COVID-19 and Food System Resilience in the Polynesia: Lessons from Rapa Nui

By

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Abstract

There is growing recognition of the pressing need for food systems transformation towards resilience, particularly in the face of climate change and, more recently, the COVID-19 pandemic. Pacific Island territories offer valuable perspectives on food system transformation processes during COVID-19 due to their experience with increasing dependency on food imports, rising levels of non-infectious diseases, and the loss of indigenous foodways. Rapa Nui is a remote Pacific Island home to the Rapanui indigenous people, and a special territory of Chile. Rapa Nui isolated itself from the mainland for 2.5 years during the COVID-19 pandemic due to concerns about the effect of the pandemic on its remote population and limited local medical facilities. This research uses participatory approaches to document local knowledge around food system resilience in the agricultural sector in Rapa Nui during COVID-19 and provide recommendations for policymakers and donors to strengthen the local food system. I conducted 13 in-depth interviews with various food system stakeholders, revealing the adverse impact of the pandemic on food security, particularly in its early stages. However, I also observed a remarkable resilience, marked by a resurgence of indigenous Rapanui cultural practices, which played a pivotal role in sustaining food security. I conclude that Rapa Nui's food system has undergone an accelerated transformation in the last decades characterized by a growing reliance on food imports and a shift towards less nutrient-dense food, resulting in reduced food system resilience. Globalization is identified as a dominant trend at the landscape level that was temporarily – but strongly – counterbalanced during the COVID-19 pandemic. This external shock favored the alignment of diverse forces within the food system guided by

cultural revitalization, indicating conducive conditions for sustainable food system transformation. My interviews highlight the need for more coordination among food system stakeholders to address pressing challenges related to water availability, insects and diseases, food safety, dietary change, food access, climate change, and the preservation of traditional species of agricultural value. Based on this research, I recommend policymakers, donors, and other food system stakeholders to take advantage of this opportunity by investing in innovative, multi-stakeholder food system governance structures aligned with indigenous Pasifika cultural values, and by fostering overall food system robustness by increasing agrobiodiversity.

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1. Introduction

There is growing recognition of the urgent need for food systems transformation towards sustainability and resiliency, particularly in the context of climate change and, more recently, the COVID-19 pandemic (e.g., Zurek et al., 2022; Leeuwis et al., 2021; den Boer et al., 2021; Queiroz et al., 2021; Savary et al., 2020; Webb et al., 2020; Caron et al., 2018; Knickel et al., 2018; Schipanski et al., 2016; Tendall et al., 2015). Three common threads that cut across the literature are: a) existing food systems have been increasingly exhibiting *undesirable emergent properties* including "food insecurity", "malnutrition", "poverty", and "environmental degradation" despite the many efforts to precisely accomplish the opposite to sustain a growing population, b) food systems *are complex socio-ecological systems* where attempts to modify one part can have diverse and sometimes even unpredictable consequences on the system as a whole, and c) to carry out the necessary food system transformation, more attention, research, action, and investment are needed on the social aspects of the system, particularly on building and supporting appropriate *governance structures* to accommodate diverse stakeholder's perspectives and negotiate tradeoffs among food system outcomes.

The recent COVID-19 pandemic was a major disruptor of food systems worldwide mainly due to the disarticulation of supply chains (e.g., HLPE, 2020; Savary et al., 2020), exposing systems vulnerabilities and opening a window of opportunity to re-think our food systems towards greater sustainability and resilience. Hence, multiple research efforts deployed to document learnings and analyze adaptation strategies in different territories offer valuable perspectives that add to the existing literature on food system transformation (e.g., Béné et al., 2021 focused on low and middle-income countries; Dixon et al., 2021 focused in Asia; Adhikari et al., 2021 in Nepal,

Weersink et al., 2021 in the US and Canada; Davila et at., 2020 in the Pacific; Meuwissen et al., 2021 in Europe; May et al., 2021 in Africa).

Pacific Islands countries and territories (PICT) are particularly well-suited for analysis on food system transformation based on the COVID-19 pandemic experience, given that literature has already recognized the significance of islands as a valuable source of knowledge, mostly concerning environmental sustainability, disaster risk reduction, climate change adaptation, and resilience (e.g., Kelman et al., 2013; Walshe et al., 2012; Mcleod at al., 2019). Studies assessing COVID-19 impacts on food systems in these territories highlight the negative consequences of food-import dependency on food security (e.g., Davila et al., 2020; Iese et al., 2021; Georgeou et al., 2022) and the vital role played by certain *crops* (for example ancestral crops; Kagawa et al., 2021), *forms of cultivation* (for example home gardens; Farrell et al., 2020 and Davila et al., 2020), forms of *distribution and processing* (for example food hubs; Azizi et al., 2021), and food acquisition ways or *"food environments"* (for example barter systems, environments based on kin and community ties, and non-cash economies in general; Boggard et al., 2021; Farrell et al., 2020; Davila et al., 2020). Moreover, there is evidence that much of what "worked" in the region to sustain food security during the COVID-19 pandemic lockdown period can be attributed to the revitalization of traditional, ancestral food systems rooted in Pasifika indigenous values (Iese et al., 2021; Bogard et al., 2021). This aligns with research before to the pandemic that stresses the importance of indigenous values for food security (e.g., McLeod et al., 2019). In most places, pandemic lockdown measures were maintained for less than a year (Statista, 2021). After this period, most supply chains resumed operations, limiting the opportunities for: a) researchers to design and conduct participatory qualitative research based on case studies that capture this

momentum for food system transformation and, more importantly, 2) for local food systems to develop longer-term adaptation responses, considering the seasonal nature of most crops.

Rapa Nui is a remote Pacific Island of approximately 7,750 inhabitants and 63.3 sq miles, home to the Rapanui indigenous people (from here on, 'Rapanui'), who comprise roughly 50% of the population. Rapa Nui is a special territory of Chile, administratively within the Valparaiso Region. The territory self-isolated from the mainland for an impressive period of 2.5 years due to strict self-imposed, democratic, COVID-19-pandemic-related travel restrictions. This offers the potential for an interesting case study to examine the impacts of COVID-19 in the agri-food system for a more extended period. My research is centered on the following questions: *how did the COVID-19 lockdown period impact the agricultural sector in Rapa Nui, what lessons can be learned from this period to strengthen the resilience of Rapa Nui's food system, and what recommendations for policymakers, donors, and other food system stakeholders that can be drawn from this experience?* To develop and explore these questions, I used a participatory action research approach including: 1) unstructured interviews with key informants, 2) conformation of a local steering committee, 3) in-depth interviews with farmers and other stakeholders in the food system, and 4) dissemination of results (in progress).

In this thesis, I first document and analyze interviewee conceptions on the food system prior and after COVID-19 and perceptions on food security before, during, and after the pandemic, prompting for perceived innovations and trade-offs. I then apply a framework for food system transformation presented by Leeuwis et al. (2021) as a guide to organize final discussions and provide recommendations for policymakers, donors, civil society, and other food system stakeholders. Throughout this thesis I refer to "food system transformation" as a process of

transformation *towards resiliency* using the definition of food system resilience provided by Tendall et al. (2015): "the capacity over time of a food system and its units at multiple levels, to provide sufficient, appropriate and accessible food to all, in the face of various and even unforeseen disturbances". Hence, I understand resilience to be "specific to the function of food security" (Tendall et al., 2015) as well as "the means to achieve sustainability" (Tendall et al., 2015).

In this thesis, I show that COVID-19 negatively impacted food security on the Island, particularly during the first months of the pandemic, although I found that farmers and their immediate families were not much affected. Despite the severe initial shock, I observed a high rebound capacity concurrent with a reinvigoration of traditional Rapanui cultural practices. According to interviews, the *discontinuation of perishable food imports from the mainland* – which rely on commercial flights sustained by tourism – created food insecurity for some community members. Another factor that contributed to food insecurity in the early period of the pandemic was the *low agricultural production* on the island before the pandemic, based on smallholder and subsistence farming. A third factor was the drastic reduction in *household acquisition capacity*, given the high preponderance of tourism in the island's economy. During the 30-month "mainland' self-isolation" period (March 2020 to September 2022), local farmers increased their production, new farmers emerged, and home gardens were reinvigorated. The revitalization of indigenous Rapanui cultural values and practices like '*Ūmaŋa*' (reciprocity) also proved key in sustaining food security during this period. For example, the community perceived the reactivation of barter and gifting systems, communal food sharing, and ancestral production systems positively, not only because of its capacity to sustain food security but also because of the perceived contribution to the community overall wellbeing. Finally, this research identified several opportunities for

increasing food system resilience in the future, mostly in the areas of food system governance, insects and diseases, and water management.

I conclude that the Rapa Nui food system has undergone an accelerated transformation process in the last 50 years, characterized by a growing dependence on food imports and shifting food preferences towards less nutrient-dense food. The Multi-Level Perspective (MPL) on socio-technical transitions (Geels & Schot, 2007) is useful to understand the current changes and opportunities in Rapa Nui food systems, as elaborated in Leeuwis et al. (2021). According to the MPL model, globalization is seen as a dominant trend at the socio-technical landscape level that was temporary but strongly counterbalanced during the COVID-19 pandemic in Rapa Nui. This external shock favored the alignment of diverse forces at the niche and dominant food regime, allowing us to infer that the necessary conditions for food system transformation towards sustainability and resilience are currently present in the case of Rapa Nui. Policymakers, donors, civil society, and diverse food system stakeholders must take advantage of this opportunity by investing in innovative, multi-stakeholder food system governance processes and platforms and by creating and supporting the system's robustness.

In the remaining sections, I begin with a literature review of Rapa Nui's historical context, providing insights to understand the current local food system and introducing key definitions and concepts that informed this research. Then, I present the methods used on this research and the results of my interviews, followed by a discussion that includes identified tensions that needs to be accommodated to advance food system resilience as well as recommendations for policymakers, donors, civil society, and other stakeholders in the local food system based on seven strategies

proposed by Leeuwis et al. (2021). Lastly, I present my conclusions of this research work and suggest potential directions for future research.

1. Literature review

1.1 Rapa Nui in context

Rapa Nui, also known under its colonial name as Easter Island, is a small Pacific Island of 7,750 inhabitants often identified as the most remote inhabited place in the world (UNESCO, 2021; Rull, 2019). Rapa Nui is a special territory of Chile, administratively within the Valparaíso Region, situated 2330 miles away from the Chilean coastline. The Island is well known for its unique archeology and culture, including its gigantic stone sculptures (Mo'ai); a large amount of the island was declared a world heritage site by UNESCO in 1995 (UNESCO, 2021).

Throughout its history, Rapa Nui´s indigenous people (also called *Rapanui*) have endured a well-documented past of colonization and environmental exploitation. Slavery, severe illness, confinement, and shortage of food and basic products led *Rapanui* people to the edge of extermination (UNESCO, 2021; Rochna-Ramirez, 1996). During the 1960s, Rapa Nui rapidly entered the global context[1]. The swift increase of tourists along with a growing immigration of "*tire*" or non-Rapanui Chileans mainlanders, has imposed further demographic, political, social, cultural, and environmental challenges for Rapanui people that are still ongoing (Delsing, 1998; Alba Roque, 2018; Gundermann et al., 2021). The recognition of Rapa Nui historical trauma, the

[1] Important events occurred in the 1960's include: 1) Alfonso Rapu's indigenous movement to eliminate Chilean Navy rule on the island, ending Rapanui language suppression and travel restrictions for Rapanui, 2) Act. No. 16.441 or "law Pascua" and the incorporation of Rapa Nui to the Chilean civil administration giving Rapanui people right to vote, 3) US American military presence between 1967 and 1971 to build a NASA airstrip, and 4) establishment of the first commercial air route to the island (Delsing, 1998).

understanding of different forms of resistance exerted by the *Rapanui*, the awareness of the complexities around *Rapanui* identity discourses, and ultimately, the intricate relationship between the *Rapanui* and the Chilean Nation-State (Delsing, 1998) informed this research project, particularly in the decision to take a participatory action research approach and in the selection of a qualitative study based on semi-structured in-depth interview with stakeholders directly affected by the agri-food system's functioning such as farmers and food distributors instead of relying in agricultural authorities, agricultural leaders, or in secondary sources.

Interestingly, the above-mentioned challenges are not unique to Rapa Nui. As Campbell (2009) indicates, Pacific islands have been portrayed as sites of vulnerability but "this vulnerability lies […] in the loss of traditional measures that enhanced resilience and the *introduction of new ways of life that have increased exposure*" (p. 94, emphasis mine). Along the same line, Georgeou et al. (2022) states that "Rural Pacific communities demonstrate a high degree of resilience to external shocks, however […] *the nature of life in PICTs is changing*, and Pacific ecosystems are becoming more fragile" (Georgeou et al., 2022, emphasis mine) and that "due to the nature of landholding, any 'agricultural transformation' that linked the Pacific more closely with a global market economy would most likely increase PICT vulnerability to market shocks and precarity" (Georgeou et al., 2022, p. 16).

Over the last 15 to 20 years, political pressure exerted by Rapanui people to have more spaces of autonomy has led to the enactment of several laws and to the development of government-supported initiatives, including 2007's constitutional reforms that recognized Rapa Nui as a "special territory" (see Appendix 1 for a visual timeline). A more recent initiative was Act 20,070, enacted in 2018, that regulates residing, staying, and moving to Easter Island's special

territory due to increasing concerns about Rapa Nui's demographic burden on the environment. This initiative is implemented through a Demographic Carrying Capacity Management Plan[2] addressing four dimensions of development: 1) socio-environmental; 2) economic; 3) cultural; and 4) infrastructure and equipment, establishing priorities in various areas. The above-mentioned Plan includes agriculture as one of the 15 theme modules and the general diagnostic states that the "agricultural sector has *lost importance* in the territory and its production is not sufficient for self-sufficiency" (emphasis mine) and indicates dependency on agricultural products from the mainland despite the high costs associated with transport.[3] Nevertheless, the Plan's only measure addressing this issue (Measure No. 38) specifically mandates one institution - the Institute of Agricultural Development (INDAP)[4] - to "strengthen local agricultural productivity". This contrasts with the extensive literature on food system transformation highlighting the need to move away from technical fixes to focus on social aspects of the system, for example governance efforts to accommodate and negotiate tradeoffs among agri-food system outcomes to ultimately *advance* on a path forward (Zurek et al., 2022; Leeuwis et al. 2021; den Boer et al., 2021; Queiroz et al.,

[2] Published on the Official Gazette on January 8th, 2021, issue No. 42.849, "Aprueba plan de gestión de la capacidad de carga demográfica para Isla de Pascua", Chilean Ministry of Interior and Public Security.

[3] This is coherent with the reviewed literature from other Pacific islands, indicating a general decline in agricultural production throughout the Pacific Islands region over the last decades (for example Davila et al. 2020)

[4] INDAP is a governmental agency dependent of the Ministry of Agriculture of Chile promoting economic, social, and technological development of smallholder farmers whose main source of income comes from farming or forestry activities. Despite the wide array of INDAP's programs, only one is available in Rapa Nui (Elsa Nahoe, personal communication).

2021; Savary et al., 2020; Webb et al., 2020; Caron et al., 2018; Schipanski et al., 2016; Tendall et al., 2015). Moreover, the Carrying Capacity Management Plan leaves behind important food system stakeholders and activities within the food system such as those involved in home gardens, community gardens, agroforestry initiatives, and non-market economies that have demonstrated to be especially important to sustain food security and resilience in the Pacific region and worldwide (FAO, 2023; Georgeou et al., 2021; Davila et al., 2020; Manner, 2014)

In addition to the Demographic Carrying Capacity Management Plan, the Inter-American Development Bank (IDB) developed a detailed Investment Agenda for the Sustainable Development of Rapa Nui in conjunction with local and national authorities and the Rapa Nui community (IDB, 2020; see pages 12-14 for information on collaborators). IDB's technical diagnosis (Appendix 2) describes food security as one of the six critical priorities along with sanitation, vulnerabilities to natural disasters, land use, heritage, and connectivity (IDB, 2020, p.560-561), which coincides with guideline No. 1 of the Environment Directorate of the City of Rapa Nui – created in 2020 – that includes food autonomy among its strategic objectives (Appendix 3).

At the grassroots level, civil society has been advocating for "food autonomy" for more than 10 years, through organizations such as NGO TOKI Rapa Nui (a school of music that developed an agricultural branch) and the Aldea Educativa Rapa Nui '*Hoŋa'a o te Mana*' School (high school that offers a specialization in agriculture that have demonstrative plots of ancestral varieties and ancestral agricultural techniques).

Despite the possible critiques including my own mentioned above, the work conduced to the enactment of Act. 20,070 and its Demographic Carrying Capacity Management Plan (Angel,

2017; Angel & Bergamini, 2020) and the IBD's Investment Agenda for Sustainable Development (IBD, 2020) seem to have encouraged "novel ways of talking about the food system" (Leeuwis et al., 2021) prior to the COVID-19 pandemic, which seems to have leveraged a catalyst effect of change-(according to Leeuwis et al. (2021) this is an indicative of coalition building for change in the food system).

Months into the COVID-19 pandemic, the Chilean government established the cessation of the confinement measures in Rapa Nui, nevertheless local leaders declared the Island under *Tapu,* an ancestral *Rapanui* indigenous law of self-care and community protection against adversities, and respect for the decisions adopted by the traditional authorities (Nahoe, E., personal communication, November 11, 2021). This resulted in a voluntary isolation from the mainland to reduce the spread of COVID-19. It also resurfaced the concept of *Ūmaŋa* that can be described as "the ancestral collective consciousness that leads [a community] to act as a single coordinated body" (Casa Amèrica Catalunya, 2020). In the words of City of Rapa Nui's Mayor Pedro Edmunds Paoa, *Ūmaŋa* roughly means "I help you, you help me, and between the two of us we help others, without thinking if you are going to pay me" (Diario Universidad de Chile, 2021). It is interesting to note that despite of the detrimental impacts of COVID-19 on Rapa Nui's economy, the pandemic seems to have reinforced a sense of community cohesion and social wellbeing (La Tercera, 2021; Nahoe, E., personal communication, November 11, 2021) through the revival of home gardens, subsistence agricultural production, and barter systems (Nahoe, E., personal communication, November 11, 2021), a situation that was confirmed in my interviews.

The presented antecedents are key to understand the unique social context and the narratives in which the Rapa Nui food system was embedded *prior* to the COVID-19 pandemic

and provides some insights of the dynamics existent *during* the pandemic that informed and drove this research project.

1.1. Prior research on Rapa Nui agri-food system

In this section, it is important to acknowledge the contribution of Ramirez (2010) that examined the Rapa Nui food system from an anthropologic lens. On analyzing the changes in diet occurring in Rapa Nui, Ramirez (2010) concluded that "the massive entry of new and some already known foods generated a strong change in the food system. It was no longer necessary to produce for domestic supply, so agricultural production systems began to be abandoned which ultimately led to the loss of traditional knowledge". These conclusions are concordant with my results given that most interviewees referred to the agricultural "boom" experienced during the COVID-19 pandemic not as something "new", but as practices and knowledge that was somehow "recovered", indicating that people "came back to agriculture" using knowledge that was latent or "hidden".

Regarding the role of the Chilean State, Ramirez (2010) also concluded that "currently, it is the State that maintains a policy (through its institutions and programs) oriented towards the development of Rapa Nui that promotes dependence on the continent and perceives the island as a tourist destination […].all this hinders the production and use of internal food resources that could provide greater autonomy to the island". This idea also arose in my interviews, where a common theme was the "abundancy" of food resources evidenced by the COVID-19 pandemic, a situation previously overshadowed by the convenience of food imports. This supports the notion that agricultural policies and programs need to reduce the focus on productivity and put more attention on food system governance and food sovereignty.

1.2 Food systems, food system transformation, and food system resilience: Approaches and definitions

Food systems are social–ecological systems, formed of biophysical and social factors linked through feedback mechanisms and comprise the activities involved in food production, processing and packaging, distribution and retail, and consumption (Berkes et al., 2003; Ericksen, 2008b; Ericksen, 2008a; as cited by Tendall et al., 2015). The High Level Panel of Experts on Food Security and Nutrition expand this definition indicating that food systems encompass "all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation, consumption [and waste management] of food, and the output of these activities, including socio- economic and environmental outcomes" (Pingault et al., 2017, p.23)

Over the last 8 to 10 years, there has been a surge in literature advocating for and exploring the *transformation* of food systems towards sustainability and other development goals (see Weber et al., 2020; Anderson, 2024 p. 243, and Juri et al., 2024 for an expanded literature review on the state of the art of the topic). Juri et al. (2024), for example, note that food system transformation has become a "fuzzy and very diverse field" (p.13) in which "oftentimes, change refers to very different types of outcomes or goals, which are in turn enabled via different strategies based on how the problems are framed, either as a technical or political challenge" (p.2). Similarly, Weber et al. (2020) indicate that "while the need for deep changes in social values, resource use, production and consumption practices, as well as socio-economic relations is widely recognized, there is less agreement among scientists and practitioners on *how* such changes should be achieved" (Weber et al., 2020 p.2). The same authors propose five key components for food systems "deep change": *political action* to support inclusive and participatory governance structures, *close*

collaboration of stakeholders in food systems in new networks and platforms, *education* of consumers, and *deep value shift* regarding food and food systems (Weber et al., 2020 p.12).

In the same line, Béné and Abdulai (2024) note that food system transformation "has become buzzword in food literature and the global development community" (p.1) and that scholars are "scrabbling with many propositions […] to redirect food systems toward more sustainable outcomes" (Bene & Abdulai, 2024 p.2). The authors propose a conceptual framework for food system transformation consisting in *four domains* defining food systems dynamics (powers, discourses and knowledge; culture, social norms and behaviors; capacity and financial resources, and technological innovation) and *five steps* to guide the trajectory of transformations over time (identifying resistance to change in the current regime; creating and maintaining new momentum; converting new momentum into sustainable options; and managing trade-offs, reducing incoherence, and prioritizing actions) (Béné & Abdulai, 2024).

Finally, Anderson (2024) on her recent book "Transforming food systems, narratives of power" analyze different narratives on food system transformation and their underlying assumptions based on a review of the literature. She proposes that food system transformation needs to go beyond sustainability and aim for *regeneration* and concludes that approaches with the greatest potential are those capable to "spread through the system and catalyze self-organizing changes in different parts of the system" (Anderson, 2024, p 245).

The discussion on how to transform or "deeply change" food systems is ongoing, nevertheless at the time of my research design, one of the most recent approaches was the one proposed by Leeuwis et al., (2021), which is consistent with the most updated literature presented above. Leeuwis et al. (2021) propose that food systems are "complex, diverse, and self-organizing wholes in which relatively autonomous stakeholders have competing interests, values, and

perspectives, where transformation depends to a considerable extent on the willingness and capacity of interdependent actors to accommodate and navigate differences and work towards a mutually acceptable future*"* (Leeuwis et al., 2021 p.764). The same authors argue that food system transformation or "synthesis" is, hence, a "socio-political challenge" and propose seven governance strategies based on the Multi-Level Perspective (MLP) theory on socio-technical transformation processes (Rip & Kemp, 1998; Geels & Schot, 2007). The MPL model has been increasingly discussed in the literature on agro-food sustainability transitions (El Bilali, 2019; Geels, 2019; Nora & Alberton, 2021; Anderson, 2024 p.78) and argue that system transitions occur through the interaction of processes at the niche, system, and landscape levels landscapes (Geels & Schot, 2007; Geels, 2019). In essence, the MPL model suggest that system transformations occur when niche innovations gain enough momentum to disrupt the system, and the socio-technical landscape creates pressure on the dominant system regime to eventually destabilize it and reconfigure it (see Appendix 4 for a graphic description of the MPL model).

The MPL theory has not been exempt of criticism (e.g., El Bilali, 2019), nevertheless Leeuwis et al. (2021) framework strongly features in the recent literature (e.g., Juri et al. 2024; Béné, 2024; Anderson, 2024) noting that provides "solid recommendations" (Anderson, 2024 p. 247) to deeply transform food systems. The literature reviewed on food system transformation processes, particularly Leeuwis et al. (2021) was instrumental in shaping the interview guide for this research, since it enabled me to explore not only food security perceptions before, during, and after COVID-19 but also to gather valuable insights into interviewees' motivations for engaging in the food system and their perceptions of the trade-offs and tensions present in the local agri-food system.

Resilience, on the other hand, is a concept that emerged in ecology in the 1960s and early 1970s that has been widely applied and studied in the context of socio-ecological systems. Folke (2006), for example, provides an overview of how this concept emerged from ecology and was expanded to social-ecological systems, indicating that resilience in this context "incorporates the idea of adaptation, learning and self-organization *in addition to the general ability to persist disturbance"* (Folke et al., 2006, emphasis mine) More recently, Zurek et al. (2022) offer an interesting review of this concept applied to *food systems* and argue that to operationalize resilience, food system stakeholders needs to "agree on which positive outcomes should be the function of our food systems, and hence, made more resilient" and to balance those outcomes not only against the most evident undesirable outcomes such as natural resources degradation or greenhouse gas emissions, but also against "socioeconomic impacts such as the loss of traditional skills, knowledge, institutions farming practices, moderns slavery, and loss of cultural heritage", which seems to be important in indigenous communities such as Rapa Nui according to my interviews. Zurek et al. (2022) also suggest four questions to frame this negotiation process (resilience of what, to what, from whose perspective, and over what time frame) and propose food system actors to define which kind of resilience strategy they want to aim for: robustness, recovery, or reorientation, where the latter "involves food system actors and stakeholders accepting alternative food system outcomes before or after disruption".

As noted in the introduction section, this idea of "trade-offs negotiation process" among food system actors about food system outcomes as a precondition to achieve change is supported by many scholars (e.g., Leeuwis et al. 2021; den Boer et al., 2021; Queiroz et al., 2021; Savary et al., 2020; Webb et al., 2020; Caron et al., 2018; Knickel et al., 2018; Schipanski et al., 2016;

Tendall et al., 2015) evidencing the critical role of social sciences in the field of agricultural development.

Tendall et. al (2015) provides a useful definition of *food system resilience* in the context of this research, indicating that resilience is "specific to the function of food security" and "the means to achieve sustainability". According to Tendall et. al (2015), food system resilience is: "the capacity over time of a food system and its units at multiple levels, to provide sufficient, appropriate and accessible food to all, in the face of various and even unforeseen disturbances" (Tendall et al., 2015).

This definition links concepts of food system resilience, food security, and sustainability, helping to bridge the discursive gap between social-ecological systems resilience research (often focused in the long term based on a systems analysis approach applied to a broader territory) and agricultural development public policy and programming (often oriented to increase agricultural production at the farm level in the short-medium term to sustain food security).

More recently, Béné et al. (2023) expand Tendall et al.'s (2015) definition adding two secondary functions of food system resilience in addition to food security: "the generation of decent livelihoods and viable incomes/profits for those who are economically engaged in food systems" and "the protection (or restoration/rehabilitation) of the environmental integrity of agro-ecosystems" (Béné et al., 2023), which is consistent with Folke et al. (2016) concluding that "social-ecological resilience approach emphasizes that humans and well-being fundamentally rest on the capacity of the biosphere to sustain us, irrespective of whether or not people recognize this dependence" (Folke et al., 2016, p. 09).

Béné et al. (2023) also developed an analytical framework to assess the resilience of food systems at the *local level* which seems interesting to explore in the case of Rapa Nui, as mentioned in the conclusions section of this thesis. Moreover, this assessment could build on the qualitative research findings presented in this study, leveraging the learning opportunities presented by the COVID-19 external shock.

Finally, understanding *agriculture* as an activity embedded in a complex socio-ecological *food system* in which change is a socio-political challenge is essential not only for *agricultural development* in Rapa Nui (for maintaining food security and conforming to the island's demographic carrying capacity,) *but to promote community development in a broader sense.* This idea is supported by Caron et al. (2018), who propose that agricultural policies worldwide should move "beyond food supply as the basis for food systems" and align with all 17 Sustainable Development Goals (SDG) of the 2030 Agenda for Sustainable Development instead of only focusing on SDG 2 "end hunger, achieve food security and improved nutrition, and promote sustainable agriculture" (Caron et al., 2018). Similarly, Georgeou et al., (2022) indicates that "much of the academic focus on agricultural production and its sale tend to be technical, which is a significant oversight as historically there is a relationship between cultural identity, associated customs and traditions across the Pacific". Finally, Davila et al. (2020) concludes that COVID-19 recovery in Pacific Islands needs to "use agriculture as an inclusive economic recovery strategy" that can go "towards creating spaces for greater food sovereignty where communities and governments determine their own food production systems that support social inclusion and the sustainable production of culturally appropriate nourishing food". The literature's call to "broaden" the scope of agricultural policies and the extensive literature existing on food system

transformation highlights a gap in the current agricultural development strategy for Rapa Nui, which this research project intends to address.

2. Methods

This research is framed under a Participatory Action Research (PAR)[5] framework that informed not only the methods used, but the overall research project design. This approach is characterized for being a reflective, flexible, and iterative process of inquire where the key difference from "conventional" research lies in the distribution of power dynamics throughout the entire process, particularly in determining who defines research questions and who "generates, analyzes, owns, and acts on the information which is sought" (Cornwall & Jewkes, 1995), where PAR is aimed to share the researcher's power with those directly affected by an issue. As noted in the previous section, this approach was essential for example in determining research questions in collaboration with local community members that were relevant for the local community. This allowed me not only to gain *access* to key players in the local food system to be interviewed, but to gather valuable and honest perspectives from them which influenced the research question and methods. To highlight PAR's relevance in this case, is important to note my positionality as a Chilean mainlander researcher, the cultural differences between Chilean mainlanders and *Rapanui* people, and the historical trauma of colonization that originated a complex relationship between *Rapanui* and Chilean mainlanders, especially researchers. For example, one of the key informants consulted at the City of Rapa Nui's Environmental Directorate told me that they were "tired" of people coming to the island to conduct "a research about the research of the research" and not

[5] Also found in the literature as "community-based participatory research"

giving back their results to the community or not leaving any concrete benefit for Rapa Nui (Felipe Rivera, personal communication, July 7, 2023).

In line with the PAR approach mentioned above, I collected data in two rounds, the *first* to determine the relevance, methods and overall design of the proposed research and assess community partners, and the *second* to answer research questions. The first round of data collection is reflected in the literature review section of this thesis and included a) review of secondary sources of information for example local and national news, social media, podcasts, reports, laws, and different websites and, b) unstructured 30 minute to 1 hour interviews with key informants including *community outsiders* (national-level governmental top officer from the National Institute of Agricultural Development (INDAP), an international scholar who "got locked in" Rapa Nui during the pandemic, and a Chilean researcher in the agricultural sciences with recent experience researching in Rapa Nui) and *community insiders* (a Rapanui smallholder farmer with whom I have established a trusted relationship, three local leaders, and at least two mainlanders who have lived in the island for over 10 and 50 years). Finally, I interviewed the head of INDAP's Rapa Nui office, who is a member of the indigenous Rapanui community and a lifelong Rapa Nui resident whose work entails fulfilling the responsibilities of a centralized governmental agency; I identify her in this role as an *outsider-insider*. The method of consulting community outsiders, insiders and outsider-insiders is suggested by Eng et al. (2013) to make sure different perspectives are considered while assessing the community. The consultation of secondary sources was mostly done during several months prior to the key informant interviews which facilitated the flow of these interviews.

After the first round of data collection, I selected six local people to invite to form part of a local steering committee using a framework presented by Emery et al. (2006) as a reference (see

Appendix 2). After a first virtual meeting and several communication exchanges (mostly via phone and text messages) four people accepted to participate in this research project as the steering committee, three of them members of the *Rapanui* ethnic group and one Chilean mainlander long-term resident of Rapa Nui: 1) Elsa Nahoe, head of the National Institute of Agricultural Development Rapa Nui Office, 2) Diana Edmunds Tuki, former president of the Rapa Nui beekeeping cooperative "Meri Henua", 3) Juan Haoa, Director at the NGO Toki and City of Rapa Nui's councilman, and 4) Felipe Rivera, agroecologist and home garden advocate employed at the City of Rapa Nui, Environmental Directorate. After a first zoom meeting, we all agreed to create a WhatsApp group chat to communicate, which was helpful for streamlining communications. The steering committee met six times throughout the project, three times in-person and three times virtually.

During the second round of data collection, I conducted 13 in-depth semi-structured interviews from August 7th to August 21st 2023, eleven months after the Island´s reopening. Interviews were in person, lasted between 45 and 128 min (with an average of 1hr 15 min) and typically took place at the household dinner table over a cup of tea. An indigenous Rapanui college student was hired by the research project to facilitate field activities. Her role was important not only to facilitate the location of interview sites and assist with the recruitment of interviewees, but also to hold me accountable to a local community member who was present during the interviews.

On my first day in the Island, I met with the local steering committee of this project in a 2.5-hour in-person meeting to revise and adapt the interview guide, making sure that the language, extension, and content was appropriate. At the same meeting, the local steering committee and I deliberated and arrived at a list of suggested interviewees of approximately 30 people that was then prioritized by the steering committee and reduced to 14 to adjust to time constraints. The main

criteria used for selecting interviewees was obtaining a good representation of stakeholders in the local agri-food system. All 14 interviewees were reached via phone or in person and asked to participate in the research project using an informative flyer specially developed for that purpose. Given the small size of the community, some of them already knew about the project and 13 agreed to participate. Interviewees included *farmers* of different productive sectors (machinery services, vegetables, fruits and livestock), farm size (home garden, subsistence agriculture, smallholder farmer), production systems (from greenhouses with irrigation and water accumulation infrastructure to rainfed agriculture), gender (roughly 50% identifying as male and 50% as female, with no individuals identifying as non-binary), age (ranging from 21-30 to 61-70 years old, with a majority of interviewees in the range of 41-50), and ethnicity (approximately 75% identifying as indigenous Rapanui and 25% as Chilean mainlanders who are long-time residents) and a few *food processors and/or distributors*, including the owner of a produce store, a mini-market, several restaurants, a food processor, and a representative of the only company in charge of processing and distributing food to the school system.[6] It is important to note that this research project was limited to the agri-food system; actors specifically related to the seafood system were not interviewed, although several interviewees noted that they also participate in the seafood system, and provided insights on that topic.

The interview guide included questions aimed to understand the effects of COVID-19 on food system resilience and how the local food system responded to the disruption caused by the

[6] This company is key player in the local food system considering that in Rapa Nui all children K-12 are entitled to free lunch independently of their income level (unlike in the mainland). I originally did not consider this stakeholder as a possible interviewee, but it was pertinently brought about by the steering committee.

pandemic. Topics discussed in the interviews included: a) motivations for participating in the food system, including how did they started their activities, what aspects of their activities they liked and disliked, production criteria, production practices, productive connections to others, and other productive activities developed, b) positive and negative aspects of the food system as it was before the pandemic, c) how the pandemic influenced their daily activities within the agri-food system, d) how the pandemic influenced their perceived food security at the household and community level, e) actions and innovations that strengthened food security at the household and community levels during COVID-19, f) perceived assessment of the food system after the reopening of the Island, g) how concepts of food sovereignty and food system resilience could look like in Rapa Nui, and h) overall learnings of the 2.5-year "pandemic period."

The last field activity was a closing event led by the steering committee and me that included participation of some interviewees (all were invited) and few locals who showed interest in our research. At this event I explained the overall project objectives, its timeline, and shared some preliminary results from the interviews. This was followed by a discussion by the participants and steering committee that ended with a traditional Rapanui food sharing blessing ceremony called '*Umu tahu'* in which a special food prepared by one of the steering committee members was shared.

It is worth noting that although a significant proportion of Rapa Nui inhabitants speak Rapanui Indigenous language, the primary language spoken in the Island is currently Spanish (only a small proportion of the population has Rapanui as a mother tongue and Spanish as a second language, particularly Indigenous elders). Considering that my native language is also Spanish, the interviews, transcription, edition, and coding and theming process was conducted in Spanish. I

translated the quotes using an online translator and then I edited it manually to make sure the meaning was maintained.[7]

Approximately 980 minutes of interviews were audio recorded, transcribed into 340 pages using the transcription tool in Microsoft Word 365, then manually edited. The most important parts of the interviews were selected in parallel with the editing process for later codification (approximately 25% of the transcription). The selected portions were transferred to a Microsoft Excel file for coding and theming. Saldaña (2021) and Lareau (2021, pp. 195-225) were used as a reference. I chose to code inductively (in at least three rounds), given that my goal in this research was to understand with an "open mind" what lessons can be learned from the COVID-19-induced "isolation" period based on interviewees perceptions and motivations. As noted by Saldaña (2021 p.41), "Coding inductively is entering the analytic enterprise with as open mind as possible –a "learn as you go" approach that spontaneously creates original codes the first time data is reviewed [...] as an inducted coding system is constructed and become solidified, it then becomes a deducting coding system for the data analyses that follows." A ranking of themes and codes by question was run in a pivot table using frequency of mentions of unique interviewees to make sure all interviewees were considered.

[7] In a few cases, Chilean/Spanish slang was used by our interviewees, and I could not directly translate this into English without potencially changing the meaning. In those cases, I did my best to find equivalent English slang and consulted native English speakers when necessary. For example, the expression "es un parto" (literally "it's a birth" in reference to give birth) is used in Spanish to express when things are accomplished with great difficulty. In this case I used "it's an uphill battle" that seems more appropriate for an English speaker reader.

It is important to note that given that I used Excel as a tool to code, in some cases I had to use different columns to theme specific questions so I could calculate the frequency of codes using pivot table. In addition, a few questions were analyzed at the code-level and some at the theme-level. In Appendix 7 I include the interview guide (in original language). In Appendix 5 I show the themes by question, and in Appendix 6 I show the overall themes.

Finally, the prioritized list of themes and codes by question and by the overall interview was presented to the steering committee in a Zoom meeting held on April 30th, 2024 to explain the interview analysis process, discuss preliminary findings from the interviews, and obtain the steering committee's feedback on the research process and preliminary findings. Ideas on how to best use funds for disseminating the results of the research were also discussed.

Despite the use of a PAR approach and the method's suitability for this research context, it presented several limitations and challenges. The most notable is that research projects under PAR needs enough time and resources (financial and human) to positioning itself as "transformative" or at least closer to that end within the "collaborative – transformative/emancipatory" continuum (compared to conventional research) (Wallerstein & Duran, 2013). As a M.Sc. student researcher those resources were scarce, which constrained the possibilities of this project at multiple stages, especially given the remoteness of the site. For example, a better resourced 3-year project could have allowed more time to co-design the project with more community members, establish more and stronger partnerships, use additional methods of inquire such as focus group and surveys, and develop more impactful, timely, and creative materials to disseminate results. Another limitation is on the selection of in-depth, semi-structured interviews as a method of inquire, which limits the number of people possible to reach compared to structured interviews or surveys. This risks the possibility of less perspectives being heard. To mitigate that risk, I spent several months revising

secondary data such as local newspapers, interviews, and social media and interviewed as many key informants as I could to assess the community and select the steering committee.

3. Results

3.1. The pre-pandemic agrifood system: motivations to participate in the food system and perceptions

My results indicates that farmers *motivations* to participate in agricultural production are mainly related to a) a connection with their culture, ancestors and their land, b) the high value of being self-sustainable, c) guaranteeing the quality and safety of what their family circle consumes, and d) responding to a kind of ancestral call or vocation to assume the important social role of feeding their community, linked to a sense of social transcendence. It is noteworthy that, although most of our interviewees referenced motivations linked to the economic returns of production, these aspects were typically sidelined during the discussion. The following quotes illustrate this point:

> "We never thought we were going to end up in agriculture [...] The '*toto*', the blood, pulled more... And the desire to work too, to maintain the traditions, to give to the people... because agriculture is a lot of giving"

> "My [father or mother] comes from a very old clan [...] and now I think that *all that has fallen on me*".

> "To be able to *say* that one is capable of self-supporting [...]"

> "The good thing about Rapanui [people] is that they know how to plant, they know how to fish [...] the people still know how to survive. In almost every house there are banana trees. Many families perhaps do not plant entire plots, but they have their garden and know how to work the land, it is like something almost innate or something that their

family taught them at some point [...] like that closeness to the land is very important on the island"

"If I plant it, I know what I am planting [...] to have a good diet is ultimately, health".

"I am a farmer. I am a help to society. [...] I get very moved when the children eat what comes from here [his farm]"

"To work with the feeding of our own people, with your '*kaiŋa*' [land, uterus], with your '*henua*' [land] is powerful".

"That's why I accepted, I decided for the land".

"I decided to become a farmer [...] thinking on the future of the world, thinking on the future of my children, thinking on the future of my people"

"I have [studies] that are very different from what I do [...] but I realized that no, that I carried something else, it was agriculture"

Likewise, some interviewees mentioned the maintenance of ancestral or traditional crops as an important motivation and as the main production criterion. This includes different varieties of tubers such as taro, *'uhi'* (yam), *'kumara'* (sweet potato), *'toa'* (sugar cane), *'maika'* (banana), ti, and cassava. Although these crops are not endemic to the island, they were introduced from Polynesia by the first settlers who arrived with the mythical king Hotu Matu'a and are an important identitarian element in Rapanui culture (Ramirez, 2010, p. 53; De Kartzow et al., 2020). The following sentences summarizes this criterion:

> “First there is the criterion of thinking about the things that are native to us and what I want to preserve, which is what I want the most…to pass it on to future generations so that it will exist.”

> “I really like to plant things native to the Island, tubers, bananas, because I see that it is becoming extinct, it is disappearing, and I like to maintain it.”

Despite their strong vocation for agriculture, farmers mentioned various challenges, especially in the social and technical areas, which they see as factors hindering their development. In the social sphere, the interviewees repeatedly described agriculture as an unattractive sector, particularly compared to tourism. They also mentioned the little recognition of their activity by the community, as shown in the following quotes:

> “Everything is always difficult for us all the time but go talk to them about tourism!”

> "It's a lot of work [...]. To dedicate one's life to this lifestyle that we have chosen is too much work”

> “They prefer the tourist because they already made the cabins and the tourist is going to leave them easy money and they don't have to be planting, racking their brains that they don't have water, that there is drought, or that there is a lot of humidity.”

> "Everyone has several jobs and clearly here agriculture is the one that pays the least [...] versus tourism which is the most profitable. You can earn double or triple without putting your hands in the soil. Agriculture is sacrificial".

> “People have been moving away because of the same thing [competition with tourism, sacrificed agriculture], and the little chances to end up succeeding [...] here you find a problem and the solution will probably arrive 3 weeks later”.

This constitutes a clear disincentive for the sector, considering the motivations mentioned before. In the technical sphere, the main challenges are related to the lack (and high cost) of water especially in rural sectors and the difficulties in controlling pests and diseases, mainly due to a) the high pressure of pests considering the subtropical climate of the Island, b) the generalized lack of knowledge on the use of phytosanitary products by farmers, c) the constant entry of new pests from the mainland, and d) climate change, which according to our interviewees, is becoming increasingly evident in terms of rainfall patterns, winds intensity, and in the behavior of pests and diseases. The above is exemplified in the following quotes:

> “Without water one cannot produce at scale and one cannot produce on a permanent basis because a harvest will not last continuously”.

> "The most problematic point for us is water [...] lately the water [...] is getting very salty. And to be able to buy water in town is a big issue”

> “We get nothing out of having water ponds, if in the months when there is no water we don't have water because after 3 weeks you run out of water in the ponds, and in the months when you have a lot of rain, in one day you accumulate the ponds and the rest of the day the water gets lost”.

“Here I think that they don't even dose ... [...] many people say ‘no, I'm organic’, but it's not really like that”

“I don't think it's safe to eat vegetables on the island […] The situation is high-risk, considering that pesticides are worked intensively I imagine”

“The worst of all is that there is no control regarding the pesticides that are marketed [...] at any place they can sell you a red label chemical”

“There are a lot of insects today that we didn't have before this craziness of airplanes and bringing in cargo, and bringing in fruits and vegetables in crates without any prior handling”

"We are constantly there, vulnerable to any kind of entry of pests and diseases, bugs, of anything. It's difficult to work like that. Especially while keeping organic and clean lines, because all of a sudden you have new invader in your plants, and you have no idea."

"those winds were not ours, that's not how it is here. We have never had those winds [...] Or we had heavy drought. Or now rain, rain, rain... two weeks ago I had a 500 square meters of tomato plants spoiled because the humidity came”

Along the same lines, when asked about criteria they use to decide which crops to grow, most farmers mentioned technical and personal criteria as the most important (in equal frequency each), whereas economic criteria such as profitability and consumer preferences were less mentioned. Regarding technical criteria*, ease of cultivation and availability of genetic material* (mainly seeds) stand out. As for personal criteria, several interviewees expressed their desire to

grow “a little bit of everything” adapting to family consumption preferences, as well as maintaining the ancestral crops already mentioned. The following quotations exemplify the above:

> "Obviously I try to do [grow] everything because I like it. But if you look at it as a business, you have to grow what counts the most".

> "in relation to the profitability of the crop and the ease with which I can work with it.... And also to the availability, for example, for me to bring seeds [...] and produce".

Many interviewees also mentioned having greater knowledge in the cultivation *of ancestral crops* and highlighted the ease of cultivation of these species in relation to other agricultural crops, as seen in the following comments:

> “There was not much knowledge of lettuce, vegetables, very little at that time when I was a boy. But the cultivation of sugar cane, plantain, taro, sweet potato, cassava was maintained, that was what we islanders were strong at before it became a touristic place, since the year 67”.

> “Everything that goes under the ground, tubers, taro, cassava, sweet potato, yam, does not require much care [...] it is not so affected by rain, rain favors it”.

> “[sweet potato, yam, taro] When you plant it, it works.”

However, local consumers seem to not prefer these crops (at least not most of the varieties), which frustrates some farmers, as expressed in the following quote:

“I really like to plant things native to the Island [...] but if they don't buy them from me, then it's not profitable for me”

“ancestral crop cultivation, we have left it a little, because of people’s demand”.

“The restaurants do not help to maintain our plants. How can we maintain them in the restaurants? If I plant 7 varieties of banana, they should buy them from me. That's the way to keep them, by using them”

Some interviewees, especially those related with food processing and distribution also mentioned their *difficulties in sourcing from local producers*, which contrasts with the ease of importing food. According to them, challenges could be reduced if a) farmers provided a continuous supply, b) farmers gave more safety assurances, particularly about the knowledge and proper use of agrochemicals, and c) the hassle of handling multiple orders, invoices, and payments to different producers was lessened. The quotes below summarize these issues:

"It tends to happen that there is not much consistency.... [...] we buy [agricultural products] and sometimes I don't find them, or I find them at triple the cost, because there are no more on the island"

“It is really a high risk to buy from a third party who you don't know how they work [...] I panic when I go to buy lettuce from a third party [...] And if it is pretty, it scares me even more”.

"When my tomatoes appear and I have to sell them [...] I find that the tomatoes they sell come from the continent, either because it is cheaper for them, or because of a matter of

logistics and maybe it is more orderly for them, because of the security of having their business supplied."

"It was easier once a month to buy all their things in the mainland. They bring it, they invoice it, and that's it. But this thing of selling locally is like a hustle and bustle. You know, there are twenty scallions on Monday, there are ten scallions on Tuesday, to give you an example. And you have to be paying them... for businesses this is horrible because they have to invoice, bill, I don't know what else, so it's like extra work."

When we asked our interviewees about the negative and positive aspects of the food system before the COVID-19 pandemic, they highlighted *food safety challenges* caused by a lack of knowledge in pesticide use and difficulties in managing pests and diseases. They also strongly emphasized the *challenge of improving coordination among various food system stakeholders*, suggesting that a more abundant, diverse, affordable, and safer food production system can be easily achieved with proper governance structures. The following statements illustrate this:

"There is no [...] conscious support [...] someone who really wants food to be cheaper, and available for everyone, and safe, so that people can eat with peace of mind [...], considering budgets, production volumes and people's pockets. [...] it is all very viable, producing food is very cheap [...] Everything is overvalued here, but that is the reality."

"We are acclimatized to a system that is of no use to us: we lose money, we get sick, and on top of that, there is none."

"There is a time when the tomato drops up to $500 pesos because everyone has planted."

“There are great positive things of development in the area [not] only in financing, but also trainings, but there are also these things that there are no public policies that make these things advance.”

“There is no integration between public agencies [...] to be able to generate public policies to regulate the entry of pests and diseases.”

"There has to be a development with several actors involved. There is a big problem."

“There has to be a joint development between trade, agriculture, product internment policies as well.”

“We have to change the mentality and the actions, and resources that go to the island must be proposed with local relevance and not replicate the same thing that is experienced on the mainland, but rather to land these data and land the resources that are spent on the island so that they are better spent.”

“There is no specific institution that is seriously dedicated to producing for the island, that knows how many kilograms of any vegetable are required per year. [...] the aid is by drip.”

Another challenge our interviewees frequently mentioned is the dietary change towards less healthy foods. This change stems partly from evolving food preferences linked to a more globalized lifestyle, and partly from the high prices of fresh, nutritious food. The following quotes illustrate this issue:

“We are drinking Coke [...] we are thinking that I have to buy rice, pasta and everything, racking our brains because we are used to eating that way. It's no longer the same food we had in the old days.”

"People consume a lot of sugar and little fruit and vegetables. You look at the most sold and the least sold product and probably the one that sells the least is the salad and the one that sells the most is the dessert, the cake".

“We have also become accustomed to eating yogurt or cereal, or things that are ultra-processed that are brought in from abroad.”

"People are already used to… you know, if they like [...] their Juan Valdez coffee, to give you a name. If it is available they are going to buy it because they can buy it.”

“Moms stopped making those [ancestral] preparations, so there are entire generations that only eat a little bit at some funeral, some particular activity, an ‘*Umu*’...and the children stay away...”

“Imagine a watermelon 50 thousand pesos [about $USD 57]. It is not possible. [...] A person who does not produce watermelon, how is he/she going to buy? [...] he/she ends up eating the cheapest, going to eat junk [...] fried potatos, all that.”

“it doesn't fit in my head that an ‘*ananá*’ [pineapple] costs 7 thousand pesos [...] to start with, it reached that kind of prices because the system today, today's life pays for it.”

“All products are overpriced. Of course, it happens that they have as a reference [...] the value of the product that comes from the mainland, which brings a high added value that is transportation. But in general, producing food is not so expensive.”

Regarding *positive aspects* of the food system before the pandemic, people highlighted the wide *availability* of food and the *convenience* of acquiring it in the formal market. Interestingly, the language used by most of our interviewees suggest the assumption that most of the food they acquired use to come from the mainland. This is evident in phrases such as:

> "They had everything because it also arrived every day [...] and they knew that if it wasn't there today, tomorrow it would arrive and they could pick it up in the afternoon."

> "It was more abundant [...] there was everything and it was very convenient. That is, if you had the money... and the truth is that the cargo before the pandemic was not that expensive."

> "We had access to vegetables from the mainland through the airplane, so there was money, there where places to buy."

> "We were used to having the level of the economy because of tourism, the ease of having everything."

Likewise, everything related to ancestral crops was frequently highlighted in positive terms, including cultural preservation, ease of cultivation, and the healthfulness of their consumption because they do not require the use of pesticides or other agrochemicals. This can be seen in quotes such as:

> "So it is kept as an ancestral '*tupuna*' crop [...] that is also important, it is also nice that we keep it as culture."

"Pineapple, banana, sugar cane, cassava [...] are products that generally do not use pesticides. That is super good. These are products that have adapted to the island [...] There are several crops that can be grown without using chemicals."

"Maybe we are not going to eat bread, but we have sweet potato...and *healthy* sweet potato, you know?"

Finally, interviewees frequently praised the island's "abundancy" in terms of fertility and production, noting that it provides healthy, "natural" food with superior taste and quality compared to mainland offerings. Some also mentioned highlight the island's capacity to meet local demand and sometimes even export to the mainland. This is reflected in phrases such as:

"The island is very kind and you have to know how to work."

"There is everything, there is everything! There are the resources, there is the people, there is hard-working people, there are machines, there are resources from the government, there is land, there is climate."

"This island is also fruitful, look at the banana trees full of flowers [...] look at the flowers of that avocado tree full of blossom, look at the pumpkin that I have planted there and on the other side there is the guava, what I could be lacking?"

"What [Rapa Nui] produces is very natural, it is not an artificial product. Very, very, very. Ninety, ninety nine percent, is pure nature"

"Here there is a pineapple that only grows here, with its own origin seal, even our vegetables have their own seal".

3.2. Impacts of the COVID-19 pandemic on food security

Our interviewees frequently discussed the negative impact of COVID-19 on food security at the *community level,* particularly during the early months of the pandemic. They attributed this situation to a) the drastic reduction in flight frequency which affected the supply of perishable products, b) increased air cargo prices due to the absence of tourists, c) lower purchasing power among the entire population, particularly the non-Rapanui residents who rely on their monthly salary to cover rent, food, and other living expenses and cannot own land on the Island, and, d) the fact that local agricultural production prior to the pandemic was considerably low and not sufficient to meet the food needs of the local population . The following quotes clearly illustrate these points:

> "[Food security] was not affected, was *extremely* affected."

> "No plane, no daily food. There was no cheese, no yogurt, no eggs [...] What was left here was sweet potato. The groceries could arrive by the shipping line, which was a great contribution, but they disappeared in a week."

> "It was a critical moment for the people [...] When the ship from 'Rapel' [the cheapest supermarket] arrived [...] people had to go at night to wait in line."

> "LATAM [the only commercial airline that operates in the Island] [...] raised the price of cargo, because they could no longer bring tourists [...] which meant that the prices of everything went up."

> “We had a hard time because, you know, you wanted to eat fruit, there was none. Vegetables, it was really expensive.”

> “It was only one plane a week. So, what arrived, arrived, and what didn't arrive, didn't arrive, and if you didn't have money, you didn't buy.”

> "We [Rapanui], who live here, we have a house, we have space to plant, the reality is very different from a person who comes to work, who has a family and who are all mainlanders, who have to rent, and who do not have a stable job. So it is very difficult to have food security like this.”

> “Local agricultural production is very low, it does not cover... it probably does not even reach 5% of local demand.”

> “There were a lot of crops that they had to have, that were not there at the beginning and that people started to develop because of COVID.”

> “[Before COVID] there was not much local purchase because there were no suppliers either. There weren't any, the producers were very small, they couldn't supply enough.”

However, when asked about food security at the *household level,* most interviewed farmers noted that while the pandemic did affect their food environment, they did not perceive this as a threat to their food security. They were accustomed to a self-sufficient lifestyle and relied on non-monetary methods for obtaining food, such as self-cultivation and exchange systems rooted in the ancestral value of reciprocity or *Ūmaŋa*. The following quotations reflect this situation:

“It didn't affect us at all. People were practically out of supplies, but here at home we had [food]. And the things that we didn't have, we just didn't have!”

“This is an ordinary life for us, not a difference between if there is a pandemic or there is no pandemic, the island works like that.”

“It was always like that, before or after the pandemic it doesn't change. [...], never [felt insecure].”

“We were farmers before the pandemic [...] it was normal for us to have our things, part of our life.”

At the community level, despite the severe initial shock during the first months of the pandemic, our interviewees indicated a generalized *high rebound capacity that is concurrent with a reinvigoration of traditional Rapanui cultural practices*. Throughout the 30-month lockdown period (March 2020 to September 2022), local farmers increased their production, new farmers emerged, and home gardens were reinvigorated with support of the local government. The agricultural sector became more prominent and the abundant local resources in both urban and rural areas began to be recognized and valued. Notably, many interviewees described the situation in a highly positive way, mentioning a “switch change” (change in mindset), where the community “returned” to agriculture, joined together and “resumed” old practices that were in disuse, alluding in many cases to the feeling of having gone *back in time* several decades ago. A shift towards healthier eating was also frequently mentioned. This is exemplified in the following quotes:

“Everyone in their homes [...] started to grow something: passion fruit, parsley, chives, everyone created their own mini-garden [...] The big farmers started to develop more and more to be able to supply”

“We increased our production capacity because of the commitment with the school [...] and with the farmer's market [...] And the other commitment is with the community[...] we are always there, rain or shine, on the street, with the truck.”

“Agriculture] became much stronger [...]. Everything was tourism, it was money, but after COVID, it was the farmer, it was the fisherman [...] the industry took on a leading role [...] there was a lot of talk about food sovereignty and how autonomous we had to be in situations like these. Then the vision became even more empowered [...] there was a brutal switch change.”

“It reactivated that knowledge of the ancestral people that they had or that they inherited from their father, grandfather, to have a secure feeding [...] what they did when they were children or adolescents, before getting married, to have their children, outside their home, *they knew it* [...] they had that knowledge hidden.”

“COVID arrived and agriculture brought families together, families went out to work in the fields, children went back to planting, parents had time.”

“Everyone was in that maelstrom of making money. When the pandemic happened, we landed and realized that we were Rapanui.”

> "There are many people who, versus the necessity, have also had to change certain practices like '*Ūmaŋa*' [...] But in the old families this is still maintained [...] '*Ūmaŋa'* [...] is a concept that is lived on the island and that was put into practice again [during pandemic] and that it was tried to externalize to the families, but the families that are mainlanders do not understand the sense of it. It's just like "I give you, and you give me", it's like a kind of barter but it has a little more complex meaning than that."

The revitalization of indigenous Rapanui cultural values and practices, like *Ūmaŋa* (reciprocity) also proved key in sustaining food security during the subsequent months of the pandemic. For example, the reactivation of barter and gifting systems, communal food sharing, and ancestral production systems was perceived in positive terms by the community, not only because of its capacity to sustain food security but also because of the perceived contribution to the community overall wellbeing. This is exemplified in the following quote:

> "If you are giving away food for the people, it means that the island can [...] Here we are good at giving things away to each other [...] You didn't sell everything, you gave it away, you delivered it to the people."

Despite a generally positive perception of the agricultural boom and its contribution to physical and psychological well-being during the pandemic, the situation was not without limitations. An important challenge indicated by our interviewees was the reduced access to genetic material, mainly seeds, as explained by one of the farmers consulted: "when the pandemic started seeds here became scarce and expensive."

The interviews also revealed a pre-existenting issue of access to quality genetic material that was amplified by the pandemic, as shown in this quote:

> “seed is expensive and the businesses that bring seed here are bad. [...] You buy, and plant, and nothing, because it is expired. And here there is no seed places [...] Here I think there is a need, here [...] Everyone orders from the 'conti' [mainland]. And there are some who travel to buy their seeds [...] there, they take their time to properly choose their seed [...] Here you don't find the variety you want, no.”

Some farmers noted that the sudden surge in production led to an overstock of certain agricultural products. As a result, farmers who were producing before the pandemic saw a significant drop in prices due to the influx of urban farmers who received financial and technical support from the local government. Our interviewees observed this issue mainly during the second year of the pandemic, as reflected in the following quote:

> “Some are disappointed with the investment because you invested three months to go out to sell your product, and you get to the market and find that the municipality gave away all the inputs”

> "And then [...] everything was already planted, so prices started to drop. They [farmers] all went down. So then they complained not to bring much from Chile.”

Similarly, one interviewee mentioned that the rise in agricultural production, sold through informal channels or given to relatives, adversely impacted formal commerce. Formal markets struggled to compete with the sale of heavily subsidized or free products. However, the interviewee acknowledged the significant benefit this provided to the community, given the urgent need.

On the other hand, the municipality launched an employment program called “Proempleo” to address the high unemployment resulting from the tourism shutdown. While most interviewees viewed this initiative positively, some expressed frustration, arguing that the municipality invested resources in temporary, low-priority jobs like beautifying public spaces instead of using them to develop the agricultural sector. They saw this as a missed opportunity. This perspective is evident in the following commentary: “there were 600 - 800 people hired by Proempleo [...] If we had provided the resources properly at that time, now that the tourists are arriving there would be no problem, I no longer bring tomatoes on the plane.”

Finally, most interviewees expressed a sense of abandonment by the Chilean State for not addressing the initial food shortages. They noted that private companies stepped in to meet the demand by chartering planes to deliver various products, including alcohol, based on market needs.

> “It is the responsibility of the State […] to have the cities of all its territory covered in the food area. And they don't do that in this territory.”

> “If you ask me how the government helped us, in no way. Private traders here had to rent a plane [...] They [community] didn't have food security.”

> “I don't know why there wasn't more support in terms of supply [...] we were super insecure in terms of food.”

> “The island was full of alcohol, but there was no food. [...] and then they asked why everyone became alcoholic after the pandemic!”

> “It has also been an opportunity for some big businesses [...] to gain more market [...] raising the cost of living for everyone here.”

3.3. Actions and innovations that strengthened food security during COVID-19

When asked about innovations or novelties aimed at improving food security on the island, interviewees frequently noted the widespread *appreciation for local resources* and the shift of some businesses toward producing *processed foods* from local ingredients, such as jams, sauces, and ice cream. The following quotes illustrate these observations:

> “Those who had never put attention to their cows in their houses, at some point began to sell milk or make cheese. This reinvention of what you already had at hand in some cases or that were no longer practiced began to be incorporated in the day to day”

> “We had a [...] dehydrated fruit venture [...] I think that by-products appeared. People made a lot of yoghurt, jams, milk-based caramel... People started to activate that “creative bug” again”

Another frequently mentioned innovation was the establishment of a “family garden” program by the newly created Department of Environment within the Municipality. The following quote exemplifies this:

> “I really liked something they did within the pandemic, which is the Family Garden [...] I saw that people [...] started to produce things from the land to feed themselves [...] ...instead of having a garden full of weeds, they made it with vegetables and I went to

my friends' houses and they had green beans, lettuce, and several plants there that were for their home consumption and they gave it to other people as well."

3.4. The agri-food system after the reopening: Learnings

Our interviews (conducted in August 2023, eleven months into the gradual reopening of the island), show a rapid return to the pre-pandemic situation, where a significant group of the population engaged in agriculture returned to the tourism sector, as noted in the following quote:

"Everything is returning to its position."

"Now we reopened our doors to tourism and it's a line a lot... a lot of people are going back to tourism. To this "easy money" [...] Tourism is faster because it is a service industry."

"Only those who make a living from this remained, which are a few."

On the other hand, and despite the agricultural boom that the Island experienced during the pandemic, interviewees emphasized that food insecurity and dependence on the mainland persists at the community level, due to the lower frequency of airplanes with respect to the pre-pandemic situation, which is observed in comments such as:

"We are still restricted, [...] we have been working with 3 airplanes for several months now. And those 3 airplanes are the ones that bring the food from the mainland."

"The supplies run out within the week, it runs out! that is, today there is no milk, no flour, there are no certain fruits, eggs, I don't know if they arrived."

> “Costs are skyrocketing. [...] bringing merchandise from the mainland is very expensive. The merchandise runs out [...] there is an economic issue that is also affecting our food security.”

> “It's an uphill battle [...] you go to town, and you can't find anything [...] or you have to go on a tour of all the stores to find what you need.”

> “If the plane crashes or doesn't come for a week, we are left completely out of stock. The ship was not ready to embark three weeks ago, I don't know how long the ships have been there waiting [...] for a calm to be able to unload their things [...] We continue to depend on everything that arrives from there.”

This is partly explained by the fact that some community members who began farming during the pandemic did not keep up in the long run considering the hard work involved, as shown in the following quote:

> “Then they saw that planting is nice, but it is very sacrificial, so they left it there, they went back on their same routines. No, there were not many left in planting. But anyway, there are some young people who dedicate themselves to planting. That's the good thing.”

Despite the perception of coming back “business as usual”, many interviewees recognized a certain reconfiguration of the food system mainly in terms of a) food preference changes towards healthier, less processed products, b) a greater appreciation of local products by consumers and local commerce, c) an increased awareness of the important role of local agriculture within the community and the need for greater levels of food autonomy, and d) an increased awareness of the

negative impact of (high) prices on food security and people's health. Each of these five points are exemplified in the following quotations, respectively:

(a)

“I think people ate a little healthier [...] they went back to the sweet potato, your chard, in your house outside, your cassava, your taro, which has always been there”

“In two years, the body gets used to [...] eating what was available, and the little that was available was mostly vegetables, fruit, [...] all local. [...] So I think it was for the better”

(b)

“People have learned to buy locally [...] because local people like local products, the issue is to find them.”

"You know, I had cilantro, chives or things that could be sold in supermarkets, and they told me, ‘no, we don't buy local products’ [before the pandemic]. And now it's the other way around, they call me and say, “hey, don't you know who has chives?””

"Now after one or two years you see more variety, more people selling vegetables, they do Thursday morning markets, which was not done before. Before the pandemic they didn't do it, during the pandemic they didn't do it either."

(c)

"The tourism scenario overshadows you and ultimately blinds you not to see the reality in which we find ourselves, which is important to identify and take charge of. And create public policies focused on the development of local agriculture."

"The realization that we are super super, hyper mega dependent on the dollar that enters through that plane [...] No matter how many dollars you have accumulated, they are of no use to you if you have nothing to buy. Deep down there are issues that are fragile, delicate and worrying, such as sustainability and self-sufficiency."

"There was a lot of talk about food sovereignty and how autonomous we had to be in situations like these. Then the vision became even more empowered [...] there was a brutal switch change".

(d)

"Here we are making a mistake because not everyone has access to 7,000 pesos to buy a fruit, a fruit! [...] ... [it's more oriented] to the tourist, not to the local people or to a common person, a tourist who comes from Chile I don't know, for a week who would like to eat a fruit, but… You can imagine that I am not going to pay 7 thousand pesos for one pineapple."

"If [a farmer] produces a little, perhaps costs will skyrocket, and people try to maximize profit [...] Logically it is expensive for you to eat healthy, you probably end up feeding of pasta [...] there is high obesity on the island [...] it is worrying"

"The island is in a super complex situation economically [...] You have to buy a lettuce that is worth 1500 pesos or I buy a package of pasta that will fill me more, but it does not nourish me, which is also worth 1500 pesos. What do you do if you have a family with children, do you give them a lettuce or give them a package of pasta?"

4. Discussion

The Rapa Nui experience illustrates the complexity of food systems, where an initiative aimed at enhancing food security in response to a shock (such as a substantial investment in developing family gardens during the COVID-19 pandemic) can lead to unintended consequences in other areas (such as discouraging established farmers by significantly lowering prices) as well as unexpected or less intended positive effects (such as improved emotional well-being and increased community capital).

Our results suggest the that the local food system, despite being relatively abundant in resources, is increasingly exhibiting undesirable properties such as health deterioration (mental, and physical), environmental degradation, economic disparities, and erosion of social and cultural capital. For example, most interviewees noted that fresh nutritious food is becoming economically inaccessible, especially for those who do not farm or those not closely related to local farmers. Our interviewees note that this situation was somewhat countered or "overshadowed" by the great economic access derived from tourism prior to the pandemic. However, the COVID-19-induced period of isolation from the mainland appears to have exposed the system's vulnerability due to its reliance on food imports and its dependence on tourism for economic access.

One of the most prominent themes derived from our interviews refers to food system governance challenges, which is consistent with the literature. This is exemplified in phrases like: *"There is no [...] conscious support [...] someone who really wants food to be cheaper, and available for everyone, and safe, so that people can eat with peace of mind," "there is no integration between public agencies [...] to be able to generate public policies to regulate the entry of pests and diseases," or "we are acclimatized to a system that is of no use to us: we lose money,*

we get sick, and on top of that, there is none." Indeed, my interviews reveal complex issues such as dietary change towards less healthy foods, disappearance of species of cultural value, entry of new pests, lack of water,￼￼According to the literature reviewed should be addressed with a solid governance that help accommodate diverse stakeholder's perspectives and negotiate tradeoffs among food system outcomes to ultimately advance on a path forward (Leeuwis et al. 2021; den Boer et al., 2021; Queiroz et al., 2021; Savary et al., 2020; Webb et al., 2020; Caron et al., 2018; Knickel et al., 2018; Schipanski et al., 2016; Tendall et al., 2015).

The above means that the process to transform or "deeply change" food systems is context-specific and needs to consider motivations, values, and perspectives of the diverse actors involved, particularly those directly affected by the system's functioning. This qualitative research aims to advance on this direction by providing perspectives of key stakeholders directly involved in the local production and distribution of agricultural products, taking advantage of the COVID-19 pandemic shock.

Finally, given the significance of this topic in this research, it is important to define what we mean by "governance". Referencing multiple sources, del Valle et al., (2022) offers a useful definition in the context of this research: "Food governance can be understood as the "architecture of food systems" (Berry, 2019) that allows formal and informal interactions between institutions and people to enable the environment in which food systems perform (Candel, 2014; Kennedy et al., 2017; Béné et al., 2019)" (del Valle et a., 2022 p.3).

In the remainder of this section, I first elaborate some identified tensions that needs to be considered to achieve a more sustainable and resilient food system. Secondly, I suggest specific

measures to guide policymakers and other local leaders in this direction, using seven governance strategies proposed by Leeuwis et al. (2021).

4.1. Identified tensions in Rapa Nui food system

Below, I present some of the tensions identified in the research. I propose these tensions to be analyzed, discussed, and negotiated in an inclusive manner considering the diverse perspectives of various food system stakeholders to advance in a transition towards a resilient food system and ultimately, towards a more sustainable development. The aim of this section is not to provide an exhaustive list nor to intent to portray absolute dichotomies within the scenarios proposed. I rather seek to open ideas for consideration, by this diverse pool of stakeholders, especially government authorities, donors, and local leaders.

4.1.1. Tension 1

Tension between maintaining food dependence from the mainland while having the freedom to choose from a wide range of foods typical of a globalized life (perhaps at higher prices), versus maintaining greater food autonomy, but probably having less things to choose from at certain moments.

This tension can be observed in interviewee phrases like "*it was more abundant [...] there was everything and it was very convenient*", "*we were used to […] the ease of having everything*." , or "People are already used to...you know, if they like [...] their Juan Valdez coffee, to give you a name. If it is available they are going to buy it because they can buy it" which contrasts with phrases like "*Maybe we are not going to eat bread, but we have sweet potato...and healthy sweet potato, you know?*".

Hence, the question here is: Do we want to have the freedom to choose a wide range of foods that are typical of a life open to the world, probably at the expense of greater food autonomy, or do we want to maintain food autonomy, even if this probably means reducing the range of products we can access?

4.1.2. Tension 2

Tension between encouraging larger-scale, full-time, input intensive agriculture ("professionalizing agriculture") to significantly reduce prices of locally produced food and diversifying the economy (with exporting possibilities) while mitigating negative environmental impact as much as possible, versus maintaining a lifestyle that gives people the freedom to participate in different productive and leisure activities and prioritizing environmental sustainability of the agricultural sector.

This tension can be observed in the contrast between phrases like: "*the Island could have easily become in a pineapple exporter*" or "*If [a farmer] produces a little, perhaps costs will skyrocket, and people try to maximize profit [...] Logically it is expensive for you to eat healthy*" and phrases like: "*it is part of our culture to cultivate everything... we are a culture that does many things at the same time and this issue does not affect us much*", "*A Rapanui does everything, from fire building to constructions, innovating, everything, right? he dives, he fishes, you do everything... that, that is a Rapanui. Whether we are dedicated to something specific is different*", or "*a lot of production could mean a waste of water, a waste...because not because we produce more locally means that they are going to do it in the right way or ethically*

[...] maybe I don't know, they start to put a lot of chemicals on the land in order to have an optimal harvest"

4.1.3. Tension 3

Tension between encouraging a swift return to tourism to reactivate the economy versus diversifying the economy and investing in agricultural development with a focus on resilience, with long-term benefits.

This is hinted, for example, in phrases indicated by farmers like "*everything is always difficult for us all the time, but go and talk to them about tourism!, they open up the project you want*" or "*you have to fight in this odyssey to get ahead*"

4.1.4. Tension 4

Tension between recognizing the pandemic as an external shock that negatively impacted food security (at least for a significant part of the population) -with the opportunity to build from the lessons learned- versus recognizing Rapa Nui as self-sustainable and resilient, where ancestral cultural values and practices can maintain food security in the event of external shocks.

This tension could be seen in the contradictions between phrases like: *"we had a hard time because, you know, you wanted to eat fruit, there was none. Vegetables, it was really expensive*", versus phrases like: "*this is an ordinary life for us, not a difference between if there is a pandemic or there is no pandemic, the island works like that*" (when consulted about food security during COVID). In relation to this tension, Campbell (2009) offers interesting insights from the Pacific Island region, indicating that "a number of elements of traditional life enabled Pacific communities to

withstand the effects of environmental extreme" (p.85), nevertheless the lost, erosion, or transformation of these practices due to "colonialism, development and globalization" derived in Pacific Islands to "have become sites of vulnerability" (p.94). An example of that is reflected in the following phrase by one of our interviewees: *"There are many people who, versus the necessity, have also had to change certain practices like 'Ūmaŋa' [...] But in the old families this is still maintained [...] 'Ūmaŋa' [...] is a concept that is lived on the island and that was put into practice again [during pandemic] and that it was tried to externalize to the families, but the families that are mainlanders do not understand the sense of it. It's just like "I give you, and you give me", it's like a kind of barter but it has a little more complex meaning than that"*.

Recognizing the narrative distinctions between a territory "being vulnerable" and "having been made vulnerable" may be beneficial in addressing the issue of resilience in Rapa Nui.

4.1.5. Tension 5

Tension between aiming for a food system that better withstand external shocks by adapting the current system versus embracing a major food system transformation towards resilience, where an external shock is less likely to have an impact.

This tension is observed in how agricultural issues are addressed and worded in the Carrying Capacity Management Plan associated with the Law 20,070, which contrasts with our interviewees' perceptions that the food system requires a significant transformation.

4.1.6. Tension 6

Tension between supporting and preferring local agriculture to guarantee food autonomy versus maintaining the family livelihood of certain businesses specialized in importing agricultural products from the mainland.

This tension was identified during our interviews when participants were asked about stakeholders who might be adversely impacted by the innovations introduced during the pandemic.

4.1.7. Tension 7

Tension between strengthening non-monetary food environments (for example giving away food to family members, barter systems, self-cultivation and collecting food from nature) versus strengthening markets.

This tension was identified in some of our interviews, where participants reported being negatively impacted by the important economic and technical support given to self-cultivation.

4.1.8. Tension 8

Tension between embracing the past, acknowledging and maintaining ancestral wisdom, versus acknowledging the future, technology, globalization, and an easier, more practical lifestyle.

This tension was identified in phrases like: "*Our agriculture is very ancestral, in what sense? Without the use of technology, without technification... much, much work of*

connection with nature, planting at the full moon, that the waning moon… so if it did not rain, I did not water, you know what I mean? A work with the horse [...] So what we did was to show the local producer that there is a friendlier way of working the fields, that it is not so hard on the life of the... on the back of the worker, that there is technology to work, that there are more efficient ways to develop agriculture".

4.2. Suggested measures based on the seven strategies proposed by Leeuwis et al., (2021)

Leeuwis et al., (2021) propose seven governance strategies to guide food systems transformation processes that we believe are relevant in this case. The strategies are a) "creating and supporting variation", b) "capturing and supporting existing diversity", c) "temporary protection of niche-level initiatives", d) "analysis of landscape trends and visioning", e) "fostering landscape level pressures and active regime destabilization", f) "identifying plausible leverage points", and 7) "process investment in coalition building, collaborative research and media presence".

In this section I will discuss some of these strategies and suggest initiatives contributing to increase food system resilience in Rapa Nui in each strategy based on the information obtained in our interviews.

4.2.1. "Creating and supporting variation"

This strategy suggests piloting a range of options, both technological and non-technological, stressing that even when initiatives fail, redundancy is important in order to strengthen its resilience capacity. It also recommends an evaluation of whether the initiatives challenge or reproduce the dominant food system regime.

To create variation, I propose to expand the range of agricultural actors and the type of food environments that are subject to governmental support, for example from the Ministry of Agriculture. Although important progress has been made in broadening the type of farmers subject to receive support from the National Institute of Agricultural Development or INDAP (E. Nahoe, personal communication, August 2022), a greater range of programs is required to meet the needs of a more diverse pool of actors. For example, while in the mainland INDAP offers 44 different programs, in Rapa Nui only a limited number of programs are being executed and available to farmers. In this sense, it would be useful to develop an updated typology of farmers for Rapa Nui based for example on the work of Pérez (2007) in Rapa Nui and other similar studies such as Lincoln et al. (2019) in Hawaii. A typology would allow the design of tailor-made programs for each segment, prompting variation in the food system.

In relation to food environments, this study suggests a similar situation as the one describe by Boggard et al., (2021) in Solomon Islands. Their study conclude that the food obtained through self-cultivation, family and community, and directly from nature proven key in sustaining food security and food system resilience during COVID-19. In this sense, I suggest to invest in interventions that support and make visible the importance of these food environments, to encourage people to see it as a valid form of supply, especially younger generations. Interventions such as a communication campaigns aimed at children or young people, a story, a comic or an art installation in a visible are useful.

A promising technological proposal is the development of agroforestry projects. This cultivation technique simultaneously adjusts to multiple challenges observed in Rapa Nui. Hence, we suggest developing several pilot plots throughout the island with technical

assistant of Pacific experts. As indicated by Manner (2014) agroforestry constitute a sustainable traditional agricultural, widely used in Polynesia and highly productively efficient per unit of cultivated land, which is important on a small island like Rapa Nui (Manner, 2014).

Finally, I suggest a participatively designed special innovation fund for agriculture in Rapa Nui, which finances the piloting of innovative solutions in different lines of work aimed to expand the diversity of possible solutions and learn from failed cases. Based on the information gathered in our interviews, I identified eight priority areas that could coincide with the lines of work to be financed: a) water, b) pest and disease management, c) adaptation to climate change, d) commercialization of ancestral crops, e) processed foods, f) new cropping systems (e.g., agroforestry), g) availability of plants and genetic material for agriculture (to develop, for example a seed bank), and h) associativity.

To ensure this set of experimental initiatives generate useful knowledge, the fund should allocate sufficient resources in monitoring, evaluation and learning and avoid evaluating unsuccessful initiatives as failures.

4.2.2. "Capturing and supporting existing diversity"

This strategy involves identifying what food system stakeholders are currently doing at the niche level that seems to be working better than other initiatives. My study intentionally included some questions to obtain information on this regard, identifying urban agriculture, processing of local products, and the increased use of ancestral crops as some of the most outstanding initiatives that contributed to food security during COVID-19 at the niche level.

In relation to urban agriculture, the Municipality of Rapa Nui, through its Department of the Environment, implemented a family garden program that was widely valued by the community, where people received support in inputs and labor to implement gardens in their homes, where a part of the production was donated or sold at an affordable price to meet the needs of the most vulnerable population during the pandemic through " family baskets" distributed by the same municipality. In addition to support in terms of food security, several interviewees reported secondary benefits of this initiative, such as the greater appreciation of agricultural work and the contribution to mental and physical health, contributing to a greater and more diverse consumption of fresh vegetables. Although several interviewees mentioned that several of these gardens were not maintained over time by the beneficiaries (they indicated, for example, that "it was born out of a need, not from something that you wanted or that you did by your own choice"), it was also mentioned that "we were about 50 people [...] and today [...] there are four that have been transformed into larger orchards." From a resilience perspective, this accounts for a successful initiative that increased the robustness of the local food system. For this reason, I consider it important that this type of initiative is maintained over time and is not limited to an emergency situation, although in the future they must be redesigned by actively incorporating the beneficiaries throughout the process and must be accompanied by an information campaign that highlights the benefits of this type of urban agriculture. as one of our interviewees mentioned: "If more importance were given to how easy it is to have a garden in your home and how beneficial it would be for you as a family [...] it would be a tremendous step for your own autonomy [..] it is also seen as something very big when it does not have to be that way".

It is important to note that while several interviewees mentioned home gardens as an "innovation," most alluded to a certain reconnection with old practices, not seeing it as something completely new. This can be seen in phrases like "I liked it a lot, [...] I saw that people *went back* to producing things from the land to be able to feed themselves." This is in line with Thamann et al. (2006), who highlight the relevance of home gardens in the Pacific region not only in terms of food security, but also in relation to cultural preservation and the provision of other products such as medicinal plants, flowers, and handicraft and light construction materials. This same author also mentions the lack of understanding of the importance of this type of agriculture by policymakers as a limitation for its further development.

Moreover, the COVID-19 pandemic highlighted the important role of urban and peri-urban agriculture at the global level, contributing not only to food and nutrition security, but also to the maintenance of important ecosystem services and to people's well-being and health (Lal, 2020). The importance of these cropping systems is clearly reflected in the text of the FAO open consultation led by the High Level Panel of Experts on Food Security and Nutrition, which seeks to obtain feedback on the proposed scope of the report "Strengthening urban and peri-urban food systems to achieve food security and nutrition in the context of urbanization and rural transformation" to be presented at the 52nd plenary session of the Committee on World Food Security in October 2024 (FAO, 2023). Finally, urban and peri-urban agriculture in Rapa Nui is of special interest considering that the rapid demographic expansion and the physical limitations of the territory are amplified by the fact that a significant percentage of the territory corresponds to protected archaeological

zones (around 40%), which could limit the expansion of agriculture for self-sufficiency in the future.

Regarding processed foods, several interviewees identified this practice as a positive innovation that arose from the need to preserve local perishable foods and source a greater variety of products locally during the pandemic. This is how new products appeared for the local community such as preserves, cheese and yogurt, frozen fruit pulps, dehydrated products and jams from fruits such as pineapple, passion fruit, guava, mango and banana. One family even began to make cassava flour, a product that at the time of the interview was in the process of being released to the local market. It is estimated that these types of innovations should be supported more intentionally to increase the resilience of the food system of Rapa Nui. The benefits of developing these products are not only related to food security, but also to the diversification of the economy and health. For example, the sugar-free frozen fruit pulp venture started by a local family was highly valued by the school feeding service, allowing the entire school system to have local natural fruit juices, for example, reducing the environmental, social and economic impact of importing fruits such as apples, pears, oranges and bananas from the mainland.

Non-monetary economies like giving or barter systems also proved to have played an important role during the pandemic ensuring a quick and efficient distribution of food in times of crisis. Although this kind of systems often comes from behaviors that occurs naturally within a community (for which is not easy to establish programs encouraging its practice), I believe that promoting its societal value and making it more visible is important to support existing diversity in the system. Additionally, I suggest investing in actions targeted to increase community social capital to promote non-monetary economies as a

direct way to increase food system resilience in the case of Rapa Nui, as suggested for example by Niles et. al (2021) and Emery et al. (2006). The role of alternative economies could be the subject of future studies in Rapa Nui, allowing to develop creative programs and initiatives to support the food system.

Finally, I propose to develop a program that gives more visibility to the different varieties of ancestral crops targeted at the food service sector. For example, a program similar to "Cocina con raíces" (cuisine with roots) promoted by the governmental agency JUNAEB (National Board of School Aid and Scholarships) in Rapa Nui schools - aimed at increasing the cultural relevance of the schools meals - could be piloted in the Island to promote and encourage the use of the existent diversity of Rapa Nui ancestral crops in restaurants and hotels. The initiative should encourage the purchase of ancestral crops for example by developing promotional materials informing about the different varieties and organizing cooking shows led by elderly mothers. It could also include a promotional campaign targeted to the local population.

4.2.3. "Temporary protection of niche-level initiatives"

This strategy suggests the temporary protection of initiatives either in the form of *financing* to cover the implementation of innovative initiatives or *insurance* to reduce risk, as well as in the relaxation of certain *rules* that facilitate experimentation. Leeuwis et al. (2021) present the protection of experimental agroforestry projects as an example, which is consistent with the literature that shows the great potential of this technique in the case of Rapa Nui (e.g., Elevitch et al., 2000, Elevitch et al., 2020, Hastings 2021 & Manner,

2014. For a more comprehensive analysis of the potential of this technique in Rapa Nui, refer to Appendix 3).

Indeed, agroforestry systems, defined as "a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in agricultural landscape, diversifies and sustains smallholder production for increased social, economic, and environmental benefits" (ICRAF, 2008, as cited in Nair et al., 2021), can be considered a multi-benefit solution for resilient agricultural landscapes (Hastings et al., 2021) that are coherent with the priorities identified for the Island including food security, natural disaster threats and vulnerabilities, land uses, heritage, and health (IDB, 2020; act 21,070, 2018), particularly considering pressing issues of soil degradation, swift demographic growth, dependance of food and other imports, climate change, and cultural erosion (Honorato et al., 1999, Act. 21.070 Chilean law, 2018; IDB, 2020).

Despite the clear advantages of a more widespread use agroforestry systems in Rapa Nui, there are important entry barriers and risks that justify temporary protection of these endeavors. Some barriers identified in the Pacific region are (Elevitch et al., 2000; Elevitch et al. 2020; and Hastings, 2021): a) agroforestry systems needs careful *planning* and it often requieres replanting as part of the learning curve of species combination better adapted to local conditions, b) general shortage of scientifically-based *practical information* about these systems, including economic trade-offs, c) higher *start-up costs* and longer *returns on investments* which makes persisting after establishment challenging for farmers, d) agroforestry involves a *multi-year transition* process that is socially and ecologically complex, often involving different financing mechanisms, labor sources, and

plant and animal species, and e) *marketing challenges,* given the wider range of products being produced.

Notwithstanding these challenges, recent research supports the idea that sustainable land use and a traditional type of agro-forestry was widespread in ancient Rapa Nui (Mieth et al., 2018), which is concordant with studies in other Pacific Islands (Hastings, 2021; Elevitch et al., 2000). Hence, I believe that a certain alignment of agroforestry practices with Pacifika cultural values can increase the likelihood of adoption and maintenance of this systems, considering the motivations for farming evidenced in our research.

Moreover, Rapa Nui soils are relatively infertile compared to other Pacific Islands like Hawai'i (Vitousek, 2015) and present low ecological diversity, for which agroforestry systems seems appropriate and in line with other efforts of environmental restoration such as those implemented by CONAF (National Forestry Corporation, Ministry of Agriculture).

Finally, given the unique land distribution in Rapa Nui on which half of its rural land is government owned (IDB, 2020) coupled with the fact that most agricultural-category soils are situated in government-owned land (CIREN, 2013) the flexibilization of some rules to allow, for example, agroforestry pilot programs in government-own land seems appropriate.

Another area that could be considered for temporary protection and flexibilization of rules is water extraction for farming. Currently it seems to be only one entity authorized to extract underground water in Rapa Nui (government own SASIPA SpA) which according to some of our interviewees, is limiting the possibilities for farmers to extract

underground water from their farms. Similarly, ancestral wells are allegedly not allowed to be repaired for agricultural use because of their high archeological value. This issue is summarized by one of the interviewees in the following quote “I am always looking for what to do to have water, but it is difficult [...] you can't just come and do it your way to open places and draw water”. Hence, initiatives that allow piloting and temporary protection of novel water extraction solutions could be implemented along with the necessary infrastructure investment in water accumulation.

4.2.4. “Analysis of landscape trends and visioning”

This strategy suggests that “coinciding trends and developments can pose pressures on the dominant food regime and at the same time, offer opportunities to come closer to a ‘tipping point’ in system dynamics” (Leeuwis et al., 2021). In this case, I suggest investing efforts and resources in a multidisciplinary and participatory longitudinal study analyzing food trends and local consumption, for example at the household, food service and retail levels. This could help visualize and dimension the current trends of food dependence and dietary changes, generating a more favorable social environment to make the necessary changes, in addition to being an important input for the agricultural sector in terms of production. It is suggested to pay special attention to food trends related to a) community health, b) the maintenance of preparations that involve ancestral crops, and c) eating habits and preparations of high cultural value. Ancestral crops in this case are important considering that most interviewees positively associated these plants not only to food security during the pandemic, but also with an easiness of cultivation and cultural relevance,

which allows us to assume that farmers will be more inclined to stay in the sector if these crops increase their demand, prompting the overall resilience in the food system.

Moreover, visualizing landscape level trends is imperative in a context where tourism seems to be overshadowing food system vulnerabilities due to the great purchasing power left by this economic sector and the constant flow of people and perishable food that arrives by air. In fact, recent estimations indicate that Rapa Nui imports nearly 90% of its food and that the basic family basket of fruits and vegetables cost is 65% higher than the mainland (IBD, 2020, p. 359). Tourism then indirectly generates resistance to change within the food system, situation that could be counteracted with the studies suggested above. Finally, the economic effect of tourism was clearly reflected in our interviews, in phrases such as: "*I never thought that there was no food security, because there were planes, there were ships that brought food*", "*We were used to having the level of the economy because of tourism, the ease of having everything*", "*we were used to just buying [...] economically we were all good, so we had no need to be planting" and "the tourism scenario overshadows you and blinds you not to see the reality in which we find ourselves*."

4.2.5. "Fostering landscape level pressures and active regime destabilization"

This approach suggests to strategically influence pressures at the landscape level through policy and/or social movements, fostering values and philosophies not well represented in the dominant food regime (Leeuwis et al., 2021).

To apply this strategy in the context of Rapa Nui, we propose identifying and reaching out to international organizations directly related to agriculture in Polynesia,

fostering the exchange of knowledge and ideas not only around technical solutions, business models and commercialization, but also in terms of innovative food system governance structures based on Pasifika epistemologies.

While it is true that Rapa Nui constantly maintains close contact with international organizations and with other Polynesian territories, we believe that these relationships have been more linked to the areas of tourism, ocean protection, culture, and climate change in general, and have been maintained at a level that does not necessarily permeate the reality of farmers and other actors in the food system of Rapa Nui. In this sense, it is suggested to encourage direct contact between farmers and other actors in the food system with Polynesian entities and initiatives currently working in the transformation of their food systems, such as the Pacific Farmers Association, the University of Hawai'i (for example, the Sustainable Community Food Systems (SCFS) program in West O'ahu), Hawai'i Ulu Cooperative, Pacific Community (Land and Resource Division, Sustainable Agriculture theme). This can be implemented, for example, as part of measure No. 38 numeral e) of the Carrying Capacity Management Plan associated with Law No. 21,071, which seeks to "strengthen local agricultural productivity" through "international and national tours with users of the National Institute of Agricultural Development (INDAP)" of the Ministry of Agriculture. In this sense, it is paramount to invest human resources to develop or expand collaborative agreements with international agencies are such as Aid and Development programs offered by different governments like New Zealand, Australia, Japan or Germany, if necessary, with of the Chilean Agency for International Development Cooperation (AGCID). To facilitate this work, it is recommended to develop a comprehensive funding

strategy to identify the different agencies and understand their mandates so different funds could be correctly orchestrated.

4.2.6. "Identifying plausible leverage points"

This strategy suggests identifying "entry points in the system (e.g. in the form of constraining or enabling policies, rules, meanings, technologies, communities, stakeholders) where change is most likely to catalyze subsequent self-organizing changes elsewhere in the system", to adjust to a reality in which funding and capacity resources are often restricted (Leeuwis et al., 2021).

In this regard, it is important to recognize that a local agricultural food system cannot exist without farmers. Our interviews, nevertheless, captured a reality in which farmers are constrained in several aspects (technical, social and economic), and there is a generalized sentiment that they have everything "against them", especially in a context where tourism captures most of the attention and resources. This is exemplified in phrases like "*Everything is always difficult for us all the time, but go and talk to them about tourism!"*, "*you have to fight in this odyssey to get ahead", "agriculture is a lot of dedication, it is a lot of sacrifice*", or "*people have been moving away because of the same [competition with tourism, sacrificed agriculture], and the few possibilities of succeeding*". This reality highlights the need to continuously encourage farmers and farming practices in a way that recognize their motivations, which we believe is an important leverage point. Initiatives identified in this regard are: a) encourage the creation of local *cooperatives*, b) promote activities that *bring farmers together* with a certain frequency throughout the year, c) invest in *promotional campaigns* around healthy and culturally appropriate diets targeted

to the local community highlighting local products and the important role of farmers in the provision of healthy products (prompting food system change from a public health perspective), d) establish creative *awards and reward systems* for farmers, recognizing and raising awareness of their important role in the local community (a physical award such a medal, statuette, etc., to offer a space to talk about their journey in the local radio, a special place or a plate at the weekly farmer´s market, etc.) e) piloting *a marketing order or a marketing agreement* that consider a window of time in which the imports of certain products are discouraged. This model is well known and applied in developed countries like the U.S., where is described by the USDA as agreements "initiated by industry to help provide stable markets […] tailored to the individual industry's needs. Marketing Orders are a binding regulation for the entire industry in the specified geographical area, once it is approved by the producers and the Secretary of Agriculture. Marketing Agreements are only binding for those handlers that sign the agreement. Fruit, vegetable and specialty crop marketing orders and agreement help producers and handlers work together to solve marketing problems that they cannot solve individually by (1) maintaining the high quality of produce that is on the market; (2) standardizing packages and containers; (3) regulating the flow of product to market; (4) establishing reserve programs for storable commodities; and (5) authorizing production research, marketing research and development, and advertising" (USDA, 2024)), f) piloting agricultural practices that are rooted in Pacifika cultural values, like *agroforestry systems* (Manner, 2014; Campbell, 2009), and g) facilitating, regulating, or creating *international volunteer programs* to temporary make up for labor shortages in the agricultural sector such us Worldwide Opportunities on Organic Farms (WWOOF).

4.2.7. "Process investment in coalition building, collaborative research and media presence"

This is presented by Leeuwis et al., (2021) as a "more overarching strategy" that suggest investment in stakeholder processes that encourage and enable previous six strategies, indicating that "transformation requires the emergence of a strong coalition for change around promising initiatives, characterized by common goals, a shared discourse and joint strategy" (Leeuwis & Ararts, 2011, as cited by Leeuwis et al., 2021).

The results from the interview offer a great opportunity in this area. In fact, most of the interviewees indicated the need for coordination and public-private integration at different levels, evidencing a demand for innovative forms of governance.

In line with this strategy, I suggest a major resource routing to develop an inclusive multi-stakeholder and multi-partner working group that help navigate through and accommodate tensions of the current food system and establish a road map for transformation. To implement this initiative, I recommend reviewing the available literature on food system governance (for example Kraak & Niewolny (2024) and observing similar efforts being done in Polynesia. A good example is "Transforming Food Systems Together", working-group initiative developed in the State of Hawai'i that, at stated at their webpage, "seeks to build statewide capacity and pave the way for a more robust, sustainable and resilient food system, especially in times of crisis. The initiative harnesses innovation and momentum developed in response to the COVID-19 pandemic,

documents lessons learned, articulates policy and planning recommendations, and sets up the State to expand large-scale institutional purchasing of local foods". To achieve this vision, the group is working towards three main objectives: "1) *conduct applied research* that informs the prioritization of necessary food system actions at the community, county and state level, 2) develop an *integrated food policy framework and food system resilience and equity strategy* that is inclusive of indigenous values and producer perspectives, and 3) implement *capacity building strategies* to facilitate institutional purchasing of locally produced food".

I found that investing in a similar initiative is much needed in Rapa Nui to advance in a food system that is resilient and sustainable. Moreover, efforts to quantify the productive potential of the Island and estimate consumer demands (as indicated in the Management Plan of law 21,071) are futile if food system stakeholders are not first united and empowered to direct the changes needed. As an elderly interviewee stated: "I think that we save ourselves and had to create a way to self-supply [...] Of course we can withstand that, but as long as a community is *united to develop in a common way*."

The results from the 13 in-depth interviews, key informant interviews, and the overall participatory research work, show that COVID-19 positively impacted Rapa Nui's food system resilience by strengthening local production, mobilizing stakeholders and sparkling new conversations within the community around how the food systems should be transformed in the future. The results also show that many of the necessary conditions are currently in place to support food systems transformation in the island, especially after COVID-19. The same way that the pandemic exposed food system´s vulnerabilities, it

ignited and strengthened a previous process of [food] autonomy that can also be seen as a resistance to colonization and acculturation processes that occurred throughout the history of this territory. Nevertheless, urgent and coordinated action is needed to take advantage of this situation. In the absence of tourism and with disrupted supply chains from the mainland, Rapanui also made use of their ancestral cultural knowledge and quickly turned back to agriculture including the revitalization of traditional farming systems, the use and recovery of home gardens and urban farming, and the more intensive use of existent alternative food environments and foodways based on familial ties and the ancestral concept of *Ūmaŋa* or reciprocity. This ancestral knowledge was key to sustain food security in the Island. Hence, one of the key lessons drawn from this study is that the *diversity* of food environments, agricultural products, actors, and agricultural practices is key in sustainable and resilient food systems, and that governmental and community efforts *needs to account for this diversity*.

5. Conclusion

The accelerated process of globalization experienced by Rapa Nui since the 1970's has reconfigured the Island's food system by changing dietary preferences, shifting preponderance of tourism sector in detriment of local agricultural sector and increasing food import-dependency and food prices and reducing overall health. Moreover, the *kind of agricultural products* produced by local farmers and the *environments* where food is acquired has dramatically changed. This is consistent with previous literature on Rapa Nui (Rochna-Ramirez, 1996; Delsing, 1998; Ramírez, 2010; Delsing 2015; IDB, 2020; Lastra Bravo, 2020) as well as other islands (for example, Schipanski et al., 2016; Mc.Leod et al., 2019). The current food system seems to be increasingly restricting access to diverse, nutritious, and culturally appropriate food for Rapa Nui inhabitants, and has proven fragile in maintaining food system's desirable properties such as food security and healthy nutrition, particularly in the face of the COVID-19 experience.

Food system practices based on indigenous cultural values and visions like *Ūmaŋa* (roughly, "reciprocity") as well as the increased cultivation of certain crops better adapted to the local conditions proved key in sustaining food security during COVID-19 and seems to have reconnected the community to their Rapanui and Pasifika culture and enhanced social cohesion and wellbeing. This is coherent with other literature in Rapa Nui (Ángel & Bergamini; 2020; Stevenson et al., 2022) and other islands (Kagawa-Viviani et al, 2018; Hastings et al, 2021; Bogard et al., 2021), indicating that traditional agricultural practices like home gardens, agroecological production, barter systems, and the acquisition of food through self-cultivation, wild, and kin and community food environments are important in sustaining food security, and have multiple benefits in other areas of development, particularly in the context of climate change. Hence, the call is for authorities and donors to go beyond "adapting" mainland agricultural programs to Rapa

Nui's reality and to question the underlying epistemologies that are assumed when supporting agricultural development and measuring its success. This implies that decision-makers need to reevaluate, for example, who is considered a "farmer", which environments are understood as "farm", which purposes a farming should serve within the community, and which kind of governmental resources should be deployed to support Rapa Nui food system.

Most farmers in Rapa Nui do not live exclusively from agriculture, and their motivations to participate in agricultural production are more related to their cultural values and the ease of cultivation than from obtaining economic benefits. This is an important factor to consider in the development and deployment of appropriate policies in the agricultural sector. Moreover, the few farmers who dedicate much of their productive time to agriculture face multiple and important challenges that must be urgently addressed considering the COVID-19 experience.

COVID-19 served as a sudden shock or force counter to globalization trends that put strong pressure on the food system at the level of the socio-technical landscape to temporarily, but substantively reconfigure the dominant regime. This external shock is aligned with various forces at the niche and dominant regime levels that allow us to infer that the necessary conditions for food system transformation towards sustainability and resilience are present in the case of Rapa Nui. Policy makers and diverse stakeholders of the food system must take advantage of this opportunity by investing significative resources to strengthen food system governance.

The governance strategies proposed by Leeuwis et al. (2021) appear to be valuable in guiding the necessary transformation processes in Rapa Nui. Many of these strategies align with the adaptation measures observed during the isolation period in Rapa Nui and with the needs and desires expressed by our interviewees, who consistently emphasize the importance of governance within the food system. Ideal governance structures needs to build redundancy in creating,

supporting, capturing and temporary protecting diverse niche initiatives to pressing food system challenges while analyzing, visioning and fostering landscape level forces that can bring about systemic change. Finally, identifying leverage points and investing in coalition building, collaborative research and media presence seems like a good starting point to secure scarce resources are used wisely.

The implementation of the proposed strategy to deeply change the food system in Rapa Nui needs to be accompanied by more participatory action-oriented research, particularly to establish a baseline and to monitor food system agreed-upon outcomes. On this regard, Béné et al. (2023) offers an analytical framework to assess food system resilience at the local level that seems interesting to consider in the case of Rapa Nui. Moreover, the adaptation of food system transformation theory to Rapa Nui's food system may offer valuable indigenous perspectives to understand how food systems can substantially change, contributing to the advancement and enrichment of this field of study.

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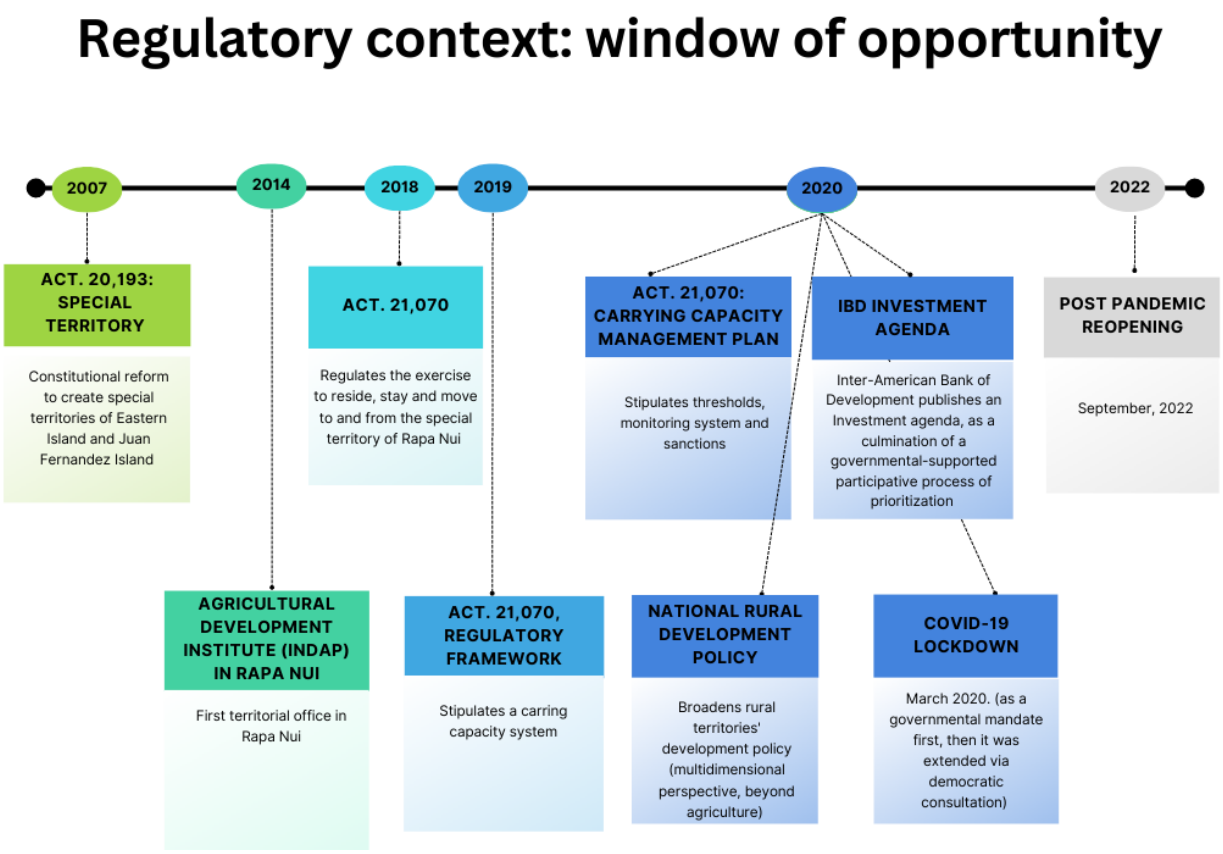
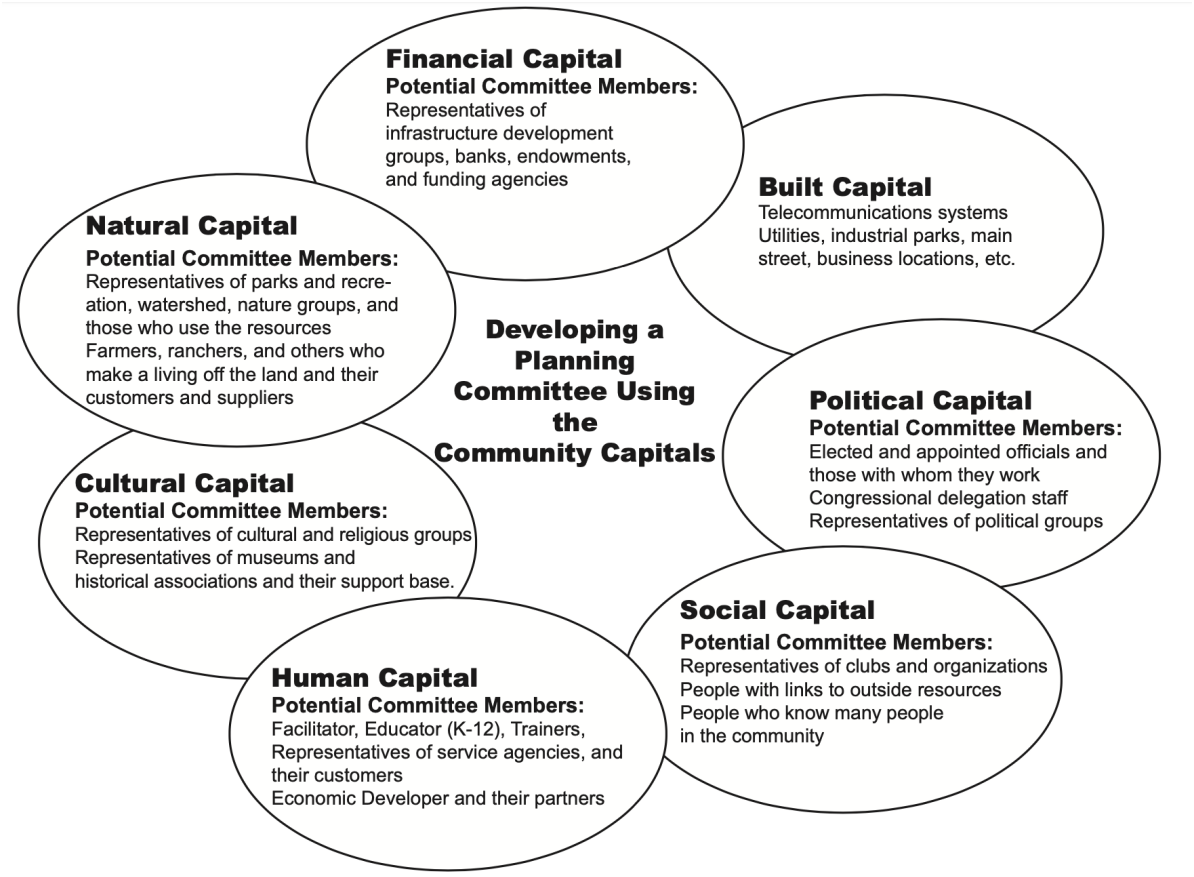
Appendix 1: Key legislation, regulation, and governmental-led initiatives in Rapa Nui since 2007 (own elaboration)

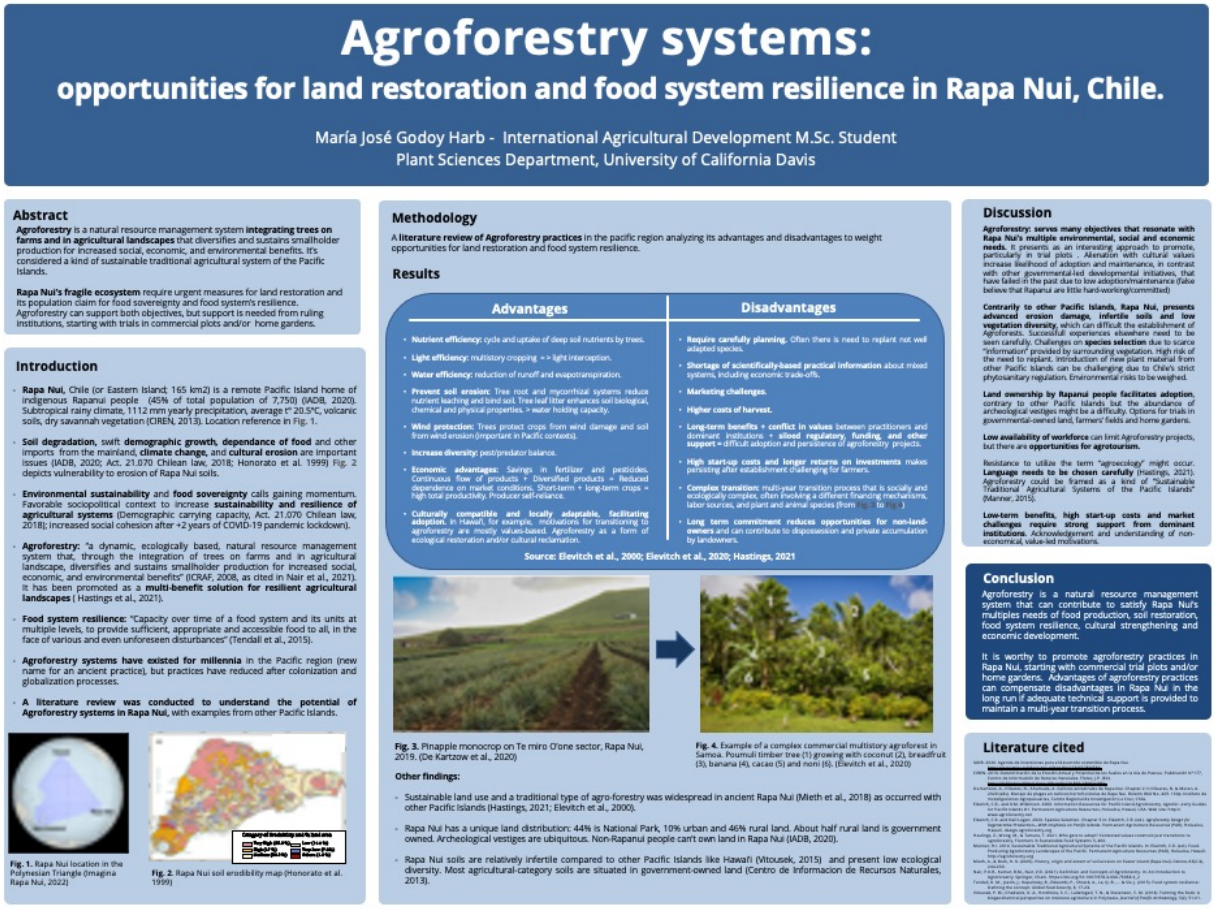


Appendix 2: Using Community Capital framework to develop a steering committee

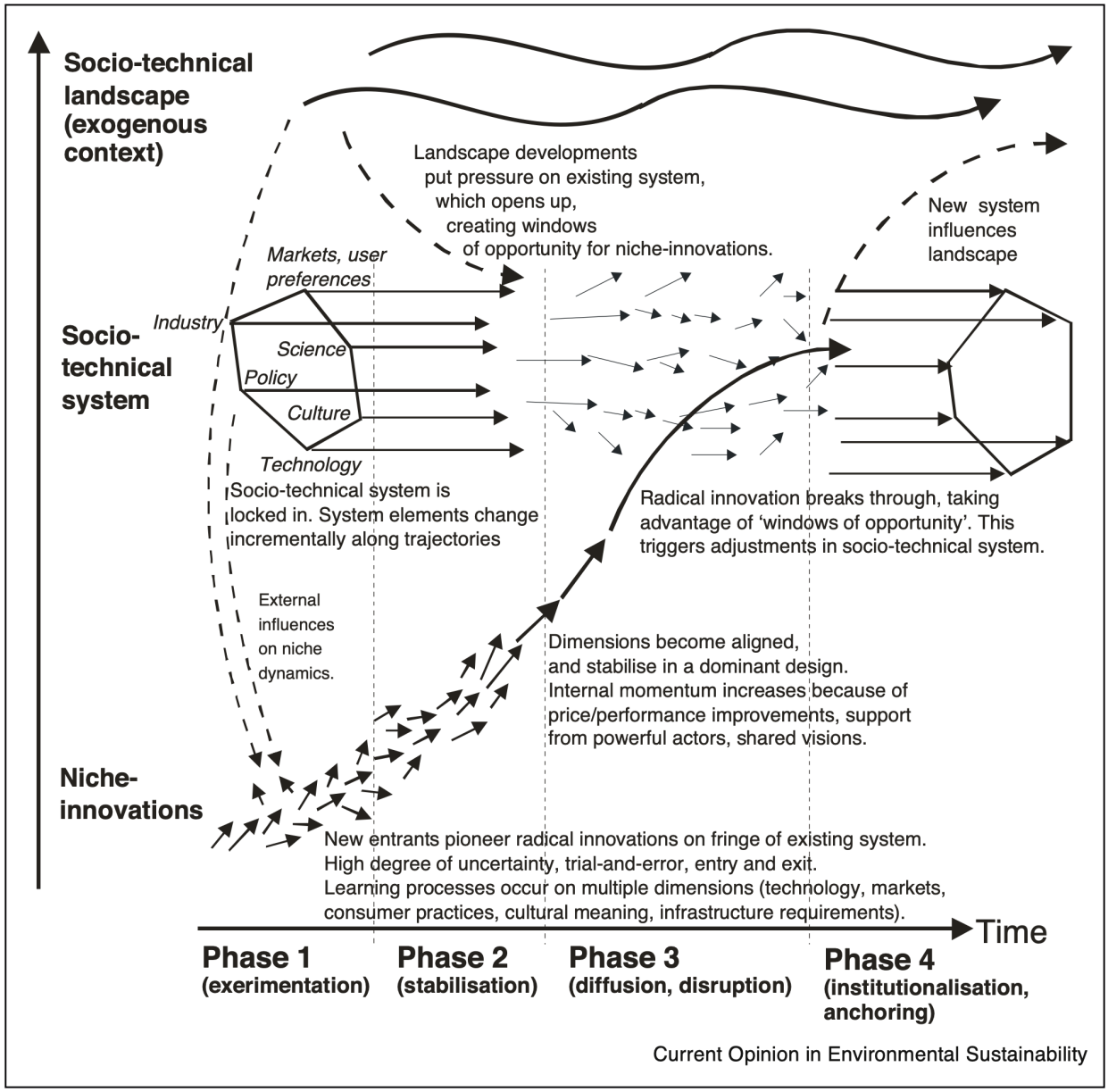


Source: Emery et al., 2006.

Appendix 3: Poster "Agroforestry systems: opportunities for land restoration and food system resilience in Rapa Nui, Chile"



Appendix 4: Multi-level perspective on socio technical transitions (Figure No. 2 in Geels, F. W. (2019). Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. *Current opinion in environmental sustainability*, *39*, 187-201)



Appendix 5: Themes by question

Appendix 6: Overall themes

Appendix 7: Interview guide