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Landscape Entanglements:
Toward a Descriptive Project for Planning Research

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Abstract

The conceptual dyad of urban/rural has long formed the basis of the planner's description of space. However, the terms themselves are increasingly insufficient to describe the world in which we live, presenting as overdetermined and reductive signifiers. In this photographic essay, we use Google Earth satellite images to examine a series of locations where descriptors such as 'urban' and 'rural' falter against manifold, shifting, and unstable landscape forms. We draw on Henri Lefebvre's concept of the abstract spaces of capitalism, globalization, and urbanization, which he argued are dialectically produced through their interaction with landscape. However, where Lefebvre contended that abstraction instantiates in more or less discrete typological forms, we argue that abstract space only becomes intelligible under conditions of 'entanglement,' where qualities such as 'urban' and 'rural' become momentarily comprehensible at the instant we observe or describe them. In the end, holding the world still long enough to describe it reveals crucial patterns and relations, but always at a cost, always with the risk of reduction, simplification, and overdetermination. Such pitfalls are inevitable in research; however, they become all the more prevalent as the terms we use to describe the world become less and less applicable, and as the accumulation of anomalies compels us to build new models and to tell new stories.

Keywords: Landscape, Entanglement, Observation, Planning Theory, Orbital Photography

Introduction

The 'urban' and the 'rural' are two of the most powerful concepts in the lexicon of planners. Since the origins of the planning profession, these terms have been deployed to fix, contain, and describe the world, and to assign qualities to a variety of landscapes, behaviors, and built forms. The conceptual dyad of urban/rural, town/country, metropole/hinterland has long formed the basis of the planner's vision, while at the same time offering up an elegant device for the apprehension of space more generally. The persistence of this conceptual dyad has shaped the analytic frameworks of a range of disciplines since their emergence in the mid-nineteenth century, including economics (Moore 1984; Hendrickson, Muro, and Galston 2018), sociology (Andersson et al. 2009; Florida 2018), political economy (Marx and Engels 2011; Engels 1970), and planning (Boyer 1986).

Increasingly, however, the analytic framework of planning research is becoming strained by the use of these conceptual dyads. The problem is not simply that the dyad subordinates the rural to the urban (Lefebvre 1991, 234–235); it is that the terms themselves are increasingly insufficient to describe the world in which we live. Even descriptive innovations such as the 'suburban' or 'third landscape' presuppose forms defined in relation to a spatial dyad. Whether in ordinary parlance, or instrumentalized through planning methods, these terms present as overdetermined signifiers, often obscuring more than they reveal, meaning more and less than they say. They are not so much abstractions as reductions of a complex system, increasingly strained by their limitations as terms whose meanings solidified in the context of nineteenth-century Western Europe.

For this paper, we offer a selection of Google Earth satellite images depicting locations where descriptors such as 'urban' and 'rural' falter against manifold, shifting, and unstable landscape forms. Rather than developing an analytic argument and then seeking illustrations for it, we have taken a curatorial approach, capturing a range of images around which to build a descriptive framework. Description, of course, has a long and important history in the study of landscapes and built environments, from the sprawling accounts of nineteenth-century surveyors and geologists to the systematic research of Carl Sauer (1916), and from the Annales School of long-durée historiography (Burguière 2005) to the crucial work of cultural landscape geographers John Brinckerhoff Jackson and Donald William Meinig (Meinig and Jackson 1979). Indeed, description provides the very groundwork for analysis.

At stake in this effort are the ways in which planners deploy terms to comprehend landscapes, to make sense of the world around them, and to formulate interventions. As a normative discipline emerging out of the Western intellectual tradition, planning tends to draw on categories presumed to be universal, but that are in fact particular to European and North American contexts. Part of the legacy of this tradition is planners' reliance on universalist terms to undergird their analyses of land use, built forms, and interventions in the physical world. However, while analysis is crucial to planning practice, the terms of analysis require periodic refreshment with rich, thickly woven description, particularly when those terms reach the limits of their descriptive power (see Geertz 1973). Thus, the work presented here comprises the speculative beginning of a longer research endeavor that will, eventually, include efforts at systematization. For the moment, it is our goal to provide immersion in a series of landscapes that challenge the urban/rural dyad.

In the following sections we build a scaffold for alternate readings of the landscapes included in the exhibition of satellite photographs. We begin by grounding the work in the theory of abstract space developed by Henri Lefebvre. Recognizing Lefebvre's limits within the Western intellectual project, we turn to insights from recent work in urban theory that proposes a reformulation and decolonization of terms used to describe the 'urban.' Finally, as a way forward, we propose a descriptive project

centered on the concept of landscape 'entanglement,' with due attention to the utility and limits of aerial photography as a mode of looking.

The Problems of the Dyad

The 'urban' and the 'rural' enjoy a long lineage in Western societies that dates at least to ancient Greece, where the polis represented the highest achievement of civilization against the backdrop of the rustic countryside. However, modern concepts of urban and rural solidified within the Western intellectual tradition of the nineteenth and early twentieth centuries that gave rise to disciplines such as planning, architecture, political economy, and sociology (Perkin 1980; Heilbron et al. 1998; Hostetler 2012, 82–95). When Frederick Engels, George Simmel, Louis Wirth, and Le Corbusier wrote about cities, they were confident in the stability and explanatory power of terms such as 'urban' and 'rural.' Moreover, they presumed that the particularities of Manchester, Berlin, Paris, and New York would furnish abstract laws applicable to urbanizing societies generally (Engels [1845] 1950; Simmel [1903] 1976; Benjamin 2002; Wirth [1938] 2000). They did not imagine cities themselves to be stable places, but rather relied on the conceptual stability of the urban/rural distinction to make sense of the changes they saw before them. In this way, they derived conclusions about modernity, industrial expansion, the growth of cities, class relations, habitat, and planning that were in turn applied elsewhere.

Arguing against such crude modeling, Henri Lefebvre developed a theory of modernity grounded in a more nuanced understanding of spatial transformation. His work constitutes a major effort to link the ideological and material in the production of what he calls "abstract space." In The Production of Space, Lefebvre defined abstract space as a signal feature of modernity, wherein the economic-productive intentionality of forms, routines, and relations are projected onto the material world of geomorphology and settlement. Moreover, he argues that these projections are not deterministic. Rather, the abstract spaces of capitalism, globalization, and urbanization are inextricable from and dialectically produced through their interaction with landscape. "Space," he observes, "is neither a 'subject' nor an 'object' but rather a social reality––that is, a set of relations and forms" (Lefebvre 1991, 116). The spatial dimension of modernity, in other words, emerges from a set of dispersed but powerful administrative techniques for ordering cities, institutions, and everyday life that are increasingly brought under the register of capitalism.

While Lefebvre established a basis for reconceptualizing space as a dialectic of social relations, he nevertheless took the terms used to describe space (e.g., urban, rural, industrial, agricultural) as given. This left binary conceptions of landscape largely intact––not just urban vs. rural, but other operative categories in the lexicon of theorists and practitioners, such as planned vs. unplanned, nature vs. artifice, wilderness vs. settlement, industrial vs. agrarian, feudal vs. capitalist. These dyads continue to exert a strong influence over the normative spatial disciplines of planning, architec-

ture, and urban design, influencing the ways that practitioners describe, analyze, and intervene in landscapes.

From the Binary to the Planetary

Recent contributions by Neil Brenner and Christian Schmid (2015, 163–176) provide a crucial articulation of Lefebvre's theoretical work by reframing the urban through a series of interrelated theses. First, they restate Lefebvre's position that the urban constitutes a theoretical rather than an "empirically self-evident object," one that describes a process rather than a bounded form. Second, drawing on the work of Manuel Castells and Edward Soja, they contend that urbanization––that is, the extension of 'the urban'––is not reducible to the growth of the city, but rather has extraterritorial dimensions. These dimensions, including distinctive spatial practices, forms of governance, and patterns of everyday life, do not simply derive from but rather are co-productive of urban processes over time. And finally, they forward the idea that urbanization, as an uneven process of spatial development, "has become planetary."

While a useful point of departure for current theoretical work, the 'planetary urbanization' approach comes with its own limitations. Chief among these is that the approach risks overdetermining the urban so that nothing escapes its ambit. Theorists working within this framework lean heavily on the word 'urbanization' to establish the urban as a process rather than finished form, but as Ananya Roy (2015, 813) suggests this leaves little room for a reckoning with the "constitutive outside," that is, what is "not urban?" If the problem was once the reductive urban/rural dyad, the planetary urbanization approach subsumes the rural within the ambit of the urban. For Roy, this approach relegates the rural and the agrarian to secondary categories, and collapses other conditions such as 'industrial' and 'capitalist' into the urban (Roy 2015, 814). Such an encompassing framework runs the risk of reducing the analytic power of terms to statements of finality, so that empirical work undertaken within the precepts of planetary urbanization becomes a matter of confirmation.

Moreover, the 'planetary urbanization' approach does not escape the limitations created by origins of terms in disciplines such as planning, architecture, and urban design that are grounded in Eurocentric conceptualizations of the world. Indeed, as Roy asks, how far across the globe can we stretch concepts emerging out of the self-referential Western intellectual project until they begin to lose meaning? At what point do such terms begin to lose their salience as descriptors of human experience? The deployment of such concepts to describe the world has resulted in the creation of epistemologically limited understandings that tend to substitute theoretical claims for empirical analysis, account for wholes at the expense of parts, misread spatial forms and orders through Eurocentric lenses, and offer reductive conclusions rather than contingent points of departure (Radoine 2011; Roy 2011). These terms present an index of spatial imaginaries––floating signifiers that often reveal more about the observer than what is being observed.

The problem, as Kanishka Goonewardena (2018) argues, is not so much that the planetary urbanization approach presumes an all-encompassing condition; indeed, Brenner and Schmid's work can best be understood as proposing an extensivity of the urban, rather than a totality. Rather, the problem is twofold. First, we tend to misread extensivity for salience, thereby taking the spread of urbanization as an indicator of its depth of penetration and its organizational power in shaping human experience. Second, in deploying the concept of planetary urbanization, we risk foreclosing the possibility of alternative explanatory frameworks. Indeed, as Brenner and Schmid (2015, 176) observe, a "new vocabulary of urbanization is urgently required that would help us, both analytically and cartographically, to decipher the differentiated and rapidly mutating landscapes of urbanization that are today being produced across the planet."

We agree. To begin building this "new vocabulary," we need deeper empirical engagements with how the urban is made and unmade through uneven development within and across national boundaries, how the urban emerges not simply as a system in itself, but as a category of governance and prescription, and how the urban is entangled with other forms of landscape and social relations (Roy 2015, 814; Peake 2016; Zeiderman 2018). To contribute to these efforts and to expand the ambit of planning theory, we adopt the concept of 'entanglement' as a strategy for reading landscape.

Entanglement

The concept of 'entanglement' has its origins in the 1930s, in the work of theorists such as Albert Einstein, David Bohm, and Erwin Schrödinger, who first used the term. For physicists, the term describes action on the quantum scale, where characteristics of two or more particles (e.g., energy, position, momentum, spin) become linked through mutual influence. In such cases, the particles cannot be described independently, but only in relation to each other, and the act of measuring one changes the characteristics of the others, even if the particles themselves are separated by vast distances. Thus, our observations of matter are inseparable from the state of that matter; not only do observations affect what is being observed, they actively produce the reality under observation. As Nils Bohr famously said, "there is no quantum world. There is only abstract quantum mechanical description. It is wrong to think that the task of physics is to find out how Nature is. Physics concerns what we can say about Nature" (Bell 1987, 142).

During World War II, the need to conceptualize immense flows of information bolstered entanglement as a conceptual approach, and catalyzed the development of systems theory in various fields adjacent to physics, including cybernetics, computer science, neuroscience, psychology, and game theory (Pias 2016; Kline 2017). For scholars in these fields, entanglement describes open, non-linear systems where multiple, interacting feedback loops create the conditions for the emergence of new material or informational states. In such systems, the various elements become entangled, such that changes in one induce changes in others. Rather than defining stable ontological

categories (how Nature is), these entangled systems suggest contingent relational categories dependent on the epistemological framework within which they are observed (Halprin 2016, 150–160, 169–173).

From physical and mathematical sciences, the concept of entanglement spilled into social research primarily through French linguistics and social theory. In the middle- to late-twentieth century, scholars such as Hélène Cixous, Gilles Deleuze, Jacques Derrida, Michel Foucault, Julia Kristeva, and Jean-François Lyotard developed theoretical frameworks that moved beyond binary concepts to interwoven discourses, networked social relations, and communicative acts (Lafontaine 2007). Deleuze and Guattari's (1987) work in particular has been crucial for its focus on the elements of a system assembled into more or less interdependent relations, which they called assemblages. Taken together, the work of these literary and social theorists reveals the mutually constitutive relation between ideology and materiality, the ideal and the real, in the construction of social categories such as class, gender, race, nature, power, knowledge, the body, the self, and the city.

Meanwhile, the concept of entanglement took hold in geography and urban theory, largely under the influence of Marxist sociologists following Henri Lefebvre, as well as the emerging field of ecology, itself an outgrowth of the application of systems theory to biology. The work of scholars such as Doreen Massey, Nigel Thrift, Bruno Latour, Manuel De Landa, and Trevor Pinch has been particularly important in broadcasting the idea among spatial thinkers that elements of complex systems are interconnected, coeval, and mutually constitutive, and that these entanglements are grounded in epistemologies and power relations. In turn, spatial theorists have applied concepts of entanglement to a broad range of subjects, from technology and urbanism to development, trade, governance, and empire (De Landa 2000; Hecht 2011). As geographer Jennifer Houghton (2013, 2793) argues, the concept of entanglement has become crucial to the re-examination of spatial categories, shifting "interpretation away from a sense of dualism and frequently normative theorization towards a more complex and nuanced understanding of the interrelationships between the elements which coalesce to produce tangible outcomes in places."

When Lefebvre contended that abstraction is a mode of alienation in which the conceived comes to dominate the lived, he assumed that terms such as 'urban' and 'rural' would adequately describe the resultant typological forms. We argue, however, that such forms only become intelligible under observation, indicative of a social reality that remains messy and unfinished––indeed, entangled. Just as the lived and conceived are inextricably entwined, so do qualities such as 'urban' and 'rural,' 'artifice' and 'nature,' 'planned' and 'unplanned' become momentarily comprehensible at the instant we observe or describe them. After all, the complex feedback loops between economies, networks, technologies, social relations and built forms quickly overwhelm the observer. Holding the world still long enough to describe it reveals crucial patterns and relations, but always at a cost, always with the risk of reduction, simplification,

and overdetermination. Such pitfalls are inevitable in research; however, they become all the more prevalent as the terms we use to describe the world become less and less applicable, and as the accumulation of anomalies compels us to build new models and to tell new stories (Scott and Storper 2015; Simone and Pieterse 2017, 183-198).

Thus, if we accept that elements of systems are entangled, how do we describe those elements in ways that avoid reification? How do we observe entangled elements in a system without radically overdetermining that system? Given that the terms we use are increasingly inadequate to describe complex phenomena, we argue that a new descriptive project is needed in the study of landscapes and built environments. In this case, we do not need to jettison terms such as 'urban' and 'rural' so much as we need to redeploy them as heuristic and contingent, rather than normative or ontologic categories. As Chantal Mouffe argues, such terms imply constitutive outsides, but these outsides cannot be understood merely as something "asserted/negated by another content which would just be its dialectical opposite." Rather, terms such as 'urban' and 'rural' can best be apprehended in terms of their "radical undecidability," that is, their contingent meanings formed in relation to each other and to the observer (Mouffe 2000, 12–13, cited in Roy 2016).

Landscapes Under Observation

As we observe images of entangled landscapes, it is necessary to consider the entanglements of the very tools we deploy––in the case of this essay, the suite of products known as Google Maps and Google Earth. After all, the Google Earth operation emerges out of an entangled series of landscapes that defy ready categorization, connecting satellite launch pads with military aerospace installations with city center corporate headquarters with banal suburban office parks. Google Earth relies on images relayed to the Geospatial Intelligence Agency (NGA) in Springfield, Virginia from the Landsat 8 and GeoEye-1 orbital satellites. In this way, Google Earth assembles a vision of a "known world" from a mosaic of millions of Terabytes of mapping data gathered amid the otherwise mundane landscapes of geospatial intelligence, national security, and surveillance. We might call this landscape 'rural' for its setting amid former tobacco fields of the Piedmont; 'suburban' for its emergence alongside the curvilinear streets and cul-de-sacs of American edge habitat; or 'urban' for its intellectual, cultural, and political connections to Washington, DC. It may be all of these things, entangled with a wide range of other landscape forms across the world; the point is to describe and understand them so that we can build new theory.

Of course aerial and satellite photographs only provide a partial view of the world. Beyond the obvious diminution of species life and activity and the privileging of the visual over other sensory modes, vertical views also flatten topography and distort the Earth's curvature. Moreover, projects such as Google Earth pretend to a pristine, smooth, "god eye" view, but in fact present visual data stitched together by algorithms using visual data captured during multiple passes of several satellites (Dial et al.

2007; Dorrian 2013, 290–293; Kurgan 105–120). After all, while Landsat 8 and GeoEye-1 capture data on a 16-day Earth rotational cycle, Google acquires and displays images selectively, so that the resultant atemporal mosaic is comprised of tiles created across a wide range of dates (Roy et al. 2014, 156).

Nevertheless, these aerial views are useful in that they cannot help but expose a world of intertwining spatial forms, comprised of iterative, ever-shifting composites of the material and the ideational, the abstract and the concrete. Satellite imagery provides an important tool for descriptive and analytic research, since it reveals forms that can be difficult to fathom on the ground, but that exert a powerful organizing force on everyday life and spatial experience (Heathcott 2019, 32). The view from above throws particular elements, assemblages, and relations into relief, providing important insights into landscape forms as they change over time.

Entangled Forms

What, then, are the elements under observation in this project? To bring a measure of coherence to our reading of images, we provide some definitions of content. Most of these terms will apply in one way or another to most of the images. For example, nearly all landscapes are extractive in one way or another, whether through realizing ground rent or netting fish from an estuary or transposing nitrogen from soil into crops or digging out minerals from the earth. However, we are interested here in the more or less predominant modalities of landscape form that appear in each satellite photograph. Our paratactical list of terms includes the following:

> *Bespoke*. A bespoke landscape is one that has been custom designed and engineered over a relatively short period in order to perform a highly specific function. These functions may include but are by no means limited to leisure, entertainment, science, industry, incarceration, containment. It may incorporate modular elements, but the way in which these elements are assembled can be unique.

> *Colonial*. All landscapes take form through relations of power. We use the term 'colonial' here to refer to landscapes that clearly reflect the imposition of political, economic, and epistemological power by one national or ethnic group over another. Often this emerges in episodes of cross-territorial invasion or occupation, but may also come about through ethno-racial dominance within states.

> *Cultivation*. Cultivation landscapes are those devoted to the production of food and other resources. These include farms, fisheries, timber stands, pastures, ranges, and other forms. Such landscapes take a wide variety of forms across the planet. Agrarian landscapes, for example, include smallholder kitchen gardens and family orchards, monoclonal plantations and industrial farms. They are imbricated within a range of political, economic, and social relations that may be entangled with, but not always reducible to, capitalism.

Diagrammatic. A diagrammatic landscape is one that goes beyond merely being highly organized or comprehensibly planned. Rather, it evinces a formal, architectonic, indexical design, one that stands in dramatic contrast to its surrounds while signaling modes of power and control. Sometimes a diagram is singular, such as the nonagonal shape of Palmanova, Italy. Other times, the diagram functions like a cartouche, a form containing other forms, such as World's Fairs and theme parks.

Extractive. While agriculture and property are both extractive processes, their modes of extraction tend to be more diffuse, subordinated to other purposes such as the provision of shelter, the plantation of staple crops, and the reproduction of labor. We use this term in this essay to refer to landscapes dedicated singularly to resource extraction, such as mining, fishing, and data harvesting.

Gridded. The concept of the grid has a long history in planning, architecture, and other spatial disciplines. From the Roman camp to the Law of the Indies settlements in New Spain to the U.S. Township system, the grid constitutes a powerful locus of control over land by state authority. Grids are abstract spatial orders: some remain invisible, such as navigational systems; others take material form through human settlement, cultivation, and building.

Industrial. The extension of industrial space and time to multiple locations constitutes one of the most crucial factors shaping the world today. By industrial, we refer to a system wherein factors of production are broken into repeatable tasks performed in linked chains by interchangeable laboring bodies and machines. Like the 'urban,' industrial factors may be less visible or tangible; we use the term here to refer to industrial functions that directly shape landscapes.

Isolate. A spatial isolate is a landscape form that is significantly disconnected from its surroundings, whether geomorphically or through engineering and design or both. Very often an isolate performs a singular or highly dominant function, such as the Federal Penitentiary at Alcatraz, a prison located on an island in the middle of the San Francisco Bay, or the nuclear waste disposal sites that dot the planet.

Logistical. Logistical landscapes are most closely related to Lefebvre's concept of abstract space. Here, we use the term to refer to highly engineered landscape forms dedicated to controlling the flows of information, materials, goods, and people. These landscapes often serve as key nodal points in chains of extraction, refinement, transportation, production, assembly, inventory, storage, and consumption.

Macroform. This term refers to a landscape that results from the contiguous repetition of a form or combination of forms at scale. It can refer to city-making processes of subdivision and development, where individual properties in a grid of streets push outward in fits and starts from the urban core. It can also refer to a specific kind of agricultural unit replicated

over and over, resulting in a relatively uniform agrarian landscape. In any case, as with similar terms such as 'urban sprawl,' the content of macroform must be described.

Metropolitan. Despite its troubled origins in colonial discourse, the term 'metropolitan' remains useful as a way to describe the conditions created by the projection of urban macroform into regional space. Often misread as an object, the metropolitan is less a definition of a specific landscape typology than a description of relations among people, networks, and systems created by the uneven expansion of landscape forms.

Modular. This term refers to elements of landscape comprised of repeatable, interchangeable forms. Like the logistical, the modular relates closely to Lefebvre's notion of abstract space, in that it may be conceived in one place under a particular circumstance, and subsequently deployed in multiple spatial-temporal contexts. Modular forms such as shopping malls, dams, office parks, research laboratories, and container ports often embed power relations.

Patchwork. Unlike the grid, a patchwork results from the repetition of an irregular form across a defined space. This can be 'urban' in the case of the figure-ground of medieval towns and cities, or 'rural' in the case of feudal and kinship-oriented agrarian landscapes. The distinction between patchwork and grid forms is often misread as 'organic' versus 'rational' or 'informal' versus 'formal,' but we reject such reductive binaries. Rather, the distinctions tend to reflect different modalities of planning, collectivity, authority, and management of land.

Rhizomic. The rhizome emerges without a center and extends through a mesh of complex forms with multiple nodes of growth, so that alteration of or damage to any part does not compromise the whole. Many landscapes evince rhizomic form at the local level, but at the metropolitan or regional scale they are usually part of multinucleated systems with subtle but definite hierarchies and agglomerations.

Scientific. A scientific landscape is simply one optimized for research. The imperatives of research in the sciences often shape the architecture, engineering, and land uses wherein such research takes place. This can range from the brief for a small laboratory building to the design of a large research park or even to the mobilization of earthworks for particle colliders, weapons testing, and nuclear research. Rather than seeing these as universal expressions or techno-rational requirements, we view such landscapes as highly charged with ideological meaning.

Settlement. Any area of human habitation marked by relative proximity of people to one another, interdependent social practices and processes, and more or less fixed dwelling that endures over time. There is a nearly uncountable variety of settlement landscapes across the globe, linked closely to culture and tradition, though modified through varied

influences from near and far over time. Human settlement comprises some 3% of the planet's land surface, more than any other land use.

With these terms we have endeavored to attach relevant content to each image, while avoiding the dyad of urban and rural in our descriptions. Indeed, all of the landscapes depicted evince elements of both urban and rural forms, networks, and systems along a continuum; none of the landscapes, however, can be reduced to either urban or rural. Of course, this is only a partial and preliminary effort, not to mention one based on a very broad sweep. There are dozens if not hundreds of terms useful for landscape description. Moreover, no landscape can be understood solely through aerial, orbital, or plan views; Google Earth is just one among a suite of tools useful in the apprehension of landscape forms. Our assertion here is that the careful application of terms to descriptions of landscape constitutes a key factor in the construction of new theory and analysis that moves beyond dyadic, reductive, and overdetermined readings of landscape. Ultimately, new theoretical frameworks will provide planners with more nuanced, calibrated, and sensitive methods for intervention into landscapes and built environments.

Preliminary Observations

The photographic gallery assembled here explores landscapes through the framework of entanglement. Far from a conclusion to these issues, we provide one possible point of departure: An initial effort to look at landscapes that defy ready categorization so that we can develop a new descriptive language. We have taken a curatorial approach so that we can focus simultaneously on the landscapes depicted in the images as well as the entanglement of the images with the technologies of their production. Thus, our selection of images is purposefully non-definitive, partial, unsystematic, and fragmentary. There is no formal logic to the selection other than our interest in landscapes that defy ready categorization. After all, this piece is not an effort to analyze entanglement within the accepted terms of landscape. Rather, we offer a meditation on entanglement in landscape as a first step in building new planning theory.

The images that follow expose some of the rank inadequacies of terms we traditionally use to describe landscapes. We begin to see the shortcomings of commonplace theoretical assertions. For example, Lefebvre's (2003) claim that we live in an urban world appears woefully premature; we live in an urbanizing world, to be sure, a world of dilating settlement macroforms, but that is an unfinished project (Allain 2004). More to the point, actual landscapes complicate assertions that every patch of earth touched by technology, capital, surveillance, and communication flows is necessarily urbanizing or is sui generis urban. Likewise, the common view of the rural as undeveloped (Edwards 1976), as rustic pre-urbanized space, or as an absence of the urban, necessarily falls apart in the face of architectures, landforms, and mediations that spread through human settlements of varying densities (Damon et al. 2016; Irwin

et al. 2010; Lichter and Brown 2011). Finally, whatever comfort we might once have felt in conjuring wilderness as nature untouched by human hand falters before the planetary mesh of industrial and communicative technologies that increasingly connect points of the globe.

This is not to say that the urban dimensions of Sanaa or Manilla are qualitatively the same as those of Antarctic encampments or the middle of the Atlantic Ocean. The urban might concentrate in thick bundles around areas of dense human habitation that we call cities, but large-scale migrations bring rural social relations, cultural practices, and spatial traditions into those same areas, remaking them in the process. Urban forms penetrate far into rural regions and remote natural landscapes, whether through visible infrastructure and population expansions, or through invisible webs of communication, utility, and surveillance--but they are also transformed in those circumstances. Meanwhile, mass mediated representations of the 'urban' and the 'rural' extend across all settlement forms through television, film, and the internet. Ports, dams, military facilities, electrical grids, and other logistical spaces spread like rhizomes across the planet's surface, driven by the "demand that our Amazon package be sent cross-country overnight; that fresh roses from Colombia appear at the local deli within days of being cut; and that an Uber car pick us up in a matter of minutes" (Easterling, LeCavalier, and Lyster 2016). The spaces that such demands engender are neither wholly urban nor rural, but rather projections of human technē onto varied landforms, environments, and imaginaries.

While we live in an age of rapidly multiplying connections and space-time compression, the world we are making cannot simply be collapsed into any one quality. After all, we still inhabit a very small portion of the planet. According to the Food and Agricultural Organization of the UN, little more than one half of one percent of the Earth's land is covered by artificial materials such as pavement, housing, quarries, and open mines, while 12% is devoted to agricultural crops (Latham et al. 2014, 23). Nine out of ten people live on 3% of the Earth's land surface, and half the population lives on 1% of the land (European Environment Agency 2015, 1). Nevertheless, the human imprint is profound. The resource shed of New York City, for example, requires an area of land at least five times its size to sustain the population. And as of 2009, the global "Human Footprint" covers 75% of the terrestrial surface (UN Secretariat 2018, 70). Industrial toxins, particulate emissions, and waste dumping have taken a significant toll on the world's oceans, and the increasing pace of resource extraction and land degradation threatens thousands of species with extinction (ibid. 2018, xxxi).

In all cases, our reductive use of terms looks increasingly like category errors masquerading as theoretical insights. After all, there is a tremendous difference between claiming that the planet is undergoing urbanization (as one among many forces of transformation), and claiming that we have arrived to an urban world. To say that the world is 'urban' seems as problematic as saying that we live in a largely wild or aqueous world; such statements correspond to some qualified truth, but explain lit-

tle. Our lack of more precise descriptive capacity leads us to read complex landscapes through familiar categories, stretching their meaning to the breaking point. Over time, as planners have encountered landscapes that defy description, they have reached for terms such as 'suburban,' 'peri-urban,' 'semi-rural,' 'informal,' or 'unplanned'––terms that only convey meaning with respect to something else.

Amid these perturbations, Lefebvre's notion of abstract space remains a useful theoretical concept, but its skeleton must be "clothed in flesh and blood" (Lenin 1894 quoted in Lefebvre 2014), tempered perhaps by his equally important insights into everyday life and the realities of lived experience. These are not simply sites of resistance to an all-encompassing abstract space, but rather revelatory of far more varied kinds of spatial practice. After all, amid the expanding signatures of industrialization, globalization, and urbanization, Gyan Prakash (2010, xx) reminds us that people experience globally situated and connected spaces as "decidedly local lifeworlds, thick with specific experiences, practices, imaginations, and memories." People tend to work out, on the ground, their own shared understandings of the landscapes that surround them, assigning shifting content and meaning to terms like 'urban' or 'rural' or 'town' or 'country.'

In this sense, the spatial disciplines must once again take up a multi-pronged descriptive project, similar to the sprawling accounts of nineteenth century diarists, boosters, illustrators, and chroniclers. Given that the complex reality of the world presents so many anomalous, contingent, ill-fitting landscapes, a new round of descriptions should scaffold analysis and build the next generation of spatial and planning theory. Such a descriptive project could bring a refined understanding to scalar alignments and disjunctures that only basic research can obtain. Moreover, it should begin from a decolonized position, rejecting points of departure that rely solely on Western theoretical precepts. A trickle of journals has made room for descriptive work, but scholarly venues overwhelmingly privilege analysis over narrative, description, poetics, illustration, and other registers. This in turn causes many scholars to use theoretical and critical shortcuts that preclude careful description.

A new descriptive project can use aerial and satellite views to identify landscapes entangled by multiple forms, but such tools must be calibrated against the deeply problematic histories of cartography as a field of power. Nevertheless, as Denis Wood (2011, 15) reminds us, empirical description does not require the suppression of unavoidable subjectivities. The "vertical view" afforded by orbital and suborbital flight technologies provides a useful tool for identifying entangled landscapes, which can then be studied on the ground to work out how varied actors understand, shape, and contest them––actors that include not only humans, but multiple species, geomorphologies, climate patterns, and other features of the "natural" world. These grounded studies can then confirm, challenge, or articulate what we learn from seeing the world at 30,000 feet.

In the photographic gallery that follows, then, we use visual survey methods to identify a series of landscape entanglements. We attach keywords to each image, listing the predominant landscape form first, followed by additional terms in a diminishing order of salience. We do not use these keywords as determinants with fixed meanings, but rather as heuristics to describe the gradients and imbrications of varied landscape elements. Some of the images show edges and collisions of forms, while others show interstitial, folded, and entwined forms. However abstract their spatial codes and parameters, however embedded in systems of economy and governance, however contested through conflict and war, every landscape emerges out of grounded, specific material relations. In that sense, the landscapes depicted here are simultaneously ideational and material, phenomenal and constructed.

Many of these landscapes may seem familiar at first glance: a routine collection of elements, a recognizable architectural form, an oft-encountered substrate of terrain. But looked at closely, they may seem aberrant or strange, abnormal or discomforting. They may oscillate between the known and unknown, or assume uncanny shapes that gain and lose resolution according to the filters we use to view them. Such landscapes defy categories, their raiment braided into knots of spatial significance, their forms bristling with functions and meanings. They are at once material instantiations of spatial modularities, flows, and abstractions, and at the same time productive nodes of worlding, reflecting back, however imperfectly or adulterated, layered social and cultural meanings as well as the inchoate projects of capital and state. Sometimes these landscapes manifest through juxtapositions of distinct spatial forms, other times through adumbrations and slippages. Still other times they are invisible, ghostly, fugitive. In all cases, they are works in progress, landscapes under constant transformation, worlds in the making.

National Geospatial Intelligence Agency, Reston, Virginia.

Set amid the interchanges, malls, and cul-de-sacs of Northern Virginia, the National Geospatial Intelligence Agency is the chief organ for the production and circulation of satellite images, including the Google Earth photograph below. The 2.4 million square foot building at the center, located on the former proving grounds of Ft. Belvoir, contains most of the mapping, monitoring, and data processing facilities. Nearby office parks house facilities for General Dynamics, Raytheon, U.S. Customs and Border Protection, the Coast Guard, and numerous security and communications companies. Meanwhile, Chipotle, Starbucks, Walmart, Costco, and other staples of bigboxia fill the surrounding shopping centers. To the east, a community of modest two-story and split-level homes spreads out along curvilinear streets in lush green parkland. The setting of geointelligence facilities amid such banal landscapes is not accidental; it is part of a long process of spatial deconcentration of military, government, and commercial "back office" operations from central city locations.

Keywords: Modular, Extractive, Logistical, Scientific, Metropolitan
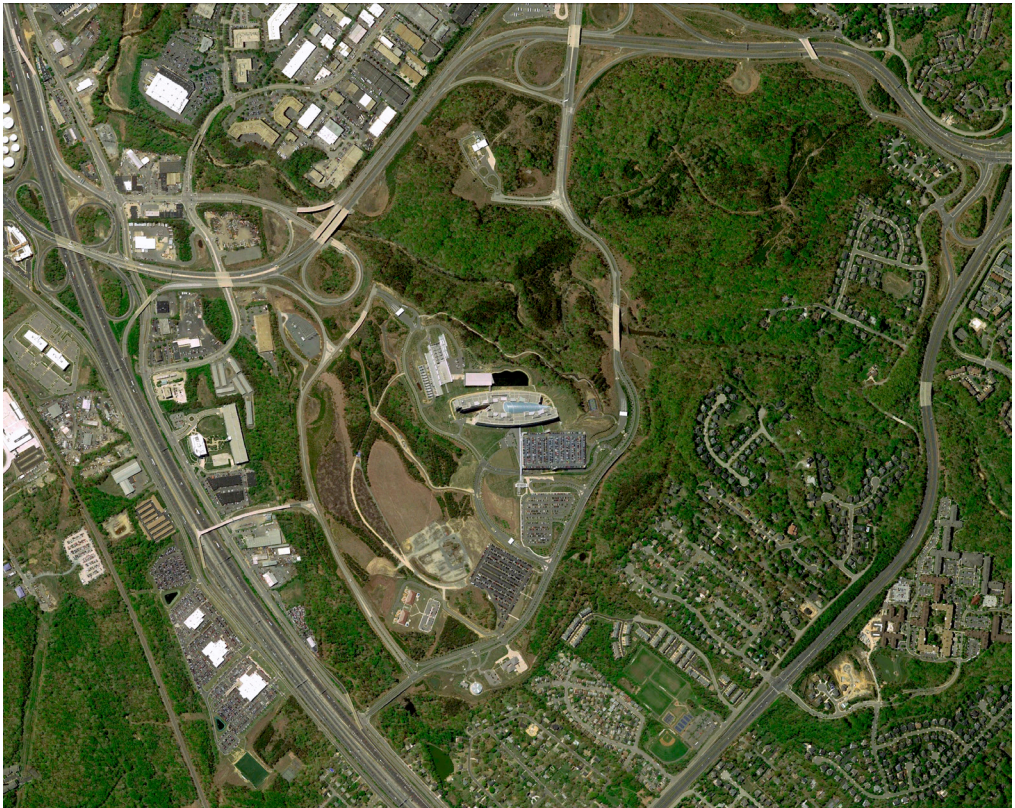
Location: Latitude 38°45'13"N, Longitude 77°11'50"W, Altitude 18,472 feet.

Date: 20 April 2018 (accessed 3 April 2019).

The Graticule

The center of this image shows the zero point of the graticule, or Geographic Coordinate System, where the Prime Meridian crosses the Equator. While the Equator consti- tutes a natural feature of the oblate-spheroid planet determined by the distance from poles along its axis of spin, the Prime Meridian is an arbitrary designation. Indeed, the Greenwich Prime Meridian constitutes the ultimate expression of imperial power, anchoring the projection of measured space across the curved surface of the earth. This navigational machine envelops the planet in a grid of sections of varying size. At the equator, a section that measures one second by one second covers approximately 10,000 square feet: There are 233,280,000 such sections on the earth's surface. The zero point shown below is the necessary product of this spatial imaginary, located in the Gulf of Guinea approximately 400 miles south of Accra, Ghana, and 650 miles west of Libreville, Gabon. It was captured by the Geo-Eye Satellite on 30 December 2016, and is rendered here from an "Altitude" of 3,281 feet.

Keywords: Colonial, Gridded, Isolate, Logistical, Scientific

Location: Latitude 00°00'00", Longitude 00°00'00", Altitude 3,281 feet.

Date: 30 December 2016 (accessed 9 March 2019)

IRRI

The U.S. government established the International Rice Research Institute in 1960 on the outskirts of Manila as part of a "soft power" turn in foreign policy. Conceived as a weapon of the Cold War waged through the stomach, IRRI sought to win allies with the promise of ending hunger through technology transfer. Under the sign of the "Green Revolution," IRRI pursued the erasure of indigenous and local knowledge systems and their supplanting by scientific, techno-rationalist industrial agriculture. Not incidentally, this Global North research epistemology also involved the transfer of the mundane U.S.-style suburban office park landscape, shown below, itself a product of Cold War decentralization policy. The research center, with its grid of agricultural test plots, modular buildings, and parking lots, abuts a densely patchworked vernacular landscape of orchards, kitchen gardens, pig pens, and chicken coops, all interspersed with signatures of the encroaching sprawl of Manila. The rigid line between the two landscapes conveys the sense that they are pushing against each other along the line of separation.

Keywords: Colonial, Extractive, Scientific, Cultivation, Gridded, Metropolitan

Location: Latitude 14°10' 08"N, Longitude 121°15' 16"E, Altitude 4,692 feet.

Date: 23 March 2016 (accessed 9 March 2019)

Dadaab

Located in Central Kenya near the Somali border, Dadaab is one of the largest refugee camps on the planet, with a peak official population of some quarter million people. This view shows only one part of the larger complex, a section known as Ifo Camp, laid out in 2012 to provide a catchment for the increasing flow of refugees. Since 2018, however, the Kenyan government has closed Ifo and reduced the number of refugees at Dadaab, which it perceives as a security risk. As a landscape typology, the refugee camp defies ready categorization. Located in a vast semi-arid plain, it contains densities of settlement similar to many cities. Evincing a kind of urban rigidity in its infrastructure, it is home to large numbers of people from rural regions of Somalia, Ethiopia, and Sudan. Based on a militarized grid form that has its roots in Roman camp design, residents bring their own array of spatial sensibilities and settlement preferences to the camp, and engage in complex re-working of the landscape--moving tents into clusters, establishing 'desire' paths, planting trees and cultivating natural fencerows.

Keywords: Settlement, Gridded, Modular, Logistical
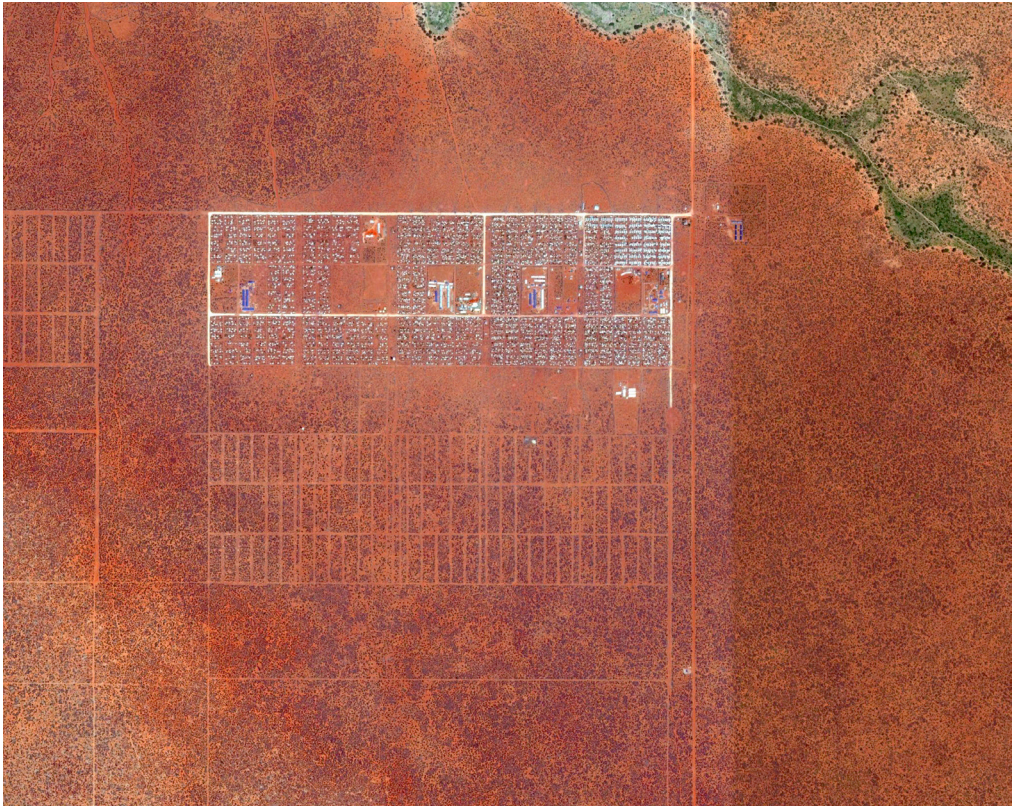
Location: Latitude 14°10' 08"N, Longitude 121°15' 16"E, Altitude 4,692 feet.

Date: 1 February 2014 (accessed 9 March 2019)

Port Klang

The logistical space of Port Klang spreads across a series of mainland and island facilities in Malaysia's Selangor Estuary. Westport, shown below, occupies the island of Indah. Prior to the development of Westport in 1994, Indah was home to a patchwork of mangrove forests dotted by small fishing villages and farming communities of aboriginal Semang and Senoi people, most of whom were displaced by ethnic Malay and Chinese. Today, the port incorporates large-scale infrastructure for unloading containers, warehousing goods, processing customs and duties, docking and refueling ships, and disembarking passenger cruise liners and naval vessels. At lower left, the 1000-acre free trade zone, established in 2004, houses a range of corporate offices, technology and equipment companies, and manufacturing plants all geared toward transoceanic markets. Companies located in the zone are exempt from most taxes as well as fees for capital transfer. A wavering road and high fences separate the port facilities and free trade zone from a neighborhood of small houses and plots used for agriculture and home production.

Keywords: Logistical, Modular, Extractive, Industrial, Settlement, Gridded

Location: Latitude 02°55'27"N, Longitude 101°17'28"E, Altitude 30,285 feet.

Date: 23 March 2014 (accessed 9 March 2019)

Maitri Station

One of three stations established by the Indian government through the International Convention on Antarctic Research, Maitri houses scientists studying a range of geologic and atmospheric phenomena. Indian military engineers located the facility at the remote Schirmacher Oasis, a landscape of elevated rocky plateaus and freshwater lakes carved out by nearby Dakshin Gangotri Glacier. The Oasis remains uncovered by snow during most of the year. In addition to storage structures, generator equipment, and a water conduit, the facility includes a large main building housing most of the laboratories, residential quarters, and offices. Today Maitri can support up to 26 scientists and staff for overwinter stays, representing numerous Indian scientific organizations, universities, and research centers. Key ongoing projects include studies of ozone depletion, monitoring ultraviolet radiation, and tracking the chemical and geomorphic signatures of climate change driven by industrialization and urbanization. The Indian government recently announced that it will replace Maitri with a new station in the next 2–3 years.

Keywords: Scientific, Isolate, Bespoke
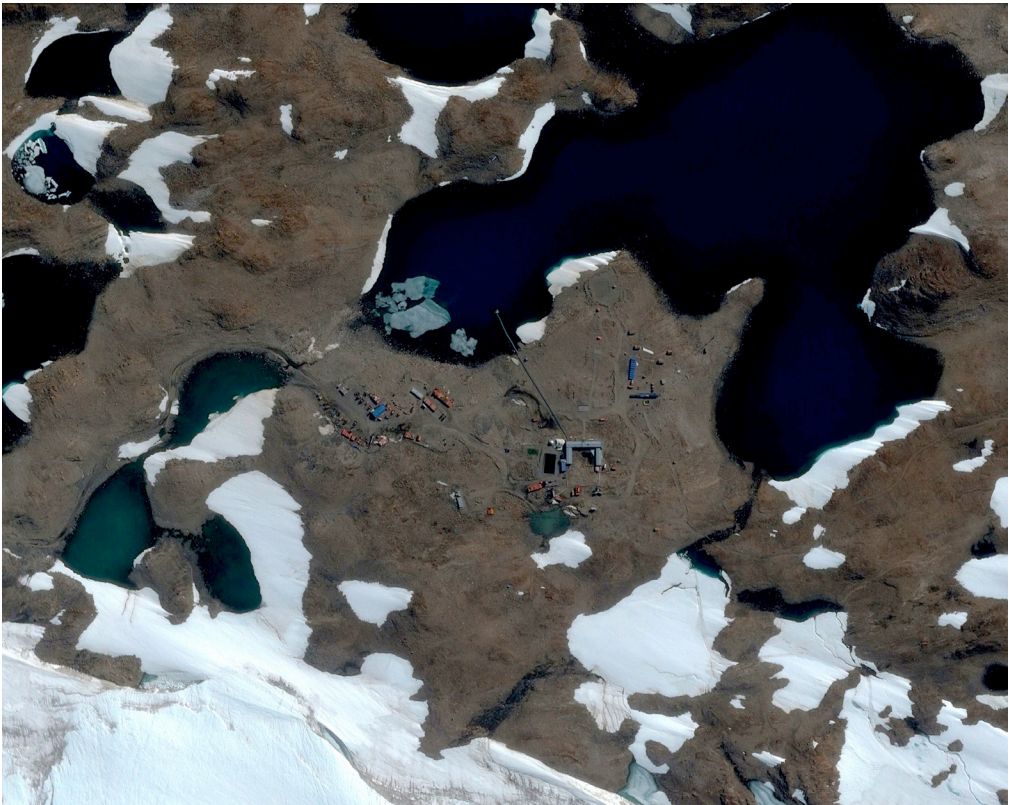
Location: Latitude 70°45'60"S, Longitude 11°43'53"E, Altitude 6,183 feet.

Date: 20 December 2016 (accessed 9 March 2019)

Sanaa

One of the oldest continually inhabited cities in the world, Sanaa stretches lengthwise through a semi-arid valley of the Sarawat range. The city occupies a tense breakpoint between tribal alliances and the Houthis movement, between Sunni and Shiite Islam, and between the expansionist political ambitions of Riyadh and Tehran. The dense morphology of the city reflects a mix of Islamic residential and town-building principles, traditional Yemeni rammed-earth architecture that restricted the base dimensions of buildings, and a series of intersecting roadways launched by Ottoman rulers in the late nineteenth century and continued under the Zaydi imamate in the twentieth. In the image below, the Assafi'yah district on Sanaa's eastern edge forms a bright line against a steep escarpment crisscrossed by mountain trails and seasonal watercourses. The monochromatic tint indexes the materiality of the landscape out of which the city emerged, both in terms of the earthen resources used to build, and the high particulate drifts from the surrounding mountains.

Keywords: Settlement, Macroform, Patchwork, Rhizomic

Location: Latitude 15°20'01"N, Longitude 44°13'45"E, Altitude 16,182 feet.

Date: 16 December 2018 (accessed 9 March 2019)

Fermilab

Built in 1967 in Batavia, Illinois, the Fermi National Accelerator Laboratory occupies 6800 acres of former prairieland, now surrounded by farms, golf courses, and subdivisions. Created to advance particle detection capacity, it has the capacity to accelerate protons to 99.999954% of the speed of light. Throughout the 1970s and 1980s, Fermilab played a major role in the refinement of nuclear weapons technology. Much of the apparatus is buried or housed in low-rise structures, woven together through a bestiary of mechanical systems, from vacuum pumps and injector tubes to booster rings, beam position monitors, magnets, and a vast thicket of water, electric, and cryogenic conduit. The circular forms of the Main Injector Ring (left) and the Tevatron particle accelerator (center) echo the numerous cul-de-sacs in the nearby streets with names like Woodland Hills Road, Clover Court, Lake Spur Lane, and Pine Street. The expanse of former prairie once occupied by Illinewek, Macouten, Kickapoo, and Shawnee people, was reconfigured to support the development of weapons of mass destruction.

Keywords: Bespoke, Scientific, Diagrammatic, Metropolitan

Location: Latitude 41°50'09"N, Longitude 88°14'52"W, Altitude 24,632 feet.

Date: 27 June 2009 (accessed 9 March 2019)

Cunene Basin

Tucked into a valley between the Sierra Chilengue and the high Bié Plateau, the Cunene basin in Huambo Province, Angola is part of a great watershed fed by three rivers, the Cunene, Etembo, and Cunhangamua. With the construction of the Gove dam, seen at bottom right as an elegant grey arc, the basin became a reservoir, exploited both for electric generation and irrigation of nearby farmland. Initially planned in 1969 by the Portuguese government with World Bank funds, construction halted in the 1970s during the Civil War. The dam was finally completed between 2007–2012 by a Brazilian company during a spate of infrastructure investment by the Angolan government. Today the dam's large spillway and hydroelectric intake station boast a 60-megawatt capacity, although a series of droughts have prevented it from reaching full power. The dam feeds a network of high-tension transmission lines across the land as far as Huambo. Nearby towns such as Cuma and Chipindo are sparsely populated, most under 10,000 people, though an airstrip and series of small villages can be seen along the bottom of the image.

Keywords: Settlement, Patchwork, Cultivation, Rhizomic, Macroform

Location: Latitude 13°25'06"S, Longitude 15°50'36"E, Altitude 11 miles.

Date: 12 July 2018 (accessed 9 March 2019)

Xochimilco

Xochimilco is the last place where one can see remnants of the chinampas macro-form that once dominated the Mēxihc Valley. Chinampas are woven reed mats piled up with multiple layers of mud to create new land within a lake, marsh, or swamp. Spaces between the built-up land are given over to canals. As a landscape, the chinampas afforded dense agricultural settlement with an efficient transportation network for moving people and goods. Aztec rulers expanded the chinampas across the five major lakes of the valley, including Xochimilco, located in the south of today's Mexico City. Spanish invaders drained most of the lakes, but left Xochimilco largely to its own devices. Today this UNESCO World Heritage site retains a significant agricultural function as one of the centers of flower production for the metropolis. However, the influx of population spreads urbanizing forms into the chinampas, causing the land to sink more rapidly and polluting the canals. With water increasingly siphoned off for urban households, less is available to recharge the canals, and the area is subject to extensive silting.

Keywords: Settlement, Cultivation, Gridded, Macroform

Location: Latitude 19°15'48"N, Longitude 99°05'22"W, Altitude 5,418 feet.

Date: 28 December 2009 (accessed 12 April 2019)

Hashima

Hashima is an island converted into a machine inhabited by ghosts. Located nine miles off the coast of Nagasaki, Hashima is part of an archipelago surrounding the Kumamoto peninsula in the south of Japan. Beginning in the1880s during the Meiji period, the island played an important role in national industrial development as a base for submarine coal mining. In the 1920s and 1930s, the Mitsubishi concession increased investment in heavy mining, spurring the development of larger apartment blocks as well as a school, hospital, and other public facilities. During World War II, it was a site of forced labor for Chinese prisoners and conscripted Korean civilians. Upon restoration in the 1950s, the island reached its peak population of 6,000 people, making it the most densely inhabited place on earth. In the 1970s, Japan switched to petroleum and nuclear energy, leading to the abandonment of Hashima island, which remained closed to visitors from 1974 to 2009. Today it offers tour groups a post-apocalyptic spectacle of ruined concrete towers and rusting industrial equipment overgrown with plants.

Keywords: Isolate, Industrial, Settlement, Diagrammatic, Bespoke

Location: Latitude 32°37'20"N, Longitude 129°44'19"W, Altitude 3,172 feet.

Date: 12 December 2016 (accessed 12 April 2019)

Mithi Estuary

As it meanders into Mumbai, the Mithi River slows, shallows, and widens, forming an estuary up to one half a mile across that discharges into the Arabian Sea. Along the South bank sprawls the community of Dharavi, one of the largest informal settlements in the world. Tucked into Dharavi are the Koliwada, families who have fished the estuary for generations and who descend from some of the earliest inhabitants of Mumbai. The Mithi river has grown increasingly polluted since the 1980s, as sections of metropolitan Mumbai along its banks have swelled with high-density settlements. To overcome these problems, the Koli have employed a practice that dates back hundreds or even thousands of years in riparian zones of central India. They have painstakingly removed silt sediments, constructed berms to create tanks or ponds, cultivated mangrove trees for soil retention, and engineered mud dams to regulate the tides that rush in and out from the sea. Over time, the pollutants in the tanks soak into the sediments or discharge into the sea, and the water becomes cleaner, allowing the Koli to establish viable fisheries.

Keywords: Settlement, Extractive, Cultivation, Patchwork, Macroform, Rhizomic

Location: Latitude 19°02′59″N, Longitude 72°51′16″E, Altitude 5.403 feet

Date: 27 October 2018 (accessed 9 March 2019).

Iran-Iraq Border

This image reveals fortifications and battle scars exquisitely etched into the desert landscape just north of Basra. Part of ancient Sumeria, the area known today as Khorramshahr in Iran and Shatt Al-Arab in Iraq lies 58 miles inland from the Persian Gulf and 10 miles west of the conjunction of the Tigris and Euphrates rivers. To the left of the long vertical line lies Iraq, with numerous traces of circular gun emplacements, military access roads, earthworks and battlements. Similarly, the war-weary Iranian terrain spreads to the right through a series of remnant grid formations, campsites, ramparts, and large gun arrays. The two nations waged war on a horrific scale from 1980 to 1988, with much fighting concentrated in this region due to its vast oil reserves. Oil, however, was only a means to an end in war conducted for religious, cultural, and regional supremacy. Today, a region that once housed millions of soldiers has fewer than 250,000 residents inhabiting some 1500 square miles. Substantial stretches of the landscape remain toxic from petrochemical fires ignited during relentless ground and aerial bombardment.

Keywords: Logistical, Modular, Rhizomic

Location: Latitude 30°58'16"N, Longitude 48°02'41"E, Altitude 37,457 feet.

Date: 10 February 2017 (accessed 12 April 2019).

Leavenworth

The United States Penitentiary at Leavenworth presents a carceral diagram set amid an expanse of flat agricultural and prairie landscape. Converted from a maximum to medium security facility in 2005, the prison sits at the northern edge of Leavenworth, Kansas, just under one mile west of the Missouri River. A massive wall brackets the ensemble of cellblocks, administrative buildings, paths, and yards, reading like some great cartouche of confinement. The St. Louis architectural firm of Eames & Young designed Leavenworth's principal buildings in 1895, deploying a neoclassical style they would later use for the Palace of Education building at the 1904 World's Fair. To the south, the main building faces a gridded neighborhood of small single-family homes; to the north stretches the large administrative and residential campus of Ft. Leavenworth. Surrounding the prison on all sides, the gently sloping topography facilitates surveillance and detection. While the federal prison houses a disproportionate number of Black, Latino, and Native men, the town of Leavenworth is nearly 80% white.

Keywords: Diagrammatic, Bespoke, Colonial, Isolate

Location: Latitude 39°20'17"N, Longitude 94°56'53"E, Altitude 3,989 feet.

Date: 21 September 2013 (accessed 9 March 2019).

Acknowledgments

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