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Living Lab as an approach to island rejuvenation through co-creation and Local Ecological Knowledge inclusion in the context of the Aegean Islet Conservation Program: the islet of Anthropofas as a case study

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THESIS APPROVAL

I, Alessio Surian as supervisor of the student Lorenzo Bragagnolo Carlon, hereby APPROVE the thesis entitled "Living Lab as an approach to island rejuvenation through co-creation and Local Ecological Knowledge inclusion in the context of the Aegean Islet Conservation Program: the islet of Anthropofas as a case study".

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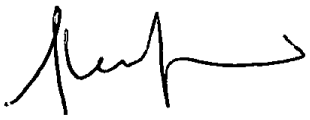

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Declaration of Mobility

This thesis is the result of the Erasmus Mundus Joint Master's degree in Climate Change and Diversity: Sustainable Territorial Development (CCD-STeDe).

This program is offered by a consortium made up of the following universities: Università degli Studi di Padova (UNIPD, Italy), The Universidad Andina Simón Bolívar, Sede Ecuador, Universidade da Madeira (Portugal), the University of Johannesburg (South Africa) and Université Joseph Ki-Zerbo de Ouagadougou (Burkina Faso).

This program has a duration of 24 months. The course started at UNIPD in Italy, for the first semester. The second semester was spent at Universidad Andina Simón Bolívar in Quito (Ecuador). The third semester was blended with the international Winter School in Kenya. The fourth semester was spent for internship and thesis at the Archipelagos Institute of Marine Conservation, based in Samos, Greece, under the supervision of the Università degli Studi di Padova.

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Abstract

The Aegean Islet Conservation Program is a research project focused on creating a protocol for islet restoration and solutions to land degradation in the Mediterranean, developed by the Archipelagos Institute of Marine Conservation and the John H. Daniels Faculty of Architecture, Landscape, and Design of the University of Toronto. Its first case study is constituted by the islet of Anthropofas, part of the Fournoi-Korseon archipelago. Within this initiative, this investigation develops a framework to integrate Local Ecological Knowledge (LEK) to scientific expertise, with the intention of enhancing collaboration and sense of ownership among different stakeholders throughout the entire project life cycle. The main proposition is to deploy a Living Lab user-centred approach to amplify collaboration among different actors and promote co-creation of both knowledge and solutions to existing challenges in the context of Anthropofas. Given the operational nature of this work, after the methodological core of this paper is explained, this is then applied to the program itself. As Participatory Methods are seen as a means to translate Living Lab theory into practice, current research being developed under the Aegean Islet Conservation Program is combined with a series of such tools, categorized according to the four main phases that constitute the development of Living Lab. This is followed by a reflection concerning the concrete potential for a co-creative process to unfold within the program, based on the way the project has been articulated so far by its proponents. The contribution concludes by discussing what limitations could affect the feasibility of the Living Lab-based framework for LEK inclusion and co-creation throughout the project, while also pointing out where future research pertinent to the program ought to head.

Resumen

El Aegean Islet Conservation Program es un proyecto de investigación centrado en la creación de un protocolo para la restauración de islotes y soluciones a la degradación del suelo en el Mediterráneo, desarrollado por el Archipelagos Institute of Marine Conservation y la John H. Daniels Faculty of Architecture, Landscape, and Design of the University of Toronto. Su primer estudio de caso está constituido por el islote de Anthropofas, parte del archipiélago de Fournoi-Korseon. Dentro de esta iniciativa, esta investigación desarrolla un marco conceptual para integrar el Conocimiento Ecológico Local (CEL) con la experticia científica, con la intención de potenciar la colaboración y el sentido de apropiación entre diferentes partes interesadas a lo largo de todo el ciclo de vida del proyecto. La proposición principal es desplegar un enfoque de Living Lab centrado en el usuario para amplificar la colaboración entre diferentes actores y promover la co-creación tanto del conocimiento como de soluciones a los desafíos existentes en el contexto de Anthropofas. Dado el carácter operativo de este trabajo, después de que se explique el núcleo metodológico de este documento, éste se aplicará al programa mismo. Como las metodologías participativas son vistas como los medios para traducir la teoría del Living Lab en práctica, la investigación actual que se está desarrollando bajo el Aegean Islet Conservation Program se combina con una serie de tales herramientas, categorizadas según las cuatro fases principales que constituyen el desarrollo del Living Lab. Esto es seguido entonces por una reflexión concerniente al potencial concreto para que un proceso co-creativo se despliegue dentro del programa, basado en la manera en que el proyecto ha sido articulado hasta ahora por sus proponentes. La contribución concluye discutiendo qué limitaciones podrían afectar la viabilidad del marco conceptual basado en Living Lab para la inclusión del CEL y co-creación a lo largo del proyecto, mientras también señala hacia dónde debería dirigirse la investigación futura pertinente al programa.

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Introduction

Desertification is one of the most vivid environmental challenges of the present day: it affects approximately 70% of arable arid lands globally, which equates to around 30% of the total emerged land surface (Salvia et al., 2022). Initially acknowledged as a critical environmental issue in the 1960s, desertification, and more broadly speaking land degradation are affecting nearly 3.2 billion people globally (Jordi, 2022). As mentioned by Halbac-Cotoara-Zamfir et al. (2020), the United Nations Convention to Combat Drought and Desertification (UNCCD) defines desertification as a form of "land degradation in arid, semi-arid and dry sub-humid areas, resulting from various factors, including climatic variations and human activities". This clarifies how desertification is attributable to two main kinds of causes, each with specific declinations and manifestations. Furthermore, although desertification was originally seen as an expansion of desert areas within fertile ones, it is now conceived as a process that is primarily of anthropogenic nature and occurring outside of existing deserts (European Institute of the Mediterranean, n.d.).

Returning to the two categories of drivers of desertification, anthropogenic factors can include agricultural intensification, overgrazing, unsustainable water resource management, deforestation or urban expansion (Halbac-Cotoara-Zamfir et al., 2020; Jordi, 2022). Conversely, natural factors that deepen land degradation range from geomorphology to vegetation cover characteristics and soil types, which imply a certain degree of vulnerability of landscapes to degradation processes (Halbac-Cotoara-Zamfir et al., 2020). Climate change can interact and exacerbate the fragility related to natural conditions or human-induced processes due to extreme weather conditions such as prolonged droughts and heavy rainfall (Jordi, 2022). These processes can lead to a variety of interrelated consequences. As Jordi (2022) exemplifies, as desertification pushes a decrease in cropland productivity leading to food insecurity and price inflation, social instability, forced migration, and broader environmental deterioration.

A place where human pressure on land can be definitely felt is the Mediterranean basin, a particularly vulnerable region with respect to land degradation as a consequence of millennia anthropogenic action on soil and other resources (Halbac-Cotoara-Zamfir et al., 2020). Short-term sighted agricultural practices were of pivotal importance, through yields maximization, use of pesticides or overgrazing (Halbac-Cotoara-Zamfir et al., 2020). The way in which these played and still vest a role in threatening land’s health is not always straightforward. For instance, as stated by Halbac-Cotoara-Zamfir et al. (2020), despite a recent reduction in the number of livestock in the Mediterranean region, the impact of livestock farming has remained unchanged due to animal concentration and high specialization. In addition, climate projections predict significant

temperature increases and precipitation decreases under various CO_2 emission scenarios: these trends will inevitably intensify desertification risks in specific areas of the Mediterranean (Morianou et al., 2021). Demographics also play a key rol, given that the Mediterranean region's population has increased by 50% over the last 30 years, and this upward trend has still not curbed, particularly in the Southern area (European Institute of the Mediterranean, n.d.). It is suggested that approximately 30% of semi-arid Mediterranean drylands are currently affected by desertification processes, with 47% of the region's population experiencing these impacts (European Institute of the Mediterranean, n.d.).

An overlap between demographic pressure and the economic sphere can be found in the tourism industry, a key sector in the Mediterranean. Estimates suggest that tourist flows could reach 396 million by the current year, doubling the region's population during summer months (European Institute of the Mediterranean, n.d.). This seasonal flux and the infrastructures of the touristic industry have led to an overdevelopment of coastal regions, accelerating a peculiar form of desertification called "littoralisation", while also increasing eutrophication of the Mediterranean Sea (European Institute of the Mediterranean, n.d.).

Zeng et al. (2021) note how the warming trend observed in the Mediterranean region is exceeding global averages, as temperatures are projected to be 20% higher than global means during the twenty-first century, especially during summer months and in northern Mediterranean areas (Zeng et al., 2021). Rising sea levels are also deemed to become a major issue in the coming future (European Institute of the Mediterranean, n.d.). Major anthropogenic threats in the Mediterranean coincide with the global drivers defined above: they include population pressure, land use intensification and abandonment, wildfires, overgrazing and grazing abandonment, and urban expansion (Zeng et al., 2021). Zeng et al. (2021) discuss grazing practices on dryland ecosystems as a complex issue, given that while being seen as a major impulse of land degradation in countries like Greece or Spain, the effects of its abandonment are ambiguous: it can lead to soil recovery, but also potentially reduce soil fertility and microbial activity in some contexts.

A Mediterranean country where different implications of land degradation can be felt is Greece. The Desertification Information System for the Mediterranean (DISMED) project, funded by the European Commission to assess desertification vulnerability based on three indicators (climate, soil, and vegetation), identified Greece as having the second highest proportion of national territory affected by severe soil degradation in the Mediterranean region, with 5.8% of its lands exhibiting high degradation levels (Salvia et al., 2022).

However, addressing desertification in Greece and the broader Mediterranean region is a complex task due to its multidimensional nature, as well as because of the methodological inconsistencies in measuring degradation processes. Measurement approaches are not harmonized, hence complicating the comparison of desertification metrics across regions with specific biophysical, socioeconomic, and political contexts (European Institute of the Mediterranean, n.d.). Country-specific studies often employ locally developed estimation methods or fail to cover entire national territories, creating confusion for regional level assessment and policy development (European Institute of the Mediterranean, n.d.). This methodological fragmentation hinders the development of coherent, cross-border strategies to address what is fundamentally a transnational environmental challenge.

Overall, restructuring land management practices appear to be an effective way to tackle the threats of land degradation. Practices such as agroforestry initiatives, cultivation of halophytes in saline-affected areas, controlled grazing schemes, and terracing can improve soil fertility, restore vegetation (European Institute of the Mediterranean, n.d.). Their implementation is strictly bounded to decisions developed at the local level, yet it can benefit from incentives such the schemes part of the European Union's Common Agricultural Policy (CAP), which however have also proved to be promoters of pesticide usage and overgrazing (Halbac-Cotoara-Zamfir et al., 2020). Thus, crafting successful strategies to combat the pressure imposed by phenomena such as land erosion and loss of vegetation necessitates an interplay between external funding mechanisms and policies, but also an adequate involvement of research bodies and local actors able to contribute to territorial planning (Halbac-Cotoara-Zamfir et al., 2020). While participation in environmental decision-making is increasingly recognized as a democratic right, stakeholders often exhibit heterogeneous perceptions of degradation and feelings of helplessness that can reinforce local power imbalances (Halbac-Cotoara-Zamfir et al., 2020). This backs up the consideration expressed in relation to the methodological difficulties related to the management of areas at risk of desertification.

In the Greek context, an organization that has recently decided to begin working around this issue is the Archipelagos Institute of Marine Conservation (Archipelagos). Founded in 1998 by Thodoris Tsimpidis and currently based in Agios Konstantinos, Samos, Greece and Lipsi, Greece, the Institute is a non-profit NGO primarily focused on marine and terrestrial conservation of the Aegean Sea and its islands (Archipelagos Institute of Marine Conservation, n.d.). Both areas of focus are mainly concerned with protecting and monitoring wildlife: the marine part deals with marine mammals surveying, assessments of fisheries activities, protection of coastal ecosystems and oceanographic research. On the other hand, the terrestrial area includes studies on species that populate Samos or other neighbouring islands, going from mammals like jackals to birds and

butterfly species, as well as local flora (Archipelagos Institute of Marine Conservation, n.d.). Beyond its staff, the Institute works closely with other institutions like universities and research centres. Among these partnerships, a recently launched one brings together Archipelagos and the John H. Daniels Faculty of Architecture, Landscape, and Design of the University of Toronto. An initiative the two institutions have embarked on is the Aegean Islet Conservation Program, which aims to create a protocol for island rejuvenation in the Aegean Sea blending scientific and local knowledge.

As outlined in the project proposal document drafted on the 25th of February 2025,

"*The Aegean Islet Conservation Project will establish frameworks for the integrated landscape recovery and restoration, anti-erosion and water retention, infrastructural renewal, rehabilitation, adaptive reuse of vernacular architecture, sustainable stewardship, conservation and resource management. These will operate both at a research and design phase, producing documents and best-practice protocols applicable across the Aegean and East Mediterranean. The project will develop an applied project phase, implementing the physical restoration and conservation of a single Islet as a pilot. This will be a collaborative, phased implementation of soil restoration and planting, stone terrace and small shelter reconstruction, water retention infrastructure building and eventually the establishment of an active research base, monitoring the islet and its marine habitats, dedicated to the sustainable pursuit of anti-desertification, conservation, and rejuvenation strategies for the greater Aegean islet systems.*

The design project will have an experimental approach and interface architectural and landscape design, digital documentation, fabrication and traditional building technologies; marine, environmental and social science; fisheries and forestry conservation; ethnography, history and archaeology, and the documentation and recording of available local knowledge. The design phase of the project will provide a series of sustainable, low-footprint landscape, infrastructural, and building restoration and construction techniques, drawing from traditional / vernacular but also state-of-the-art practices, working with local and locally sourced materials and ecological knowledge. These will include stone construction, rammed earth, fog and water collection techniques, the replanting of local shrubs and species and the recultivation of anhydrous and halophyte varieties.

After consultations and discussions with the mayor and municipality of Fournoi Korseon, an islet has been identified at the South East of this greater island complex: Megas Anthropofagos. Measuring 0.55 km2 (c. 136 acres), this islet features a protected harbour, built structures and stone walls, cisterns and remains of local farming activities. It is less than 8 nautical miles away from the

nearest major port and 2.7 n.m. from the nearest protected cove of Fournoi. The islet is also situated at a key point among marine areas of great ecological interest, unique to the entire Mediterranean". (Aegean Islet Conservation Program Project Proposal, see Appendix A).

In the context of the Aegean Islet Conservation Program, this contribution is situated in its first phase, focused on reviewing literature on relevant topics, developing an understanding of best practices and fostering a better understanding of elements that should be incorporated within the program as this will begin to unfold (Aegean Islet Conservation Program Project Proposal, see Appendix A). Its focus will be on analysing the use of Local Ecological Knowledge and on creating an understanding of how this and its bearers could be included in a collaborative way. For this reason, the primary objective of this work will be to grasp in what ways participation of all stakeholders could be maximized, and what approaches to the interacting types of knowledge, as well as to the project design itself, could be deemed as beneficial.

Upon these considerations, the following pages will constitute the theoretical backbone for the creation of a manual on stakeholder engagement, to be deployed within the Aegean Islet Conservation Program, but also as a reference for other similar initiatives. To define stakeholder engagement, reference is made to the United Nations Development Program (2020), which connotes it as a notion comprising a range of activities and ongoing interactions developing throughout a project and including, among others, stakeholder analysis and planning, consultation and meaningful participation, involvement in monitoring and evaluation.

After having presented the guiding research questions, literature concerning the central concepts within this contribution will be reviewed to create an adequate theoretical backbone for the following sections. Subsequently, the methodological principles of the manual will be explained, together with its case study. These will then be connected and applied to three areas of action around which the program is set develop: these areas have been discussed and agreed on with Dr. Anastasia Miliou, scientific director of the Archipelagos Institute of Marine Conservation, and Dr. Petros Babasikas, lecturer at the University of Toronto. The final part of this work will deal with reflecting on the potential limitations that the presented strategies might face, as well as with discerning in what ways this work could be strengthened.

Research questions

This thesis serves as the body of research that will lead to the creation of a manual for use of LEK and for stakeholder engagement in the context of island rejuvenation, coherently with the goals of the Aegean Islet Conservation Program:

It will be guided by the following main Research Question:

- How can Local Ecological Knowledge be used to create a framework focused on a) ecological and b) technological inputs to foster sustainable island rejuvenation in the island of Anthropofas?

To make the question more operational and to avoid overly generalized answers, a series of sub questions has been developed.

- How can the Living Lab approach benefit the use of Local Ecological Knowledge within the Aegean Islet Conservation Program?
- How can stakeholders' power be redistributed effectively to enhance ownership of the rejuvenation process and of its final product?
- What are the spaces and hindrances for co-creation of knowledge within the program?

Overall, these questions will be used to generate a piece of research able to create a novel theoretical understanding concerning the relationship between LEK, stakeholder engagement and island rejuvenation, while also being pragmatic in its premise of being intrinsically made for a real-life project.

Literature Review

The following section will serve to delve into a review of literature that touches on some of the key concepts to the Aegean Islet Conservation Program. As outlined in the introduction, the initiative is aimed at paving the way for restorative practices in the Mediterranean's islets, and it intends to do so making extensive use of Local Ecological Knowledge (LEK). Thus, this notion will be introduced and examined in its specificities, as well as by explaining its pertinence to this research. Furthermore, the same will be done with other concepts that are deemed as adequate to enrich this research in its operational component, and which will then be combined together in the next chapters.

Local Ecological Knowledge (LEK)

Defining Local Ecological Knowledge

The meaning of Local Ecological Knowledge (LEK) may seem straightforward, yet various authors depart from different definitions. Alexopoulos et al. (2025) assert that the term, interchangeable with Traditional Ecological Knowledge (TEK) or Indigenous and Local Knowledge (ILK), describes the generational knowledge that the stakeholders of an area have acquired about the environment and the ecology that take place there.

On the other hand, Aswani et al. (2018) posit that LEK is a site specific knowledge that integrates scientific and practical knowledge, while TEK is peculiar for its inclusion of the historical and cultural dimensions. Other definitions emphasize how LEK concerns the extensive observation of an area or species, and how it should not be determined by asserting the existence of a shared culture or indigeneity, but simply on the presence of common histories of interactions with an environment, even if short lived ones (Beaudreau & Levin, 2014; Early-Capistrán et al., 2020).

Joa et al. (2018) reaffirm the centrality of strictly ecological and environmental knowledge within the definition of LEK, stating that together with the emphasis on the local, it constitutes the essential pillar of the concept. Nevertheless, the authors posit that this kind of knowledge can stem from empirical observation or management systems of natural resources, but also form the influence of social institutions and cultural worldviews (Joa et al., 2018).

Thus, it can be argued that, although LEK does indeed solely concern ecological and environmental knowledge obtained at a strictly local level, its inevitable intersections with other domains and epistemologies should undoubtedly be acknowledged.

What remains ambiguous in the equation is the understanding of the noun knowledge, for which it will be useful to revise the history of LEK.

History and theory of LEK

It was in the 19th century that LEK begun to be an object of interest for academia, with a clear imprinting: non-Western knowledge, such as the one of indigenous populations of the American continent, was seen as "pre-logical", non-material and seemingly magical, thus still needing to go through what was thought to be a universal linearity of social development (Lauer, 2017). Around 60 years ago, research on LEK started to be more systematic, thanks to the first ethnobiological studies carried out among indigenous islanders or to the ones concerning fishers and fisheries' biology (Lauer, 2017). However, these studies were still marked by problematic assumptions. Firstly, they conceived indigeneity as pristine, unique and almost antithetical to scientific knowledge (Lauer, 2017). Secondly, knowledge was seen as a monolithic body made of abstractions that could be dissected regardless of any connection they might have with the socioecological context in which they had been produced (Lauer, 2017).

More recently, academia has begun to see knowledge as dynamic and relational, hence challenging the assumptions that led to a static conception of LEK (Aswani et al. 2018). Since the 1990s, the interaction with LEK has acquired a novel value: it is seen as a social process that can broaden the scope of an investigation with more nuance and attention to blind spots.

Particularly, it is now seen as an epistemic body that can complement scientific knowledge in a variety of fields (Beaudreau & Levin, 2014). Its use has been championed in fields such as rural development or environmental conservation. Examples can be found within marine conservation: Beaudreau and Levin (2014) focused on mapping how fisheries practitioners with different expertise would describe perceived changes in marine populations in Puget Sound, Washington. Through the use of LEK they were able to compensate for the lack of adequate historical data concerning the evolution of different species, such as the rockfish, over the area of study (Beaudreau & Levin, 2014). Another example comes from Alexopoulos et al. (2025), who showed how LEK outperformed governmental and remote sensing dataset in predicting the distribution of seagrass around different islands in the Aegean Sea, such as Fournoi and Patmos. Moreover, in studies concerning landscape dynamics, LEK has been significantly useful to evaluate perceptions of biodiversity elements, as well as to enrich analyses on ecosystem services maintenance (Evangelista et al., 2024). Beyond generating information combinable with scientific data, LEK can help with various other tasks, ranging from providing expertise applicable

in other case studies, eliciting new research hypotheses or being at the basis of processes of resources co-management and sustainable governance (Gadgil et al., 2001; Ladio, 2025). The overall effectiveness of LEK is confirmed by the study of Aminpour et al. (2020), who investigated the validity of using the Wisdom Of stakeholder Crowds (WOC) in the management of socioecological systems (Ali et al., 2025). The authors demonstrated that an adequately sized group of diverse and informed stakeholders can provide descriptions of their context that mirror the representations of system knowledge of scientists (Aminpour et al., 2020). Overall, it can be asserted that LEK can be used to promote a decentralised, community-based and at times replicable model of environmental management (Alexopoulos et al., 2025).

When bringing together ecological resources and community, a question arises: who can actually benefit from the integration of different forms of knowledge?

Co-creation of Knowledge: an objective in the interaction with LEK?

Up until a more dynamic understanding of LEK began to arise, its use would be purely extractive, with locals being seen as sinks of information that could improve already existing scientific precepts (Lauer, 2017). Yet even in contemporary projects this issue has not disappeared completely.

It can happen to have research experts or local elites deciding what is to be considered knowledge, rather than letting the bearers of LEK themselves discern an answer to that question (Lauer, 2017). LEK's content may solely concern ecology, yet its usage can lead to different social implications. If LEK presumes to aid to the conservation and sustainable development of its own context of production, then those producing it should have their voice heard when discussing its management and application (Lauer, 2017). Yet as stakeholders are not elevating the role of LEK on their own, it is adequate to posit that the objective in the use of LEK and in its connection with scientific expertise should be to co-create new forms of knowledge (Lauer, 2017).

A genealogy of co-creation of knowledge

Co-creation of knowledge can be defined as a set of iterative and collaborative processes comprising heterogeneous kinds of preparation, skills and figures able to create contextual knowledge aimed at a more sustainable and resilient future (Norström et al., 2020). This definition leads to two considerations. Firstly, 'iterative' and 'collaborative' respectively

imply that there is no predefined path for success, and that an interdisciplinary understanding of knowledge is key for its co-production (Norström et al., 2020). Secondly, it is a definition primarily tailored to the field of sustainable research, while knowledge co-production have a broader reach.

Together with being key in designing truly resilient policies and systems, at the end of the 20th century it became prominent within science and technology studies: scholars began to challenge the assumption that only false or disproven knowledge needed to be socially analysed, acknowledging the non-neutrality of science and the intention to grasp its social background (Miller & Wyborn, 2020). These fields share a set of ideas about co-production with the discipline of public administration, starting from the work of Elinor and Vincent Ostrom. Discussing public service provision and more specifically the role of police in society, they posited that the service offered by this body is intrinsically dependent on the actions of citizens, that through reporting and civic responsibility act as enablers for law enforcement to take place (Miller & Wyborn, 2020). The Ostrom were the first to explicitly mention the notion of 'co-production' when discussing the collaboration between institutions and civilians, but its conceptual roots were already alive decades prior, as testified by the work of Kurt Lewin (Norström et al., 2020).

In the 1930s, Lewin was one of the first scholars to approach knowledge in an interdisciplinary, context-driven and problem oriented manner, drawing away from canonical top-down, strictly academic paradigms (Norström et al., 2020). In what came to be known as Participatory Action Research, Lewin and his students began to develop tests in factory settings to prove how greater productive gains derived from democratic, horizontal participation rather than autocratic coercion (Adelman, 1993). Lewin was primarily concerned with increasing the self-esteem and sense of agency of minority groups, which kept being a core issue for Participatory Methods like knowledge co-production (Adelman, 1993). For example, the anthropologist Gary Kofinas started using the ideas of co-production and co management of socio-ecological ecosystems to grasp how governments could share power with communities to sustainably manage resources (Miller & Wyborn, 2020). As shown by Kofinas' work, co-creation of knowledge has been consolidating its presence within a variety of fields and their intersections. Nevertheless, it is key to outline some elements that ought to be ever present constituents in its development.

Transdisciplinarity, Reflexivity and Pluralism in Co-creation

Co-production is shaped by transdisciplinarity, which Lang et al. (2012) regard as a reflexive and integrative scientific principle that sees solutions to societal problems and their

scientific counterpart as nestled in the differentiation and integration of knowledge spanning out of different scientific and societal bodies. While the notion of reflexivity will be outlined in the following subchapter, research from Hage, Leroy and Petersen (2010) can aid to discern the integrative component of transdisciplinarity. The authors state this characterization refers to the involvement of non-scientific actors in an applied context, born in a diversity of sites and through horizontal, ephemeral networks, marked by flexible settings and novel forms of quality control. This relates to the idea that the most contemporary societal issues inherently refer to a variety of spheres, thus necessitating a response able to be epistemologically inclusive, not rigid and devoid of positivistic normativity (Hage, Leroy & Petersen, 2010). This represents a break from a logic based on technocracy, rationality and older modernist ideas that elevated objectivity and neutral science (Verwoerd et al., 2021).

Reflexivity is strictly bound to this reframing. It builds on the assumption that scientific knowledge is inevitably socially constructed, hence intertwined with cultural declinations of socio-economic and socio-ecological relations (Verwoerd et al., 2021).

Jasanoff posits that co-creation is understandable as a response to the ideology that constantly alienates the domains of 'nature', facts and reason from those of culture, emotions or values (Jasanoff, 2004). "Briefly stated, co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it" (Jasanoff, 2004).

As a consequence, all researchers should not only be critical of the body of work that they create and refer to, but also of their own positionality, assumptions and existing ontologies, which counter any premise of impartiality (Verwoerd et al., 2021). Investigators need to vest their role with an humble attitude, open to discussion, feedbacks and to the awareness of how 'truth' might be a guiding idea, but not an attainable end goal (Malmborg et al., 2022; Verwoerd et al., 2021).

The ambiguity of this epistemic terrain can be accepted by seeing co-production not as a theory but rather an idiom: a means to deconstruct complex phenomena to avoid the erroneous fallacies that can connote conservative conceptions of science (Jasanoff, 2004). As researchers should proceed reflexively in their tasks, so it should be the case with the knowledge they contribute to producing. If knowledge is said to be inevitably dependent on its context and social background, its applicability and usefulness should also be tested (Norström et al., 2020; Hage, Leroy & Petersen, 2010).

A third component of knowledge co-production is its pluralistic character. Norström et al. (2020) assert that co-production of knowledge must acknowledge all the different know-hows that bring it about. This pertains to the supply side, ensuring adequate inclusion of all stakeholders and actors involved in the co-creative instance, of their complementary expertise and of the different roles they may vest over time (OECD, 2021). It is also relevant to mention how co-production processes produce not only knowledge, but also networks, social capital, capacity (Norström et al., 2020).

Grouping together multiple actors to generate an applicable, multifaceted product in a reflexive manner requires to engage adequately with the power imbalances that might be present, in order to prevent them from worsening the quality of the engagement of stakeholders and avoiding to reinforce existing hegemonies (Norström et al., 2020). This can only happen if the arena is set for all actors to have an equal voice and representation.

Issues for Local Ecological Knowledge and its co-creation

Approaching LEK, especially if aiming at co-creation is far from an easy task. Various issues can arise at the methodological level, for instance when trying to identify 'knowledgeable' persons, or when trying to grasp how to best aggregate the inputs provided by different individuals (Aminpour et al., 2020; Joa et al., 2018). Furthermore, as Aminpour et al. (2020) observe, gathering different observations can lead to different outcomes: if stakeholders are grouped in different modules (subgroups of individuals whose opinions are more likely to be influenced by their subgroup peers) according to similarities in their thought and mental models and the inputs of the single modules are then grouped together, the socioecological potential of their observations will be far more useful than if all the bits of knowledge were simply put together without trying to categorizing those that enunciated them. For instance, respondents of different ages provide information that is filtered through specific experiences, memories and perceptions, which need to be taken into account when creating a unified body of LEK (Beaudreau & Levin, 2014). Furthermore, the number of participating stakeholders is also relevant. Most protocols rely on the participation of a high number of persons, yet participation quotas might either be not feasible or not necessarily correlated with valid LEK (Alexopoulos et al., 2025; Aminpour et al., 2020). On a similar note, small communities tend to have only a low number of knowledgeable individuals, which are oftentimes some of their older members, with whom creating a relationship of trust tends to be harder (Alexopoulos et al., 2025 & Strenchok, n.d.).

Another issue to take into account is the fact that imagining that seeing knowledge as dynamic could solve all the problems characterising the interaction between LEK and scientific knowledge

would be erroneous. Appropriation and misinterpretation of LEK can easily unfold without giving adequate voice to stakeholders and ensuring that the paradigms of co-creation are being maintained throughout the exchange (Bélisle et al., 2018). Conversely, holders of LEK may not consider science as adequate to validate their expertise, thus discrediting the potential for a fruitful collaboration (Gadgil et al., 2001).

At a global level, the overall trend is of a loss of LEK, with an annual rate ranging between 1.9% and 2.2% (Aswani et al., 2018). Globalization and standardized educational systems are causing an impoverishment of intergenerational environmental knowledge (Aswani et al., 2018). Reversing this trend requires systems that thrive through co-creation themselves, such as agroecological movements, local associations or cooperatives (Aswani et al., 2018).

Co-learning and co-production of knowledge can be essential tools to empower local communities and institutions by equipping them with collaborations that can integrate their LEK with scientific and technical expertise (Bélisle et al., 2018). As these work together, the preservation of LEK and its transmission patterns (through teaching programs, government intervention) can avoid the loss of knowledge that could be applied beyond its context of production (Aswani et al., 2018).

Finally, research from Ladio (2025) testifies how LEK has not yet gained enough traction in policy decision-making or scientific literature dedicated to sustainability. This is particularly true for the European context, given that its case studies of LEK are among the least geographically represented on a global scale (Aswani et al., 2018; Joa et al., 2018).

Living Labs

Unpacking a definition

The necessity of thinking of LEK and co-creation as a necessary couple makes it appropriate to introduce the concept of Living Lab (LL). The European Network of Living Labs (ENoLL) et al. (2025) describe Living Labs as "*dynamic, open innovation ecosystems where innovation unfolds in real-life, operational environments. Using a systematic co-creation approach, they integrate research and innovation activities across communities, placing citizens and end-users at the centre of the innovation process*." Living Labs identify a research approach focused on enabling those partaking in it to actively participate in the different phases of the process, from the investigative ones to the ones in which an innovation is being implemented and monitored (Ali et al., 2025). Being based in real-life implies that LLs represent spaces where local challenges are put up front, with the idea of working through them with a collaborative experimentation (Ali et

al., 2025). Given their practical premises, LLs are intrinsically made with a pragmatic purpose, not mere theory creation. Moreover, as highlighted by ENoLL et al., the emphasis on innovation makes it so that practicality gets combined with creativity and innovating with impact-making as a focus (European Network of Living Labs et al., 2025). Spagnoli, Campodonico, de Los Rios White, Desole, Kaiser, Keller, Torres, Alev, and Bosmans (2022) state that LLs function as innovation intermediaries that coordinate an ecosystem of actors in a specific context and semantic, with the goal of co-designing solutions.

This set of definitions is useful to understand how LLs indicate not only an approach, but also an umbrella structure under which multi-stakeholder collaboration and innovation can arise.

History of Living Labs

One of the earliest documented uses of the notion of 'Living Labs' dates back to the early 1990s, when it was employed to describe student-led community problem-solving experiments in a Philadelphia neighbourhood (Hossain et al., 2019). Nevertheless, the birth of the concept is commonly attributed to the MIT School of Architecture professor William J. Mitchell, who in 1995 used it to connote an innovative research focused on developing and testing ICT in homes, neighbourhoods, and cities (European Network of Living Labs et al., 2025; Hossain et al., 2019).

However, the roots of the Living Lab approach in Europe are to be found even further back, within both ICT innovation and user-centred approaches (European Network of Living Labs et al., 2025). Firstly, in the Cooperative Design movement that emerged in Scandinavia during the 1960s and 1970s, which emphasized user involvement in technology design (European Network of Living Labs et al., 2025). Then in the 1980s, when European Social Experiments started exploring how IT could be used to benefit society (European Network of Living Labs et al., 2025). The third predecessor involved the development of "Digital City" initiatives, which created early virtual community spaces (European Network of Living Labs et al., 2025).

As the 21st century began, Living Labs started appearing in different European Cities through projects like InfoCities (1996-1999), part of the TEN-Telecom Initiative (European Network of Living Labs et al., 2025). In 2006 ENoLL was inaugurated, kickstarting a momentum accompanied by funding measures like the projects Corelabs and Clocks, and more recently maintained through funding initiatives for LLs included in the Horizon research programmes of 2021 and after (European Network of Living Labs et al., 2025). Living Labs diversified beyond their tech origins into various embodiments oriented towards socially

sustainable innovation. Among these, Urban Living Labs focus on city challenges, Transformation Labs target systemic social change and applications for areas such as agriculture, but also agroforestry and forestry (Ali et al., 2025). This signalled a drift from early literature on LLs, focused predominantly on software development and digital tools and representing Living Labs as spaces where researchers and users could jointly develop and test complex home technologies in a real-world context (Lupp et al., 2020).

This ties in with the separation that arose between the North American approach to LLs and the European one. The former still sees LLs as demo homes, home labs, or houses of the future, while the latter conceives them as a mean to study users' everyday habits and provide connected solutions and innovations (Ali et al., 2025).

Features and Goals of LLs

Ali et al. (2025) see the Living Lab approach as integrating three fundamental features: experimentation within real-world everyday contexts, structured innovation processes aimed at developing new products or services, and collaborative engagement across diverse stakeholder groups.

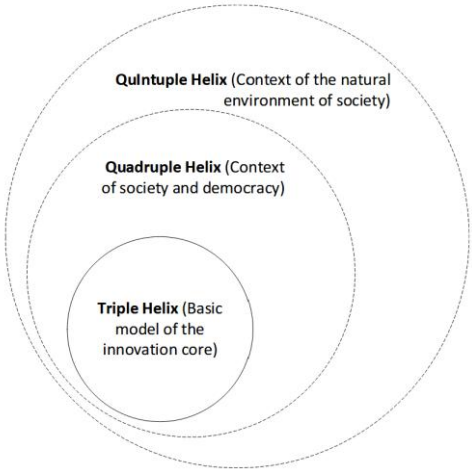
The manner in which LLs act can be grasped by making reference to a three-layers model: the macro level is made by the LL itself, seen as an established ecosystem made to support long-term innovation (European Network of Living Labs et al., 2025). Then, the meso level describes the specific projects that are undertaken under the LL organization, while the micro level comprises the single activities and interactions that take place within each project (European Network of Living Labs et al., 2025).

Open innovation principles are also essential: they suggest that researchers cannot entirely rely on their own research and development, thus needing to acquire knowledge from external sources, focusing on creating solutions through skill exchanges and multi-stakeholder collaboration (Hossain et al., 2019).

Living Labs act as a user innovation paradigm as their users solve their needs by deepening their own involvement or through the inclusion of other users in product creation, with both lead-user approach and horizontal co-creation as possible approaches (Hossain et al., 2019). Finally, the alignment with Responsible Innovation can be seen in the emphasis on inclusivity, ethics, and societal impact (European Network of Living Labs et al., 2025).

Stakeholder engagement is a main feature of LLs as shown by their structuring around the Quadruple Helix model, where citizens, public authorities, private companies and research institutions cooperate for new services responding to their needs (European Network of Living Labs et al., 2025). This can give birth to public private partnerships (3Ps) or public private people partnerships (4Ps) (Hossain et al., 2019). However, given the focus on environmental restoration of this research it is useful to briefly introduce the Quintuple Helix Model. This represents an evolution of the Quadruple Helix that attributes more importance to the relationship between society and nature in innovation ecosystems, acknowledging how any societal product should be framed within boundaries that respect the ecological condition of its context of development and application (Cai, 2022).

Figure 1. The evolution of Helix models



Note. From Cai (2022).

It is also useful to describe LLs' actors as enablers, providers, users and utilizers (Hossain et al., 2019). *Enablers* refer to the organizations that make the activities of living labs concrete through financial, physical support. Living Labs for Grand Societal Challenges or Living Labs for Policies and Governance tend to be enabler-driven (European Network of Living Labs et al., 2025).

Providers are instead bearers of knowledge and expertise such as universities or consultants: they are central to Living Labs for Business and Emerging Technology, where *users* also play important roles (European Network of Living Labs et al., 2025; Hossain et al., 2019). These are citizens that contribute to and make use of the LL work, while *utilisers* are the organizations that will benefit from the developed innovation activities (Hossain et al., 2019). These two actors often take leading

roles in Living Labs for Inclusive Social Innovation (European Network of Living Labs et al., 2025).

The Living Lab innovation process typically progresses through four interconnected stages: co-creation, exploration, experimentation, and evaluation (Trivellas et al., 2023). Some frameworks expand this to five phases: initiation, preparation, co-creative design, evaluation with decision-making linkages, and feedback. These structured yet flexible processes help guide Living Lab activities while accommodating the unpredictable nature of innovation.

Living Labs, co-creation and participation

Living Labs place stakeholder participation at the core, similarly to an use of LEK placing co-creation at the centre. Unlike other participatory approaches, both Living Labs and co-creation emphasize active user involvement from the earliest design stages through implementation (Ali et al., 2025). This approach aims at fostering stakeholder engagement and representation from the start, with the goal ensuring the creation of a service or product truly innovative and useful to those involved. 'Participatory approach' and 'Living Lab' may appear to be almost overlapping notions, although a clear distinction is given by the strict focus on innovation and on engaging different stakeholders proper of the LL. A participatory approach is then a key component to any Living Lab, rather than a synonym (Ali et al., 2025).

As within the use of LEK and the realm of co-creation, the challenge of power arises: when certain groups remain underrepresented, power imbalances can end up negatively affecting the collaborative process, thus defying the premise of the LL (Ali et al., 2025). This can happen along the collaboration, but also when defining stakeholders, as selection biases may privilege certain perspectives over others and limit the representativeness of outcomes (Ali et al., 2025).

Reviewing some case studies can elicit how Living Labs have taken place, and how they made use of LEK in different scenarios. Two examples come from Lupp et al. (2020): The Isar-Plan river restoration project in Munich and the Mountain Forest Initiative in Bavaria's Upper Allgäu region. Both projects did not begin under a Living Lab approach, yet they are analysed through a LL framing based on three phases: Setup Phase, Working Phase, Outcome & Evaluation Phase (Lupp et al., 2020).

The Isar River restoration project focused on improving the state of the body of water in terms of ecological and sociocultural aspects, after these had been degraded when it had been forced into a concrete channel with various water diversions for hydropower production (Lupp et al., 2020). It

included eight steps placeable under the three phases: the initial three, part of the first two phases, included the creation of partnerships among different actors, as well as the co-creation of a design for the river's rehabilitation (Lupp et al., 2020). This phase started with civil demands well before Living Lab even existed as a concept, to then acquire a stronger collaborative structure through the involvement in planning proposals of consultants, energy producers, conservationists and other experts, totalling over 100,000 contributions (Lupp et al., 2020). Co-creative design kept being a constant feature of the project, as different actors continued working together under the monitoring of the Water Management Office of Munich (Lupp et al., 2020). The following phases involved the Munich City Council to approve and commence the project and assign responsibilities of the implementation of the plan, but also the Technical University of Munich and different NGOs to evaluate the design and monitor the area as it was being restored (Lupp et al., 2020). Overall, the project proved to be a success, and the participating stakeholders are now trying to upscale the solutions to other portions of the river (Lupp et al., 2020).

The 'Mountain Forest Initiative' focused on reestablishing deteriorated forest stands on steep mountains above the town of Hinterstein: forest owners knew little about how to manage their lands, and so did the hunters that used them for their jobs. Therefore, stakeholders such as the tourism association of the local Alpine Club started helping to understand both how to rejuvenate the land and its flora, but also how to efficiently disseminate what was being done in schools, companies, and small businesses (Lupp et al., 2020). Still unfolding, the project put at the centre the idea of achieving a strong sense of ownership for the overall process for all stakeholders, as this is believed to be the best mechanism to guarantee its resilience in the long run (Lupp et al., 2020). Though initiated before formal Living Lab methodologies were developed, this project embodied similar principles of inclusive participation and real-world experimentation (Lupp et al., 2020). Both projects placed emphasis on ecological restoration, as well as on merging together the LEK of different actors, who at the same time were beneficiaries of the work they had been dedicating themselves to. Furthermore, as Trivellas et al. (2023) observe, establishing a Living Lab in a rural area can create a dynamic hub that can end up combining local physical presence with digital connectivity to both revitalize target areas and create learning networks with institutions or similar contexts.

Contemporary examples focusing less on Nature based Solutions (NbS) and more on urban planning are those pertaining to oPEN Lab, a set of Living Labs that developed with the intention of creating Positive Energy Neighbourhoods in Europe demonstrate practical applications of these principles in community development contexts. For instance, the oPEN Living Lab in Pamplona targets a neighbourhood with high poverty rates through collaborative renovation efforts

involving both public and private participation, while the Lab in Tartu wants to revitalize the Annelinn neighbourhood by implementing initiatives that improve quality of life while building community engagement, going from physical improvements to co-created renovation strategies or inclusive planning models (Spagnoli et al., 2022 and Iriarte, San Emeterio, Arias, Bosmans, Baptist, Lieten, Urbas, & Vervoort, 2024). Overall, the projects developing under oPEN Lab focus not only on LLs themselves, but also on how to replicate their successes and methodologies in bringing together participation, co-creation and a resilient form of planning both in community and infrastructural terms (Spagnoli et al., 2022 and Iriarte et al., 2024).

Methodology

Given the aim of the Aegean Islet Conservation Project (Introducing it will be part of my Introduction) of developing a framework to be turned into a manual for island sustainable development, methodological observation will inevitably play a central role in defining the components, as well as the rationale and overall coherence of such product. In the following sections, a series of issues will be addressed, starting from explaining the main objective of this research.

Overarching Goal: Developing a Manual for a LL approach to the Aegean Islet Conservation Program

The overarching goal of this research is to be the theoretical backbone of a manual to be used in the Aegean Islet Conservation Project. Its intent is to depart from the main goal of the project of restoring the ecosystem of an islet in the Aegean Sea focusing on the integration of Local Ecological Knowledge to then focus on ways to achieve this last element. It is believed that proposing a Living Lab approach to the project will allow for an optimal use of LEK. This does not mean necessarily an increase in the quantity of LEK-based notions that might be used, but rather on making it so that their role and the one of its bearers gets elevated in the planning scene, countering a top-down approach that would diminish participation and stakeholder ownership along the project.

The following subchapters of this section will serve as a means to better locate the considered case study, as well as the stakeholders involved. After that, the methodological approach aimed at

connecting Living Labs and LEK through co-creation will be presented through its different components.

The case study approach

To understand why a case study approach is fit to this investigation, reference is made to Yin (2018), who regards this kind of research method as:

a) Able to offer an empirical understanding of a real-world phenomenon, of its context and of their demarcations.

b) Suitable with dealing with a variety of data and theoretical information, not solely with individual data points, thus capable of creating an inquisitive logic able to approach sources of different nature.

The case study approach can deal with processes that evolve over time, throughout which not all the factors at stake can be controlled, as it would instead happen with a laboratory analysis (Yin, 2018). Furthermore, a case study research can have an explanatory nature, while also embracing a relativist and social constructivist approach, able to encompass the perspectives of different actors and the existence of a subjective and contextual reality, rather than departing from a fixed ontology (Yin, 2018). Having these pillars as a background is key, since the aim of this inquiry is to make use of LEK and a Living Lab procedure that places participation and complementarity of know-hows at the centre. Furthermore, as Yin (2018) posits, a case study research method allows for generalizations to theoretical propositions: was this research to prove useful successful throughout the Aegean Islet Conservation Program, it could then be maintained as the premise or starting point of both future research and applications.

As usual within a case study approach, a 'how' question guides this study. However, in order to strengthen the main research question of this contribution and clarify its direction, a series of theoretical proposition will be outlined, following Yin's (2018) advice:

1. Co-creation of knowledge is an ideal intermediary between LEK and LLs. Including LEK in a LL approach to island development will be particularly effective when taking co-creation as the default approach to LEK. This is coherent with Jasanoff's (2004) assertion that a specific representation of the world implies a way of living in it: if during the LL process LEK will be considered as static and to be simply extracted, no sense of ownership will derive from the process (Lauer, 2017). A

level of ownership and integration of knowledges such as the one described in the experiences described by Lupp et al. (2020) is deemed as desirable.

2. Addressing and monitoring power imbalances will aid co-production, in line with what suggested by Norström et al. (2020), but also ensure that the LL will objectively benefit its actors, in accordance with its definition introduced in the Literature Review chapter (European Network of Living Labs et al., 2025).

3. LEK will be necessary to understand what elements should be prioritized in the rehabilitation process, as well as how these should be organized. This is in line with the work conducted by Alexopoulos et al. (2025), which demonstrates the validity of LEK usage in the Aegean and its historical accuracy, similarly to what is shown in Beaudreau and Levin's (2014) paper.

4. Reflexive practices shall be incorporated along the different phases of the LL, but also within this investigation to perform a check-and-balances operation in relation to the previous points and to limit the possibility of conflict and failure of the LL, in line with what observed about positionality and the role researchers shall take in co-creation (Malmborg et al., 2022; Verwoerd et al., 2021).

5. Incorporating LEK to LL with a focus on a present and widespread issue such as dryland restoration in the Aegean/Mediterranean sea can work against the risk of LEK loss mentioned by Aswani et al. (2018).

A final note relates to the intention of designing this research around a single case study. Firstly, this is to be in line with the goal of the Aegean Islet Conservation Project. Secondly, it can be both revelatory and longitudinal in its purpose: it aims at proposing an innovative approach that will unfold progressively over time within a specific context of analysis (Yin, 2018).

Case Study Context

Anthropofas, also known as *Anthropofagos* ('Eater of Men') or *Megas Anthropofagos* is an islet part of the Fournoi-Korseon archipelago, situated around 30 kilometres south of the Aegean islands of Samos and Ikaria, in a section of the Aegean known as the Ikarian Sea (Demesticha & Blue, 2021). The archipelago is composed of 20 islands and islets, of which only Fournoi, Thimena and Aghios Minas are currently inhabited (Bertsiou et al., 2018). Nevertheless, more islets were inhabited and exploited in the past, with the greatest population densities being recorded during Hellenistic and Roman periods: Samos was a major naval hub, and this favoured an increase in the relevance of the Fournoi complex (Demesticha & Blue, 2021). The archipelago gained importance

through the Fournoi Pass, a busy maritime route still used and home of several shipwrecks, due to the strength of winds blowing from the heights of Ikaria and Samos and the oftentimes messy currents that generate around the complex (Demesticha & Blue, 2021).

Figure 2. Anthropofas and the Fournoi archipelago

Note: Map made using Google Earth Pro.

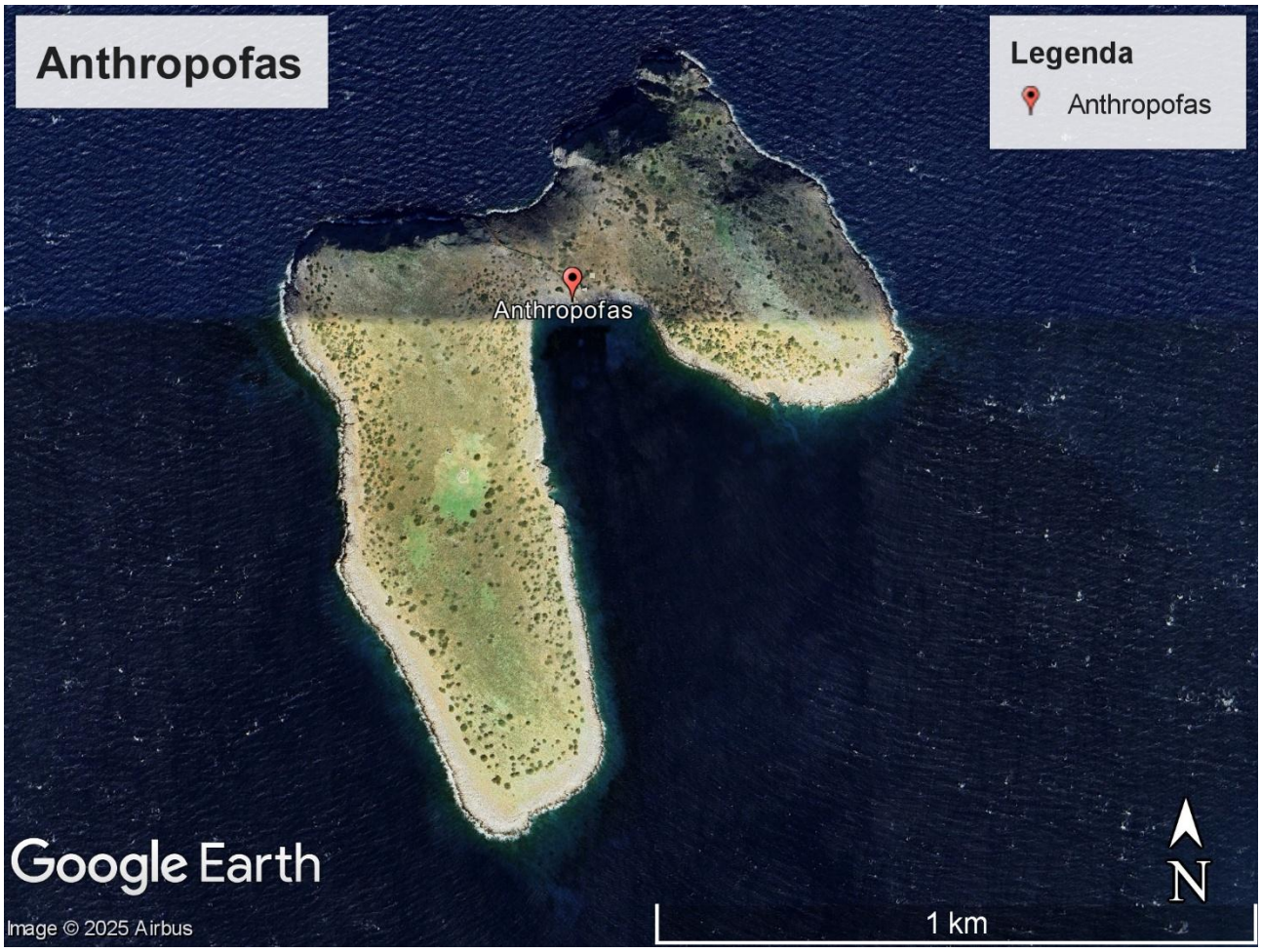
The entire archipelago is a protected site under the Natura 2000 (GR4120006 Site Code), one of the main networks of environmental conservation existing in the EU (European Environment Agency, n.d.). The environmental value of the area is mainly connected to its seabirds and species typical of Mediterranean scrub (European Environment Agency, n.d.). As of now, issues such as migration of invasive species, modification of soil usage and anthropogenic impact on habitat connectivity are regarded as some of the most pressing threats for the archipelago, while no positive restorative activity is currently being reported (European Environment Agency, n.d.). Furthermore, Bertsiou et al. (2018) point out how drinking water is still not always accessible due to the conformation of the area and its insular nature, while agriculture is exerting a noticeable pressure on parts of the archipelago.

Anthropogenic land use in Fournoi, and most specifically in Anthropofas, is of critical importance. The islet's aridity is a direct consequence of the overgrazing that spread throughout the Aegean since the end of the 20th century, primarily as a consequence of subsidy schemes of the European Union Common Agricultural Policy (Fetzel et al., 2018; Kondyli, 2010; Lorent et al., 2009). Between the 1980s and 1990s, the main aim of CAP subsidies was to keep prices stable by regulating taxes and import quotas: to attain this goal, two subsidies were introduced for cattle owners: an incentive per head and a compensatory sum for farms located in areas with harsh

geophysical conditions (Fetzel et al., 2018). It is unclear if the complex regulations concerning environmental and animal wellbeing standards (such as respecting a maximum grazing pressure of 1.4 head/ha for degraded semi-mountainous and mountainous lands) were ever enforced or respected (Fetzel et al., 2018). Kondyli (2010) concludes that, in the case of the Fournoi complex, the beginning of the 21st century was marked by an inheritance of eroded soils with low infiltration capacity, depleted porosity and compaction.

Anthropofas has been recently leased to a private who used it for grazing goats over the last decades. Satellite images and photos taken during a boat trip showcase that the majority of its surface is dry and rocky, with few bushes and green patches (Figures 3 and 4).

Figure 3. A map of Anthropofas



Note: Map made using Google Earth Pro

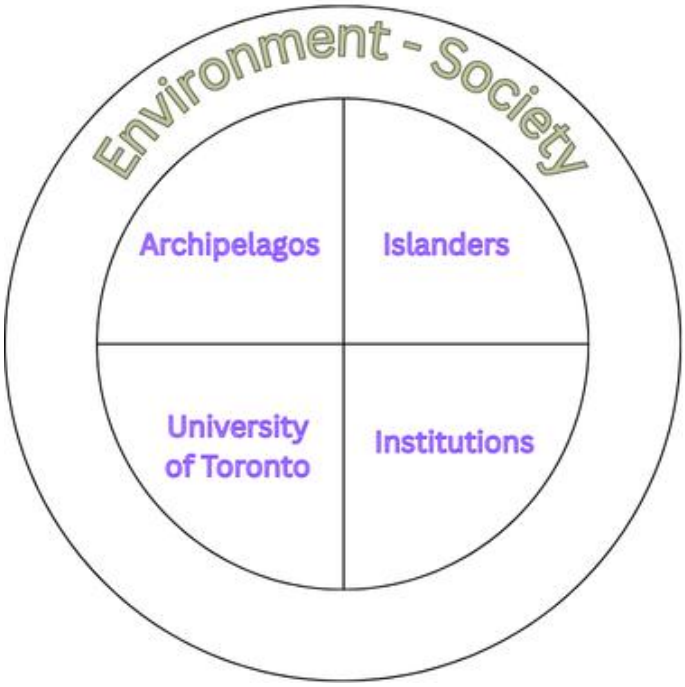
Figure 4. Drone image of Anthropofas

Note: Drone footage from a boat trip carried out at the Archipelagos Institute of Marine Conservation.

Stakeholder Mapping and Analysis

As stated in the literature review section, an adequate tool to map stakeholders given the semantics of this investigation is the Quintuple Helix Model. This is effective not only to grasp the role of the different actors involved, but also to better understand the range of possible solutions that will be outlined over the Results section. This device will then be used to develop a Stakeholder Analysis: an identification and assessment of project's key stakeholders, of their needs and interests, as well as of the power relations, alliances and conflicts that may arise throughout the project cycle (UNDP, 2020).

Figure 5. A bidimensional Quintuple Helix Model for the Aegean Islet Conservation Program



Note. Figure created using Canva.

Figure 5 is a bidimensional representation of the Quintuple Helix Model tailored to the Aegean Islet Conservation Project. The inner circle is divided among four areas, where stakeholders are placed.

A Living Lab developed around the Aegean Islet Conservation Project would bring together instances that would require juxtaposing areas such as technology, policy, social cohesion and more. Hence, referring to the categorization developed by the European Network of Living Labs et al. (2025) introduced in the Literature Review chapter becomes reductive.

Islanders and *Local Institutions* are used as polysemic terms. They refer to both to the inhabitants and institutions of Fournoi and to their counterparts in other areas of the Aegean, as well as the Mediterranean as a whole. They would act as *enablers*, *providers* and *users* and could benefit from having access to strategies that tackle environmental issues like soil degradation or social ones, such as land abandonment and community erosion. The Archipelagos Institute individuated Anthropofas as a suitable pilot case study given their closeness with the mayor of the Fournoi and due to both the degraded condition of the island and the possibility of its rehabilitation to be a process where locals residents play a focal role. A collaboration can develop through different layers. A central assumption is that giving relevance to their voice, without conceiving their expertise and knowledge as aseptic instruments to be used for the project's ultimate objective can increase their psychological ownership in relation to the health of the islet. Gutschmidt et al. (2023) define psychological ownership as a feeling of property towards an object, an idea or a person that can be both conscious

and unconscious and may not have any legal validity. It is believed that if LEK is addressed aiming at participation and co-creation of solutions for the Anthropofas case, psychological ownership can vest a twofold role: it can be an existing force motivating inhabitants of Fournoi and its institutions to get involved in the Aegean Islet Conservation Program, but also a goal to aim for throughout the entire project's cycle. By involving communities, these deepen their relationship with the target object, hence increasing their feeling of ownership towards it (Matilainen et al., 2017). Furthermore, although psychological ownership is primarily an individual feeling, framing it through collective initiatives and discourses can help to turn it into a community matter (Matilainen et al., 2017). At a practical level, besides providing learning opportunities on pressing topics for insular ecosystems, involving local figures can aid to job creation, strengthen networking between different actors and also help in marine conservation: the few ruins individuated in Anthropofas were originally built as military bases for their strategic positions and if restored could be used as watchpoints to monitor illegal fishing practices, while also surveying existing species of marine mammals, birds and more, as the Archipelagos Institute of Marine Conservation already does through the Eastern Aegean (Archipelagos Institute of Marine Conservation, n.d.).

The Archipelagos Institute of Marine Conservation and the John H. Daniels Faculty of Architecture, Landscape, and Design of the University of Toronto represent the other side of the equation. Acting as partners, they are invested in the project through various channels. Firstly, being research institutions their main goal is to provide scientific expertise to reach solutions to the issue of environmental revitalisation and make it so in a way that is academically sound, yet generalizable and operational. Secondly, they are the stakeholders that will be financing the project, yet only indirectly, primarily through grants or specific agreements (seed funds, sponsorships, …). Finally, given how their role will range between those of *enablers, providers* and *utilisers*, they will be bearing most of the power along the project.

This implies that to have a link between LEK and the Living Lab involving a co-creative process, co-creation needs to be seen both as a means and a goal, while also acknowledging how its feasibility will inevitably encounter a series of barriers along the way (Puerari et al., 2018). It is not a given that co-creation will be achievable, nor that the Program will be able to transcend the initial power imbalances among its stakeholders. Thus, *Making* together becomes parallel to *learning* together: the interacting actors are being brought together for the first time, thus needing to design their own relationships before and as the output of their collaboration begins to take shape (Puerari et al., 2018). This reinforces the underlying assumption of LL literature, whereby the distinction between producers and consumers becomes blurred. As the collaborative process would be set up by a specific stakeholder (Archipelagos Institute of Marine Conservation) with a specific goal in

mind, co-creation will require an adequate design and definition of secondary goals and phases, while involving a reduced degree of adversity to engagement by stakeholders, provided that trust and the stipulated agreements will be maintained (Puerari et al., 2018).

The external layer of the Quintuple Helix Model representation makes reference to the relevance that the model attributes to placing LLs functioning within its broader context of socio-ecological relationships. This is particularly important in the case study of this research, due to its inherent bond with areas such as sustainable development and land management. To obtain an adequate understanding of how socio-ecological processes should be evaluated, a theoretical framework stemming from the realm of economics will be adapted. This is the Doughnut Model developed by Dr. Kate Raworth. As displayed in Figure 3, the Doughnut Model is made of two concentric rings: the internal one represents a social foundation that should always be maintained to avoid having individuals not meeting their needs, while the ecological ring marks the planetary boundaries that should not be trespassed to avoid altering the planet's environmental and climatic resilience (Doughnut Economics Action Lab. n.d.). The doughnut-shaped layer that arises between these two rings indicates what room for action can exist to grant both human and ecological health (Doughnut Economics Action Lab. n.d.). Brought in the context of the Quintuple Helix Model of this contribution, it implies that the solutions that ought to be implemented in the case of Anthropofas or similar realities must abide to specific standards of both environmental and social nature.

Figure 6. The original conceptualization of the Doughnut Model

Note. From Doughnut Economics Action Lab (n.d.).

Participation and Participatory Methods

Placing stakeholders within a Living Lab approach to innovation implies a dynamic conception of LEK. As Lauer (2017) states, this propels a conceptual space apt for the co-production of knowledge among all stakeholders, especially in environmental management schemes. Nevertheless, to do so it is imperative to avoid an imposition of extra local power, as this could tarnish the effectiveness of initiatives that strive for stakeholder engagement and that rely on stakeholders' acceptance (Lauer, 2017).

This implies that the methodologies involved in getting stakeholders and their knowledge together through the Aegean Islet Conservation Program will have to place participation at their core. A participatory approach presupposes to actively involve the relevant 'public' (citizens, stakeholders, experts, …) in decision-making dynamics (Slocum, 2003). At a practical level, participation helps in improving the quality of decisions, policies and actions, while from a normative perspective it aids in making processes more inclusive and representative (Slocum, 2003).

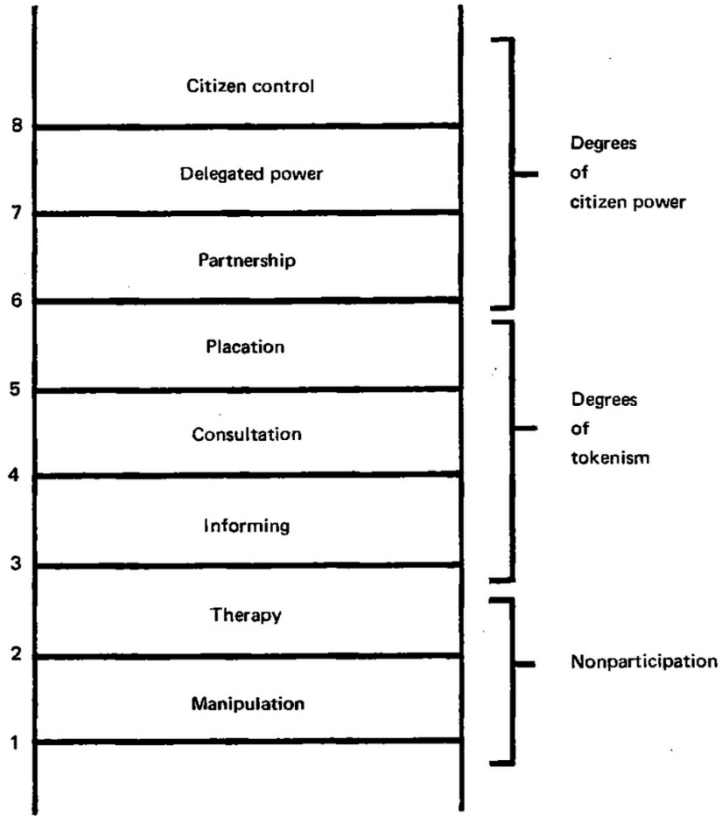
In trying to enabling relevant actors to play an active role in the decisions that can affect their lives, the use of Participatory Methods is deemed to as interconnected with the following elements:

- Multiple techniques and exercises towards the process
- A project design able to articulate the evolution of the initiative and its methodologies in relation to a) Objectives b) Scope c) Participants d) Time and e) Budget
- A specific societal outcome such as a product or an increase in team capacity (Slocum, 2003).

It is essential to bring up how in advocating for participation, an organization must look inward and ensure that its own behaviours, morals and culture are coherent with that (UNDP, 1997). Given the intention of the Archipelagos Institute of Marine Conservation of tightening its bond with local communities in the island of Samos and beyond, focusing on participation is in line with the organization's ethics, while also being an opportunity to put them in practice (Archipelagos Institute of Marine Conservation, n.d.).

One of the pioneering models in the field of Participatory Methods is the Ladder of Citizen Participation developed by Sherry Arnstein in 1969, which provides a representation of what level of citizen participation can be achieved, depending on how power gets redistributed in favour of citizens (Fig. 7) (Karsten, 2012).

Figure 7. The ladder of citizen participation



Note. From Karsten (2012).

Taking the model as a reference, Islanders and Institutions replace Arnstein's citizens as the recipients of power redistribution through participation. Nevertheless, their role is far from clear. As of now, this is due to:

a. The embryonic stage of the Aegean Islet Conservation Project.

b. A consequential lack of clarity on what weight to attribute to participation itself.

c. A poor understanding of what methods ought to be put in place to achieve, or at least explore the possibility of co-creation through LEK integration.

While the first element represents a structural limitation that can only be tackled by advancing through the phases of the project, it is believed that this work will be able to provide an exhaustive roadmap to navigate through the other points. To do so, three areas of intervention have been identified. These will be introduced in the Areas of Action and Practical Examples chapter, and combined with a series of techniques that could be used throughout their development and implementation to foster participation, co-creation and stakeholder engagement.

These methods will derive from two main kinds of sources:

1. Toolkits developed by existing Living Labs (CommuniCity, 2024; Institute for Housing and Urban Development Studies, n.d.; *UNaLAB Toolkit*, n.d.).
2. General secondary sources and manual of academic nature (Duea et al., 2022; Glenn, 2003.; Slocum, 2003; Wates, 2014).

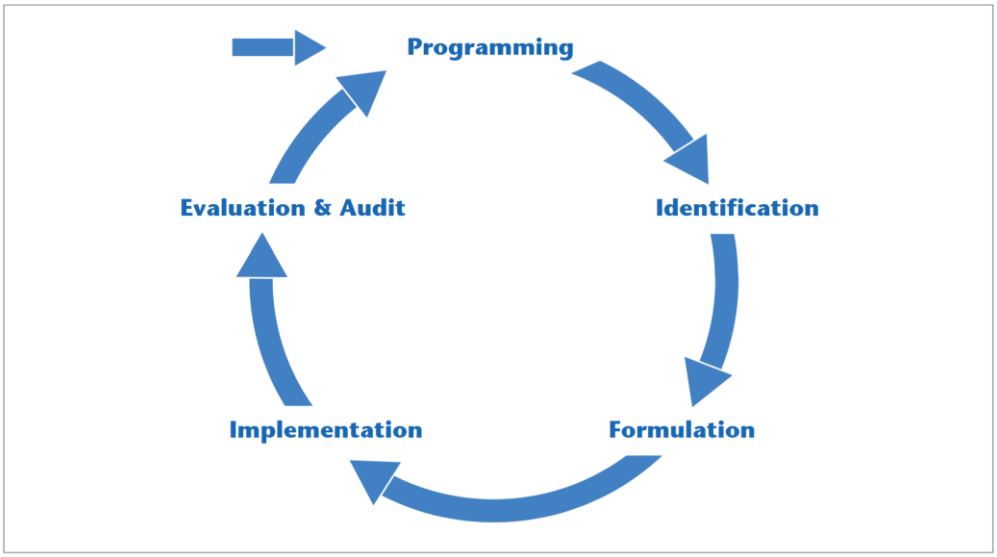
Placing a Living Lab within the Project Cycle

It is of use to understand how this research can be placed within the overarching process that will define the Aegean Islet Conservation Program. For this, a canonical project cycle structure will be presented, to then include a Living Lab Design within it as a specific approach to its realization.

The 'Project Cycle Management Guidelines' from the European Commission (2004) defines a project as a structured intervention that includes an agreed timeframe, budget, and desired results. The organization of a project cycle develops through the following phases:

1. Programming – Defining strategies that can align priorities of different stakeholders, partners and donors.
2. Identification – Analysing needs, characteristics of stakeholders and defining priorities.
3. Formulation - Developing a detailed project design.
4. Implementation – Focusing on effective delivery, monitoring and reporting.
5. Evaluation – Analysis of results, reflection on practices and lessons learned.
6. Audit - Accountability checks, financial compliance (European Commission, 2004).

Figure 8. Project phases



Note. From European Commission (2004).

Project Cycle Management (PCM) is a notion that describes the decision-making instances and activities undertaken during the life-cycle of a project (European Commission, 2004). PCM is key to ensure that the project moves towards the concretization of its goals, but also that their coherence, feasibility and sustainability (environmental, financial, social) is maintained through the different phases of the Cycle (European Commission, 2004). This requires three elements:

a) Active participation of stakeholders to achieve local ownership
b) Deployment of tools to support key assessments and analyses (charts, matrixes, …)
c) Production of exhaustive reports and documentation in each phase to support reflection and adequate decision making (European Commission, 2004).

Emphasizing these needs is in line with some of the main concerns related to PCM. Projects in which excessive power is allocated to donors or those controlling funds lead to inadequate local ownership and detrimental effects for sustainability of benefits, while these can also be hampered by inadequate planning and design of the project itself (European Commission, 2004).Furthermore, establishing a strict, disciplinary distinction within different areas (such as management, financing and monitoring) can undermine local capacity and accountability, instead of increasing it (European Commission, 2004).

The Living Lab approach can therefore emerge as a solution to the needs of the Aegean Islet Conservation Program, as well as to the issues that PCM can face. It can be seen as a common thread connecting all phases of a project. Nevertheless, given how the Aegean Islet Conservation Program is yet to be kickstarted, LL Design in this research will be primarily spacing between the two initial phases of PCM.

The underlying figure showcases a conceptualization of a Living Lab approach for the project, departing from the multilevel division introduced along the Literature Review chapter (Table 1).

Table 1: Living Lab Levels

Levels	**Definition and components**	**Research Paradigm**
Macro Level	The partnership between the Archipelagos Institute of Marine Conservation and the faculty of Architecture of the University of Toronto*.	Open Innovation, collaboration and co-creation focused on reinforcing the ties between the two institutions and enabling access to case studies in the Aegean for UoT, but also reinforcing

	*The collaboration between the two institutes has never been termed as a Living Lab so far. Nevertheless, its alignment with the LL precepts underlined by the European Network of Living Labs et al. (2025) make it appropriate to place it on this level.	Archipelagos expertise and reach within fields such as rural development, environmental policy, urban planning.
Meso Level	Aegean Islet Conservation Project and its stakeholders	Open and User-led innovation: co-creation of knowledge through integration of LEK and scientific expertise
Micro Level	Living Lab Methodology applied within different research steps (PCM) and areas** **The three proposed research areas will be outlined in the Areas of Action and practical examples section.	User Innovation: User involvement with co-creation as an aim. Deployment of Participatory Methods for the purpose.

Note. Adapted from European Network of Living Labs et al. (2025).

Participatory Methods are seen as a red thread able to connect the different levels. As they are implemented at the Micro Level, they can facilitate involvement and willingness towards collaboration, while also being an empowering set of tools. This can spiral up to the Meso Level, where a synergy will necessarily have to develop with Archipelagos and the University of Toronto. As stated, for this to happen, commitment towards collaboration and co-creation itself from the two organizations will be an imperative.

To further understand the connection between the tripartite division and the way in which a LL approach could take place throughout the examined project, reference is made to the Four Phases Implementation developed by the ENoLL et al. (2025) and schematized through the following table (Table 2).

Table 2. The Four Phases of a Living Lab Implementation

Phase	**Definition**

1. Exploration	Understanding problems and needs of stakeholders through qualitative participative methods.
2. Co-Creation	Co-creation of solutions through collaboration within stakeholders.
3. Experimentation	Testing solution to understand their feasibility, but also what room for improvement might exist.
4. Evaluation	Assessing whether the solution is complying with stakeholders' expectations, while also analysing how its application could be ameliorated, even in different case studies.

Note. Adapted from European Network of Living Labs et al. (2025).

As the four phases of LL implementation are defined, the task of integrating them to the project and to the use of LEK arises. It will be a *sine qua non* to ensure participation of all stakeholders in each phase: regardless of what solutions may be identified, if power will have been distributed effectively, acceptance for either scientific inputs or LEK-based ones will be maximal and consensual. As mentioned, the Aegean Islet Conservation Program will inevitably deal with a series of constraints that will potentially hamper the achievement of true co-creation. For this reason, it is essential to develop an accurate depiction of what each phase could look like in relation to the different areas that will be included along the Program. The following Chapter will deal with this task, and will discuss how participation might take root throughout the four different phases in relation to different areas of action part of the Program.

A note on Evaluation

Before understanding what kind of Evaluation metrics could be used within the application of a LL approach to the Aegean Islet Conservation Project, a relevant methodological clarification ought to be made. As stated, the Living Lab emerges as an approach to be applied throughout the project life cycle. Thus, evaluation metrics will be related to the living lab performance itself, not to the state of the project at a broader scale. Furthermore, given that this research is not scrutinizing an existing LL, but rather proposing the implementation of one, a toolkit for evaluation will be developed, similarly to what will be done considering the other three phases of the Implementation procedure discussed above.

Who am I? A personal reflection on positionality

The research context of this study is grounded in creating a product intended to be as operational as possible. Thus, it presupposes that its validity will be put under test as soon as it is completed. This will happen by adopting it throughout the project, but also by exposing this manual to the different parties involved, from the staff of the Archipelagos Institute of Marine Conservation to members of the Fournoi municipality and inhabitants of the set of islands. Given this aim, it becomes essential to bring up the topic of positionality, and most importantly to be aware of one's own. This is especially important when dealing with a context that is alien to one's background in linguistic, sociocultural and demographic terms.

I am Lorenzo, a 24-year-old person born in a town in North-East Italy. Through luck, privilege, scholarships and a supporting mother I was able to spend a high school year in Chile as an exchange student, to then complete my BA in International Studies in The Hague, Netherlands and become part of the Erasmus Mundus Double Masters in Sustainable Territorial Development I am completing.

I have decided to start my internship at the Archipelagos Institute of Marine Conservation for several reasons. Firstly, the idea of working in an insular context for an NGO primarily focused on conservation deeply attracted me. I knew close to nothing about what that could entail, which sparked my interest. Secondly, knowing that the institution was looking for someone that could deal with a project related to rural development seemed to be a great opportunity to on one hand work within an area I would like to focus my research on, while at the same time exposing myself to new stimuli. Furthermore, I have a particular appreciation for smaller realities such as Agios Konstantinos, where the Archipelagos Institute of Marine Conservation is based. I find them to be oftentimes showing an intrinsic peculiarity and folklore that in bigger centres is countered by a homogenising sense of assimilation and hyperstimulation.

Working to understand how to revitalize Anthropofas can be tied to some of the activities I like the most. Interacting with locals to learn about elements pertinent to the project but also bits of their personal lives, memories and hopes; being close to the reality I am working on, thus being able to see it, or at least to understand how similar island and islets can work; learning more about sustainable agriculture, forestry and landscaping, which are some areas that I find the most intriguing at a professional but also personal level; working in a team that brings together diverse forms of expertise. Those that have been working with me so far are Silvie, a Dutch graduate on Aquaculture & marine resource management, and Liv, who is currently completing her MSc in

Applied Sustainability in Bochum, Germany. Our thinking and know-how present lots of similarities, but also complementary elements.

As I am dealing with the project and its elements, I must be conscious of the place from which I am observing dynamics and drawing conclusions. I am assuming that, aside from its theoretical validity, participation and collaboration should be taken as a normative ideal. This assertion is mainly of ethical nature, yet it fails to acknowledge the perspectives of some of the stakeholders involved: Two institutions are proposing the development of the discussed project, yet it is not unimaginable to think that some inhabitants of Fournoi could think of different solutions for the problem of desertification, or in terms of possible uses of Anthropofas.

I am assuming that actors would attribute to sustainable revitalization a pivotal role when thinking about the Anthropofas case: the island could be seen as an economic opportunity, where for instance aquaculture or a novel form of grazing could be developed. Ultimately, I must acknowledge how, together with trying to both strengthen and question my beliefs concerning the project, I should maintain a humble attitude towards it: aside from the preparation I might have, I am not familiar with this context, nor with its history or the way in which social relationships between the stakeholders I am considering have been developing. I believe I should take this project as an opportunity to learn and discover more than one to postulate.

Areas of Action and Practical Examples

Landscape planning as an umbrella approach to islet restoration

This section will be used to bring the presented methodology closer to the Anthropofas case study. To do so, I will introduce outputs of research that has been carried out since a team began working on the Aegean Islet Conservation Program. In accordance with what was agreed with Dr. Petros Babasikas, research on practices able to bring together island rejuvenation, use of LEK and sustainable development ought to be analysed from the angle of landscape planning. Neundorf et al. (2018) define landscape planning as the set of forward-looking initiatives targeted at enhancing, rejuvenating or creating landscapes. Miklós and Špinerová (2018) emphasize how landscape planning is mainly oriented to the evaluation and development of land cover with a focus on the values, aesthetics, cultural and historical features of landscapes. The notion of landscape can be understood through Vallés-Planells et al. (2014), who regard it as a holistic, spatial and mental dynamic element, deriving from interactions between people and place. Planning, intended as

spatial planning can instead be regarded as the coordination of sectorial areas such as transport, agriculture and environmental management, with the inclusion of landscape-ecological elements (Miklós & Špinerová, 2018).

As landscape planning drifts away from a strongly technical approach and embraces a more transdisciplinary one, involving different experts and stakeholders in a participative way, connecting it to the methodology presented priorly becomes academically adequate (Neuendorf et al., 2018). On this matter, a drawback is related to the issue of applicability: landscape planning-related applied studies oftentimes indicate the option to apply their findings to planning practice, yet without managing to reach the step of real planning (Miklós & Špinerová, 2018).

These considerations can be linked to what Ahern (2006) refers to as Landscape-ecological Planning (LANDEP), a specialization of landscape planning that mainly focuses on spatial planning and organization of land to achieve explicit goals connected with sustainable development, such as habitat improvement, reforestation or soil restoration. In embracing both the latter view and a transdisciplinary standpoint, the Program exemplifies a strategic orientation that couples defensive and offensive elements (Ahern, 2006). Defensive strategies are applicable to fragmented and degraded landscapes with the intention of containing negative processes of fragmentation and ecosystem erosion, while offensive ones are based on a vision of a possible future landscape, which is taken as an ultimate goal (Ahern, 2006). Further clarity is derived from Miklós and Špinerová (2018, p.6), who describe LANDEP as:

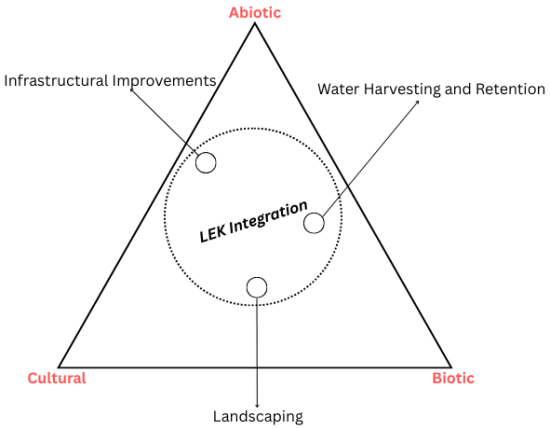
“A geosystem based purpose-oriented complex of applied landscape-ecological methods aimed at the ecologically optimum spatial organisation, utilisation and protection of landscape which results to the proposal of most suitable localization of demanded human activities within the given territory (what and where?) and successively to the proposal of necessary measurements ensuring the ecologically proper functioning of those activities on the given locality (how?).”

The final output of LANDEP is a proposal including applicable landscape-ecologically sound design and utilisation of a space (Miklós & Špinerová, 2018). This includes elements such as the delimitation of areas for specific activities, plans for landscape greenery, but also functional measures for community inclusion and legal viability (Miklós & Špinerová, 2018).

When discussing planning methods and their orientation, Ahern (2006) proposes to understand them through the Abiotic-Biotic-Cultural (ABC) Model, which allows to comprehend effectively where to place strategies that are being discussed within Landscape-ecological planning in a transdisciplinary structure. Figure 9 represents an adaptation of the Model to the areas that are

currently being studied at Archipelagos. Defined by the two scientific organizations active in the Program, they will be enriched by use of LEK in the following stages of the initiative. Furthermore, additional topics will be summed to the existing ones as the Program will continue developing.

Figure 9. The ABC Model for the Aegean Islet Conservation Program



Note. Adapted from Ahern (2006).

Through the following subchapter, the elements included in Figure 9 will be presented through a recapitulation of the work that has been carried out at the Archipelagos Institute of Marine Conservation so far. Subsequently, an analysis of what methodologies could be used to successfully integrate LEK will be presented and explained.

Landscaping in Anthropofas

During research at Archipelagos, landscaping has been deployed as a term to refer to the design through which the island's space ought to be reorganized. Given the paucity of buildings present on Anthropofas and the goals of Aegean Islet Conservation Program, the main rationale has been to think about a system open enough to include inputs from different actors, yet based on principles such as reforestation, efficiency in soil usage, potential productivity. Thus, so far most of the attention has been given to the possibility of developing a design based on the principles of Syntropic Farming/Agroforestry. This was initially proposed by a member of the research team who had been witnessing its success as a restorative method in harsh, dry contexts such as Portuguese coastal farms in the Setubal province.

Developed by Swiss geneticist and farmer Ernst Götsch, Syntropic Farming is an agricultural approach that mimics natural forest regeneration processes. It specifically focuses on replicating life's tendency to accumulate and organize energy, expressed through increasing diversity and

complexity similar to natural forest ecosystems (Andrade & Pasini, 2022). Andrade asserts that Syntropic Agroforestry aims at reaching regeneration by use: creating fertile areas with low-to-none dependence on irrigation and inputs that are also able to provide ecosystem services such as soil formation and regulation of microclimates (Andrade, 2019).

Overall, Jacobi et al. (2025) state Syntropic Farming develops around three main tenets:

1. Syntropy: The complementary opposite of entropy, governing life processes that accumulate and organize energy rather than disperse it. In this case, it is taken as a guide to create agroecosystems able to accumulate energy and restore fertility.
2. Ecological Succession: The idea of making extensive reference to the natural progression of species over time in an ecosystem, instead of conceptualizing it as static in its composition.
3. Strata Distribution: an approach to plantation that considers not only horizontal distributions, but places instead extreme importance into vertical development of flora.

Succession, the temporal variable of Syntropic Farming, relies on two classifications. One concerns categorizing plants in consortia according to their succession stages, as outlined below:

- Placenta: Annual and biannual species
- Secondary: Trees and shrubs with short/medium lifecycles
- Climax: Long lifecycle species
- Transitional: Very long lifecycle species

Flora belonging to each stage will mark a specific step in the reforestation of an area, which at a general level develops in accordance with different systemic succession phases:

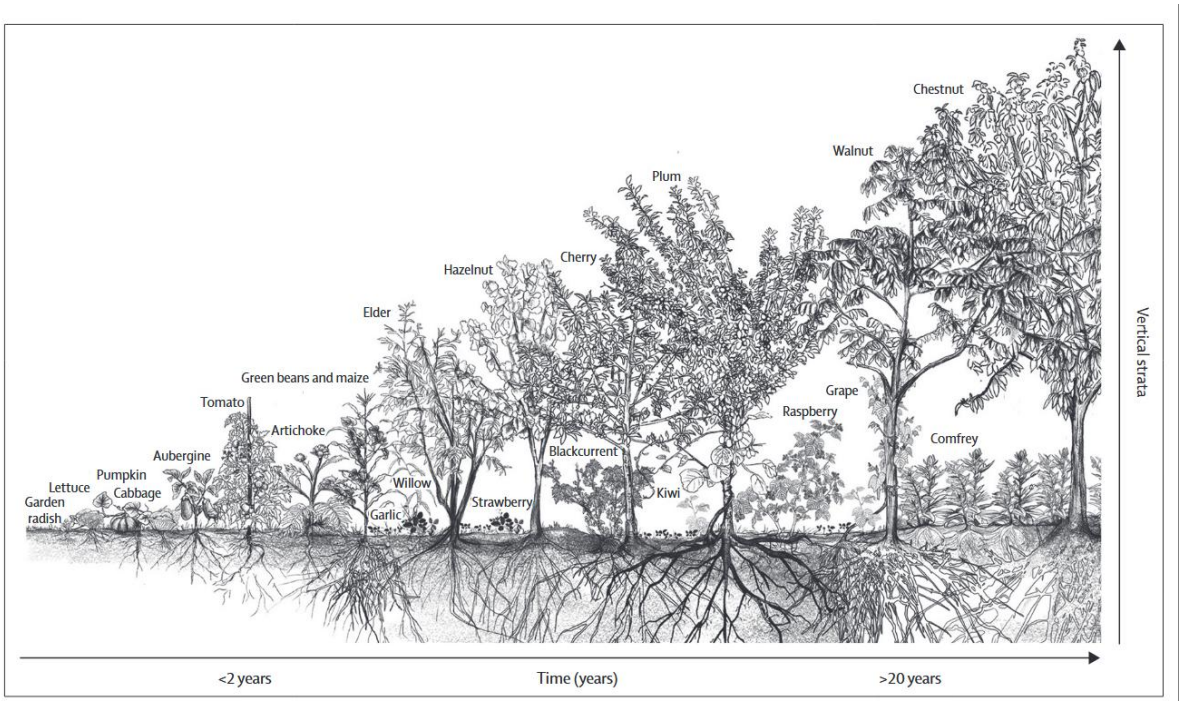
a. Colonization Systems: An initial phase with no plants and primarily bacteria, fungi, and microorganisms.
b. Accumulation Systems: The first shrubs begin to appear, yet water and soil nutrients are still limited.
c. Abundance Systems: Nutrients and water flow in the ecosystem, which can now sustain high demanding plants and fauna.

Thus, the goal of Syntropic Agroforestry is to design land trying to juxtapose specific systemic phases with a set of plants adequate to propel successional processes, build fertility and activate nutrient and water circulation regardless of external inputs (Andrade & Pasini, 2022). Nevertheless,

other interventions (technical pruning, removing of aged plants) can help to accelerate succession (Andrade & Pasini, 2022).

This needs to be combined with the spatial element, defined as Stratification (Andrade and Pasini, 2022). Figure 10 helps visualizing how this can concretely take place.

Figure 10. Strata occupation as proposed by Ernst Gotsch.



Note. From Jacobi et al. (2025).

The basic idea behind Stratification is to distribute plants to optimize sunlight use, hence the overall photosynthesis of the area (Andrade & Pasini, 2022). This leads to arranging plants in five strata with specific occupancy rates for a given area of land:

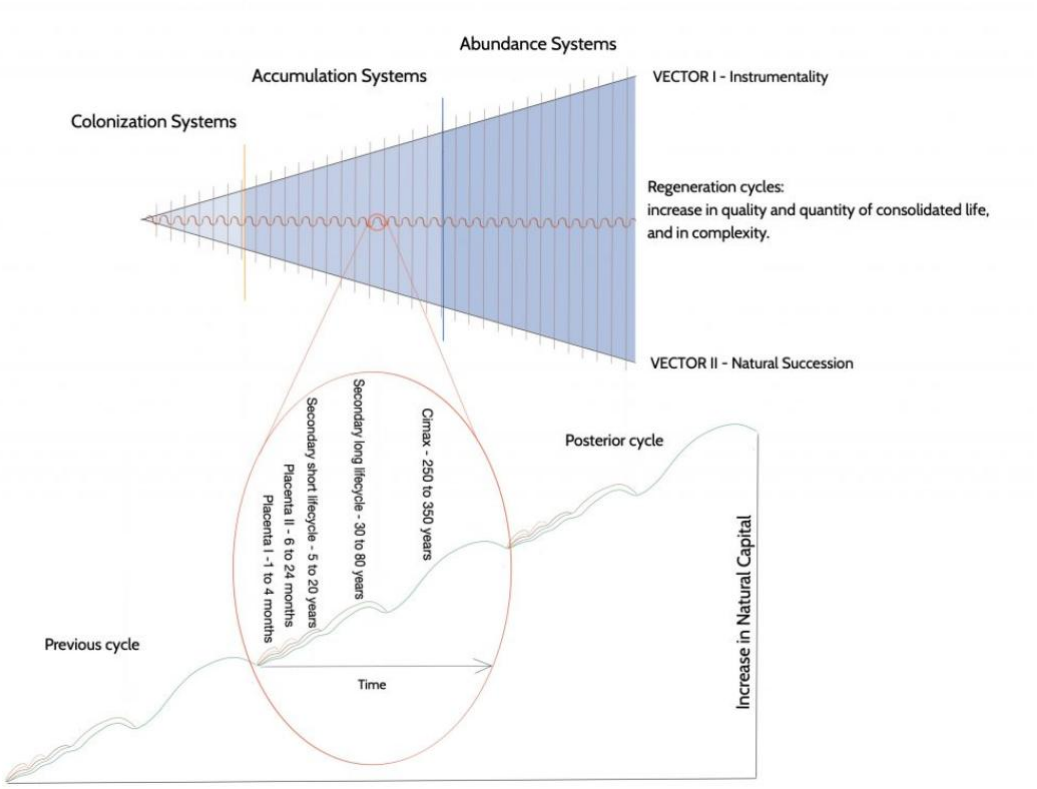
- Emergent species (20% occupation)
- Canopy species (40% occupation)
- Medium strata (60% occupation)
- Lower layer (80% occupation)
- Ground cover species (15-20% occupation) (Andrade & Pasini, 2022).

Putting all elements together results in a design where species apt to fill all gaps in space and time are identified, while all consortia need to have a mix of species occupying the different spatial layers (Andrade & Pasini, 2022). The logic underpinning this schematization is consistent with

syntropy: over time, the cultivated area will move towards increasing complexity, quantity and quality of life (Andrade, 2019).

In a study comprising a review based on the outcomes of Syntropic Farming in 67 case studies, Jacobi et al. (2025) discovered that this kind of design proved to yield more benefits than monocultures, conventional agroforestry and natural regeneration in areas relevant to this research such as agrobiodiversity, water dynamics and climate resilience, plant health, soil fertility, carbon storage.

Figure 11. The overall development of a Syntropic Agroforest.



Note. From Andrade (2019).

However, applying the principles of Syntropic Agroforestry to the Anthropofas case study presents a series of intricacies. A key issue is represented by local wind currents, as remarked by Periklis Koxilas, a boat captain working at Archipelagos and one of the three residents of the islet of Agios Minas, in Fournoi (Periklis Koxilas, personal communication, 14th of May 2025, see Appendix C). Periklis was extremely radical in pointing out how thinking of planting anything higher than 1-2 m would be implausible, as wind guts in Anthropofas can easily reach 100 km/h, hence making it impossible for tall flora to resist (Periklis Koxilas, personal communication, 14th of May 2025, see Appendix C). Thus, the system would have to be adapted to the meteorological conditions of the islet, maintaining his tenets but aiming for a reduced complexity. On the other hand, the interview

carried out with Thodoris Tsimpidis, honorary director of the Institute, revealed something different, given how he asserted that other examples in neighbouring contexts show the opposite (Thodoris Tsimpidis, personal communication, 22nd of May 2025, see Appendix C). Hence, garnering a more nuanced perspective on the impact that wind could have for Anthropofas' revegetation becomes key. Furthermore, returning to the principles of Succession and Stratification, various issues can be pointed out. There is no real clarity on which system best characterizes Anthropofas: some patches of the island show scarce vegetation, yet others are a mix of dry soil and stones. In addition, there is no clarity on the nutritional composition of the islet's soil, or on its water retention capacity. In terms of what flora could be apt to be inserted into a Syntropic Agroforestry System in an Aegean Islet, research work is currently being carried out, yet observational inputs from locals will be essential to grasp how flora could be organized in accordance with the design proposed by Syntropic Agroforestry. Ultimately, different stakeholders will also have to voice on the potential efficacy of this approach as a whole, or whether a simpler form of design could be more apt for the case. Even at Archipelagos there is still no ultimate consensus on what should be the first step to begin dealing with the issue of landscaping. For example, Thodoris Tsimpidis, has proposed to create a ring of tamarisk trees around the island to counter further soil erosion and start from a plant that is known to be highly resistant to saline waters and the weather conditions of the Aegean (Thodoris Tsimpidis, personal communication, 22nd of May 2025, see Appendix C).

Proposed means of water harvesting and retention

The challenge of water management in Anthropofas is key in the fight against desertification, but also aid the development of an ecosystem that is able to self-sustain itself in the longer run.

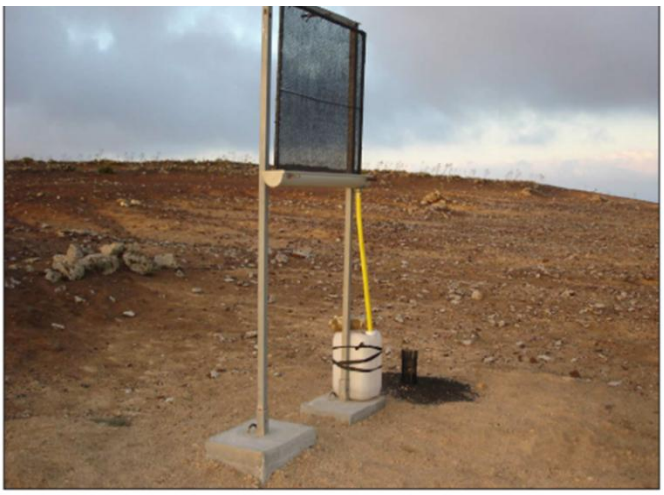
So far, the following technologies and measures have been investigated as possibilities to harvest and contain water in the islet:

- *Ollas*
- Fog Nets
- Subsurface drip irrigation
- Solar powered desalination systems.

Olla is Spanish for clay pot. They are an ancient and highly efficient method of irrigation, traditionally shaped like round jugs with long necks. Made with clay, they are buried in the ground with only the top opening left exposed. This is used to refill the olla, where water can seep through

the porous walls, providing a steady and gradual supply of moisture directly to plant roots (Nickel and Brischke, 2021). Through this system, soil moisture can be supported during drier periods. In smaller patches of land ollas are normally refilled by hand, yet adaptations at a larger scale can include connecting ollas to gravity-fed systems from water tanks or rainwater collectors, reducing the need for manual refilling. In Anthropofas, the existence of old water tanks has been confirmed by personnel familiar with the island (Thodoris Tsimpidis, personal communication, 22nd of May 2025, see Appendix C).

Figure 12. A standard fog net



SFC project, Canary Islands.

Note. From FogQuest (2022).

Fog nets are fog collectors that imitate the fog beetle or Namibian dune grass, which can extract large quantities of water from the fog with its surface (The Biomimicry Institute, 2024). As wind pushes fog through a vertical mesh net, the smallest water droplets stick to the water repellent mesh and combine to form large drops, which then flow downwards by gravity into the collecting channel, from where the fog water flows through pipes into a reservoir (FogQuest, 2022). Fog collectors can also collect rain, if the rain hits the nets together with the wind and falls at a suitable angle.

So far, fog nets have yielded the best results in coastal or high-altitude. These are favoured by relatively frequent wind flows, and frequent fog cover deriving from upwind cloud and orographic clouds in the case of mountainous areas (FogQuest, 2022). The preference for similar environments is confirmed by businesses areas of operation, as the distribution of projects from Aqualonis, a leader in fog nets construction can confirm (Fig. 13).

Figure 13. Aqualonis Fog Nets global distribution.

Note. From Aqualonis (n.d.).

Overall, the fog nets manual from FogQuest (2022) states that windward sites with persistent winds such as trade winds with a speed of 4 to 10 m/s from one direction are ideal for fog collection. Regardless of the altitude, what is essential is to verify if fog or clouds form at the height of the specific site, and if wind speed is adequate for collection.

Similarly to *ollas*, another technology that could be beneficial to enhance capillarity of water distribution in Anthropofas is drip irrigation. According to Bansal et al. (2021) drip irrigation is a micro-irrigation method that delivers water directly to plant roots at a consistent flow rate, minimizing evaporation and maximizing water and nutrient efficiency. It works through systems comprising valves, filters, controllers, pipes and more components, which distribute water coming from a fixed body of water, such as a tank, oftentimes with a slow-release rhythm (Bansal et al., 2021). Subsurface drip irrigation is a variation on traditional drip irrigation where the dripline (tubing and drippers) is placed beneath the soil surface instead above the ground, thus supplying water directly to the roots. The depth and distance the dripline is placed depends on the soil type and the plant's root structure (Netafim, 2022). Hence, the system becomes a root zone management tool, together with an irrigation one: fertilizer and nutrients can be applied to the root zone in a quantity in which it will be most beneficial and be channelled there through the driplines, together with water (Netafim, 2022).

Depth depends on the soil type and the plant's root structure. Generally, single season crops are watered with driplines at a maximal depth of 10 cm, while for semi permanent crops 25 cm can be reached (Netafim, 2022). Finally, permanent crops are commonly associated with driplines placed at 25-40 cm from the surface (Netafim, 2022).

Finally, a desalination plant powered through solar energy has been presented as a necessary technology for water purification, to have access to both water for irrigation but also for hydration of people working in Anthropofas. On this matter, the intention expressed by Archipelagos is to do so by replicating the system that is being used in their base in Lipsi Island, due to economic convenience and preexisting relationships with suppliers of both PV systems and desalination ones.

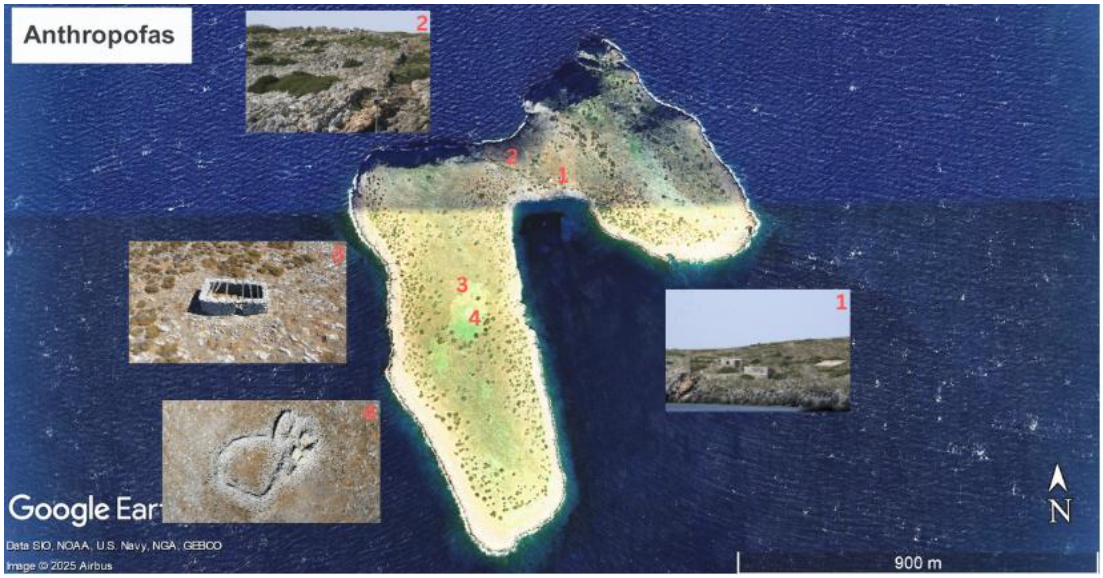
When thinking about putting into practice the proposed examples of water management, a series of complications can be noted. As this investigation focuses on integration of LEK and stakeholders, these issues are observed from similar perspectives. A key element where interaction between stakeholders will be key is the maintenance of the systems that have been presented. They would all require a relatively frequent human presence in the islet, and the only realistic option would be to delegate the role to people living in the Fournoi complex, as it is the only site from which Anthropofas can be reached with relative ease (Periklis Koxilas, personal communication, 15th of May 2025, see Appendix C). Furthermore, the issue of wind has the same importance as for the possibility of applying a Syntropic Design: as Periklis Koxilas remarked during his interview, what would be the chances for a fog net to resist strong wind currents? (Periklis Koxilas, personal communication, 15th of May 2025, see Appendix C). Likewise, soil depth in different sections of the islet has not been estimated, which leaves it unclear to what extent *ollas* or subsurface drip irrigation could be developed.

Observations on possible infrastructural improvements

A third area of interest connected to the revitalization of Anthropofas is nestled in the opportunity of giving new life to the derelict buildings that exist in the island. Thodoris Tsimpidis from Archipelagos has expressed the will of the Institute to renovate such structures, as already iterated in the project proposal that is currently being written between such institution and the University of Toronto (Aegean Islet Conservation Program, 2025; see appendix A). Nevertheless, specific procedures or goals on how to restructure each building have not been advanced yet. Furthermore, there is a lack of complete clarity on what was the purpose of each structure at the time of its construction, although it is believed that talks with Fournoi inhabitants will help in answering such doubts (Thodoris Tsimpidis, personal communication, 22nd of May 2025, see Appendix C).

Fig. 14 shows the location of the buildings that have been built in Anthropofas in the past. So far, they have been identified as it follows:

Figure 14. Man-made buildings in Anthropofas



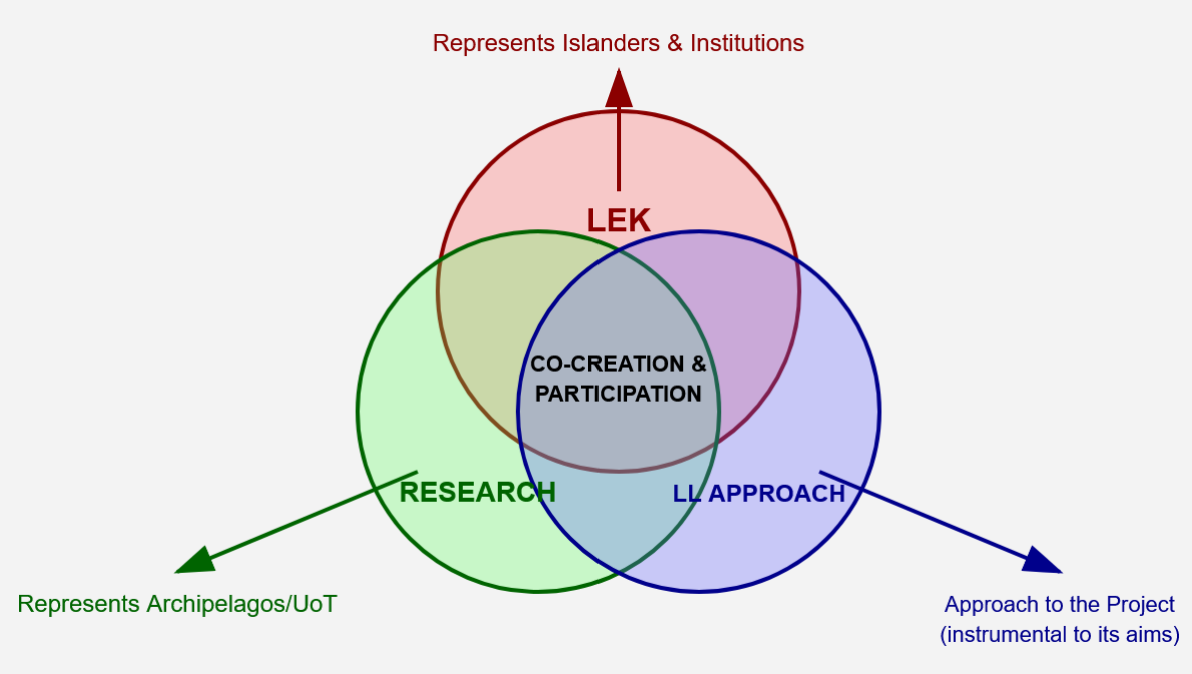
Note. Map created using Google Earth Pro.

1. Two old houses or storage rooms and a water tank.
2. A stone wall that used to divide the islet in half, to allow to alternate the portion of land allocated to cattle.
3. Supposedly, an old storage room.
4. The ruins of a fence that is assumed to have been used to keep cattle (Thodoris Tsimpidis, personal communication, 22nd of May 2025, see Appendix C).

Participatory Methods for a Living Lab approach to the Aegean Islet Conservation Program

The examples attained from current research efforts of Archipelagos' staff will now be discussed in relation ton Local Ecological Knowledge, Living Labs, Co-Creation and Participatory Methods. Figure 15 depicts the rationale along which this subchapter will develop: if the goal is to create an approach to the Aegean Islet Conservation Project able to combine LEK and scientific research, the Living Lab conceptualization is ideal. What arises as the element bringing together these different sphere is co-creation, achievable through the deployment of Participatory Methods.

Figure 15. Intersections within the conceptualization of the Aegean Islet Conservation Program.



Note. Created using Canva

The research outputs stemming from the work that has been done at the Archipelagos Institute of Marine Conservation are taken as a case study that can elicit what limitations could arise in the implementation of measures for the rejuvenation of Anthropofas. According to the Living Lab approach, the development of such measures would be articulated under the Four Phases of Living Lab Implementation presented priorly. What is presented below is a set of Participatory Methods that could compensate for specific research gaps by leveraging on LEK, in accordance with the Four Phases division. To better understand the linkages between these tools and the project, the phases have been re-framed in accordance with the directions defined by the Archipelagos Institute of Marine Conservation so far (Table 3).

Table 3. The Four Phases of Living Lab Implementation in relation to research and participation goals in the Aegean Islet Conservation Program.

Phase	Current Framing
1. Exploration	Using qualitative participative methods to discern feelings of stakeholders that have not been included so far (Islanders and Institutions) in relation to the research that has been done at

	Archipelagos, as well as with the direction it embodies.
2. Co-Creation	Finding ways to make the design and planning of the solutions coo-creative and collaborative, taking into account the power and knowledge differences that exist within stakeholders, and how these could be used strategically.
3. Experimentation	Testing solution in Anthropofas to understand their feasibility and effectiveness, both in terms of ecological and social goals.
4. Evaluation	Assessing whether the solution is complying with different stakeholders' expectations, while reflecting on and how objectives such as stakeholder engagement, enhanced sense of ownership and environmental/infrastructural impact have been achieved.

Note. Adapted from European Network of Living Labs et al. (2025).

Having clarified what each phase would look like in the current state of affairs, these will be analysed singularly to provide a plan on how to tackle the needs that characterize each one of them. To do so while abiding to the framework under which this research develops, each phase has been connected to specific Participatory Methods. These are grouped according to their source in the table below (Table 4) and introduced singularly in the Appendix section (Participatory Methods Explained, 2025; see Appendix B). This serves to create a comprehensive toolkit of a wide range of methodologies that could be used in different moments to foster collaboration of the different stakeholders part of the project.

It must be noted that the examples that have been developed do not make use of all the listed PM. Rather, they focus on explaining the way in which some of these could be used in the context of the Aegean Islet Conservation Program, in accordance with a Living Lab approach. Methods that are not be mentioned will still be utilizable by those that will take this research as a guideline.

Table 4. A matrix of the Participatory Methods proposed for the Aegean Islet Conservation Program, inserted in a Living Lab approach.

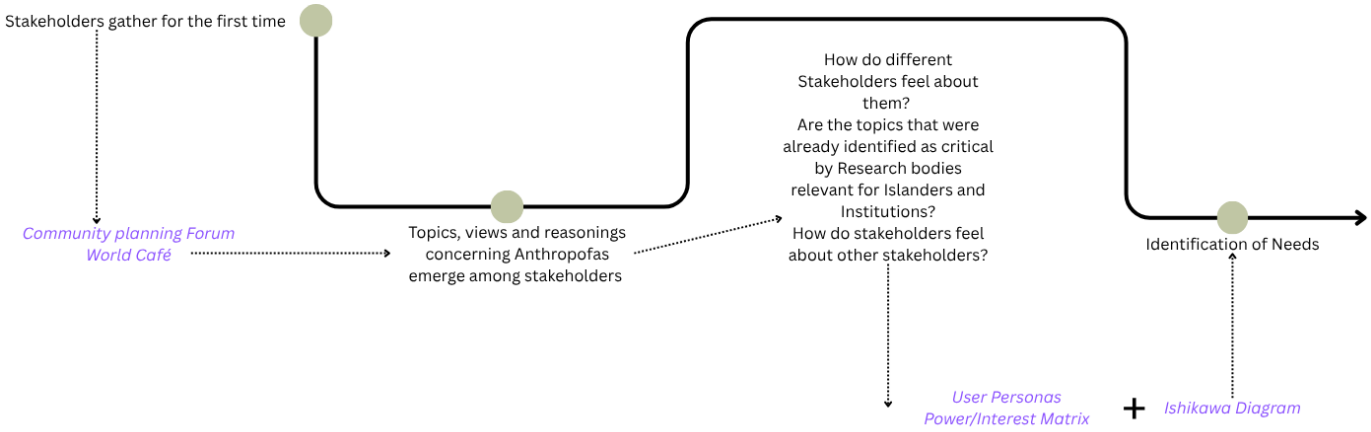
Participatory Methods **LL PHASES**	**(*UNaLAB Toolkit*, n.d.)**	**(CommuniCity, 2024)**	**(Institute for Housing and Urban Development Studies, n.d.)**	**(Duea et al., 2022)**	**(Glenn, 2003)**	**(Slocum, 2003)**	**(Wates, 2014)**
1. EXPLORATION	Commons Mapping; Geographical Mapping; Ishikawa Diagram; Mental Mapping; Participatory Mapping; People Shadowing; Power/Interest Matrix.	Align on your Impact Goals; Design Project Scoping Guide; Empathy timeline; Peers observing Peers; Photojournal; Problem Framing Canvas.	Activities Canvas; Strategical Canvas; SWOT; User Personas.	Community Engagement Studios, Concept Mapping Methodology, Group Level Assessment (GLA), World Café.	Focus Groups, Future Search Conferences.		Briefing Workshop; Community Planning Forum; Community Profiling; Design Games; Reconnaissance trip
2. CO-CREATION	5 Bold Steps; 6 Thinking Hats; Ambition Setting; Awareness Sheets; Bright Stars; Co-creation Assemblies; Collaborative Pilot Schedule; Community Canvas; Community Level Indicators; Data Dashboards; Future Newspaper; Idea Card; Lottery Game; Recruitment; Roadmapping; Sensing Guides; Stakeholder Journey; The actors map; Transect Walk; Vision Development.	Design Thinking	Brainstorming; Brainwriting; Focus groups; Lego Serious Play; Participatory Backcasting; Role Storming; Round table; SOAR analysis; World Café.	Deliberative Democratic Forum (DDF); GIS Mapping.		Delphi; Expert panel; Focus groups.	Choice Catalogues; Future Search Conference; Microplanning Workshop; Process Planning Session; Risk Assessment.
3. EXPERIMENTATION	A/B Testing; Stakeholder Journey; Usability Testing.		Assumption Mapper.				Community Design Centre; Microplanning Workshop.
4. EVALUATION	Appraisal Interviews; I like. I wish. What if; Interview Guide; Pattern Finding; Pilot Appraisal; Questionnaires; Storylines; Training the next generation; Transect Walk.		Critical Friend; Dotmocracy; Listening Levels.	Partnership evaluation; Ripple Effects Mapping (REM).		PAME (Participatory Assessment, Monitoring and Evaluation).	

Exploration

This phase is primarily concerned with two elements, namely identifying the needs of stakeholders and developing an adequate analysis of them (*UNaLAB Toolkit*, n.d.). Hence, in the current context of the Aegean Islet Conservation Program, it refers to discovering the demands of Islanders and Institutions, while also discerning how they could be combined with those of the two research bodies involved in the project. Nevertheless, what could also be of use would be to improve the understanding of the goals that drove the University of Toronto and Archipelagos to conceive the project. Grasping their research aims with more detail can aid the discovery of commonalities with the discourses of other stakeholders, thus making the definition of goals and targets that will shape the following phases easier. In this sense, research such as the one presented previously is already informative of what concrete actions Archipelagos is envisioning: hence it can be taken as a starting point to understand where and if other stakeholders could fit in. Broadly speaking, this phase must create an appropriate ground to deal with the issue of power distribution: it should lead to the creation of an arena where different interests and need can be debated and presented with equally loud and respected voices.

For this dialogical process to happen, these needs must be initially defined in connection with those voicing it. To deal with this issue, an approach like the one displayed in Figure 16 can be taken as an example.

Figure 16. Identifying stakeholder's needs in the Exploration phase



Note. Created using Canva.

As the project's stakeholders have been individuated and there is already an existing connection among them (Archipelagos is already in contact with the University of Toronto and the Municipality of Fournoi, which can in turn include locals given their small number), the starting point of the Exploration phase is assumed to be the instance in which all stakeholders will be able to gather together. As each group is counting on multiple members, experts or representatives, the

quantity of attendees for each gathering and their respective community will be variable and contextual to availability and time. To get stakeholders acquainted with each other and with the project's topics, activities like the Community Planning Forum or the World Café can land great results. The World Café places stakeholders in a setting where they can engage in small group discussions by rotating tables where specific topics are addressed and then shared with the larger group (Duea et al., 2022). Conversations are encouraged to have a certain degree of informality, as if they were indeed taking place in a café, and they can include a large number of participants, which is fitting for the number of attendees that could take part in initial gathering connected to the revitalization of Anthropofas (Duea et al., 2022). Community Planning Forums are defined by Wates (2014) as open events lasting several hours that bring together interactive displays, an open forum, workshop groups and informal networking. The event requires a facilitator and to have people seated in a horseshoe shape, ideally with a model (in this case a map or 3D model of Anthropofas) to interact with. After introducing the meeting and those attending it, an open forum is developed and moderated by the facilitator (Wates, 2014). Workshop groups around pre-decided topics follow the debate, while the activity is concluded with a moment of networking, to enable stakeholders to mingle informally (Wates, 2014). Carrying out these initiatives will enable stakeholders to familiarise themselves with the project, while also being offered the opportunity to look at their positionality in it, in absolute terms but also in relation to other actors. It is expected that this initial step of the Exploration phase will be useful for *Islanders* and *Institutions* to understand what the aim of the project is according to other stakeholders, but also to ponder whether it holds relevance for themselves. This can refer to the Program as an overarching initiative for island rejuvenation, but also for some of the research areas that have already been proposed. For instance, at this stage issues related to values and social dynamics can also arise: reflections on hierarchies and roles, but also on the trust that stakeholders are reciprocally perceiving. To dig deeper into these matters, methodologies that can foster an improved closeness to others' thought and values ought to be proposed. Among these, one can find the Power/Interest Matrix or User Personas.

The Power/Interest Matrix is a methodology that allows us to understand how much power and interest stakeholders have within a project (*UNaLAB Toolkit*, n.d.). It consists of a four-quadrant graph where the axis indicate respectively power and interest. Stakeholders placed in the bottom left corner have low power and low interest, while the corner at the top left groups those with high power, yet low interest. Stakeholders mapped in the top right quadrant show high power and high interest, while those in the remaining section are highly interested but lack power (*UNaLAB Toolkit*, n.d.). Stakeholders themselves can voice their opinions on where each actor should be placed, with

a facilitator moderating the discussion (*UNaLAB Toolkit*, n.d.). Based on the outcome of the activity, actions apt at managing the representation of each group should be presented by the facilitator.

User Personas is useful to better understand who are the stakeholders acting within the Living Lab in terms of needs, qualities, realities and possibilities for action (Institute for Housing and Urban Development Studies, n.d.). It can be carried out to develop a general understanding of a specific persona (e.g. the University of Toronto), or multiple ones. Within the exercise, a template related to the analysed persona is handed out to each participant to the activity, who will fill out all the categories to then have a facilitated discussion on the general conclusions that arose (Institute for Housing and Urban Development Studies, n.d.).

A tool that can be used subsequently to refine the identification of stakeholders' needs is the Ishikawa Diagram. Also known as Fishbone Diagram, it is a cause analysis tool used to identify many potential causes leading to an effect/problem (*UNaLAB Toolkit*, n.d.). The method begins with a specific problem statement, after which its major categories of causes are brainstormed among stakeholders. Brainstorming continues, stimulated by the question 'Why does this happen?' with all the causes that are named being placed under the appropriate category. The facilitator will continue asking "Why does this happen?" about each cause (*UNaLAB Toolkit*, n.d.). Increasingly, more and more sub-causes will be written, reaching deeper levels of analysis and of causal relationships (*UNaLAB Toolkit*, n.d.). An example of an initial problem statement related to Anthropofas is 'Anthropofas is under the risk of desertification'. Causal categories could be connected to the kind of driver of desertification, or the areas in which this is manifesting itself.

As needs become clearer, their analysis becomes central in order to have an appropriate conceptualization of the elements that will underpin following phases. Figure 17 shows a constellation of methods apt for the aim.

Figure 17. Ways of analysing stakeholders' needs

Note. Created using Canva.

A possible sequence could include taking a Reconnaissance Trip guided by a team of local people and technical experts to Anthropofas to get acquainted with the characteristics of the islet and have different points of view interacting about it, to then translate ideas into concrete elements through Participatory Mapping: by drawing and incorporating elements to a map of the islet, different experiences of the place and its space can emerge and be put into paper (*UNaLAB Toolkit*, n.d. and Wates, 2014). As stakeholders have completed the task, they are asked to present their product to other groups, to create awareness on different understandings of the criticalities of the mapped object (*UNaLAB Toolkit*, n.d.). This methodology is great to gather insights from different stakeholders, yet as it can be quite dispersive and disorienting, it requires extensive framing and planning from facilitators (*UNaLAB Toolkit*, n.d.). To delve further into the analysis of participants' needs and their relationship with the project, Concept Mapping Methodology could enrich the results of Participatory Mapping. The former is a research method that couples data of quantitative and qualitative nature to create a visual representation of ideas (Duea et al., 2022). The latter presupposes working with materials to come up with small models to place around the map, to create a design that is adaptable and to be record/photograph it (Wates, 2014). As needs become more defined, Future Search Conferences and Strategic Canvas can help to create a connection with the following phase. Future Search Conferences want to create a shared future vision and strategy among a non-uniform set of people through the facilitation of two professionals and five phases:

a) Identification and discussion of desirable/probable trends in the project
b) Analysis of how these trends can affect stakeholders

c) Projection of how the trends will impact the project
d) An ideal design based on previous points
e) Potential strategies that could aid to the creation of such a design (Glenn, 2003).

Strategic Canvas are an easy-to-use tool that can be used together with Future Search Conferences to deconstruct stakeholder's needs by having participants filling out a table constituted by the following categories: Key Stakeholders; Key ethical, legal and social issues; Critical Success factors; Desired Results; Milestones; Risks and Contingencies (Institute for Housing and Urban Development Studies, n.d.).

Co-Creation

As the second phase begins, attention turns from problem and needs definition to active co-creation and collaboration. Here different forms of knowledge are intended to cooperate in the production of strategies, designs and instruments that may help in the revitalization of Anthropofas, and potentially other similar realities. As this step is being reached, stakeholders should have acquired an exhaustive familiarity with the Program, and also with all the actors composing it, their standpoints, expertise and power. When it comes to power and its distribution, this is the stage in which, as asymmetries become clearer, efforts should be made to approach collaboration with the intention of countering them to expand ownership of the rejuvenation process, but also to include of different skills and inputs.

A strategic way to get around this phase within the case study is to go back to one of the areas of research that have been introduced, namely the one related to the management of abandoned buildings and ruins in the island. As it is the one within which the least ideas have already been advanced, debates on its utility and future design can develop in a multitude of ways.

The CommuniLab of the City of Amsterdam proposes Design Thinking as a methodology to craft solutions to be used in the co-creation phase of a Living Lab (CommuniCity, 2024). Design Thinking is an iterative approach to design that addresses problems in a non-linear way through five key stages (Empathize, Define, Ideate, Prototype, Test) (CommuniCity, 2024). Here it is taken as a way to break down the co-creation phase in smaller steps, some of which overlap with other moments of the living lab implementation process. The first phase, *Empathy*, directly connects to what was discussed in the Exploration section, as it aims at understanding users and what they see as challenging, thus placing values on co-creation, but also immersion and empathy (CommuniCity,

2024). The following phase, *Define* begins with a clear problem statement and targets the identification of an ideal solution to it. In *Ideate* the most ideas possible are collected, based on their coherence with the challenge they refer to: it is here that co-creation plays a key role in gathering ideas, but also selecting them at the end of the phase (CommuniCity, 2024). These ideas are then tried on a small-scale during *Prototype*, and as some emerge as better than others, these will undergo more serious try-outs during the *Test* phase (CommuniCity, 2024).

A variety of tools exist to amplify co-creation and LEK inclusion throughout this phase. Beginning with its first part, at first activities such as 6 Thinking Hats or People Shadowing can further deepen the attainment of a common understanding of discussed issues, given how they enable participants and researchers to place themselves in the position of others, in an emphaticising motion of reciprocal learning.

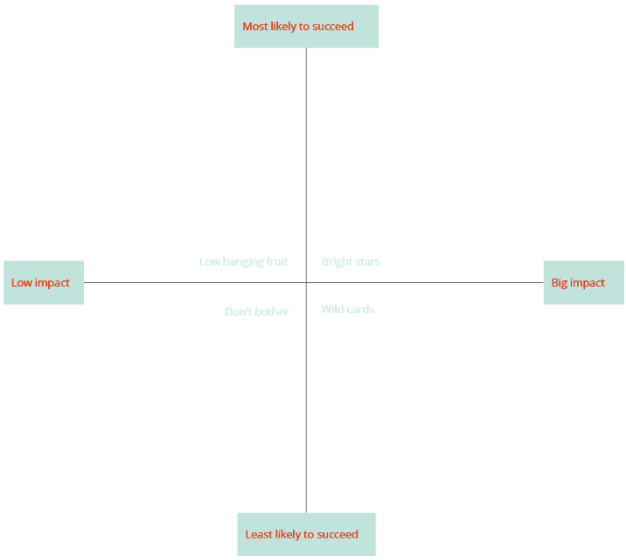
6 Thinking Hats is a technique developed by Edward de Bono in the 1980s in which six thinking roles are represented by six hats, which are mentally worn and switched among the participants during a meeting (*UNaLAB Toolkit*, n.d.). The six hats are: the White Hat, symbolising facts and figures; the Red Hat, representing the emotional view; the Black Hat, worn by the 'devil's advocate'; the Yellow Hat embodying the positive side; the creative Green Hat; the Blue Hat, epitome of the organising view (*UNaLAB Toolkit*, n.d.). The activity is moderated through questions that incite members of a group to reflect on their roles (What's your gut reaction to a given issue?) and on what problems/solutions they may be facing (what is the criticality here? What additional opportunities exist?) (*UNaLAB Toolkit*, n.d.). Although the dynamic is open-ended and flexible, it should always be shaped with a sense of direction: introspection should come before problem analysis, which in turn should not precede thinking up about solutions (*UNaLAB Toolkit*, n.d.).

People Shadowing involves having one or more stakeholders following other stakeholders in their daily lives and tasks, to help them to better understand the behaviours and assumptions of those they are seeking collaboration with (*UNaLAB Toolkit*, n.d.). For instance, if some residents of Fournoi were to spend some days at Archipelagos' base in Samos, they could improve their comprehension of the Institute's work, hence its approach to the project. In turn, this could foster further reflection on elements of commonality in relation to identified needs.

What follows are more pragmatic methodologies such as Ambition Setting and Collaborative Pilot Schedule. Ambition Setting is an extended set of workshops that targets the definition of the ambitions underpinning the co-creation process. It is commonly articulated in three days to include workshops with groups representing the same stakeholder, presentations of focus areas and working

sessions to establish scope and lay out the main points of a concept report (*UNaLAB Toolkit*, n.d.). The results of the workshops are then discussed in a team setting with different stakeholders to phrase priorities and ambitions (*UNaLAB Toolkit*, n.d.). As goals are set, stakeholders need to be included in the planning process: a Collaborative Pilot Schedule implies that the campaign for the revitalisation of Anthropofas will be open to all actors and not only managed by one, while also being flexible and adaptable as the process evolves (*UNaLAB Toolkit*, n.d.). With the *Define* phase, solutions to previously identified problems begin to appear. As mentioned, thinking about an area in which no stakeholder has concretely advanced a plan makes it easier to grasp how different methodologies could work. Two tools to lay out ideas in a relatively non filtered manner are Brainstorming and Brainwriting. Brainstorming is aimed at generating as many ideas as possible in a group setting to then have a reflection moment on what emerged, with a facilitator to guide the activity and ensure no monopolization (Institute for Housing and Urban Development Studies, n.d.). Brainwriting is a brainstorming in which ideas are written down anonymously instead of being voiced out amidst others (Institute for Housing and Urban Development Studies, n.d.). This enables shyer individuals to express more, while also giving more space to more controversial ideas (Institute for Housing and Urban Development Studies, n.d.). These ought to be coupled with a Risk Assessment: an analysis of threats that may be relevant for the project or its social cohesion (Wates, 2014).

Figure 18. Bright Stars Matrix



Note. From *(UNaLAB Toolkit, n.d.).*

The strength of wind flows mentioned previously can be an example of the first category. Through various Co-creation Assemblies ideas can begin to take further shape, be categorized and made familiar to all stakeholders. These are events in which possible futures can be proposed, debated and prototyped: each assembly should include a diverse range of stakeholders, who with the help of a moderator can discuss in order to find a common ground and solutions, which will then be gathered in a report for future meetings, but also for policymakers and potential funding entities (*UNaLAB Toolkit*, n.d.), The two finals steps of the Design Thinking process can include Choice Catalogues, which allow participants to make design choices based on catalogue elements that can be introduced through workshops, presentations by researchers, photographs and models (Wates, 2014). The findings of this LL phase

can be backed up through Bright Stars, a matrix framework to evaluate ideas based on their impact and possibility of success (*UNaLAB Toolkit*, n.d.). The matrix is built around two intersecting axes, indicating the potential for impact and success respectively (Fig. 18). The ideas generated so far can be placed in the graph after a collective discussion: some 'Bright Stars' will emerge, and they will be picked as those solutions to be further prototyped and experimented (*UNaLAB Toolkit*, n.d.).

Figure 19. A possible Co-creation pathway

Note. Created using Canva.

Experimentation

To introduce Participatory Methods usable in the Experimentation phase, the focus will be placed on how this phase could look like in regards to testing Syntropic Agroforestry principles in Anthropofas. Doing so does not imply that the issue of landscaping should not be undergoing the previous phases, but is instead a practical escamotage to give adequate insights on how Experimentation could concretely take place. More so, it is reiterated how co-creation should be a component of all the phases of the project. Hence, even research results that have already been catalogued should be taken as malleable and open to integration. What comes handy in this situation is to develop a Stakeholder Journey. This is a visual interpretation of a stakeholder's relationship and feelings towards other stakeholders, the state of the project and the dynamics that are characterizing it (*UNaLAB Toolkit*, n.d.). Sketches of the project's phases and of a stakeholder's impressions are drawn with the help of a facilitator: they will be used to create a story of the stakeholder's journey to better understand how to frame their role along the following steps of the project (*UNaLAB Toolkit*, n.d.). This is a tool intended to be used for single stakeholders, but it can be repeated to include all parts involved. As this Living Lab step regards trying solutions to assess their impact based on previously defined needs and goals, it can be argued that its starting point coincides with the *Test* phase of the Design Thinking methodology. This is why, for instance, Microplanning Workshops are being included as a methodology useable in both phases.

In the case of Syntropic Agroforestry, it has already been proposed to try out its design in a small pocket of land of around 300 m2, with the idea of understanding what plants could grow in

Anthropofas and discern what complexity could be attained in terms of strata distribution. This resembles the Usability Testing method, which involves testing solutions while also having some stakeholders and planners observing the process, which unfolds according to a preestablished test plan (*UNaLAB Toolkit*, n.d.). The test plan includes a description of participating stakeholders, of its objectives and success metrics (time, goal fulfilment, expectation matching, …) (*UNaLAB Toolkit*, n.d.). The test is constantly facilitated and can require an extended amount of time, after which all findings and observations are collected in a report. This kind of method could allow us to tackle some of the doubts that were listed priorly, such as how wind currents might impact the growth of plants in the islet, or whether its soil could allow for the growth of vegetation. A/B Testing can be an excellent complement to Usability Testing, as it is based on comparing two versions of something to learn which one is more apt for the problem being addressed (*UNaLAB Toolkit*, n.d.). It can be a way to gather insights on what flora can take root in Anthropofas, but also on what planting methods or design features may work best.

As the Experimentation phase progresses, the efficacy of the solutions being implemented will be assessable as a practical level. In the case of landscaping measures or re-vegetative practices, their success will be noticeable in terms of markers such as plant growth, increase in complexity, soil moisture and fertility. Through the Evaluation phase, it will be possible to analyse these collectively, while also estimating the impact on the relationship between users that collaborated along the Living Lab process and their sense of ownership and representation.

Evaluation

Before going over a set of PM appropriate to this phase, it is useful to state how no divide has been created between methods aiming at evaluate environmental and social impacts within the project: the evaluation tools that are listed have a scope broad enough to include an analysis of both stakeholders' experience and observations on the success, or lack of it, of implemented actions. However, more quantitative estimations of criteria such as soil fertility or biodiversity rates will require models and data analysis that are not pertinent to the research focus of this contribution. Notwithstanding, these could be incorporated within some of the discussed methodologies.

Differences can be remarked when it comes to the nature of the evaluation a method intends to achieve. Some methods are systematic, in the sense that the way in which they frame the evaluating indicators, and their understanding of the object to be evaluated are analytical and bound to specific structures. Other methodologies are based on a narrative approach to evaluating: they work towards the creation of stories, of personal and group accounts of experiences, their successes and

drawbacks. Among the first group, Questionnaires are a great tool to evaluate perceptions while safeguarding anonymity and being able to touch upon a diverse set of issues such as inclusivity, attainment of goals or coherence with initial criticalities (*UNaLAB Toolkit*, n.d.). Conducting a Pilot Appraisal can create results to juxtapose with those of the Questionnaires. This can be carried out in a formal or informal session, to understand what went well and what not through games and other methods to overcome potential shyness (*UNaLAB Toolkit*, n.d.). For example, flashcards with descriptions of different water management techniques implemented can be created, with participants being asked to rate their likelihood of success in a determined range of time with sticker dots of a certain colour. Stickers of another colour can be used to evaluate their opinion with regards to a technique, or if that is being seen as representative of their point of view with regards to water management. The latter methodology is commonly called Dotmocracy (Institute for Housing and Urban Development Studies, n.d.).

Examples of narrative methods pertinent to the project can include a Transect Walk, I like, I wish, What if and Critical Friend. Conducting a Transect Walk is indicated by the UNaLAB Toolkit (n.d.) as a methodology pertinent to the Experimentation Phase, yet it is believed that it can be used as an Evaluation tool given its ability to favour stakeholders' reflection. The walk would take place in the islet and follow a planned route, with specific stops where discussions on the existing scenario could elicit stakeholders' feelings regarding the output of the Aegean Islet Conservation Program (*UNaLAB Toolkit*, n.d.). I like, I Wish, What if is a feedback tool with which users are invited to give their opinion by formulating three types of statements: 'I like…', 'I wish…', 'What if…' (Institute for Housing and Urban Development Studies, n.d.). As the activity is completed, the facilitator should collect all statements to verify the existence of patterns or discrepancies among opinions (Institute for Housing and Urban Development Studies, n.d.). Critical Friend is the role that one of the stakeholders or an external individual receives in a session in which a facilitator is presenting a project's results: as the feedback part of the session takes shape, the critical friend is asked to sit with the facilitator and give a personal set of recommendations based on what the audience is voicing (Institute for Housing and Urban Development Studies, n.d.).

As the Aegean Islet Conservation Program presumes to use Anthropofas as a pioneering case to develop solutions replicable in other islets, another PM that is worth mentioning is Training the Next Generation. This is process requires a wide range of sessions and workshops spread over different months, as well as an appropriate design, campaigning and team of trainers (*UNaLAB Toolkit*, n.d.). As the project concerns an islet and travelling amidst the different municipalities of the Aegean is an expensive and oftentimes complicated and lengthy process, it is advised to carry out this activity as an online educational tool, with practical workshops along the way if feasible.

To organize the Evaluation phase in a co-creative manner and to include different kinds of methods, a great umbrella tool is a Participatory Assessment, Monitoring and Evaluation (PAME). This is an evaluation process within which participants share the management and responsibility for deciding what to evaluate, what methods and data to use, as well as how to carry out the evaluation and analyse its results (Slocum, 2003). Hence, participants can be offered a range of PMs from which to draw the ones they think are more apt for evaluating the state of the project and of its moments and the conclusion of it. Given the different parts that compose a PAME, adequate personnel is needed: a director, moderators, researchers and administrative figures will need to help in the organization of a multi-layered, time-extended initiative (Slocum, 2003). Planning a PAME is a multi-step process:

2) Reviewing objectives and activities
3) Reviewing reasons for evaluation
4) Developing evaluation questions and metrics
5) Define who will be carrying out the evaluation
6) Decide what indicators to deploy (Slocum, 2003).

Indicators can be direct when openly connected to what is being measured (e.g. The number of planted trees when trying to cast information on variation of trees number in a specific area) or indirect when serving as substitutes to answer questions hard to measure (e.g. Stakeholders' opinion of other stakeholders to assess the perception of collaboration along the LL) (Slocum, 2003). Following these steps, what will be needed will be to understand how do work around existing data:

7) Identify what information sources are available
8) Determine what skills and labour are needed to obtain such information and work with it
9) Determine when to gather information and who will be in charge of the task (Slocum, 2003).

Data collection will be coupled with the creation of a database, after which data will be analysed in a systematic manner to create a presentation for stakeholders and action plan on how to use the results and to generate a discussion around them (Slocum, 2003). Overall, the objective of final reflections should not be to judge the experience as successful or negative, but rather to learn through the evaluation process, and also to reconsider the feasibility of initial objectives. PAME can be used as an overarching methodology that includes the other techniques that have been proposed in this section, as well as additional ones among those proposed in Table 4 and on the related explanatory list (see Appendix B).

Discussion and limitations

Through the examples that have been laid out, the rationale justifying the centrality attributed to participation and co-creation has been developed by crafting a prototype of how Participatory Methods for the rejuvenation of Anthropofas could be used within a Living Lab approach. This has been combined with a broader set of PMs, which have been categorized in accordance with the four phases division typical of the Living Lab approach and introduced in the related appendix section (see Appendix B). It is believed that tackling stakeholder engagement by developing the Aegean Islet Conservation Program through a LL approach bears the potential to maximize LEK integration, given the importance that would be attributed to all the forms of expertise joining the project. Furthermore, by creating a framework under which a relative degree of flexibility is allowed, replicability in other contexts is made easier. This is confirmed by the realm of PMs that have been listed, which derive from experiences that took root in areas such as urban planning, community building or participation in the health sector (CommuniCity, 2024, Duea et al., 2022, Institute for Housing and Urban Development Studies, n.d., Slocum-Bradley, 2003, *UNaLAB Toolkit*, n.d. and Wates, 2014). Overall, adopting a framework uniting these elements will represent an element of novelty in research concerning the restoration of insular contexts: within existing literature, no example has been found of framing any project in a similar reality through a Living Lab approach that would focus on enhancing the representation and use of Local Ecological Knowledge.

Focusing on LEK involvement in the process is not a merely ethical objective, but rather a goal born out of practical considerations. This is backed up by research such as the one carried out by Alexopoulos et al. (2025) and introduced in the Literature Review chapter, but also by the need of attaining a higher clarity on what kind of measures could be implemented in the islet, which represents a reality that has not been studied before, and for which strictly scientific data may not be sufficient to acquire an exhaustive panorama on what limitations and potentialities exist in terms of weather conditions, fertility, biodiversity enhancement and productivity. Simultaneously, it is acknowledged that the research process related to the Aegean Islet Conservation Program will have to expand way beyond the scope of this contribution and delve deeper into areas pertaining to architecture, hydrology, ecology, funding and more.

Attributing centrality to the topics of LEK inclusion and participation will also be essential to avoid a top-down approach and maximize the possibility of both collaboration and development of

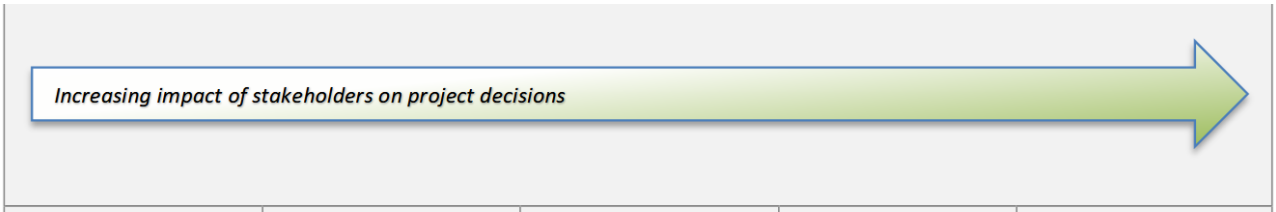
ownership, which in turn will be useful to maintain the results achieved in Anthropofas once the project will reach its conclusion. On this matter, it is useful to explain the categorization of project results created by Muçaj (2020):

- Outputs: the recorded changes in skills or abilities, but also the products and services resulting from the completion of an intervention or project.
- Outcomes: the likely or achieved short to medium term effects of the detected outputs.
- Impacts: long term effects (positive, negative, desired or unintended) of an intervention.

Hence, as the Aegean Islet Conservation Program to guarantee aims at long term sustainability, ownership will be a key element to reach long lasting results through its interventions (Muçaj, 2020). Muçaj (2020) emphasizes the importance of developing a multistakeholder form of ownership, as this creates the best set of conditions for inclusivity, as well as the merging of the broadest possible set of people and skills. Furthermore, coherently with the LL approach to a project life cycle, for multistakeholder ownership to develop and be long lasting, collaboration and co-creation ought to be permeating all project phases (Muçaj, 2020). This is backed up by the United Nations Development Programme (2020), which values early and iterative stakeholder engagement as necessary to create mutual trust and results that can extend beyond the project itself. On a similar note, Salsberg et al. (2017) emphasize how developing commitment among all stakeholders form the early phases of a project is a must to develop elements such as knowledge transition, social justice and competence with regards to the skills required along the way. Ultimately, promoting ownership can counter problems typical of top-down approaches to project management such as lack of coordination, conflict and lack of long-term success and knowledge creation (Muçaj, 2020).

All these considerations need to be joined to an analysis of the levels of stakeholder engagement that can arise, given that this criteria is better understandable as a spectrum more than a dichotomy. The United Nations Development Programme categorises stakeholder participation following the distinction presented below (Fig. 20).

Figure 20. Levels of stakeholder participation in project decision making



Inform	Consult	Collaborate	Consent	Empower
Provide stakeholders with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions	Obtain stakeholder feedback on project analysis and design, alternatives and/or decisions and consider stakeholder concerns and aspirations	Partner with stakeholders in reaching all key project decisions and ensure stakeholder input incorporated to maximum extent possible	Respect freely given decisions of rights-holders to proceed or not proceed with project or certain project activities	Transfer control over decision-making, resources and activities to stakeholders

Note. From United Nations Development Programme (2020).

Although the image conceives stakeholder engagement from the point of view of donors, governance bodies or project holders, it can still be relevant for this contribution. Given that stakeholder involvement can develop at varying levels, not all of these can be considered as instances of co-creation of knowledge. For instance, if stakeholders are only asked to provide information or feedback on particular issues, their involvement will be objectively different than if they will be vesting a central position in decision making processes, with an importance comparable to those of other parties. In the case of the Aegean Islet Conservation Program, this raises the question of where different stakeholders are actually standing, and what level of involvement can be expected. Indeed, even if the project is yet to take off, it is essential to be aware of the context in which it will develop, to have realistic expectations concerning the way in which its actors will come into play.

Figure 21. Levels of stakeholder involvement throughout project stages

Project phases according to European Commission (2004) and Wates (2014)

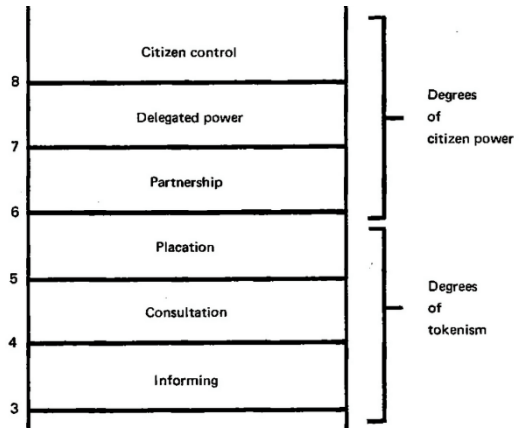
Levels of stakeholder participation (UNDP, 2020 and Wates, 2014)

	Programming & identification	Formulation	Implementation	Evaluation (& Audit)
Empower	Islanders and local institutions initiate action on their own	The community and its institutions plan alone	Islanders and local organs implement alone	Feedback, reflection and final tasks are solely managed by local stakeholders
Collaborate & Consent	All actors involved jointly initiate action	Planning and design unfold collaboratively	Implementation is carried out in a participated manner	Evaluation processes are developed collaboratively
Consult	Research bodies initiate action after consulting with other stakeholders	Islanders and local institutions are consulted before planning begins	Archipelagos & UoT implement strategies with community consultation	Evaluation takes place with local stakeholders' consulation
Inform	Research bodies initiate action	Research institutions plan and design autonomously	Scientific bodies implement alone	All final tasks are carried out by Archipelagos and UoT

Note. Adapted from European Commission (2004), United Nations Development Programme (2020) and Wates (2014).

Figure 21 is apt to further clarify what path could participation, thus co-creation take within the addressed project. It builds on two axes: one that differentiates between levels of stakeholder involvement, and another that analyses them in relation to different moments of the project cycle. The table cells with text in purple indicate in what way phases should develop to ensure that all stakeholders are being included throughout the different project's steps. As the project conceptual core and its main goals have already been pre-established by the Archipelagos Institute of Marine Conservation and the University of Toronto, it can be asserted that the initial Programming & Identification phase is already confined in the Inform area. Even if the lease of Anthropofas will necessitate the approval of the Fournoi municipality, the dictamens that will guide the following phases of the project will inevitably be managed by the two scientific institutions in charge of it, unless some goals may be altered following talks with other stakeholders. What will be essential for the following phases will be to maintain a strong and continuous collaboration among actors: if this was to be absent true participation, thus ownership would be hampered. The risk would be to incur in a form of tokenism, whereby participation and stakeholder inclusion would end up being symbolic and performative, rather than backed up by real measures and processes.

Figure 22. Tokenism and Citizen Power (Detail from Figure 7)



This connects to the issue of power distribution, which permeates the entirety of the project cycle. For collaboration to take place, a shift in power distribution will be inevitable, as the leap that needs to be taken from the Inform level of stakeholder involvement to the Collaboration & Consent one exemplifies. This process will require the research bodies coordinating the Aegean Islet Conservation Program to be willing to give up part of their decision-making authority, while also acknowledging other ways of seeing the project and its facets as equally valuable as their approaches to it, in line with what Madsen and O'Mullan (2018) regard as an expanded awareness of project partners. This step is also necessary to counter the issue of tokenism discussed above: assuming the nominal inclusion of other actors will create a more horizontal distribution of agency is erroneous, as for this to happen reflexivity needs to be present recurrently (Madsen and O'Mullan, 2018). To orchestrate power distribution appropriately, it is a must to develop an understanding of each stakeholder's expertise, capabilities and positionality, but also of what their specific goals are within the project (Keeys and Huemann, 2017). In addition, these goals are to be seen as dynamic, and not necessarily attainable: the goal of different stakeholders could be at the antipodes, and one or more actors may be required to sacrifice part of their viewpoints throughout the project. Various PMs proposed in the previous chapter can help dialogue with this kind of scenario, ideally with the aid of neutral figures such as facilitators or mediators.

This points back to the idea of developing the Aegean Islet Conservation Program using a Living Lab approach to lay an appropriate ground on which to develop a successful co-creation, able to integrate LEK and scientific knowledge efficiently and in a collaborative setting. By reflecting on Living Lab phases in relation to those of a canonical project cycle, it can be posited that organising the project through a LL framework from the beginning could ensure to have collaboration and user centrality as focal elements. Furthermore, it could help in making the first step of the project cycle more participative than it is as of now. It is worth reminding that the Living Lab approach is thought to be adequate for the project as it can provide a comprehensive response to its demands: it allows to vest LEK of a central role by advocating for knowledge co-creation and an overlap between creators and users of the end product, and in turn this can aid to the long-term sustainability of the results that the Aegean Islet Conservation Program will generate. When it then comes to the socioenvironmental sustainability dimension, having combined the Quintuple Helix Model typical of LL theory and the Doughnut Model enables to create a setting with boundaries that restrict the area of action to avoid detrimental trespassing. What undoubtedly helps is that the project itself is built around tenets such as low-impact measures, restoration and predilection for local flora and architectural improvements, as well as use of renewables. Having developed this contribution by aiming to be both theoretically exhaustive but also pragmatic helps with the issue of

replicability. The feasibility of this framework will be tested through the Anthropofas case study, together with all the other areas that will be planned and designed for the project, and if successful it will be easily replicable in other contexts. All the PMs that have been listed are not place-dependent, nor is the Living Lab approach. Other variables (demographics, geophysical elements, …) will inevitably differ, yet without altering the validity of the framework per se. However, further complications may arise, as discussed in the following subchapter.

Limitations

Firstly, a reason of doubt concerning the developed framework lies in its experimental character: bringing together island rejuvenation, co-creation for LEK inclusion and Living Labs has never been done before, hence all current conclusions can only refer to the conceptual richness of the framework itself and its possibility for application in Anthropofas. When it comes to the Anthropofas case study and its relation to other possible places in which the findings of the project may be replicated, an important element to consider are stakeholders. Stakeholders are highly contextual, and even if the Archipelagos Institute of Marine Conservation and the University of Toronto were to maintain their roles in future replications of the practice, other actors will inevitably show unique traits, responses and room for collaboration. Hence, even if the framework could be reproposed, the easiness of such action will be unclear even after the Aegean Islet Conservation Program will have reached its conclusion. Given the embryonic stage at which is currently laying, this kind of reasoning will only be done in the medium-to-long term.

Another potential difficulty that may arise along the project concerns the use of Local Ecological Knowledge, as the usefulness of islanders' expertise, as well as their willingness to collaborate in the project is still to be concretely explored. For example, it may happen that some inhabitants of Fournoi will only be available to join the initiative as paid workers during specific phases, thus altering the way in which collaboration has been conceptualized, as well as the nature of the co-creation process and the resulting development of a form of ownership. Remaining on the role of LEK holders, a complication connected to their integration can also derive from the place in which the project is set to take place: Anthropofas is an island that is relatively close to Fournoi, yet at around four hours of navigation from Samos island, where the Archipelagos Institute of Marine Conservation is based, which is also where researchers from the University of Toronto have stayed so far. Developing in-presence activities including all stakeholders will require an important level of scheduling and coordination, and it likely will not be happening on a frequent (more than monthly)

basis. For this reason, it will be useful to address the option of tailoring some activities to an online format, where doable in a way that will not be detrimental to dialogue and collaboration.

As stated, LEK is to be seen as dynamic, similarly to its relationship with scientific knowledge along a co-creative effort. As a consequence, when working with it, standardized procedures can lead to extractivism rather than collaboration, but also to misinterpretation. The framework for LEK inclusion that has been developed aims at tackling such issues, but it also requires a resource intensity that a vertical approach could avoid. Firstly, as already mentioned previously, to propose Participatory Methods adequately one or multiple facilitators are needed. Secondly, having to calibrate different phases of the project cycle to the needs of different stakeholders, their reflexive reasoning and the development of multiple PMs is a time-consuming effort, which may extend the length of the project beyond an initally estimated duration. In turn, this can affect other areas, such as the funding one: a higher financial input may be required, while donors would have to agree with the formulation of the project that this research proposes.

The element of novelty can also present some risks. Of the two coordinating institutions, the Archipelagos Institute of Marine Conservation is the one that holds the most important role in managing the project in terms of stakeholder engagement practices, given its relative proximity to Anthropofas and Fournoi, as well as because of its ties with both the University of Toronto and the municipality of the archipelago under which Anthropofas is placed. However, as the Institute has been historically dedicated to marine and terrestrial conservation, dealing with a project that intersects areas such as environmental restoration, landscape design under a Living Lab approach represents a new frontier. This offers vast possibilities for learning and will benefit from the cooperation with the John H. Daniels Faculty of Architecture, Landscape, and Design of the University of Toronto, but simultaneously presents challenges connected to lack of experience with the type of project and its components.

Concluding Remarks

Starting from the demands of the Aegean Islet Conservation Program, a newborn project revolving around the regeneration of the Greek islet of Anthropofas, this research developed a replicable framework focused on Local Ecological Knowledge inclusion, one of the objectives of the project. It has proposed to develop the project through a Living Lab approach, apt to ensure that the body of knowledge generated within in will derive from a co-creative collaboration between different kinds of stakeholders and expertise. After having explained how this would fit in the project cycle, an

analysis of Participatory Methods useful to foster co-creation has been introduced and connected with areas of research that are being investigated as useful for the Anthropofas case. Having done so, a chapter has been allocated to discussing the framework that was created in relation to the content of the Literature Review section, and also to highlighting its potential criticalities.

Due to the experimental nature of this study, it is useful to conclude it by pointing out to the ways in which this could evolve, but also in what ways the Aegean Islet Conservation Program could concretely develop. As said, given the difficulty that may arise in working constantly in Anthropofas and Fournoi, research on how to adjust this framework to an online learning scenario may become a need, if the population of the Fournoi archipelago will demonstrate an adequate digital literacy. In any case, this could be a valuable addition for future projects of this kind. Further digitalization could also be useful to landscape design: at Archipelagos it has already been tried to create a 3D model and orthomosaic of Anthropofas to then simulate real-life designs. However, Archipelagos is still lacking enough images adequate for that. If these were to be realized, they could then be juxtaposed to the inputs derived from activities carried out among stakeholders.

Developing a set of metrics to quantitatively and qualitatively assess elements such as stakeholders' participation and support of the project will strengthen the implementation of the proposed measures, while also evaluating their effectiveness. A similar monitoring will need to follow the restorative techniques that will be put in place in the islet, to then analyse the correlation between their success, the Living Lab approach and the overall sustainability of the project. Refining the manual based on what techniques will prove to be the most effective in fuelling collaboration will add clarity to its contents and make it easier to use for future endeavours.

When it comes to the directions that the project in itself could take, various interrogatives arise, equally to space for creative thinking and speculation. Many areas are yet to be explored, and they will unquestionably impact the way in which restoration will unfold: wind could be too strong for any tree to grow or tall structure to be erected, soil's chemistry is still to be evaluated, together with the practical feasibility of using the island for productive purposes in the near future. Another intriguing possibility is inspired by a project developed in 2023 at the Archipelago Studio, a masters of Architecture Research at the Faculty of Architecture, Landscape, and Design, University of Toronto (Archipelago Studio, 2023). In his project, Will Banks proposes the creation of a research centre within the National Marine Conservation Area spanning the western shores of James Bay and southwestern Hudson Bay to protect the Hudson Bay Lowlands, Canada, the world's third largest wetland (Archipelago Studio, 2023). The centre would serve Indigenous knowledge keepers, scientists, and advocates working in the region through an approach that combines Local Ecological

Knowledge with natural and applied sciences for comprehensive study and stewardship (Archipelago Studio, 2023). Given the conceptual resemblances with the case study of the Aegean Islet Conservation Program and the existence of buildings in Anthropofas, developing the islet as a base for research and monitoring of the surrounding ecosystems appears to be an intriguing possibility. However, as for other declinations of the project, only time and future advancements will tell more about the space for turning ideas into reality.

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APPENDIX A: Aegean Islet Conservation Program project proposal

AEGEAN ISLET CONSERVATION PROGRAM
Archipelagos Institute for Marine Conservation
John H. Daniels Faculty of Architecture, Landscape, and Design

The Aegean Islet Conservation Project is a pilot research and conservation initiative establishing protocols and best practices for reversing the pervasive desertification of coastal areas in the East Mediterranean.

The project brings together two institutions – the Archipelagos Institute of Marine Conservation and the John H. Daniels Faculty of Architecture, Landscape, and Design at the University of Toronto– along with local and international experts and stewards of the East Aegean. It will set up a framework for the rehabilitation, restoration, and sustainable conservation of Islets across the Aegean Sea (and an alternative to tourism). It will also test this framework through an applied restoration, conservation and design project on a specific islet within the Fournoi Korseon island complex.

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The Aegean Islets form bio-diverse, unique and historically significant land and marine systems. Among 1,188 uninhabited islets across the Aegean Archipelago, 135 are located in the East Aegean – South of Icaria and Samos, North of Kos, among the islands of Fournoi, Patmos, Leipsoi, Leros and Kalymnos to the West and the Turkish coastline to the East.

Flanked by some major islands to the West and densely populated coastal areas to the East – all regional hubs of agricultural production and global tourism – these smaller islets are key ecological and cultural hotspots. They nurture networks of biodiversity, at the junction of a continental shelf with a deep sea trench, and define an inter-continental transit zone of geo-political and -ecological significance: a meeting point of species and civilizations for thousands of years forming one of the world's most unique cultural landscapes.

Most Aegean have been undergoing significant, and often definitive transformations over the past decades. A shift in local economies from harvesting and production to seasonal over-tourism and industrial fishing, the impacts of a continuing economic crisis, misapplied top-down economic policies, unsustainable herding practices, a lack of public environmental policy, have resulted in the decline and disappearance of the human stewardship of these systems. Their

soil, water table and landscapes have been extensively damaged and are constantly degrading. Atmospheric warming and drought exacerbate this decline to a point of no return (if unmanaged), resulting to widespread desertification. This, in tandem with environmental degradation of their marine ecosystems, transforms these diverse habitats into 'deserted rock islets.' A documented, fundamental cause for this decline is the unregulated, top-down distribution of EU-funds aimed at boosting local farming. Subsidies of €20 Euro per animal result in the dumping of large herds of goats on these islets with no management of their population growth (after subsidies are disbursed). Animals overgraze across the sparce land surface and shrub volume of the islets causing the loss of water retention, surface erosion, and ultimately catastrophic decline.

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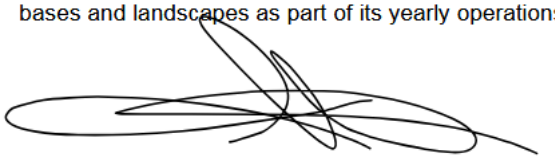
The 135 East Aegean islets share a rich history as wildlife sanctuaries, small farms, outposts, shelters and navigation stations. Material remains and seasonal traces of this history are visible on many of the islets; local knowledge and oral histories are also available among the nearby islands' aging population. These histories provide evidence of a sustainable recent past where these systems flourished via human management – small scale, high impact stewardship. They stand in absolute contrast with the islets' present state.

Desertification, pervasive across all East Mediterranean coastal regions, is thus particularly visible and tangible within the East Aegean.

Local communities in the islands of Samos, Patmos, Fournoi and Astypalaia share strong bonds. They have been practicing traditional sustainable practices of farming and fishing across the East Aegean, participating in crisis management while also retaining historical and traditional cultural and ecological knowledge and participating in their renewal. The Archipelagos Institute, active in the area over the past 30 years, has built extensive networks of collaboration with local authorities, organizations, and individuals practicing conservation, research and monitoring activities across the sea and land, educating and collaborating with more than 20,000 international students, interns, and researchers in these processes. The Institute has also constructed and renovated multiple infrastructures, research facilities and bases and landscapes as part of its yearly operations.



The network of East Aegean islets exists in relative proximity and is navigable, while touristic and industrial development remain relatively mild in comparison with other Aegean regions. This activity, coupled with the islets broader geoecological importance allows its biodiversity to remain relatively rich. The islets' international visibility and cultural significance are also stille evident.

These historical, environmental, social and resource-specific factors provide the ideal setup for an applied, integrated rehabilitation, restoration, and sustainable conservation project in the area. The Aegean Islet constitutes the most basic spatial and ecological unit for the inception of an innovative anti-desertification process.

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The Aegean Islet Conservation Project will establish frameworks for the integrated landscape recovery and restoration, anti-erosion and water retention, infrastructural renewal, rehabilitation, adaptive reuse of vernacular architecture, sustainable stewardship, conservation and resource management. These will operate both at a research and design phase, producing documents and best-practice protocols applicable across the Aegean and East Mediterranean. The project will develop an applied project phase, implementing the physical restoration and conservation of a single Islet as a pilot. This will be a collaborative, phased implementation of soil restoration and planting, stone terrace and small shelter reconstruction, water retention infrastructure building and eventually the establishment of an active research base, monitoring the islet and its marine habitats, dedicated to the sustainable puruit of anti-desertification, conservation, and rejuvenation strategies for the greater Aegean islet systems.

The design project will have an experimental approach and interface architectural and landscape design, digital documentation, fabrication and traditional building technologies; marine, environmental and social science; fisheries and forestry conservation; ethnography, history and archaeology, and the documentation and recording of available local knowledge (Informations from other islanders about a)agriculture, seed collection (create a seed bank!), local varieties b)local ecology c) water collection.The design phase of the project will provide a series of sustainable, low-footprint landscape, infrastructural, and building restoration and construction techniques, drawing from traditional / vernacular but also state-of-the-art practices,

working with local and locally sourced materials and ecological knowledge. These will include stone construction, rammed earth, fog and water collection techniques, the replanting of local shrubs and species and the recultivation of anhydrous and alophyte varieties, tamaric tree (which loves salty water).

After consultations and discussions with the mayor and municipality of Fournoi Korseon, an islet has been identified at the South East of this greater island complex: Megas Anthropofagos. Measuring 543 km2 (c. 136 acres), this islet features a protected harbor, built structures and stone walls, cisterns and remains of local farming activities. It is less than 8 nautical miles away from the nearest major port and 2.7 n.m. from the nearest protected cove of Fournoi. The islet is also situated at a key point among marine areas of great ecological interest, unique to the entire Mediterranean.

The Aegean Islet Conservation project will consist of the following phases and operations:

PHASE 1: Documentation, Agreements, Funding, Preparation
March – October 2025
1A. *04-06/2025* Preparation, Team Building, Agreements & Documentation
1B. *04-06/2025* Preliminary Research, Best Practices, Literature Reviews
1C. *06-10/2025* Documentation & Design
1D. *04-10/2025* First Field Visits

PHASE 2: Presentations, Protocols, Field Work
September 2025 – June 2026
2A. *09-12/2025* Equipment Deployment
2B. *10/2025 – 1/2026* Final Design, Presentations, Field & Best Practice Manual
2C. *11/2025-4/2026* Planting & Basic Infrastructure
2D. *03-06/2026* Workshops

PHASE 3: Construction, Major Conference
June – November 2026

3A. *06-08.2026* Infrastructure construction

3B. *08-11.2026* Building Construction, Planting & Harvest

3C. *11.2026* International Conference

3D. *11.2026-5.2027* Monitoring, Adaptation

3E. *3.2027* Research Station Inauguration

Archipelagos Institute Team:

Thodoris Tsimpidis, Director
Anastasia Miliou, Scientific Director
Vassilis Tsamadou

Lorenzo Bragagnolo Carlon
+2 Researchers
Cassie Pistun
Clare Pontefract
+1 Intern

U of T Daniels Team:

Petros Babasikas, Architect, Professor of Architecture
Fadi Massoud, Professor of Landscape Architecture, Director CLD
Danijela Puric-Mladenovic, Professor of Forestry Conservation

Hadi El-Shayed, Landscape Architect
+2 Researchers

Scientific Team:

Faidon Moudopoulos, Archaeologist
Boulouki, Traditional Restoration Collective
+ Geologist

Partners:

Municipality of Fournoi
Regional Government of East Aegean
+ Farmers

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PHASE 1: Documentation, Agreements, Funding, Preparation

March – October 2025

1A. *04-06/2025* Preparation, Team Building, Agreements & Documentation

The Archipelagos Team will proceed with negotiations and putting together agreements for the release and long-term use of Anthropofagos Islet with the Municipality of Fournoi, while establishing communications and other agreements with individuals and stakeholders. The Daniels Team will confirm participation of all project collaborators and coordinate schedules and availability. Both institutions will prepare funding applications.

1B. *04-06/2025* Preliminary Research, Best Practices, Literature Reviews

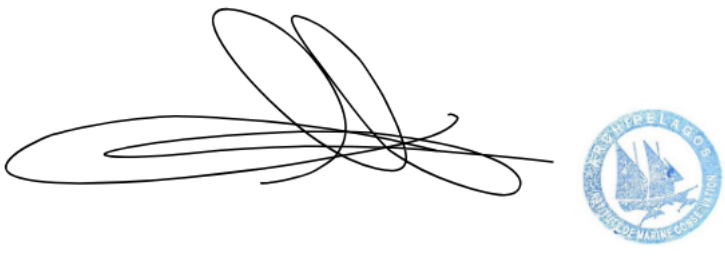
A joint research team will investigate and document anti-desertification and recovery practices in similar environments, water harvesting techniques (both traditional and contemporary), landscape architecture strategies, soil and shrub restoration, vernacular architecture & building science, and gather oral histories and accounts on the East Aegean islets. The team will also research relevant policy aspects

1C. *06-10/2025* Documentation & Design

A design team, integrated with the research team, will survey, document and produce accurate topographic, landscape, and building drawings of the island and its nearby marine environments. It will embark in a preliminary design phase for the development of a basic footing on the island and the development of the research base. The design team will work on producing drawings, visuals, a field and conservation manual and a design manual for future actions.

1D. *04-10/2025* First Field Visits

Field visits to the islet will commence for surveys and documentations.



APPENDIX B: Participatory Methods Guide

Methodology	Definition	Participants	Time Required
5 Bold Steps	Method that identifies five crucial actions needed to achieve a significant goal or transformation.	5-12 decision-makers and implementers	2-4 hours
6 Thinking Hats	Edward de Bono's method that uses six different coloured "hats" to represent different thinking perspectives (facts, emotions, caution, optimism, creativity, process).	5-10 participants	1-3 hours
A/B Testing (Technologies or Plants)	Controlled experiment comparing two versions of technologies, plant varieties, or interventions to determine which performs better under similar conditions.	Researchers + variable number of participants	Several weeks to months for meaningful results
Activities Canvas	Visual tool for mapping and organizing activities, resources, and timelines in a structured format to support project planning and execution.	Not specified	Not specified
Align on your Impact Goals	This method helps to think carefully about the impacts that want to be achieved. It allows to distinguish between long-term and short-term objectives, while giving transparency to the goals of each stakeholder.	Not specified	1 hour
Ambition Setting	Collaborative process for defining and agreeing on ambitious but achievable goals.	Not specified	2-4 hours

Methodology	Definition	Participants	Time Required
Appraisal Interviews	Structured conversations with stakeholders to gather qualitative feedback, insights, and evaluation of project processes and outcomes.	Interviewers + 1 interviewee per session	45-90 minutes per interview
Assumption Mapper	Tool for identifying, documenting, and testing key assumptions underlying a project or strategy to reduce risks and improve decision-making.	Not specified	1 hour
Awareness Sheets	Information materials designed to raise awareness about specific issues, solutions, or project components among target audiences.	Not specified	4-8 hours to develop
Brainstorming	Creative problem-solving technique where participants generate as many ideas as possible without initial judgment or criticism.	Not specified	1-2 hours
Brainwriting	A written version of brainstorming in which participants note down ideas individually before sharing, allowing for more equal participation and diverse input.	Not specified	1-2 hours
Briefing Workshop	Working sessions used to develop a project agenda. They are great to get people involved, while aiming at setting an agenda.	9-24 people split in smaller groups led by facilitators	1-2 hours
Bright Stars	Method focusing on identifying and analysing successful examples, best practices, or positive deviants within a system.	6-15 participants	1-3 hours

Methodology	Definition	Participants	Time Required
Choice Catalogues	People make individual/collective design choices based on a catalogue of different options.	Not specified	Not specified
Co-creation Assemblies	Large-scale events that bring together diverse stakeholders to collaboratively generate ideas, solutions, and strategies for addressing common challenges.	Ideally all stakeholders	4-8 hours per day
Collaborative Pilot Schedule	A structured timeline and planning tool for coordinating multiple stakeholders in pilot project implementation, ensuring synchronized activities across different phases.	Key stakeholders and facilitators	2-4 hours for initial development
Commons Mapping	A participatory method to identify, map and analyse shared resources, spaces, and assets that belong to or benefit the collective community.	Not specified	2-3 hours
Community Canvas	Visual framework for mapping community ecosystem including stakeholders, resources, challenges, opportunities, and relationships.	Not specified	2-4 hours
Community Design Centre	Community design centres are places where communities can get technical help to plan and manage their environment. They are the environmental equivalent of health centres and are invaluable for helping local people design and implement environmental projects.	Not specified	Not specified

Methodology	Definition	Participants	Time Required
Community Engagement Studios	A moderator facilitates a discussion intended to include contributions able to challenge or refine existing research designs with local and object-specific inputs.	Not specified	2 hours
Community Level Indicators	Metrics and measurement tools that track progress and impact at the community scale, often including social, environmental, and economic dimensions.	Facilitators, data collectors and stakeholders' representatives	4-8 hours (Setup)
Community Planning Forum	Open events that last multiple hours where people are encouraged to interact and discuss, draw and think about different topics, which can be pre-selected or agreed during the forum.	30-150 people (with specific key roles that must be present)	3+ hours
Community Profiling	Creating a picture of local nature, needs and resources of a community with the participation of that community. It is useful to establish a context which is widely agreed. Different methodologies can be deployed.	Not specified	Not specified
Concept Mapping Methodology	Technique that combines qualitative and quantitative data collection instruments to create a data-driven depiction of group ideas.	Not specified	Not specified
Critical Friend	Role-based methodology where an external or internal person provides feedback and challenges assumptions in relation to a specific initiative.	Not specified	One hour for a 'short format', one day for a 'long format'

Methodology	Definition	Participants	Time Required
Data Dashboards	Visual interface that displays key metrics, indicators, and real-time data relevant to project monitoring and decision-making.	Data analysts and stakeholders	Not specified
Deliberative Democratic Forum (DDF)	Procedures for conducting a DDF include several key steps such as framing sessions, facilitated forums (including deliberation), and identifying actions. Participants can reach a consensus on which topic bears the most importance.	Not specified	Multiple forums lasting 1-2 hours each
Delphi	Delphi involves an iterative survey of experts. Each participant completes a questionnaire and is then given feedback on the whole set of responses. With this information in hand, they then fill in the questionnaire again, this time providing explanations for any views they hold that were significantly divergent from other viewpoints. The explanations serve as useful intelligence for others. Participants may change their opinions based upon evaluation of new information provided by others. This process is repeated as many times as is useful. The idea is that the entire group can weigh dissenting views that are based on privileged or rare information.	Not specified	Multiple moments over different days
Design Games	Starting from a base map of a site, participants can interact with the map by adding elements, designing sketches and explaining their inputs.	Not specified	Not specified

Methodology	Definition	Participants	Time Required
Design Project Scoping Guide	The Project Scoping Guide provides five elements for framing a challenge. These encourage to think about stakeholders, context, purpose and core aspects. The templates leave room to expand the challenge and add new information collaboratively.	Not specified	Not specified
Design Thinking (Empathise-Define-Ideate-Prototype-Test)	Human-centred design methodology that follows five phases: understanding users (Empathise), defining problems (Define), generating ideas (Ideate), building prototypes (Prototype), and testing solutions (Test) to develop innovative solutions.	Not specified	Not specified
Dotmocracy	Decision-making tool where participants vote on options using coloured dots to prioritize ideas or choices visually and collectively.	Ideally all those involved in the project	20 minutes
Empathy Timeline	This method involves asking community members to think about the complexities of the issue at hand. Community members can become aware of their own subjective viewpoints on environmental problems, as this approach allows participants to think about their own personal perceptions.	All stakeholders	Less than 1 hour
Expert Panel	The main task of an expert panel is usually synthesising a variety of inputs to produce a report that provides a vision and/or recommendations for future	Not specified	Multiple sessions (1-2 hours each) over different days

Methodology	Definition	Participants	Time Required
	possibilities and needs for the topics under analysis.		
Focus Group	A facilitated discussion arises around a list of topics that give it a direction, albeit without prohibiting spontaneous topic changes.	1-100 participants	2-4 hours
Focus Groups	Structured group discussions with selected participants to gather qualitative insights, opinions, and feedback on specific topics or concepts.	6-12 participants and facilitators	1-2 hours
Future Newspaper	Exercise where participants write fictious newspaper articles from a future date, describing successful outcomes and impacts of current initiatives.	All participants	2 hours
Future Search Conference	An approach based on 5 phases: 1) identification and discussion of desirable and probable trends; 2) analysis of relevant trends and how they can affect the project; 3) projections of how this will evolve based on the trends; 4) future design of the project; and 5) generation of strategies to reach this design.	64 as an optimal number of participants (8 groups of 8 people)	2-3 days
Geographical Mapping	Spatial visualization technique to map physical locations, boundaries, and geographical features relevant to the project area or community.	Not specified number of participants with local knowledge	1.5-3 hours
GIS Mapping	Use of GIS tools for geographic mapping.	Not specified	Not specified

Methodology	Definition	Participants	Time Required
Group Level Assessment (GLA)	A collaborative technique to generate data and plan actions. It usually uses 7 flexible steps. 1) Climate Setting; 2) Generating; 3) Appreciating; 4) Reflecting; 5) Understanding; 6) Selecting; and 7) Action.	Not specified	Not specified
I Like. I Wish. What If.	Simple feedback framework that structures responses into three categories: positive aspects (I like), desired improvements (I wish), and creative possibilities (What if).	Any number (individual or group activity)	1 hour
Idea Card	Structured format for capturing, documenting, and organizing creative ideas generated during brainstorming or innovation sessions.	Any number (individual or group activity)	15-30 minutes per idea
Interview Guide	Protocol with predetermined questions and prompts to ensure coverage of topics during interviews.	Interviewers and interviewee	Not specified
Ishikawa Diagram	Root cause analysis tool that systematically identifies potential causes of a problem by organizing them into categories.	Multiple team members with relevant expertise	1-2 hours
Lego Serious Play	Facilitated thinking methodology using LEGO bricks to enhance innovation and business performance by building 3D models to express thoughts and ideas.	Not specified	Less than 1 hour
Listening Levels	Framework for understanding different depths of listening, from internal listening	1-10 participants	Less than 1 hour

Methodology	Definition	Participants	Time Required
	to empathetic and generative listening, to improve communication quality.		
Lottery Game	Gamified decision-making or prioritization method where participants use chance elements to explore different scenarios or resource allocation options.	8-20 participants	1-2 hours
Mental Mapping	Individual or group exercise to visualize and map cognitive perceptions, mental models, and emotional connections to spaces or concepts.	5-20 participants	30-60 minutes per person
Microplanning Workshop	Communities and experts work through a sequence of planned activities to creating data at the basis of future initiatives. The workshop can be repeated cyclically to monitor progress.	Not specified number of stakeholders, external experts, facilitators	Several days
PAME (Participatory Assessment, Monitoring and Evaluation)	An evaluation method that allows participants to share control on: deciding what is to be evaluated; choosing methods and data for it; realizing the evaluation; presenting its results.	Director, moderator, researchers, administrative roles and stakeholders	Several days
Participatory Back casting	Future-oriented planning method that starts with a desired future scenario and works backward to identify the steps needed to achieve it.	5-10 participants	1-2 hours
Participatory Mapping	Collaborative mapping process where community members actively contribute their local knowledge to create maps that	10-30 community members	2-4 hours

Methodology	Definition	Participants	Time Required
	reflect their understanding of place, resources, and issues.		
Partnership Evaluation	Evaluation of partnership functioning and ability to meet objectives. Works through models that consider: contexts, group dynamics, research and intervention designs, outcomes. Criteria of evaluation can be of economic, cultural, social, historical nature.	Not specified	Not specified
Pattern Finding	Method useful to identify recurring themes, trends, or structures within data, observations, or experiences.	6-12 stakeholders and analysts	4-12 hours
Peers observing peers	Using key members of the community as researchers helps you retrieve more information than you will manage on your own. Valued members have prestige and trust. Moreover, it can also resolve cultural issues if, for example, a woman is not allowed to be interviewed by a man or if it is about sensitive topics.	Not specified	2-4 hours
People Shadowing	Researchers follow and observe individuals in their natural environment to understand behaviours, routines, and interactions.	Researchers and subjects being observed	2-8 hours per observation session
Photojournal	Method where participants use photography to capture and reflect on their experiences, environments, or perspectives over time.	All stakeholders	2-7 days

Methodology	Definition	Participants	Time Required
Pilot Appraisal	Systematic evaluation of pilot project outcomes, processes, and lessons learned to inform scaling and future implementation.	4-12 evaluators and stakeholders	4-8 hours for session, weeks for full analysis
Power/Interest Mapping	Tool that plots stakeholders on a matrix based on their level of power/influence and interest in the project outcomes.	4-12 project team members and key stakeholders	1-2 hours
Problem Framing Canvas	Visual tool for defining and structuring problems clearly, including context, stakeholders, constraints, and success criteria.	Not specified	1-2 hours
Process Planning Session	A facilitator will present various planning options, which will be evaluated by a group of stakeholders as diverse as possible.	16-20 participants, although larger numbers are fine.	2-4 hours
Questionnaires	Data collection instruments with predetermined questions to gather standardized information from respondents.	Not specified	10-30 minutes per questionnaire
Reconnaissance Trip	Inspection of the target area by both experts and locals. Useful to get acquainted with the physical context while stimulating on-site reflections.	Not specified	Not specified
Recruitment	Systematic process for identifying, engaging, and enrolling participants for studies, pilots, or community initiatives.	2-5 recruitment team members, variable target participants	Length depending on the number of participants (+ 1 week)

Methodology	Definition	Participants	Time Required
Ripple Effects Mapping (REM)	A retrospective, qualitative evaluation approach that brings together project stakeholders to map the chain of effects of a program or collaboration.	Not specified	Not specified
Risk Assessment	Risk assessment involves analysing threats (or 'hazards') facing a community. It should ideally be used in all planning – since most communities face some kind of threat.	Not specified	Not specified
Road mapping	Planning tool that visualizes the path from current state to desired future state, including milestones, dependencies, and timelines.	4-15 planners and stakeholders	4-8 hours (may span multiple sessions)
Role Storming	Technique where participants adopt different roles or personas to generate ideas from various perspectives.	1-10 participants	1 hour
Round Table	Structured discussion format where participants sit in a circle to promote equal participation and open dialogue on specific topics.	All the stakeholders involved	1-2 hours
Sensing Guides	Structured protocols or frameworks for observing, measuring, and documenting changes or responses in the environment or community.	Not specified	Ongoing monitoring
SOAR Analysis	Tool focusing on Strengths, Opportunities, Aspirations, and Results to create a positive, future-oriented perspective.	5-10 participants	1-3 days

Methodology	Definition	Participants	Time Required
Stakeholder Journey	Mapping exercise that traces the experience and touchpoints of different stakeholders as they interact with a project, service, or system over time.	Stakeholder representatives and facilitator/s	2-4 hours
Storylines	Narrative method that creates compelling stories to communicate experiences, impacts, or scenarios in an engaging and memorable way.	Not specified	3-6 hours
Strategic Canvas	Visual framework for mapping strategic elements including goals, resources, constraints, and pathways to guide strategic planning and decision-making.	1-10 participants	1-2 hours
SWOT Workshops	Structured analysis sessions examining Strengths, Weaknesses, Opportunities, and Threats related to a project, organization, or initiative.	6-15 relevant stakeholders	2-3 hours
The Actors Map	Visual representation of all stakeholders involved in or affected by a project, showing their relationships, roles, and levels of influence.	4-12 participants with appropriate stakeholder knowledge	1.5-2.5 hours
Training the Next Generation	Knowledge transfer and capacity building activities designed to ensure continuity and spread of skills, knowledge, and approaches.	3-8 trainers, 10-25 trainees	4-40 hours depending on scope
Transect Walk	Walk through an area with community members to observe, discuss, and document conditions, resources, and issues along a predetermined route.	5-15 community members and facilitators	2-4 hours

Methodology	Definition	Participants	Time Required
Usability Testing on Piece of Land	Evaluation of how well a physical space, installation, or intervention meets user needs and expectations in real conditions.	5-15 test users 2-4 observers	2-4 hours per test session
User Personas	Fictional characters created based on research to represent different user types and their needs, behaviours, and goals.	1-10 participants	1 hour
Vision Development	Participatory process for creating a shared, inspiring picture of the desired future state that guides strategy and action.	8-25 diverse stakeholders	3-6 hours
World Café	Conversational process that fosters collaborative dialogue and knowledge sharing through multiple rounds of small group discussions.	30+ participants	2-4 hours per each session

Templates, examples and more detailed designs can be found in the sources used to create this Participatory Methods list (CommuniCity, 2024, Duea et al., 2022, Institute for Housing and Urban Development Studies, n.d., Slocum-Bradley, 2003, *UNaLAB Toolkit*, n.d. and Wates, 2014)

APPENDIX C – Full transcripts of interviews with Periklis Koxilas (14th of May 2025) and Thodoris Tsimpidis (22nd of May 2025)

The interviews were transcribed using simplified transcription rules based on Dresing and Pehl (2018), adapted for English language. The interviews do not strictly follow an interview-guide and can rather be seen as lose and semi-structured.

Date of Interview: 14th of May 2025
Place: Kampos, Samos, Greece.
Interviewers (I): Liv Lehmann, Lorenzo Bragagnolo Carlon, Silvie Kalkman (Archipelagos Institute of Marine Conservation).
Interview partner (IP): Periklis Koxilas, captain of a research boat, originally from Ikaria, currently living between Kampos and Agios Minas, an islet in Fourni (male, 69).

Talk before recording: *we greeted each other and (I) asked if it was okay to record him and use the recording for the work of Archipelagos. He agreed and the recording started.*

I: Wait, I have to look for questions. I have some here. Oh, perfect. We don't know much about the island and the archipelago as a whole, right? So, maybe first, how would you describe the condition of the soil on your island? Yeah, so we thought, because you have this house at the other island, right? I don't remember the name. Yes. And we were wondering what type of soil you think, what was the question? Yeah, the condition of the soil. Did you prepare it maybe, or how is this?
IP: In my island?
I: Yeah, in the area where you are living. Agios Minas and surroundings.
IP: Okay. First, my island. I had developed a fish farm over there. Some years ago. Now, I gave that up around 10 years ago. In total I have spent there 30 years of my life. Life there is not so easy. It's very difficult. It's a matter of money, but the main problem is the weather. Yeah, we have very strong wind in the winter. Very, very strong. The place, yeah. It's like funny. You know what's funny? Funny. You know what I mean?.
I: Come on, come on, describe that please. What do you mean with funny?
IP: What you use to put water in some bottle. You get me?
I: Ah, yeah, yeah, a funnel. Not funny, a funnel. Ok, now I think we get you

IP: Yeah, ok- it's just like that. You get all the wind, you see. It's open sea from the North side. And then, with this geography the wind becomes even stronger. It makes it faster. Sometimes, we have something like 130 kilometres per hour. It's too much. That is very hard. This is mostly during the summer. The wind from the North, we call it Meltemi… Yeah, yeah. All the summer time, maybe from the end of May, it will be windy. So, life there is it's not so easy. Also, on the upper part of the island, there is goats, a lot of goats. Much more than what should be. Too much for the island.

I: This is all about Agios Minas or also Anthropofas?

IP: No, I was speaking about Agios Minas. But yes, the same basically goes on in Anthropofas. Yeah. They (the goats) eat everything. There is some plants there. I'd say quite a lot of plants given the goats. They are different from those in Agios Minas, I think. But I'm no specialist. I don't know. I'm no specialist. But there is different plants. Years ago someone was working there, without making much I think. But he was getting some money from things grown in the island. Like to make salad, or thyme plants. Oh, there are also rabbits there. Rabbits, a lot of them.

I: Really?

IP: Yeah. A lot.

I: And mice, as well? Mouse?

IP: I don't know in Anthropofas, but in Agios Minas, yes.

I: Okay, okay.

IP: But no rabbits in Agios Minas.

I: Ah, no rabbits. But in Anthropofas, yes.

IP: They brought them from the other island, from Lipsi. Carnivorous. They can kill other animals I think. and they eat what they can find.

I: But in Anthropofas there is still goats now, right?

IP: Yes, a lot.

I: How many right now?

IP: I cannot say now exactly how many, but every year, people from Fournoi, they bring some.

I: Ah, they bring new goats every year. Ah, okay. Can we ask you how you deal with water in Agios Minas? And with that if you know how they managed that in Anhtropofas.

IP: There is some building up there in the island, in Anthropofas. There is also some tank for save water from the winter time. Maybe something like 40 cubic meters of space. Yeah. And also, one time, I was ready to go and see with my boat, but I don't know exactly how is the situation with who is the owner. Even in Agios Minas, it's a little bit confusing with who owns what. But in Anthropofas, I think everything is owned by the state.

I: I guess you mean the municipality of Fournoi. But I think it's a private. They told us that it's privately owned.

IP: No, no, that is not true. No, no, not in Anthropofas.

I: Well, Anastasia (from the Archipelagos Insitute of Marine Conservation) was telling us that they are trying to speak with the mayor, because the mayor would then speak with the owners of Anthropofas.

IP: The people there, they try to make it private. But they have maybe a lease, they rent. But the islands are connected with the state. The mayor as you said. I know this because ome years ago, some years ago I was ready to go to rent this. The island, Anthropofas. I wanted to have it, because I thought it could be some special place to make something. If I had energy, if I saved water from there. And now, with solar power, with wind power, all this is possible, we have everything.

I: But what would you make there, if you could?

IP: Me, I had plan to have, I say, one cultivation of herbs. Aromatic ones. Medicinal herbs.

I: But would it be different from your island? Is Anthropofas so different from your island?

IP: Yeah. It's drier, the island. Anthropofas is drier. Because of the wind. When I pass by, every time the weather is calm, it looks beautiful. But for than six month the weather situation there are not so good. Especially with the wind.

I: And you still think it can be a special place where you could grow stuff? You'd still think it's possible to do anything on Anthropofas?

IP: Yeah, I think, yes. All the islands, they all have some treasures. And I have some dreams. I want to show to the state and to everyone that in all these fucking, fucking islands where nobody now lives, it is instead possible to have inhabitants. Because years ago, there lived people. That was the reality. In my island, in Agios Minas, there used to be six families with I don't know how many children. They would build things, they would use the soil, they would make gardens. Now, there's me. But every island has its own face. But it's possible to live

there. And make something there. Snails, take snails as an example. There's some special species, it's so big. Even in Agios Minas, I would breed them when I was there for longer timespans, and make one or two kilos on my own. Every year.

I: Ok, have a look at this map of Anthropofas. So, these are the houses you were mentioning. Then there is a little something, like a wall, no?

IP: Yeah, it's a wall that would divide the island in two.

I: Ah, why?

IP: Because of the goats.

I: Ah, one side for the goats.

IP: Six months and six months.

I: Ah, they would alternate them.

IP: Yeah. The people from before, they were more organized. And now it's destroyed. The wall and the island.

I: But here, here there is two other buildings.

IP: It's old buildings. Old buildings, yeah.

I: Yeah, yeah, yeah.

IP: They had people living there.

I: Ah, there was, but when? Do you remember about people staying there?

IP: No, no, no, no.

I: So was it before your arrival?

IP: Yeah, yeah.

I: Do you know how many people lived there?

IP: No, that I don't know. But some did. Not many. But some were there. And also there is something there. Something like a cave.

I: Oh, maybe we'll see it on the map. The cave. Oh, yeah, we saw that (during a boat trip). Yeah. I have a picture of the cave. It's close to the shore, right? It's like a shore cave. Close to the sea. There it is, here there is one (shows one photo taken during the boat trip).

IP: No, you don't see it from the sea. It's on the upper part and you have to go down in a narrow hole. It's deep. And there is sweet water. But it's too dangerous to go there.

I: But there is sweet water then. Oh, wow.

IP: Yeah. A little bit. A little bit. Okay.

I: Did you go there?

IP: Yeah, I did..

I: Amazing. And Periklis, do you think it will be possible to, plant trees and different plants n Anthropofas? Maybe you tried even like this before in Agios Minas. Just to give an examples, do you think a fig tree could be planted there?

IP: No.

I: Why? Too rocky?

IP: The main problem is the wind.

I: The wind, okay.

IP: I think it's too strong of a wind for planting.

I: Ok, but for example do you do anything to avoid the damage that this can inflict? To your house, to the soil…

IP: I try, I have my own garden. Yeah. I have take the compost from Samos. And I try to create shelters for it.

I: Does that work normally?

IP: Not really.

I: Because of the wind?

I: But in Anthropofas there's some steepness, right? Which is why I was wondering, is there at least one of the two sides in which there would less wind? Or you think the wind just goes everywhere?

IP: The most is from North. So maybe what you say can make sense. But then only trying would give an answer.

I: If you would place a garden like the one you were describing anywhere on the island, for example, where would you place it? I know you don't really see the slopes from this picture, but...

IP: You see, I don't know. It's maybe... I'm not sure. As a first step, something needs to be done with the goats there. And then water is another matter. Wind is a problem, but also water. But there are plants that can also grow in soil with a lot of salt. And so, salt water, you know.

I: Yeah. Even fig trees can drink salt water for example. I mean, not super salty, but they can. That's why I was asking about them.

IP: Okay, and also remember that if you make something there, it's not only to make it look beautiful. You have to use it for something.

I: Yes, of course.

IP: Okay. Also, it's surely possible to grow something small, like oregano, like things like this. Maybe some spices. They are also good as a product or for someone to use them. Or thyme.

I: We were researching sea fennel actually.

IP: What? Sea fennel. Sea? Sea fennel.

(show picture)

IP: Ah yeah, it's possible. Oh. And maybe the plant of figs. I still don't know about trees, but it is true that they could make use of that water maybe.

I: Yeah, you see. Maybe trying would be worth it.

IP: It's possible to have them growing them close to the water, that yeah. I know places in Arki or Karlovasi where there is trees like that. Growing close to the water. I can bring you there maybe. Perhaps, if you take them from there then you have trees that are already used to that kind of condition.

I: Somebody will have to go and check for them then… And also tamarisk trees. Yeah? You know, tamarisk? When you go to Agios Konstantinos, there's those plants...

IP: Ah, yeah, okay, that is easy, yeah. Yeah, that is, it's no problem.

I: But do they use it here for anything specific?

IP: No, no, no.

I: Why?

IP: Only dirty things, only for the sun, to protect from the sun. Ah, it doesn't do anything. Ah, okay. It's possible they use it to protect from the sun. Maybe the wood? I don't think so…

I: Ah, even the wood is bad, okay.

IP: But it's good for maybe… The thing is that it's a plant they normally plant only to create a protection from the sun. I never heard of its wood being used a lot. But maybe you can. It's wood in the end.

I: And another thing. For water, how do you get fresh water?

IP: Fresh water, I make water. It's easy, if you have power, yeah, the water is no problem.

I: Ah, desalination?

IP: From the sea. And also it's possible, to use the water stored in the tank. But if you make some project like this, anyway, it includes the water system. To treat water. And then you need to use solar energy.

I: So, water is no real worry? If there's the means to built a desalinations system, that does it.

IP: Kind of. The problem is to find the right idea, what fits well your project. But you need more data, and the main one is related to the weather situation.

I: Do you know what fog nets are?

IP: What?

I: Liv can explain you. She's an expert.

(Liv explains how fog nets work and are built)

IP: Oh! No, no, no, you forget it. Too windy. Forget it. No, no. You think a tall metal structure can win against that wind? No, no. Sorry!

I: Okay, good to know. So tank it is. Maybe more tanks.

IP: Yes.

I: How do you catch the rainwater? Do you have pipes?

IP: We take it from the roof of the house. We have some pipes.

I: But if you live there alone, how much water do you need per day?

IP: I'd say everyone needs minimum 20 litres per day, just for a person. It's the minimum, if you use the toilet, if you use things like this, yeah. Minimum, minimum, minimum.

I: Okay. Then, but like how much food do you then eat per day? Do you have to go to a different island to get your food for, or how many days can you survive without?

IP: If you talk about for me, every time I go to Samos or to Fourni and I store stuff for maybe one, two weeks. But normally, if I'm alone, I can almost do it all on my own. I make my own bread. I fish. I get plants. I get by my way.

I: But so, is it always only you there?

IP: Yeah, now yes. My family, they come at times. I have a son and a daughter who both live in Germany.

I: Ok, understood.

IP: And about the food, Fournoi is very close. I also have a car over there. If I really need something, I'll go there.

I: Do you eat anything from your garden nowadays?

IP: Yeah, for that I try. I have tomatoes, peppers…but now I want to try growing crops under a shelter. To protect them from this sun. I also had some chickens for eggs. And there's the goats. And look, I am almost 70 and I can go 45 meters deep without oxygen. I don't need the supermarkets.

I: 45 in apnoea?

IP: Yes.

I: Damn. I wish I would be able to do that. I guess the lifestyle at the island strengthens you…

IP: Oh yeah, yes. And if you want to go there, that's my dream, to have volunteers helping around.

I: Yeah, maybe for some days, it would be wonderful. You'd teach a bunch of stuff for sure.

I: But we haven't asked you yet, were you actually born in Agios Minas? Where are you from?

IP: I'm from Ikaria originally.

I: oh, yeah, I read many articles about Icaria, and that people get so old there. Icaria is a blue zone, no?

IP: No, no, no, no, no, Icaria has changed a lot. What they say is about the past maybe…

I: What changed?

IP: Before, it was…it's a long story. When I was young, 16, 17 years old, I would go to the coffee shop, and I remember people, you know, older than 70, very strong, very strong people. And I'm very, very lucky, because I have met these people, because I have listened to many stories. But you know, they would always bring their own food around. Drink tea from plants from the island. Now that isn't there anymore. It's supermarkets and tourism. And I believe that had a big impact in how people changed too. People that live beyond 100 years old or anything like that is now a rare thing, and this lifestyle we have nowadays is the issue.

I: Hmmm, ok. It makes sense. Also, there's a lot of sensationalization about this 'Blue zone' concept. Can I ask, from Agios Minas, can you go to Fournoi without going to the port of Fournoi. Can you dock on your side?

IP: Yes I can go directly from there.

I: And then you can just walk to the town then. Ah, okay. Or you have your car. And could the same happen from Anthropofas?

IP: Yes, unless the wind makes it hard. But then it'd be hard anyway.

IP: Those places are the places where I'd like to die. Other people think I am crazy. But for me those islands are my dream. But for other people… They think I'm stupid, crazy.

I: Maybe you are a bit, but who cares, you know. Yeah. Everyone is a bit crazy, you know. I don't know. It's nice, crazy. You could say that you find crazy somebody that is sitting at a desk for 10 hours a day. If I think about it, that sounds crazy for sure. Anti evolution in a way. Ok, I stop here.

IP: That's why I cannot live in the city!

I: To each one their own.

IP: So, I don't know if I helped you or not, but...

I: Yes, yes. You really did. In the worst case, we ask you more things in the next days.

IP: Yeah. Yeah. Of course.

Date of Interview: 22.05.2025

Place: Agios Konstantinos, Samos, Greece

Interviewers (I): Liv Lehmann, Lorenzo Bragagnolo Carlon, Silvie Kalkman (Archipelagos Institute of Marine Conservation)

Interview partner (IP): Thodoris Tsimpidis, Director of the Archipelagos Institute of Marine Conservation. Translation from Greek to English realized by Dr. Anastasia Miliou.

Talk before recording: *We (I) asked if it was okay to record and use the recording for the work of Archipelagos. He agreed and the recording started.*

IP: Ok, first things first. The wall here (points to the wall on a map of Anthropofas) needs to be rebuilt as it was in the past. It separates the island. It's a type of wall that would alternate sides for animals.

I:What about the houses next to it?

IP: They should also be repaired as it used to be. Next to it there's a tank for rainwater. It should also be fixed. And look, here (points to two ruins on the map) there are some buildings, where they used to gather goats to milk them. They are also repairable. And then this building next to them, we don't know what it was. Probably a storage room. Could be used to build a stone fridge. But that needs research. It was being done in the past but who knows what specific things need to go in there…

I: We mainly wanted to ask you about trees. Periklis was saying there's too much wind for most kinds of trees. What are your thoughts?

IP: That we do not know. Look, in Lipsi we managed to revegetate quite a bit for example. We don't know what wind could or could not allow to do. Plus even it Lipsi, we tried. From cuttings even. Clearly some worked, some did not.

I: And how many survived?

IP: Honestly, almost 90%. Especially those that were left with a lot of water around. Not necessarily soil, just stone and seawater.

I: With Periklis we were also speaking about fig trees, making similar considerations

IP: Yeah, maybe. It's the same process. As in, what we did in Lipsi was done with tamarisks for the most, as you know.

I: Yes. Indeed with Periklis we had been speaking about them too.

IP: Ah, good. Look, what I would do would be to plant Tamarisks all around the island, and then create an inner layer of cistus, like one you can find in Lipsi or Ikaria. In this way you use plants that are known to survive in this kind of environment, and then you start fighting soil erosion. Then the inner areas of the island can start hosting other kinds of flora. You know, tamarisks grow fast, have deep roots, they are great against erosion. It's a proper hardcore plant.

I: Do you think that people could live in Anthropofas?

IP: No, no way. It's not something I see as thinkable. Maybe in the longer run.

I: On the map we can see that some areas are actually greener than others. Any clue on why?

IP: No, not really. Just another thing about tamarisks. They are easy to cut, and then they sprout again. So at a late stage of growth wood can be easily used for construction, without harming the roots. But now I am speaking about a far future…