west were reoccupied, and the clove plantation system developed. Four different site types reflected social divisions and demographic and economic changes. While swidden field plots persisted in the east, small surface scatters in the west likely represented hamlets or small villages associated with plantation agriculture. A third site type was the plantation estate, which we identified at Mwanakombo, Kibirikani, and Mkataleni. These sites had stone architecture and oral histories related to the plantation system. A final site type was the town, which grew to an unprecedented size during this period. Chaani and Mahonda were town-sized sites of this period, though our survey methodology only detected Chaani as a coherent site. The large growth in site count and site size during the late colonial period likely reflected demographic shifts which occurred during this era, as Omani planters imported large numbers of enslaved East Africans from the mainland. Even modest towns like Chaani that develop in this period were larger than the largest precolonial stone towns across the coast (e.g., Wilson 1982). This increase in site size reflected the transformative changes of this period.

Reconstruction of Island-Wide Settlement Using the 1907 Khan Bahadur Map: A second achievement of this project was reconstructing the settlement system of the island from 1890-1900 using the 1907 Khan Bahadur map, which shows settlements, road systems, hydrology, and other features in Zanzibar. In Chapter 11, I described the process for digitizing this map and interpreting settlement size-classes based on archaeological comparisons and typographical conventions. This process captured a different scale of settlement for the late colonial period compared to the sites recorded during archaeological survey.

Spatial Analysis: I carried out spatial analyses of clustering and site-size distributions across all periods. Settlement data for the precolonial period shows that settlements were dispersed and not politically integrated during this period. Rank-size distributions show a convex pattern, even when placing Tumbatu at the apex of the settlement hierarchy; this suggests that no precolonial inland village site was dominated by a larger neighbor. The settlement system of the precolonial period consisted of autonomous village communities that engaged with foreign trade on their own terms.

During the early colonial period, only Kandwi was permanently occupied in Phase 1, during the era of Portuguese incursion, so spatial analysis did not reveal statistically significant patterns. However, a viewshed assessment of settlement during this time shows that the seclusion provided by the Kandwi plateau may have been a factor in village's founding during this time, in contrast to the coastal village of Pwani Mchangani which was abandoned around the same period. Viewshed analysis shows that Kandwi is one of the closest areas to the coast while still being invisible to an observer on the shore or at sea, which may have made it an attractive location for settlement during a period where Portuguese ships patrolled the coasts of the island.

Spatial analyses of late colonial settlement systems shed light on economic, political, and demographic transformations, and the dynamics of anti-colonial resistance. In the late colonial period, I analyzed 32 sites from the survey region as well as the entire settlement system of the Khan Bahadur map using a cluster analysis and site-size distribution analysis. In both cases, cluster analyses showed statistically significant clustering at multiple spatial scales. This reflected settlement preferences for certain environmental zones (see below). This may also indicate kin-based systems of land tenure.

Site-size distributions for both datasets showed convex and primo-convex patterns, reflecting the specific conditions of the plantation system. For archaeological sites of the survey region Chaani was the primate site, reflecting its outsized growth in relation to an otherwise convex settlement distribution pattern. At the scale of the whole island, Zanzibar Stone Town was the primate urban center, but its relatively small size in relation to a large and robust distribution of village communities in rural areas shows that the settlement system did not conform to expectations for an urban landscape. While Stone Town dominated the island politically, it does not appear as a population center; this is best explained by the social conditions of plantation slavery and an economy based around rural agricultural production after slavery was abolished. Elites in Stone Town did not politically integrate rural communities; instead, they used their power to control the wealth in these areas and keep populations tied to the land. This lack of political integration resulted in the weakness of the Busaid state, which was easily seized by the British. Anti-colonial resistance on the East African coast was fierce, but it was not organized at the level of the state. Rather, heterarchical elements organized resistance, like religious and town leaders, Swahili patricians, and other non-Swahili communities.

Environmental Analysis: The densest settlement clusters of the plantation system in the late colonial period developed across the central and western areas of the island, nearly on top of precolonial inland village communities. Zonal statistical analyses of sites across different environmental contexts (Chapters 10 and 11) show that this was likely due to preferences for specific environmental zones related to agricultural production, favored by both the grain-producing inhabitants of precolonial villages and clove tree planters of the late colonial period. These zonal preferences have allowed me to produce predictive models for site locations across the island, which point to *kinongo* soil areas with moderate soil infiltration, high rainfall, high

elevation, and proximity to perennial streams as important settlement areas, and zones with a high likelihood to contain additional undiscovered sites.

However, while agriculturally fertile regions in the west and central areas supported large-scale settlement, occupation histories were chronologically fragmented and reflected periods of social reorganization. In contrast, the rocky and agriculturally marginal eastern regions of the island supported consistent small-scale occupation from the earliest period to the present. Specific agricultural adaptations (*kupiga makongo*, the construction of stone walls, and the digging of wells) in the east and south allowed rural communities to persist through social reorganization and political marginalization. Reef systems also likely related to differences in settlement across the island—near-shore reefs in the east supported small-scale marine subsistence, while the lack of reefs in the west and around Mkokotoni, Tumbatu and Stone Town would have permitted larger ships to come closer to shore.

Today, demographic pressures finally appear to be having an effect on the practice of shifting cultivation in the east. With population growth in recent decades, mobility for shifting cultivators is far more limited, and in some areas like Kandwi Kibokwa, it no longer exists. All land is owned and farmed, meaning that harvests have become more marginal as less land is available to rest in fallow. These pressures may spur new adaptive agricultural strategies for intensifying production.

Recognition of the adaptive strategies that Swahili people developed in the east should nevertheless not justify their exclusion and dispossession in the 19th century, or the relative poverty of the east in the present day, which is a legacy of late colonial history. Land use in the east during the late colonial period developed within the context of exclusion and displacement, as fertile lands in the west were developed by enslaved people for the purpose of making profits from cash crops. Given this history of dispossession and exclusion, I want to avoid characterizing agricultural adaptation in this region as something to be celebrated or valorized. The east is the poorest region of a poor island, where people literally scratch (*kupiga*) subsistence off rocks. Much of the land directly on the coast has been bought up by beach hotels, who do not reinvest in the local economy. It feels crass to frame agricultural techniques as enabling “resilience”, which, in my view, paints a kind of triumphalist or feel-good narrative. Actual resilience should come through a political solution at a systemic level—investment in infrastructure, healthcare, and education, and some kind of redistribution of wealth from the tourism industry, which now dominates the economy of the island. Archaeologists in general should consider the broader political contexts in which agricultural adaptation and resilience takes place—often, it occurs in contexts where other economic opportunities are limited, for sociopolitical reasons relating to deep histories of dispossession and exploitation.

Ceramic Trends: Across my survey area, I identified local and imported ceramic types consistent with regional types across the coast during the second millennium. One contribution of this research has been to show evidence for these types in inland Zanzibar, especially late sgraffiato wares that we identified at inland sites for the first time. Another result has been to synthesize the limited number of local ceramics from the early colonial period on Zanzibar with scattered 16th and 17th century assemblages elsewhere on the coast—at Fort Jesus, Gede, Takwa, Ungwana on the Tana, Kilewa, Pate, Kilwa and Manda. Finally, a result of ceramic analysis for the late colonial period has confirmed the findings of Croucher’s (2006) excavation at Mgoli, which showed everted rim cooking pots dominating the assemblage. This also appeared to be the case across the regions that we surveyed, though we also have shown that other bowl and jar forms persisted into this period from derived Tana/TIW ceramics.

Attribute analyses of local ceramics over time show that in the precolonial and early colonial periods, ceramic temper, fabric color and clay color reflected local soil and geological conditions. In the late colonial period, local ceramics became uniformly darker and had a more uniformly fine temper. These changes suggest that there was a shift from localized to regional production over the last millennium, indicating the reorganization of craft networks on the island alongside the development of the late colonial plantation system. This may reflect the arrival of new potter communities among enslaved East Africans from the mainland. This trend is paralleled by shifts in imported ceramics, reflecting how certain parts of Zanzibar's settlement system became increasingly integrated within specific 19th-century global commodity flows. European hand-painted, sponge decorated and transfer-printed whitewares and late Qing Chinese blue and white porcelain appeared in relatively large quantities across sites in the late colonial period, especially in the west and central regions.

Historical and Archaeological Synthesis of Chronology: Finally, on the basis of ceramic assemblages, site counts, and historical sources, one result of this research project has been to clarify and refine periods and phases for the early and late colonial era in Zanzibar. I discussed this in greater detail in Chapter 4 and Chapter 15. Overall, my analysis suggests that the early colonial period should be divided into two phases, from 1500-1698 (Portuguese rule), and then from 1698-1830 (early Omani rule). Rather than taking the entire 19th century as a period or defining the late colonial period as the phase of Busaid rule on the coast (1750-1890), I suggest that 1830 is a temporal marker that reflects real sociopolitical, material, and economic changes which occurred on Zanzibar, related to the intensification of the clove plantation system. As such, I define the first phase of the late colonial period as the years from 1830-1890, when the plantation system developed under independent Busaid rule. 1890 to 1963 was the second phase of the late colonial period, during the British protectorate.

18.3 Future Research Directions

This research has systematically reconstructed the spatial patterns of sites and settlements across a region of inland Zanzibar and synthesized these results with historical sources. Future research might reveal more about daily life and material culture within the sites that we recorded. Since we were not able to perform stratigraphic excavations of sites in the survey area, little can be said about the materiality of daily existence in inland regions apart from our summary of long-term ceramic trends. Stratigraphic excavations at precolonial, early colonial and late colonial sites might help clarify spatial layouts within sites, refine ceramic chronologies, investigate other aspects of the domestic economy, and clarify social networks between the inland areas and urban centers at Tumbatu and Zanzibar Stone Town. Furthermore, far more could be done with zonal statistical analysis; for instance, using the zones presented in Chapter 3, it might be possible to model and predict coastal settlement as well as settlement in inland areas. Environmental modeling that takes reefs and landforms into consideration could be productively used to aid in surveys for more first-millennium sites on the coast, which would help clarify the dynamics of island resettlement from the 6th to 8th centuries.

For the precolonial period, one future priority is to clarify the relationships between inland village communities and the urban center of Tumbatu. While Mwanakombo and Kirikacha clearly were developed and abandoned within the same chronological frame as Tumbatu, it is still not clear exactly how the residents of these sites would have related to one another. Stratigraphic excavations and archaeobotanical and faunal analysis between these three sites would help to reconstruct the settlement system of the early second millennium in northern Zanzibar.

For the early colonial period, stratigraphic excavations with archaeobotanical and faunal analyses at Kandwi and Pwani Mchangani would likely produce assemblages to compare with those from other known early colonial sites on Zanzibar, like the Portuguese farms at Mvuleni and Fukuchani, or 15th and 16th century contexts from Stone Town itself. This research would build toward refining the ceramic chronology for the early colonial period and help to understand the early colonial domestic economy in relation to the Portuguese and early Omani colonial projects.

For the late colonial period, stratigraphic excavations at sites like Kibirikani, Mwanakombo and Chaani might reveal trends related to daily life, domestic production, and the materiality of slavery on Zanzibar. Furthermore, from a landscape perspective, a pressing question is the way in which Omani plantation owners projected and enforced power in rural areas. Site-size distributions reflect a relatively unintegrated urban system during the mid-19th century, so how did Omani plantation owners maintain a social system based on slavery and extracting wealth through cash crop agriculture? Were these methods comparable to strategies of power within other plantation systems globally? To answer this question, it may be useful to investigate the spatial landscapes of plantation estates themselves, as Croucher (2006) did at Mgoli in Pemba. This research might shed light on how plantations organized space and controlled enslaved populations. Analyzing the spatial layouts of plantation sites likely will require ground-penetrating radar or large-scale excavations, to assess the complete spatial layout of subsurface deposits. Future understanding might also come through a synthesis of Arabic-language sources (*c.f.* Bishara 2017), which may reveal previously unknown aspects of the plantation system and social life during this period.

FOMU YA ENEO – LOCALITY FORM
UPIMAJI WA ARDHI ZANZIBAR 2019 - ZANZIBAR SURVEY 2019

Jina la Eneo <i>Locality Name</i>			Tarehe <i>Date</i>	Saa <i>Time</i>
Alama za GPS / <i>GPS Points</i>	Longitudo <i>Longitude</i>	Latitudo <i>Latitude</i>		
Deta <i>Data</i>	Mwandishi <i>Recorder</i>	Picha za Eneo <i>Photographs</i>	Hali ya Hewa <i>Weather</i>	

Maelezo ya Mandhari *Environment*
description

Upeo <i>Terrain</i>	
Mteremko <i>Slope</i>	
Uoto <i>Vegetation</i>	
Jiolojia <i>Geology</i>	
<i>Geomorphic</i> <i>feature</i>	
Maji <i>Water</i> <i>elements</i>	
Uso wa mandhari <i>Surface</i>	

**Shughuli za
Watu**
Human activity

Shughuli za watu wa kale <i>Archaeological</i> <i>human activity</i>	
Shughuli za watu wa kisasa <i>Modern human</i> <i>activity</i>	

Kumbusho / Ramani - *Notes/Maps*

of associated locality sheets _____

FOMU YA SEKTA - TRANSECT FORM

UPIMAJI WA ARDHI ZANZIBAR 2019 - ZANZIBAR SURVEY 2019

Eneo - *Locality*:

Sekta # - *Transect #*:

Mashimo la Uchunguzi yaliyochimbuliwa – *STPs which were dug*:

Mifuko # - *Bag #*:

Tarehe - *Date*:

Mpimaji / Timu - *Surveyor/Team*:

Alama za GPS za Mwanzo – *Beginning GPS coordinates*:

Alama za GPS za Kati – *Middle GPS coordinates*:

Alama za GPS za Mwisho – *Ending GPS coordinates*:

Maelezo ya Sekta: Uoto, mteremko, maji, jiografia ya asili na vitu vilivyotengenezwa na watu, namna za udongo. Ukubwa wa sehemu ya ugunduzi. - *Transect Description: Vegetation, slope, water, natural / human features, soil type.*

Vitu vya Kale: Ueleze namna za vitu hivi. - *Artifacts: Please note artifact types.*

Gunduzi Maalum - *Special Finds/Features/Conditions*:

Namba ya Mahali - Site Number _____

Fomu ya Mahali - Site Survey Form

Upimaji wa Ardhi Zanzibar 2019 - Zanzibar Survey 2019

UC Berkeley – Zanzibar Department of Antiquities

Tarakimu ya Mahali Site Code _____ Jina La Mahali Site Name _____

Tarehe Date _____

Mkoa Region _____ Kiambo District _____ Mtaa Ward _____

Jina katika Ramani Map Reference _____ Urefu _____

Elevation _____

UTM: Kaz. (N) _____ Mash. (E) _____ From GPS? Y N

Kaz. (N) _____ Mash. (E) _____

Kaz. (N) _____ Mash. (E) _____

Kaz. (N) _____ Mash. (E) _____

Sekta Transect _____ Mahali uligunduliwa na mashimo la uchunguzi? Located with STPs? Y N

Kama Y, utaje namba za mashimo If Y, list STP number(s) _____

Maelezo, umbali (m), na mwelekeo wa: Distance to, direction to, description of nearest (in meters):

• mji/kijiji town/village _____

• maji ya kunywa fresh water _____

• pwani shoreline _____

• Mahali ya uzee wa kufanana contemporary sites _____

Hali ya topografia Topographic Setting _____

Uoto/Kilimo Vegetation/cultivation _____

Maelezo ya Udongo Soil description _____

Njia ya kufika mahali Directions to _____

site _____

Mwenye Ardhi na Anwani Yake Owner and _____

address _____

Namba ya Mahali - *Site Number* _____

Wengine wanaofahamu mahali *Others knowledgeable about*

site _____

Vipimo vya Mahali (m) - *Site dimensions (m)*

Namna ya Mahali / Maelezo *Site type/description/visible*

features _____

Maelezo ya safu za asili: kina na hali *Depth/condition/description of*

deposits _____

Vitu vya kale vilivyoona *Artifacts*

observed _____

Vitu vya kale vilivochukuliwa na utaratibu wa kuvichukua *Artifacts collected/collection*

procedures _____

Kronolojia inayokadiriwa, na sababu *Estimated chronology (and why)*

Marejeo yanayochapishwa *Published*

references _____

Tarakimu za Mifuko *Bag*

Numbers _____

Namba ya Mahali - *Site Number* _____

Kazi inayopendekezwa, na maoni mbali zaidi *Further work recommended, comments*

Kazi iliyofanyikiwa *Work Done:*

- kusanya kutoka uso *surface collection*
- Mashimo la Uchunguzi *STP*
- uchimbuaaji *excavation*
- keeke ya udongo *auger*
- picha *photo* _____
- ramani *plan*
- mahojiano *interviews*
- kuwekwa kwenye ramani ya topografia *plotted on topo map*

Ongezeka *Appended:*

- ramani ya mahali *site map*
- ramani ya topografia *topo map*
- LRF
- fomu ya shimo la uchunguzi *STP form*
- picha *photo*
- sura za kuta za mraba wa kiakiojia *profiles*
- choraji *drawings*
- ramani zilizochorwa *plans*
- _____

Mwandishi *Recorder* _____

FOMU YA UPANA WA VITU VYA KALE – ARTIFACT SCATTER FORM

UPIMAJI WA ARDHI ZANZIBAR 2019 - ZANZIBAR SURVEY 2019

Eneo - *Locality*:

Sekta - *Transect*:

Upana wa Vitu vya Kale # - *Artifact Scatter #*:

Mfuko # - *Bag #*:

Tarehe - *Date*:

Mpimaji / Timu - *Surveyor/Team*:

Alama ya GPS ya kwanza – *First GPS point*:

Alama ya GPS ya pili – *Second GPS point*:

Alama ya GPS ya tatu – *Third GPS point*:

Alama ya GPS ya nne – *Fourth GPS point*:

Maelezo ya Sehemu ya Ugunduzi: Uoto, mteremko, maji, jiografia ya asili na vitu vilivyotengenezwa na watu, namna za udongo. Ukubwa wa upana huo. - *Findspot Description: Vegetation, slope, water, natural / human features, soil type. Size of artifact scatter.*

Vitu vya Kale: Ueleze namna za vitu hivi na msongamano wao katika upana huo. - *Artifacts: Please note artifact types and relative density within the scatter.*

Gunduzi Maalum - *Special Finds/Features/Conditions*:

FOMU YA SHIMO LA MAJARIBIO - STP FORM - 2019

Sekta - Transect:	Shimo # - Test Pit #:	Mfuko # - Bag #:	Tarehe - Date:	Alama za GPS - GPS Coordinate s:	Kina - Depth	Namna ya Udongo - Soil Types	Vitu Vya Kale - Artifacts	Maoni - Comments

FOMU YA SEHEMU ZA GUNDUZI- *FINDSPOT FORM*
UPIMAJI WA ARDHI ZANZIBAR 2019 - *ZANZIBAR SURVEY 2019*

Sekta - <i>Transect:</i>	Sehemu # - <i>Find spot #:</i>	Mfuko # - <i>Bag #:</i>	Tarehe - <i>Date:</i>	Alama za GPS - GPS <i>Coordina tes:</i>	Namna ya Udongo – <i>Soil Types</i>	Vitu Vya Kale – <i>Artifacts</i>	Gunduzi Maalum – <i>Special Finds</i>

Appendix B: Ceramic Data

This appendix shows the find frequency data for local and imported ceramics.

Date	Bag	GPS Point Name	weight (g)	Local Dec Rims	Local Under Rims	Local Dec Body	Local Under Body	Local Base	Imported Rim	Imported Body	Imported Base
30-Jun-19	1	1-S1P2	131	30	1		1				
30-Jun-19	2	1-S1P6	7	7			2		1		1
30-Jun-19	3	1-S1P9	3	3			1				
30-Jun-19	4	1-S1P14	5	4			1				
30-Jun-19	5	1-S1P15	5	5			1				
30-Jun-19	6	1-S1P17	10	10			1				
30-Jun-19	7	1-S1P19	25	25			4				
30-Jun-19	8	1-S1P20	23	23			9				
30-Jun-19	9	1-S1P21	4	4			2				
30-Jun-19	10	1-S1P3	5	5			1				1
30-Jun-19	11	1-S1P4	3	3			1				1
30-Jun-19	12	1-S1P5	21	21			8				1
30-Jun-19	13	1-S1P6	2	2			1				1
30-Jun-19	14	1-S1P5	1	1			1				1
30-Jun-19	15	1-S1P6	23	23			1				1
30-Jun-19	16	1-S1P6	22	22			1				1
30-Jun-19	17	1-S1P7	8	8			1				1
30-Jun-19	18	1-S1P9	1	1			1				1
30-Jun-19	19	1-S1P10	1	1			4		1		1
30-Jun-19	20	1-S1P11	6	6			4		1		1
30-Jun-19	21	1-S1P12	616	3	3		4		1		1
30-Jun-19	22	1-S1P21	12	12			2				
30-Jun-19	23	1-S1P24	36	36			9				
30-Jun-19	24	1-S1P25	23	23			3				
30-Jun-19	25	1-S1P31	31	24			3				
30-Jun-19	26	1-S1P31	13	13			1				1
30-Jun-19	27	1-S1P32	21	21			6				
30-Jun-19	28	1-S1P34	46	46			8				
30-Jun-19	29	1-S1P34a	62	62			7				
30-Jun-19	30	1-S1P34b	52	52			7				
30-Jun-19	31	1-S1P35	77	77			1				
30-Jun-19	32	1-S1P35	56	56			1				
30-Jun-19	33	1-S1P35	6	6			1				
30-Jun-19	34	1-S1P39	17	17			1				
30-Jun-19	35	1-S1P39	15	15			1				
30-Jun-19	36	1-S1P39	14	14			1				
30-Jun-19	37	1-S1P39	5	5			1				
30-Jun-19	38	1-S1P39	168	168			9		1		
30-Jun-19	39	1-S1P41	111	29			11				
30-Jun-19	40	1-S1P41	29	29			3				
30-Jun-19	41	1-S1P41	34	34			3				
30-Jun-19	42	1-S1P41	21	21			3				
30-Jun-19	43	1-S1P41	145	145			7				1
30-Jun-19	44	1-S1P41	8	8			3				
30-Jun-19	45	1-S1P41	14	14			1				
30-Jun-19	46	1-S1P43	4	4			1				
30-Jun-19	47	1-S1P43	34	34			1				
30-Jun-19	48	1-S1P43	10	10			6				
30-Jun-19	49	1-S1P43	17	17			1				
30-Jun-19	50	1-S1P43	4	4			2				
30-Jun-19	51	1-S1P43	9	9			2				
30-Jun-19	52	1-S1P43	79	79			2				1
30-Jun-19	53	1-S1P43	176	176			67				
30-Jun-19	54	1-S1P43	1225	1225			85				
30-Jun-19	55	1-S1P43	1285	1285			2				
30-Jun-19	56	1-S1P43	459	459			2				
30-Jun-19	57	1-S1P43	32	32			3				3
30-Jun-19	58	1-S1P43	34	34			3				3
30-Jun-19	59	1-S1P43	58	58			3				3
30-Jun-19	60	1-S1P43	1	1			2				2

Appendix C: AMS C14 Dates

I took nine charcoal samples from shovel-test pits and submitted them for AMS C14 radiocarbon dating to the Keck Carbon Cycle AMS Facility at the University of California, Irvine. I calibrated this data using the OxCal program, in version 4.4. I used the SHCal 20 calibration curve, which is appropriate for the southern hemisphere. Table 0-1 shows the raw data. Table 0-2 shows an estimated date range in CE based on the calibration curves, with a confidence interval of 95.4%. Figure 0-1 through Figure 0-9 show the calibrated data tables for each sample. Figure 0-10, Figure 0-11, and Figure 0-12 show the locations of each sample.

The spread of samples is not ideal since I had to leave the field early due to a medical emergency, and I was not able to return to complete sampling due to the Covid-19 pandemic. I wanted to sample Kirikacha and other sites more intensively, but I was not able to do so. Instead, I chose to use funds to analyze the samples that I did take, which primarily came from the site of Mwanakombo.

Samples 001-Mwana, 004-Mwana, 005-Mwana, 006-Mwana, and 007-Mwana came from the deepest layers in shovel-test pits in open areas of the site. I took these with the aim of determining the earliest period of occupation at the site. The results show that the earliest levels at the site date to the 11th-12th centuries, which matches the ceramic evidence well. One sample, 006-Mwana, suggests a slightly earlier date from the late 9th to 11th centuries.

Samples 002-Mwana and 003-Mwana came from the deepest levels of a fill beneath the floor of the 19th/20th century house at Mwanakombo. These samples date to the late second millennium with 95.4% confidence. They also date to a more constrained period within the 19th century, though with a lower confidence percentage.

The sample from Kichangani002 (008-Kich) came from a piece of charcoal attached to a large local ceramic sherd that we found in a shovel-test pit. The sample dates from the late 9th or 10th century. This is an anomalous date not in line with the 19th-century ceramic evidence from the site.

The sample 009-Kiri came from the deepest level in an STP at Kirikacha. I took this sample to determine the earliest date for this site. I intended to take other samples from this site as well, but I was forced to leave the field by a medical emergency. The sample gives a date from the late 7th to mid-9th century, which is earlier than ceramic evidence at the site would suggest. This warrants further excavation and more radiocarbon dating, to determine whether our survey missed late first millennium site components at Kirikacha.

UCIAMS	Sample name	Site	Depth (cm)	d ¹³ C	±	fraction	±	D ¹⁴ C	±	¹⁴ C age	±
#				(‰)		Modern		(‰)		(BP)	
252613	001-Mwana	Mwanakombo	65			0.8790	0.0015	-121.0	1.5	1035	15
252614	002-Mwana	Mwanakombo (house)	80			0.9803	0.0017	-19.7	1.7	160	15
252615	003-Mwana	Mwanakombo (house)	70			0.9833	0.0017	-16.7	1.7	135	15
252616	004-Mwana	Mwanakombo	82			0.8871	0.0015	-112.9	1.5	960	15
252617	005-Mwana	Mwanakombo	80			0.8884	0.0015	-111.6	1.5	950	15
252618	006-Mwana	Mwanakombo	70			0.8681	0.0015	-131.9	1.5	1135	15

252619	007-Mwana	Mwanakombo	35			0.9832	0.0017	-16.8	1.7	135	15
252620	008-Kich	Kichangani002	35			0.8672	0.0015	-132.8	1.5	1145	15
252621	009-Kiri	Kirikacha	75			0.8509	0.0015	-149.1	1.5	1295	15

Table 0-1. Radiocarbon data, showing ¹⁴C age in years BP.

UCIAMS	Sample name	Site	Depth (cm)	Estimated Date Range (CE), 95.4% probability
#				
252613	001-Mwana	Mwanakombo	65	994-1140, ±15
252614	002-Mwana	Mwanakombo (house)	80	1686-1921, ±15
252615	003-Mwana	Mwanakombo (house)	70	1698-1810, ±15
252616	004-Mwana	Mwanakombo	82	1045-1183, ±15
252617	005-Mwana	Mwanakombo	80	1046-1210, ±15
252618	006-Mwana	Mwanakombo	70	896-1015, ±15
252619	007-Mwana	Mwanakombo	35	1698-1810, ±15
252620	008-Kich	Kichangani002	35	895-994, ±15
252621	009-Kiri	Kirikacha	75	685-856, ±15

Table 0-2. Estimated date ranges for each sample, in CE.

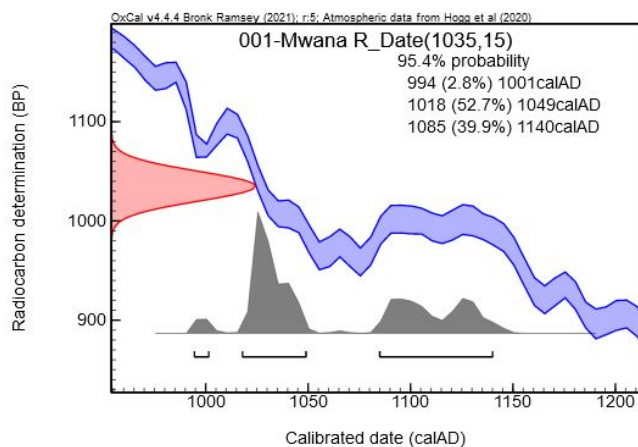


Figure 0-1. 001-Mwana OxCal calibration curve.

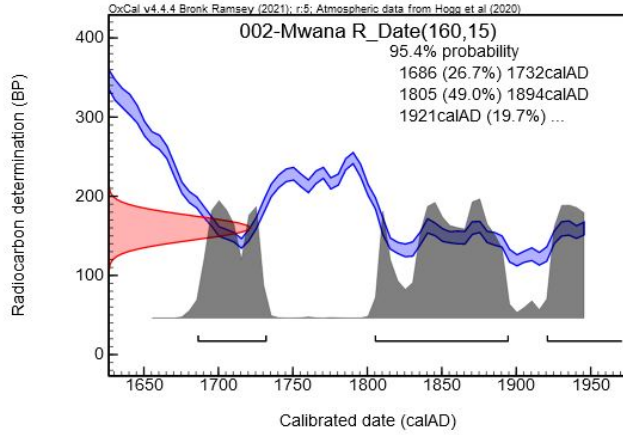


Figure 0-2. 002-Mwana OxCal calibration curve.

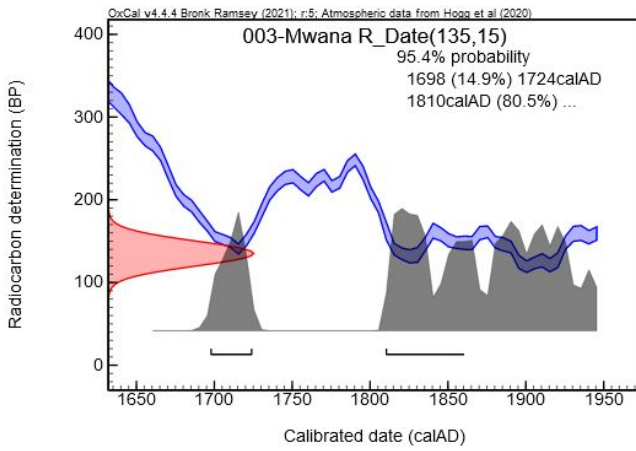


Figure 0-3. 003-Mwana OxCal calibration curve.

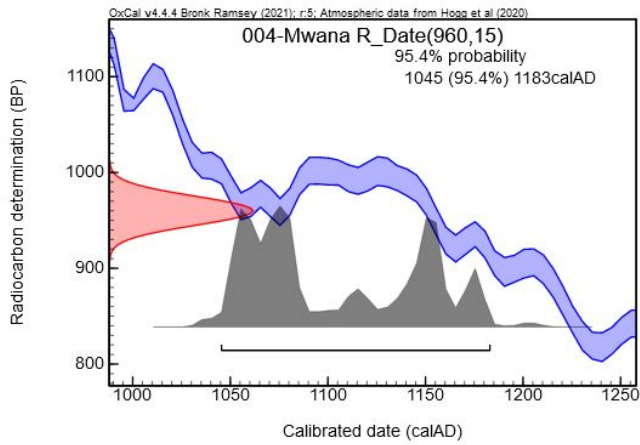


Figure 0-4. 004-Mwana OxCal calibration curve.

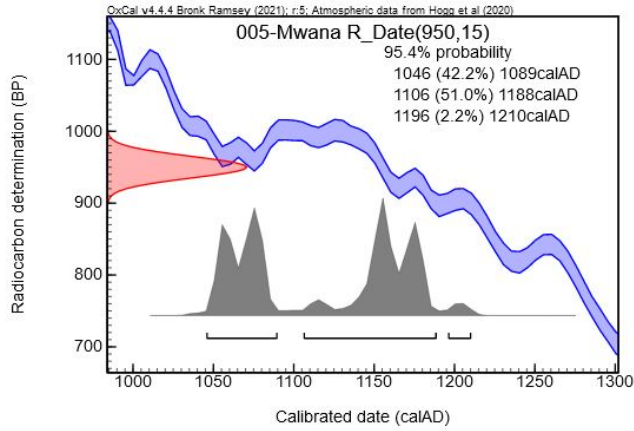


Figure 0-5. 005-Mwana OxCal calibration curve.

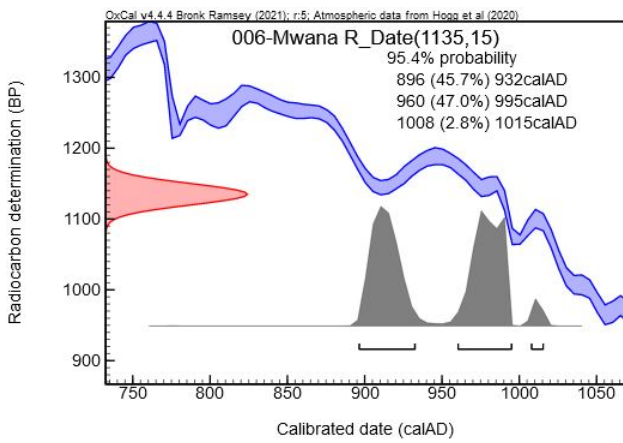


Figure 0-6. 006-Mwana OxCal calibration curve.

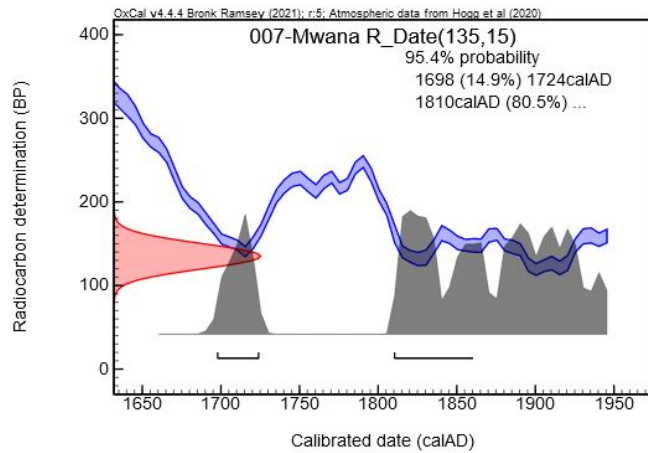


Figure 0-7. 007-Mwana OxCal calibration curve.

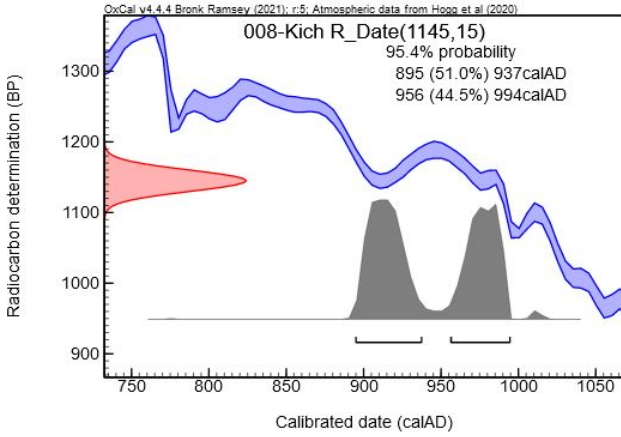


Figure 0-8. 008-Kich OxCal calibration curve.

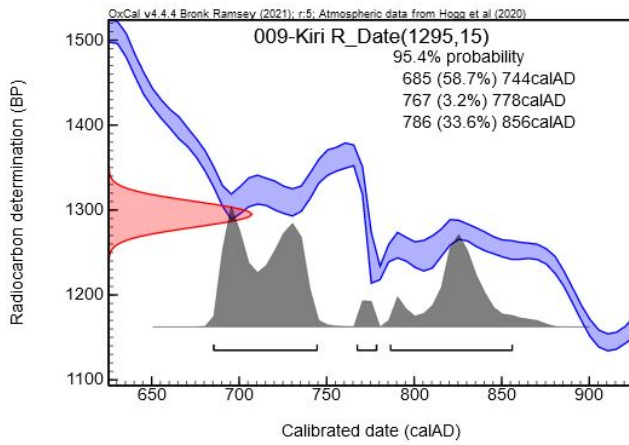


Figure 0-9. 009-Kiri OxCal calibration curve.

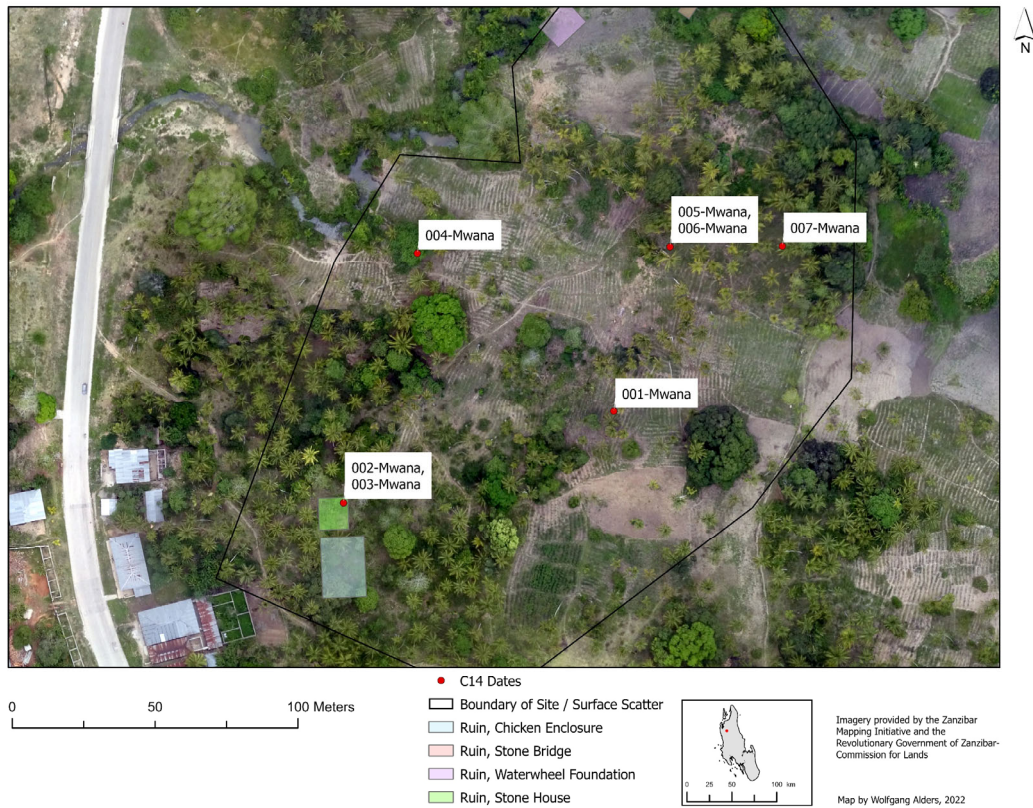


Figure 0-10. Locations of charcoal samples at Mwanakombo.

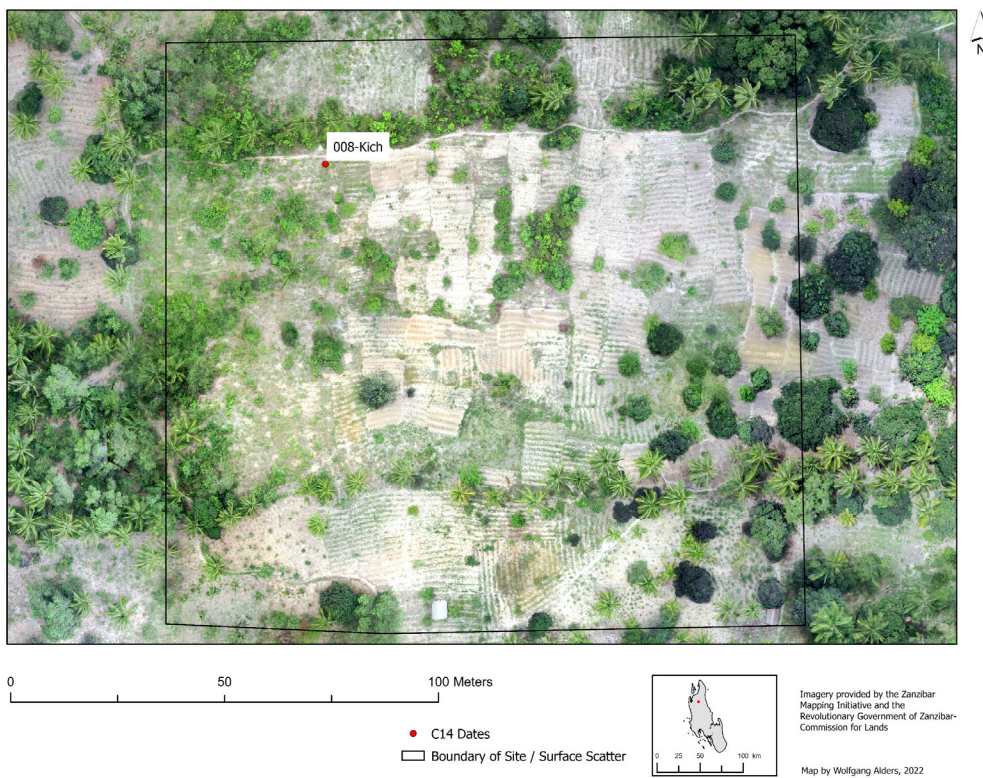


Figure 0-11. Location of charcoal sample at Kichangani002.

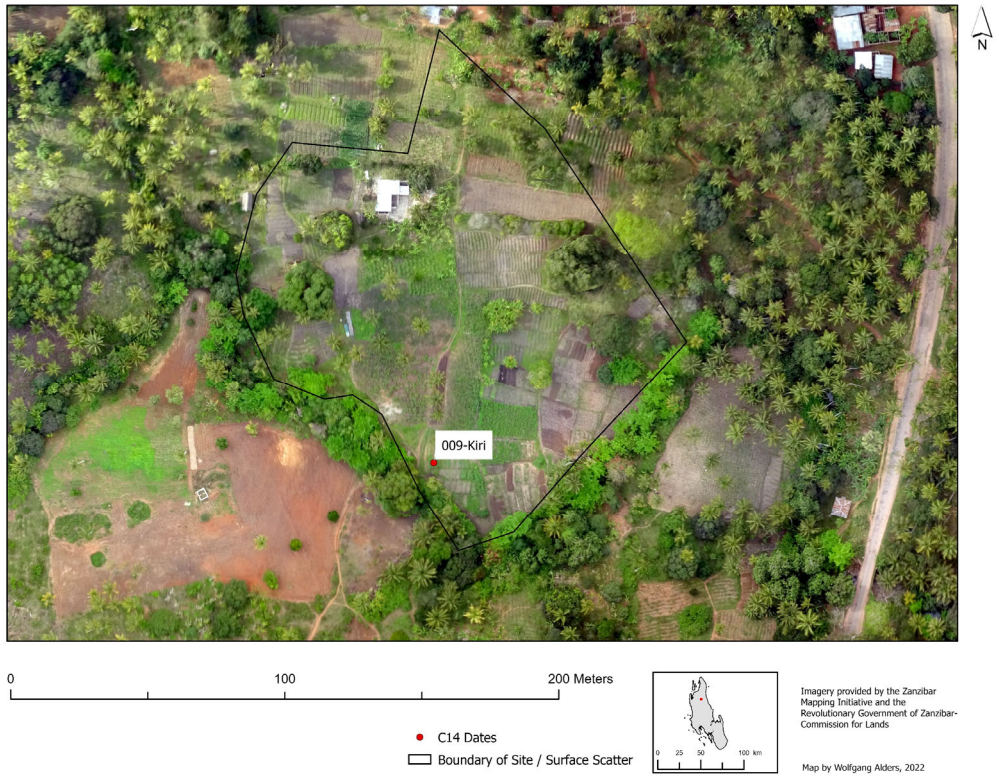


Figure 0-12. Location of charcoal sample at Kirikacha.

Appendix D: Permits

This appendix shows the permits that I obtained in order to complete my field research in 2019.

REVOLUTIONARY GOVERNMENT OF ZANZIBAR

<p>SECRETARY ZANZIBAR RESEARCH COMMITTEE P. O Box 239 Tel: 2230806 FAX: 2233788</p>		
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RESEARCH/FILMING PERMIT
(This Permit is only Applicable in Zanzibar for a duration specified)

SECTION

Name:	Wolfgang Alders
Sex	Male
Date and Place of Birth	October 31 1991
Nationality:	USA
Passport Number:	486615644
Date and Place of Issue	19 Oct 2011 B.MD.USA
Date of arrival in Zanzibar	8 June 2019
Expected date of departure	1 Oct 2019
Duration of study	1 Year
Research Tittles:	Settlement History in Plantation Landscapes of Central Zanzibar AD1500-1850

Full address of Sponsor: University of Colifonia B.B. CA94720 aldres@berkeley.edu

This is to endorse that I have received and duly considered applicant's request I am satisfied with the descriptions outlined above.

Name of the authorizing officer: Mwanaisha A. Khamis

Signature and seal: 

Institution: Office of Chief Government Statistician

Address: P. O Box 2321
Zanzibar.

Date: 21/06/2019



NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE: *October 11, 2018*
TO: Lisa Maher
Wolfgang Alders, Anthropology
CPHS PROTOCOL NUMBER: *2017-12-10574*
CPHS PROTOCOL TITLE: *Settlement History in the Plantation Landscapes of Central Zanzibar, AD 1500-1850*
FUNDING SOURCE(S): *Funding Type#*

A(n) *new* application was submitted for the above-referenced protocol. The Committee for Protection of Human Subjects (CPHS) has reviewed and approved the application on an expedited basis, under Category 7 of the federal regulations.

Effective Date: *October 11, 2018*

Expiration Date: *October 10, 2028*

Continuation/Renewal: Applications for continuation review should be submitted no later than 6 weeks prior to the expiration date of the current approval. *Note: It is the responsibility of the Principal Investigator to submit for renewed approval in a timely manner. If approval expires, all research activity (including data analysis) must cease until re-approval from CPHS has been received.* See [Renew \(Continue\) an Approved Protocol](#).

Amendments/Modifications: Any change in the design, conduct, or key personnel of this research must be approved by the CPHS **prior** to implementation. For more information, see [Amend/Modify an Approved Protocol](#).

Ten-year approvals: Minimal risk, non-federally funded protocols that are not subject to federal oversight may now be given a ten-year approval period. Please see [Ten Year Approvals](#) for information about which protocols can qualify for ten-year approvals.

The addition of federal funding or certain modifications that increase the level of risk may require a continuing review form to be submitted and approved in order for the protocol to continue. If one or more of the following changes occur, a Continuing Review application must be submitted and approved in order for the protocol to continue.

- Changes in study procedures that increase risk;
- Addition of federal funds.

Unanticipated Problems and Adverse Events: If any study subject experiences an unanticipated problem involving risks to subjects or others, and/or a serious adverse event, the CPHS must be informed *promptly*. For more information on



Committee for Protection of Human Subjects (CPHS)
Office for Protection of Human Subjects (OPHS)

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ophs@berkeley.edu
cphs.berkeley.edu
FWA# 00006252



definitions and reporting requirements related to this topic, see [Adverse Event and Unanticipated Problem Reporting](#).

This approval is issued under University of California, Berkeley Federalwide Assurance #00006252.

If you have any questions about this matter, please contact the OPHS staff at 642-7461 or email ophs@berkeley.edu.

Sincerely,

Jane MAULDON
Committee for Protection of Human Subjects

Bibliography

- A map of Zanzibar Island from surveys made by Imam Sherif Khan Bahadur, Survey of India, under the direction of the late General Sir Lloyd William Mathews, K.C.M.G. (1907). London: Stanford's Geographical Establishment.
- Acabado, S. (2012). The Ifugao agricultural landscapes: Agro-cultural complexes and the intensification debate. *Journal of Southeast Asian Studies*, 43(3), 500-522.
- Adams, R. (1981). *Heartland of Cities*. Chicago.
- Alders, W. (2020). Preliminary results of a 2019 survey in inland Zanzibar, Tanzania. *Nyame Akuma*, 94, 38-45.
- Alexander, J. (2001). Islam, archaeology and slavery in Africa. *World Archaeology*, 33, 44-60.
- Allen, J. (1993). *Swahili Origins: Swahili Culture and the Shungwaya Phenomenon*. Ohio University Press.
- Armstrong, C., Shoemaker, A., McKechnie, I., Ekblom, A., Szabó, P., Lane, P., . . . Crumley, C. (2017). Anthropological contributions to historical ecology: 50 questions, infinite prospects. *PLoS One*, 12(2).
- Ashbee, P. (1972). Field archaeology: its origins and development. In P. Fowler, *Archaeology and the Landscape* (pp. 38-74). London.
- Ashmore, W., & Knapp, A. (1999). *Archaeologies of Landscape: Contemporary Perspectives*. Oxford: Blackwell.
- Aubrey, J. (1982 [1693]). *Monumenta Britannica*. London.
- B., W., & Smith, E. (2000). Analyzing adaptive strategies: human behavioral ecology at twenty-five. *Evolutionary Anthropology: Issues, News, and Reviews*, 51-72.
- Balée, W. (1998). *Advances in History Ecology*. New York: Columbia University Press.
- Balée, W. (2006). The research program of historical ecology. *Annual Review of Anthropology*, 35, 75-98.
- Balée, W., & Erickson, C. (2006). *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands*. New York: Columbia University Press.
- Banning, E. B. (2002). *Archaeological Survey*. New York: Kluwer Academic/Plenum Publishers.
- Banning, E., Hawkins, A., & Stewart, S. (2011). Sweep widths and the detection of artifacts in archaeological survey. *Journal of Archaeological Science*, 1-12.
- Barker, G. (1991). Approaches to archaeological survey. In G. Barker, & J. Lloyd, *Roman Landscapes: Archaeological Survey in the Mediterranean Region* (pp. 1-9). London: Archaeological Monographs of the British School at Rome 2.

- Barnes, G., Mashida, S., & Okita, M. (2005). Geoarchaeological studies in Nara, Japan: the integrated findings. *Geoarchaeology*, 20(8), 837-860.
- Barrett, J. (1994). *Fragments From Antiquity: An Archaeology of Social Life in Britain, 2900-1200 BC*. Oxford: Blackwell.
- Barton, C., Bernabeu, J., Aura, J., Garcia, O., Schmich, S., & Molina, L. (2004). Long-term socioecology and contingent landscapes. *Journal of Archaeological Method and Theory*, 11, 253-295.
- Bauer, A., & Kosiba, S. (2016). How things act: an archaeology of materials in political life. *Journal of Social Archaeology*, 16(2), 115-141.
- Baužytė, E. (2019). *Making and Trading Iron in the Swahili World: An Archaeometallurgical Study of Iron Production Technologies, Their Role, and Exchange Networks in 500-1500 CE Coastal Tanzania*. Aarhus, Denmark: Unpublished PhD Thesis, Centre for Urban Network Evolutions, Aarhus University.
- Bender, B., Hamilton, S., & Tilley, C. (1997). Leskernick. Stone worlds; alternative narratives; nested landscapes. *Proceedings of the Prehistoric Society*, 63, 1471-1478.
- Bennett, J. (2010). *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press.
- Bent, M. (1900). *Southern Arabia*. London: Elder and Co.
- Bernardi, M. (1992). *Archaeologia del Paessaggio*. Florence: All'Insegna di Giglio.
- Berry, B. (1961). City size distributions and economic development. *Economic Development and Cultural Change*, 9, 573-587.
- Bevan, A., & Conolly, J. (2006). Multiscalar approaches to settlement pattern analysis. In G. Lock, & B. Molyneaux, *Confronting Scale in Archaeology: Issues of Theory and Practice* (pp. 217-234). New York: Springer.
- Bishara, F. (2017). *A Sea of Debt: Law and Economic Life in the Western Indian Ocean: 1780-1950*. Cambridge: Cambridge University Press.
- Boivin, N., Crowther, A., Prendergast, M., & Fuller, D. Q. (2014). Indian Ocean food globalization and Africa. *African Archaeological Review*, 31(4), 547-581.
- Boserup, E. (1965). *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*. New York: Aldine.
- Bourdieu, P. (1977). *Outline of a theory of practice*. London: Cambridge University Press.
- Bradtmöller, M., Grimm, S., & Riel-Salvatore, J. (2017). Resilience theory in archaeological practice-- an annotated review. *Quaternary International*, 446, 3-16.
- Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

- Bronson, B. (1972). Farm labor and the evolution of food production. In B. Spooner, *Population Growth: Anthropological Implications* (pp. 190-218). Cambridge: MIT Press.
- Brookfield, H. C. (1972). Intensification and disintensification in Pacific agriculture: a theoretical approach. *Pacific Viewpoint*, 13, 30-48.
- Brookfield, H. C. (1984). Intensification revisited. *Pacific Viewpoint*, 25, 15-44.
- Brooks, A., & Connor, A. C. (2015). At the center of the web: later eighteenth- and nineteenth-century ceramics from Huntingdon Town Centre in an international context. In A. Brooks, *The Importance of British Material Culture to Historical Archaeologies of the Nineteenth Century* (pp. 29-68). Omaha: University of Nebraska Press.
- Bruck, J. (2005). Experiencing the past? The development of a phenomenological archaeology in British prehistory. *Archaeological Dialogues*, 12(1), 45-72.
- Buccellati, G., & Buccellati, K. (1977). The Terqa Archaeological Project: First Preliminary Report. *Les Annales Archeologiques Arabes Syriennes*, 27, 71-96.
- Buchanan, L. (1932). *The Ancient Monuments of Pemba*. Zanzibar Town: Zanzibar Museum.
- Carrer, F., Kossowski, T., Wilk, J., Pietrzak, M., & Bivand, R. (2021). The application of local indicators for categorical data (LICD) to explore spatial dependence in archaeological spaces. *Journal of Archaeological Science*, 126, 1-9.
- Carter, R. (2011). *Ceramics of the Qatar National Museum*. Oxford Brookes Archaeology and Heritage.
- Chami, F. (1992). Limbo: early iron-working in south-eastern Tanzania. *Azania*, 27, 45-52.
- Chami, F. (1994). *The Tanzanian Coast in the Early First Millennium AD: An Archaeology of the Iron-Working, Farming Communities*. Uppsala: Societas Archaeologica Uppsaliensis.
- Chami, F. (1995). The first millennium AD on the East coast: a new look at the cultural sequence and interactions. *Azania*, 30, 232-237.
- Chami, F. (1998). A review of Swahili archaeology. *The African Archaeological Review*, 15, 199-218.
- Chami, F. (2004). The archaeology of the Mafia archipelago, Tanzania. In F. Chami, G. Pwiti, & C. Radimilahy, *African Archaeological Network: Reports and Reviews* (pp. 73-101). Dar es Salaam: University of Dar es Salaam Press, Studies in the African Past 4.
- Chami, F., Maro, E., & Kessy, J. (2000). *Historical Archaeology of Bagamoyo*. Dar es Salaam: Dar es Salaam University Press.
- Chartkoff, J. (1978). Transect interval sampling in forests. *American Antiquity*, 43, 46-53.
- Chayanov, A. V. (1986). *The Theory of Peasant Economy*. University of Wisconsin Press.

- Chirikure, S., Bandama, F., House, M., Moffet, A., Mukwende, T., & Pollard, M. (2016). Decisive evidence for multidirectional evolution of sociopolitical complexity in southern Africa. *African Archaeological Review*, 33(1), 75-95.
- Chisholm, M. (1962). *Rural Settlement and Land Use*. London: Hutchinson.
- Chittick, N. (1969). An archaeological reconnaissance of the southern Somali coast. *Azania*, 4, 115-130.
- Chittick, N. (1974). *Kilwa: An Islamic Trading City on the East African Coast* (Vol. 5). Nairobi: The British Institute in Eastern Africa Memoir Series.
- Chittick, N. (1984). *Manda: Excavations at an Island Port on the Kenya Coast* (Vol. 9). Nairobi: The British Institute in Eastern Africa Memoir Series.
- Christaller, W. (1933). *Die zentralen Orte in Sueddeutschland*. Jena, Germany.
- Cleyndert, G., Newman, R., Brugere, C., Cuni-Sanchez, A., & Marchant, R. (2021). Adaptation of seaweed farmers in Zanzibar to the impacts of climate change. *African Handbook of Climate Change Adaptation*, 3-28.
- Colbert, G., Wagner, B., & Pinther, M. (1987). *Hydrogeological map of Zanzibar*. New York: United Nations.
- Connolly, W. (2013). *The Fragility of Things: Self-Organizing Processes, Neoliberal Fantasies, and Democratic Activism*. Durham: Duke University Press.
- Coole, D., & Frost, S. (2010). *New Materialisms: Ontology, Agency, and Politics*. Durham: Duke University Press.
- Cooper, F. (1977). *Plantation slavery on the east coast of Africa*. New Haven: Yale University Press.
- Crawford, O. (1953). *Castles and Churches in the Middle Nile Region*. Khartoum.
- Croucher, S. (2006). *Plantations on Zanzibar: An Archaeological Approach to Complex Identities*. Manchester: Dissertation Thesis, University of Manchester.
- Croucher, S. (2014). *Capitalism and Cloves: An Archaeology of Plantation Life on Nineteenth Century Zanzibar*. New York: Springer.
- Croucher, S., & Wynne-Jones, S. (2006). People, not pots: locally produced ceramics and identity on the nineteenth-century East African coast. *The International Journal of African Historical Studies*, 39, 107-124.
- Crowther, A., Faulkner, P., Prendergast, M., Quintana Morales, E., Horton, M., Wilmsen, E., . . . Boivin, N. (2016a). Coastal subsistence, maritime trade, and the colonization of small offshore islands in Eastern African prehistory. *Journal of Island and Coastal Archaeology*, 11(2), 211-237.

- Crowther, A., Lucas, L., Helm, R., Horton, M., Shipton, C., Wright, H., . . . Douka, K. (2016b). Ancient crops provide first archaeological signature of the westward Austronesian expansion. *Proceedings of the National Academy of Sciences of the United States of America*, 113(24), 6635-6640.
- Crowther, A., Veall, M.-A., Boivin, N., Horton, M., Kotarba-Morley, A., Fuller, D. Q., . . . Matheson, C. D. (2015). Use of Zanzibar copal (*Hymenaea verrucosa* Gaertn.) as incense at Unguja Ukuu, Tanzania in the 7th-8th century CE: chemical insights into trade and Indian Ocean interactions. *Journal of Archaeological Science*, 53, 374-390.
- Crumley, C. (1994). *Historical Ecology: Cultural Knowledge and Changing Landscapes*. Santa Fe: School of American Research Advanced Seminar Series.
- Crumley, C. (2021). Historical ecology: a robust bridge between archaeology and ecology. *Sustainability*, 13(15), 8210.
- David, B., & Thomas, J. (2008). *The Handbook of Landscape Archaeology*. Routledge.
- Davies, M. (2009). Wittfogel's dilemma: heterarchy and ethnographic approaches to irrigation management in Eastern Africa and Mesopotamia. *World Archaeology*, 41(1), 16-35.
- Davis, D., & Douglass, K. (2020). Aerial and spaceborne remote sensing in African archaeology: a review of current research and potential future avenues. *African Archaeological Review*, 37, 9-24.
- Davis, D., & Douglass, K. (2021). Remote sensing reveals lasting legacies of land use by small-scale foraging societies. *Frontiers in Ecology & Evolution*, 9.
- De Cardi, B., & Doe, D. (1971). Archaeological survey in the northern crucial states. *East and West*, 21(3), 225-289.
- Dietz, U. (1980). *A new look at the spatterware at Winterthur*. Winterthur Museum.
- Duyvendak, J. (1949). *China's Discovery of Africa*. London: School of Oriental and African Studies, Occasional Paper.
- Earle, T. (2009). A nearest-neighbor analysis of two formative settlement systems. In K. S. Flannery, *The Early Mesoamerican Village* (pp. 196-223). Walnut Creek: Left Coast Press.
- Earls, A. (2000). A selection of cut-sponge designs, part 1. *Victorian Ceramics Group Newsletter*, 5(1).
- Edney, M. (1997). *Mapping an Empire: the Geographical Distribution of British India, 1765-1843*. Chicago: University of Chicago Press.
- Eerkens, J. W. (2004). Privatization, small-seed intensification, and the origins of pottery in the western Great Basin. *American Antiquity*, 69(4), 653-670.

- Ehret, C., & Posnansky, M. (1982). *The Archaeological and Linguistic Reconstruction of African History*. Berkeley: University of California Press.
- Ekblom, A. (2004). *Changing Landscapes: An Environmental History of Chibuene, Southern Mozambique*. Uppsala: Department of Archaeology and Ancient History, Uppsala University.
- Erickson, C. L. (2006). Intensification, political economy and the farming community: in defense of a bottom-up perspective of the past. In J. Marcus, & C. Stanish, *Agricultural Strategies* (pp. 334-367). Los Angeles: Cotsen Institute Publications.
- Fawcett, W., LaViolette, A., & Karoma, N. (1989). *Final Report: Archaeological Investigations at Coastal Sites between Dar es Salaam and Bagamoyo*. Dar es Salaam: Archaeology Unit, Department of History.
- Fitton, T. (2017). *Pushing the Boat Out: A study of spatial organisation and harbour spaces in the early Swahili ports of the Zanzibar Archipelago, 550-1100 CE*. York, UK: Unpublished PhD Dissertation, Department of Archaeology, University of York.
- Fitton, T. (2018). Zanzibar. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 239-244). London: Routledge.
- Fitzgerald, W. (1898). *Travels in the coastlands of British East Africa and the islands of Zanzibar and Pemba; their agricultural resources and general characteristics*. London: Chapman and Hall.
- Fitzhugh, B., Butler, V., Bovy, K., & Etnier, M. (2019). Human ecodynamics: a perspective for the study of long-term change in socioecological systems. *Journal of Archaeological Science: Reports*, 23, 1077-1094.
- Fleisher, J. (2003). *Viewing Stonetowns from the Countryside: An Archaeological Approach to Swahili Regional Systems*. Charlottesville, Virginia: PhD Dissertation, University of Virginia.
- Fleisher, J. (2010a). Housing the market: Swahili merchants and regional marketing on the East African coast, seventh to sixteenth centuries AD. In C. Garraty, & B. Stark, *Archaeological Approaches to Market Exchange in Ancient Societies* (pp. 141-159). Boulder, CO: University of Colorado Press.
- Fleisher, J. (2010b). Rituals of consumption and the politics of feasting on the eastern African coast, AD 700-1500 AD. *World Prehistory*, 23, 195-217.
- Fleisher, J. (2010c). Swahili synoecism: rural settlements and town formation on the central East African coast, AD 750-1500. *Journal of Field Archaeology*, 35(3), 265-282.
- Fleisher, J. (2013). Performance, monumentality and the 'built exterior' on the eastern African Swahili coast. *Azania: Archaeological Research in Africa*, 48, 263-281.

- Fleisher, J. (2014). The complexity of public space at the Swahili town of Songo Mnara, Tanzania. *Journal of Anthropological Archaeology*, 35, 1-22.
- Fleisher, J., & LaViolette, A. (1999). Elusive wattle-and-daub: Finding the hidden majority in the archaeology of Swahili. *Azania: Archaeological Research in Africa*, 34, 87-108.
- Fleisher, J., & LaViolette, A. (2013). The early Swahili trade village of Tumbe, Pemba Island, Tanzania, AD 600-950. *Antiquity*, 87(338), 1151-1168.
- Fleisher, J., & Sulas, F. (2015). Deciphering public spaces in urban contexts: geophysical survey, multi-element soil analysis, and artifact distributions at the 15th-16th century AD Swahili settlement of Songo Mnara, Tanzania. *Journal of Archaeological Science*, 55, 55-70.
- Fleisher, J., & Wynne-Jones, S. (2010). Authorisation and the process of power: the view from African archaeology. *Journal of World Prehistory*, 23(4), 177-193.
- Fleisher, J., & Wynne-Jones, S. (2011). Ceramics and the early Swahili: deconstructing the early Tana tradition. *The African Archaeological Review*, 28(4), 245-278.
- Fleisher, J., & Wynne-Jones, S. (2012). Finding meaning in ancient Swahili spatial practices. *African Archaeological Review*, 29, 171-207.
- Fleisher, J., Lane, P., LaViolette, A., Horton, M., Pollard, E., Quintana-Morales, E., . . . Wynne-Jones, S. (2015). When did the Swahili become maritime? *American Anthropologists*, 117, 100-115.
- Fleming, A. (2017). Landscape archaeology and the re-humanisation project. In U. Rajala, & P. Mills, *20 Years of Taskscapes in Archaeology* (pp. 28-40). Oxbow Books.
- Foliard, D. (2017). *Dislocating the Orient : British Maps and the Making of the Middle East, 1854-1921*. London: University of Chicago Press.
- Freeman-Grenville, G. (1966). *The East African Coast: Select Documents from the First to the Earlier Nineteenth Century*. Oxford: Clarendon Press.
- Fuller, D. Q., Boivin, N., Castillo, C., Hoogervorst, T. R., & Allaby, R. (2015). The archaeobiology of Indian Ocean translocations: Current outlines of cultural exchanges by proto-historic seafarers. In S. Tripathi, *Maritime Contacts of the Past: Deciphering Connections Amongst Communities* (pp. 1-23). New Delhi: Delta Book World.
- Geertz, C. (1963). *Agricultural Involution: The Processes of Ecological Change in Indonesia*. Berkeley and Los Angeles: University of California Press.
- Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. Oxford: Polity Pres.
- Gilbert, E. (2004). *Dhows and the Colonial Economy of Zanzibar, 1860-1970*. Oxford, UK: Eastern African Studies Series.
- Gilbert, E. (2017). *Swahili City-States*. ABC-CLIO.

- Gillings, M., Mattingly, D., & Dalen, J. (1999). *Geographical Information Systems and Landscape Archaeology*. Oxford: Oxbow Books.
- Glassman, J. (1995). *Feasts and Riot: Revelry, Rebellion and Popular Consciousness on the Swahili Coast, 1856-1888*. Heineman.
- Glassman, J. (2011). *War of Words, War of Stones: Racial Thought and Violence in Colonial Zanzibar*. Indianapolis: Indiana University Press.
- Glassman, J. (2014). Creole nationalists and search for nativist authenticity in twentieth-century Zanzibar: the limits of cosmopolitanism. *Journal of African History*, 55, 229-247.
- Gonzalez-Ruibal, A., De Torres, J., Fernandez, M., Barrio, C., & Juberias, P. (2021). Asia in the Horn. The Indian Ocean trade in Somaliland. *Archaeological Research in Asia*, 27, 1-28.
- Graham, E. (2006). A neotropical framework for terra preta. In W. Balée, & C. Erickson, *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands* (pp. 57-86). New York: Columbia University Press.
- Gray, J. (1957). A portuguese inscription and the Uroa coin hoard: some discoveries in Zanzibar. *Azania: Archaeological Research in Africa*, 10(1), 123-131.
- Gray, J. (1962). *History of Zanzibar from the Middle Ages to 1856*. London: Oxford University Press.
- Grey, A. (2011). Late trade wares on Arabian shores: 18th-20th-century imported fineware ceramics from excavated sites on the southern Persian (Arabian) Gulf Coast. *Post-Medieval Archaeology*, 45(2), 350-373.
- Griggs, D. B. (1982). *The Dynamics of Agricultural Change: The Historical Experience*. New York: St. Martin's Press.
- Grzymski, K. (1986). Locational patterns in Ancient Nubia. In M. Krause, *Nubische Studien* (pp. 93-97). Mainz.
- Grzymski, K. (2004). Landscape archaeology of Nubia and Central Sudan. *The African Archaeological Review*, 21(1), 7-30.
- Guillain, C. (1856). *Documents sur l'histoire, la géographie et le commerce de l'Afrique Orientale*. Paris.
- Haggett, P. (1965). *Locational Analysis in Human Geography*. London: Edward Arnold.
- Håkansson, N. (2004). The human ecology of world systems in East Africa: the impact of the ivory trade. *Human Ecology*, 32, 561-591.
- Håkansson, N. T. (2008). Regional political ecology and intensive cultivation in pre-colonial and colonial South Pare, Tanzania. *International Journal of African Historical Studies*, 41(3), 433-459.

- Håkansson, N. T., & Widgren, M. (2014). *Landesque Capital: The Historical Ecology of Enduring Landscape Modifications*. Walnut Creek: University of California Press.
- Håland, D., & Msuya, C. (2000). Pottery production, ironworking, and trade in EIA: the case of Dakawa, East Central Tanzania. *Azania: Archaeological Research in Africa*, 35, 75-106.
- Haour, A., Manning, K., Arazi, N., & Gosselain, O. (2010). *African Pottery Roulettes Past and Present: Techniques, Identification, and Distribution*. Havertown: Oxbow Books.
- Hardy, A., Mageni, Z., Dongus, S., Killeen, G., Macklin, M., Majambare, S., . . . Thomas, C. (2015). Mapping hotspots of malaria transmission from pre-existing hydrology, geology, and geomorphology data in the pre-elimination context of Zanzibar, United Republic of Tanzania. *Parasites and Vectors*, 8(41).
- Harmansah, O. (2014). *Of Rocks and Water: Towards an Archaeology of Place*. Philadelphia: Oxbow Books.
- Harrison, B. (1995). *Later Ceramics in Southeast Asia*. Kuala Lumpur.
- Harrower, M., & D'Andrea, C. (2014). Landscapes of state formation: geospatial analysis of Aksumite settlement patterns (Ethiopia). *African Archaeological Review*, 31, 513-541.
- Harrower, M., Mazzariello, J., D'Andrea, C., Nathan, S., Taddesse, H., Dumitru, I., . . . Gebreegziabher, G. (2022). Aksumite settlement patterns: site size hierarchies and spatial clustering. *Journal of Archaeological Research*.
- Helm, R. (2000). *Conflicting histories: the archaeology of the iron-working, farming communities in the central and southern coast region of Kenya*. Bristol: Unpublished dissertation for the Department of Archaeology at the University of Bristol.
- Helm, R. (2004). Re-evaluating traditional histories on the coast of Kenya: an archaeological perspective. In A. Reid, & P. Lane, *African Historical Archaeologies* (pp. 59-89). London: Kluwer Academic / Plenum Publishers.
- Helm, R., Crowther, A., Shipton, C., Tengeza, A., Fuller, D., & Boivin, N. (2012). Exploring agriculture, interaction and trade on the eastern African littoral: preliminary results from Kenya. *Azania*, 47(1), 39-63.
- Hicks, D. (2016). The temporality of the landscape revisited. *Norwegian Archaeological Review*, 49, 5-22.
- Hillocks, R. (2002). Cassava in Africa. In R. Hillocks, j. Thresh, & A. Bellotti, *Cassava: Biology, Production, Utilization* (pp. 41-54). Wallingford: CABI Publishing.
- Hingley, R. (1990). Domestic organization and gender relations in Iron Age and Romano-British households. In R. Samson, *The Social Archaeology of Houses* (pp. 125-147). Edinburgh: Edinburgh University Press.
- Hodder, I., & Orton, C. (1976). *Spatial Analysis in Archaeology*. Cambridge: Cambridge University Press.

- Hogg, A. H., & Pearson, C. (2020). SHCal20 Southern Hemisphere calibration, 0–55,000 years cal BP. *Radiocarbon*, 62(4), 759-778.
- Holling, C. (2001). Understanding the complexity of economic, ecological, and social systems. *Ecosystems*, 4, 390-405.
- Hopper, M. (2015). *Slaves of One Master: Globalization and Slavery in Arabia in the Age of Empire*. New Haven: Yale University Press.
- Horton, M. (1984). *The Early Settlement of the Northern Kenya Coast*. Cambridge, UK: Unpublished PhD thesis, University of Cambridge.
- Horton, M. (1996). *Shanga: The Archaeology of a Muslim Trading Community on the East African Coast*. London: British Institute in East Africa.
- Horton, M. (2001). The Islamic conversion of the Swahili coast, 750-1500: some archaeological and historical evidence. In B. Amoretti, *Islam in East Africa: New Sources* (pp. 449-469). Rome: Herder.
- Horton, M. (2004). Islam, archaeology, and Swahili identity. In D. Whitcomb, *Changing Social Identity with the Spread of Islam: Archaeological Perspectives* (pp. 67-88). Chicago: Oriental Institute Seminars I.
- Horton, M. (forthcoming). *Zanzibar and Pemba: The Archaeology of an Indian Ocean Archipelago*. London: Ashgate.
- Horton, M., & Clark, C. (1985). Zanzibar archaeological survey. *Azania*, 20, 161-171.
- Horton, M., & Middleton, J. (2000). *The Swahili: The Social Landscape of a Mercantile Society*. Wiley-Blackwell.
- Hoskins, W. (1955). *The Making of the English Landscape*. London: Hodder and Stoughton.
- Hunt, A. M. (2017). *The Oxford Handbook of Archaeological Ceramic Analysis*. Oxford: Oxford University Press.
- Hunter, R., & Miller, G. (1994). English shell-edged earthenwares. *Antiques*, 432-443.
- Ingold, T. (1993). The temporality of the landscape. *World Archaeology*, 25(2), 152-174.
- Ingrams, W. (1920). *Zanzibar: Its History and People*. London: Frank Cass and Company Limited.
- Jervis, B., Cembrzyński, P., Fleisher, J., Tys, D., & Wynne-Jones, S. (2021). The archaeology of emptiness? Understanding open urban spaces in the medieval world. *Journal of Urban Archaeology*, 4, 221-246.
- Jia, R. (2014). Weather shocks, sweet potatoes, and peasant revolts in historical China. *The Economic Journal*, 124, 92-118.

- Johnson, A., & Earle, T. (2000). *The Evolution of Human Societies: From Foraging Group to Agrarian State*. Stanford: Stanford University Press.
- Johnson, G. (1980). Rank-size convexity and system integration: a view from archaeology. *Economic Geography*, 56(3), 234-247.
- Juma, A. (2004). *Unguja Ukuu on Zanzibar: An Archaeological Study of Early Urbanism*. Uppsala: Studies in Global Archaeology.
- Kennet, D. (2004). *Sasanian and Islamic Pottery from Ras al-Khaimah*. Oxford: Archaeopress.
- Ketchum, W. (1983). *Pottery and porcelain*. New York: Knopf.
- Khamis, Z., Kalliola, R., & Käyhkö, N. (2017). Geographical characterization of the Zanzibar coastal zone and its management perspectives. *Ocean and Coastal Management*, 149, 116-134.
- Kinshella, M. (2014). Consuming hunger: experiences of cassava and development in a coastal Tanzanian village. *Food, Culture and Society*, 17, 377-393.
- Kirch, P. (2007). Hawaii as a model system of human ecodynamics. *American Anthropologist*, 109(1), 8-26.
- Kirch, P. V. (1994). *The Wet and the Dry: Irrigation and Agricultural Intensification in Polynesia*. Chicago: University of Chicago Press.
- Kirch, P., & Hunt, T. (1997). *Historical Ecology in the Pacific Islands: Prehistoric Environmental and Landscape Change*. New Haven: Yale University Press.
- Kirch, P., Asner, G., Chadwick, O., Field, J., Ladefoged, T., Puleston, C., . . . Vitousek, P. (2012). Building and testing models of long-term agricultural intensification and population dynamics: a case study from the leeward Kohala field system, Hawai'i. *Ecological Modeling*, 227, 12-28.
- Kiriama, H. (2018). Mombasa: archaeology and history. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 620-228). New York: Routledge.
- Kirk, J. (1897). *Papers of Sir John Kirk and Lady Kir*. Edinburgh: National Library of Scotland.
- Kirkman, J. (1952). The Excavations at Kilepwa. *Antiquaries Journal*, 32, 168-184.
- Kirkman, J. (1954). *The Arab City of Gedi: Excavations at the Great Mosque, Architecture and Finds*. London: Oxford University Press.
- Kirkman, J. (1957). The Mosque of the Pillar. *Ars Orientalis*, 2, 175-182.
- Kirkman, J. (1958). Potters' marks from medieval Arab sites in Kenya. *The South African Archaeological Bulletin*, 13, 156-159.
- Kirkman, J. (1959). Excavations at Ras Mkumbu on the Island of Pemba. *Tanganyika Notes and Records*, 53, 161-178.

- Kirkman, J. (1959). Mnarani of Kilifi: The mosques and tombs. *Ars Orientalis*, 3, 95-112.
- Kirkman, J. (1964). *Men and Monuments on the East African Coast*. London: Lutterworth.
- Kirkman, J. (1966). *Ungwana on the Tana*. The Hague: Mouton.
- Kirkman, J. (1974). *Fort Jesus: A Portuguese Fortress on the East African Coast*. Oxford: Clarendon Press.
- Klehm, C. (2017). Local Dynamics and the Emergence of Social Inequality in Iron Age Botswana. *Current Anthropology*, 58, 604-633.
- Klehm, C., & Gokee, C. (2020). Geospatial analysis in African archaeology: current theories, topics, and methods. *African Archaeological Review*, 37, 1-7.
- Klehm, C., Barnes, A., Follett, F., Simon, K., Kiahtipes, C., & Mothulatshipi, S. (2019). Toward archaeological predictive modeling in the Bosutswe region of Botswana: Utilizing multispectral satellite imagery to conceptualize ancient landscapes. *Journal of Anthropological Archaeology*, 54, 68-83.
- Kleppe, E. J. (2001). Archaeological investigations at Kizimkazi Dimbani. In *Islam in East Africa: new sources ; (archives, manuscripts and written historical sources, oral history, archaeology)* (pp. 361-384). Herder.
- Kluiwing, S., & Guttman-Bond, E. (2012). Introduction. In S. Kluiwing, & E. Guttman-Bond, *Landscape Archaeology Between Art and Science* (pp. 11-32). Amsterdam: Amsterdam University Press.
- Koh, N. (2013, May 9). *Dehua Blue and White (德化青花)* . Retrieved March 1, 2022, from <http://www.koh-antique.com/Dehua/dehuamain.html>
- Kusimba, C. (2004). Archaeology of slavery in East Africa. *The African Archaeological Review*, 21, 59-88.
- Kusimba, C., & Kusimba, S. (2007). Intensification and protohistoric agropastoral systems in East Africa. In T. Thurston, & C. Fisher, *Seeking a Richer Harvest: The Archaeology of Subsistence Intensification, Innovation and Change* (pp. 217-235). Springer.
- Kusimba, C., & Kusimba, S. (2018). Mosaics: rethinking African connections in coastal and hinterland Kenya. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 403-418). London: Routledge.
- Kusimba, C., & Walz, J. (2018). When did the Swahili become maritime? A reply to Fleisher et al. (2015), and to the resurgence of maritime myopia in the archaeology of the East African coast. *American Anthropologist*, 120(3), 429-443.
- Kusimba, C., Kusimba, S. B., & Dussubieux, L. (2013). Beyond the coastscapes: preindustrial social and political networks in East Africa. *African Archaeological Review*, 30, 399-426.

- Kusimba, C., Kusimba, S., & Agbaje-Williams, B. (2006). Pre-Colonial African Cities: Size and Density. In G. Storey, *Population and Preindustrial Cities: A Cross-Cultural Perspective* (pp. 145-158). Tuscaloosa: University of Alabama Press.
- Ladefoged, T., McCoy, M., Asner, G., Kirch, P., Puleston, C., Chadwick, O., & Vitousek, P. (2011). Agricultural potential and actualized development in Hawai'i: an airborne LiDAR survey of the leeward Kohala field system (Hawai'i Island). *Journal of Archaeological Science*, 38(12), 3605-3619.
- Lal, P. (2015). *African Socialism in Postcolonial Tanzania: Between the Village and the World*. Cambridge: Cambridge University Press.
- Laland, K., & O'Brien, M. (2011). Cultural niche construction: an introduction. *Biological Theory*, 6, 191-202.
- Lally, J. (2008). *Analysis of the Chinese porcelain associated with the "Beeswax Wreck", Nehalem, Oregon*. Ellensburg, WA: Unpublished M.S. thesis, Resource Management, Central Washington University.
- Lane, P. (2014). The archaeological potential for reconstructing the history of labor relations in East Africa, c. 1500-1900. *History in Africa*, 41, 277-306.
- Lane, P., & Breen, C. (2018). The Eastern African coastal landscape. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 19-35). New York: Routledge.
- Lang, C., & Stump, D. (2017). Geoarchaeological evidence for the construction, irrigation, cultivation, and resilience of 15th–18th century AD terraced landscape at Engaruka, Tanzania. *Quaternary Research*, 88(3), 382-399.
- Langley, M., Prendergast, M., Shipton, C., Quintana-Morales, E., Crowther, A., & Boivin, N. (2016). Poison arrows and bone utensils in late Pleistocene eastern Africa: evidence from Kuumbi Cave, Zanzibar. *Azania: Archaeological Research in Africa*, 51(2), 155-177.
- LaViolette, A. (1989). Preliminary report: excavations and survey at Pujini, a fortress on Pemba Island, Tanzania. *Nyame Akuma*, 32, 35-38.
- LaViolette, A. (2000). Swahili archaeology on Pemba Island, Tanzania: Pujini, Bandari ya Faraji, and Chwaka, 1997-'98. *Nyame Akuma*, 53, 50-63.
- LaViolette, A. (2002). Encountering archaeology in Tanzania: Education, development, and dialogue at the University of Dar es Salaam. *Anthropological Quarterly*, 75(2), 355-374.
- LaViolette, A. (2008). Swahili cosmopolitanism in Africa and the Indian Ocean world, AD 600-1500. In C. Cobb, & D. Loren, *The Archaeology of Colonialism and Contested Modernities* (pp. 24-49). Archaeologies: Journal of the World Archaeological Congress.
- LaViolette, A. (2018). Pemba Island: 1000-1500 CE. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 231-238). New York: Routledge.

- LaViolette, A., & Fawcett, W. (1990). Iron age settlement around Mkiu, south-eastern Tanzania. *Azania*, 25, 19-26.
- LaViolette, A., & Fleisher, J. (1995). Reconnaissance of sites bearing triangular incised (tana tradition) ware on Pemba Island, Tanzania. *Nyame Akuma*, 44, 59-65.
- LaViolette, A., & Fleisher, J. (2005). The archaeology of sub-saharan urbanism: cities and their countrysides. In A. Stahl, *African Archaeology: A Critical Introduction* (pp. 327-352). London: Blackwell.
- LaViolette, A., & Fleisher, J. (2009). The urban history of a rural place: Swahili archaeology on Pemba Island, Tanzania, 700-1500 AD. *The International Journal of African Historical Studies*, 42, 433-455.
- LaViolette, A., & Fleisher, J. (2018). Developments in rural life on the eastern African coast, A.D. 700-1500. *Journal of Field Archaeology*, 43(5), 380-398.
- LaViolette, A., & Norman, N. (in press). The archaeology of Portuguese agricultural outposts in the 17th century Zanzibar countryside. In J. Haines, & M. Hauser, *Modern Worlds and Archaeological Records in the Indian Ocean*. Gainesville: University Press of Florida.
- LaViolette, A., Fawcett, N., Karoma, N., & Schmidt, P. (1999). Survey and excavations between Dar es Salaam and Bagamoyo: University of Dar es Salaam Archaeological Field School 1988 (part II). *Nyame Akuma*, 52, 74-78.
- Leach, H. M. (1999). Intensification in the Pacific: a critique of the archaeological criteria and their application. *Current Anthropology*, 40, 311-340.
- Leech, N. (2017, August 10). *Island stories: digging Zanzibar's Arabian past*. Retrieved from The National: <https://www.thenational.ae/arts-culture/island-stories-digging-zanzibar-s-arabian-past-1.618489>
- Leveau, P., Trément, F., Walsh, K., & Barker, G. (1999). *Environmental Reconstruction in Mediterranean Landscape Archaeology*. Oxford: Oxbow.
- Liebkecht, W. (2001). Joseph Mayer's arsenal pottery dump part 3: cut sponge decorated ironstone China. *Trenton Potteries; Newsletter of the Potteries of Trenton Society*, 2, 1-4.
- Lightfoot, K. (1986). Regional surveys in the eastern United States: the strengths and weaknesses of implementing subsurface testing programs. *American Antiquity*, 51, 484-504.
- Lock, G., & Stancic, Z. (1995). *Archaeology and Geographical Information Systems*. London: Taylor and Francis.
- Madsen, A., & White, C. (2009). *Chinese Export Porcelains*. New York: Taylor and Francis.
- Majewski, T., & O'Brien, M. (1987). The use and misuse of nineteenth-century English and American ceramics in archaeological analysis. *Advances in Archaeological Method and Theory*, 11, 97-209.

- Malinowski, B. (1930). The rationalization of anthropology and administration. *Africa*, 3(4), 405-430.
- Malthus, T. R. (1798). *An Essay on the Principle of Population as It Affects the Future Improvements of Society*. London: J. Johnson, in St. Paul's Church Yard.
- Mann, M. (2008). Infrastructural power revisited. *Studies in Comparative International Development*, 43, 355-365.
- Mansor, H., Zhang, R., Soljo, B., Chen, B., & Wang, G. (2021). The Chinese ceramics unearthed from the site of Jahan Nama Palace. *Journal of Archaeological Studies*, 12.
- Mapunda, B. (2018). Metals and metal-working along the Swahili coast. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 306-318). New York: Routledge.
- Marcus, J. (1973). Territorial organization of the lowland Classic Maya. *Science*, 180, 911-916.
- Marks, R. (1996). Conservation and community: the contradictions and ambiguities of tourism in the Stone Town of Zanzibar. *Habitat International*, 20(2), 265-278.
- Marx, K., & Engels, F. (1978 [1877]). *Capital: A Critique of Political Economy*. London: Penguin.
- Mazrim, R. (2013). Consumer practices and visibility of identity in antebellum St. Louis: A 1,200 vessel archaeological sample from an Irish and German neighborhood, 1845-65. *International Journal of Historical Archaeology*, 17(4), 684-712.
- McAllister, L. (2001). *Collector's guide to feather edge ware: Identification and Values*. Paducah: Collector Books.
- McCann, J. (2005). *Maize and Grace: Africa's Encounter with a New World Crop, 1500-2000*. Cambridge: Harvard University Press.
- McCoy, M. (2021). Defining the geospatial revolution in archaeology. *Journal of Archaeological Science: Reports*, 1-9.
- McGlade, J. (1995). Archaeology and the ecodynamics of human-modified landscapes. *Antiquity*, 69, 113-132.
- McGovern, T. H. (2018). Too many bones: data management and the NABONE experience. In J. Lev-Tov, P. Wapnish, & A. Gilbert, *The Wide Lens in Archaeology: Honoring Brian Hesse's Contributions to Anthropological Archaeology* (pp. 29-42). Atlanta: Lockwood Press.
- McGovern, T. V. (2007). Landscapes of settlement in northern Iceland: historical ecology of human impact and climate fluctuation on the millennial scale. *American Anthropology*, 109, 27-51.
- McIntosh, S. (1999). *Beyond Chiefdoms: Pathways to Complexity in Africa*. New York: Cambridge University Press.

- Mead, G. (1977 [1938]). The process of mind in nature. In A. Strauss, *George Herbert Mead on Social Psychology* (pp. 85-111). Chicago: University of Chicago Press.
- Megahed, H. (2020). Hydrological and archaeological studies to detect the deterioration of Edfu temple in Upper Egypt due to environmental changes during the last five decades. *SN Applied Sciences*, 2.
- Middleton, J. (1961). *Land Tenure in Zanzibar*. London: HMSO, Colonial Research Studies No. 23.
- Miller, G. (1980). Classification and economic scaling of 19th century ceramics. *Historical Archaeology*, 14, 1-40.
- Miller, G. (1991). A revised set of CC Index values for classification and economic scaling of English ceramics from 1787 to 1880. *Historical Archaeology*, 25, 1-25.
- M'Mbogori, F. (2013). *Popoulation and ceramic traditions: revisiting the Tana ware of coastal Kenya (7th-14th century AD)*. Nairobi: University of Nairobi.
- Monroe, J. (2013). Power and agency in precolonial African states. *Annual Review of Anthropology*, 42, 17-35.
- Monroe, J. (2018). 'Elephants for want of towns': archaeological perspectives on West African cities and their hinterlands. *Journal of Archaeological Research*, 26, 387-446.
- Morrison, K. (2007). Rethinking intensification: power relations and scales of analysis in precolonial South India. In T. Thurston, & C. Fisher, *Seeking a Richer Harvest: The Archaeology of Subsistence Intensification, Innovation and Change* (pp. 235-249). Springer.
- Morrison, K. (2014). Capital-esque landscapes: long-term histories of enduring landscape modifications. In T. Hakansson, & M. Widgren, *Landesque Capital: The Historical Ecology of Enduring Landscape Modifications* (pp. 49-75). Walnut Creek: Left Coast Press.
- Morrison, K. D. (1994). Intensification of production: archaeological approaches. *Journal of Archaeological Method and Theory*, 1(2), 133-151.
- Morrison, K. D. (1996). Typological schemes and agricultural change: Beyond Boserup in South India. *Current Anthropology*, 37(4), 583-608.
- Morrison, K. D. (2013). *The Daroji Valley: Landscape History, Place, and the Making of a Dryland Reservoir System*. New Delhi: Manohar.
- Mullins, R., Ylimaunu, T., Brooks, A., Kallio-Seppa, T., Kuorilehto, M., Nurmi, R., . . . Symonds, J. (2013). British ceramics on the northern European periphery: creamware marketing in nineteenth-century northern Finland. *International Journal of Historical Archaeology*, 17(4), 632-650.

- Mutoro, H. (1979). *A Contribution to the Study of Cultural and Economic Dynamics of the Historical Settlements on the Kenya Coast with Particular Reference to the Ruins at Takwa*. Nairobi: MA Thesis, University of Nairobi.
- Naranjo-Santana, J., & Carter, R. (2010). *'Amara Excavations 2009*. Oxford Brookes Archaeology and Heritage. Retrieved from https://www.academia.edu/628937/Amara_Excavations_2009
- Nash, G. (1997). *Semiotics of Landscape: Archaeology of Mind*. Oxford: Archaeopress.
- Netting, R. M. (1993). *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*. Stanford: Stanford University Press.
- Norman, N., & LaViolette, A. (2016). Avant Guard and Awaiting Support: Considerations of the Uneven Stops and Starts of the Colonial Project. *Society of Africanist Archaeologists (SAfA) 23rd Biennial Meeting*. Toulouse, France.
- Nunez-Lyne, R. (1905). *Zanzibar in Contemporary Times: A Short History of the Southern East in the Nineteenth Century*. London: Hurst and Blackett.
- Nurse, D., & Spear, T. (1985). *The Swahili: Reconstructing the History and Language of an African Society*. Pennsylvania: University of Pennsylvania Press.
- Olwig, K. (1993). Sexual cosmology: nation and landscape at the conceptual interstices of nature and culture; or, what does landscape really mean? In B. Bender, *Landscape: Politics and Perspectives* (pp. 307-343). Providence: Berg.
- Opitz, R., & Limp, F. (2015). Recent developments in high-density survey and measurement (HDSM) for archaeology: implications for practice and theory. *Annual Review of Anthropology*, 44, 347-364.
- Ortner, S. (1984). Theory in anthropology since the sixties. *Comparative Studies in Society and History*, 26(1), 126-166.
- Osborne, J. (2013). Sovereignty and territoriality in the city–state: A case study from the Amuq Valley, Turkey. *Journal of Anthropological Archaeology*, 32, 774-790.
- Owens, R. (2007). Exploring the Articulation of Governmentality and Sovereignty: The Chwaka Road and the Bombardment of Zanzibar, 1895–1896. *Journal of Colonialism and Colonial History*, 8(2).
- Pakenham, R. (1948). *Land Tenure Among the Wahadimu at Chwaka, Zanzibar Island*. London.
- Palmisano, A. (2017). Confronting scales of settlement hierarchy in state-level societies: upper Mesopotamia and central Anatolia in the Middle Bronze Age. *Journal of Archaeological Science: Reports*, 14, 220-240.
- Pawlowicz. (2019). Beyond commoner and elite in Swahili society: re-examination of archaeological materials at Gede, Kenya. *African Archaeological Review*, 36, 213-248.

- Pawlowicz, M. (2011). *Finding Their Place in the Swahili World: An Archaeological Exploration of Southern Tanzania*. Charlottesville, VA: Department of Anthropology, University of Virginia, Unpublished Dissertation Thesis.
- Pawlowicz, M. (2012). Modeling the Swahili past: the archaeology of Mikindani in southern coastal Tanzania. *Azania*, 1-21.
- Pawlowicz, M. (2013). A review of ceramics from Tanzania, Malawi, and northern Mozambique, with implications for Swahili archaeology. *African Archaeological Review*, 30, 367-298.
- Pawlowicz, M., Fleisher, J., & Wynne-Jones, S. (2021). Exploring Swahili urbanism through survey of Songo Mnara Island, Tanzania. *Journal of Island and Coastal Archaeology*.
- Pawlowicz, M., Stoetzel, J., & Macko, S. (2014). Environmental archaeology at Mikindani, Tanzania: towards a historical ecology of the southern Swahili coast. *Journal of African Archaeology*, 12(2), 119-139.
- Paynter, R. (1982). *Models of Spatial Inequality: Settlement Patterns in Historical Archaeology*. New York: Academic Press.
- Pearce, F. (1920). *Zanzibar, the Island Metropolis of Eastern Africa*. London.
- Pearson, C. (1980). Rank-size distributions and the analysis of prehistoric settlement systems. *Journal of Anthropological Research*, 36(4), 453-462.
- Pearson, F. (1998). *Port Cities and Intruders: The Swahili Coast, India and Portugal in the Early Modern Era*. Baltimore: Johns Hopkins University Press.
- Phillipson, D. (1979). Some Iron Age sites in the lower Tana Valley. *Azania*, 155-160.
- Pollard, E. (2008). *The Archaeology of Tanzanian Coastal Landscapes in the 6th-15th Centuries AD: The Middle Iron Age of the Region*. Oxford: Archaeopress.
- Porter, B., Routledge, B. E., Simmons, E. M., & Lev-Tov, J. S. (2014). Extensification in a Mediterranean semi-arid marginal zone: An archaeological case study from Early Iron Age Jordan's Eastern Karak. *Journal of Arid Environments*, 104, 132-148.
- Pouwels, R. (2000). The East African Coast, c. 780 to 1900 CE. In N. Levtzion, & R. Pouwels, *The History of Islam in Africa* (pp. 259-260). Athens: Ohio University Press.
- Power, R., Güldemann, T., Crowther, A., & Boivin, N. (2019). Asian crop dispersal in Africa and late holocene human adaptation to tropical environments. *Journal of World Prehistory*, 32, 353-392.
- Power, T. (2015). A first ceramic chronology for the late Islamic Arabian gulf. *Journal of Islamic Archaeology*, 2(1), 1-33.

- Power, T., & Al-Kaabi, O. (2010). A preliminary ceramic chronology for the late Islamic Period in Al-Ain (UAE). *The Conference on Emirates Archaeology* (pp. 1-22). Abu Dhabi: Abu Dhabi Authority for Culture and Heritage.
- Prendergast, M., Quintana-Morales, E., Crowther, A., Horton, M., & Boivin, N. (2017). Dietary diversity on the Swahili coast: the fauna from two Zanzibar trading locales. *International Journal of Osteoarchaeology*, 27, 621-637.
- Prendergast, M., Rouby, H., Punwong, P., Marchant, R., Crowther, A., Kourampas, N., . . . Boivin, N. (2016). Continental island formation and the archaeology of defaunation on Zanzibar, eastern Africa. *PLoS One*, 11(2), Online.
- Prestholdt, J. (2001). Portuguese conceptual categories and the "other" encounter on the Swahili coast. *Journal of Asian and African Studies*, 36, 383-392.
- Prestholdt, J. (2008). *Domesticating the World: African Consumerism and the Genealogies of Globalization*. Berkeley: University of California Press.
- Prestholdt, J. (2018). Navigating the early modern world: Swahili polities and the continental-oceanic interface. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 517-528). New York: Routledge.
- Priestman, S. (2013). *A Quantitative Archaeological Analysis of Ceramic Exchange in the Persian Gulf and Western Indian Ocean*. University of Southampton.
- Punwong, P., Marchant, R., & Selby, K. (2013). Holocene mangrove dynamics from Unguja Ukuu, Zanzibar. *Quaternary International*, 298, 4-19.
- Qin, D., & Ding, Y. (2018). Mambrai and Malindi. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 205-213). New York: Routledge.
- Quintana Morales, E. (2013). Shifting fish consumption and climate change on the Swahili Coast (AD 800-1500). *Archaeofauna: International Journal of Archaeozoology*(22), 113-122.
- Quintana Morales, E., & Horton, M. (2014). Fishing and fish consumption in the Swahili communities of East Africa, 700-1400 CE. In R. Fernandes, & J. Meadows, *Human Exploitation of Aquatic Landscapes' Special Issue*. Internet Archaeology.
- Quintana Morales, E., & Prendergast, M. (2018). Animals and their uses in the Swahili world. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 335-249). New York: Routledge.
- Rabi, U. (2011). *Emergence of States in a Tribal Society: Oman Under Sa'Id Bin Taymur, 1932-1970*. Brighton: Sussex Academic Press.
- Radimilahy, C. (1998). *Mahilaka, An Archaeological Investigation of an Early Town in Northwestern Madagascar*. Uppsala: Studies in African Archaeology.
- Redman, C. (2005). Resilience theory in archaeology. *American Anthropologist*, 107(1), 70-77.

- Reid, S. (2016). Satellite remote sensing of archaeological vegetation signatures in coastal West Africa. *The African Archaeological Review*, 33, 163-182.
- Reid, S. (2020). Forests of history: satellite remote sensing and archaeological survey in southern Ghana. *African Archaeological Review*, 37, 597-614.
- Renes, J. (2011). European landscapes: continuity and change. In Z. Roca, P. Claval, & J. Agnew, *Landscapes, identities and development* (pp. 117-136). London: Ashgate.
- Rhodes, D., Breen, C., & Forsythe, W. (2015). Zanzibar: a nineteenth-century landscape of the Omani elite. *International Journal of Historical Archaeology*, 19(2), 334-355.
- Rice, P. (1996). Recent ceramic analysis: 1. function, style, and origins. *Journal of Archaeological Research*, 4(2), 133-163.
- Rice, P. (1996). Recent ceramic analysis: 2. composition, production, and theory. *Journal of Archaeological Research*, 4(3), 165-202.
- Richard, F. (2018). *Reluctant Landscapes: Historical Anthropologies of Political Experience in Siin (Senegal)*. Chicago: University of Chicago Press.
- Richards, C. (1993). Monumental choreography: Architecture and spatial representation in Late Neolithic Orkney. In C. Tilley, *Intepretive Archaeology* (pp. 143-178). Oxford: Blackwell.
- Roberts, P., Prendergast, M., Janzen, A., Shipton, C., Blinkhorn, J., Zech, J., . . . Boivin, N. (2020). Late Pleistocene to Holocene human palaeoecology in the tropical environments of coastal eastern Africa. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 537, 109438.
- Robins, R. (1976). The composition of Josani Forest, Zanzibar. *Botanical Journal of Linnean Society*, 72, 223-234.
- Rocha, J. M. (2011). Agriculture intensification, market participation, and household demography in the Peruvian Andes. *Human Ecology*, 39(5), 555-568.
- Rødland, H. (2021). *Swahili Social Landscapes: Material Expressions of Identity, Agency, and Labour in Zanzibar, 1000–1400 CE*. Uppsala: Department of Archaeology and Ancient History.
- Rødland, H. (2022). Crafting Swahili beads: exploring a new glass bead assemblage from northern Zanzibar, Tanzania. *African Archaeological Review*. doi:10.1007/s10437-022-09475-9
- Rødland, H., Wynne-Jones, S., Wood, M., & Fleisher, J. (2020). No such thing as invisible people: toward an archaeology of slavery at the fifteenth-century Swahili site of Songo Mnara. *Azania*, 55, 439-457.
- Roux, V. (2019). *Ceramics and Society: A Technological Approach to Archaeological Assemblages*. Springer.

- Sahlins, M. D. (1972). *Stone Age Economics*. Chicago: Aldine-Atherton.
- Samford, P. (1997). Response to a market: dating English underglaze transfer-printed wares. *Historical Archaeology*, 31(2), 1-30.
- Samford, P., & Miller, G. (2012 [2002]). *Post-Colonial Ceramics*. Retrieved June 30, 2020, from Diagnostic Artifacts in Maryland: <https://apps.jefpat.maryland.gov/diagnostic/Post-Colonial%20Ceramics/index-PostColonialCeramics.htm>
- Sarathi, A. (2018). Shellfish exploitation at Kuumbi Cave, Zanzibar (c. 11kya-20th c. CE): a preliminary study. In A. Sarathi, *Early Maritime Cultures in East Africa and the Western Indian Ocean* (pp. 171-184). Oxford: Archaeopress.
- Sassoon, C. (1978). *Chinese Porcelain Marks from Coastal Sites in Kenya: Aspects of Trade in the Indian Ocean, XIV-XIX Centuries*. Oxford: British Archaeological Reports International Series, 43.
- Sauer, C. (1925). The morphology of landscape. In J. Leighly, *Land and Life: A Selection from the Writings of Carl Ortwin Sauer*. Berkeley: University of California Press.
- Savage, S. (1997). Assessing departments from log-normality in the rank-size rule. *Journal of Archaeological Science*, 24, 233-244.
- Sayer, D., & Wienhold, M. (2013). A GIS-Investigation of Four Early Anglo-Saxon Cemeteries: Ripley's K-function Analysis of Spatial Groupings Amongst Graves. *Social Science Computer Review*, 31, 71-89.
- Schama, S. (1995). *Landscape and Memory*. London: Fontana Press.
- Scott, J. (2009). *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia*. New Haven: Yale University Press.
- Seland, E. (2014). Archaeology of trade in the western Indian Ocean, 300 BC - AD 700. *Journal of Archaeological Research*, 22, 367-402.
- Sen, A. K. (1959). The choice of agricultural techniques in underdeveloped countries. *Economic Development and Cultural Change*, 7(3), 279-285.
- Service, E. (1975). *Origins of the State and Civilization: The Process of Cultural Evolution*. New York: Norton.
- Shanks, M. (2012). *The Archaeological Imagination*. Walnut Creek: Left Coast Press.
- Sheridan, M. (2014). The social life of landscapes capital and a Tanzanian case study. In T. Hakansson, & M. Widgren, *Landesque Capital: The Historical Ecology of Enduring Landscape Modifications* (pp. 155-172). Walnut Creek: Left Coast Press.
- Sheriff, A. (1987). *Slaves, Spices and Ivory in Zanzibar: Integration of an East African Commercial Empire into the World Economy, 1770-1873*. Athens, OH: Athens University Press.

- Sheriff, A. (1991). *Zanzibar Under Colonial Rule*. Athens, OH: Ohio University Press.
- Sheriff, A. (2010). *Dhow Cultures of the Indian Ocean: Cosmopolitanism, Commerce, and Islam*. London: C. Hurst & Company.
- Sheriff, A. (2018). Zanzibar old town. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 529-540). New York: Routledge.
- Sheriff, A., Teelock, V., Omar Wahab, S., & Peerthum, S. (2016). *Transition from Slavery in Zanzibar and Mauritius: A Comparative History*. Dakar, Senegal: CODESRIA.
- Shipton, C., Crowther, A., Kourampas, N., Prendergast, M., Horton, M., Douka, K., . . . Petraglia, M. (2016). Reinvestigation of Kuumbi Cave, Zanzibar, reveals Later Stone Age coastal habitation, early Holocene abandonment and Iron Age reoccupation. *Azania: Archaeological Research in Africa*, 51(2), 197-233.
- Shipton, C., Helm, R., Boivin, N., Crowther, A., Austin, P., & Fuller, D. Q. (2013). Intersections, networks and the genesis of social complexity on the East African coast. *African Archaeological Review*, 30, 427-453.
- Shriar, A. J. (2001). The dynamics of agricultural intensification and resource conservation in the buffer zone of the Maya biosphere reserve, Petén, Guatemala. *Human Ecology*, 29(1), 27-48.
- Sinclair, P. (1982). Chibuene: an early trading site in southern Mozambique. *Paideuma*, 28, 149-164.
- Sinclair, P. (2013). The Archaeology of African Urbanism. In P. Mitchell, & P. Lane, *The Oxford Handbook of African Archaeology*. Oxford: Oxford University Press.
- Sinopoli, C. (1991). *Approaches to Archaeological Ceramics*. New York: Plenum Press.
- Skerry, J., & Hood, S. (2009). *Salt-Glazed Stoneware in Early America*. Williamsburg: Colonial Williamsburg Foundation.
- Soper, R. (1967). Iron Age sites in north-eastern Tanzania. *Azania*, 2, 19-37.
- Soper, R. (1967). Kwale: an early Iron Age site in southern Kenya. *Azania*, 2, 1-17.
- Southall, A. (1988). The segmentary state in Africa and Asia. *Comparative Studies in Society and History*, 30, 52-82.
- Spear, T. (2012). *Swahili City-States of the East African Coast*. Oxford: Oxford University Press.
- Stahl, A. (2004). Political economic mosaics: archaeology of the last two millennia in tropical sub-Saharan Africa. *Annual Review of Anthropology*, 33, 145-172.
- Stahl, A., & Logan, A. (2014). Resilient villagers: eight centuries of continuity and change in Banda village life. In J. Anquandah, B. Kankpeyeng, & W. Apoh, *Current Perspectives in the Archaeology of Ghana* (pp. 44-63). Accra: Sub-Saharan Publishers.

- Steffen, W., Crutzen, P., & McNeill, J. (2007). The Anthropocene: Are humans now overwhelming the great forces of nature? *Ambio*, 36(8), 614-621.
- Steward, J. (1955). *Theory of Culture Change: The Methodology of Multi-Linear Evolution*. Urbana: University of Illinois Press.
- Stigand, C. (1966 [1913]). *The Land of Zinj: Being An Account of British East Africa, Its Ancient History and Present Inhabitants*. New York: Barnes and Noble.
- Stoetzel, J. (2014). *Toward a Swahili Historical Ecology: Phytolith-based Analysis in Coastal Eastern Africa Since AD 600*. Charlottesville: Department of Anthropology, University of Virginia Unpublished Dissertation.
- Stone, G. (2001). Theory of the square chicken: advances in agricultural intensification theory. *Asia Pacific Viewpoint*, 42(2/3), 163-180.
- Stone, G. D. (1994). Agriculture intensification and perimetrics: ethnoarchaeological evidence from Nigeria. *Current Anthropology*, 35(3), 317-324.
- Stone, G. D. (1997). 'Predatory sedentism': intimidation and intensification in the Nigerian savanna. *Human Ecology*, 25(2), 223-242.
- Strandes, J. (1961 [1899]). *The Portuguese Period in East Africa*. Nairobi: East African Literature Bureau.
- Stump, D. (2006). The development and expansion of the field and irrigation system at Engaruka, Tanzania. *Azania*, 1, 69-94.
- Subrahmanyam, S. (2019). Between eastern Africa and western India, 1500-1650: slavery, commerce, and elite formation. *Comparative Studies in Society and History*, 61, 805-834.
- Sulas, F., & Madella, M. (2012). Archaeology at the micro-scale: micromorphology and phytoliths at a Swahili stonetown. *Archaeological and Anthropological Sciences*.
- Sulas, F., Fleisher, J., & Wynne-Jones, S. (2016). Geoarchaeology of urban space in tropical island environments: Songo Mnara, Tanzania. *Journal of Archaeological Science*, 1-12.
- Sulas, F., Kristiansen, S., & Wynne-Jones, S. (2019). Soil geochemistry, phytoliths and artefacts from an early Swahili daub house, Unguja Ukuu, Zanzibar. *Journal of Archaeological Science*, 103(1), 32-45.
- Szymanski, R. (2018). Middle Holocene Environmental Change at Mtwapa Creek, Kenya: Distinguishing Human Activity from Regional Ecological Processes. In A. Mercuri, A. D'Andrea, R. Fornaciari, & A. Höhn, *Plants and People in the African Past* (pp. 194-214). Springer.
- Taylor, M., Ravilious, C., & Green, E. (2003). *Mangroves of East Africa*. Cambridge: UNEP.
- Thomas, J. (1991). *Rethinking the Neolithic*. London: Cambridge University Press.

- Thomas, J. (1993). The hermeneutics of megalithic space. In C. Tilley, *Interpretive Archaeology* (pp. 73-97). Oxford: Blackwell.
- Thomas, J. (1996). *Time, Culture, and Identity: An Interpretive Archaeology*. London: Blackwell.
- Thomas, J. (2001). Archaeologies of place and landscape. In I. Hodder, *Archaeological Theory Today* (pp. 165-186). London: Polity.
- Thompson, D. (2002). An analysis of Castle Hill Ceramics. In J. McMahan, *Archaeological Data Recovery at Baranof Castle State Historic Site, Sitka, Alaska: Final Report of Investigations* (Vol. 84, pp. 85-120). Anchorage, AK: Office of History and Archaeology, Alaska Department of Natural Resources.
- Thurston, T. (2006). The barren and the fertile: central and local intensification strategies across variable landscapes. In J. Marcus, & C. Stanish, *Agricultural Strategies*. Los Angeles : Cotsen Institute Publications.
- Tilley, C. (1994). *A Phenomenology of Landscape: Places, Paths, and Monuments*. Oxford: Berg.
- Trigger, B. (1989). *A History of Archaeological Thought*. Cambridge: Cambridge University Press.
- Turner, S. (2009). These young men show no respect for local customs-- globalization and Islamic revival in Zanzibar. *Journal of Religion in Africa*, 39, 237-261.
- Ucko, P., & Layton, R. (1999). *The Archaeology and Anthropology of Landscape*. London: Routledge.
- Vernet, T. (2009). Slave trade and slavery on the Swahili coast (1500-1750). In B. Mirzai, I. Montana, & P. Lovejoy, *Slavery, Islam and Diaspora* (pp. 37-76). Africa World Press.
- Vernet, T. (2010). Porosité des frontières spatiales, ambiguïté des frontières identitaires: le cas des cités-États swahili de l'archipel de Lamu (vers 1600-1800). *Afriques*, 1.
- Vernet, T. (2017). The deep roots of the plantation economy on the Swahili coast: productive functions and social functions of slaves and dependents. In A. Weldemichael, A. Lee, & E. Alpers, *Changing Horizons of African History* (pp. 51-100). Trenton, NJ: Africa World Press.
- Vita-Finzi, C., & Higgs, E. (1970). Prehistoric economy in the Mount Carmel area of Palestine: site-catchment analysis. *Proceedings of the Prehistoric Society*, 36, 1-37.
- Von Thünen, J. (1826). *Der isolierte Staat in Beziehung auf Landwirthschaft und Nationalökonomie, oder Untersuchungen über den Einfluss, den die Getreidepreise, der Reichtum des Bodens und die Abgaben auf den Ackerbau ausüben*. Hamburg: Friedrich Perthes.

- Wagstaff, J. (1987). *Landscape and Culture: Geographical and Archaeological Perspectives*. Oxford.
- Walker, B., & Salt, D. (2006). *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Washington: Island Press.
- Walker, J. (2012). Recent landscape archaeology in South America. *Journal of Archaeological Research*, 20(4), 309-355.
- Walsh, K. (1999). Mediterranean landscape archaeology and environmental reconstruction. In P. Leveau, & e. al., *Environmental Reconstruction in Mediterranean Landscape Archaeology* (pp. 1-8). Oxford: Oxbow Books.
- Walshaw, S. (2015). *Swahili Trade, Urbanization, and Food Production: Botanical Perspectives from Pemba Island, Tanzania*. Oxford: Cambridge Monographs in African Archaeology 90 (British Archaeological Reports series 2755, Archaeopress).
- Walshaw, S. C.,. (2010). Converting to rice: urbanization, Islamization and crops on Pemba Island, Tanzania, AD 700-1500. *World Archaeology*, 42, 137-154.
- Walshaw, S., & Stoetzel, J. (2018). Plant use and the creation of anthropogenic landscapes: coastal forestry and farming. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 350-362). New York: Routledge.
- Walz, J. (2017). Inland connectivity in ancient Tanzania. *Islamic Africa*, 8, 217-227.
- Walz, J. (2018). Inland entanglement in the Swahili world, c. AD 750-1550. In S. Wynne-Jones, & A. LaViolette, *The Swahili World* (pp. 388-402). London: Routledge.
- Wetherbee, J. (1996). *White Ironstone: A Collector's Guide*. Dubuque: Antique Trader Books.
- Widgren, M., & Sutton, J. E. (2004). *Islands of Intensive Agriculture in Eastern Africa*. Athens: Ohio University Press.
- Willems, W., & Lim, S. (1981). *Nonya Ware and Kitchen Ch'ing*. Kuala Lumpur: Southeast Asian Ceramics Society, West Malaysia Chapter.
- Willis, J. (1993). *Mombasa, the Swahili and the Making of the Mijikenda*. Oxford: Clarendon Press.
- Wilson, T. (1978). *The Monumental Architecture and Archaeology North of the Tana River*. Nairobi: National Museums of Kenya.
- Wilson, T. (1980). *The Monumental Architecture and Archaeology of the Central and Southern Kenyan Coast*. Nairobi: National Museums of Kenya.
- Wilson, T. (1982). Spatial analysis and settlement patterns on the East African coast. *Paideuma*, 28, 201-219.

- Wilson, T. (1984). Sites and settlement patterns of coastal Jubaland, southern Somalia. In T. Labahn, *Proceedings of the Second International Congress of Somali Studies, Vol. II: Archaeology and History* (pp. 73-106). Hamburg: Helmut Buske Verlag.
- Wilson, T. (1992). Settlement Patterns of the Coast of Southern Somalia and Kenya. *Proceedings for the First International Congress of Somali Studies*, 76-112.
- Wilson, T. (2019). *Settlement Archaeology at Takwa*. Retrieved from https://www.academia.edu/39865710/Settlement_Archaeology_at_Takwa
- Wilson, T., & Omar, A. (1997). Archaeological investigations at Pate. *Azania*, 32, 31-76.
- Winterhalder, B., & Smith, E. (1981). New perspectives on hunter-gatherer socioecology. In E. Smith, & B. Winterhalder, *Hunter-Gatherer Foraging Strategies: Ethnographic and Archaeological Analyses* (pp. 1-12). Chicago: University of Chicago Press.
- Witmore, C. (2014). Archaeology and the New Materialisms. *Journal of Contemporary Archaeology*, 1(2), 203-246.
- Witowski, T. (2015). Early history and distribution of trade ceramics in southeast Asia. *Journal of Historical Research in Marketing*, 8, 216-237.
- Wittfogel, K. A. (1976 [1957]). *Oriental Despotism: A Comparative Study of Total Power*. New Haven: Yale University Press.
- Wright, H. (1984). Early seafarers of the Comoro Islands: the Dembeni phase of the IXth-Xth centuries AD. *Azania*, 19, 13-59.
- Wynne-Jones, S. (2005). *Urbanisation at Kilwa, Tanzania, AD 800-1400*. Cambridge, UK: University of Cambridge Press, PhD Dissertation.
- Wynne-Jones, S. (2007). Creating urban communities at Kilwa Kisiwani, Tanzania: AD 800-1300. *Antiquity*, 81, 368-380.
- Wynne-Jones, S. (2010). Remembering and reworking the Swahili diwanate: the role of objects and places at Vumba Kuu. *The International Journal of African Historical Studies*, 43, 407-427.
- Wynne-Jones, S. (2012). Exploring the use of geophysical survey on the Swahili coast: Vumba Kuu, Kenya. *Azania: Archaeological Research in Africa*, 47, 137-152.
- Wynne-Jones, S. (2015). Biographies of practice and negotiation of Swahili at nineteenth-century Vumba. In F. Richard, *Materializing Colonial Encounters: Archaeologies of African Experience* (pp. 155-176). New York: Springer.
- Wynne-Jones, S., & Fleisher, J. (2014). Swahili urban spaces of the eastern African coast. In A. Creekmore, & K. Fisher, *Making Ancient Cities: Space and Place in Early Urban Society* (pp. 111-144). Cambridge: Cambridge University Press.

- Wynne-Jones, S., & Fleisher, J. (2015). Fifty years in the archaeology of the eastern African coast: a methodological history. *Azania: Archaeological Research in Africa*, 50(4), 519-541.
- Wynne-Jones, S., & Fleisher, J. (2016). The multiple territories of Swahili urban landscapes. *World Archaeology*, 48(3), 1-14.
- Wynne-Jones, S., & LaViolette, A. (2018). *The Swahili World*. London: Routledge.
- Wynne-Jones, S., & Mapunda, B. (2008). 'This is what pots look like here:' ceramics, tradition and consumption on Mafia Island, Tanzania. *Azania*, 43(1), 1-17.
- Ylvisaker, M. (1978). The origins and development of the Witu Sultanate. *The International Journal of African Historical Studies*, 11, 669-688.
- Yoffee, N. (2005). *Myths of the Archaic State: Evolution of the Earliest Cities, States, and Civilizations*. Cambridge: Cambridge University Press.
- Yoffee, N. (2016). The power of infrastructures: a counternarrative and a speculation. *Journal of Archaeological Method and Theory*, 23, 1053-1065.
- Zalasiewicz, J., Williams, M., Haywood, A., & Ellis, M. (2011). The Anthropocene: a new epoch of geological time? *Philosophical Transactions of the Royal Society A*, 369, 835-841.
- Zaro, G. (2014). From terraces to tree: ancient and historical landscape changes in southern Peru. In T. Hakansson, & W. M., *Landesque Capital: The Historical Ecology of Enduring Landscape Modifications* (pp. 232-251). Walnut Creek: Left Coast Press.
- Zipf, G. (1949). *Human Behavior and the Principle of Least Effort*. Cambridge: Harvard University Press.
- Zivkovic, J., Power, T., Georgakopoulou, M., & Lopez, J. (2019). Defining new technological traditions of Late Islamic Arabia: a view on Bahlā Ware from al-Ain (UAE) and the lead-barium glaze production. *Archaeological and Anthropological Sciences*, 11, 4697-4709.