picture of Mario Piu, made by author

From extractive to regenerative insular food systems

'Uncovering the entrepreneurial barriers and opportunities towards shaping a regenerative productive food system in the Galapagos Archipelago, guided by the principles of circular communities.'

picture of Edith Rodriguez, made by author

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Supervised by Fátima Delgado Medina and Linda Kamp. Created in collaboration with Francisco Cuesta of Universidad San Francisco de Quito, Els Leclercq of Circular Communities Foundation and Isabel Grijalva.

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Abrazo,
Noa

Picture with participants of the co-creation workshop (family member have been made unrecognizable purposely)

From left to right: Isabel Grijalva Arroyo, Sebastian Loor (Sabor cafe) and family, Lucia Galarza (Art Coffee & Sin Lata), Romer Ochoa (Granja Integral Ochoa) and family, Jadira Larrea Saltos (Drupa Real) and family, Cecilia Guerrero (Finca Darwin's Ecogarden) and family, Maria Belén Andrade (Islander coffee roasters) and family.

Executive summary

This thesis investigates the socio-economic and ecological challenges faced by the Galapagos Islands, focusing on their increasing reliance on mainland Ecuador for food and the social tensions stemming from top-down conservation policies. These challenges are compounded by the islands' growing ecological footprint and tourism pressures. The study explores the potential of Circular Communities, regenerativity, and convivial conservation as frameworks to address ongoing issues in the food sector and to provide recommendations for structural solutions.

Using a mixed methods approach and participatory action research, the study holistically analyses the productive food systems of Santa Cruz and San Cristobal, the primary inhabited islands. By conducting active participant observation, semi-structured interviews, and a co-creation workshop, the researcher uncovered findings that indicate how adopting a regenerative food system can reduce the islands' dependency on external resources, decrease ecological pressures, enhance social cohesion, and align conservation efforts with local entrepreneurial needs.

Part of the research took place inside the research context, adding remarkable value to the research outcomes due to the incorporation of lived experiences. During the fieldwork, the problem context was validated and a set of strategies that aid the transitions towards a regenerative food system was co-created by the research participants. These strategies also involve learnings from a quantitative analysis of the coffee sector, which is viewed as a productive sector as the Galapagos coffee is recognized locally, nationally as well as internationally.

Key outcomes of the research include a diagram of the current food system, an analysis of leverage points, and categorized strategies designed to drive systemic change.

In terms of additions to current methods, the study created a visual model that simplifies regenerativity as a concept and proposed an additional worksheet of the Circular Value Flower, extending its applicability beyond European contexts and incorporating regenerative principles.

Limitations of the study include the exclusion of livestock and processed products and potential data loss due to language barriers and automated processing. Future research should focus on strategies for inter-island organic resource exchange, participatory design within governance frameworks, and updating the Material Flow Analysis with current data to better measure strategy impacts.

This thesis contributes to the academic fields of regenerative entrepreneurship and convivial conservation by providing practical frameworks applicable to insular ecosystems in the Global South, offering both theoretical insights and actionable solutions for fair and sustainable development. By emphasizing grassroots involvement and leveraging local knowledge and Indigenous worldviews, this research created a scalable framework for co-managing environmental policies and fostering resilient, sustainable communities in island contexts.

Keywords: Regenerative entrepreneurship, Convivial Conservation, Insular ecosystems, Circular Communities, Material Flow Analysis, Participatory decision-making, Social cohesion, Bioregional resilience.

Table of contents

List of abbreviations

CvF = Circular Value Flower
CDF = Charles Darwin Foundation
CLD = Causal Loop Diagram
Intermediaries = Every entrepreneur that takes a position between producer and consumer, such as hotels, restaurants and tour operators
Ministry of A&L = Ministry of Agriculture and Livestock
MFA = Material Flow Analysis
PI-matrix = Power-Interest matrix
RP = Research participant
SQ/SRQ = Sub-research question
USFQ = Universidad San Francisco de Quito

Pictures of Santa Cruz' food system (created by author)

1. Introduction

Sustainable development is increasingly critiqued due to its strong focus on economic and technological development and its separation of economy and environment (Virtanen et al., 2020). As it is becoming more evident how climate change exacerbates existing socio-economic vulnerabilities, policies and practices on sustainability must require a stronger systemic focus (Greenpeace International, 2023). True sustainable trajectories include principles of climate justice at its core and promote social development to ensure resilient and circular communities (Carmen et al., 2022).

Community actions are often overlooked as core actors for such transformative change. Current research highlights how the (top-down) global sustainability agenda is unaligned with (small-scale) entrepreneurial efforts (Lobo et al., 2023). Additionally, traditional approaches to conservation rely on the misguided belief that human activity is a disturbance of natural order and therefore humans should be kept out of biodiverse areas (Millhause & Earle, 2022). An example of an issue with top-down conservation practices can be found in the fishing industry in Botswana. Here, so-called no-take zones have been installed in the coastal regions. However, policies on no-take zones – such as the ones applied in Botswana - are often poorly calibrated with the local food production needs, hence destabilizing food security and the local economy (Mosepele & Kolawole, 2017). Using entrepreneurship as a force for socio-economic prosperity has already been recognized widely and most often operates within neoliberal and techno-optimistic perspectives (Lobo et al., 2023). However, as these conventional perspectives also overlook the destructive side of traditional entrepreneurship on nature and society, so-called regenerative entrepreneurship can prove effective in promoting sustainable development and more inclusive conservation practices (Lobo et al., 2023; Buscher & Fletcher, 2020). Exposing and removing structural (political/social) barriers will help to spur community-led conservation efforts as well as human well-being (Serenari et al., 2016). In this way, grassroots innovations can act as transformation catalysts that address both ecological and social issues (Leclercq & Smit, 2023).

This research focuses on insular ecosystems. These ecosystems are identified as spatially segregated land masses, characterized by high rates of endemism. Even though they cover only 5% of the terrestrial areas on earth, their endemic richness usually exceeds mainland species by a 9,5 factor (Veron et al., 2019). On the other hand, these ecosystems are also highly vulnerable to extinction and the effects of climate change disturb insular ecosystems more strongly than any other place on Earth (Quintanilla, 2020). Not only does it technically alter how people are able to live their lives, but the relationship with the land and ocean is also changing drastically. Where the sea was a provider of life before, it is now becoming a source of fear and insecurity (Quintanilla, 2020). Insular human communities are usually dependent on external markets for food (Veron et al., 2019; United Nations, n.d.). Also in terms of economic resources, seen that fisheries and tourism constitute over half of the GDP of insular communities (United Nations, n.d.). Therefore, the impacts of climate change and biodiversity degradation not only impact the local ecology of these island groups, but also their social and economic landscape.

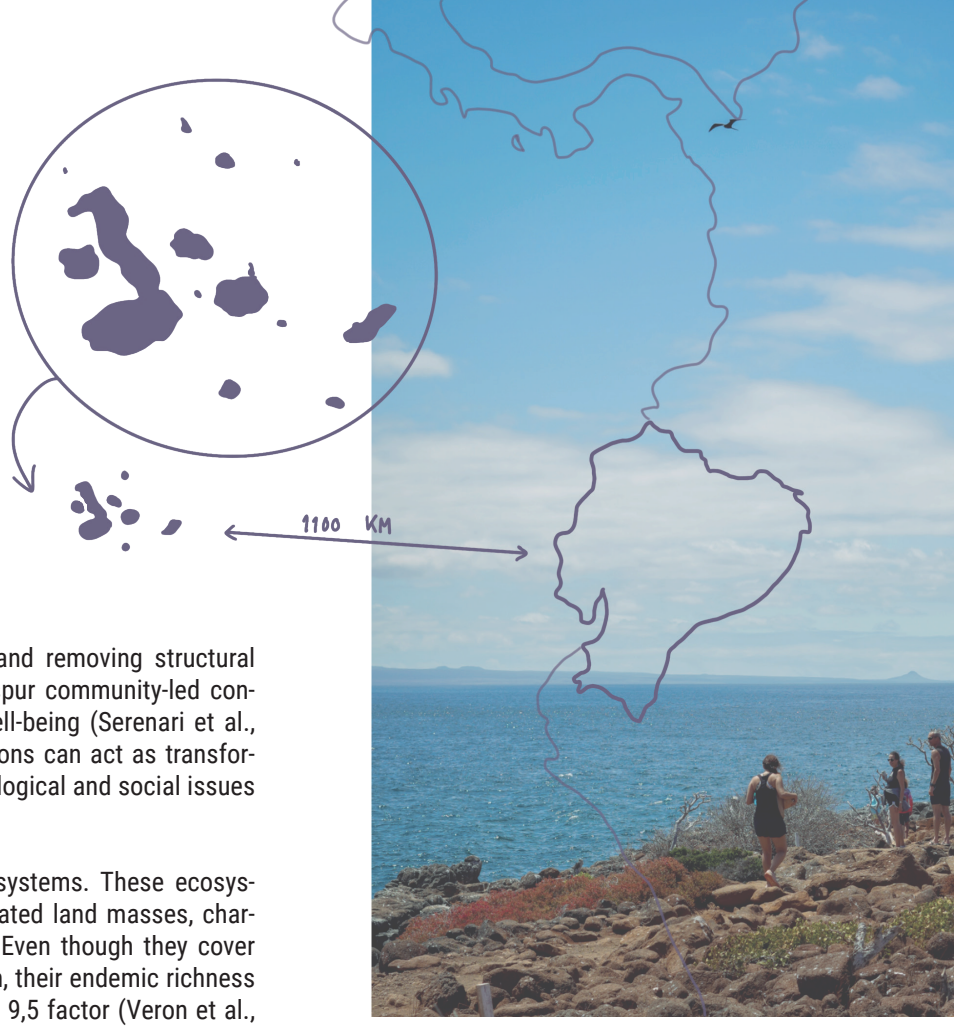


Figure 1: Ecuador and the Galapagos islands

The Galapagos archipelago, located around 1100 km off the coast of Ecuador (Figure 1). The islands are well known for Darwin's theory on evolution and therefore visited by nature- and animal enthusiasts. The archipelago is an example of a volcanic insular ecosystem that is heavily subjected to climate change.

Figure 2: Galapagos Giant Tortoise (bottom) and Marine Iguana (top, created by author)

Due to the change in weather conditions such as rising temperatures, shifting currents, and increased rainfall, many of its species have been struggling to survive and their populations have plummeted by 50% or more (Park et al., n.d.). This is one of the highest rates of extinction in the world (Galápagos Conservancy, 2024). The Galapagos islands are home to many endemic species, such as the giant tortoise or marine iguana (Figure 2). Around 80% of land birds, 97% of reptiles and more than 30% of the plants can only be found in the Galapagos archipelago (Park et al., n.d.). To prevent its ecosystems from collapsing, the islands are subject to many conservation efforts that limit invasive species or establish no-fishing zones. Although these conservation efforts are necessary to protect the islands' richness, they also strongly influence the lives of small-scale entrepreneurial activities. The small-scale fish industry, specifically, is strongly affected by these conservation laws (Park et al., n.d.). As a result, societal tension rises between governmental institutions – bound by national and international conservation law - and the industry (Castrejon et al., 2024). Not only the fishers but also the agricultural sector suffers as fertile land cannot be converted for agriculture, maintaining a strong dependency on the mainland for food crops (González et al., 2008).

Thus, literature highlights the struggle of insular ecosystems to provide themselves with the resources needed for their inhabitants and the need for entrepreneurial initiatives in conservation science. This leads to an interesting case study to explore the concepts of Regenerativity and Circular Communities in an island context. Regenerativity is country-focused and culture-specific and aims to foster collaboration in communities that can build economic and bioregional resilience (Paton et al., 2023). Regenerative initiatives do not only aim to create and maintain ecological, but also social well-being. Similarly, Circular Communities use Multiple Value Creation to set up a so-called well-being economy, where economic, ecological and social values are balanced (Leclercq & Smit, 2023). Where Circular Communities are now researched in the context of spatial design on a small scale, they have a strong potential to connect to regenerative economies due to their similar goals and values.

This thesis will focus on the productive food sector of both Santa Cruz and San Cristobal islands, the islands with the highest population in the archipelago and which serve as the main tourist hotspots. Due to all combined anthropogenic pressures, these islands face the greatest ecological and social challenges such as the provision of sustainable food sources (Galápagos Conservancy, 2024).

Developing insights on regenerative food systems in the Galapagos context might prove an interesting view for other insular environments that equally struggle with high dependency on external food sources. Overall, this thesis project aligns with the lens through which the master Industrial Ecology was set up: Combining interconnected areas of policy, society and natural sciences into (usually) technology-driven solutions. The master's is a multidisciplinary field that aims to find holistic solutions by using qualitative as well as quantitative research methods. However, throughout the program, there is a strong focus on the latter to justify design and policy choices through (big) data. Additionally, the program often approaches sustainability from a Western perspective, focused on its technical aspects. Non-Eurocentric perspectives on sustainability note how social justice and indigenous approaches lie at the core of a just transition (Ogunbode, 2022). This research could prove powerful in integrating both qualitative and quantitative approaches whilst exploring different perspectives on sustainable pathways.

Alike its topic, this research is set up in a regenerative way, meaning that it intends to have a net-positive approach to sustainability, acknowledges community efforts that made this research possible and applies **Two-eyed seeing** (*Etuaptmumk* in Mi'kmaw language), viewing the world with one Indigenous eye and one Eurocentric eye.

2. Conceptual framework

This chapter will highlight the conceptual framework of this study. It underlines the significance of the research within the broader academic discourse and establishes how it seeks to fill existing gaps in the litera-ture. This chapter also outlines the research objectives, presents the guiding research questions, describes the high-level methodological approach, and provides an overview of the study's structure and timeline.

2.1 Academic research gap

Circularity has been the way communities were shaped for centuries, centred around holistic and restorative approaches where one process feeds into another (UNDP, 2021). Current research and practices on circularity focus mainly on technological challenges, whereas circularity also closely connects with social and organizational problems (Leclercq & Smit, 2023). Research also critiques the circular economy as a flawed approach towards sustainability as it does not regard decreasing consumption and changing behavioural patterns (Das & Bocken, 2024).

Circularity is considered part of a greater whole of regenerative methods. However, there is limited research on the concept of regenerativity and more so on how it connects to better-known concepts such as circularity and sustainability. Next to the vagueness of the term, there are - to date - also no methods of quantification for regeneration which makes the term susceptible to greenwashing (Konietzko et al, 2023). The practical application of regenerativity remains also unclear as its many definitions have not yet been synthesized with profitable business models (Konietzko et al., 2023).

Circularity has additionally been relatively unexplored in the realm of organic flows and often focuses on closing inorganic material cycles, such as metal or concrete. García-Sánchez and Enciso-Alfaro (2024) state: 'The current linear production model of the agri-food industry entails various environmental impacts… Opting for a circular model… Will create value through the recovery of resources and the reduction of food losses, or waste, contributing to the sustainability of food sources' (García-Sánchez & Enciso-Alfaro, 2024). Currently, organic waste flows such as food waste are often disposed of in landfills with very little recovery as an in-termediate step (US Environmental Protection Agency, 2024). Transitioning from linear to circular food sup-ply chains is an essential element in preventing unnecessary pressures, such as exploited soils and overstressed waste processing systems ("Circular Food Supply Chains," 2020). Additionally, next to the paper of Checcin (2016), there is little information available on the organic material flows of the Galapagos islands.

When discussing current academic discourse on Galapagos ecosystems, most conducted research is centred around climate change impacts on local biodiversity and the balance of nature conservation with development needs (González et al., 2008). Often, articles describe the challenges at hand but usually disregard practical- and mainly structural - solutions. This debate between conservation and development is exempli-fied in a more recent article by Castrejon et al. (2024). Here, the authors of this article revise the Galapagos fishing zoning system which was set up in 2014 to limit the pressure on aquaculture. As the zoning system was set up top-down, it resulted in socio-political tensions which eroded the trust of the fishermen towards NGOs, the local municipalities, and the national government. In order to move forward and regain trust, the authors emphasize the importance of participatory management processes and appropriate economic incentives for sustainable fishing practices (Castrejon et al., 2024). Exploring research on regenerativity and circular food supply chains, but in the context of the insular ecosystem of the Galapagos, might prove fruitful in finding practical solutions and could thus close the encountered academic re-search gaps. Additionally, as the introduction of this study highlighted, regenerative entrepreneurial activities have the potential to leverage conservation efforts (Lobo et al., 2023). However, practical applications require in-depth examination.

The concept of Circular Communities and the method of the Circular Value Flower (CVF), both set up by Leclercq and Smit (2023), will be applied during the fieldwork phase (discussed more elaborately in Chapter 4). Although this concept is promising and its principles will guide most of this research, the development of the method would benefit from more practical application in communities across different continents.

2.2 Research objectives

The elements of the academic research gap can be synthesized into a main research objective stated as follows: '*This study explores the intersection of* ***convivial conservation*** *and* ***regenerative entrepreneurship*** *in setting up circular insular food systems and aims to synthesize the many definitions of regenerativity throughout this process. Focused on Santa Cruz and San Cristobal, it seeks to provide hands-on approaches to* ***multisolve*** *the current socio-ecological challenges in the food sector, instead of solely researching the im-pacts of climate change on the Galapagos Archipelago. This is done by leveraging* ***participatory decision-making processes*** *and* ***circular community principles****. By advancing understanding in these areas, the study contributes to broader discussions on sustainable food systems in insular ecosystems.*'

The main research objective can be divided into the following elements:

1. The first objective is to analyse the current organic material flows of Santa Cruz' food system which helps to define the problem context and explore possibilities for circularity;
2. The second objective is to synthesize the many different definitions of regenerativity into a model which is easy to understand and to use in participatory policy design practices;
3. The third objective is to collectively develop a set of hands-on strategies that help transition towards such a regenerative economy;
4. The last objective is to explore the use of the Circular Value Flower in other cultural or functional contexts and to subsequently provide recommendations to the creators of the model.

To approach the research gap and objectives well, several core concepts (written in bold in the main re-search objective) will need to be explained in more detail so they are understood profoundly and their (multi-faceted) definition can be applied throughout the research. These concepts are explored in detail in Chap-ter 3: *Convivial conservation, Circular communities, Regenerativity, Climate justice & Participatory decision-making and Multisolving.*

2.3 Research questions

The academic research gap in combination with the research objectives, leads to the following research question:

'In what way can bioregional regenerative food systems, developed using principles of circular communities, contribute to overcoming socioecological challenges in the food sector of Santa Cruz and San Cristobal – islands of the Galapagos Archipelago?'

With the following sub-research questions:

Sub-RQ 1: *What are the (social, environmental, political and economic) challenges that lead to and result from the current management of the local food industry on Santa Cruz and San Cristobal is-land?* – relating to phase 1

Objectives of this SRQ: A description of the current management of the food system, an analysis of its organic material flows and a detailed problem context.

Sub-RQ 2: *Which impactful strategies [for the local food systems] can be co-created bottom-up, guided by the principles of circular communities and convivial conservation, that can multisolve the current challenges?* – relating to phase 2

Objectives of this SRQ: A set of co-created strategies, which are translated into an actionable matrix and of which several are qualitatively validated, and a reflection on the CVF methodology.

Sub-RQ 3: *How can these strategies be linked to the principles of regenerativity to facilitate future implementation?* – relating to phase 3

Objectives of this SRQ: A model visualizing the 5 R's of regenerativity and a framework connecting the strategies to these R's.

These sub-research questions each relate to the different phases of the research, which will be specified at the end of this chapter (sub-chapter 2.5).

As reflected in the research questions, the scope of the research is to operate on the islands of Santa Cruz and San Cristobal. These two islands are the most populated in the Archipelago and therefore require the most resources to sustain the community and its visitors. Additionally, both islands were selected based on existing connections of the supervising researchers which made it easier to develop a network. The research aims to include all (layers of) actors which are impacted by the Galapagos food sectors, such as producers, intermediaries, consumers and decision-making bodies, however, the exact actors are determined using snowball sampling (methods are elaborated on in Chapter 4). The determined food sectors were initially fish, produce and livestock, although this choice was iterated on throughout the research process.

2.4 Research approach

The following approaches are applied throughout the research:

- **Qualitative and quantitative** – This research will take a mixed methods approach where data is collected and interpreted in a non-numerical as well as numerical manner. Although the biggest part of the research is done qualitatively, meaning that lived experiences are understood through personal stories and contact with the research participants, this data is supported by quantitative analysis. Here, methods such as surveys as well as a Material Flow Analysis will be applied to understand the high-level context better.

- **Inductive** – This research will be aimed at framework-building instead of framework-testing which means it is an inductive approach. It will build upon current research and methodologies and combines the knowledge into a new framework for regenerative food systems. As part of the research will be executed during a 2-month fieldwork practice, the theories which are built along the way can be constantly reiterated.

- **Descriptive** (phase 1) / **Exploratory** (phase 2) / **Prescriptive** (phase 3) – The approach of this project will be descriptive, exploratory as well as prescriptive however there is a strong exploratory focus. The first two concepts refer to collecting facts and linking pieces of information together to come up with new insights (DeCarlo, 2018). This will be done in both the problem- and idea-finding phases (phases 1 and 2).

Lastly, this research will be prescriptive as it will eventually provide recommendations or a framework which is to be implemented and potentially scaled in the future (DeCarlo, 2018).

- **Participatory** and **theoretical** – As described in the section on the quantitative and qualitative approach, both theoretical and participatory frameworks will be used to fully understand the problem context as well as to explore a future vision. An example of this is the set-up of a co-creation workshop, where the research participants are asked to provide their opinions and ideas to create a set of strategies. Just as with the qualitative approach, the focus of the research will be on participatory methodologies since the goal of the research is to give a voice to bottom-up initiatives to systematically change how decisions have been made so far.

2.5 Research phases

Figure 3 below shows the projected timeline of the thesis project. It is split up into three phases that mimic the processes of (human-centred) design thinking, that move along 3 diamond-shaped phases usually formulated as the problem-, idea- and solution-finding phases (Marin-Garcia et al., 2020). Although this research follows a double diamond instead of three, this theory is visualized in Figure 3 on the left and thus incorpo-rates this method of design thinking into the research approach. All phases will now be elaborated on in de-tail and their methods in Chapter 4.

Phase 1 - Problem-finding phase: The first phase focuses on setting up a conceptual framework that contextualizes the issues at hand, which is done both qualitatively and quantitatively. The qualitative conceptual framework is built through setting up a DPSIR model as well as conducting a stakeholder analysis. The quantitative conceptual framework is set up through a Material Flow Analysis, that depicts all organic flows in the system. In this phase, the research approach will be descriptive and both theoretical and participatory. It revolves around answering the first sub-question: *'What are the (social, environmental, political and economic) challenges that lead to and result from the current management of the local food industry on Santa Cruz and San Cristobal island?'*

Phase 2 - Idea-finding phase: The second phase of the research process will take place entirely in the context of the case study: On the Galapagos islands. There are two main objectives in this phase, to deepen the problem context by employing participatory action research and qualitative methods and to develop a set of strategies collaboratively with the stakeholders. In comparison to the earlier phase, this phase will be only qualitative, exploratory and participatory and will rely on the contact and input from the local inhabitants. This phase will revolve around diverging possible solutions and will answer the following question: '*Which impactful strategies [for the local food systems] can be co-created bottom-up, guided by the principles of circular communities and convivial conservation, that can multisolve the current challenges?'*

Phase 3 – Solution finding phase: In the last phase, the possible strategies are validated quantitatively and compiled into a framework that synthesizes the many definitions of regenerativity into a comprehensible whole. As a final step, the researcher will provide a set of recommendations for future research. This phase will be prescriptive, mainly theoretical (as it will link the practical findings back to the theory) and will answer the last sub-question: *'How can these strategies be linked to the principles of regenerativity to facilitate future implementation?'*

Figure 4 highlights the prospected timeline for this thesis research. The middle section, or phase 2 – the idea-finding phase, will take place during fieldwork on the Galapagos islands to which the researcher will be travelling. In order to ensure that the stay on the Galapagos islands runs smoothly and safely, it is of high importance to maintain constant contact with the actor-network on Santa Cruz island. Additionally, adequate funds and accommodation will need to be arranged as soon as possible in the process to ensure the stay for the full period.

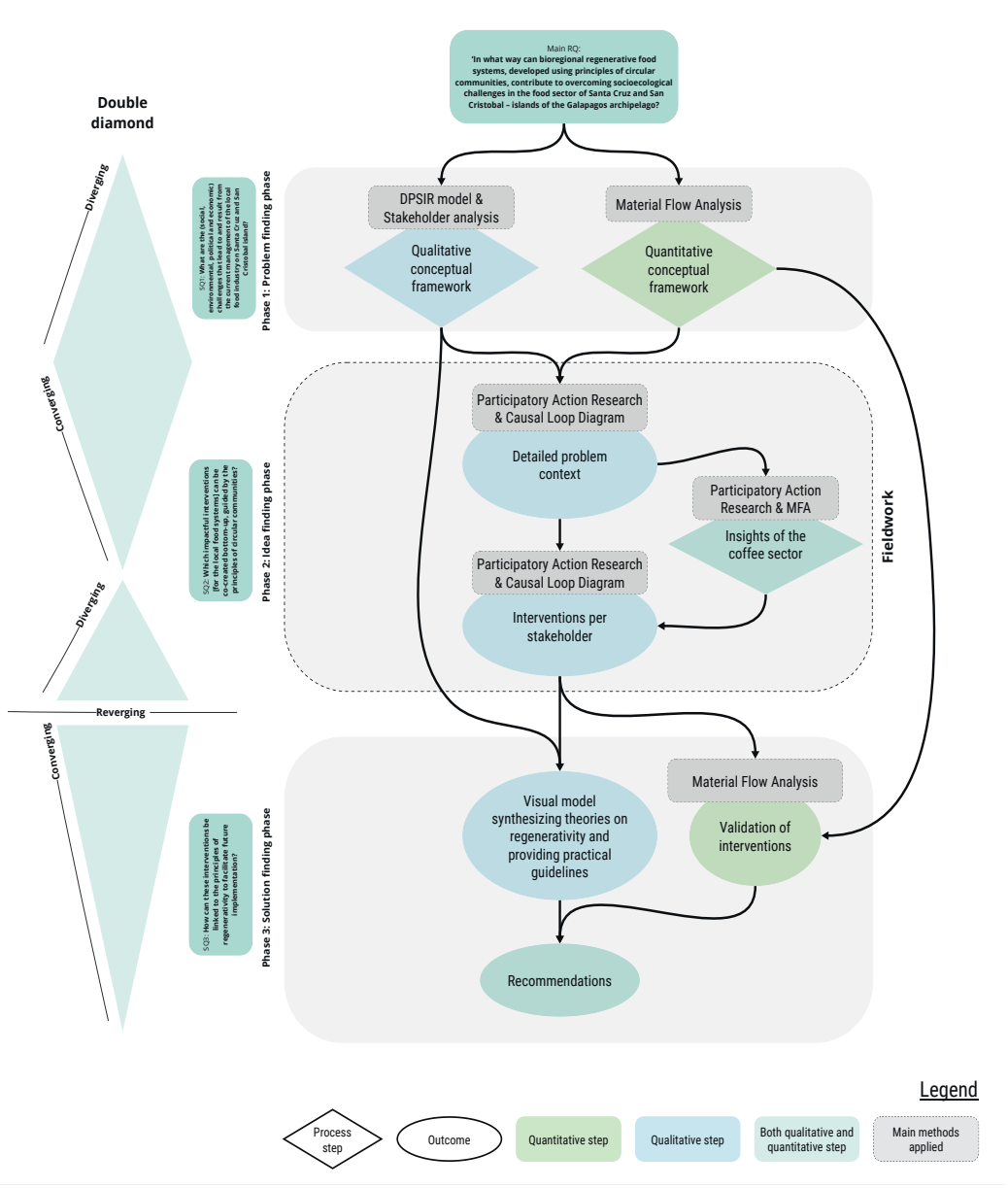


Figure 3: The structure of the research project (created by author)

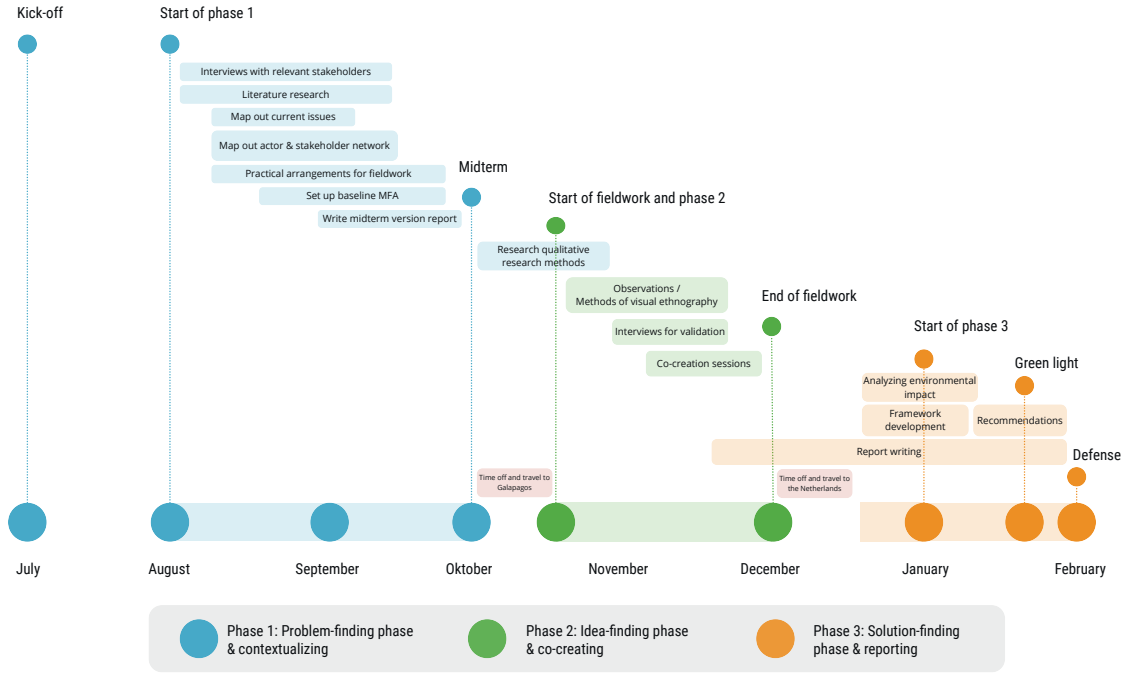


Figure 4: The prospected timeline which runs from July 2024 until February 2025 (created by author)

2.6 Structure of the report

In this chapter, a detailed overview of the structure of this report is provided, highlighting the purpose and content of each subsequent chapter. This structured approach ensures that the research is presented coherently and systematically, allowing for a comprehensive understanding of the processes, findings, and implications of the study. Importantly, all the work presented in this report builds on previous research or has been co-created, emphasizing the collaborative nature of knowledge production.

Chapter 3 lays the foundation for this research by presenting the necessary background information and core concepts. This chapter is crucial for understanding the context within which this study is situated. It explores existing literature, theories, and frameworks that bring initial depth and context to the research questions and objectives. By doing so, it is ensured that the study is rooted in a solid academic foundation and builds upon the contributions of earlier scholars.

In Chapter 4, the methodological framework is described. This includes the research design, data collection techniques, and analytical methods used to address the research questions. The methodology is carefully selected to ensure reliability, validity, and relevance to the field of study. This chapter provides transparency in the full research process, allowing readers to assess the robustness of the methods used.

Chapter 5 presents the raw data which was collected during the fieldwork. The raw data serves as the empirical basis for further analysis and discussion, providing the groundwork upon which interpretation is built in the subsequent chapter.

In Chapter 6, we delve into the interpretation and discussion of the findings presented in Chapter 5. Here, the data is analysed in light of the theoretical framework and core concepts introduced in Chapter 3. Connections can be drawn between the data and existing literature, offering insights and highlighting the implications of the findings. Finally, this chapter aims to demonstrate how this thesis contributes to the ongoing academic discourse.

Chapter 7 focuses on the practical implications of our research. Based on the insights gained from the findings and discussions, recommendations for model development and directions for future research are proposed. This chapter aims to bridge the gap between theoretical understanding and practical application, guiding stakeholders and future researchers in advancing the field.

Chapter 8 presents the conclusion of the report. This chapter summarizes the key findings, discussions, and contributions of the study. This chapter reaffirms the significance of the research and underscores the collaborative effort that underpins the entire project. It serves as a synthesis of the report, highlighting how the work connects with and extends the existing body of knowledge.

Finally, Chapter 9 offers a personal reflection on the research process. Here, I discuss the challenges faced, lessons learned, and the personal growth experienced throughout the study. This chapter provides an introspective view of the research journey, adding a human dimension to the scholarly work.

3. Background

This chapter will provide all the background information which is necessary to know before starting the empirical study. First of all, Chapter 3.1 will dive deeper into the problem context at hand. It will do so by exploring how the different issues that result from literature are interconnected on a base level. This analysis will be the foundation from which sub-research question 1 can be partially answered. Chapter 3.2 will ex-plore the core concepts, which were defined in the previous chapter in the research questions and research approach. The first concept explained is Convivial conservation, which is a novel take on conservation prac-tices that collaborate with human agents in a system. Circular Communities are discussed as their method-ology will be applied during the qualitative part of this research and strongly relies on the principles of circularity, which has an essential overlap with regenerativity. Then the main concept of this research, Regenerativity, is explained along with its origin in Indigenous knowledge (Sands et al., 2023). The fourth core concept is Climate justice and the resulting need for Participatory decision-making. Finally, this chapter discusses Multisolving, a concept that promotes the creation of strategies that intend to solve multiple societal issues with a single investment (Sawin, 2018). Together, the problem context and the core concepts form the quali-tative conceptual framework of this research (Figure 3).

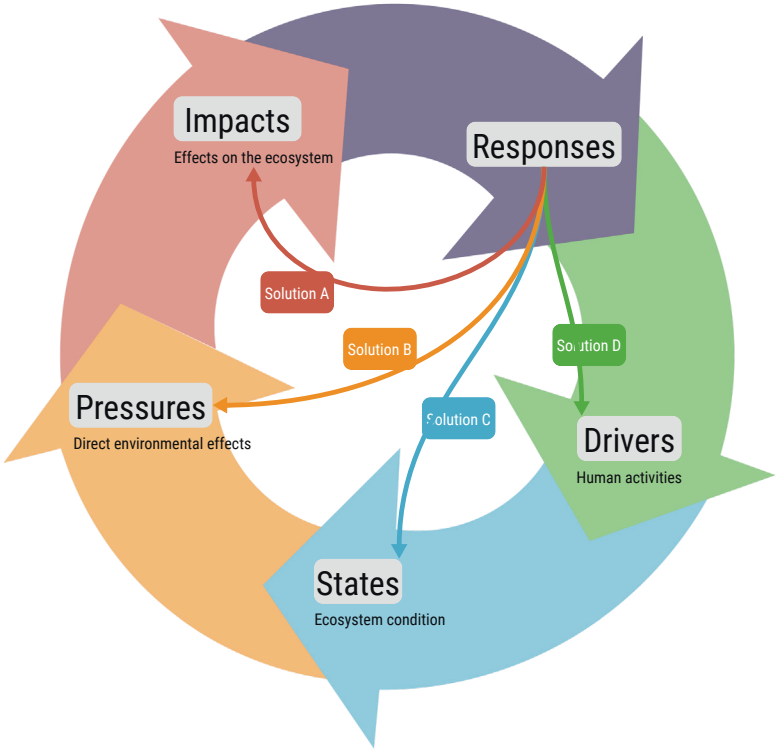


Figure 5: The DPSIR model explained (created by author, inspired by Labianca et al., 2020)

3.1 Problem context

Figure 5 highlights the Drivers-Pressures-States-Impacts-Responses model, or DPSIR model in short. The model aims to show the connection between anthropogenic activities and their outcomes (Labianca et al., 2020). This model describes how drivers, any human activities, lead to (environmental) pressures. These pressures can then change the conditions of the ecosystem, the state. A change in the state of an ecosystem can lead to impacts on the ecosystem, which can be urban as well as natural outcomes (Labianca et al., 2020). Responses, such as policy-making or community events, can provide solutions to change any oth-er element of the framework to minimize the impacts. As an example, a driver could be plastic littering.

The littering of plastic can lead to direct effects (pressure) of pollution, say, polluted beaches and shores. Polluted beaches can lead to a change in the state of the ecosystem, such as a layer of plastic on top of the water so that oxygen and light cannot reach deeper parts of the water. This changed state leads to environmental impacts, such as the death of aquatic plants and animals and overall water quality decline. A response to prevent the driver could be to prohibit single-use plastics, a response to the pressure could be to host beach clean-ups, and so forth.

The current social, political, environmental and economic problem contexts of the Galapagos islands are illustrated by the DPSIR model in Figure 6. Its insights are based on the initial interviews and literature studies conducted during phase 1. It highlights the issues that take place in the different spheres, which are colour-coded. Although the separate elements are not all directly linked to each other, their combined effects lead to the overarching impacts stated on the next page.

Figure 6: The DPSIR model of this thesis research (created by author)

- **Increased dependency on mainland Ecuador** - The increase in local population and amount of tourists in combination with the limited amount of land used for agricultural purposes and sea used for fishing, has led to increased imports of food products and hence to a stronger dependency on the mainland for providing enough food for all people residing on the islands (Checcin, 2016; González et al., 2008).

- **Erosion of trust of the local entrepreneurs** - As decisions have been made top-down for the last ten years and the conservation industry has had a lot of power over decisions on land use, local entrepreneurs have lost trust in the political bodies to make fair and inclusive policies (Castrejon et al., 2024). Additionally, these happenings have led to an individualistic mindset rather than a collec-tive one, making solving of complex problems such as the effects of climate change even more com-plex.

- **Environmental effects due to poor waste management** - Although the exact environmental effects due to ineffective waste management remain unclear for now, practices of landfilling and burning waste are proven to be more polluting than more environmentally friendly waste manage-ment such as energy recovery processes, composting or recycling (FrontlineWaste, n.d.). As current waste processing methods on the islands are rarely circular and mainly rely on open burning and landfills, the waste sector can be considered to have high environmental impacts.

- **Decreased social cohesion** – Conservation as a concept and its application will be elaborated on in chapter 3.2.1. Initial research shows that Galapagos policies are strongly based on traditional concepts of nature conservation and often disregard the livelihoods of the human communities in the process of executing them. This may lead to conflicts of interest and decreased social cohesion as a result.

Next to all identified impacts, these two drivers will be commonly discussed throughout the research and therefore are briefly elaborated on now.

- **Increasing number of tourists** - In 2022, 267.688 tourist arrivals were reported to the Galapagos islands and in 2023 over 329.000 visitors which was a new annual record (The Directorate of the Galapagos National Park & Directorate of Public Use of the DGNP, 2022 / O'Hara, 2024). This com-pared to the permanent population of the Galapagos of around 32.000 means that the economy is supplying more food for almost 10-fold amount of tourists yearly, aggravating the aforementioned issues such as higher dependency on mainland Ecuador and waste management problems (Galapa-gos Conservation Trust, 2023).

- **Invasive species** – Despite all measurements of biosecurity that are deployed on the islands, the Galapagos still struggles with the high degree of

invasive species. Invasive species are introduced species that often have no natural enemy in the ecosystem and are therefore able to thrive. A couple of examples of these species are vampire flues, rats, blackberries and cats. These species mainly have a strong effect on the bird populations, which have put nearly 50% of the Galapagos' land birds at risk of extinction (Galapagos Conservation Trust, 2024).

From the problem context displayed in Figure 6, a preliminary problem statement can be set up on which the research can be built: '*Due to increased human pressures on the local ecology of the Galapagos islands and the resulting strong influence of the conservation sector alongside top-down decision-making processes, the local entrepreneurs' trust in policy-making and -enforcing institutions has been eroded. Additionally, the lack of opportunities to source food locally and the overwhelming amount of tourism has led to an increased dependency on the mainland and the difficulties of processing waste in an environmentally friendly manner have led to increased ecological pressures on the bioregion.*'

3.2 Core concepts

The core concepts, which are extracted from scientific literature and incorporated in the research questions, can be divided into five subsections which now will be further elaborated on in combination with current research practices. The most important concepts will be in **bold**.

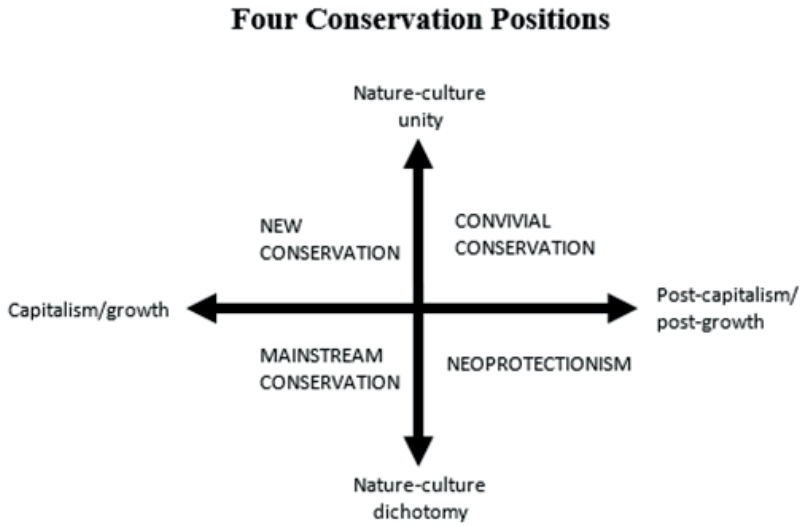


Figure 7: The four conservation positions (Buscher and Fletcher, 2020)

3.2.1 Convivial conservation

Conservation has been a topic under debate in terms of how its practices should be applied. Traditional approaches to conservation rely on the misguided belief that human activity is a disturbance of natural order and therefore humans should be kept out of **biodiverse areas** (Millhause & Earle, 2022). This type of conservation is often referred to as **fortress conservation**, as this approach aims to shield humans from nature and make money in the process. The book 'The Conservation Revolution' by Buscher and Fletcher (2020) describes the different positions on saving nature in the Anthropocene. The approaches are divided based on the following four categories: *Nature/culture dichotomies, Beyond dichotomies, Capitalist and Beyond-capitalist. With nature/culture dichotomies,* the authors mean that conservation practices are set up in such a way that they divide environments dedicated to nature and other environments dedicated to humans and human settlement. Capitalist forms of conservation relate to ways in which nature is being turned into natural capital so that it provides a so-called 'environmental service' (Buscher and Fletcher, 2020). Through these axes, we can identify four different conservation positions, based on these principles (illustrated in Figure 7 and elaborated on in Appendix A).

Convivial conservation extends beyond dichotomies and capitalism and its practices enable humans to live with and be part of biodiversity (Buscher and Fletcher, 2020). The research of Buscher and Fletcher highlights that convivial conservation methods and principles are the *only* approach that enables human societies to live with biodiversity and hence contribute to more effective conservation practices.

It is built upon the following five visions:

1. From protected to promoted areas - Encouraging places where people are considered welcome visitors
2. From saving nature to celebrating (non)human nature – Protecting ourselves from ourselves
3. From touristic voyeurism to engaged visitation – Encouraging long-term visitation
4. From spectacular to everyday environmentalists – Focusing on mundane-ness
5. From privatized expert technocracy to common democratic engagement – All people are able to live with all nature

An interesting example of convivial conservation comes from Hanalei, Hawaii. Here, the US Fish and Wildlife Service (USFWS) recognized that many top-down conservation efforts are rooted in colonialist values and therefore are re-creating similar issues (Millhause & Earle, 2022). Therefore, the long-standing intimate kin-ship with the land was exercised to protect the endangered birds in Hanalei. Native Hawaiians were en-couraged to restore farming practices that are geared towards supporting the islands' endemic wildlife (Millhause & Earle, 2022).

In terms of conservation on the Galapagos, there are ongoing international efforts to protect terrestrial and marine environments by - for example - installing no takeno-take zones, officially termed **Marine Protected Areas** (MPAs, Serenari et al., 2016). These protected areas are designed to safeguard local biodiver-sity but also to help the area recover and regenerate its abundance (Mosepele & Kolawole, 2017). Serenari et al. (2016) discussed the social benefits of MPAs as they seemingly foster better resource management, decrease utilitarian views on nature and enhance citizen participation. The article also states that protected areas in Latin-America have shown significant increases in employment, which has been especially beneficial for women female empowerment (Serenari et al., 2016).

However, research is also gradually uncovering that these top-down designed MPAs are often not aligned with the local food production needs or even destabilize the local economy at times (Mosepele & Kolawole, 2017). This is in line with the critique on mainstream conservation, enforcing the dualist mentality between humans and nature (Buscher and Fletcher, 2020). Hence, some case studies hence highlighted the importance of **Locally Managed Marine Areas** to foster a better relationship between coastal communities and their local governments (Rohe et al., 2018).

If the conservation sector continues to exclude local stakeholders, they purposely reproduce the colonialist domination of humans that they themselves strongly oppose concerning animals (Millhause & Earle, 2022). Convivial conservation strategies could be key in ensuring a type of conservation which includes local knowledge instead of purposely excluding it.

3.2.2 Circular communities

As explained in Chapter 2.1, circularity principles can contribute to regenerativity through the following actions: Reduction of total resource consumption, Redistribution of resources and Regeneration to restore the damage which has already been done (Konietzko et al., 2023).

Circular Communities can enforce such principles on a local scale. Focusing beyond the technological challenges of closing material cycles, a circular community also fosters resilience and respect between people and nature (UNDP, 2021). At the moment, the concept has mainly been researched in the context of the building environment and in the Netherlands, where neighbourhoods are practising circularity, cooperation and innovative ways of organizing development (Leclercq & Smit, 2023). Circular communities can be considered as outings of social innovations as they focus on the process of institutionalising changes in social relationships. They aim to change the set of principles and values as well as a narrative of change by reshaping the way that decisions are made (Strasser et al., 2019). In the case of Circular Communities, policy-building and exchanging of resources is enforced bottom-up and holistically. Hence, partnerships between public authorities, individual and organized citizens and knowledge institutes are built and co-managed. The concept relies on **empowered citizens** who are often referred to as the 'energetic society' or 'do democracy' and gov-ernments increasingly see a role for them as drivers of social change (Leclercq & Smit, 2023). This is also a downside of the concept, as the system relies on motivated groups or individuals and it is important to make sure that these communities operate in a clear system.

The goal of Circular Communities is to generate **Multiple Value Creation** to set up a so-called well-being economy, where economic, ecological and social values are balanced. Integrating all these values will en-hance the liveability of a neighbourhood or region (Leclercq & Smit, 2023).

Figure 8 shows the Value Flower Field map, which visually depicts the methodology of the Circular Communities into a map where physical developments - such as interventions – are placed in the context of resource availability and value creation. The outcomes of this research will also be reflected in this visual.

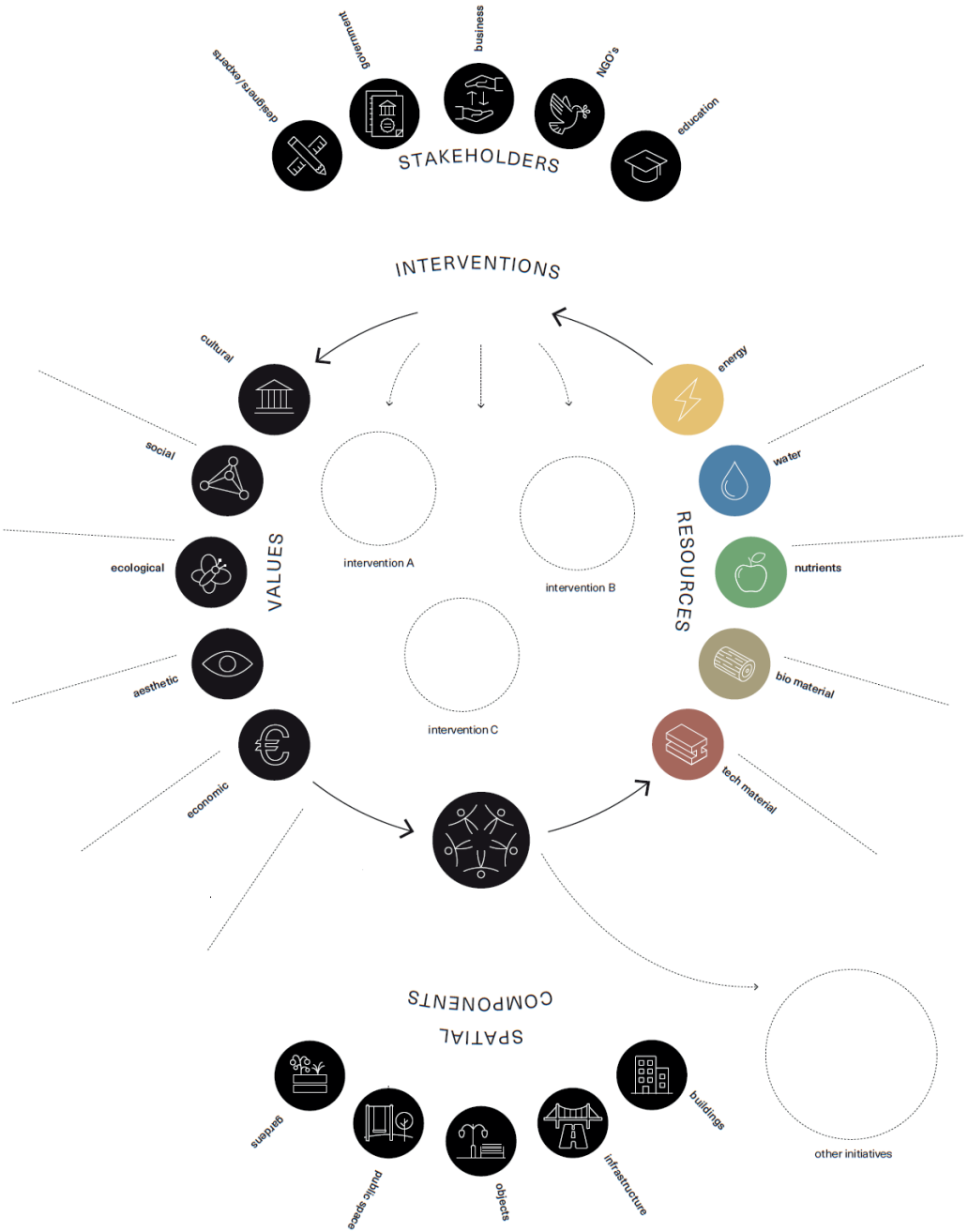


Figure 8: The Value Flower Field Map (Leclercq & Smit, 2023)

3.2.3 Regenerativity & Indigenous epistemologies

Circularity in the biosphere has a close connection to regenerative systems, as exemplified by Konietzko et al. (2023) in Figure 9. The commonality between circularity and regenerativity is to set up a regenerative biosphere. However, whilst circularity aims to simply close material cycles, a **regenerative economy** seeks to go beyond these concepts and focuses on restoring and maintaining ecological and societal well-being. Regeneration is different from restoration as restoration aims to bring the environment back to its original state however regeneration focuses on the self-regulating renewal of natural systems which have been overexploited before (Morselotto, 2020).

Regenerative economies are country-focused and culture-specific and aim to foster collaboration in communities that can then build economic and **bioregional resilience** (explained in Appendix B, Paton et al., 2023). As the linear and degenerative economy has weakened the planet's **regenerative capacity**, it strives to shape a society in balance with its natural environment (Konietzko et al., 2023). A society that sees humans as connected to and reliant on their natural world, not standing above it (Pomerleau, 2022).

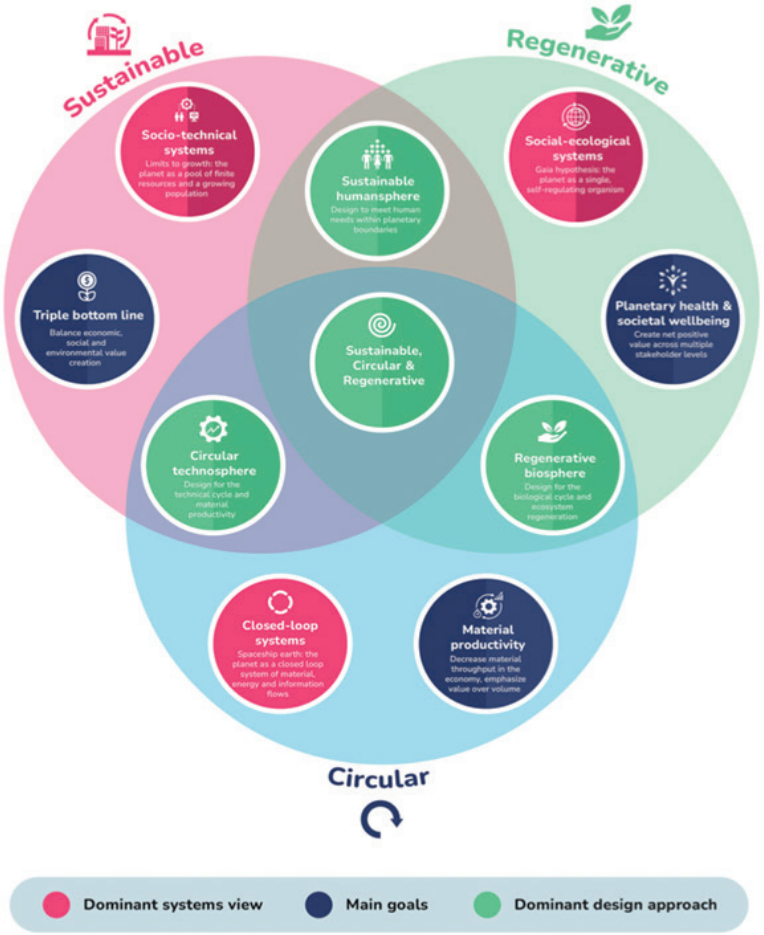


Figure 9: The connection between regenerativity and circularity (Konietzko et al., 2023)

The model of Paton et al (2023), shown in Figure 10, sees regenerative principles more as foundational loops that activate principles of the circular economy. These foundational loops help to foster collaboration and bioregional resilience and can be considered the following: Regenerate, renewable, relocalize, reconnect, and recognize.

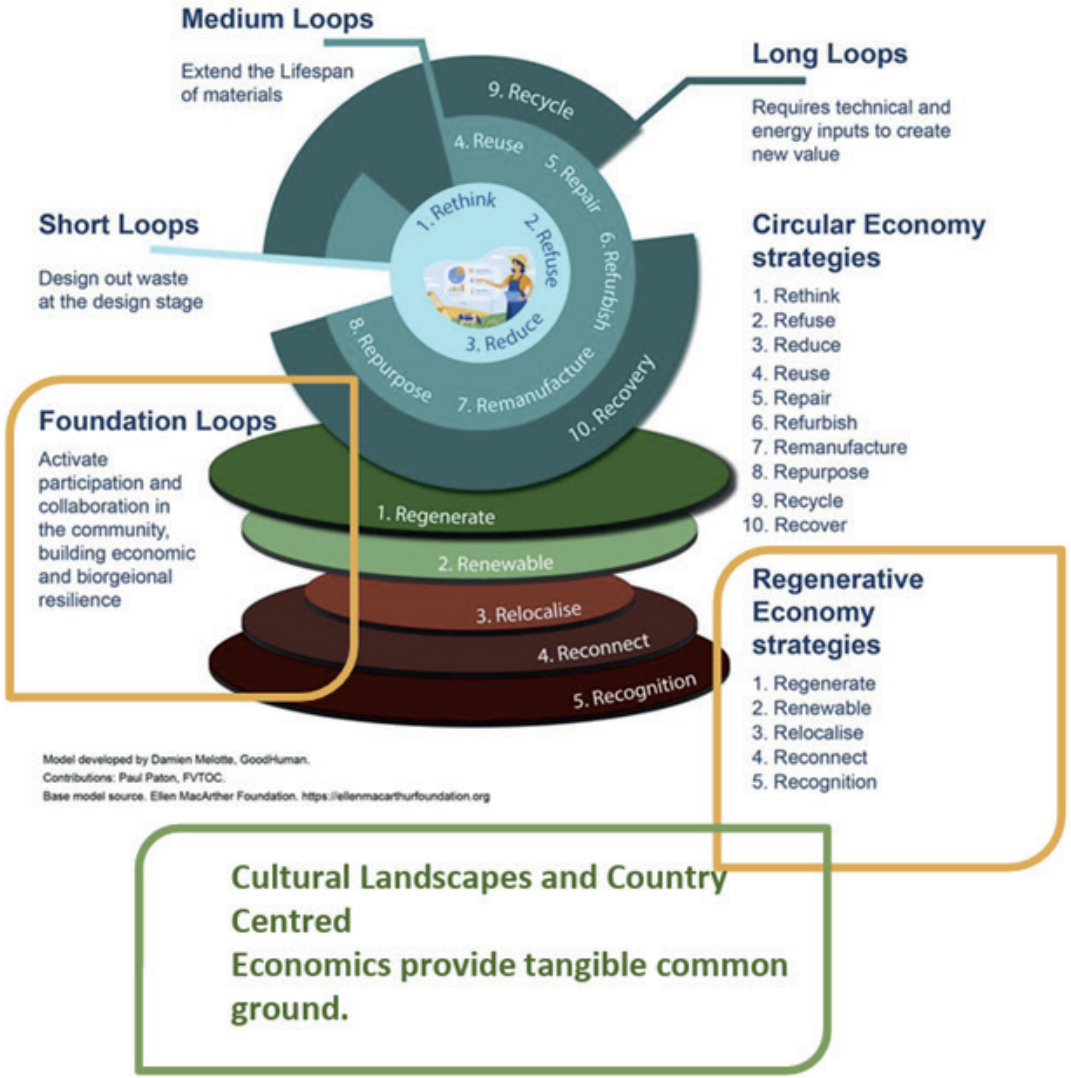


Figure 10: The foundational loops of regenerativity (Paton et al., 2023)

Regenerative businesses thus propose a narrative that doesn't only focus on closing resource loops or balancing economic and ecological factors but seeks to redefine the relationships between humans and nature by adding a layer of individual purpose, leadership and rights of nature (Konietzko et al., 2023). Regen-erative businesses are often operating in sectors strongly dependent on natural capital, such as agriculture or forestry, where it is known to promote soil health, on-site biodiversity conservation, crop productivity and ecosystem restoration as well as general ecosystem resilience (Figure 11, Rainforest Alliance, 2022). Regen-erativity in agriculture is called **agroecology** or **agroforestry**. Even though 50% of the estimated ecological pressure comes from agriculture, the other sectors often overlook that around 55% of global GDP is directly dependent on nature (Konietzko et al., 2023).

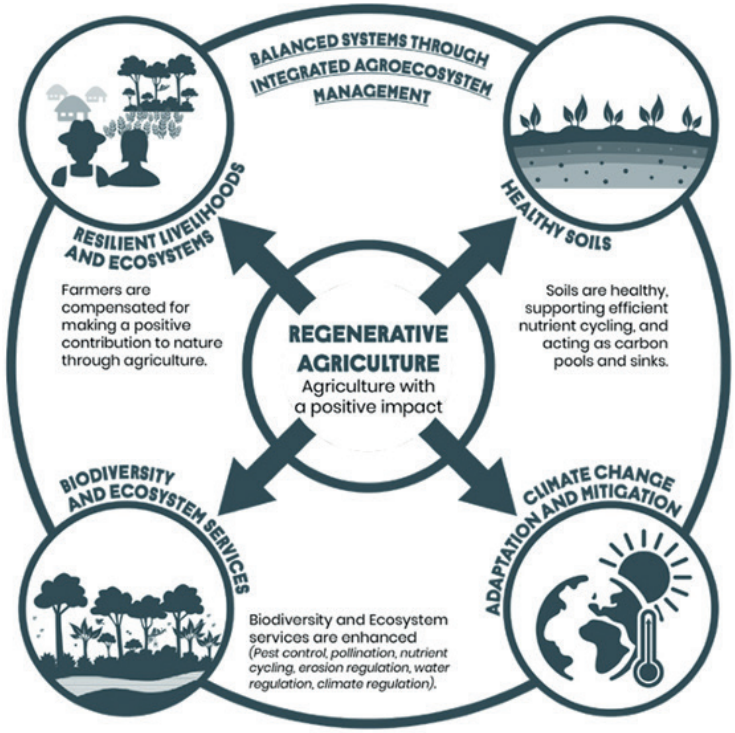


Figure 11: Principles of regenerative agriculture (Rainforest Alliance, 2022)

Regenerative businesses are characterized by five different principles. First of all, they operate on three different degrees, restoring, preserving and enhancing. Secondly, they move from shareholder to stakeholder profits so that all parties are included and paid fairly. Thirdly, regenerative businesses focus on their handprint as well as their footprint. They do so by guaranteeing value capture across natural, social and cultural capital. The fourth principle is about internalizing all externalities, meaning that products and services are priced more fairly. Finally and generally, they take a holistic approach and focus on economic activity, but within an ecological system (Konietzko et al., 2023).

Regenerative businesses can also operate in a regenerative supply chain. These supply chains are characterized by the following principles (Konietzko et al., 2023):

1. **Proportionality**: The supply chain adjusts the scale and scope of production and consumption to the boundaries of the socio-ecological system it is operating in.
2. **Reciprocity**: The supply chain ensures interaction and compassion between stakeholders, local communities and nature.
3. **Polyrhythmicity**: The supply chain works with the biorhythms of the natural space that the supply chain operates in.

These concepts mainly originate from Indigenous philosophies and play a huge role in indigenous accounts on environmental ethics. Specifically the terminology of reciprocity plays a vital role in transmitting knowledge about the land intergenerationally (Meissner, 2022). Arjaliès and Banerjee (2024) state that, to fundamentally change the way that land is used in agriculture, different relationships must be developed with the land. Such as those embedded in Indigenous epistemologies, views that are naturally more holistic (Arjaliès & Banerjee, 2024). Capitalist modes of production are based on relationships which are extractive and exploitative, leading to dispossession, colonial domination, poverty and even genocide. As 80% of the planet's remaining biodiversity is concentrated on indigenous land, this is a powerful testimony to adhering to indigenous conservation practices (Arjaliès & Banerjee, 2024).

Principles of regenerativity have been re-embedded in Western contexts, but originate in Indigenous worldviews (Sands et al., 2023). Indigenous peoples have profoundly different relationships with the land, seeing it as a living force deserving of care rather than as an asset from which value can be extracted (Arjaliès & Banerjee, 2024). Whereas regenerativity in Western terminology mainly refers to biophysical and socio-economic elements and a non-material layer is often disregarded (depicted in Figure 12). This layer recognizes (spiritual) values and cultural beliefs, as well as norms of reciprocity and even power (im)balances (Sands et al., 2023). Viewing regenerativity through this lens helps us understand that its implementation will always be embedded in the sociocultural context (Sands et al., 2023). These values are necessary to shift the valuation of the land from extractive to regenerative practices (Arjaliès & Banerjee, 2024).

A concept that also incorporates this non-material layer is Buen Vivir. **Buen Vivir** originates in *Quechuan* (*Sumak Kawsay*) and *Aymaran* culture (*Suma Qamana*) and literally translates to *collective wellbeing*. It embraces the interdependence of humans and nature and fosters harmony and conviviality (Pierandrei, 2022). Designing for Buen Vivir means that the research context is approached with equity, recognition of the his-torical context, respect for cultural codes and values and understanding of the local (Indigenous) mentality. '*Un mundo donde quepan muchos mundos*[1]' , describes that a person with a Western upbringing and who designs for or withs with Latin-American culture should consider the different worldviews (Pierandrei, 2022).

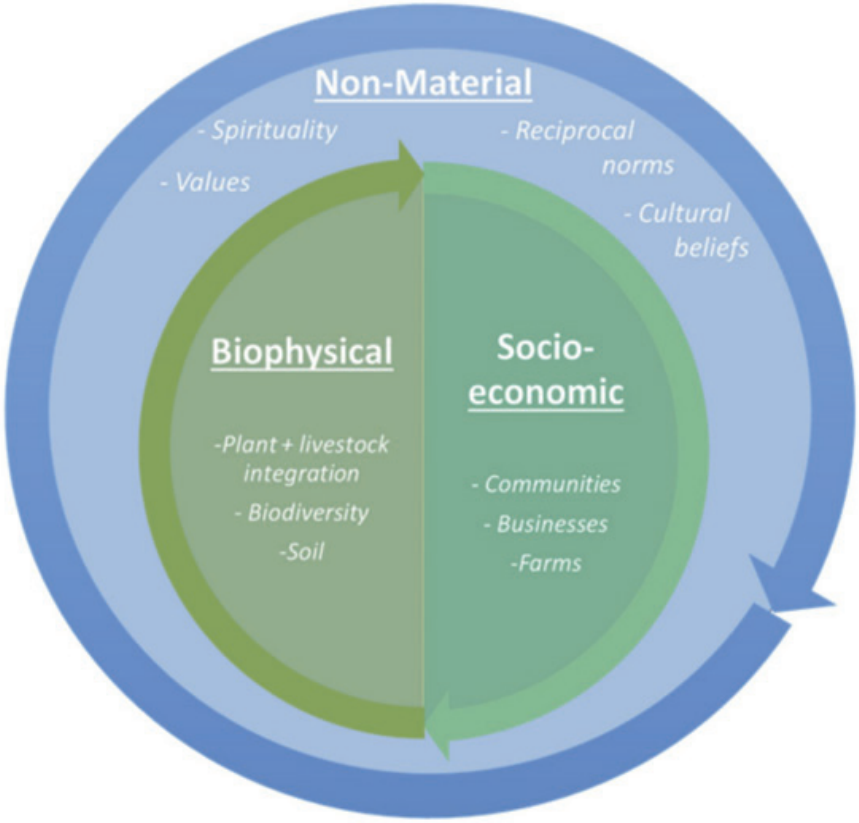


Figure 12: The non-material layer of regenerativity (Sands et al., 2023).

In conclusion, Western – or modern – definitions of regenerativity build upon Indigenous – or traditional – worldviews however disregard an important element: The socio-cultural context in which this regenerative economy is set up. The two different (Western and Indigenous) definitions of regenerativity are connected in an epistemology called **Two-Eyed Seeing** (*Etuaptmumk*) meaning to see the world with one Indigenous eye and one Western eye amongst native Mi'kmaw peoples (Arjaliès & Banerjee, 2024).

Combining models of regenerativity identifies five distinct core principles which from now on will be referred to as **the 5 R's** in this research:

1. **Reciprocate** = Emphasizing respect for the relationship between humans and nature and ensuring mutual benefits in all anthropogenic activities
2. **Restore** = Rehabilitating damaged land in order to rejuvenate natural resources that are self-regulating
3. **Recognize** = To acknowledge or (re)connect with the existence of something and show apprecia-tion to a person or group for their contributions
4. **Resonate** = Working with the biorhythms of that specific location, such as seasons, weather pat-terns or breeding seasons
5. **Relocalize** = Reestablishing something in a specific location, such as introducing species that are native to the local ecology

1 'One globe that holds many worlds'

Finally, there are several difficulties to acknowledge that come with the implementation of regenerativity. Firstly, as discussed earlier in the academic research gap, the term regenerativity (like most sustainability-related terms) is quite susceptible to greenwashing due to the ambiguity of the term. As it is yet quite unde-fined, it can be easily used as a buzzword (Konietzko et al., 2023). Secondly, the intended environmental gains may be undermined through the moral licensing of other environmental pressures. Lastly, there might be practical difficulties. For example, applying regenerative principles in a business or supply chain may re-quire a greater skillset (knowledge/experience) from the practitioners. Additionally, the products might be-come more expensive so the customer base also needs to be willing to pay more (Konietzko et al., 2023).

3.2.4 Climate justice & Participatory decision-making

When addressing the interconnectedness of social and environmental inequalities, the distributional inequality and resulting disproportionate impacts on marginalized communities must also be addressed. Where social justice engages exactly this, climate justice is a concept which acknowledges injustices and underlying power structures that lead to disproportionate effects of climate change. Ogunbode (2022) describes three dimensions of climate justice and how it manifests itself in the Global South:

1. **Distributional inequality**: The countries that face greater exposure to the effects of climate change, systematically have few to no financial means to mitigate and adapt to these risks (Ogunbode, 2022);
2. **Procedural rights**: The people who are most affected by climate change, typically have fewer opportunities to participate meaningfully in the implementation of responses to climate change (Ogunbode, 2022);
3. **Recognitional inequality**: Socioeconomically marginalized groups and those without a political voice, but who are actors that can have meaningful contributions to the discourse on climate change, are often excluded or unrecognized (Ogunbode, 2022).

Based on these premises of climate justice, **design for justice** practices should be applied in sustainability research. These types of design (processes) focus mainly on **participatory approaches** which include a diverse group of stakeholders in a design or decision-making process. In this way, policy-making involves more local knowledge and values, increasing the effectiveness of climate policy and decreasing social inequalities (Sobkowiak et al., 2023). Additionally, as a disjointed society will not be able to solve complex issues, it is important to address the social side of sustainability issues (Carmen et al., 2022).

Arnstein's ladder of participation is a helpful tool to determine the current and desired level of citizen in-volvement in decision-making processes (depicted in Figure 13). The ladder metaphor explains that there are different levels of citizen engagement, which are grouped in three degrees ranging from non-participation, through tokenism to citizen power. It reflects the power struggles between decision-making bodies and citizens who try to let their voices be heard (Arnstein, 1969).

Contemporary critiques on this model include comments on its linear and hierarchical model. Collins & Ison (2006) state that it fails to capture the dynamic state of user involvement and neither acknowledges that some citizens might not wish to be involved (Collins & Ison, 2006). These authors suggest a move away from traditional decision-making and towards a concept they call social learning. **Social learning** is a collective process that takes place amongst multiple independent stakeholders and is facilitated towards a threefold objective: Converging their goals towards mutual representation, co-creating knowledge, and changing behaviours and actions. Figure 14 highlights how social learning incorporates information-, consultation- as well as participation practices and could therefore be more effective in having an inclusive approach to-wards complex challenges (Collins & Ison, 2006).

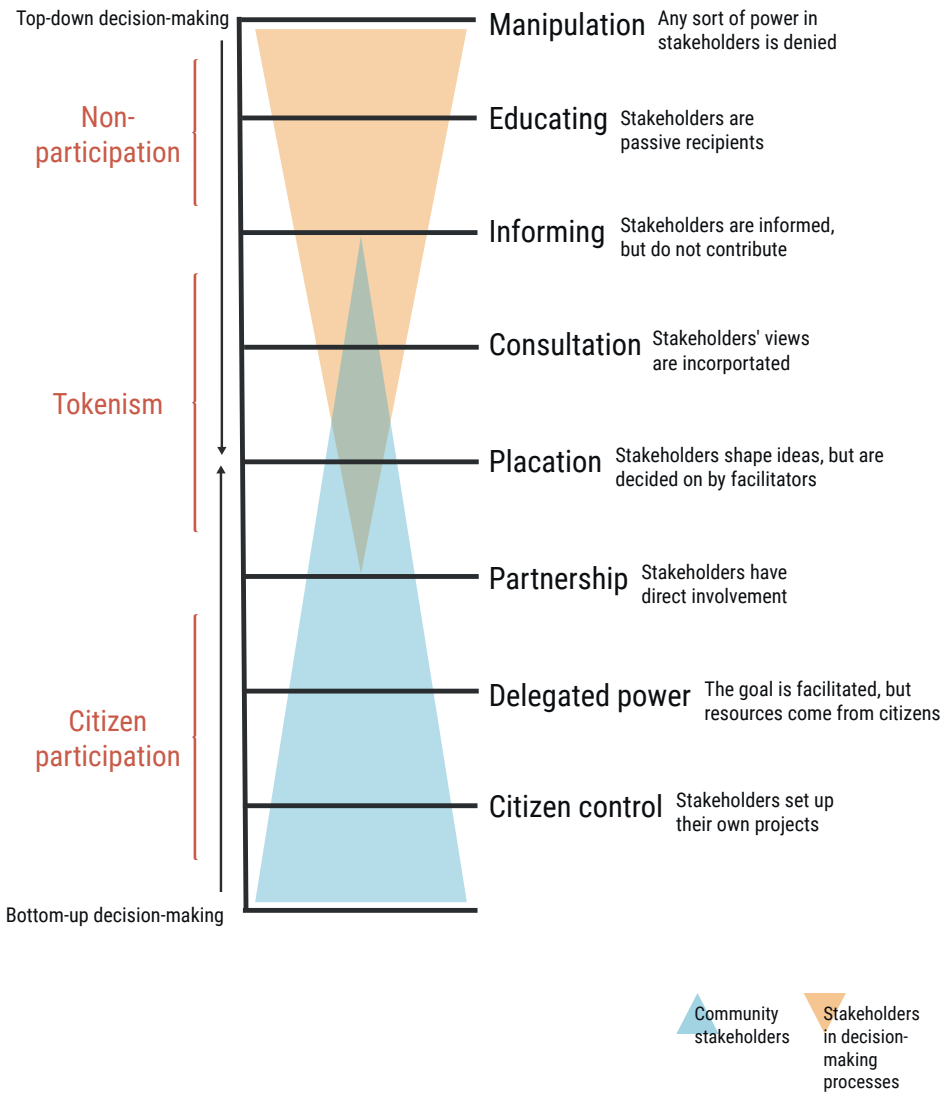


Figure 13: Arnstein's ladder of participation (created by author, inspired by Arnstein, 1969)

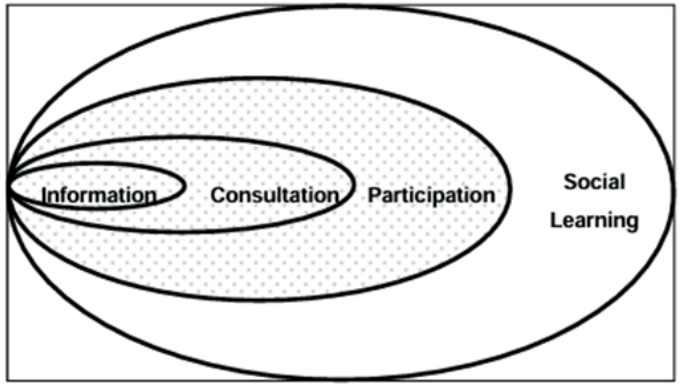


Figure 14: The social learning model of Collins & Ison (2006)

Innovation that includes practices such as design for justice or participatory action research can also be called social innovation. **Social innovation** aims to cause system-wide reorganisation across technological, social and economic spheres. It mainly focuses on changing factors such as goals and values that influence how societies see themselves and their connection to the world around them (Chaminade, 2024). Bringing together different actors in the creation of social innovation might prove difficult as different backgrounds, expertise and expectations lead to different goals, values and ways of thinking. These unaligned goals can lead to misunderstandings and tension (Buckenmayer, 2021). However, friction should be considered a cata-lyst rather than a barrier for change as conflict is extremely effective in changing mental models. When a person detects patterns of inconsistency, they become aware of their implicit frames which can subsequent-ly be transformed. In these processes, it is of crucial importance to find a **common cognitive frame of reference** to counteract the misalignment (Buckenmayer, 2021).

Principles of *Participatory decision-making* will be applied throughout the research to guide an inclusive re-search process as well as to incorporate in the recommendations.

3.2.5 Multisolving

As the previous sub-chapter explained, it is crucial to tackle social injustices to tackle environmental problems and vice versa due to their inherent linkage. This is just one example of interlinked issues. **Multisolving** is a concept which is applied in policy design and -making and, simply put, solves interlinked societal chal-lenges with a single investment of time and money. It does so by merging the expertise, funding and political will of multiple stakeholders (Sawin, 2018). It addresses symptoms and root causes at the same time. Examples of multisolving are a 'Walk to School' programme in the UK that improves kids' health as well as tackling heavy traffic congestion or a cooking initiative in Spain that aids food insecurity as well as limits food waste (Sawin, 2018).

Multisolving relies on three core principles (Sawin, 2018):

1. **Unified expertise**: Tackling problems requires joint perspectives, experiences, knowledge and ex-pertise. Every person is needed and each individual holds part of the solution;
2. **Integrated solutions**: Most challenges are easiest to approach collectively instead of one by one. Find single strategies that can solve multiple problems at once.
3. **Iterative innovation**: Commit to innovation pathways that move in cycles of experimentation, learning and documenting impacts. Storytelling is a big part of successful strategies.

Farmers are well-known 'Multisolvers'. In Permaculture, mutually dependent relationships are often emphasized as changing one element of the ecosystem naturally influences another. Therefore, introducing a predator animal species might help to decrease the amount of invasive (insect) species as well as feed the predator animals. By doing so, animal as well as plant health has been improved. Permaculture practitioners also call about 'stacking functions', meaning that a fruit tree (next to growing fruits) can also provide shade and nourish the soil with its leaves. In Multisolving all of these benefits must be seen as equally valuable, instead of a primary goal and a secondary benefit (Resilience, 2024).

Overall, multisolving promotes cross-sectoral thinking and at the same time makes efficient use of resources with the goal find strategies that co-produce multiple benefits and create more resilient networks and communities.

4. Methodology & Research ethics

Figure 15 visualizes the full approach of this research, synthesizing the inputs, 5 R's of regenerativity and the outputs into one model. The middle section, the blue orb, connects the 5 R's with the inputs using a quantitative as well as a qualitative analysis. The visual gives an overview of how this research has been set up to reach the previously discussed objectives and answer the research questions of this study. The specific methods which were applied in this study will be discussed in this chapter.

To synthesize the research approach, the researcher decided to take a mixed methods approach, meaning that the research is conducted using qualitative as well as quantitative methods. Due to the complexity of the issue and the exploratory nature of current literature on regenerativity, the researcher purposely chose to approach the issue from multiple stakeholder perspectives and by using multiple methodologies. Where qualitative research brings personal stories and helps understand the social dynamics, quantitative research highlights which waste streams are most prominent and which strategies could be most effective in setting up a regenerative food system. All methods have an inductive nature which aims to build a framework rather than testing it and the general purpose of the research is exploratory. The methods used are written in **bold** in each sub-chapter and the full research process will iterate on the research questions and problem context defined earlier.

As mentioned, this thesis project is led by practices of participatory action research (PAR). While PAR values experiential knowledge when tackling issues in uneven social systems, it is also geared towards envisioning and implementing alternatives whose goals seamlessly fit with the goals of this research (Cornish et al., 2023).

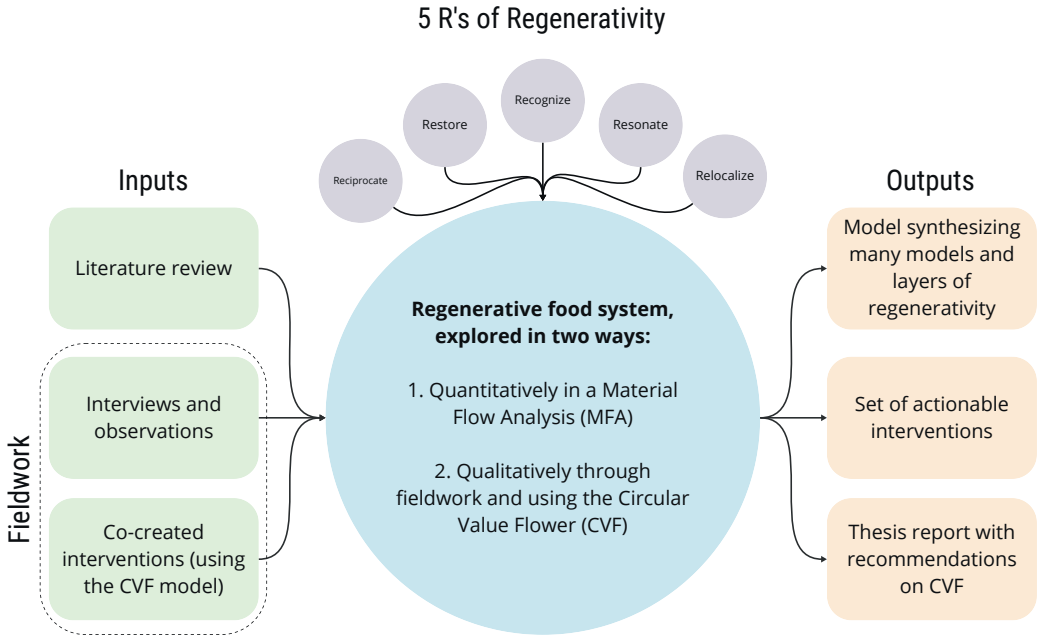


Figure 15: The inputs, methods and outputs of this study (created by author)

The theory aims to empower the people experiencing the effects of these uneven societies by letting them participate in and take leadership over the emancipating process. The principles of a PAR process can be summarized in six building elements, reflected in Figure 16 (Cornish et al., 2023). Appendix C further elaborates on the different elements and highlights how this research contributes to each of them.

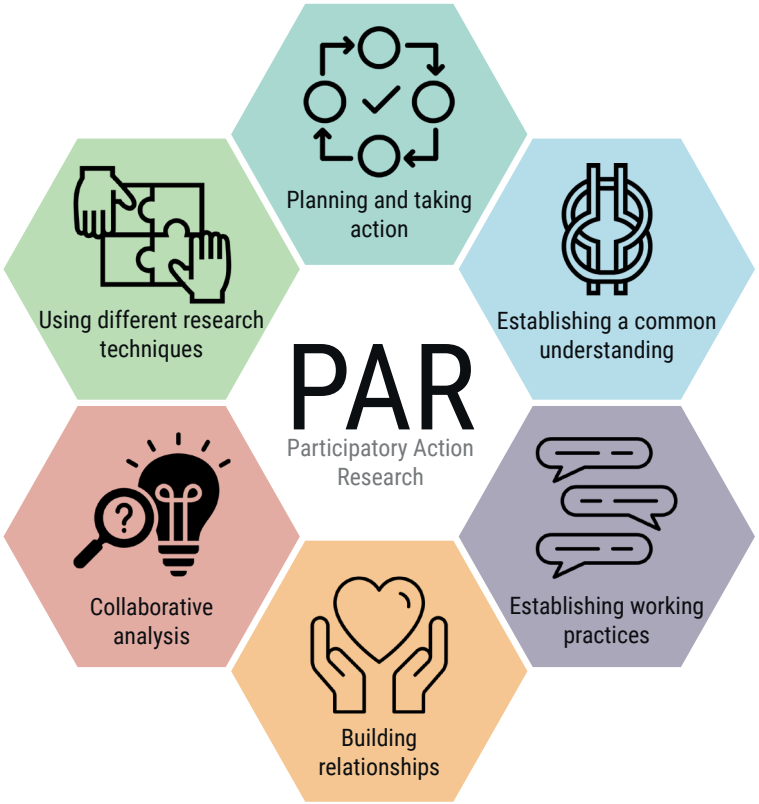


Figure 16: PAR elements (created by author, inspired by Cornish et al., 2023)

4.1 Research methods used to answer SRQ1

In phase 1, the focus is on developing the (social/environmental/political) problem context by setting up a qualitative as well as a quantitative conceptual framework. This phase is set up to answer sub-research question 1: *'What are the (social, environmental, political and economic) challenges that lead to and result from the current management of the local food industry on Santa Cruz and San Cristobal island?'*

To develop a framework that reflects a primary understanding of the current management – and therefore current challenges – of the food industry, **literature reviews** and **desk research** (initial interviews with stakeholders and grey literature review) have been used to develop a set of core concepts (Chapter 3.2), a stakeholder map (Appendix D) and a DPSIR model (Chapter 3.1). The **stakeholder map** identifies all (accessible) actors in the research context. A **DPSIR model** is an abbreviation for Drivers-Pressures-States-Impacts-Responses and was created to make sense of real-life complexities and interlinkages (Carnohan et al., 2022). The model provides feedback between society, policy and science and thus is an excellent way to map an initial analysis of the problem context. These three models together will form the qualitative conceptual framework, which forms a strong basis for the exploratory part of the research to be based on and answers the first sub-research question from a qualitative perspective.

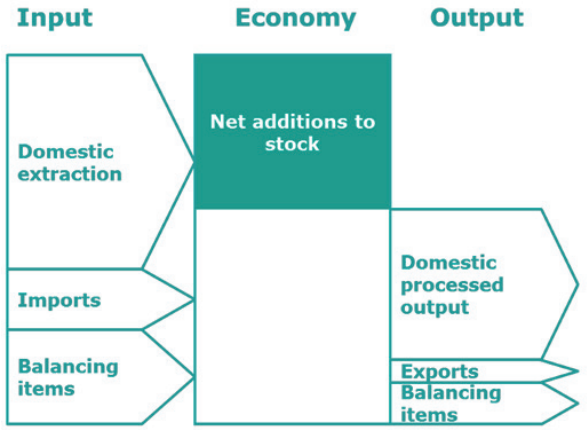


Figure 17: Simplified explanation of MFA models (Eurostat, 2018)

The SRQ is also partially answered quantitatively. Through more desk research, the researcher retrieved enough data to start setting up a baseline Material Flow Analysis (MFA) that shapes the quantitative conceptual framework. An MFA is a statistical accounting framework in which the inflows, outflows and stocks of materials in a certain economy or area are represented. A simplification of this approach is visualized in Figure 17 (Eurostat, 2018). MFA's are often used in environmental assessments as a basis for system analysis and it is considered the guiding quantitative methodology in this research. As seen in Figure 3, the method has been applied in phase 1 for setting up a quantitative conceptual framework, where it was used to understand the material flows in the food system and to obtain insights on how these can become more circular, or in other words, less ecologically impactful. This MFA of the food system was brought back in phase 3, where it was used to apply the strategies in order to validate their effects. MFA as a method was also used in phase 2, where it was applied to visualize the coffee cycle.

As a final step in answering this SRQ, the findings from desk research will need to be validated by real-life experiences. This is where fieldwork is applied. **Fieldwork** is defined as collecting data outside of a laboratory, library or any other workplace setting. It is used to gain practical knowledge first-hand (Merriam-Webster Dictionary, 2025). In her book 'The New Land', Macedonian author Ljupka Cvetanova states: 'No one plows the land by just thinking about it' (Cvetanova, 2013).

Before starting fieldwork, upon arrival, a network needed to be built in order to start the sampling process. As the researcher was unfamiliar with the research context, they relied fully on the network of the host family and informal connections made via them. This reliance also led to the subconscious exclusion of livestock, as the researcher was in closer connection with the fish- and agricultural industry. The host family was thankfully familiar with the topic and involved actors and therefore was a helpful base from which to build a network. The research participants have been sampled through **purposive and snowball sampling**. Purposive sampling refers to a sampling method where individuals are selected based on their expertise. Snowball sampling means that one useful connection will lead to the next useful connection (usually an acquaint-ance or someone in their existing network) until a reliable network isis formed which is consulted for the necessary information. All consulted stakeholders are highlighted in Appendix D.

The validation of the qualitative conceptual framework is done through **active participant observations**, **informal discussions** and **semi-structured interviews.** Both of these methods are explained further in the next sub-chapter.

Both findings of desk research, as well as fieldwork, are compiled into a Causal Loop Diagram, which has the power to visualize complex systems by clustering and connecting different themes. The power of CLDs is to transform a set of drivers and impacts into their interrelated issues. From these interconnections, rein-forcing or balancing loops can be identified. These loops are system elements that lead to a spiral effect, enforcing every element along the way and eventually creating spiral-like effects – whether positive or negative. These loops help recognize harmful or beneficial cycles to which strategies can be applied (De Pinho et al., 2015). The CLD is a crucial step to connect the research findings with the outcomes of the research as so-called 'leverage points' can be identified. These leverage points will be extracted later in the research and will give guidance to the impact analysis of the strategies in SRQ2.

Together, these methods will help to understand the current status of the food system and help determine the social, ecological, political and economic challenges that lead to and result from the current management of the food system (as stated in SRQ1).

4.2 Research methods used to answer SRQ2

The methods in phase 2 are put in place in order to answer SRQ2: *Which impactful strategies [for the local food systems] can be co-created bottom-up, guided by the principles of circular communities and and convivial conservation, that can multisolve the current challenges?',* a question that builds on the problem context developed in phase 1 by referring to the current challenges. Additionally, this phase was crucial for immersing the researcher in the local context which was done through conducting fieldwork. Collecting data in the relevant spatial, cultural and social context has strengthened the outcomes of the project se-verely. The research in Phase 2 contains mainly explorative and only qualitative research methods as this phase was conducted on-site and in close contact with the research participants.

During this phase, it is important to realize for the researcher that although the variety of different research methods provides rich-ness to the outcomes, they also can affect the generalizability of the results.

Although the fieldwork phase is mainly targeted towards the outcomes of SRQ2, the initial data collection was geared towards validating the problem context set up in phase 1 by enriching the analysis with lived experiences. Afterwards, the researcher focused on co-developing strategies with the research participants that aim to close material loops and find ways to build a more regenerative food system. Obtaining the data needed during the fieldwork phase is divided into 5 steps, which were sometimes conducted chronologically and sometimes in parallel. Active participant observations and informal discussions during site visits (1), visual ethnography (2), semi-structured interviews that create space for storytelling (3), surveys (4) and the co-creation workshop (5). All of these steps will be elaborated on now.

The initial information collection method is through **active participant observations** and **informal discussions** (1). The outcomes from these methods are processed as field notes. In the initial weeks of field-work, the researcher has focused on building connections with the local stakeholders – through snowball sampling - and gaining perspectives on what their daily tasks look like. This was done through site visits and active participation in their work. The ethnographic method, active participant observation, describes that the establishment of a researcher in a culturally definable role in the social system - rather than as a stranger or outsider – is highly beneficial in eliminating the stigma that comes with an outsider role and in increasing trust (Johnson et al., 2006). An ethnographer in this role can overcome the difficulties which are associated with a more passive observer, as their role as a researcher is overshadowed by their culturally recognised role as a co-worker, acquaintance or friend (Johnson et al., 2006). Due to time constraints, the researcher was only able to take on a peripheral membership role, meaning that interactions with the research participants varied from near-daily acquaintance interactions to friendships with key informants. As the results from these methods can be fully anonymised, there is no need to set up consent forms for this part of the research. However, it was important to always state the role of a researcher and that any state-ments could be used in the reporting process.

During the process of site visits, the researcher applied a method of **visual ethnography** (2), where the research participant was photographed along with the product that they promoted or sold. Visual methodological tools are increasingly used along participant observation as they offer an opportunity to reconfigure, dialogue and link different research layers and methods (Bloustien, 2003). In this way, the researcher is able to connect to the participant in a different way, where pride and admiration are central. The photographs which were taken during the site visits have also been used in the co-creation workshop, where they provoked a visual stimulus to help kickstart the dialogue on regenerative food systems and represented entrepreneurial voices. The use of visual ethnography during the workshop will be elaborated on in the co-creation paragraph in this Chapter.

In order to obtain more in-depth information, **semi-structured interviews** (3) were set up with individuals from different entrepreneurial sectors or decision-making bodies. During this time, it was important to get as many inputs from different perspectives. Three sets of questions were set up (in Spanish and in English) for entrepreneurs, NGOs and governmental bodies/the Ministry of A&L in order to direct the questions to their expertise (see Appendix E for the interview introduction and sets of questions). All questions that were asked were geared towards understanding the current problem context as well as asked for the participant's expertise on how to build a more regenerative food system. These questions helped the researcher guide the interview process in the way it is structured as well as help with conducting the interview in Spanish. By having such a structure, the answers become comparable and thus easier to analyse and recognize patterns. However, although this structure is guiding, the researcher will leave space for the research participants to switch to storytelling. Storytelling, or narrative telling, helps the researcher gain access to the inner world of the research par-ticipants and obtain a better understanding by immersing themselves in the participant's world (Götsch & Palmberger, 2022). Specifically in the context of the theme of this thesis, narrative- and storytelling have the potential to enhance the understanding of ecological concerns by allowing expressions of individuals and communities about their relationships with their environment (Sobkowiak et al., 2023). Overall, conducting these interviews allowed the researcher to fully refine the problem context through lived experience. Additionally, the first possible strategies were identified during the interview phase and all participants of the interviews could be invited to the upcoming co-creation workshop.

One of the food sectors has been explored in more detail by, next to conducting observations and an inter-view, setting up a diagram that reflects the organic material flows of one particular business in this sector using MFA. By doing so, it can be explored what role circularity can play in the food sector and how the imagined strategies can incorporate a circular mentality as well.

In order to enrich the number of perspectives, a survey (4) was conducted with tourists. This survey contained questions about the expectations of tourists during their travels and mainly referred to expectations in the food systems. For example: What food sources do they expect to consume and how could they better contribute to the health of the ecosystems by their choice of food? All questions are listed in Appendix E and the survey was distributed by handing out QR's to tourists on the streets and in restaurants, so they were able to fill these in a time which is convenient for them.

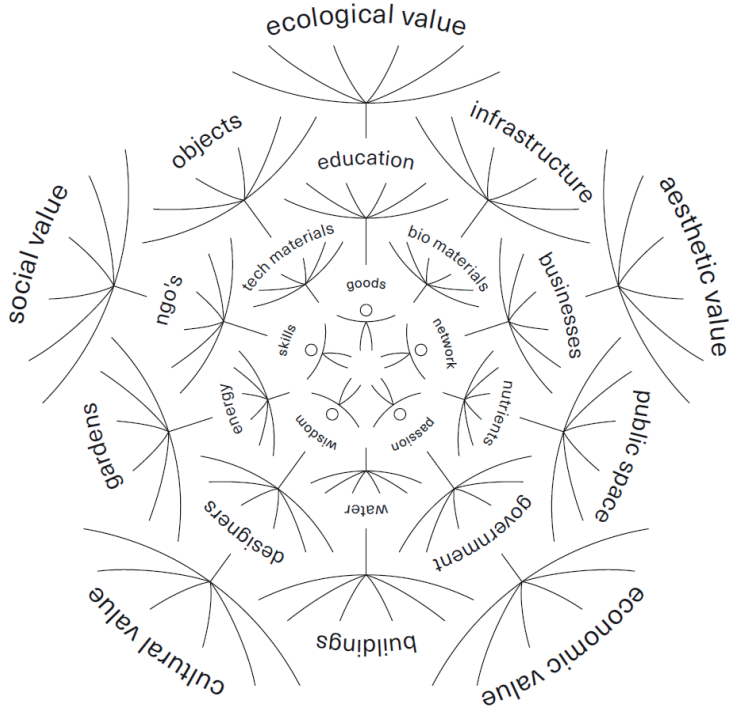


Figure 18: The Circular Value Flower (Leclercq & Smit, 2023)

The data collection concluded with a co-creation workshop (5) in which the imagined ideas thus far were reflected on and new strategies were explored together with the involved stakeholders. This workshop is a big source of valuable data in which all research participants take part in a creative session to rethink the Galapagos food system. The Circular Value Flower which has been set up by Leclercq & Smit in their work on Circular Communities (previously described in Chapter 3.2.2) connects seamlessly to the PAR methodology and was thus guiding in this workshop (depicted in figure 18, Leclercq & Smit, 2023). The publication of Leclercq and Smit highlights many different uses of this model in their case studies, which were all conducted in the Netherlands. It is made to support design processes in communities by visualizing how resource loops can be closed on a local scale (Leclercq & Smit, 2023).

The Flower has five layers which are the following (inside to outside, respectively):

1. **Activating capital** which is needed or currently present in the community: Goods, networks, passion, wisdom and skills.
2. **Resource cycles:** Water, energy, nutrients, bio-/tech-materials
3. **Possible stakeholders** to connect with: Governments, designers, NGOs, education and businesses
4. **Spatial strategies:** Gardens, objects, infrastructure, public spaces and buildings
5. **Overarching values:** Ecological, aesthetic, economic, cultural and social value

This model was extremely useful as a guide to the co-creation workshop. Not only does its workflow help to make the complex issues understandable and easy to discuss, regenerativity also has a strong basis in local community values which are defined in the model. As indigenous cultures base their regenerative practices on the relationship with the land and the living beings around them, these values are important to acknowledge before going to the next step and defining strategies (Sands et al., 2023).

The pictures which were taken during the site visits and interviews as a method of visual ethnography, played a role in the co-creation session as they were combined into a photo exposition. This photo exposition had three functions, first and most practically, the exposition doubled as a public event so the entrepreneurs were more inclined to join the workshop as there was another element to the day. Secondly, exhibiting the pictures allowed the researcher to give back to the research participants and to the community. The event was held in a community centre and put the entrepreneurs and their work in the spotlight. Additionally, it sparked conversations with some visitors from outside of the research network who came to see the exposition. At the end of the day, all pictures were handed to the entrepreneurs to take home. Third of all, the photos helped to kickstart the conversation among the research participants who were present which greatly aided the co-creation workshop. Along with a photo, a quote from every entrepreneur accompanied the image in order to enrich the image and resulting conversations. An example of such a picture-quote combination is shown in Figure 19.

Figure 19: Portrait, product and quote of Romer Ochoa (created by author)

The planning of the full event and workshop is stated in Appendix F. The goal of the co-creation workshop is two-fold. Firstly, the workshop was an opportunity for the entrepreneurs to connect and share their passions and struggles with each other. Ideally, a community was fostered where they feel comfortable reaching out to each other in the future. This first goal is achieved by mapping their values utilizing the CVF and defining our shared and individual values. This part of the session started by mentioning some of the findings of the interviews and the values highlighted during the process of hosting interviews. By taking the lead in the workshop, the researcher was able to kickstart the conversation.

Secondly, there was an opportunity to spark ideation on strategies that might promote the local food system better and thus contribute to regenerative principles. This was achieved by first mapping all associated stakeholders on an ecosystem map (Figure 20, (Pierandrei, 2022)) and later discussing how each of these layers contributed better to fostering a local food system, whether these strategies are focused on separate stakeholders or on how the stakeholders can collaborate better.

Part of the fieldwork methods were conducted once more, as the researcher explored both the island of Santa Cruz as well as San Cristobal. The focus of the research conducted on San Cristobal was however more focused on enriching the findings from Santa Cruz and hence the full cycle described in this sub-chapter was not fully repeated. As the researcher had few to no existing connections on the island of San Cristobal and limited time, the research process here focused mainly on semi-structured interviews and storytelling methods with several actors.

In order to process the findings resulting from interviews, a threefold platform was used. First, in order to transform the recordings into written text, the transcription software of Microsoft Teams was applied. However, although the interviews were recorded with the use of a microphone, the software did not pick every-thing up seamlessly. Hence, the interviews were anonymized and uploaded to Chat GPT in order to fill in any missing gaps or transform text which was transcribed poorly. Chat GPT also helped to structure the information from the research findings into the interview structure which was mentioned earlier. Finally, the transcribed, structured and translated document was uploaded into ATLAS.ti, which is a software in which the interview findings were labelled and compiled into useful categories such as making an initial selection of strategies. By doing so, the researcher was able to gather and use information more readily. The data resulting from the surveys was processed using Microsoft Excel and can be found in Appendix G.

All other fieldwork findings, such as fieldwork notes as well as the co-creation workshop outcomes, were categorized and transferred to the thesis document as visuals or text without any intermediate analysis.

In order to start the interpretation phase and to categorize the strategies per stakeholder, the stakeholders that are most valuable to design strategies for need to be identified. This is done through a Power-Interest matrix. Actors that have high power (thus, the agency to make system changes) or high interest (thus, the willingness to make system changes) are considered to be key actors. This helped the researcher to under-stand which stakeholder has a position of influence and is thus most important to consider when co-creating strategies.

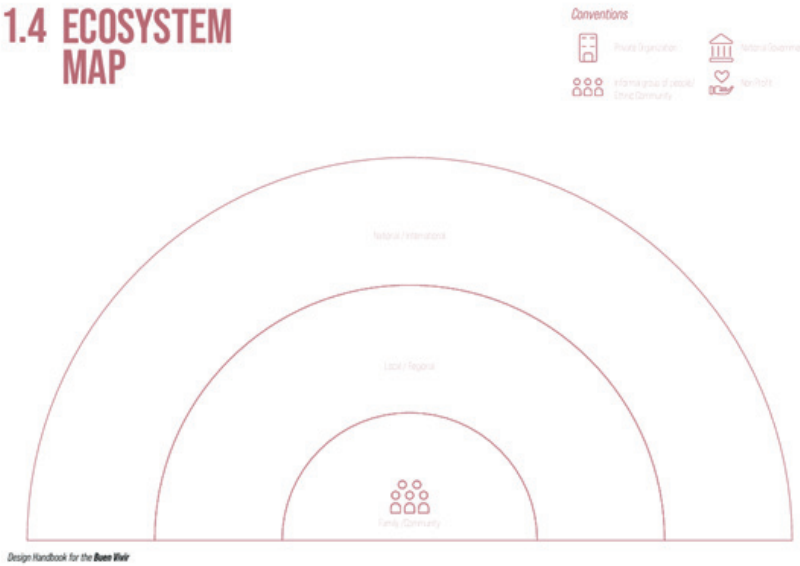


Figure 20: Ecosystem map template (Pierandrei, 2022)

Next to defining the key actors, certain leverage points need to be determined to gauge the impact of the interventions. These points were extracted from the Causal Loop Diagram and based on the theory of De Pinho et al. (2015). As the key actors as well as the leverage points both formed an axis, the strategies mentioned during the interviews and co-creation workshop could be connected to this matrix. By doing so, the researcher is left with a categorized matrix of strategies, providing a clear overview of where change is implemented and by whom.

As a final step, several (combinations of) strategies were integrated into the baseline MFA (set up in phase 1) to validate their impacts. Additionally, bringing back a quantitative analysis as a validation step highlights how it has the ability to enrich qualitative research and how both work in an integrated matter.

4.3 Research methods used to answer SRQ3

Phase 3 focuses on compiling the research findings post-fieldwork and deploys methods to answer (sub-)research question 3: *'How can the strategies [co-created in SRQ2] be linked to the principles of regenerativi-ty to facilitate future implementation?'*. This question connects the findings with the academic background of the research and will not focus on generating new findings but rather aims to build theory, aligning with the inductive nature of this study. The outcome of answering SRQ3 will be a model and a framework that visual-ize and explain regenerativity and its application in similar contexts, respectively.

The first model that was developed in this phase combines the findings of regenerativity into a visual that can be used for communicational aspects and highlights the 5 R's of regenerativity, taking into account Indigenous as well as Eurocentric approaches towards the concept. The second framework combines the theory of regenerativity with the set of strategies that were co-created during fieldwork. Using a **Sankey-inspired diagram**, the interventions are categorized into overarching themes, which in turn are connected to the local values and the 5 R's.

By setting up such a framework, the data collected during fieldwork is reconnected to the academic layer of this study and thus proves how the imagined strategies are able to collectively set up a regenerative economy. Additionally, it might form a basis for further research in this field, such as the potential scaling of the concept of circular communities towards regenerative economies.

This phase concludes with **recommendations** for the involved parties, for the research participants as well as the client. Finally, this phase functioned as a reflective phase. The researcher was able to look back on the conducted process and provide insights into the successes and possible improvements.

4.4 Ethics & potential pitfalls

This sub-chapter will discuss potential ethical concerns and how they will be prevented or mitigated.

In the preparation phase of the fieldwork, the main contact point was a researcher from the Universidad De Las Americas who is closely connected to one specific fishing cooperative. This led to doubts about informational bias as the student was apprehensive that working closely together with this contact point would lead to one-sided research outcomes. However, this risk was prevented as the researcher was able to get into contact with the local university department of the Universidad San Francisco de Quito and hence used this connection as a more neutral starting point. Overall, especially seen that snowball sampling methods were used in this research, it must be noted that in qualitative research the researcher can hardly ever be unbiased.

The biggest ethical concern throughout the research is the use of personal data, as research participants could be identified for their expressions which could have social or political consequences. A big part of this concern was eliminated by setting up a clear consent form and communicating its content to the research participants before conducting any type of research. This consent form was set up in the participant's native language (usually in Spanish) and is attached in Appendix H. This form ensured that the participants were fully aware of what would happen to their data during and after the research. Each person was given a copy of this form. Additionally, the researcher always made sure to ask if the research participants wanted their data to be anonymous. The data of the surveys will always be anonymous. As an extra layer of verification, the participants were sent the final report before public exposure in order to check the data used and the information displayed.

Another ethical concern was that the researcher, due to unfamiliarity with the social dynamics and limited mastery of the language, would not easily pick up on any social or political tension and could potentially aggravate any existing vulnerabilities. This was prevented from happening by becoming familiar with Spanish early in the process of fieldwork. By learning the native language of the research participants, the researcher not only obtain deeper research insights but automatically became more aware of the cultural layers of the conversation and thus better understood the social dynamics at hand.

The last concern is the use of (open-source) software, as the uploaded data is personal and therefore data leaks can become more serious. In order to prevent this, all data uploaded into these software programmes were anonymized before doing so, without exception. This was done by deleting any information that discloses information like contact details, location of residence or occupation.

To summarize, the mitigation steps to handling any ethical concerns was to be aware of them, inform the research participant, speak their native language and anonymize as much as possible.

5. Results

This chapter presents the raw data that is collected to answer the research questions of this study. The results are categorized per sub-research question and the sub-chapters make a distinction between qualitative and quantitative findings in order to facilitate the interpretation process in Chapter 6.

5.1 Results for SRQ1

Phase 1 is solely focused on answering sub-research question 1: *'What are the (social, environmental, political and economic) challenges that lead to and result from the current management of the local food industry on Santa Cruz and San Cristobal island?'* and explores findings through desk research, a Material Flow Analysis and qualitative research. First, in sub-chapter 5.1.1, the findings of the academic literature and desk re-search will be discussed through both a qualitative (analysed through the core concepts in chapter 3.2) as well as quantitative lens. The second sub-chapter (5.1.2) discusses fieldwork findings which helped identify the current challenges of Galapagos' island inhabitants regarding the food system. The outcome of this SRQ, after interpretation in Chapter 6, is a description of the current management of the food system and a detailed problem context.

5.1.1 Findings from literature

Traditional conservation practices have continued to reinforce human-nature dichotomies and capitalist views on nature. Convivial conservation is geared towards including humans as part of conservation practices by, for example, de-privatizing areas and engaging visitors in the culture by promoting long-term visits (Buscher and Fletcher, 2020).

The concept of Circular Communities is set up to address Multiple Value Creation in communities by not only addressing technical circularity but also the exchange of knowledge. By doing so, more resilient human networks are cultivated that are geared towards solving complex issues (Leclercq & Smit, 2023).

Regenerativity is seen as foundational to circularity and focuses on restoring and maintaining ecological- and societal well-being (Morselotto, 2020). Regenerative businesses thus propose a narrative that doesn't only focus on closing resource loops or balancing economic and ecological factors but seeks to redefine the relationships between humans and nature by adding layers of individual purpose, leadership and rights of nature (Konietzko et al., 2023). Principles of regenerativity have been re-embedded in a Western context, but originate in Indigenous worldviews (Sands et al., 2023).

Combining models of regenerativity identifies five distinct core principles which are referred to as the 5 R's in this research:

1. **Reciprocate** = Emphasizing respect for the relationship between humans and nature and ensuring mutual benefits in all anthropogenic activities
2. **Restore** = Rehabilitating damaged land in order to rejuvenate natural resources that are self-regulating
3. **Recognize** = To acknowledge or (re)connect with the existence of something and show appreciation to a person or group for their contributions
4. **Resonate** = Working with the biorhythms of that specific location, such as seasons, weather patterns or breeding season.
5. **Relocalize** = Reestablishing something in a specific location, such as introducing species that are native to the local ecology

To address issues of climate justice and set up effective climate policies, participatory approaches towards decision-making are essential (Sobkowiak et al., 2023). Social learning and Social innovation are designed to aid such Participatory decision-making processes (Collins & Ison, 2006). Multisolving is an approach to designing strategies that tackle multiple societal issues and, therefore, can make efficient use of resources (Sawin, 2018).

When researching available literature which is Galapagos-specific, most conducted research is centred around climate change impacts on local biodiversity and the balance of nature conservation with development needs (González et al., 2008). More recent articles discuss the set-up and ongoing struggle of the zoning system and the waste management system (Castrejon et al., 2024; Checcin, 2016).

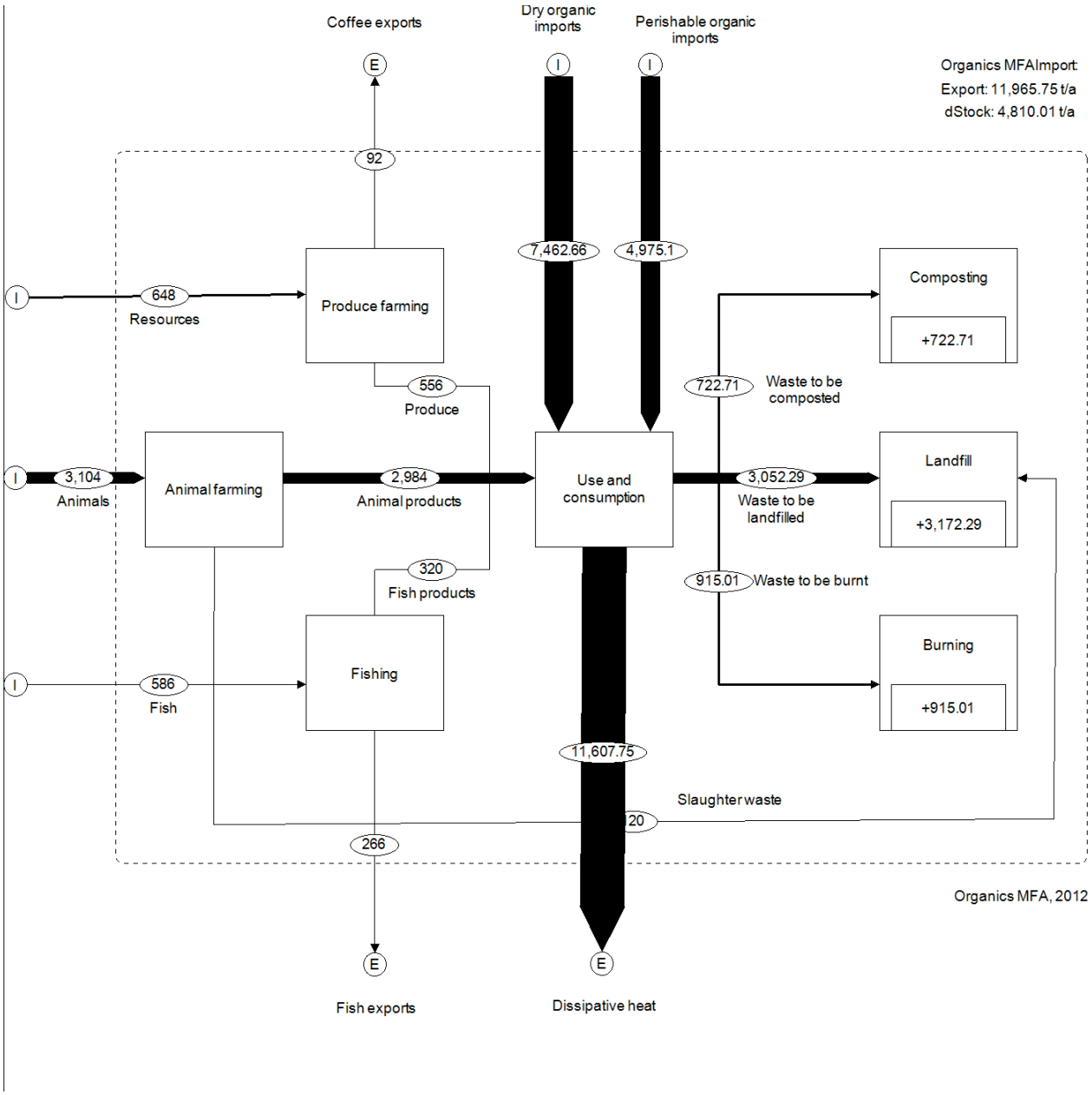


Figure 21: The organic material flows on Santa Cruz island in 2012 (created by author, based on data by Checcin (2016))

Organic waste streams are cumulative the biggest waste stream on Santa Cruz island (Jones, 2023). There-fore, researching ways to limit their impacts (using principles of circularity and regeneravitity) would be fa-vourable in achieving a more sustainable (food) system. One way to obtain a clear overview of the (organic) material streams, from which their impacts can be derived or to which strategies can be applied, is to set up a Material Flow Analysis (MFA).

Figure 21 represents the current organic material flows on Santa Cruz island. This model was set up using the data of Checcin (2016) from 2012. The model gives a clear overview of the full supply chain including imports, exports and flows between the different processes.

Additionally, it emphasizes on the material quantities through mass-balance equations and thus gives insight into resource efficiency and environmental sustainability. Although the data from Checcin is outdated information, it provides a good baseline model with clearly structured material streams.

The insights that came out of the analysis are the following:

- **76% of all food consumed is imported.** This confirms earlier desk research that highlighted the dependency on imports from mainland Ecuador;
- **40% of all imported food is perishable**. Especially perishable imports should be reduced as there is a high risk that these products perish before arrival and they might carry invasive species that could bring the fragile ecosystems out of balance;
- **15% of all organic waste is composted** at the moment of measurement (iterated on later);
- **16% of locally caught fish is consumed locally**, the rest is exported to mainland Ecuador.

The file containing the data listed to create this model is included in Appendix I.

In a more recent article, by Castillo Pazmiño et al. (2022), it was mentioned that the local municipality has actively put time into differentiated collection systems for enhanced waste segregation, setting up public awareness/educational campaigns and infrastructural improvements such as dedicated composting facili-ties in the last 10 years. These efforts have resulted in a significant increase in the amount of waste which is segregated and composted and, therefore, impacts are limited on the post-consumption side of the system. Thus, this research will focus more on the productive and distributive side of things, such as imports and fish consumption.

5.1.2 Fieldwork findings on the problem context

The stakeholders which were consulted throughout the research, are reflected in Appendix D. This network was set up through a purposive and snowball sampling method.

21 in-depth interviews and 17 site visits, of which 7 highland farms, gave many different insights into the lives of entrepreneurs on the island. The main element that immediately stood out, was the types of social tension that different entrepreneurs experience in their interactions with decision-making bodies. The entrepreneurial groups that experience clear distinctions are intermediaries, farmers and fishers. These groups are in closest contact with and highly dependent of decision-making bodies. Their position on Arnstein's ladder of participation and their experience of social tension is visualized in Figure 19.

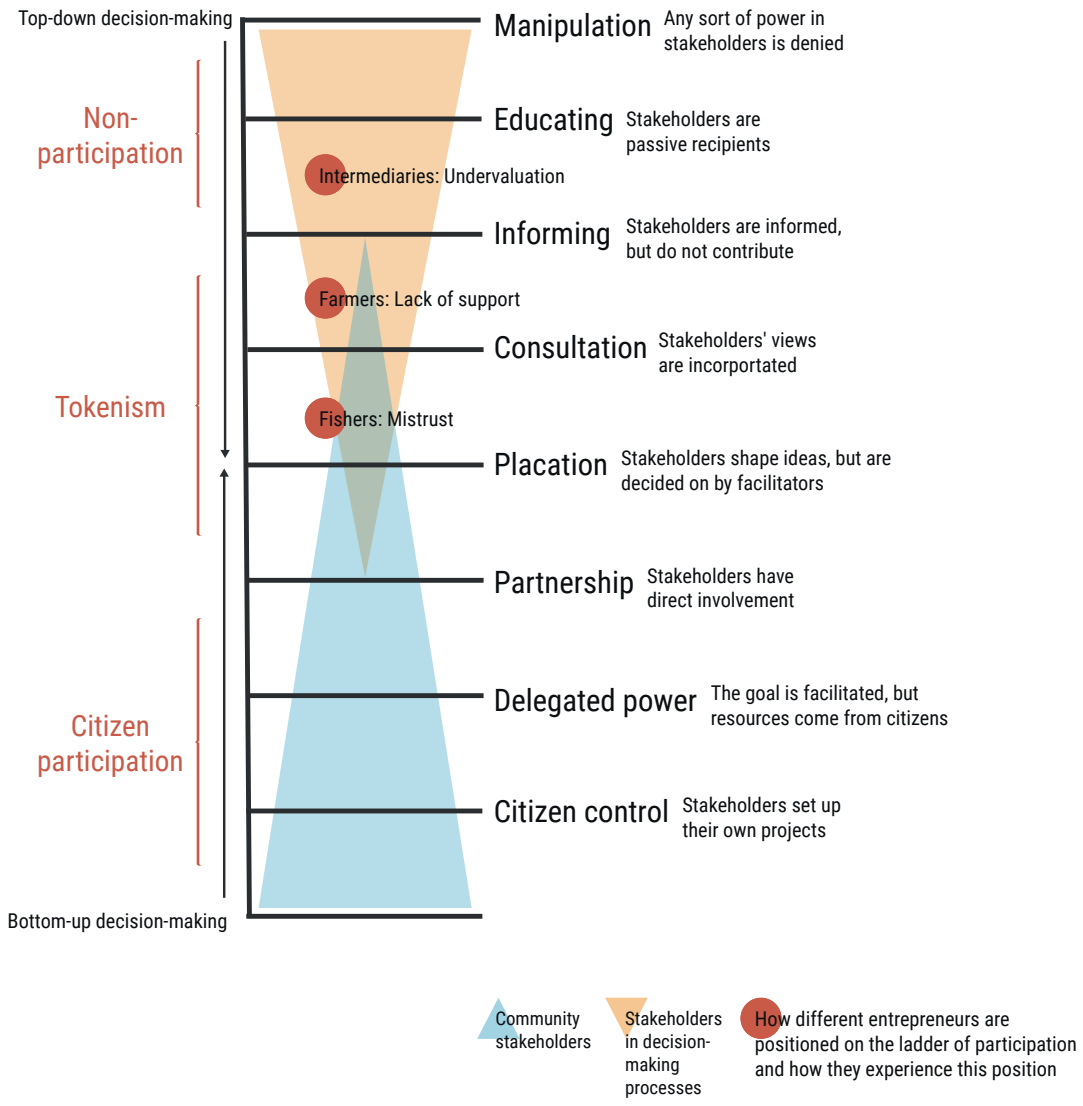


Figure 22: Positioning of different entrepreneurial groups on Arnstein's ladder of participation (created by author, inspired by Arnstein, 1969)

As reflected in Figure 22, the ladder of participation reflects different types of involvement of citizen groups or stakeholders, who have no decision-making power, in decision-making processes. The ladder runs from top-down decision-making practices such as educating or consulting to bottom-up practices such as dele-gated power or placation. All entrepreneurial groups are positioned in the top-down decision-making para-digm which is based on how they expressed themselves and their relationship to top-down decision-makers in the interviews. The intermediaries expressed feeling unacknowledged in the work that they do. They are merely a passive actor and are told by governmental bodies what rules to follow in order to execute their business. This is illustrated by restaurant owners stating: '*… Limitan algunas operaciones, especialmente en lo que respecta a la importación de productos y la obtención de ciertos recursos fuera de las islas.*' [1] (Research participant B4, 2024) and '*The legal regulations here… are strict. These regulations make it more difficult to run a business but are necessary for preserving the environment. However, they can also create extra costs, such as for waste disposal or inspections.*' (Research participant B2, 2024).

An entrepreneurial group that experiences a strong lack of support, causing social tension, are farmers. They mainly experience challenges regarding the lack of infrastructure in the highlands. Three farmers mention the following: '*Durante las temporadas secas, tenemos que comprar agua y no siempre es de la mejor calidad. La falta de infraestructura y recursos para la comercialización de nuestros productos también es un reto, ya que no siempre encontramos el mercado adecuado para los excedentes de producción.*'[1] (Research participant A6, 2024).). *'Las regulaciones legales han influido de manera significativa, especialmente en cuanto a la importación de insumos como semillas o productos biológicos. Estas restricciones limitan la autonomía y la capacidad de optimizar la producción de manera más eficiente y ecológica.'* [2] (Research participant A7, 2024). A coffee farmer mentions: *'Regulaciones también garantizan que los productos sean seguros para el consumo, lo que es positivo, pero el proceso de cumplir con todos estos requisitos puede ser costoso y complicado para los productores locales.'* [3] (Research participant A8, 2024).

Overall, farmers were observed to have a positive attitude towards conservation and they appreciate the biodiverse environment they are able to farm in. They often witness it as a privilege, rather than a burden. An organic farm, however, sees opportunities in the challenges that the Galapagos gives them: *'A veces, las restricciones ambientales y la falta de recursos hacen que sea complicado alcanzar nuestros objetivos, pero al mismo tiempo, nos obliga a ser más innovadores y responsables en nuestras prácticas.'* [1]*(Research participant A4, 2024).*

The fishers are a group that are most vocal in their opinion on, or resistance to, conservation. A member of a fishing cooperative, states: *'En Galápagos, las prácticas de conservación han afectado mucho las actividades pesqueras. Por ejemplo, las restricciones de pesca han dificultado la capacidad de los pescadores de hacer negocios de manera rentable. Aunque las leyes son necesarias para proteger el entorno, deben basarse en estudios científicos más sólidos para permitir una pesca más sostenible y rentable.'* [2](Research participant A3, 2024). Another fisher explains: '*Las políticas actuales no favorecen el desarrollo de nuevas prácticas pesqueras ni apoyan adecuadamente a los emprendedores locales, lo que complica la gestión de los recursos naturales de manera responsable. '*[3] (Research participant A1, 2024) and states about overall policies: *'la*

1 *'They also limit certain operations, especially with regard to the importation of products and the obtaining of certain resources outside the islands.'*

1 *'During dry seasons, we have to buy water, and it's not always of the best quality. The lack of infrastructure and resources to market our products is also a challenge, as we don't always find the right market for surplus production.'*

2 *'Legal regulations have significantly influenced us, especially when it comes to importing inputs like seeds or biological products. These restrictions limit our autonomy and ability to optimize production more efficiently and ecologically'*

3 *'Restrictive laws and regulations ensure that products are safe for consumption, but the process of complying with these requirements can be costly and complicated. We need clearer and more accessible regulations that support small entrepreneurs without hindering their ability to operate.'*

1 *'Sometimes, environmental restrictions and the lack of resources make it challenging to reach our goals, but at the same time, it forces us to be more innovative and responsible in our practices.'*

2 *'In Galapagos, conservation practices have greatly affected fishing activities. For example, fishing restrictions have made it difficult for fishermen to do business profitably. While the laws are necessary to protect the environment, they should be based on more solid scientific studies to allow for more sustainable and profitable fishing.'*

3 *'The current policies do not favor the development of new fishing practices or provide adequate support to local entrepreneurs, which complicates the management of natural resources in a responsible way'*

conservación no debe anteponerse al bienestar de las personas; debe haber un enfoque que permita la coexistencia entre el desarrollo humano y la protección de los ecosistemas.' [1] (Research participant A1, 2024).

A conservation expert, comments on the social tensions between the sector he works in and entrepreneurial groups: *'En algunos momentos, las comunidades enfrentan un conflicto entre priorizar la conservación o su propio bienestar inmediato. Pero yo no veo estas dos cosas como opuestas; al contrario, estoy convencido de que no puede haber bienestar a largo plazo sin ecosistemas sanos.'* [2] (Research participant C3, 2024). Research participant D2 is a fisher who is working on the fishing market strategies and connects with NGOs and knowledge bodies to do so. About the connection between conservation and fishers, he finds more of a communicational rather than a social issue: *'Muchos [Pescadores] piensan que los científicos solo recopilan datos para imponer más regulaciones. Es un problema de comunicación y de falta de educación sobre los beneficios reales de la conservación.'* [3](Research participant D2, 2024).

Another noticeable tension was the tension between producers and intermediaries. Intermediaries often look for the lowest price possible (RP2: *'Compran barato, venden caro. Nada mas.'*)[1], which leads to unfair payment of local farmers or often results in imports from mainland Ecuador for food products. As imports are subsidized, these products are often cheaper than local produce and thus there is very little incentive for the intermediaries to buy local. *'Una de las mayores barreras es la percepción de que no es posible producir localmente de manera sostenible… Esto hace que muchos empresarios turísticos prefieran importar alimentos desde el continente, ya que es más barato y más sencillo.'* [2](Research participant C3, 2024). To illustrate this, farmers on the Galapagos pay 12 times more for their water than the farmers in mainland Ecuador do (Research participant B6, 2024). This topic will be further elaborated on in chapter 5.2.3. A conservation expert sees the following as a solution: *'El objetivo final es un sistema en el que todos los actores, desde el pescador hasta el consumidor, estén conectados y trabajen juntos hacia un futuro sostenible y próspero para Galápagos. '* [3](Research participant C3, 2024).

Interestingly, the only group that expresses very few (social, political, economic or ecological) barriers and complications regarding conservation practices are the coffee farmers. As coffee imports are prohibited, all local consumption is local and the sector is able to export a lot as well under the trademark of 'Galapagos coffee'. *'Las regulaciones en Galápagos, enfocadas en la conservación, limitan ciertas actividades productivas para proteger el ecosistema. Aunque esto encarece el costo de producción, también asegura que nuestro café cumple con prácticas sostenibles y respeta el medio ambiente. También existe una normativa que prohíbe la entrada de café de otras regiones, lo cual ha beneficiado a los productores locales como yo.'* [1] (Research par-ticipant A5, 2024). Their only uncertainties are the changing seasons, which makes it hard to have consistent production. Overall, all entrepreneurs express a struggle to find trained local staff who are interested in con-tributing to the long-term view of a business: *'Local staff is hard to find. There is also a lack of long-term thinking among some local workers.'* (Research participant B2, 2024). As training their own staff is time-consuming and costly, entrepreneurs often hire people from – or trained in – mainland Ecuador.

1 *'Conservation should not take precedence over human well-being, there must be an approach that allows for coexistence between human development and ecosystem protection.'*

2 *'At times, communities face a conflict between prioritizing conservation or their own immediate wellbeing. However, I don't see these two things as opposites: On the contrary, I'm convinced that there can be no long-term well-being without healthy ecosystems.'*

3 *'Many [fishers] think that scientists only collect data to impose more regulations. It's a communication problem and a lack of education on the real benefits of conservation.'*

1 *'They buy it cheap, they sell it expensive. Nothing more'*

2 *'One of the biggest barriers is the perception that it's not possible to produce locally in a sustainable way… This leads many in the tourism industry to prefer importing food from the mainland, as it's cheaper and easier.'*

3 *'We need public policies and market systems that incentivize sustainable production and reduce costs for local producers. The ultimate goal is a system where all actors, from the fisher to the consumer, are connected and work together towards a sustainable and prosperous future for Galapagos'*

1 *'Regulations in Galapagos, focused on conservation, limit certain productive activities to protect the ecosystem. Although this raises production costs, it also ensures that our coffee adheres to sustainable practices and respects the environment. There's also a regulation that prohibits the import of coffee from other regions, which has benefited local producers like me.'*

In order to enrich the interviews with the farmers, surveys were conducted anonymously with local farmers who are selling their produce every week on Tuesday and Saturday mornings. Even though the survey only yielded 6 responses, out of the informal conversations that followed, it became clear that most fruits need to be imported and most vegetables could be produced locally, but currently are not. The most sold items are tomatoes, bell peppers, onions, potatoes, pipino (cucumber) and lemons. In the survey, these produce farmers expressed how the ministry does not do their best to support them. The issue most mentioned is the problem with the water, which was also mentioned during my interviews, making their produce expensive and unreliable. Additionally, they feel the ministry could invest more in producing citrus fruits locally and providing training for the farmers. Overall, they feel local produce could be incentivised way more by taxing or prohibiting products from the continent. One farmer, in particular, mentioned their confusion about why there is not more exchange of products between islands. Isla Isabela, for example, has a lot of fertile soil and very few mouths to feed. Santa Cruz Island is the opposite. There might be a risk for contamination of plants and animals from different islands, but the same is true with imports from the continent.

5.2 Results for SRQ2

This sub-chapter discusses the results that answer SRQ2: *'Which impactful strategies [for the local food systems] can be co-created bottom-up, guided by the principles of circular communities and convivial conservation, that can multisolve the current challenges?'*. This chapter discusses first the recommended strategies which resulted from the literature study, elaborates on the results from the survey conducted with tourists, discusses the findings from the coffee sector (as a source of inspiration to derive strategies from) and finally, discloses the outputs from the co-creation workshop. The outcome of this SRQ, after interpretation in Chapter 6, is a set of co-created strategies, which are translated into an actionable matrix and of which several are qualitatively validated.

5.2.1 Recommendations from literature

Literature highlights the following recommendations in fostering a regenerative economy. These can be principally divided into social, political, ecological and economic problem context. However, the concept of multisolving taught us that the goal is to solve an issue in one problem context, which could lead to solving issues in another context.

Socially, it was highlighted by González et al. (2008) as well as Buscher and Fletcher (2020) that the Gala-pagos should be seen as a social-ecological system rather than a natural environment in which humans also reside. The 'conservation for development' mentality highlights that entrepreneurial activities should be organized so that conservation is a mandatory element in setting up an initiative that strengthens the economy (Figure 23, González et al., 2008). Additionally, this article highlights the need for integrated spatial planning (of human and animal settlements).

Drawing on recommendations from 'Convivial Conservation': Mundaneness and not only spectacularism must be promoted regarding tourism (Buscher & Fletcher, 2020). This could mean engaging Galapagos visitors into the local economy by having a minimum stay time of – for example – two weeks. On average, visitors now only stay 8 days on average (The Directorate of the Galapagos National Park & Directorate of Public Use of the DGNP, 2022). Regarding the social tensions between different groups – such as conservation and the fishermen -, this tension should also be regarded as a positive element as groups become aware of their implicit frames which can subsequently be transformed towards common frames of reference (Buckenmayer, 2021).

Politically, it is recommended to build a regenerative system bottom-up. Doing so will foster trust and actively engage the people who are most connected to food sources, in policy-making processes (Castrejon et al., 2024). It is important to do so from an early stage in the decision-making process and to connect all stakeholders deeply to the goals of the initiative (Leclercq & Smit (2023), Castrejon et al. (2024). Additionally, Castrejon et al. (2024) suggest that once a system is not accepted by all parts of society

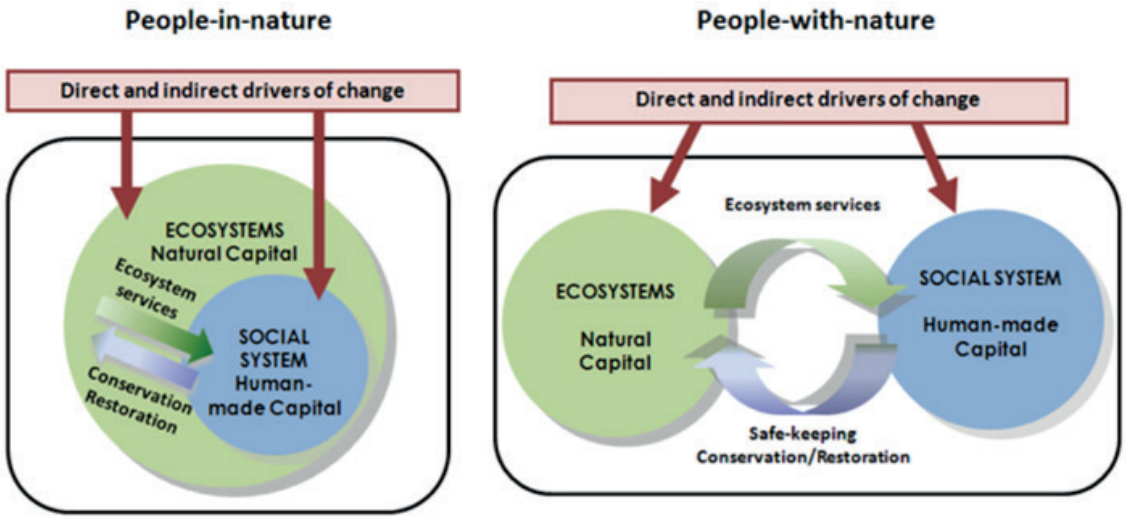


Figure 23: Conservation for development (González et al., 2008)

(which has been the case on the Galapagos islands), different methods or techniques must be explored. Finally, the government can play an important role in coping with the complexities of a transition, so forms of network governance must be enabled (Leclercq & Smit, 2023).

Ecologically, overall it is important to build a food processing technology that increases the local value chain and hence also creates potential for local tourist markets and evades invasive species (Checcin, 2016). For example, farmers should be assisted in introducing species that benefit the local ecology and thus their production systems (Barrera et al., year). Additionally, they should receive help in planning their land- and water use according to the potential of the soil on which they work. Cooperation amongst local producers should also be encouraged and certain market mechanisms can help to protect local production (Checcin, 2016). Finally, local production should be marketed to tourists as something that contributes to the health of the Galapagos islands (Checcin, 2016).

5.2.2 Findings from the survey with tourists

Secondly, as tourists are a vast contribution to the pressure on resources (over 329.000 visitors in 2023 compared to around 30.000 inhabitants and have a significant impact on how food is managed, their views needed to be included in the qualitative analysis (The Directorate of the Galapagos National Park & Directorate of Public Use of the DGNP, 2022;O'Hara, 2024). In order to approach tourists best, the chosen method was to conduct a survey (its set-up is elaborated on in Appendix J). The most interesting finding was that all respondents mentioned that its consumption is either somewhat, quite or very important to them. This high-lights that almost all tourists – taking the sample group into account - value local consumption, for which they gave reasons such as *'development of local producers and workers'*, '*local produce has less environmental impact, it is fresher and expresses local culture through local dishes*' and '*I believe consuming local prod-ucts of any regions is key to understanding that region*'. Their motivations to consume locally were thus based on economic, social, environmentavl and cultural reasons.

On the other hand, respondents also mentioned struggling with identifying which products are exactly local by stating *'Generally I would try to understand the local access… but, without additional indication, this is not always easy to understand'*. They also mention relying heavily on the knowledge of local staff (from restaurants or shops or naturalist guides): '*We have a guide who comes from Ecuador, without him it would be difficult to explore what is local and what not'*.

When asking for any recommendations on how to promote local consumption, the following activities were mentioned more than once:

- Labelling local food on menu's (3x)
- Clearly state which restaurants serve local food (3x)
- Increase import taxes (2x)
- Run campaigns to highlight the benefits of local products (2x)

When ranking these different strategies, 77% of the respondents ranked highlighting local products on the menu as the **most effective** in promoting local consumption. Additionally, it was mentioned that cooking workshops, fishing tours and farms visits would be interesting in terms of ecotourism activities.

5.2.3 Findings from the coffee sector

During the fieldwork phase, it became clear that the only sector which is experiencing very few political, social or ecological issues is the coffee sector. Additionally, the sector is waste-free as all its by-products can be upcycled, recycled or ultimately composted, providing rich nutrients to the soil (Research participant B4, 2024). Furthermore, it is considered as a thriving agricultural sector, providing welfare, job opportunities and a product Galapagos trademark which is known nationally as well as internationally.

One of the entrepreneurs that were interviewed were the owners of roaster and café Islander coffee roasters. The goals of Islander are to be transparent in their supply chains, to minimize waste and reduce their environmental impact as much as possible and lastly, to honour farming culture and promote fair trade products. Islander roasts locally-grown coffee beans and is in close contact with two coffee farmers who supply them with beans. *'Al apoyar estos métodos [de cultivo tradicionales], contribuimos a garantizar que la tierra siga siendo fértil y saludable para las generaciones futuras. Por ejemplo, uno de nuestros proveedores utiliza técnicas de rotación de cultivos y agricultura orgánica, lo que reduce la necesidad de productos químicos nocivos y garantiza la salud del suelo.'* [1] (Research participant B4, 2024)

Figure 24: Illustration of the coffee process (created by author)

This coffee process of Islander is visualized in Figure 24, where the left side illustrates all the steps undertaken to brew a cup of coffee and the right side shows the five different by-products. Here, the '*defectos*' (unusable beans) are composted, the '*cascaras*' (red skins) are used for brewing tea and the '*piel de café*' (parchment skins) can be used for beauty products or producing paper. The ground coffee can also be used in beauty products but is mainly an excellent fertiliser which can be used on the farms.

Because of climate change, the coffee beans are now harvested throughout the whole year (Research participant B4, 2024). By rotating their crops, farmers can ensure that the trees bloom in different seasons which ensures a reliable supply. Using a Material Flow Analysis, the weight of the waste products can be analysed and thus the mass of by-products in one harvest year. The model for one harvest year of Islander coffee roasters (2022/2023) is shown in Figure 25.

1 *By supporting these [traditional farming] methods, we help ensure that the land remains fertile and healthy for generations to come. For example, one of our suppliers uses crop rotation and organic farming techniques, reducing the need for harmful chemicals and ensuring soil health.'*

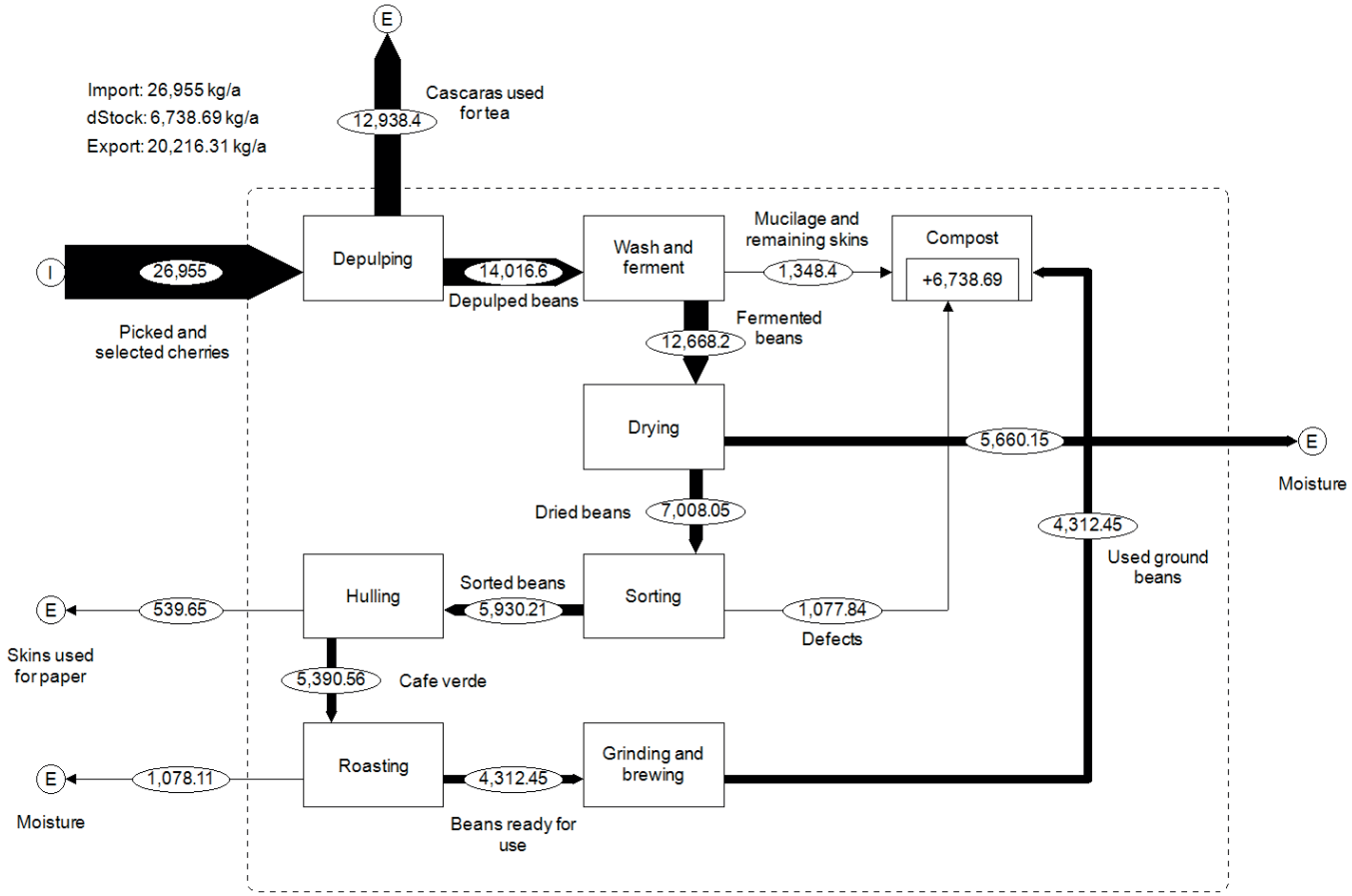


Figure 25: Material Flow analysis of the coffee cycle of Islander Coffee Roasters and partners for harvest season 2022/2023 (created by author)

In the harvest season of 2022/2023, Islander coffee roasters bought a total of 5391 kg of Café Verde from their suppliers, which is the bean pre-roasted. Literature shows that the Café Verde is around 20% of its' original weight, which means that the mass of the red cherries – which signify the start of the coffee process – is 26.955 kg (Rotta, 2020). The rest of the coffee process is mapped in Figure 22 as told by Maria Belen and Daniel Andrade (raw data can be traced in Appendix K) and enriched by the data of Rotta (2020). As seen in the model of Figure 25, the cycle is closed through a composting process which converts the by-products of mucilage, defects and ground coffee into usable compost (either to be used on the same coffee farm or to be sold to other farms). Other by-products that leave the cycle are the moisture that evaporates from the drying and roasting process, the so-called 'cascaras' which are the red skins of the coffee beans and the parchment skins of the beans ('Piel de café'). The cascaras are seen as an export product, as they can be sold and used for tea. The use for piel de café is relatively unexplored, however, the silver skins can be used for making paper. Overall, what is learnt from the quantitative analysis, is that it gives a good insight into the organic material waste streams and its impacts but also how these byproducts can be efficiently used. For example, from interviews, it was understood that the piel de café was a by-product in which producers are very interested in exploring options for processing it. However, analysis through the MFA model highlights that the mass of these skins is neglectable compared to the mass of the cascaras and the ground beans. These insights are useful information for entrepreneurs to decide which products to invest finding a new purpose.

The learnings from the coffee sector, qualitatively as well as quantitatively, will be appliedv to the imagined strategies and recommendations and will be communicated to the entrepreneurs working with coffee for them to be able to use the insights.

5.2.3 Findings from the co-creation session

Lastly, to close off and validate the interview and survey outcomes, a workshop was organized. This workshop accompanied a photo exposition that highlighted the pictures of 10 entrepreneurs (5 male and 5 female), working either as coffee- or produce-farmer, fishers or intermediaries. They were shown next to their products. These picture combinations are highlighted in Figures 26 to 35. This photo exposition was hosted with a threefold goal. To show appreciation for the entrepreneurs and their contributions, to host an event where local production and consumption is a topic of discussion and its importance is highlighted to anyone visiting the exposition and lastly, to give inspiration to the co-creation workshop conducted later the same day.

Figure 26 (top): Pictures of Research participant B4 (created by author)

Figure 27 (bottom): Pictures of Research participant A6 (created by author)

Figure 28 (left top): Pictures of Research participant B2 (created by author)

Figure 29 (left bottom): Pictures of Research participant B1 (created by author)

Figure 30 (right): Pictures of Research participant A5 (created by author)

Figure 31 (left top): Pictures of Research participants A4 (created by author)

Figure 32 (right): Pictures of Research participant A7 (created by author)

Figure 33 (left bottom): Pictures of Research participants A1 and A3 (created by author)

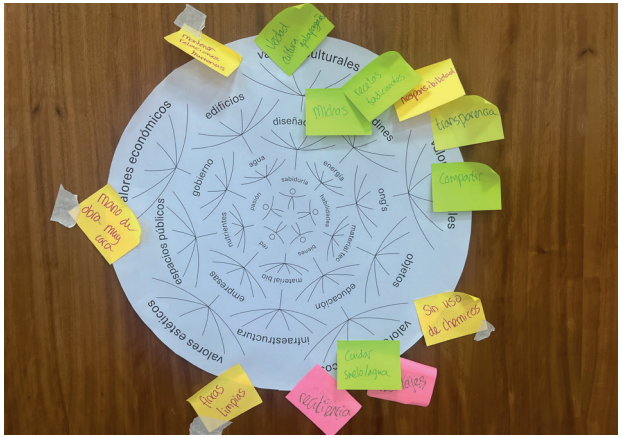
Figure 34 (top): Pictures of Research participant E1 (created by author)

Figure 35 (bottom): Pictures of Research participant E2 (created by author)

The exposition took place in the interpretation centre in Bellavista, a town in the highlands. This location was chosen to actively make an effort to approach the farmers who mainly live in the highlands. Thus, the location was more accessible to the farmers as they often did not have cars at their disposal.

The co-creation workshop was set up twofold. The first part was about mapping communal and differentiating values and the second part focused on the opportunities that the entrepreneurs foresee to work towards a more regenerative food system. Here, the main goal was to validate the insights that were gathered during the interviews and observations. Six entrepreneurs took part in the workshop, who were a combination of produce farmers and intermediaries (3 farmers and 3 intermediaries).

The values were mapped using the Circular Value Flower as a reference point (Figure 36). When discussing our values, the main conversation revolved around the unique culture of the Galapagos, with its mixture of traditions, ingredients and recipes. This culture is often overlooked by tourists and visitors, who are interested in seeing the natural elements. The entrepreneurs' main shared values were '*Sostenibilidad*' (Sustainability), '*Honestidad*' (Honesty) and '*Precios justos*' (Fair pricing). This highlighted again the need for transparent supply chains and prices that reflect the investment costs and labour well. More individual values were considered '*Vista del futuro*' (their views of the future) and '*Trabajo traditional*' (Traditional practices). These values are, generally speaking, shared amongst the entrepreneurs but their application varies across businesses.



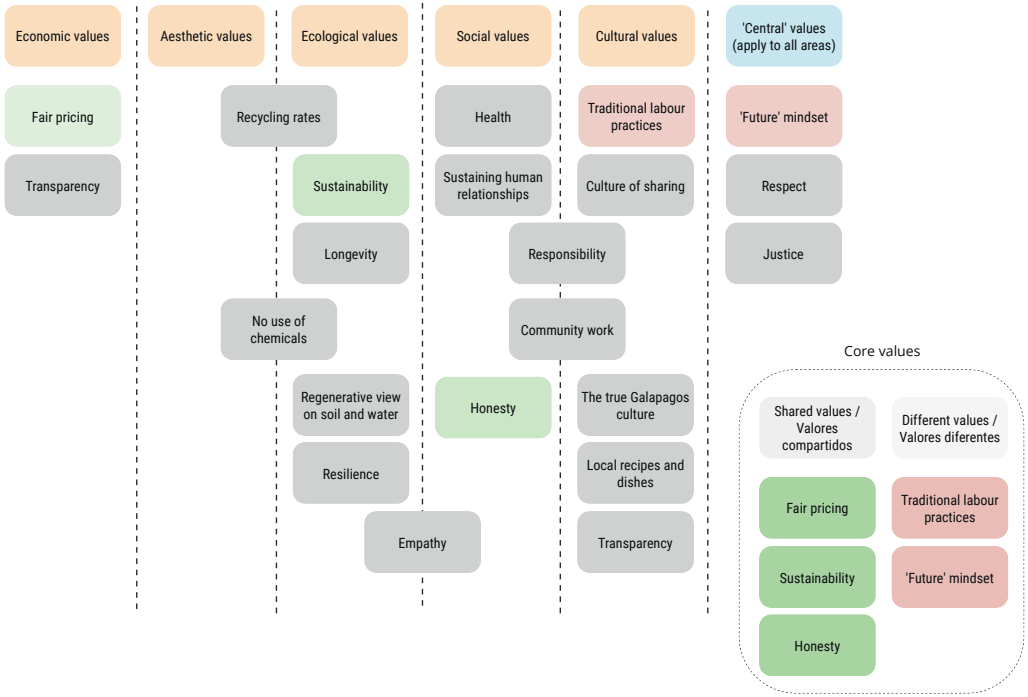


Figure 36 (left top): Use of the CVF as a reference point (co-created by research participants of this research)
Figure 37 (right): The mapped values categorized per value and highlighting the overlap between values (created by author)
Figure 38 (left bottom): The mapped values categorized per value and highlighting the overlap between values (created by author)

Figure 37 highlights all categorized values into the same values as the Circular Value Flower but showcases the overlapping values better. Both their shared and different values are reflected in Figure 37 in the dotted box on the right-hand side, as decided during the co-creation workshop. Mapping these values makes sure that the entrepreneurs first get a feel for what connects and differentiates them and therefore is a valuable first step towards generating impactful ideas.

Then, we moved on to part 2 of the workshop which was about the stakeholders and possible strategies. The stakeholder map was set up in the workshop as a so-called ecosystem map, where the core reflects the food sources and the distance between the source and the product visualised the symbolical distance to the product (Figure 38). Although setting up this model did not give any new insights, it helped the stakeholders to better understand the supply chains and to realize their posi-tion in them.

After discussing the stakeholders, the last phase was to collectively create (co-create) strategies that are able to mitigate the challenges which the entrepreneurs currently experience. The sheets on which the ide-as were collected can be found in Appendix L and will now be shortly synthesized.

The main topic discussed was education, which was considered in two ways. First of all, it was mentioned how producers could benefit from training in marketing, finance and business so they can compete better with products from mainland Ecuador. Secondly, it was discussed that youth should be stimulated to learn about (mainly) agricultural practices better. This could be promoted through an educational programme, with site visits or by setting up a living lab where knowledge is shared and community is built. Next to education, the coffee sector was taken as an example to highlight how banning imports of certain products can contribute to boosting that sector locally. Lastly, the participants talked about the difficulty of working with intermediaries and that fair pricing remains a struggle for most entrepreneurs, although no strategies resulted from that outcome. An observation during the workshop was that these entrepreneurs do not seem to connect regularly and opportunities to develop a common strategy are scarce, hence an important strategy that came out of the co-creation workshop was that these should be held more often.

5.3 Results for SRQ3

Phase 3 follows up on the fieldwork phase and answers sub-research question 3: 'How can these strategies be linked to the principles of regenerativity to facilitate future implementation?'. The outcome of this SRQ, after interpretation in Chapter 6, are two models. One visualizing the 5 R's of regenerativity and a framework connecting the strategies to these R's. This sub-chapter briefly highlights a Sankey diagram that connects the strategies, which were set up in phase 2, to the overarching themes with which the model can be created (Figure 39).

As visible in Fvigure 39, most strategies are connected to infrastructural improvements and changing mental models (equally 9 connected strategies). 5 strategies connect to setting up physical connection spaces and thirdly, 2 strategies connect to education and participatory design each.

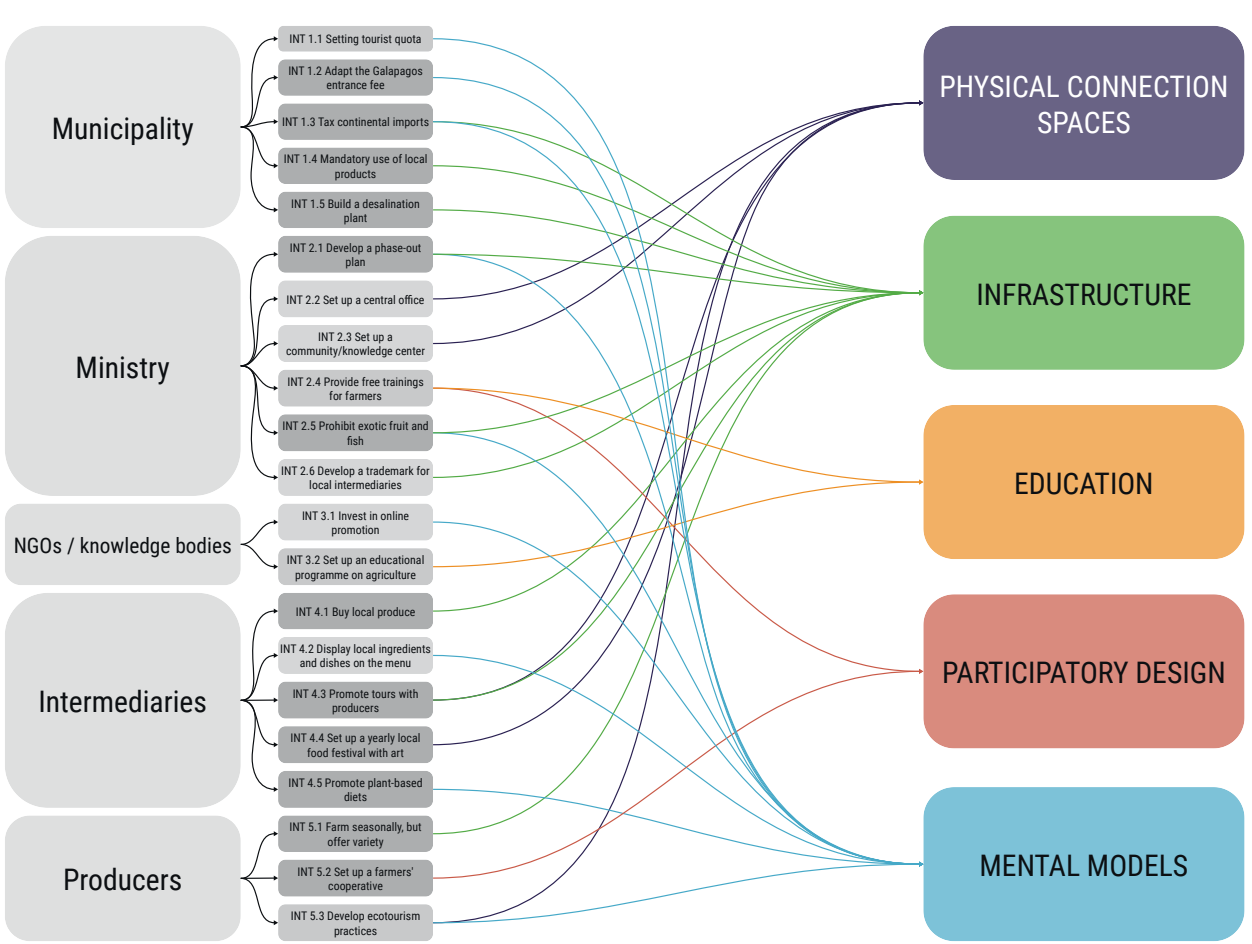


Figure 39: Flow diagram representing how the separate strategies connect to overarching themes (created by author)

6. Discussion & Limitations

This chapter will take the results discussed in Chapter 5 and interpret them to answer the research questions accordingly. To recap, the (main- and sub-) research questions to be answered in these chapters are:

'In what way can bioregional regenerative food systems, developed using principles of circular communities, contribute to overcoming socioecological challenges in the food sector of Santa Cruz and San Cristobal – islands of the Galapagos archipelago?'

Sub-RQ 1: What are the (social, environmental, political and economic) challenges that lead to and result from the current management of the local food industry on Santa Cruz and San Cristobal island?

Sub-RQ 2: 'Which impactful strategies [for the local food systems] can be co-created bottom-up, guided by the principles of circular communities and convivial conservation, that can multisolve the current challenges?'

Sub-RQ 3: How can these strategies be linked to the principles of regenerativity to facilitate future implementation?

6.1 SRQ1 – What are the (social, environmental, political and economic) challenges that lead to and result from the current management of the local food industry on Santa Cruz and San Cristobal island?

The findings from literature (5.1.1) and the fieldwork phase (5.1.2) interconnect the encountered socioeco-nomic, political and ecological challenges which can be visualized in a Causal Loop Diagram (CLD). Although visually complex, CLDs have the power to transform a set of drivers and impacts into their interrelated is-sues. How the different drivers and impacts are connected, helps the researcher to understand the problem context in detail (De Pinho et al., 2015). From these interconnections, reinforcing or balancing loops can also be identified to which interventions can be applied (elaborated on in 6.2). The Causal Loop Diagram of the food system on the Galapagos is reflected in Figure 40 and Figures 41-52 will highlight several reinforcing loops of the CLD.

As seen in Figure 40, the system contains variables, connections and reinforcing or balancing loops explained as follows:

- **Variables** are all the coloured boxes, they represent a certain activity or factor that influences another element of the system. They are divided into six different themes, such as education or infrastructural elements. This helps making the diagram readable and guides how the diagram should be analysed.
- **Drivers** are variables which affects another variable, the outcome
- Outcomes are variables which are affected by another variable, the driver
- **Key outcomes** are the variables which are considered the main challenges which the model aims to address and all form the end of a cycle, meaning that there are only incoming and no outgoing arrows. The model in figure 37 highlights the outcomes 'Material dependence', 'Ecological pressures', 'Effective conservation strategies' and 'social cohesion'.
- **Connections** highlight how the different variables connect to each other. This is done by illustrating an arrow between the driver towards the outcome. Every connection has a value, which is either reinforcing (+) – meaning that a positive driver results in a positive outcome, but also that a negative driver leads to a negative outcome – or balancing (-) which means the opposite: A positive driver, leads to a negative outcome or vice versa.
- **Delays** signify that the effect of a driver cannot be remarked immediately but over an unspecified amount of time. For example, in Figure 41, the transport emissions that lead to climate change.

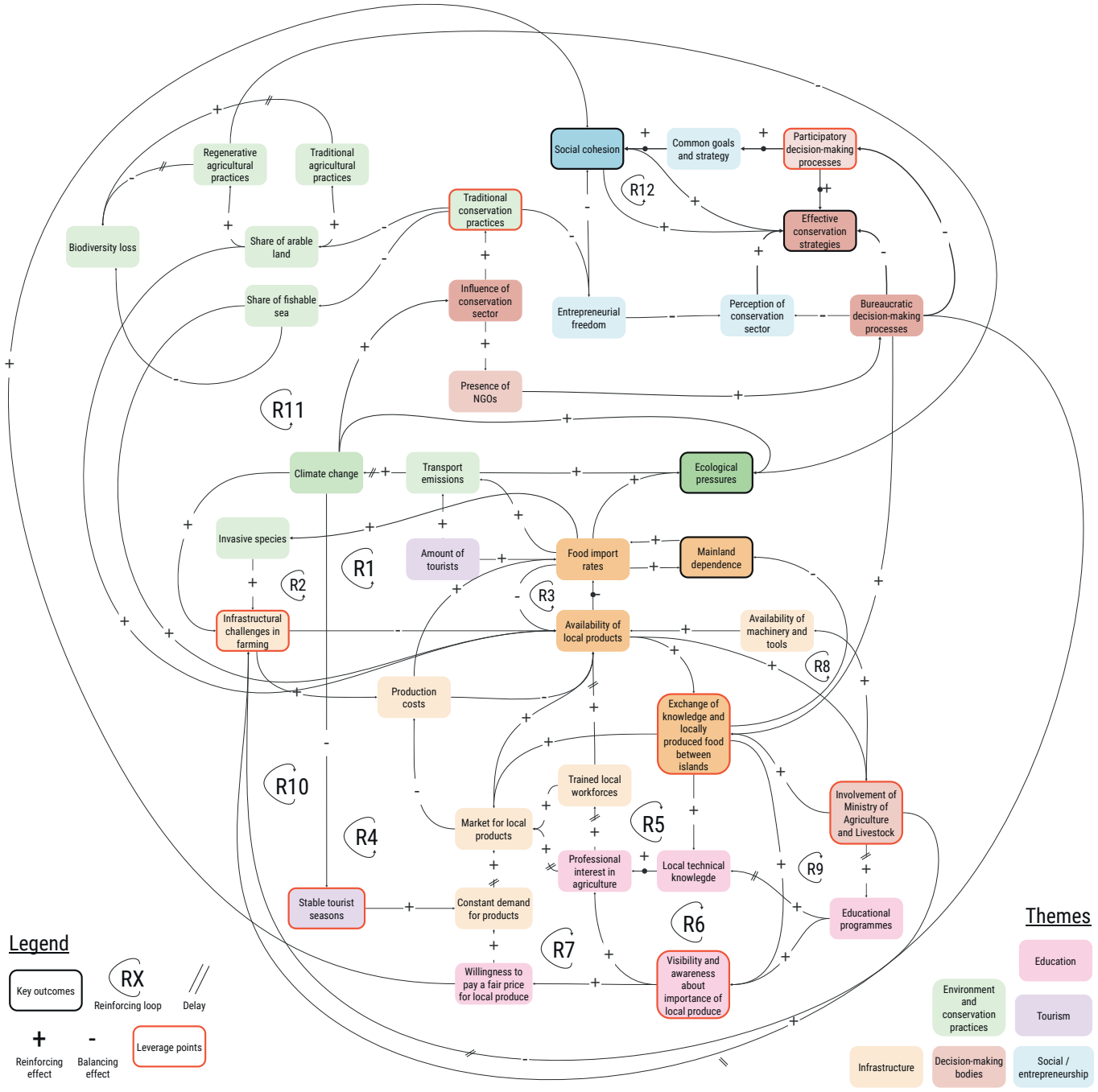


Figure 40: Causal Loop Diagram of the food system on Galapagos (created by author)

- Reinforcing loops are loops of variables and connections that lead to a spiral effect, enforcing every element in the loop and eventually creating spiral-like effects – whether positive or negative. These loops are helpful to recognize harmful or beneficial cycles to which strategies can be applied.

Figures 41 to 52 highlight twelve different reinforcing loops, which will be discussed now.

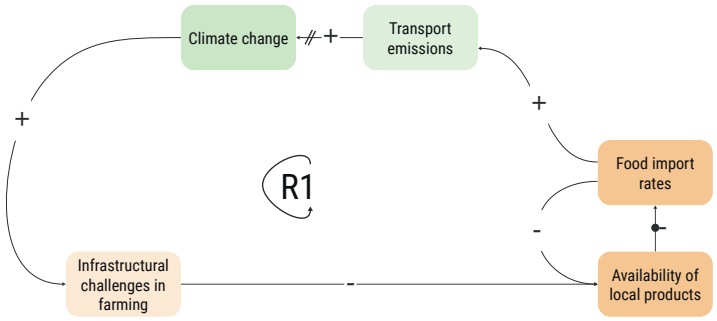


Figure 41: Reinforcing loop 1 (created by author)

R1 (Figure 41) shows how the effects of climate change affect the amount of challenges in farming, such as unstable seasons or longer periods of drought (Arora, 2019). These challenges then affect how much produce can be farmed locally which indirectly contributes again to climate change through transport emissions.

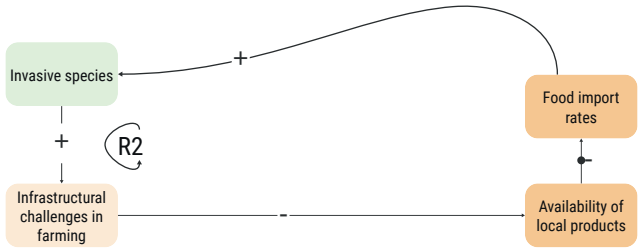


Figure 42: Reinforcing loop 2 (created by author)

R2 (Figure 42) points out the connection between the amount of imports and the amount of invasive species. This figure learns us that a decrease in imports could help to limit the amount of invasive species and therefore help increase the availability of products.

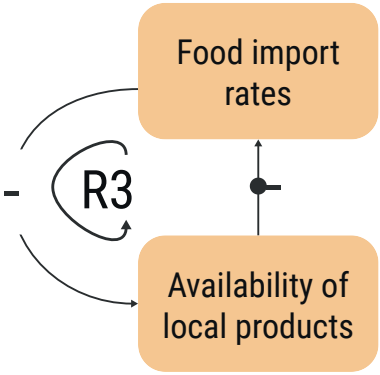
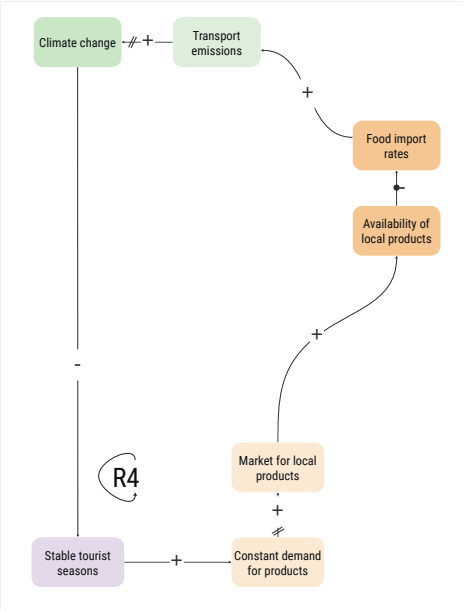


Figure 43: Reinforcing loop 3 (created by author)

R3 (Figure 43) connects the import rates of the food system with the availability of locally produced products. They both have a balancing effect on each other (higher imports > lower availability of local food and vice versa), however, when connected in a loop they become reinforcing.



R4 (Figure 44) emphasizes how climate change can lead to more unstable tourist seasons (Amelung et al., 2007). This instability lessens the constant demand and thus decreases market opportunities, increases pro-duction costs and availability of local products. This loop teaches us that stable tourist seasons will have a significant effect on the demand for (local) products and could thus incentivize a local product market.

Figure 44: Reinforcing loop 4 (created by author)

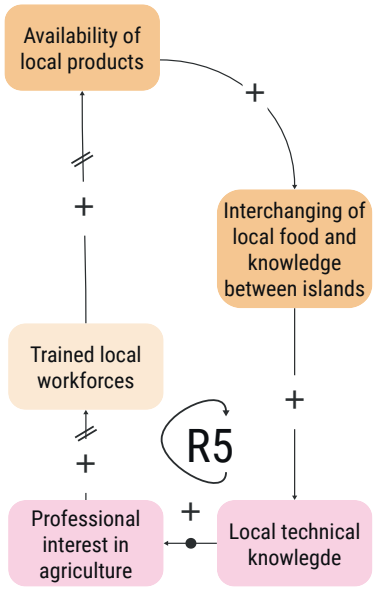


Figure 45: Reinforcing loop 5 (created by author)

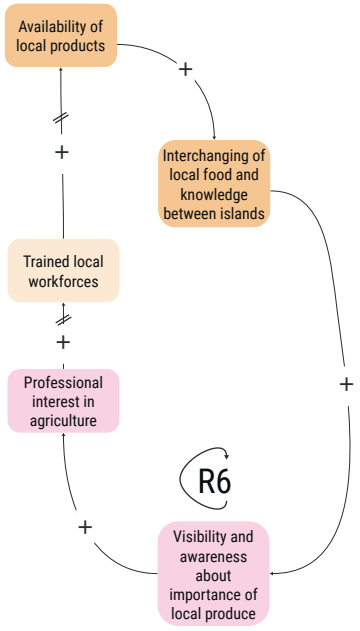


Figure 46: Reinforcing loop 6 (created by author)

R5 and R6 (Figures 45 and 46) are important to highlight that the interchanging of food between islands can help to increase the interest in agriculture through its visibility and knowledge exchanges.

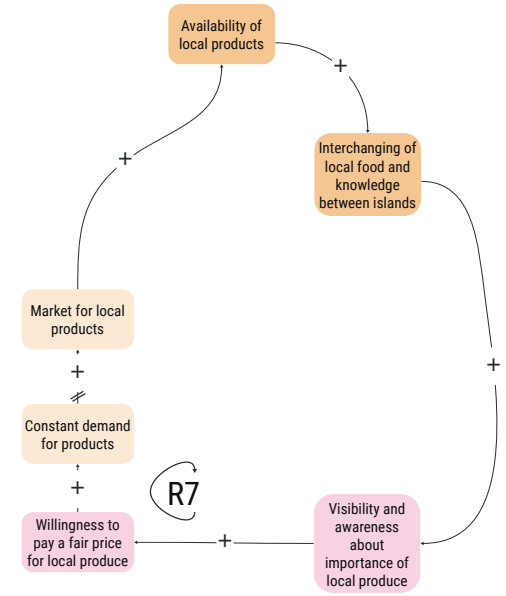


Figure 47: Reinforcing loop 7 (created by author)

R7 (Figure 47) highlights a similar pattern as Figure 43 (R6) by showing how visibility of local produce can help to increase the willingness to pay a fair price for products and therefore helps build a market. Again, it shows how a stimulus of local exchange helps to increase the availability of local food sources.

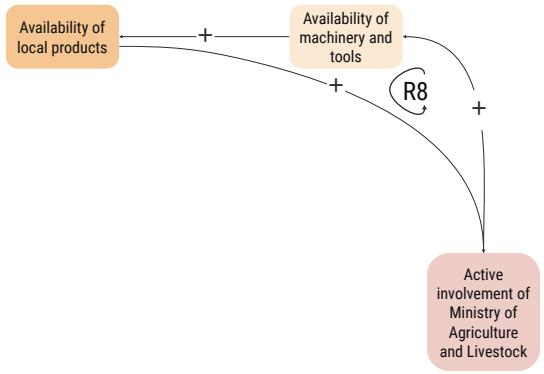


Figure 48: Reinforcing loop 8 (created by author)

R8, R9 and R10 (Figures 48,49 and 50) accentuate that the involvement of the Ministry of Agriculture and Livestock plays a key role in promoting educational programmes, and technical improvements and helping to counteract infrastructural challenges such as the lack of running clean water.

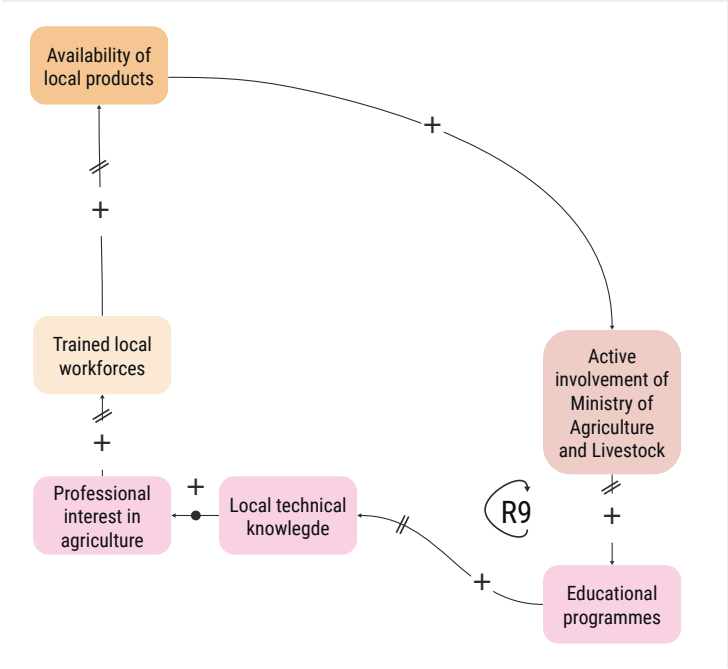


Figure 49: Reinforcing loop 9 (created by author)

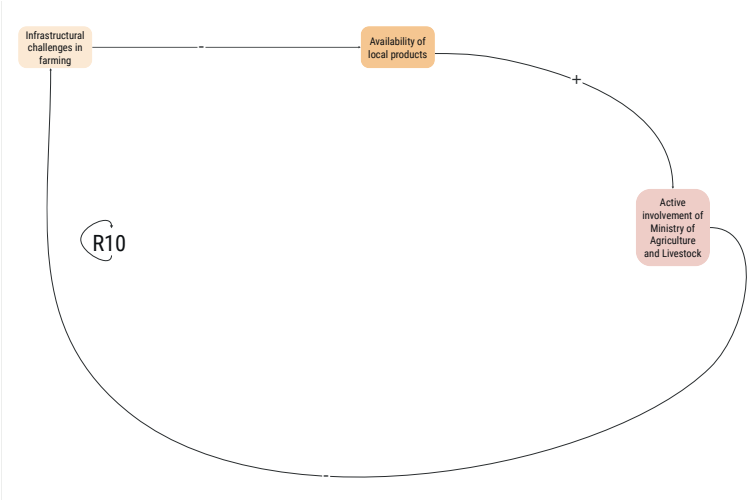


Figure 50: Reinforcing loop 10 (created by author)

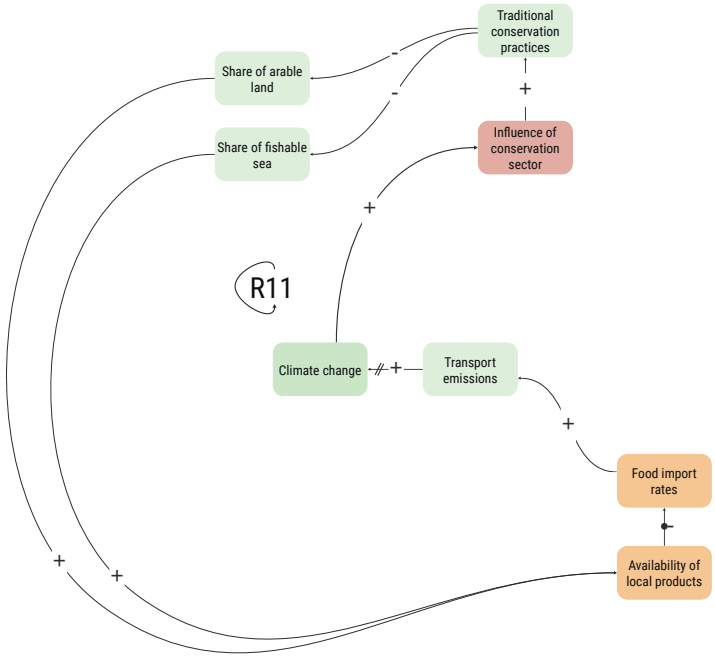


Figure 51: Reinforcing loop 11 (created by author)

R11 (Figure 51) points out how traditional conservation practices can decrease the share of arable land and fishable sea (Millhause & Earle, 2022). Therefore, decreasing the availability of products and further increas-ing the mainland dependence and ecological pressures.

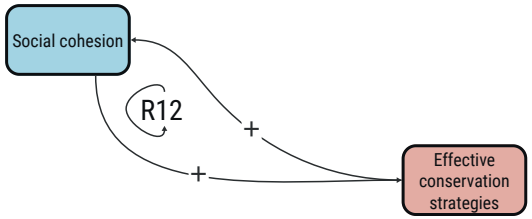


Figure 52: Reinforcing loop 12 (created by author)

Lastly, R12 (Figure 52) highlights how social cohesion can reinforce the effect of conservation strategies and how (in)effective strategies can reinforce the amount of social cohesion (Buscher & Fletcher, 2020). It is important to realize that these outcomes have a reinforcing effect on each other.

Overall, the causal loop serves a twofold function. First of all, it confirms the impacts found in the DPSIR analysis (Chapter 3). The Causal Loop Diagram builds on the DPSIR diagram and is enriched with findings from qualitative research. However, unlike the DPSIR, this model focuses on local food products and left waste management out of scope as this issue was mitigated in recent years (Castillo Pazmiño et al., 2022).

The following societal challenges can be extracted from the analysis of the CLD. These issues being aggravated by the current situation, as emphasized by the reinforcing loops in Figures 41-52, and will become the focus of the co-created strategies.

First and foremost, it needs to be discussed that the **amount of tourists** coming to the islands is detrimental to any sustainable management of resources. Even though tourism is a major driver to the economy, as long as it is not limited, the carrying capacity of the island's resources is continuously trespassed and all social, political and ecological issues – such as the issues surrounding local food production - are being ag-gravated (The Directorate of the Galapagos National Park & Directorate of Public Use of the DGNP, 2022). Additionally, it must be noted that the effects of climate change can influence the stability of tourist seasons and therefore the stability of the market (Figure 44, reinforcing loop 4).

Secondly, **governmental bodies** (such as the Santa Cruz municipality and the Ministry of Agriculture) **do not invest in a local food system**. This was remarked by almost all interviewees. Their support lacks two-fold.

- Infrastructurally, a big issue on Santa Cruz continues to be a lack of clean running water, making it logistically complicated and expensive for farmers to execute their work (Figure 50, reinforcing loop 10).
- Procedurally, the Ministry is extremely inaccessible and not visible with any campaigns or in a public location. Getting in contact is a long bureaucratic process and success is not guaranteed. There also is no record of any long-term strategy in which the islands want to increase local production and consumption. On top of this, the municipality subsidizes imported food making it disproportionately cheap which makes it even harder for local products to compete financially.

Reinforcing loops 8, 9 and 10 in Figures 48, 49 and 50 additionally highlight how higher involvement of the Ministry of Agriculture and Livestock can help overcome infrastructural issues and promote education and awareness.

Invasive species such as overgrowing plants and exponentially increasing amounts of rodents which present enormous challenges to both the conservation and agricultural sector on which they are already actively collaborating. The amount of invasive species is directly related to the import rates as perishable food imports often carry insects and rodents (Figure 42, reinforcing loop 2). Having a more self-sustaining food system on the Galapagos islands would thus not only decrease ecological pressures based on climate change, but also by limiting the amount invasive species coming in. Overall, the lack of a local food system leads to high **mainland dependence** (Figure 43, reinforcing loop 3) and **ecological pressures** due to transports and invasive species. Research participant D3, an employee of NGO Heifer who is specialized in the market mechanisms of farmers, states: *'A futuro, el sistema alimentario en las Galápagos necesitará de incentivos más sólidos para apoyar a los productores locales y reducir la dependencia de las importaciones. Para lograrlo, es necesario un enfoque integrado que involucre tanto a los productores como a los consumidores, además de un marco de políticas públicas que fomente la sostenibilidad y reduzca la dependencia de productos importados.'*[1] (Research Participant D3, 2024).

Then, it was highlighted many times that intermediaries such as restaurant owners, cruise ships and tour operators play a key role in promoting local consumption. As the power-interest matrix highlighted, they are the gateway that determines the options consumers have and therefore are considered a powerful stakeholder and key actor. However, these parties often opt for **revenue maximisation** and therefore either decide to import food – which continues to be cheaper – or exploit the producers by refusing to pay a **fair price**. The CLD highlights that the willingness to pay a fair price directly influences the demand and market opportunities for local products and therefore has a high importance to act on.

The most **social tension** was observed between the fishermen and the conservation sector due to their long history about the zoning system. They mention to have lost their trust in NGO's and decision-making bodies. Both the farmers as well as intermediaries acknowledge the importance of conservation, however, feel a lack of support towards their businesses. Also, the farmers experience tension towards intermediaries as the common perception is that intermediaries are not willing to pay fair prices.

1 *'In the future, the food system in the Galápagos will need stronger incentives to support local producers and reduce reliance on imports. To achieve this, an integrated approach is needed that involves both producers and consumers, as well as a public policy framework that fosters sustainability and reduces dependence on imported products.'*

These parties often don't collaborate closely as well, worsening the polarisation and social cohesion. A common thread amongst all entrepreneurs is that they **feel unacknowledged** for their contributions to the economy, society and health of the ecology (Figure 22).

Lastly, the issues of social cohesion, unsupportive perception of the conservation sector and strong bureaucratic decision-making processes lead to **less effective conservation strategies** (Figure 52, reinforcing loop 12). Additionally, reinforcing loop 11 (Figure 51) tells us that traditional conservation strategies limit the amount of 'productive' land and sea, increasing mainland dependence and creating a human-nature dichotomy. Applying principles of convivial conservation and regenerativity could help create conservation policies that are effective and inclusive.

6.2 SRQ2 - Which impactful strategies [for the local food systems] can be co-created bottom-up, guided by the principles of circular communities and convivial conservation, that can multisolve the current challenges?

In order to categorize the interventions per stakeholder, the key actors need to be defined. To do so, the stakeholder map was transferred to a Power-Interest matrix (Figure 53), based on the observations made and the stories heard during the fieldwork phase. It must be noted that this Figure is no absolute truth but set up in context to the qualitative research.

The matrix in Figure 53 does not only reflect the different stakeholder groups but also how they relate to each other in terms of position of power. It highlights that the Ministry of Agriculture, the local USFQ department and the NGOs are the parties with the most interest and power. An example of an NGO that is actively contributing and in close collaboration with the farmers is Heifer. Heifer is an international organisation that aids farmer families to support themselves financially and contribute to a local food system (Heifer, 2024). An employee of Heifer Ecuador, explains: *'Trabajamos principalmente en comercialización y formación de capacidades en el ámbito rural. Este enfoque no solo mejora las capacidades productivas de los agricultores, sino que también fortalece el tejido social de las comunidades rurales, creando un ambiente colaborativo.'* [1] (Donaldo Navarette, 2024).

Additionally, Figure 53 shows that the Municipality is noted to have high power, but low interest and the producers such as fishers and farmers have high interest but low power. These stakeholders are all parties that either have high power or high interest and therefore are considered the **key actors** for which recommendations will be made. The intermediaries are also grouped and marked as key actors, as they have a gateway position in connecting to the consumer.

1 *'We primarily work in marketing and capacity-building in the rural sector. This approach not only improves the productive capacities of farmers but also strengthens the social fabric of rural communities, creating a collaborative environment.'*

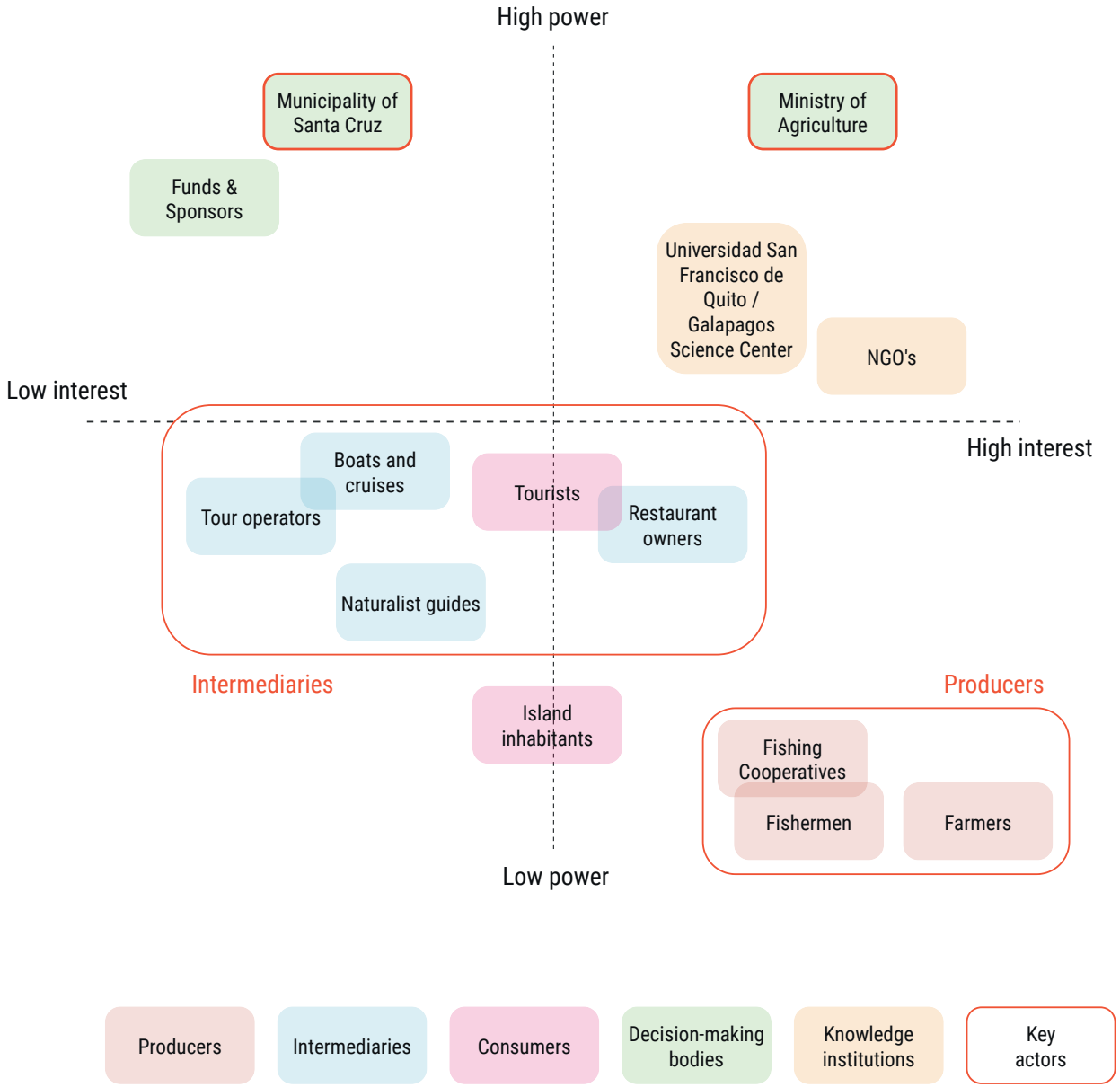


Figure 53: The Power-Interest matrix (created by author)

Next to the key actors, the so-called leverage points can be extracted from the CLD in order to determine the potential impact that the strategies can have. **Leverage points** are points in a system where a strategy can be applied so that micro-changes take place. These micro-changes are transformed into macro-changes over (undefined) time, where they have a reinforced effect. The leverage points are determined based on their effects in the reinforcing loops. For example, in reinforcing loops 8,9 and 10 (Figures 48, 49 and 50), all loops can be positively influenced when the involvement of the Ministry of A&L is higher. In this example, the leverage points that the imagined strategies will focus on (7 leverage points in total), such as the involvement of the Ministry of A&L, are divided up into physical, informational, social and conscious leverage points (De Pinho et al., 2015):

- **Physical leverage points** (least effective in system changes) are considered to be: Infrastructural improvements in the farming sector by means of higher involvement of the Ministry of Agriculture and Livestock.
- An **Informational leverage point** is to find strategies to improve the visibility and communicational strategies of the Ministry of Agriculture and Livestock.
- **Social leverage points** have a high leverage potential in this system and often relate to the rules and goals of a system, these would be stable tourist seasons and to exchange of knowledge and products between islands;
- The leverage points with the highest potential are **conscious leverage points**, which aim to shift a mindset or paradigm and challenge current assumptions. In the Galapagos food system, these points would be to lessen traditional conservation practices and to implement participatory decision-making processes.

All strategies came forth from the conducted interviews and the co-creation session with intermediaries and farmers (of which the process was described in Chapter 4.3 and the outcomes in Chapter 5.2) and were in-spired by the coffee sector which – as explained in Chapter 5.3.2 – has grown to be a profitable and productive sector in the last 10 years.

As the research participants were asked to take their values (mapped with the CVF) into account when im-agining strategies, means that all strategies are geared to foster these personal values. The workshop high-lighted that the most important shared values were '**Fair Pricing**', '**Sustainability**' and '**Honesty**'. Values were geared more towards their individual preferences, such as varying **traditional labour practices** they apply in their work field and their different **outlooks on the future**. Additionally, strategies are separated from recommendations based on their actionable nature and swift implementation (within 10 years).

Figure 54 displays these strategies and recommendations, divided into the different leverage points which they act upon. Although the leverage points determine the long-term effectiveness of the strategy, this does not determine its value as all leverage points need to be acted upon to have successful system change. It is noteworthy that, although the strategies are designed in a bottom-up manner where entrepreneurial voices have been leading, the strategies themselves are partially top-down. As they are meant to be actionable within 10 years, they need to fit into the current top-down system. At the moment, farmers and entrepre-neurs have little power and decision-making bodies will have to play an active role in order to set up a re-generative economy. The recommendation chapter (Chapter 7) will elaborate on how future research can contribute to setting up more participatory decision-making processes and this could shift the political paradigm moving forward.

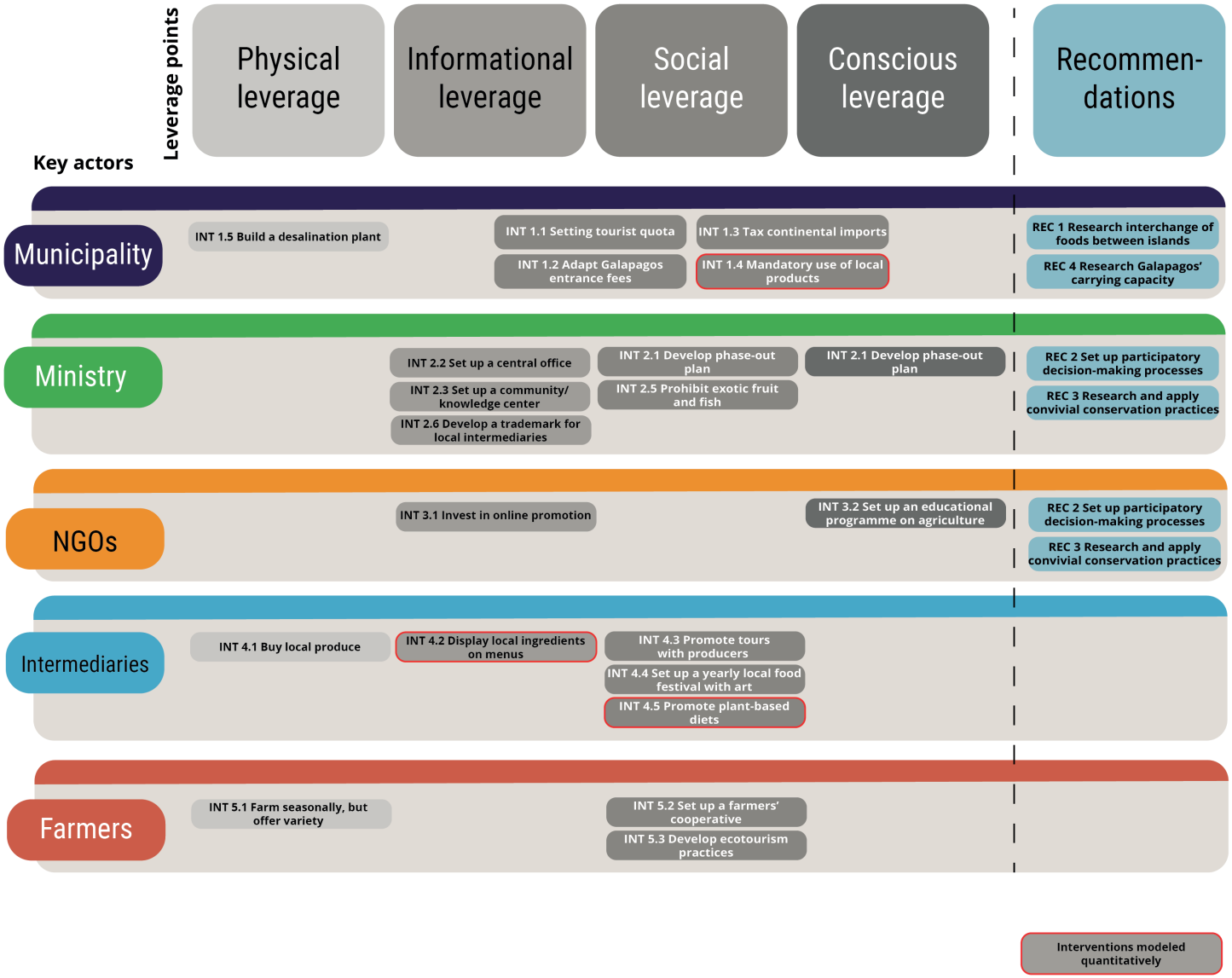


Figure 54: All strategies, categorized by leverage and actionable stakeholder (created by author)

Almost all strategies are geared to multisolve at least two key outcomes (outlined black in the CLD in Figure 40). For example, strategy 1.3 (taxing continental products) decreases dependency on mainland as well as decreases ecological pressures. Strategy 2.6, developing a trademark, also decreases ecological pressures whilst strengthening social cohesion and indirectly contributes to a more effective conservation strategy.

A timeline in which these strategies could be implemented is displayed in Appendix M. Appendix N highlights the Value Flower Field Map for the set of imagined interventions, a map based on the Circular Communities methodology discussed in Chapter 3.2.2 that highlights how the interventions are dependent on resource availability and spark value creation. The next subchapters will explain all strategies in more detail, categorized per stakeholder as displayed in Figure 54.

6.2.1 Strategies for the local municipality of Santa Cruz

The municipality, scoring as high power and low interest on the PI-matrix (Figure 50), plays a high-level key role in regulating tourism and food imports. First of all, as tourism heavily influences food demands, the strategies on tourism are discussed:

INT 1.1 Setting tourist quota: Talking to entrepreneurs (producers as well as intermediaries), it became obvious how the high- and low-tourist seasons have a distinct influence on the way that resources are managed. The high season starts in December and runs to around July/August in which months the islands are flooded with people. The low season is from August until November, leaving the streets empty and the economy running dry. Even though this is a common problem in places that depend heavily on tourism, the municipality – or even the central Ecuadorian government, could aid this problem by regulating tourism better by for example setting a tourist quota which prevents the extremely high and low peaks and offering certainty for the local inhabitants.

INT 1.2 Adapt the Galapagos entrance fee: As a tourist, you pay an entrance fee to the Galapagos National Park, which is used to manage resources sustainably. However, research of the Galapagos Conservation Trust shows the comparison of National Park fees to a Park in Tanzania and Kenya, where the weekly fee is up to 10 times higher compared to the Galapagos where tourists can also stay up to 60 days without a visa (Figure 56, O'Hara & Galapagos Conservation Trust, 2024). As increasing the general fee could lead to exclusion and travel elitism, the fee could be adapted to the number of days spent on the Galapagos to discourage too short stays. This would also align with principles from Convivial Conservation, where visitors should be encouraged to have longer stays to stimulate higher engagement with nature and the local community and culture. For example, a 1-week visa could cost more than a 2-week visa and a 4-week visa might be most profitable. The optimum visiting time for both ecology and economy should be researched further. Stays of less than a week could be prohibited in order to avoid so-called 'Whirlwind' or 'Tick-box' tourism, often focused on only seeing highlights.

Then, the municipality could implement the following strategies on food (imports):

INT 1.3 Tax continental food imports: Currently, imports of food are subsidized by the government. This financial incentive leads to high imports and low consumption of local production. In

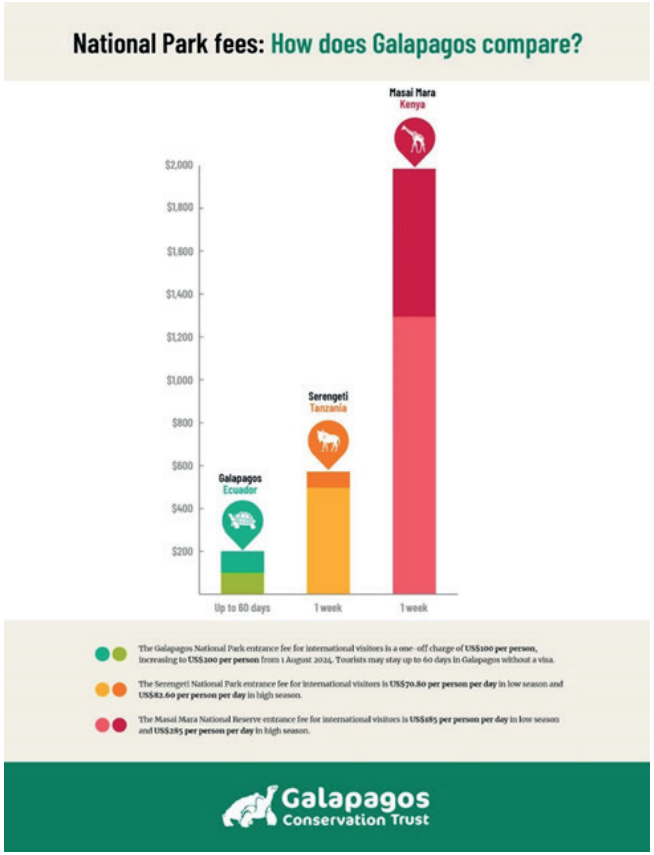


Figure 55: The Galapagos fee compared to the Serengeti and Masai Mara (O'Hara & Galapagos Conservation Trust, 2024)

order to promote a regenerative system, municipalities will need to turn the financial incentive upon local produce – ensuring fair pricing for local entrepreneurs. Taxing imports from mainland Ecuador will also generate extra municipal income, which could be invested into the local agricultural system to prevent high local food prices and risks of food insecurity with low-income households (OECD, n.d.).

INT 1.4 Mandatory use of local products: The most obvious, however most complex, manner to support local food production is to buy and consume locally. In order to kickstart a locally based economy, the municipality could aid this process by setting a mandatory percentage which is to be used in restaurants and tourism agencies. Although this might seem like a huge limitation to the intermediaries, this might be the only way to strengthen local supply chains and create awareness among business owners. A coffee farmer, states: *'También sería útil promover políticas que favorezcan la compra de productos locales en restaurantes, mercados y tiendas, incentivando el consumo responsable y consciente.'* [1] (Research Participant A8, 2024).

INT 1.5 Build a desalination plant: A major element which is missing in the farming infrastructure of Santa Cruz and is making local production extremely difficult and expensive, is the lack of running clean water. The municipality could resolve this issue by investing in a desalination plant, as there are no fresh water sources on Santa Cruz island. This technology has proven to be a very ef-fective manner of creating a reliable and constant water supply in island contexts and could there-fore be an interesting opportunity. Islands in the Caribbean have always been subject to periods of drought and therefore have been installing desalination plants for over 80 years (Balch & The Guardian, 2015). However, it must be noted that the process of desalination is very energy-intense and thus must go hand in hand with exploring renewable energy sources to prevent the island's further dependency on fossil. Until the plant is realized, the municipality – together with the Ministry of Agriculture - could assist farmers in setting up rainwater harvesting techniques.

1 *'It would be useful to promote policies that favour the purchase of local products in restaurants, markets, and stores, encouraging responsible and conscious consumption.'*

6.2.2 Strategies for the Ministry of Agriculture and Livestock

The Ministry of Agriculture and Livestock is one of the key actors and its actions are thus very needed and impactful. Possible strategies are listed below.

INT 2.1 Develop a phase-out plan: Currently, there are no records of any future or phase-out plans which makes it complicated for anyone outside of decision-making bodies to work in alignment with the goals of the Galapagos National Park. Therefore, the single most important thing is to develop a 10- or even 20-year strategy plan which outlines the goals of the food system, such as working to lower carbon emissions or increasing the islands' independence on continental products.

INT 2.2 Set up a central office: As of now, the ministry's office is located on the edge of Santa Cruz's main town Puerto Ayora. Due to their location, they are inaccessible to the town's inhabitants as well as to the farmers who are mainly situated in the highlands (about 20 minutes' distance by car). As many of the island's inhabitants commute by foot, the office is basically unreachable, leading to a physical as well as symbolic distance between the ministry and the people it tries to approach. Setting up an open office in the highland village of Bellavista would be of extreme help to become an engaged stakeholder.

INT 2.3 Set up a community centre which also functions as a living lab: Resulting from the co-creation workshop, in the dialogue of connecting farmers better amongst each other and with interested youth, the idea arose of creating a community/knowledge centre. Here, farmers – who are typically very individual workers – can connect and share their practices. Additionally, this space could function as a living lab, where farmers have a space to experiment and develop new techniques. A problem which arose during the co-creation session was the lack of connection with younger generations. Currently, the farmers' generation ages and there seems a general lack of interest from young people. Through this living lab, knowledge institutions (such as the USFQ) and thus students could be connected to this work field which can spark career opportunities.

INT 2.4 Provide free training for farmers: During the workshop, it was also mentioned that farmers feel they do not have the financial knowledge or business skills in order to compete well with products imported from the continent. An anecdote from one of the interviews was about a farmer selling a jar of marmalade. When the tour operator asked for a certain price when buying in bulk, the farmer still tried to sell the prod-uct for its original individual price. In order to make the local products more attractive, it would help farmers to market their products better. The ministry could collaborate with the university, other knowledge bodies or NGOs to develop trainings or one-day sprints for anyone interested.

An operational manager of a fishing cooperation states: *'En mi opinión, se deben fomentar más programas de formación para emprendedores locales, sobre todo en áreas como marketing, prácticas agrícolas sostenibles y cómo acceder a nuevos mercados. También se podría incentivar más la cooperación entre productores locales para fortalecer la cadena de suministro y hacerla más eficiente.'* [1] (Research Participant A2, 2024)

INT 2.5 Prohibit exotic fruits and fish: In collaboration with the municipality, the Ministry of Agriculture and Livestock should look into which exotic products could be prohibited in order to spur local production. An example would be to prohibit Salmon, which is a dish often served in tourist-focused restaurants, as this is imported from Canada or Alaska. Not many tourists have an awareness of which fish is local and the MFA highlighted (Figure 21) that there is enough fish caught but currently exported. As learnt from the thriving coffee sector, sometimes prohibiting certain food products is most effective in forcing local production. Hence, prohibiting salmon and strawberries would lead to more tuna and pineapples and on top of that generate a mindset of the importance of local consumption.

INT 2.6 Develop a trademark for local intermediaries: In order to incentivize intermediaries who do not currently work with local products and to give appreciation to the ones that do, a trademark stamp could be set up for intermediaries that work with local producers for a minimum of 75% of ingredients used in their dishes. When placing this visual on their menus and facades, it becomes a recognizable element for tourists, promoting a regenerative mentality as well. An example of this is the trademark 'Hecho en Ecuador' (Made in Ecuador, Figure 56), promoting artisanal and high-quality products made in Ecuador and exported all over the world. A suggestion for such a trademark was designed based on the values Galapageños hold dear, such as honesty, sustainability and operating in collaboration with nature (Figure 57).

Figure 56: The recognizable label of artisanal Ecuadorian products, Hecho en Ecuador (Ekos Negocios, 2015)

Figure 57: Design for a trademark used for local products, restaurants and initiatives (created by author)

1 *'In my opinion, more training programs for local entrepreneurs are needed, especially in areas like marketing, sustainable agricultural practices, and how to access new markets. It would also help to encourage more cooperation among local producers to strengthen the supply chain and make it more efficient.'*

6.2.3 Strategies for NGO & knowledge institutions

NGOs and knowledge institutions are both considered key actors, due to their high interest and power to influence decision-making processes. Resulting from literature and interviews, these institutions are known to collaborate mainly with the Galapagos National Park and invest in conservation practices. The only NGO known to actively connect with the local community and provide practical solutions is Heifer, previously discussed. Therefore, the main recommendation for these parties is to connect more with local entrepreneurs. This is elaborated on in chapter 7. Practical strategies include:

INT 3.1 Invest in online promotion: WhatsApp, Facebook and Instagram are platforms often used by NGOs to create awareness and spread information. NGOs have a big following on their channels which could therefore be an effective way to promote local consumption. An example of this would be to feature local chefs, who show recipes with the vegetables of the season. Or to have a farmer show the viewer around their property.

INT 3.2 Set up an educational programme on agriculture: As the farmer population is ageing and younger generations prefer working in tourism, for the USFQ to set up an educational programme on agricultural practices would be extremely helpful in attracting young people to this work field. NGOs could contribute to its creation by providing funds and knowledge on their experiences. This educational programme should also be closely connected with the Ministry of Agriculture and Livestock and could actively contribute to the living lab.

Figure 58: Example menu with 'local' section, plant-based dishes and 'Hecho en Galapagos' logo (created by author)

6.2.4 Strategies for intermediaries

Intermediaries play an important role in offering local produce to consumers and therefore act as gateway. Concrete strategies are:

INT 4.1 Buy local produce: The most effective thing intermediaries can do, is to increase the percentage of local ingredients and products on their menu's. By strengthening the local supply chain, the reliability of the system becomes greater (which was often remarked as a barrier) and the social cohesion between entrepreneurs increases.

INT 4.2 Display local ingredients, products and dishes on the menu: Resulting from the questionnaire, 77% of the respondents (tourists) think the most effective way of promoting local consumption with tourists is to display them clearly on the menu so consumers can make an informed decision. An example of such a menu could look like Figure 58.

INT 4.3 Promote tours with producers: A lot of the vegetable, fruit and coffee finca's (farms) are set up to host activities of ecotourism as well. For example, *Granja Integral Ochoa* offers an elaborate tour of their land, past his hydroponic systems and coffee trees and they pour a coffee for the visitor afterwards in their own small café (Figure 59). This personal and entertaining approach can be extremely helpful in connecting tourists with the different – often unheard - side of the Galapagos, therefore creating awareness and generating additional sources of income. Intermediaries, such as tour operators, play an important part in assisting the producers and promoting their ecotourism activities.

INT 4.4 Start setting up a yearly local food festival using art: As experienced in the photo exhibition which was hosted in line with this research, events – especially when combines with art or cultural elements – are extremely helpful in sparking discussions around a certain theme. All visitors who came to see my pictures discussed their purpose with family and friends and the visual material proved very helpful in embodying the farmer's values and goals. Intermediaries, such as restaurants, café's or cultural centres are in the perfect position to connect producers and consum-ers on complex topics like these.

INT 4.5 Promote plant-based diets: A big part of the lack of support for local food system origi-nates in diets dominated in animal proteins. Traditional dishes are centred around a piece of meat or fish, carbohydrates and vegetables are often considered a side dish. Although animal proteins can also be sourced locally, they are more resource intensive. Thus, in order to limit environmental pressures, intermediaries can help by offering plant-based options for traditional dishes. An example of this is the Galapagos style arepa, presented in the example menu in Figure 59.

Figure 59: Visitor's experience at the farm Granja Integral Ochoa (created by author)

6.2.5 Strategies for farmers

Individual farmers have the most interest, but the least power in increasing local production. However, even though they are extremely dependent on the strategies listed so far, the following actions can be undertaken:

INT 5.1 Farm seasonally, but offer variety: A common barrier for intermediaries to buy locally is the lack of variety of products offered. Farmers work with seasonal products, such as citrus fruits in the warm months and corn in the colder months, however, all farmers work with the same products. This means little variety on the market and therefore difficulty for intermediaries to base a menu on the available products. An strategy for the farmers thus is to explore different types of products per season.

INT 5.2 Set up a farmers' cooperative: One very effective way of gaining power as a group is to form a collective. The fishermen are an example of this, who work in different cooperatives which have a president and thus a spokesperson. Having a connection point that communicates to other members of the cooperative, makes it easier for the Ministry of Agriculture to get in touch with the individual farmers in order to set goals and make plans. Additionally, working in a community also creates social support amongst farmers and increases social cohesion.

INT 5.3 Develop ecotourism practices: Finca's are recommended to develop ecotourism practices, which would help in generating extra flows of income next to selling their produce and heighten awareness on local production and consumption. Examples of these practices are tours, cooking workshops or other events, where tourists become familiar with the land, the farmer and their products.

6.2.6 Quantitative validation of strategievs

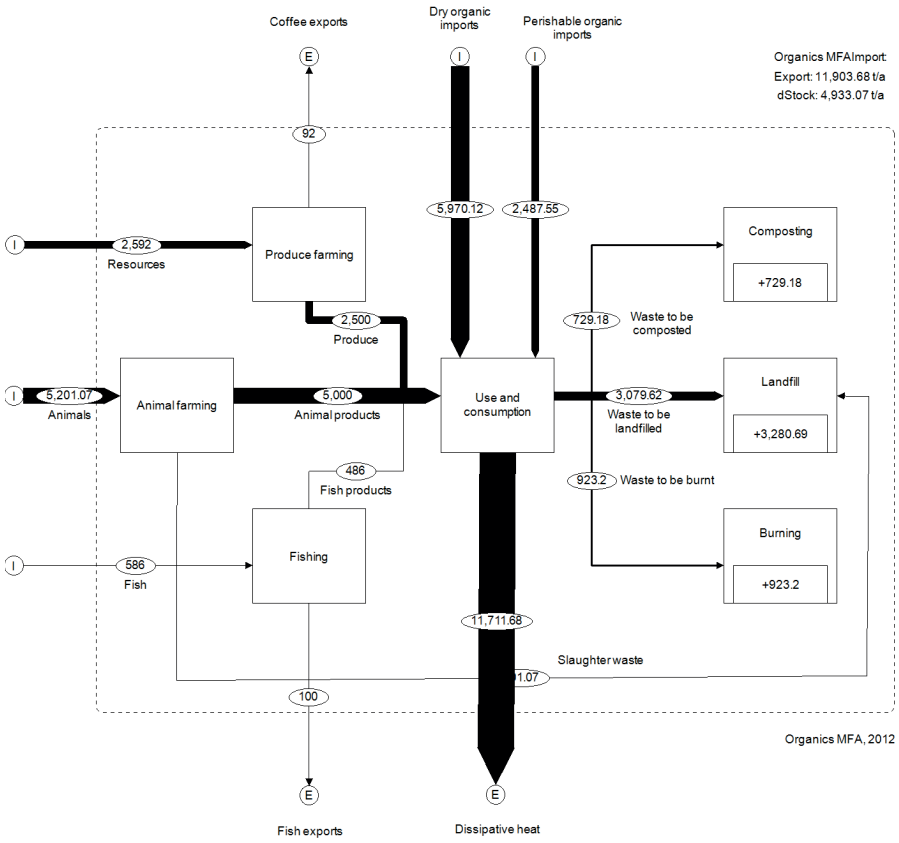
This sub-chapter will discuss the comparative quantitative validation of several strategies by integrating them into the Material Flow Analysis model set up in chapter 3.2.5. Only a sample of strategies were chosen to integrate into the model to exemplify the incorporation of qualitative data into a quantitative model. The strategies which were chosen to exemplify, were 1.4 (*Mandatory use of local products*) & 2.5 (*Prohibit exotic fruit and fish*) together and 4.2 (*Display local ingredients and dishes on the menu*) & 4.5 (*Promote plant-based diets*) together. The creation of these models is conducted through scenario-sketching, they are based on assumptions rather than real data (listed in Appendix I). These strategies were selected as their assumptions were most reliable. Their intention is to give the reader an idea of what the system would look like when the strategies are implemented.

Figure 60 shows the implementation of strategies 1.4 and 2.5, which are both directed towards shaping the productive food system through regulations and policies. Strategy 1.4 states that intermediaries must be obligated to have a mandatory percentage of local products. To uncomplicate this statement, it was assumed that this percentage is 50% of mandatory local products. Strategy 2.5 states that non-native fruits and fish should be prohibited in order to stimulate the consumption of local fish and fruits. This means that mainly the perishable organic imports are limited by 50% of which the other 50% will now be produced locally. Dry imports are only limited by 80% as these types of products (such as flour or rice) cannot be replaced readily without the proper infrastructure. Automatically, this shift also means that more locally caught fish is consumed locally instead of exported. Applying these measurements leads to an increase in local production of 24% and an automatic decrease of 24% in imports, significantly limiting dependency on main-land Ecuador. In order to achieve this, next to policy implementations, the agricultural as well as the fishing industry must be supported adequately to meet these higher demands.

Figure 61 reflects the impacts of strategy 4.2 and 4.5 which are actions that intermediaries can undertake in order to nudge consumer behaviour to consume more local and plant-based products. This is suggested to achieve through a higher offer of vegetarian options and displaying local products clearly on the menu. Although behaviour changes are not as effective as adapting policies, these strategies would still limit consumption of animal products by 33,3%, increase produce consumption by 180% and fish consumption by 30% which together compensate for the loss of mass in limiting animal products. The increase in fish consumption is balanced by less fish exports, therefore not overstepping environmental limits and keeping more catch in the local food cycle.

As most strategies aim to increase local production, an important trade-off is – when the food production system is under pressure due to the focus on outputs – the use of chemicals or harmful production processes is likely to increase (OECD, n.d.). A solution that mitigates this risk is to equally implement infrastructural improvements (such as the provision of fresh water and vending locations) as well as trainings.

Figure 60 (bottom): Implementation of strategies 1.4 and 2.5 (created by author)



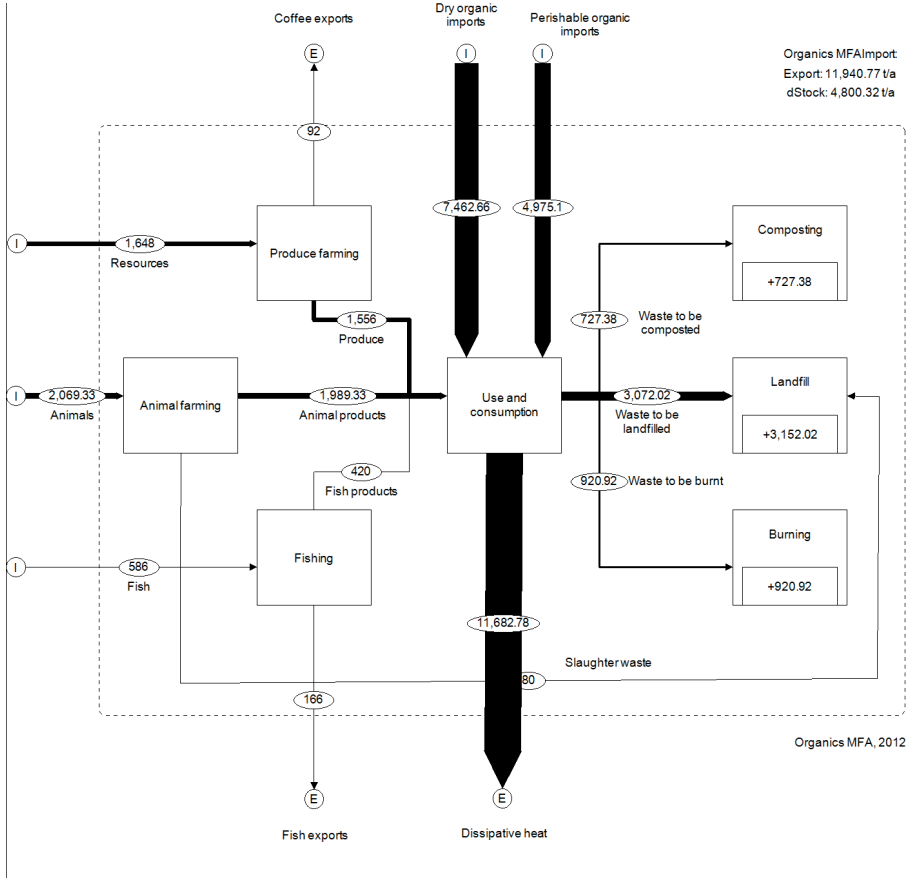


Figure 61 (bottom): Implementation of strategies 4.2 and 4.5 (created by author)

This quantitative analyses teach us that strategies are most often combined in order to achieve desired system changes, which again emphasized the need for multisolving and highlights the importance of mixed method research approaches.

6.3 SRQ3 – How can these strategies be linked to the principles of regenerativity to facilitate future implementation?

In order to link the set of strategies to the principles of regenerativity, regenerativity must first be clearly identified.

The regenerative economy relies on 5 core principles (determined earlier in Chapter 3), which are named the 5 R's of regenerativity. These principles are Reciprocate (mutual respect and benefits between humans and nature), Restore (reviving natural self-regulating resources), Recognize (acknowledging and appreciating contributing initiatives), Resonate (working with biorhythms of the area) and Relocalize (reestablishing locally-based processes). They are visualised in Figure 62 as the regenerative tree, that translates the principles into five distinct branches as follows.

- The reciprocate branch highlights the mutual benefit between the tree, which provides nutrients for the leaves to grow, and the leaves, which degrade into humus which benefits the health of the tree;
- The restore branch shows the self-regulating nature of a tree to grow its flowers and fruits and rejuvenate potentially damaged areas;

Figure 62: The regenerative tree

- Recognize is visualized through two eyes, which originate in the indigenous concept of Two-eyed seeing, where one indigenous eye and one Western eye are used to look at the world. This branch symbolizes the acknowledgement of local culture, businesses and initiatives;
- Resonate is about working with biorhythms, seasons and weather patterns and therefore is depicted as a spiral with a natural cycle from a flower to a falling leave;
- Finally, relocalize is visualized as a 'low' branch. As it is close to the ground, it is meant to reflect local consumption.

The visualization in Figure 62 helps to understand the complex terminology of regenerativity and thus aids its implementation into entrepreneurial efforts and future research.

The strategies stated in Chapter 6.2 are all set up to help cultivate the principles of regenerativity as the fieldwork research methods were geared towards a regenerative economy as the goal. For example, mandatory use of local products (Strategy 1.4, implemented by the municipality), cultivates relocalization of food sources and recognition for farmers. Another example is strategy 5.1, which is farming seasonally and offering variety, contributing to resonance with biorhythms and reciprocity between natural and anthropogenic systems.

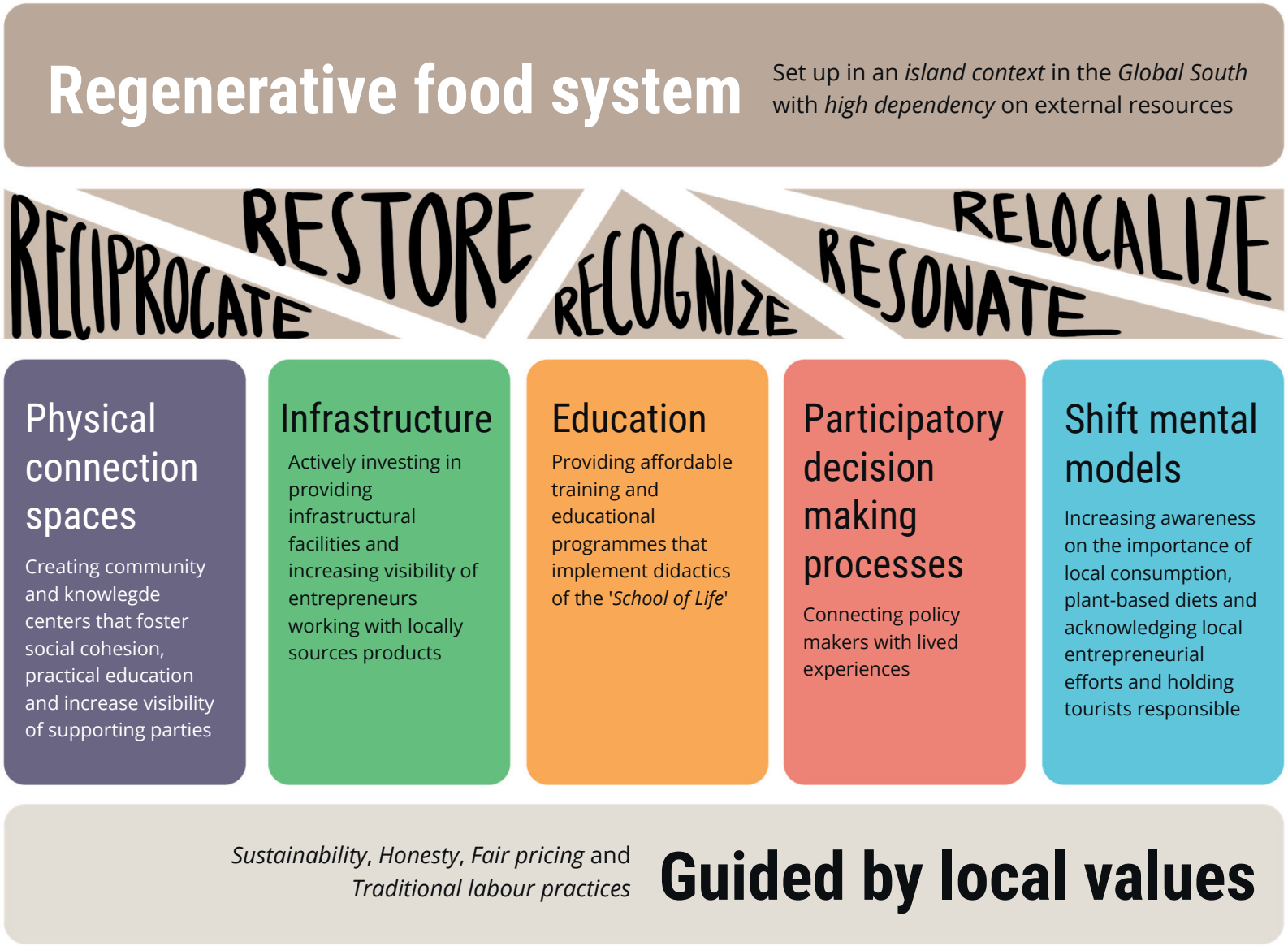


Figure 63: Five building blocks of regenerativity (created by author)

The strategies that were inspired by the interviews and were co-created with the local stakeholders can be grouped into five overarching but 'practical' themes. By connecting them with the local values on which they are based and the regenerative principles which they cultivate, the following diagram can be set up (Figure 63).

Figure 63 shows the five building blocks of a regenerative economy. Not only does it clearly categorize the strategies set up earlier, but more importantly uncomplicates the term of 'regenerativity' and its 5 R's into 5 practical and implementable categories (explained further below). It must be mentioned that these foundations and their strategies are guided by Galapagos culture and values. The building blocks are specified towards a specific context: A highly-protected insular economy, where dependency on tourism and on external food sources is high. These 'system boundaries' are represented by the big blocks below and above the building blocks. The different building blocks will be elaborated on now.

A regenerative food system is built by (from left to right):

- Connecting different layers of society through **physical connection spaces** such as community centres and living labs intended for knowledge sharing. The Ministry of A&L and knowledge bodies such as NGOs and the USFQ play a big role in achieving this;
- Setting the **infrastructural foundations** for a locally based economy, which are crucial to making farming more cost-efficient and an attractive work field. Strategies related to this pillar are mainly directed towards the local municipality and the Ministry of A&L and have the side-effect of increas-ing the visibility of these actors;
- Investing in **education**, whether this is an educational (bachelor's) programme of the local univer-sity on agriculture or providing training to entrepreneurs such as in marketing, finances or business. Education on these matters also provides excellent opportunities to connect with other layers of the community through applying practical didactics, such as farm visits or community events;
- Implementing **participatory decision-making processes** that actively include producers, inter-mediaries and consumers in order to ensure more effective conservation strategies;
- Creating a regenerative **mentality** amongst all stakeholders, based on acknowledging local en-trepreneurial efforts, appreciating local resources and increasing awareness of the importance of local consumption.

What is most powerful about this model, is not only that it makes regenerative principles easier to grasp, but that the strategies recommended to Galapagos were compiled into building blocks that can be extrapolated towards other island groups in the Global South (who are equally dependent on tourism and external re-sources) to create a regenerative system.

These generalizable elements are reflected in Figure 63 through the headers. The small accompanying texts are Galapagos-specific.

6.4 Discussion of the research

The goal of this study was to work in an inductive manner, meaning to build a theory rather than testing it. A threefold research question has provided steps towards answering the following main research question: *'In what way can bioregional regenerative food systems, developed using principles of circular communities, contribute to overcoming socioecological challenges in the food sector of Santa Cruz and San Cristobal – islands of the Galapagos archipelago?'*

The first SRQ identified the biggest challenges regarding the current food system, such as high mainland dependence and a decrease in social cohesion, and visualized the interdependence of the system elements into a Causal Loop Diagram. For answering SRQ2, a set of strategies was co-created that can multisolve the issues stated in SRQ1. Some of these strategies were visually exemplified and others were validated through a Material Flow Analysis to highlight their viability. SRQ3 synthesized the definitions of regenerativity into practical building blocks and connected the strategies to its principles by means of a framework. Not only do the sub-research questions clearly build on each other, together, they answer the main research question and build a theory. A theory that simplifies regenerativity and makes it practical through a set of generalizable strategies.

This study makes a significant contribution to the academic discourse in two ways. By adding to research on insular food systems (1) and by providing novel contributions to the methods used (2). Overall, the study provided a concrete framework that can guide the design and implementation of effective strategies in the future.

First, In the context of Galapagos literature (1), the study provides a Material Flow Analysis of organic material streams, which enhances the understanding of systemic inefficiencies and opportunities for circular practices. This model thus also provides an addition to the work of Checcin (2016) by extracting the organic material streams from their work and compiling it into a visual representation. More broadly, the research yielded a set of (Galapagos-specific) strategies that help transition to a regenerative food system and a framework that generalized these strategies into building blocks, which are grounded in local values and can be applied to other insular contexts that are heavily dependent on food imports and subject to strong conservation practices.

Secondly, the study provides novel contributions to the methods used. It extends the theoretical understanding of regenerativity, such as the theories of Paton et al. (2023) and Konietzko et al. (2023) by synthesizing the many definitions into a exemplifying visual, that highlights the core principles of regenerativity. This is further elaborated on by setting up practical building blocks, based on empirical co-created strategies. These building blocks are essential for translating the aforementioned abstract concepts, such as definitions in Indigenous epistemologies described by Arjaliès & Banerjee (2024),
into actionable strategies.

Additionally, this research enriches the literature on convivial conservation by Buscher & Fletcher (2020) and insular food systems (González et al., 2008) by adopting a grounded, context-specific approach that combines theoretical insights with empirical evidence from real-life case studies. Lastly, this research further refines the Circular Communities Methodology of Leclercq & Smit (2023) by testing it in a non-Dutch and non-European context, thereby expanding its applicability and relevance to diverse ecological and socio-economic settings. A newly designed worksheet will be presented in the recommendations chapter (Chapter 7.2) which is built on the outcomes of this research and provides a valuable addition to the current methodology by providing a validation step.

6.5 Limitations to the research

As to any research, especially one that's based in qualitative methods and conducted by one researcher only, there is bound to be limitations to the research. These could influence the credibility of the outcomes of the research questions discussed earlier in this chapter. First, the limitations of the qualitative research are discussed and, secondly, the limitations of the quantitative data collection.

First of all, the biggest limitation of this study is that the sectors that produce animal products (such as livestock or dairy) were subconsciously excluded. The fishers, however, were part of the research. This could be related to the pescetarian consumption pattern of the researcher, making them uninterested or subconsciously unsupportive of this sector. Additionally, the connections which were made through snowball sampling often led to fisher- and farmer networks and time constraints were probably an additional factor. However, the MFA highlighted that the consumption of animal products – excluding fish – is the biggest source of consumption in Santa Cruz in terms of mass. The livestock sector would thus be a valuable sector to take into consideration in future studies.

As for the structure of the interviews, the interviewer tried to stick to the questions which were set up beforehand in order to process the results in an equal manner. However, some participants enjoyed storytelling and therefore oftentimes the structure was interpreted more loosely or not followed at all. Not having similar interview structures means that its' results are harder to compare, meaning that at times no measurable conclusions could be drawn from its analysis.

The second biggest limitation is the use of software in interview processing. An automated transcription software in Microsoft Teams was used for processing the collected data. Even though the software contains an option for interpreting Spanish, the clarity of the audio or certain dialects were hard to pick up and therefore not all parts of interviews could be transcribed well.

The swift increase in familiarity with the local language could be considered a limitation. As the researchers' Spanish skills improved during their time conducting fieldwork, there is a fair chance that interviews which were conducted later in the process were more fluent and informal conversations were understood better in the later weeks. This could result in better-interpreted information in later interviews compared to previous ones. Although this factor is now listed as a limitation, overall, the researcher's familiarity with the language has greatly improved the quality of the data collected during fieldwork. Thus, the mastery of the language should rather be considered an advantage rather than a limitation.

A limitation for the use of the Circular Value Flower is that the researcher solely explored the values that the research participants hold, instead of moving through the full methodology that the client provided – ending in value creation through interventions instead of describing personal values.

A last notable limitation of the qualitative side of the research is in regard to the co-created strategies. The limitation here lies in the potential for trade-offs, such as the elevated energy consumption associated with the operation of a desalination plant or the risk of overburdening the local food system, which currently lacks sufficient agricultural capacity to support increased demand. Additionally, these strategies may be susceptible to rebound effects, wherein consumers or producers might engage in more environmentally detrimental behaviours, rationalizing such actions on the basis of prior sustainable practices. These dynamics underscore the complexity of implementing strategies in a manner that balances ecological, economic, and social considerations without inadvertently exacerbating existing challenges.

Then, on quantitative data collection. The questionnaires which were conducted amongst tourists were only answered 13 times. It was initially difficult to find willing participants, as the researcher was situated on the Galapagos in the low tourist seasons. However, once found, it appeared difficult to have active respondents as they did not always have internet access or were enjoying their free time and therefore did not care to fill in the questionnaire at that moment. A combination of these factors led to a few respondents, whose answers are useful but the quantity is not enough in order to draw strong scientific conclusions.

As mentioned earlier, the baseline MFA model in Figure 21 is based on data points from 2012. As this information dates 12 years in 2024, this Figure does not depict the current situation well. For example, a later study (Castillo Pazmiño et al. (2022)) highlighted that recent investments into local waste management have impacted the recycling and composting rates strongly in the last 10 years. This finding led to the exclusion of waste management in further analysis, as the government has already undertaken action to minimize the environmental pressures that resulted from waste.

These assumptions of the baseline model as well as the integration of certain interventions are listed in Ap-pendix I. Overall, as these models' main intentions are to communicate the effectiveness of the strategies, this is no immediate limitation to the study.

When setting up the quantitative model for the coffee cycle specifically, the researcher interviewed one coffee roaster and brewer and was able to extract numbers to base the model on. It is however important to note that this cycle is based on the exact process of Islander Coffee Roasters, meaning that their production and consumption is all in-house and that transportation is minimal to non-existent. In order to set up a mod-el for the general Galapagos coffee cycle, the roasted coffee beans would be exported outside of the system boundaries in order to be sold to third parties. Here, it would be harder to ensure that the ground coffee is actually composted and the whole system is circular.

If time were not a constraint, the researcher would have mainly focused on including all productive food sec-tors in the analysis to make the outcomes of the study more all-encompassing. This would lead to a more comprehensive set of interventions. Additionally, conducting an in-depth study about the current organic flows in order to update the data points for the MFA would greatly contribute to the impact analysis. As a final improvement, the researcher would integrate the full set of interventions in the baseline MFA to com-pare their impacts in detail. Incorporating these three improvements into the study would lead to an exten-sive set of interventions, that includes insights into the livestock industry and validates all interventions by integrating them in an up-to-date MFA model.

7. Recommendations

This chapter lists recommendations for further research (Chapter 7.1) as well as for the Circular Communities methodology (Chapter 7.2).

7.1 Recommendations for further research

In order to ensure continuous efforts and more actionable strategies in the future, further research and policy planning is required. The following recommendations are targeted towards decision-making- and knowledge bodies and are also reflected in the blue boxes at the right of Figure 54.

The first and most important recommendation is for the Municipality: It must be researched how food products can be interchanged between islands. Qualitative research highlighted that many entrepreneurs see opportunities to create a more resilient and local system by exchanging products amongst islands, however, this is limited by the National Park due to risks for invasive species. The contradiction is that the same risks, if not worse risks, are present when importing from mainland Ecuador. Thus, this policy seems to be inconsistent with what the National Park preaches. Donaldo Navarette, an employee of Foundation Heifer, confirmed this inconsistency by stating that the inability to exchange issues is due to a lack of infrastructure rather than the risk of invasive species: *'Una de las principales barreras es la falta de infraestructura adecuada para apoyar la producción local, como el transporte y la logística entre islas.'* [1](Donaldo Navarette, 2024). Additionally, Figures 45 and 46 (reinforcing loops 5 and 6) highlight how increasing the exchange of products can also increase visibility and local knowledge and thus how much professional interest and awareness there is in building local food markets. Another benefit of exchanging resources would be that less perishable food will perish on the way, as boats can take up to one week to arrive on the islands, leading to a decrease in emissions.

Secondly, municipalities as well as NGOs could do a better job in recognizing local initiatives for their contributions to the economy and ecology by implementing more participatory design processes. Since the unexpected declaration of the 'Marine Sanctuary' in 2016, decisions have been made top-down which has led to less effective conservation strategies and social tension among entrepreneurs (Castrejon et al., 2024). Connecting with locals, their businesses and their ideas would be extremely helpful in counteracting these issues. A preferred way of participatory decision-making for each entrepreneurial group is reflected in Figure 64, which shows a shift from the current situation in Figure 22. This figure points out that Farmers and Fishers both crave a 'Placation' process, which entails that they are involved in shaping the ideas and strategies but decisions are made by a facilitating party. Intermediaries crave consultation, where they do not actively help shape decisions, but their views are incorporated. This way of decision-making is called tokenism, where policy-makers give the impression of diversity, but do not fully include all stakeholders. As the current political system does not allow for citizen participation, tokenism is seen is the best achievable way of collaborating as of now.

nother way of setting up participatory design practices could be inspired by the Two-eyed seeing process model, a model that integrates the indigenous Mi'kmaw approach which was explained in chapter 3.2.3 (depicted in Figure 66). This model describes how new policies can be formed whilst incorporating indigenous views on the land, which are considered essential in setting up a regenerative economy. It exists of four phases: Prefiguration, Initial phase, Building phase and Nurturing phase. Each phase increases mutual understanding between indigenous knowledge (in the case of Galapagos, Galapagos inhabitants) and settlers mentality (NGOs). The outcome of the process leads to new projects with a *'Two-eyed seeing'* mentality and higher Indigenous engagement.

Third, as mentioned earlier, convivial conservation is a conservation strategy that is purposely non-dualist and post-capitalist and thus could be the only way of setting up conservation practices that are effective from the core (Buscher and Fletcher, 2020). It is geared towards conservation that enables humans to live with biodiversity, which is part of the solution towards a more balanced socio-economic system on the Galapagos islands. Thus, another recommendation for both the Ministry of Agriculture and NGOs is to research conservation practices that collaborate with local efforts and entrepreneurs rather than separating them from conservation. Additionally, this will also create higher social engagement and a more cohesive social fabric as different societal layers will feel like they collaborate on the same goal.

1 *'One of the main barriers is the lack of adequate infrastructure to support local production, such as transportation and logistics between the islands.'*

Individual entrepreneurs can also research possibilities to incorporate circularity businesses, meaning that they can discover ways to find value in their by-products. A group of fishers, for example, is working on de-veloping leather from fish skins. Doing so can lead to extra streams of income as well as less pressure on the current waste systems and, thus, ecology.

Overall, although some strategies regarding tourism management were mentioned, more research is need-ed on the carrying capacity of the Galapagos ecosystems to set more exact targets (such as the number of visitors allowed to the islands and the visa prices to reflect conservation efforts well. Additionally, limiting the amount of cruise ships – known for its pollutive nature – would contribute to regulating tourism numbers better. An idea for an strategy is that tourists can be held responsible through a system of 'climate credits' as a way of regulating their activities on the islands. For example, staying on the island would cost a tourist less climate credits than staying on a boat as the activity is less polluting. Not only does this strategy limit the footprints of a tourist, but also creates awareness about how pollutive each activity is.

As mentioned in the limitations (Chapter 6.5), in terms of academic further research, this research could be enriched by including processed foods such as dairy and meat into the analysis. Additionally, the quantitative analysis could be strengthened by conducting an updated study of the Material Flow Analysis for all organic flows, for which more recent numbers than from 2012 were lacking. This information will help assess the exact environmental impacts of the different strategies.

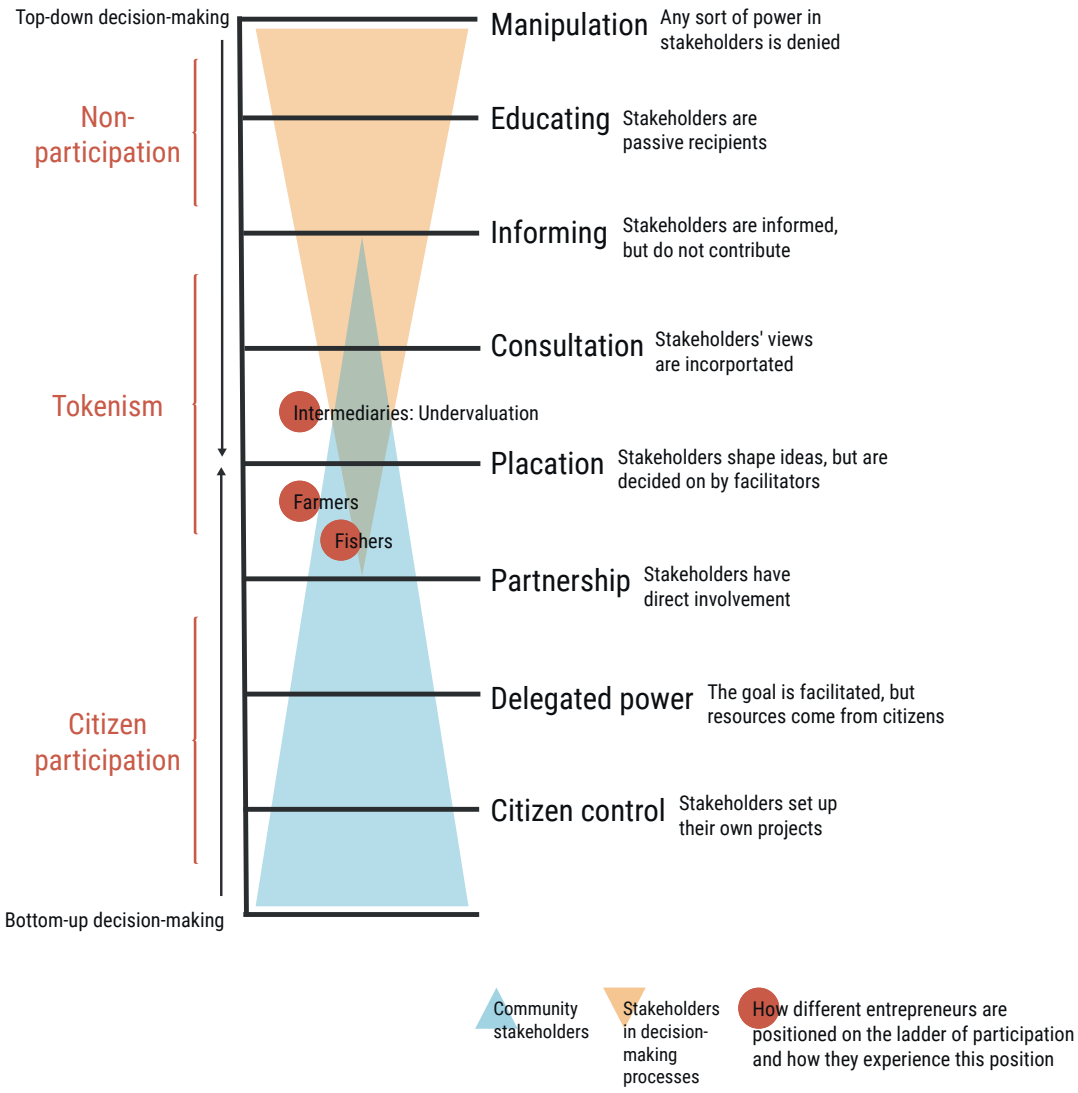


Figure 64: The recommended participatory decision-making processes per entrepreneurial group (created by author)

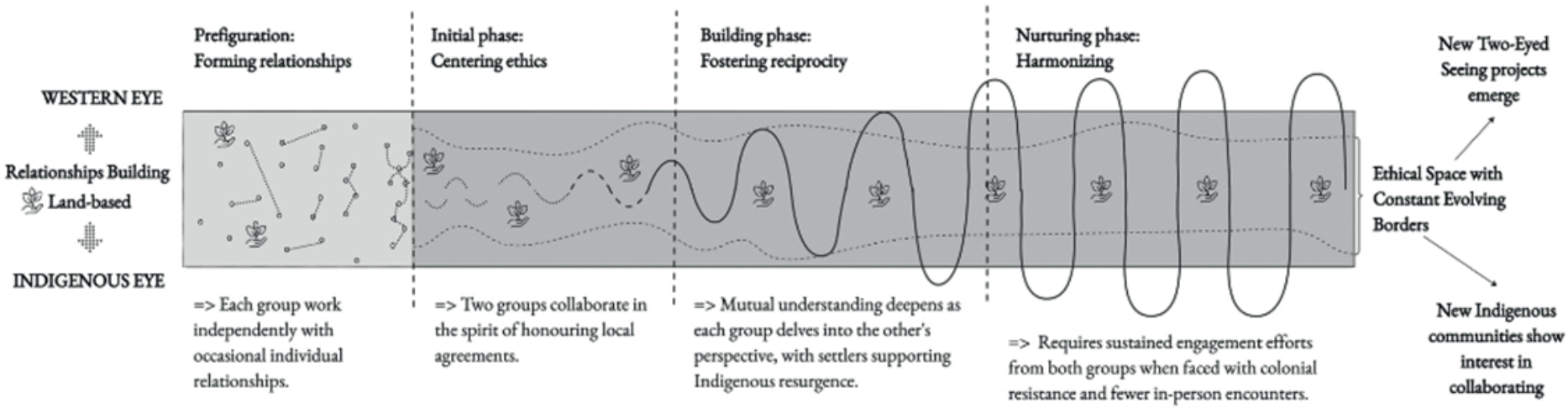


Figure 65: 'Two-eyed seeing' process model (Arjaliès & Banerjee, 2024)

7.2 Recommendations for the Circular Value Flower

Next to recommendations on further research, the following adaptations are recommended to improve the use of the Circular Value Flower in the context of this research (insular context in the Global South).

The main recommendation is to develop an additional worksheet on regenerative principles, such as the 5 R's, that can be used in the methodology of the Circular Value Flower. This worksheet is presented in Figure 67 and based on the regenerative elements of Figure 66. These regenerative elements are the 5 R's, however adjusted to fit the style of the Circular Communities design. The worksheet in figure 67 is used as a validation step in the methodology to connect the imagined intervention, and thus principles of circularity, with regenerative elements.

How it works:

- The user of the methodology is asked to note down the intervention they want to reflect on at the left side of the worksheet.
- Subsequently, they are asked to rate the intervention on the 5 R's on a scale from 1 to 5 stars. The questions guide the user in understanding the rating and the concerning element.
- Next, the user can fill in a brief explanation of the rating.

Although rating an intervention manually, doing so aids the user in understanding the principles of regenerativity and reflecting on how regenerative the imagined concept is. Hopefully, by reflecting on the current regenerative status will also spark ideas on how to increase regenerativity.

Another recommendation would be to develop an additional flower that explores the connection between circularity and regenerativity. An explorative example of the regeneration flower is based on the framework in Figure 64 and highlighted in Appendix O.

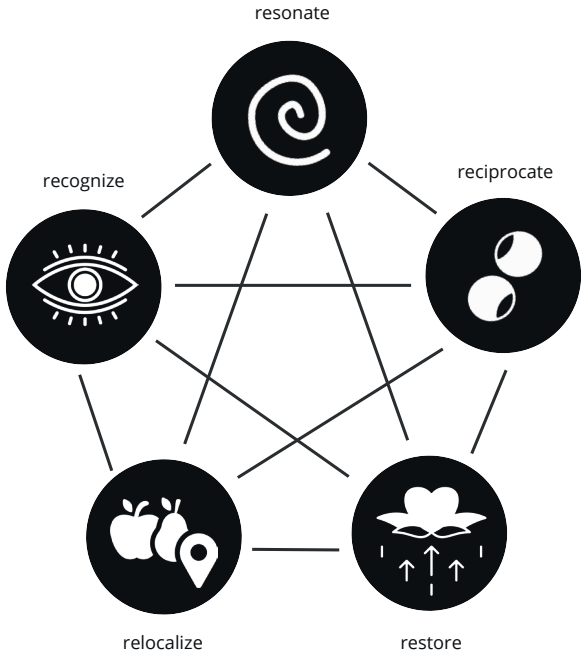


Figure 66: The regenerative elements (created by author)

8. Regenerativity rating

Chosen intervention

reciprocate

Does the intervention promote mutual respect and exchange?

Rate: ☆ ☆ ☆ ☆ ☆

Explanation:

restore

Does the intervention promote locally established processes or supply chains?

Rate: ☆ ☆ ☆ ☆ ☆

Explanation:

recognize

Does the intervention acknowledge traditional practices, local intiatives and cultural values?

Rate: ☆ ☆ ☆ ☆ ☆

Explanation:

resonate

Does the intervention work with the biorhythms and seasons of the area?

Rate: ☆ ☆ ☆ ☆ ☆

Explanation:

relocalize

Does the intervention promote locally established processes or supply chains?

Rate: ☆ ☆ ☆ ☆ ☆

Explanation:

Figure 67: Additional worksheet on regenerativity

8. Conclusions

This thesis answers the following research question: *'In what way can bioregional regenerative food systems, developed using principles of circular communities, contribute to overcoming socioecological challenges in the food sector of Santa Cruz and San Cristobal – islands of the Galapagos archipelago?'*

It builds on socio-economic issues found on islands in the Global South, which disproportionately suffer from the effects of climate change. The Galapagos islands, subject to many conservation efforts as a result thereof, are becoming increasingly dependent on mainland Ecuador for food sources and feel increasingly limited by the conservation policies, whose decisions are often forced top-down. As an effect, social tension continues to rise and the islands' ecological footprint is not effectively diminished. All this is exacerbated by the pressure of tourism.

The concepts of Circular Communities, regenerativity and convivial conservation seem like promising prospects as their principles are targeted towards solving both social and ecological challenges. However, research on the practical implementation of -especially- regenerativity is lacking, meaning that it remains rather abstract or vague.

This research thus systematically analysed the food system on Santa Cruz and San Cristobal (the two main populated islands) in a mixed methods approach and using Participatory Action Research in order to leverage regenerative entrepreneurship. Threefold novel contributions were created during this study:

1. **A set of co-created actionable strategies that contribute to a regenerative insular food system** - Figure 54 shows the strategies which were inspired by the semi-structured interviews and co-created during the workshop. The strategies are categorized by actionable stakeholder and intent to use the leverage points which were identified using the Causal Loop Diagram (Figure 40). The strategies that work with conscious or social leverage, are most effective in creating system change.
2. **A framework that exemplifies the practical application of regenerativity** - Figure 63 highlights the building blocks of regenerativity, which aim to have a practical approach towards achieving a system that serves nature, economy and society. All five building blocks are guided by the 5 R's of regenerativity and the values that were determined using the Circular Value Flower (Sustainability, Honesty, Fair pricing and Traditional practices) and therefore form a connection with the Circular Communities theory. The building blocks are directed towards the context of the Galapagos islands, however, can be generalized within the system boundaries.
3. **An addition to the Circular Communities methodology** - The main recommendation for the Circular Value flower is to incorporate the newly designed worksheet on regenerative principles, based on the 5 R's of Paton et al. (2023) and the building blocks of Figure 63 (depicted in Figure 67). This worksheet connects with the style and workflow of the current methodology but focuses on validating the imagined interventions through principles of regenerativity.

The main implications of this research are a comprehensive visual model of the current food system (CLD), an analysis of the leverage points to which strategies can be made, a set of categorized strategies (per stakeholder as well as in a timeline), a visual representation of regenerativity, and finally, a practical model that visualizes the building blocks of regenerativity which can be applied to other insular contexts in the global south in order to diminish their high dependence on external resources. Next to decreasing depend-ency, other effects of a regenerative food system were encountered, such as diminished ecological pressure, increased social cohesion and more effective conservation practices which are aligned with the needs of local entrepreneurs.

The main limitations of this research are that the livestock and processed products were excluded due to time constraints and that the use of automated transcription software may have led to the subconscious exclusion of information.

Further research can develop a strategy for exchanging organic resources between islands whilst limiting the transfer of invasive species, explore the participatory design processes that can be set up in detail within the Galapagos' governance system and update the Material Flow Analysis model on organic flows with more recent data in order to measure the impacts of the suggested strategies better.

9. Personal reflection

I cannot emphasize enough how the process of this thesis helped me grow into a better ecologist, but also a better and more understanding human. This chapter will elaborate on both of these items whilst describing (some of the many) interesting findings that I found worthy of reflection.

First of all, I will describe some observations which I had whilst working in the context of the Galapagos' culture. The most fascinating dichotomy you will find as a visitor is that generally speaking people are quite religious but still highly admire Charles Darwin and his evolution theory (which was discovered in his travels on the Beagle between 1831 and 1836). Streets and restaurants are named after him and miniature figures of his can be found all over the islands. Initially, this confused me, as evolution inherently contradicts the premise of Christianity. However, informal conversations helped me understand that whilst people do not necessarily believe in evolution, Darwin helped put the Galapagos on the map and the many tourists who want to see what Darwin has seen, have continuously brought wealth to the islands. Thus, it is not necessarily Darwin himself that they admire, but the influence he has had on the Economy of the Galapagos – as well as on Ecuador.

Secondly, it took me quite a while to understand certain power dynamics. Certain power dynamics I expected, I did not encounter and others that did not expect to arise, did. For example, as Latin America is well known for strong patriarchal outings, I expected to see more male dominance during my fieldwork phase. However, this was not the case at all. I interviewed a lot of female entrepreneurs who manage businesses by themselves and generally manage more than one role in or outside their business. . Also, whilst having no particular focus on interviewing the same amount of male and female participants, accidentally I did. This showed me that there are few barriers for women to conduct the same work as men, although it must be acknowledged that these women still are part of a patriarchy and thus will always experience inequalities to some degree. A power dynamic I did not expect that strongly, was the strong power that decision-making bodies hold. It was quite confronting to see how little power farmers have and that there is no way for them to have a say (or have a prospective in doing so) in how agricultural policies are set up. Myself, I experienced a strong hold of bureaucracy when I tried to get into contact with these decision-making bodies. Often, when I was (too) direct in my approaches by stepping into the office of the person I wanted to talk to, they or their assistant would let me know they would contact me when there was time to talk or do an interview. They rarely followed up.

On the other hand, getting into contact with entrepreneurs was relatively easy. Almost every entrepreneur welcomed me into their workplace and home without hesitation and sometimes without even having seen me before. The trust I experienced here was very special and was telling about how open and welcoming the Galapagos' culture is. I must say that it was extremely helpful for me that I was able to communicate in Spanish almost all of the time. This skill also improved rapidly over the weeks due to my immersion into the language and culture and was one of the most valuable personal developments of this thesis.

Additionally, it was interesting to witness that my background in design and anthropology has greatly influenced how the research was set up and executed. Design practices guided my general research set-up, such as the division into a problem-, idea- and solution-finding space. Furthermore, the skills I built on co-creation were applied to the workshop which was hosted during the fieldwork period. My anthropological background was visible in the way that the interviews were conducted and by the use of photography in my observations. Overall, the research outcomes also have a strong anthropological layer, which thus seems to have captured my attention strongly. For me, it was extremely rewarding to see how my different interests were able to come together in this research which made it a true 'passion project' and kept me motivated until the very end.

Professionally, this thesis helped me grow into a true ecologist. Where before, I approached sustainability issues either qualitatively or quantitatively or slightly integrated one into the other, this research helped me learn how to combine both which as an ecologist is essential to get the richest outcomes. As described in the introduction, ecologists do not only know separate parts of a system but know how they interact and interrelate. Additionally, this thesis taught me to refine my visualization and communication skills by learning to not only communicate to a 'design' audience but also to more technical or entrepreneurial backgrounds.

A last, but very important, topic I would like to discuss is colonialism and my so-called colonial bias. Although I feel I was very aware of my European perspective on 'sustainable development' and very open to other perspectives, the very act of travelling to the Galapagos to do research and set up a set of strategies (although co-created) has a colonial layer. I was most probably able to conduct this research as my ancestors were able to generate wealth by exploiting other countries, people and resources. For me, this was quite a difficult realization as I do not consciously want to act on this colonial bias. However, it cannot be ignored that colonialism was the root enabler of this fieldwork trip.

Pictures during fieldwork research on the Galapagos islands, conducting site visits and a co-creation workshop

When I became aware of this matter, I also became more conscious of how I can give back. By connecting deeply with individuals and the community, I feel that I listened, got to understand and adhere to the needs of local people. An interesting finding from my research regarding colonialism and climate justice was that, in my questionnaire, all Northern European respondents mentioned valuing local consumption to lower their environmental footprint. However, Latin American travellers valued local consumption to strengthen the local economy. This anecdote proved an earlier statement, that sustainability in the Global North is about technical solutions, but sustainability in the Global South is really about social justice. The same pattern is visible when researching the main theme of this research: Regenerativity. The Eurocentric perspective on regeneerativity is primarily focused on working with biorhythms and restoring nature and land. For non-Western societies, Regenerativity is almost a spiritual way of respecting the land and the people who take care of it. Although literature already pointed this out, experiencing this during fieldwork was eye-opening.

Most of all, this project brought me patience and deeper empathy. Patience to observe the different layers of a culture and of interactions between individuals or groups. I grew more empathy for people's individual life paths, decisions and struggles. But also for the struggles of a country, or even a continent, to continue to live under the effects of (neo-)colonialism. On the other hand, it brought me a strong appreciation for entrepreneurial efforts, that continuously help shape communities and support individuals. There is a lot of hope and passion in the eyes of entrepreneurs, whose perspectives I will carry with me in my personal and professional life.

Picture (bottom right) together with Isabel Grijalva (left) and Mario Piu (middle)

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Appendices

Appendix A: Elaborated axes of the convivial conservaton model (Figure 5)

Mainstream conservation (Dichotomist and capitalist) = A type of conservation that is embedded in dualist practices and emphasizes the creation of protected areas (PA's). PA's are considered the epicentre of conservation that is based in traditional values and often goes hand in hand with issues of social justice, such as so-called conservation refugees. Additionally, it can lead to lack of genetic inflow and human labour is involved in keeping it in its natural state. Overall, mainstream conservation serves a capitalist system in which it becomes part of the problem rather than the solution as it operates in a political economy that is unsustainable by nature. As capitalism and mainstream conservation have continuously co-produced each other, the nature-culture dichotomy is foundational to both of these (Buscher and Fletcher, 2020).

New conservation (Beyond dichotomies and capitalist) = This perspective thinks of nature as an element of a socio-natural 'garden' which is to be managed by people. New conservationists are, for example, in favour of capitalizing nature in order to protect it. According to Buscher and Fletcher (2020), letting capitalism profit from ecological disasters is morally wrong and counterproductive in achieving true conservation.

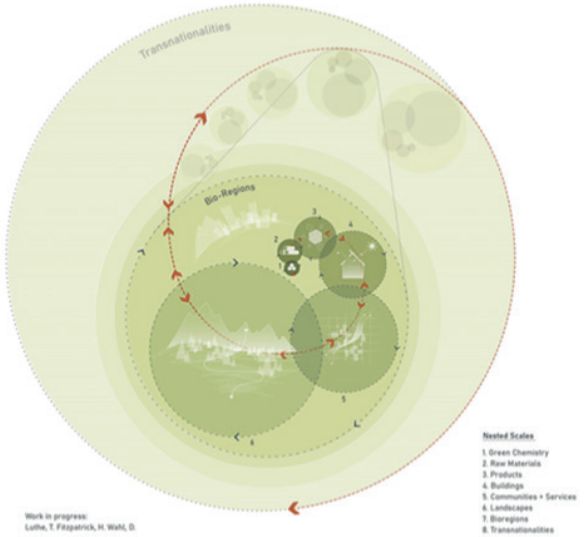
Neoprotectionism (Dichotomist and beyond-capitalism) = Practitioners that believe a nature-people dichotomy is necessary to prevent a collapse of ecosystems but are critical of capitalism. Even though it intends to let nature develop freely from human strategy, its proposal to separate nature and humans is problematic (Buscher and Fletcher, 2020).

Convivial conservation (Beyond dichotomies and capitalism) = Conservation practices that are set up convivially are non-dualist and post-capitalist. It is geared towards conservation that enables humans to live with biodiversity (Buscher and Fletcher, 2020). It is built upon the following five visions:

- From protected to promoted areas – Encouraging places where people are considered welcome visitors
- From saving nature to celebrating (non)human nature – Protecting ourselves from ourselves
- From touristic voyeurism to engaged visitation – Encouraging long-term visitation
- From spectacular to everyday environmentalists – Focusing on mundane-ness
- From privatized expert technocracy to common democratic engagement – All people are able to live with all nature

Appendix B: Bioregionalism

A crucial part of creating a balanced environment is to realize the boundaries of our ecosystem through quantifying environmental pressures. One such model is called 'planetary boundaries framework' and has been set up by Johan Rockstrom and other renowned scientists in 2009 (Stockholm resilience centre, n.d.). Even though the concept brings a general understanding of human impact, the model considers the planet as an entirety and is not designed to downscale to smaller scales. Even though national or local scales often are the entities to create policy and need have more practical use out of it (Ministry of the ecological transition and territorial cohesion, n.d.).



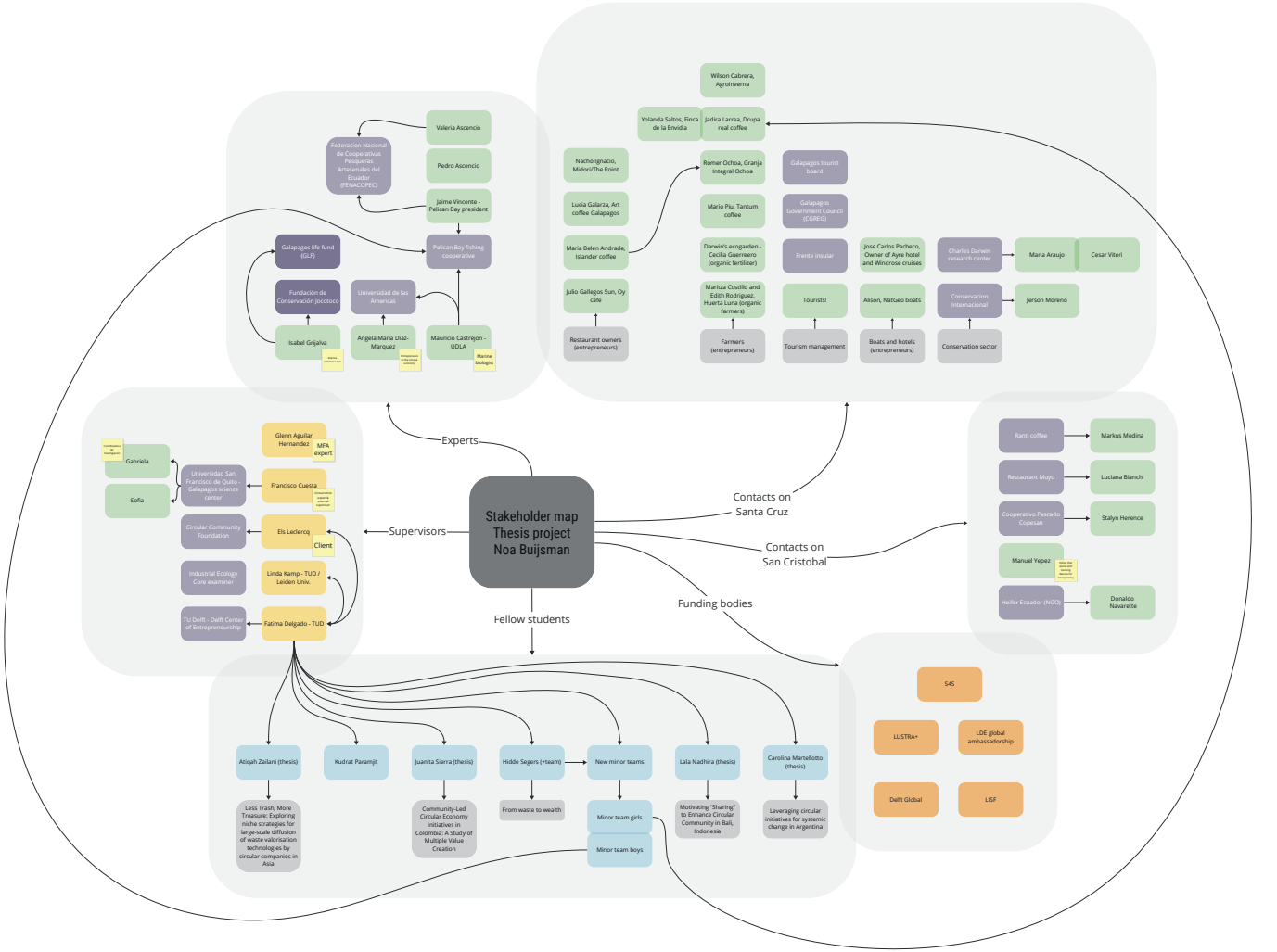
Current research thus focuses on quantifying these ecological boundaries. One such quantification method is calculating the ecological carrying capacity of a region. In other words, the human activity that can take place without significantly changing the ecological processes and populations (Mayerle et al., 2022). Quantifying the carrying capacity is often done in a bioregion. Bioregions are considered to be the optimal size for spatial proximity, biodiversity and diversity of economic activity. All whilst considering the inter-species connectedness. Bioregions connect smaller nested scales to transnational networks, see Figure above. Bioregionalism ultimately asks humanity to reimagine themselves and the places we live in ecological terms with the goal of harmonizing human activities with our natural systems (Luthe et al., 2022).

This concept is important to understand as this research will focus on the Galapagos bioregion, part of the Andes & Pacific Coast sub realm (One Earth, 2025). The Galapagos archipelago is considered their own bioregion due to their diversity or animal and plant life and its high levels of endemism. In order to design an economy that does not pressurize the ecosystem, their bioregion and its carrying capacity must be respected.

Appendix C: Participatory Action Research (PAR) explained

1. Building relationships - The key principle of PAR is 'Relationships first, research second'. The theory believes that it is more important to foster collaborations for a community rather than extracting knowledge and resources. This requires an open and honest attitude from the researcher. This principle is achieved as the researcher has immersed themselves into the research context for two months and has shown elements of reciprocity by sharing the pictures taken and the research outcomes.
2. Establishing working practices - In a partnership that brings together people with different backgrounds, norms and practices, it is incredibly important to not impose the researchers' way of working on the people that they work with. Instead, it is crucial to find a thoughtful design of joint working practices. As the researcher has been flexible in their way of working throughout the fieldwork and data collection and all methods used were only semi-structured, this principle was adhered to.
3. Establishing a common understanding of the issue - Problem definition is considered a key step in a PAR and is sometimes even considered a valid outcome. Additionally, consideration of who should be involved in the problem definition is equally important as PAR should consider the multiple needs and perspectives. This problem definition is often refined throughout the process. This principle is one of the core elements of this research as the first sub-research question fully explores the problem context based on the experiences of the research participants.
4. Observing, gathering and generating materials - The process of a PAR is equally important as the outcome. The methods chosen are different per PAR case study, however, experienced PAR students often choose methods that exchange skills and knowledge through dialogue. Another way could be to train participants to become expert users of different research techniques, such as co-producing a documentary. By hosting a co-creation workshop, the research participants experienced a different way of sharing ideas than in interviews or through observations.
5. Collaborative analysis - Participants gather or produce materials themselves in order to come together and reflect on the meaning of their creations. This generated data then becomes a basis for reflection on commonalities, patterns, differences and underlying causes. Although the research participants did not necessarily come together to generate new material, their reflections were shared and added onto during the co-creation workshop.
6. Planning and taking action - The success of a PAR process is identified by the actions that result from it, or the so-called theory of change. Such actions could be: Creating supportive networks that share resources, using artistic works to influence policymakers and combining different activist coalitions. The co-creation workshop did a great job of connecting the key stakeholders which hopefully will have a prolonged effect. Additionally, the actionable set of strategies will be communicated to these key actors which will hopefully inspire them to contribute.

Appendix D. Stakeholder map



Appendix E: Interview introduction and questions

[ENG]
Hi! My name is Noa and I am a student from the Netherlands. Here, on the Galapagos islands, I am doing research in collaboration with the USFQ about how entrepreneurs in the food sector work with their natural environments. Specifically, I am looking at entrepreneurs that are operating in a regenerative manner. This means that they focus on the self-regulating renewal of natural systems that have been overexploited before or are sensitive. Regenerative businesses are locally operating and culture-specific and also have goals of promoting social well-being. Additionally, I am talking with NGOs, the Charles Darwin Foundation and the Ministry of Agriculture in order to explore their willingness to cooperate with the entrepreneurs. Lastly, I am talking to tourists to see what kind of food products they expect to buy here in Galapagos. I would like to talk to you more about your values in your professional and personal life and how you envision the food system of the Galapagos in the future. Ultimately, I want to understand what the current obstacles are towards achieving a food system that is less dependent on imports and provides benefits to both the local ecosystem and the economy.
After a small interview, I want to invite you to be part of my workshop in two weeks where we evaluate with other stakeholders how the food system can be governed more in a bottom-up manner. The results of this will all be communicated to all collaborators and you will be credited for your contributions, unless requested otherwise.
In order to make processing of this data easier, are you okay with me recording this interview?

Questions for entrepreneurs:
1. Can you describe your business and your role in it?
2. What inspired you to work in the food sector?
3. Which values are important in the way your business operates?
4. How do you define sustainability and/or regeneravitity?
5. In your own words, how does your business operate in a sustainable or regenerative manner? For example, you can explain how local products or traditional practices play a part in your business.
6. How do you feel about operating your business in the Galapagos archipelago? Does it benefit your business, or does it make things more complicated?
a. What are the biggest complications in achieving your goals?
7. In what way has tourism influenced the way you are able to work?
8. What kind of products do you think that tourists expect to eat on the island? Would they pay more for these products in your opinion?
9. How can locally sourced food be promoted better amongst locals/tourists?
10. In what way have legal regulations influenced the way you are able to work?
11. In your own words, how would you define conservation?
a. How did practices of conservation change the island and the way people are able to do business?
12. Which partnerships have benefited your business?
13. What kind of practices can be implemented to support the local food system better in your opinion?
14. How can my research findings support your business and/or the local community?

Questions for NGO's and governance bodies:
1. Can you describe the company you work for and what your role is in it?
2. What does sustainability mean to you? How does it relate to the way the Galapagos is governed?
3. What does conservation mean to you? How did conservation shape the Galapagos?
4. In which ways are conservation practices applied on the Galapagos? Which ones do you promote most?
5. In which ways do you promote local production and consumption of food sources?
6. In your opinion, what are current or potential future barriers to create a food system that is less reliant on imports and strengthens the local ecology?
7. What is your vision for the future food system of the Galapagos? What needs to be done to achieve this?

Questions for the Ministry of Agriculture:
1. Can you describe what the Ministry of Agriculture does on the Galapagos and what your role is/was in it?
2. What does a diet with only local produce look like?
3. How does the ministry promote local production and consumption of food products?
a. In what ways does it try to assist the farmers?
b. Is there a long-term vision for the water problem?
4. Why are perishable food sources not shared amongst islands? They are more sustainable and need less pesticides. And the risk for contamination is similar in the continent.
5. There is a current composting process, what does this look like?
6. What are the current barriers in increasing the composting capacity?

7. Is there an overview of all organic waste streams of the island?
8. In your own words, what is regenerative agriculture?
9. What values does a farmer need to have in order to operate regeneratively?
10. Can you recommend farmers to me that operate in a regenerative manner?

Questions for tourists:
1. Where did you travel from?
2. Why did you decide to visit the Galapagos?
3. Did the local delicacies/food options play a role in your decision to travel here?
4. What types of food did you expect to consume here?
5. Where do you typically eat during your stay here?
6. What local products or ingredients are you most excited to consume?
7. How important is it to you to consume locally sourced products?
8. If this is important to you, how do you know which products are local?
9. In what way can the island make consuming local produce more attractive?
10. Can you explain in your own words what sustainable food means to you?
11. How important is it to you to consume products that are considered 'sustainable'. In other words, products that do not put too much pressure on the environment?
12. Do you feel that eating local and sustainable products can contribute to the conservation efforts of the Galapagos?
13. What activities would you participate in which are centred around local food production? (think of tours or cooking workshops)

Thank you for your participation!

[ESP]
¡Hola! Mi nombre es Noa y soy estudiante de los Países Bajos. Aquí, en las Islas Galápagos, estoy realizando una investigación en colaboración con la USFQ sobre cómo los emprendedores en el sector alimentario trabajan con sus entornos naturales. Específicamente, estoy observando a los emprendedores que operan de manera regenerativa. Esto significa que se enfocan en la renovación autorreguladora de los sistemas naturales que han sido sobreexplotados o que son sensibles. Las empresas regenerativas operan a nivel local, son específicas de la cultura y también tienen objetivos de promover el bienestar social. Además, estoy hablando con ONG, la Fundación Charles Darwin y el Ministerio de Agricultura para explorar su disposición a cooperar con los emprendedores. Por último, estoy conversando con turistas para ver qué tipo de productos alimenticios esperan comprar aquí en Galápagos. Me gustaría hablar más contigo sobre tus valores en tu vida profesional y personal y cómo imaginas el sistema alimentario de Galápagos en el futuro. En última instancia, quiero entender cuáles son los obstáculos actuales para lograr un sistema alimentario que sea menos dependiente de las importaciones y que beneficie tanto al ecosistema local como a la economía.
Después de una pequeña entrevista, quiero invitarte a ser parte de mi taller en dos semanas, donde evaluaremos con otros interesados cómo se puede gobernar el sistema alimentario de manera más ascendente. Los resultados de esto se comunicarán a todos los colaboradores y se te acreditará por tus contribuciones, a menos que se solicite lo contrario.
Para facilitar el procesamiento de estos datos, ¿está de acuerdo con que grabe esta entrevista?

Preguntas para emprendedores:
1.¿Puedes describir tu negocio y tu rol en él?
2.¿Qué te inspiró a trabajar en el sector de alimentos?
3.¿Qué valores son importantes en la forma en que opera tu negocio?
4.¿Cómo defines la sostenibilidad y/o la regeneración?
5.En tus propias palabras, ¿cómo opera tu negocio de manera sostenible o regenerativa? Por ejemplo, puedes explicar cómo los productos locales o prácticas tradicionales juegan un papel en tu negocio.
6.¿Cómo te sientes al operar tu negocio en el archipiélago de Galápagos? ¿Beneficia a tu negocio, o lo hace más complicado?
a. ¿Cuáles son las mayores complicaciones para alcanzar tus objetivos?
7.¿De qué manera ha influido el turismo en la forma en que puedes trabajar?
8.¿Qué tipo de productos crees que los turistas esperan consumir en la isla? ¿Estarían dispuestos a pagar más por estos productos, en tu opinión?
9.¿Cómo se puede promover mejor el consumo de alimentos de origen local entre los habitantes y los turistas?
10.¿De qué manera han influido las regulaciones legales en la forma en que puedes trabajar?
11.En tus propias palabras, ¿cómo definirías la conservación?
a. ¿Cómo cambiaron las prácticas de conservación la isla y la manera en que las personas pueden hacer negocios?
12.¿Qué asociaciones han beneficiado a tu negocio?
13.¿Qué prácticas se podrían implementar para apoyar mejor al sistema alimentario local, en tu opinión?
14.¿Cómo pueden mis hallazgos de investigación apoyar a tu negocio y/o a la comunidad local?

Preguntas para ONG y organismos gubernamentales:
1.¿Puedes describir la organización para la que trabajas y cuál es tu rol en ella?
2.¿Qué significa la sostenibilidad para ti? ¿Cómo se relaciona con la forma en que se gobiernan las Galápagos?
3.¿Qué significa la conservación para ti? ¿Cómo ha dado forma la conservación a las Galápagos?
4.¿De qué maneras se aplican las prácticas de conservación en las Galápagos? ¿Cuáles promueven más?
5.¿De qué maneras promueven la producción y el consumo local de fuentes de alimentos?
6.En tu opinión, ¿cuáles son las barreras actuales o potenciales futuras para crear un sistema alimentario que dependa menos de importaciones y fortalezca la ecología local?
7.¿Cuál es tu visión para el futuro del sistema alimentario de las Galápagos? ¿Qué se necesita para lograrlo?

Preguntas para el Ministerio de Agricultura:
1.¿Puede describir qué hace el Ministerio de Agricultura en Galápagos y cuál es/ha sido su rol en ello?
2.¿Cómo sería una dieta basada únicamente en productos locales?)
3.¿Cómo promueve el ministerio la producción y consumo local de productos alimenticios?
a. ¿De qué maneras intenta asistir a los agricultores?
b. ¿Existe una visión a largo plazo para el problema del agua?
4.¿Por qué las fuentes de alimentos perecederos no se comparten entre islas? Son más sostenibles y necesitan menos pesticidas. Además, el riesgo de contaminación es similar al del continente.
5.Existe un proceso actual de compostaje, ¿cómo es este proceso?
6.¿Cuáles son las barreras actuales para aumentar la capacidad de compostaje?
7.¿Existe una visión general de todas las corrientes de residuos orgánicos de la isla?
8.En sus propias palabras, ¿qué es la agricultura regenerativa?
9.¿Qué valores necesita tener un agricultor para operar de manera regenerativa?
10.¿Puede recomendarme agricultores que operen de forma regenerativa?

Preguntas para turistas:
1. ¿De dónde viajaste?
2. ¿Por qué decidiste visitar las Galápagos?
3. ¿Las opciones de comida o los productos locales influyeron en tu decisión de viajar aquí?
4. ¿Qué tipos de alimentos esperabas consumir aquí?
5. ¿Qué productos o ingredientes locales te entusiasma más probar?
6. ¿Dónde sueles comer durante tu estadía aquí?
7. ¿Qué tan importante es para ti consumir productos de origen local?
8. Si esto es importante para ti, ¿cómo sabes cuáles productos son locales?
9. ¿De qué manera podría la isla hacer que consumir productos locales sea más atractivo?
10. ¿Puedes explicar con tus propias palabras qué significa para ti la comida sostenible?
11. ¿En qué actividades participarías que estén centradas en la producción de alimentos locales? (como tours o talleres de cocinar)

Gracias por su cooperación!

Appendix F: Planning for co-creation session

The planning of the event is as following:

14:30 – Walk-in with snacks and drinks
15:00 – Introductory presentation to participants and a honorary mention to Isabel
15:15 – Invitation to join the co-creation session
15:15 – 15:25 – Introduction round with added question: What is your favourite locally grown or caught product and why?
15:25 – 15:40 – Part 1.1 - Explain the CvF - with examples how their previously mentioned values (in the interviews) can be mapped
15:40 – 15:50 – Part 1.2 - We will together decide which values are shared and which differ amongst businesses.
15:50 – 16:00 – Part 2.1 - Mapping the stakeholders in a big map and connect them to a power-scale such as the onion model
16:00 – 16:15 – Part 2.2 - We discuss what is necessary from each power scale to increase local food consumption
16:15 – 16:30 – Part 3 - Reflect: How can we collaborate to make sure these goals are achieved? Which values are the most important to achieve with this system?
16:30 – End of the session

Appendix G: Survey outcomes

Id	Where did you travel from?	Why did you decide to visit the Galapagos Archipelago?	Did the local foods, delicacies or products influence your choice to travel here?.Did they have influence?	What type of foods did you expect to consume here?	Where do you usually eat during your stay?	Which products, dishes or ingredients are you most excited to try?	How important is it to you to consume locally grown or produced products?.How important?	Could you explain your previous answer? Why is it (less) important for you to consume local products?	If it is important for you to consume local products or dishes, how do you usually know which ones are local?	In which ways can the island promote the consumption of local products more?	How much more are you willing to pay for a local product?	Which kind of activities can you think of that you would participate in that are centered around local food? (like tours or workshops)	Which of the following things that aim to promote local consumption are most effective for you?
1	Portoviejo, Manabí, Ecuador	Get to know the nature of the islands.	Neutral	Pescado;Local coffee;Traditional dishes;	At my Airbnb or/and any restaurant I cross by	Seafood	Very important	Because it helps the development of local producers and workers.	The only way I can get to notice that is if someone told me that fact actually.	Creating and promoting "signature" dishes with huge identity of the local culture and production.	20-40% more	Agricultural tourism and "make your own plate" kind of workshops with tourists.	Visit a 'finca' (farm) that cultivates local products;Attend a cooking workshop with local ingredients;An exposition or museum on local farmers and produce;Highlighting local products and dishes on the menu's of restaurants;Online promotion (through social media for example) with recipes and information about local ingredients;
2	Germany	Cause it's part of a Travel around Peru- Ecuador	Not really	Pescado;	Restaurants, Bars	None ideas before	Very important	Lower the costs of transport inclusive lower CO2 outputs	Asking inhabitants, Reading books	Puh, maybe in details, like menu, bill of fare.	10-20% more	Visiting local families or factorys	Highlighting local products and dishes on the menu's of restaurants;Visit a 'finca' (farm) that cultivates local products;Attend a cooking workshop with local ingredients;Online promotion (through social media for example) with recipes and information about local ingredients;An exposition or museum on local farmers and produce;
3	Germany	Because of it's fantastic Nature, esp. in the Pacific and it is part of our organized journey which started in Peru	Not really	Fish;(Tropical) fruits;Traditional dishes;	In local restaurants	Fresh juices and fish	Quite important	Because mostly they are more fresh and it strengthen the local economy	We habe a guide who comes from Ecuador. Without him it would be difficult to explore, what ist local and what not	Uniform declaration	10-20% more	Cooking-workshop, visiting Farms	Highlighting local products and dishes on the menu's of restaurants;Visit a 'finca' (farm) that cultivates local products;Attend a cooking workshop with local ingredients;An exposition or museum on local farmers and produce;Online promotion (through social media for example) with recipes and information about local ingredients;

4	Guatemala (Living), originally from Germany	Natur and biology, biodiversity, interest, vacation.	Not really	Fish;Vegetables;(Tropical) fruits;Traditional dishes;	No specific preference, but non-vegan	Sea food	Somewhat	I was not expecting Galapagos to offer too much local food supply, since this would mean local farming. And considering (mass) tourism that would be somehow counterproductive regarding preservation of Galapagos.	Generally I would try to understand the local access. For instance an island will likely live from sea food. Or we ask for a local dish, hoping the ingredients are local too.But in general, without additional indication this isn't always easy to understand.	Labeling local food in the menus. Or price, by additional import tax to imported producers and increase prices for imported food. But I don't thin that is a good idea at Galapagos. This will increase prices for locally produced food for locals too and may increase local farming, which may have a negative impact on preservation efforts.	10-20% more	Labeling of all dishes that are produced with more than 65% local food sources. Or local food overview in form of infographics (at the airport or flyers)	Highlighting local products and dishes on the menu's of restaurants;Online promotion (through social media for example) with recipes and information about local ingredients;An exposition or museum on local farmers and produce;Visit a 'finca' (farm) that cultivates local products;Attend a cooking workshop with local ingredients;
5	London	See unique wildlife, experience a different culture	Somewhat	Fish;Vegetables;(Tropical) fruits;Local coffee;Vegetarian dishes;Meats;Traditional dishes;	Different cafes and restaurants in each town	Local fish and locally grown coffee	Very important	Local produce has less environmental impact, it is fresher and expressess local culture through local dishes	Ask the restaurant staff or look for ones that specialise in local produce	Make it easier to find dishes and restaurants with local food	10-20% more	Tours of coffee farms and local ranches	Highlighting local products and dishes on the menu's of restaurants;Attend a cooking workshop with local ingredients;Visit a 'finca' (farm) that cultivates local products;An exposition or museum on local farmers and produce;Online promotion (through social media for example) with recipes and information about local ingredients;
6	Netherlands	Studies	Not really	Fish;Vegetables;(Tropical) fruits;	Everything with $5 menu del dia or tourist spots	Tuna, lobster	Quite important	Because of unique location, try if the tuna for example is better then I've tried elsewhere	Guess, based on the environment	Have it clearly stated somewhere	5-10% more	Tours of farms or going along fishers. Basically being able to see how the food on your plate ends up there	Highlighting local products and dishes on the menu's of restaurants;Visit a 'finca' (farm) that cultivates local products;Attend a cooking workshop with local ingredients;Online promotion (through social media for example) with recipes and information about local ingredients;An exposition or museum on local farmers and produce;
7	California, United States	Scuba, nature tourism	Not at all	Fish;(Tropical) fruits;Local coffee;Traditional dishes;	Convenient restaurants (location, views)	Fish, traditional dishes	Somewhat	Cheaper prices, convenience, but healthier and diverse options for local foods	Asking locals their recommendations and dishes unique to the area	location of local products where served	5-10% more	Scuba diving tours, around popular visit spots (beaches, etc)	Highlighting local products and dishes on the menu's of restaurants;Online promotion (through social media for example) with recipes and information about local ingredients;Attend a cooking workshop with local ingredients;Visit a 'finca' (farm) that cultivates local products;An exposition or museum on local farmers and produce;

8	California, united states	The nature looks beautiful	Somewhat	Meats;Fish;(Tropical) fruits;Local coffee;Traditional dishes;	Home or continent restaurants	Meats and fruits	Quite important	I believe consuming the local products of any region is key to understanding that region	Ask the locals	I'm not sure	5-10% more	Fishing tours	Attend a cooking workshop with local ingredients;Visit a 'finca' (farm) that cultivates local products;Highlighting local products and dishes on the menu's of restaurants;An exposition or museum on local farmers and produce;Online promotion (through social media for example) with recipes and information about local ingredients;
9	Vancouver	Marine life	Not really	Meats;Fish;(Tropical) fruits;	Menú del día restaurant	Tropical fruit	Quite important		I don't know	Advertisement	5-10% more	Farm tours	Highlighting local products and dishes on the menu's of restaurants;Attend a cooking workshop with local ingredients;Visit a 'finca' (farm) that cultivates local products;An exposition or museum on local farmers and produce;Online promotion (through social media for example) with recipes and information about local ingredients;
10	Netherlands	For the beautiful nature and special ecosystem	Not really	Meats;Fish;(Tropical) fruits;Local coffee;Traditional dishes;	I usually cook my own food, or grab a sandwich at Buganvilla Cafe	Empanadas, Bolon	Quite important	Consuming more locally grown food supports local farmers and is more eco-friendly, as it reduces the carbon footprint associated with transporting imports, which often rely on diesel fuel.	Aside from a few things like greens, meat, fish, and handmade items, most products are imported from the mainland. So, I usually shop for groceries at the local market.	Run campaigns to highlight the benefits of buying local, such as lower prices, fresher produce, supporting farmers, and reducing carbon footprints. Encourage restaurants and shops to source locally and actively promote these businesses. Increase import taxes to make local products more price-competitive. Improve the supply chain and expand the variety of local products, ensuring greater availability for consumers.	10-20% more	Farm tours, food tasting workshops, cooking classes, cultural & history exhibitions, food festivals	Highlighting local products and dishes on the menu's of restaurants;Attend a cooking workshop with local ingredients;An exposition or museum on local farmers and produce;Visit a 'finca' (farm) that cultivates local products;Online promotion (through social media for example) with recipes and information about local ingredients;

11	Quito	Destino unico	Not at all	Pescado;Cafe local;Mariscos;	Restaurante	Langosta	Quite important	Porque genera trabajo local	Carne maris	Preparaciones diferentes	5-10% mas		Destacar qué productos son locales en el menú de cafeterías y restaurantes;Promoción en línea (en redes sociales) de recetas con productos locales;Asistir a un taller de cocina con productos locales;Visitar una finca que cultiva productos locales;Una exposición (en un museo) sobre productos y recetas locales;
12	Guayaquil Ecuador	Por conocer su fauna	Not really	Pescado;Verduras;Cafe local;Platos tradicionales;	Villa Luna	Langosta, café, artesanías	Very important	Se reactiva la actividad local de los galapagueños hay muchos extranjeros ofreciendo productos y servicios	Café, artesanía, comidas típicas	Promoviendo desde el gobierno, haciendo ferias, videos promocionales	5-10% mas	Talleres	Destacar qué productos son locales en el menú de cafeterías y restaurantes;Promoción en línea (en redes sociales) de recetas con productos locales;Visitar una finca que cultiva productos locales;Una exposición (en un museo) sobre productos y recetas locales;Asistir a un taller de cocina con productos locales;
13	Argentina	Reconendacion amigos	Neutral	Platos tradicionales;	Restaurante	Pescado	Very important	Para apoyar la economía local	Cuando me lo dicen los habitantes locales	Promocionándolo y siendo atractivo con los precios	10-20% mas	Tours	Asistir a un taller de cocina con productos locales;Visitar una finca que cultiva productos locales;Destacar qué productos son locales en el menú de cafeterías y restaurantes;Una exposición (en un museo) sobre productos y recetas locales;Promoción en línea (en redes sociales) de recetas con productos locales;
11	Quito	It is a unique destination	Not at all	Fish;Local coffee;Shellfish	Restaurants	Lobster	Quite important	Because it generates local work opportunities		Different preparations of dishes	5-10% more		Highlighting local products and dishes on the menu's of restaurants;Online promotion (through social media for example) with recipes and information about local ingredients;Attend a cooking workshop with local ingredients;Visit a 'finca' (farm) that cultivates local products;An exposition or museum on local farmers and produce

12 Guayaquil, Ecuador	To discover the fauna	Not really	Fish;Vegetables;Local coffee;Traditional dishes	Villa luna	Lobster, coffee, artisanal dishes	Very important	Because it reactivates local initiatives, Galapagos has many foreigners that offer products and services	I know coffee and traditional dishes are local	Promoted from the government, setting up markets and using promotional videos	5-10% more	Workshops	Highlighting local products and dishes on the menu's of restaurants;Online promotion (through social media for example) with recipes and information about local ingredients;Visit a 'finca' (farm) that cultivates local products;An exposition or museum on local farmers and produce;Attend a cooking workshop with local ingredients
13 Argentina	Because my friends recommended me to visit	Neutral	Traditional dishes	Restaurants	Fish	Very important	To support the local economy	When local people tell me the products are local	Promoting it, also with attractive prices	10-20% more	Tours	Attend a cooking workshop with local ingredients;Visit a 'finca' (farm) that cultivates local products;Highlighting local products and dishes on the menu's of restaurants;An exposition or museum on local farmers and produce;Online promotion (through social media for example) with recipes and information about local ingredients

Appendix H: Consent form

Opening statement interviews/co-creation session [ENG]
hosted by Noa Buijsman

Dear Participant,

Thank you for agreeing to take part in this research project. Your participation is highly valuable, and the data you provide will contribute to the aggregated findings for my Master's thesis at TU Delft. My thesis is called 'From Circular Communities to regenerative economies, a holistic case study on the food system of the Galapagos Archipelago'. In this research, I am exploring how entrepreneurs on Santa Cruz can operate in more regenerative ways. Regenerative entrepreneurs focus on the self-regulating renewal of natural systems that have been overexploited before. Their businesses are operating locally and culture-specific and also have goals of promoting social wellbeing. My supervising university is the TU Delft and I am collaborating with the USFQ (Universidad San Francisco de Quito), LDE Global, Students 4 Sustainability, and Delft Global to make this research happen. The purpose of the session today is to refine and validate my findings thus far and potentially to gain new perspectives. We will take around 15 minutes for today's session.

Below are a few important points about how your data will be managed. All personal data will be handled according to the **European General Data Protection Regulation**. You are welcome to ask any question regarding the management of your data, and its update/deletion.

1. **Use of Your Data**: The information you share will be used exclusively for the purpose of generating aggregated findings, which will form a key part of my Master's thesis research.
2. **Ownership of Data**: All collected data will be the sole property of TU Delft. This ensures that it is handled in accordance with the university's data management policies and ethical standards.
3. **Data Verification**: The data you provide will be reviewed and verified by [Gatekeeper Person], ensuring accuracy and confidentiality throughout the process.
4. **Data Retention and Deletion**: Your data will be securely stored for a period of two years after the completion of the research project. However, as with any online activity, a breach is always possible. In order to mitigate the consequences, we will make sure to separate any personal details from the content of the information. Following this two-year period, all data will be permanently deleted in compliance with data protection guidelines.

Your participation in this study is entirely voluntary and you can withdraw at any time. If you have any questions or concerns, feel free to contact me on WhatsApp (+31683986043). You may also contact my supervising researcher, Fatima Delgado, at f.delgadomedina@tudelft.nl

Thank you again for your participation and contribution to this research.

Best regards,
Noa Buijsman

TU Delft

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICIPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated [17/10/2024], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study involves: **OR** a semi-structured interview, which is audio-recorded and later to be transcribed to text. **OR** a co-creation session, of which photos of the design process are taken	☐	☐
4. I understand that I will not be compensated for my participation.	☐	☐
5. I understand that the study will end after the researcher has finished collecting all data on 13/12/2024.		
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study may lead to the rise of current social/political tension. I understand that these will be mitigated by the fact that any participant may stop their participation in the experiment at any given time if they feel uncomfortable.	☐	☐
7. I understand that taking part in the study also involves collecting specific personally identifiable information (PII), such as name, age, and profession with the potential risk of my identity being revealed based on this information being used in the Masters' thesis. These risks will be mitigated by verifying the shared information throughout this process.	☐	☐
8. I understand that the following steps will be taken to minimize the threat of a data breach, and protect my identity in the event of such a breach, the researcher will make sure to store personal data separately from the shared information in a secure way. Additionally, the researcher will anonymize any data which can be anonymized.	☐	☐
9. I understand that personal information collected about me that can identify me, such as phone numbers, location of residence and information about family, will not be shared beyond the study team.	☐	☐
10. I understand that the (identifiable) personal data I provide will be destroyed after a period of two years.	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
11. I understand that after the research study the de-identified information I provide, will be used for reporting on the masters' thesis and any research publications that may follow from that. Additionally, with the consent of the participant, the material may be posted on any social platform to share the progress (such as blogposts, LinkedIn or Instagram).	☐	☐
12. I agree that my responses, views or other input can be quoted anonymously in research outputs named above.	☐	☐

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
13. I agree that my real name can be used for quotes in research outputs	☐	☐
D: (LONG-TERM) DATA STORAGE, ACCESS AND REUSE		
16. I give permission for the de-identified information that I provide to be archived in the TU Delft repository so it can be used for future research and learning.	☐	☐
17. I understand that access to this repository is public.	☐	☐

Signatures

_____ _____ _____
Name of participant Signature Date

I, as legal representative, have witnessed the accurate reading of the consent form with the potential participant and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

_____ _____ _____
Name of witness Signature Date

I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____ _____ _____
Researcher name Signature Date

Study contact details of thesis supervisor for further information (also to be contacted in spanish):

Declaración de apertura para entrevistas/sesión de co-creación [ESP]
organizada por Noa Buijsman

Querido/a Participante,

Gracias por aceptar participar en este proyecto de investigación. Su participación es muy valiosa, y la información que proporcione contribuirá a los hallazgos agregados para mi tesis de Maestría en la Universidad de Tecnología de Delft (TU Delft). Mi tesis se titula 'De comunidades circulares a economías regenerativas, un estudio de caso holístico sobre el sistema alimentario del Archipiélago de Galápagos'. En esta investigación, estoy explorando cómo los emprendedores en Santa Cruz pueden operar de maneras más regenerativas. Los emprendedores regenerativos se enfocan en la renovación autorreguladora de sistemas naturales que han sido sobreexplotados anteriormente. Sus negocios operan a nivel local y específico de la cultura, y también tienen como objetivo promover el bienestar social. Mi universidad supervisora es la TU Delft, y estoy colaborando con la USFQ (Universidad San Francisco de Quito), LDE Global, Students 4 Sustainability y Delft Global para llevar a cabo esta investigación. El propósito de la sesión de hoy es refinar y validar mis hallazgos hasta el momento y, potencialmente, obtener nuevas perspectivas. La sesión de hoy tomará alrededor de 15 minutos.

A continuación, algunos puntos importantes sobre cómo se gestionarán sus datos. Todos los datos personales serán tratados de acuerdo con el **Reglamento General de Protección de Datos Europeo (GDPR)**. Puede plantear cualquier pregunta relacionada con la gestión de sus datos y su actualización/eliminación.

1. **Uso de sus datos:** La información que comparta se utilizará exclusivamente con el fin de generar hallazgos agregados, que formarán una parte clave de mi investigación de tesis de Maestría.
2. **Propiedad de los datos:** Todos los datos recopilados serán propiedad exclusiva de TU Delft. Esto asegura que se manejen de acuerdo con las políticas de gestión de datos y estándares éticos de la universidad.
3. **Verificación de datos:** Los datos que proporcione serán revisados y verificados por [Persona encargada], garantizando precisión y confidencialidad a lo largo del proceso.
4. **Retención y eliminación de datos:** Sus datos se almacenarán de manera segura durante un período de dos años después de la finalización del proyecto de investigación. Sin embargo, como en cualquier actividad en línea, siempre existe la posibilidad de una violación de seguridad. Para mitigar las consecuencias, nos aseguraremos de separar cualquier detalle personal del contenido de la información. Después de este período de dos años, todos los datos serán eliminados de forma permanente en cumplimiento con las directrices de protección de datos.

Su participación en este estudio es completamente voluntaria y puede retirarse en cualquier momento. Si tiene alguna pregunta o inquietud, no dude en contactarme a través de WhatsApp (+31 6 83 98 60 43). También puede contactar a mi investigador supervisor, Fatima Delgado, en f.delgadomedina@tudelft.nl.

Gracias nuevamente por su participación y contribución a esta investigación.

Saludos cordiales,
Noa Buijsman
TU Delft

POR FAVOR MARQUE LAS CASILLAS CORRESPONDIENTES	Si	No
A: ACUERDO GENERAL – OBJETIVOS DE LA INVESTIGACIÓN, TAREAS DEL PARTICIPANTE Y PARTICIPACIÓN VOLUNTARIA		
1. He leído y comprendido la información del estudio con fecha [17/10/2024], o me la han leído. He tenido la oportunidad de hacer preguntas sobre el estudio y mis preguntas han sido respondidas satisfactoriamente.	☐	☐
2. Doy mi consentimiento voluntario para participar en este estudio y entiendo que puedo negarme a responder preguntas y retirarme del estudio en cualquier momento, sin necesidad de dar una razón.	☐	☐
3. Entiendo que participar en el estudio implica: **O** una entrevista semiestructurada, que se grabará en audio y luego se transcribirá a texto. **O** una sesión de co-creación, de la cual se tomarán fotos del proceso de diseño.	☐	☐
4. Entiendo que no recibiré compensación por mi participación.	☐	☐
5. Entiendo que el estudio terminará después de que el investigador haya terminado de recopilar todos los datos el 13/12/2024.		
B: RIESGOS POTENCIALES DE PARTICIPAR (INCLUYENDO LA PROTECCIÓN DE DATOS)		
6. Entiendo que participar en el estudio puede llevar al surgimiento de tensiones sociales/políticas actuales. Entiendo que esto se mitigará con el hecho de que cualquier participante puede detener su participación en el experimento en cualquier momento si se siente incómodo.	☐	☐
7. Entiendo que participar en el estudio también implica recopilar información específica que permite identificarme personalmente (PII), como nombre, edad y profesión, con el riesgo potencial de que se revele mi identidad al usarse esta información en la tesis de Maestría. Estos riesgos se mitigarán verificando la información compartida durante este proceso.	☐	☐
8. Entiendo que se tomarán los siguientes pasos para minimizar el riesgo de una brecha de datos y proteger mi identidad en caso de una brecha. El investigador se asegurará de almacenar los datos personales por separado de la información compartida de manera segura. Además, el investigador anonimizará cualquier dato que pueda ser anonimizado.	☐	☐
9. Entiendo que la información personal recopilada sobre mí que pueda identificarme, como números de teléfono, lugar de residencia e información sobre mi familia, no se compartirá más allá del equipo del estudio.	☐	☐
10. Entiendo que los datos personales (identificables) que proporcione serán destruidos después de un período de dos años.	☐	☐
C: PUBLICACIÓN, DIFUSIÓN Y APLICACIÓN DE LA INVESTIGACIÓN		
11. Entiendo que después del estudio, la información que proporcione y que ha sido desidentificada se utilizará para la redacción de la tesis de Maestría y cualquier publicación de investigación que pueda derivarse de ello. Además, con el consentimiento del participante, el material puede publicarse en cualquier plataforma social para compartir el progreso (como publicaciones de blog, LinkedIn o Instagram).	☐	☐
12. Acepto que mis respuestas, opiniones u otra participación puedan citarse de forma anónima en los resultados de investigación mencionados anteriormente.	☐	☐
13. Acepto que mi nombre real pueda utilizarse para citas en los resultados de investigación.	☐	☐
D: ALMACENAMIENTO A LARGO PLAZO, ACCESO Y REUTILIZACIÓN DE LOS DATOS		
16. Doy permiso para que la información desidentificada que proporcione sea archivada en el repositorio de la TU Delft para que pueda usarse en futuras investigaciones y aprendizaje.	☐	☐
17. Entiendo que el acceso a este repositorio es público.	☐	☐

Firmas

_____ _____ _____

Nombre del participante Firma Ferma

Yo, como representante legal, he presenciado la lectura precisa del formulario de consentimiento con el potencial participante y el individuo ha tenido la oportunidad de hacer preguntas. Confirmo que el individuo ha dado su consentimiento libremente.

_____ _____ _____

Name of witness Signature Date

Yo, como investigador, he leído con precisión la hoja de información al potencial participante y, en la medida de mis posibilidades, me he asegurado de que el participante comprenda a qué está consintiendo libremente.

Noa Buijsman_____ _____ _____

Researcher name Signature Date

Detalles de contacto del supervisor de la tesis para obtener más información (también se puede contactar en español):

Fatima Delgado

f.delgadomedina@tudelft.nl

+31 6 83 78 31 86

Appendix I: Assumptions for implementing the strategies into the MFA models

Baseline MFA

Processes	Inflows	Outflows	Value (tons)	TC	
P1 Produce farming	F14 Resources		648		
		F6 Coffee exports	92	0,141975	
		F3 Produce	556	0,858025	
P2 Animal farming	F15 Animals		3104		
		F4 Animal products	2984	0,961340	
		F11 Slaughter waste	120	0,038660	
P3 Fishing	F13 Fish		586		
		F5 Fish products	320	0,546075	
		F7 Fish exports	266	0,453925	
P4 Use and consump	F3 Produce		556	0,034115	
	F4 Animal products		2984	0,183093	
	F5 Fish products		320	0,019635	
	F1 Dry organic imports		7462,656		
	F2 Perishable organic imports		4975,104		
		F8 Waste to be composted	722,7	0,044344	
		F9 Waste to be landfilled	3052,3	0,187283	
		F10 Waste to be burnt	915	0,056143	
		F17 Dissipative heat	11607,76	0,712230	Labeling source: https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-gq-18-006
P5 Composting	F8 Waste to be composted		722,7		
		F16 Compost sold	722,7		
P6 Landfill	F9 Waste to be landfilled		3052,3		
	F11 Slaughter waste		120		
P7 Burning	F10 Waste to be burnt		915		
Organic imports			12437,76		
All products produced			16297,76		
Percentage imported			76,32%		
All products wasted			4690		
All products consumed			11607,76		

Assumptions for strategies 1.4 and 2.5:

- It is assumed that the import & production mass (around 16.300 tons annually) needs to be met with the new regulations too. This number is seen as the baseline societal need for food;
- Perishable imports are limited by 50% (as exotic fruits and fish is prohibited);
- Dry imports are limited by 80% as more local products are used mandatorily. However, most dry foods cannot be produced or processed on the islands so imports are still relatively high;
- Fish exports are limited by 166 tons, so that local consumption can be increased by 28%;
- Animal products are increased by 68% and produce by 350%, so that the earlier mentioned needs are met.

Assumptions for strategies 4.2 and 4.5:

- It is assumed that the import & production mass (around 16.300 tons annually) needs to be met with the new regulations too. This number is seen as the baseline societal need for food;
- Animal products are limited to 66,6% as consumers are nudged to consume more plant-based and more fish (which, if caught without exceeding the carrying capacity, pressures the environment less);
- It is assumed that the loss of mass resulting from the limitation of animal products, will need to be compensated by fish and produce consumption;
- Fish consumption is set to increase by 31% (420 tons) as consumers are nudged to consume more local products. However, this amount is increased by decreasing exports, hereby not exceeding the limits of the eco- and bioregions;
- Produce is set to increase by 180% (1556 tons) as consumers are nudged to consume more local and plant-based.

Appendix J: Survey questions

The survey questions were as follows:

- Where did you travel from? (open)
- Why did you decide to visit the Galapagos Archipelago? (open)
- Did the local foods, delicacies or products influence your choice to travel here? (likert scale)
- What type of foods did you expect to consume here? (multiple choice)
- Where do you usually eat during your stay? (open)
- Which products, dishes or ingredients are you most excited to try? (open)
- How important is it to you to consume locally grown or produced products? (likert scale)
- Could you explain your previous answer? Why is it (less) important for you to consume local products? (open)
- If it is important for you to consume local products or dishes, how do you usually know which ones are local? (open)
- In which ways can the island promote the consumption of local products more? (open)
- How much are you willing to pay for a local product? (multiple choice, varying between nothing more to 50% more)
- Which kind of activities can you think of that you would participate in that are centred around local food? (open)
- Which of the following things that aim to promote local consumption are most effective for you? (ranking)

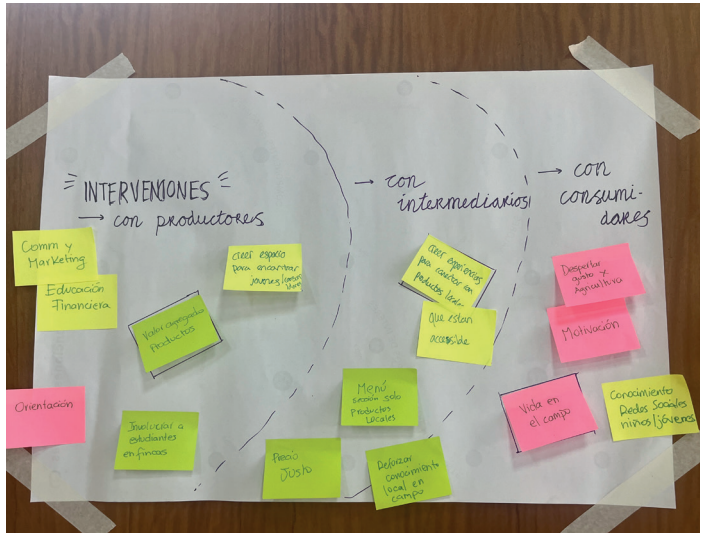
Appendix K: The raw data from café islander

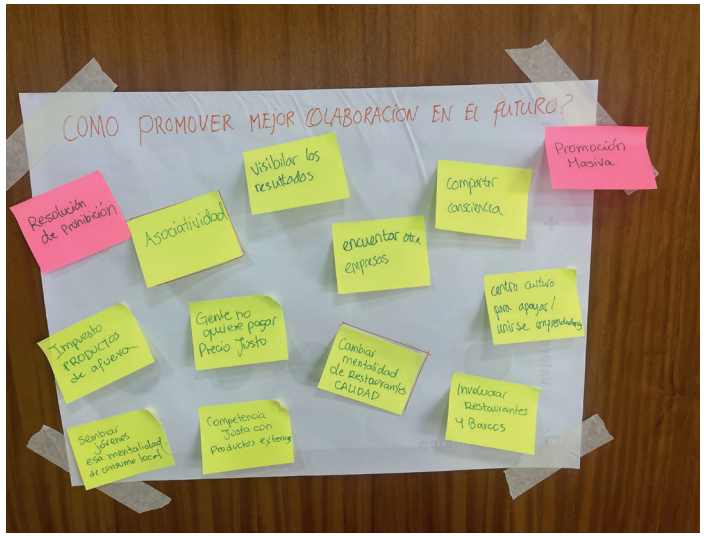
Information from meeting with Belen and Dani (05/12) from which the MFA is built:

The whole coffee process looks as following:
1. Growing the beans > First round after 4 years, then annually (however the cycles are messed up by climate change)
2. Picking by hand > So-called 'bricks' are unwanted
! Rest product: Bricks/Defects, composted
3. Selecting through floating > The beans that rise to the top are not good quality
! Rest product: Defects, composted
4. 'Despulpado' in machine, Taking the red skins off > Fruit and bean is left
! Rest product: The red skins which can be used for making tea
5. Fermentation process and washing (18 hours)
6. Drying the beans, so the fruit dries out
7. Sorting the dried beans > More defects here than any other phase
! Rest product: Defects, composted
8. Taking the dry skins off in machine > Left with 'Café Verde' or 'Green coffee'
! Rest product: The dry skins which can be used for making paper, but this is yet unexplored
9. Roasting the Café Verde
10. Grinding the roasted beans
11. Making the coffee
! Rest product: The used ground coffee, compost/fertilizer

- Thus, there are 4 rest products: The defect beans which can be composted, the red skins which can be used for making tea, the dry skin which do not have a purpose yet but have a potential to be used for paper and the used ground coffee which serves perfectly as compost or fertilizer.
- To have continuous production throughout the year, the 'growing areas' are planted in different times during the year
- The difference between low and high altitude coffee is that low altitude coffee ripes faster and thus might have less complex tastes
- 5 kg of red fruits lead to 800 grams of roasted coffee, a mass decrease of 84%
- Islander bought 1130 kg of coffee (roasted) from Granja Integral Ochoa – Romer Ochoa and 4261 kg from Finca la bohemia – Robert Christen in harvest year 2022/2023
- Next to use in the café, Islander sells about 50 bags of coffee per month

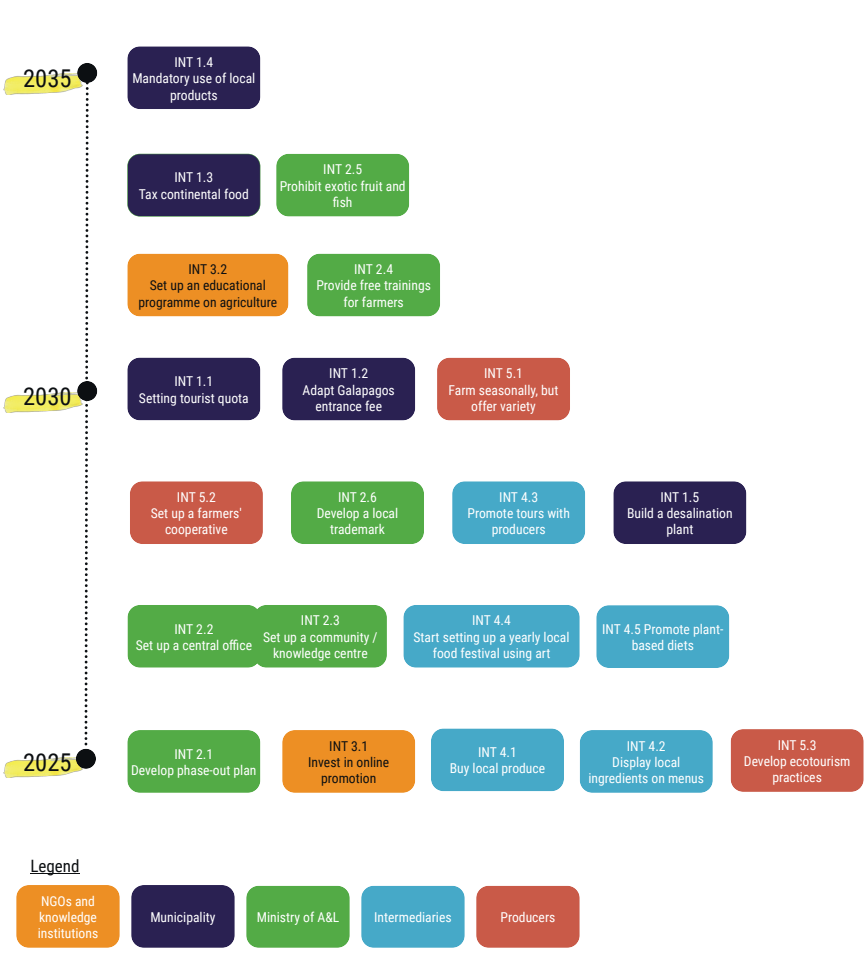
Appendix L: Co-created strategies



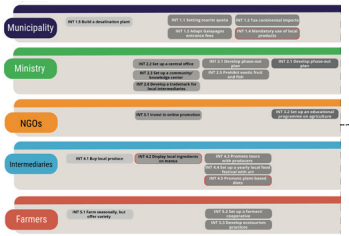


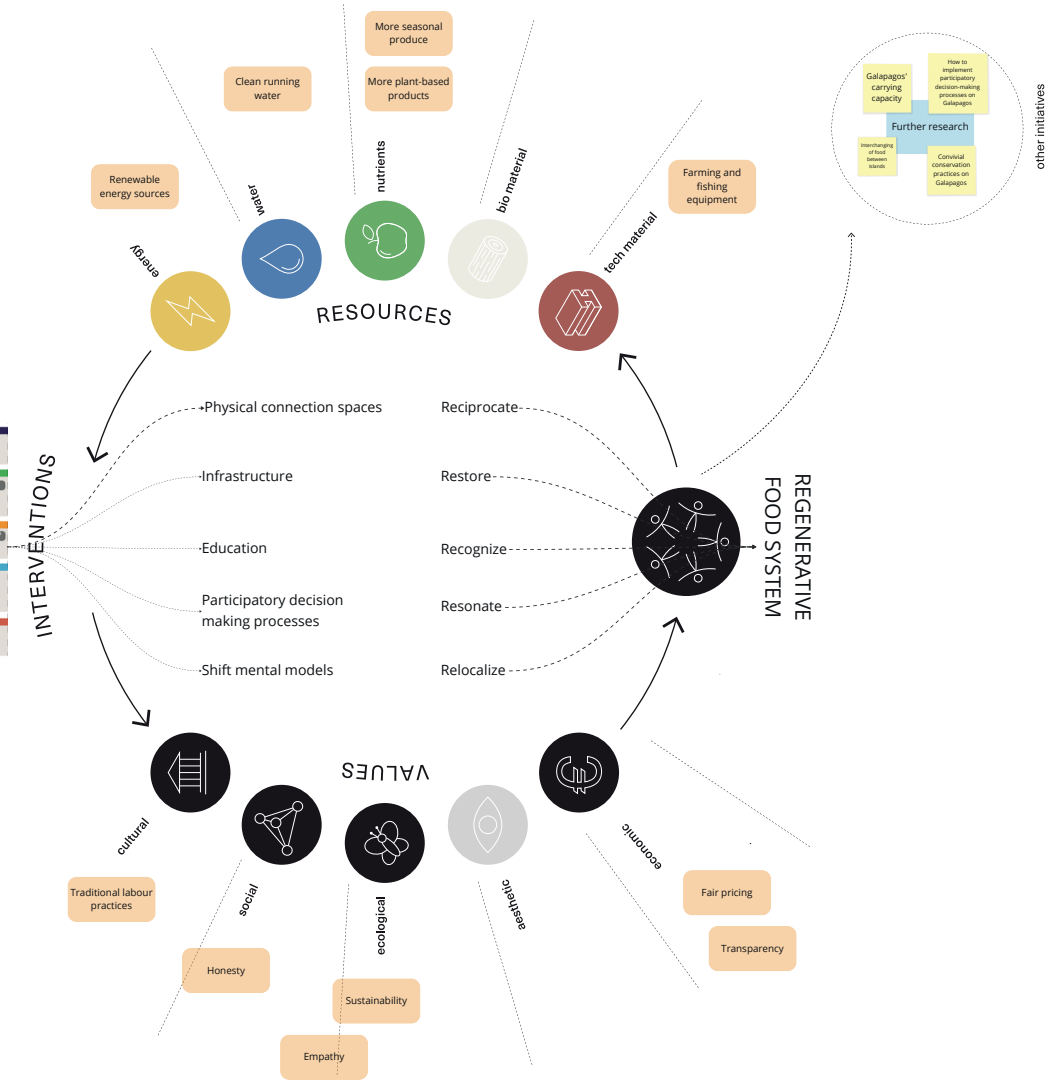
Appendix M: Strategies timeline

The strategies discussed in the previous chapter provide a holistic approach towards setting up a Regenerative economy. Although it is recommended that these strategies would be implemented Simultaneously and as soon as possible to limit unnecessary emissions and further social tension, the Timeline in the figure below highlights in which timeframe the strategies could be realistically achieved.



Appendix N: Value Flower Field Map





Appendix O: Conceptual Regenerative Flower

The figure below highlights a concept version of such a regenerative flower. This flower takes a different approach than the CVF as it has regenerativity at its core, continues with the 5 R's and presents in which ways these R's are manifested. This also means that the petals are directly linked to the R that they correspond to, which is another difference from the buildup of the CVF, where the concepts are not directly linked to each other and the viewer rather perceives them as layers.