

MEDITERRANEAN BASTARDS

Pietro Bernardini

Pietro Bernardini
6316506

Delft University of Technology
Faculty of Architecture and the Built Environment
Master of Science Architecture, Urbanism, and Building Sciences
Department of Urbanism

Urbanism Graduation Studio
2025/2026

A4

Cluster:
Critical Environments: Rights of Nature

Mentors:
Luisa Maria Calabrese
Diego Sepulveda Carmona

MEDITERRANEAN BASTARDS
A Biopolitical Project for a Tropicalising Sea

All images, diagrams, and graphics are created by the author,
unless stated otherwise. Sources for additional data are
mentioned at the end of the report

Abstract

Climate change is transforming the Mediterranean Sea, pushing it toward increasingly tropical conditions. This process entails challenges and risks whose intrinsic complexity spans natural and cultural dimensions, as well as the lives of human and more-than-human inhabitants. It raises questions about forms of cooperation and inclusive politics that have yet to be established.

Starting from a working hypothesis that recognises Mediterranean eco-regions as biopolitical subjects, this thesis first seeks to understand the Adriatic eco-region as an entity - mapping its body through the combined lens of its biophysical and cultural dimensions, identifying five operative transects, the Bastards, and understanding the risks brought by tropicalisation to them.

Using the Adriatic eco-region and the Po/North Adriatic transect as a laboratory, the research proposes Padania Tropicale - a transformative framework that envisions pathways of co-evolutionary transformation alongside the new conditions brought by climate change, rather than the protection of a "natural" order oriented exclusively toward human productive activities.

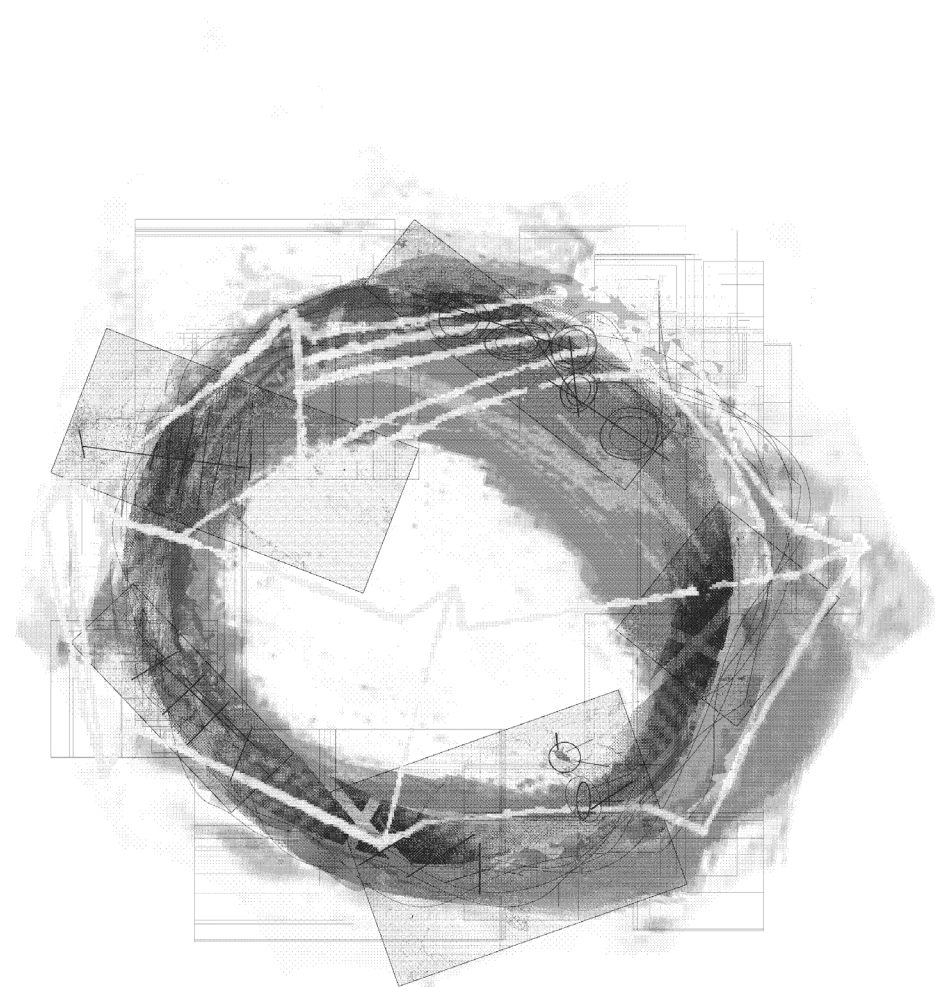
The thesis concludes with a methodological reflection on the biopolitical dimension of spatial planning, exploring how eco-regions and transects can operate as devices for spatialising the Rights of Nature and for building governance frameworks grounded in a co-evolutionary stewardship between humans and nature. A reflection that is still open by necessity, but sincere in its ambition to seed further research and design at the scale of the Mediterranean basin.

Personal Motivation

The thesis originates from an interest in Mediterranean aquatic and coastal territories as both a field of study and design, and from the desire to contribute through a design exploration to the definition of alternative pathways for the planning of mare nostrum. At the core of the project, beyond a personal and emotional attachment to the Mediterranean sea and coastlines, lies an understanding of the extreme complexity and fragility of its ecosystems, as well as a recognition of their deep interconnection and interdependence. These aspects are still insufficiently acknowledged and addressed by the multiple governance and planning bodies responsible for the Mediterranean Sea, which are fragmented along institutional and national boundaries, unable to cooperate, and often incapable of grasping the scale and complexity of the challenges posed by climate change.

The research emerges precisely from the recognition of this paradox and from an awareness of the need for a paradigm shift in the practices and processes through which we inhabit and manage the Mediterranean Sea. It aims to propose an alternative model of territorial governance, with the ambition of demonstrating - through a design exploration - more conscious possibilities and transformative pathways for Mediterranean territories in transition.

During the research phase, thanks to the stimuli provided by the members of the study cluster, my focus shifted towards post-humanist readings and design practices that approach space not only in its biophysical dimension, but also in its political one. This perspective not only provided a solid theoretical foundation for the development of the project, but also fostered both my growth as a designer and the evolution of the project itself. It is my hope that this work will position itself as a meaningful design exploration within the broader debate that advocates for a non-anthropocentric approach to urbanism.



Positioning / On the Bastards

Two moments determined the choice of the thesis title and the narrative thread to which the project is tied. The first occurred during a meeting on design/depletion in the Orange Hall, at the closing intervention of Erik Swyngedouw - a fierce and effervescent Belgian geographer and economist. Following multiple presentations on how and why to design in/with depletion, this hot-headed and energetic professor exclaimed, with a marked British accent, “soil doesn’t give a fuck about design”, generating commotion and interest among speakers and drowsy listeners alike. He then continued by underlining the necessity of abandoning an inevitably human-centric approach to design and of creating “Bastard Soil” - dirty, natural and truly resilient. The very next day I found myself in Italy on a regional train crossing the Po/North Adriatic transect, on my way home for the Easter holidays. To fight the atavic boredom of the journey, I watched a conference published online by Harvard GSD, titled “Bangkok Bastards”, in which architect Chatpong Chuenrudeemol presents his research and design experience in Thailand and his study of the concept of bastard architecture - an architecture born of practices, knowledge, tendencies, ingenuity and laziness; made of bamboo, ropes and plastic chairs, slotted together and into their context, a true and honest expression of the genius loci. These two lessons remained beneath the surface for several months, until the choice of the thesis title and the recognition of my Bastards. Beyond being a simple provocation and narrative device, I believe the concept of bastard urbanism is useful for summarising the three main insights that emerge from the design process and the R&D journey. These connect to the two interventions mentioned above and to a personal reflection on the methodologies of urbanism.

The more I study, research and design, the more I am convinced that we need a bastard urbanism - or at least a more bastard one. A design that bastardises landscape, soil and water, rather than standardising and regimented them (I). A design that is truly capable of listening to and recognising the needs of the Bastards that inhabit it, and that knows how to valorise the richness of their spatial and material practices of co-existence with nature (II). And finally, I am convinced that we need a bastard, hybrid urbanism, open to exchange with other disciplines. A design that stops norming and regulating, but instead enables care and stewardship. Hybrid, fluid, bastard projects and visions that contrast - in both form and content - the twentieth-century masterplans and planning documents. That recognise the inextricability of the urban and spatial problem, and that stay with the trouble without providing rigid, simplistic and often ineffective “solutions” (III).

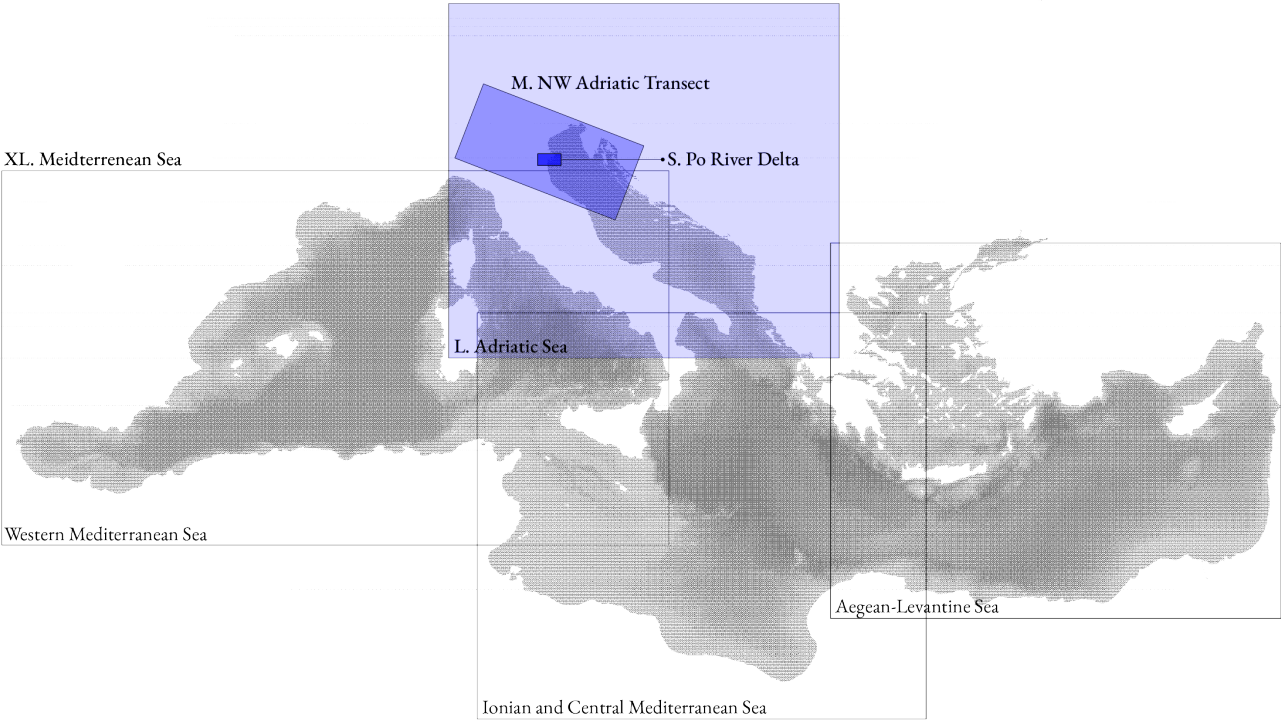
Methodological Approach

Although, like any research and design process, the path leading to this thesis was not entirely linear, it followed a relatively coherent and cumulative arc - free of major interruptions or unexpected detours. After the selection of the case study, the main efforts were directed toward the collection of spatial data specific to the Mediterranean area, the impacts of the climate crisis, the production of initial maps, and the understanding of existing planning instruments. In parallel, attention was devoted to the critical reading of scientific literature related to the topic, with particular interest in writings addressing the Rights of Nature and post-humanist approaches to design and planning. The integration of these two strands led to the formulation of two problem statements - one related to the biophysical dimension of the issue and the other to its political dimension - which culminated in the main, biopolitical problem statement. This provides the foundation for the development of an exploratory design phase and for the definition of the main research question and its related sub-questions.

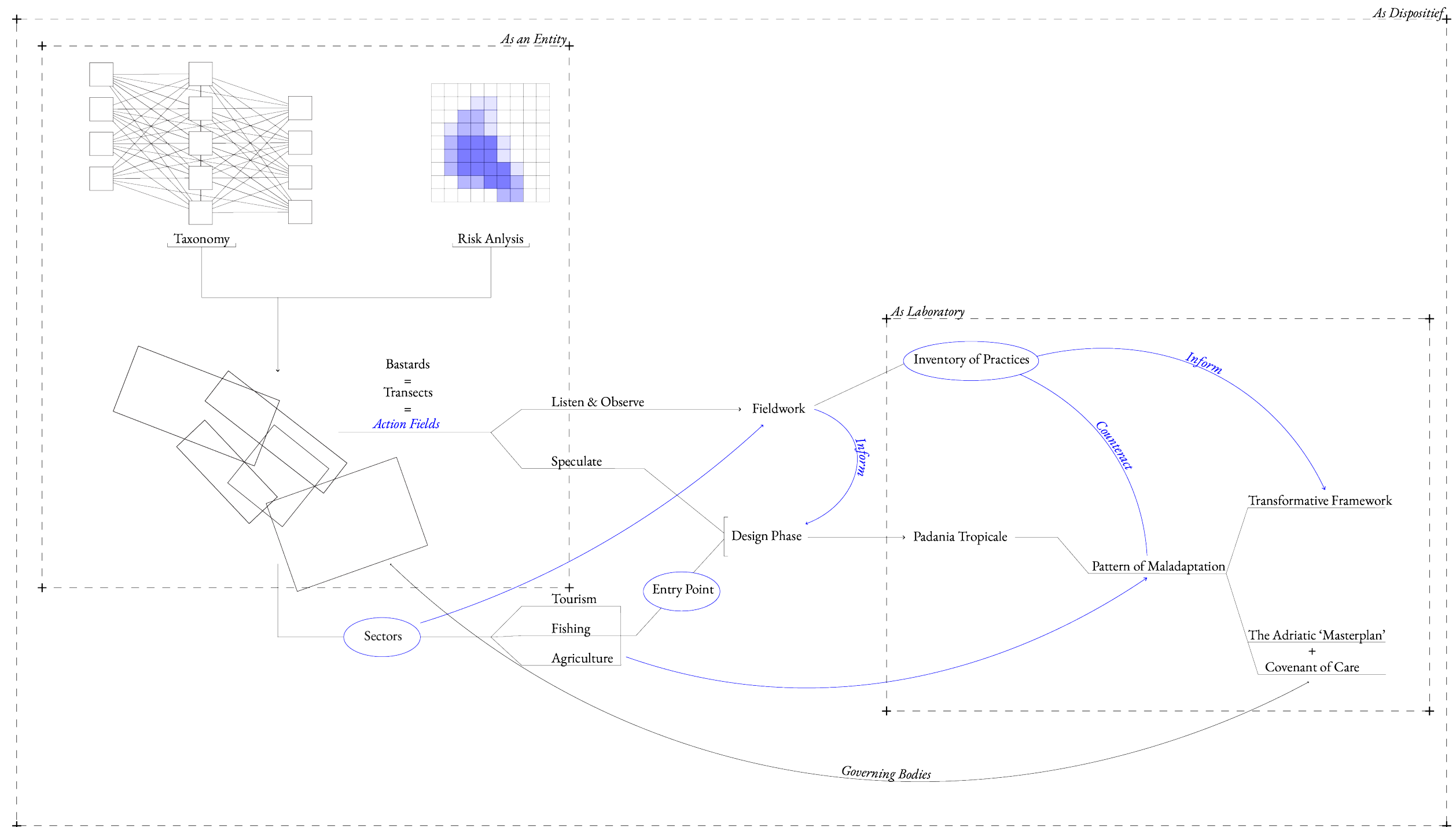
The main research question is conceived as an overarching framework guiding the entire research and design process, while the three sub-questions function as guidelines for three distinct project phases. The following page illustrates how the different steps and outcomes of the R&D process are interconnected and respond to each of the sub-questions. This process was based primarily on desk research, producing graphic outputs that include critical mappings, a risk assessment, and a spatial taxonomy of the territories of the Adriatic eco-region. From the combination of these outcomes, the transects emerged - the Bastards that give the thesis its title - which serve as action fields for two complementary purposes: listening to and understanding the body of the eco-region through fieldwork, and developing a subsequent propositional design phase.

The selection of a specific transect - the Po/North Adriatic one - was a pivotal moment in the thesis. It provided the opportunity to directly engage with the territory and to propose a transformative framework built on two pillars: the analysis of maladaptation patterns to tropicalisation, and the construction of an inventory of care and transformation practices capable of counteracting them. Padania Tropicale is the name given to this transformative framework, and it serves as a necessary stepping stone toward the final phase of the project. This concluding phase seeks to operationalise the lessons learned at the scale of the broader eco-region and the Mediterranean, proposing a Covenant of Care grounded in the principles of bio-regionalism and in the use of the transects/Bastards as governing bodies.

The diagram on the right presents the research and design areas of the thesis. Built with a hybrid and multiscalar approach, it moves from the XL scale of the entire Mediterranean basin down to the S scale of the Po Delta, passing through a substantial focus on the Adriatic eco-region (L) and the Po transect (M), before returning to the XL scale of the basin for the concluding reflections.

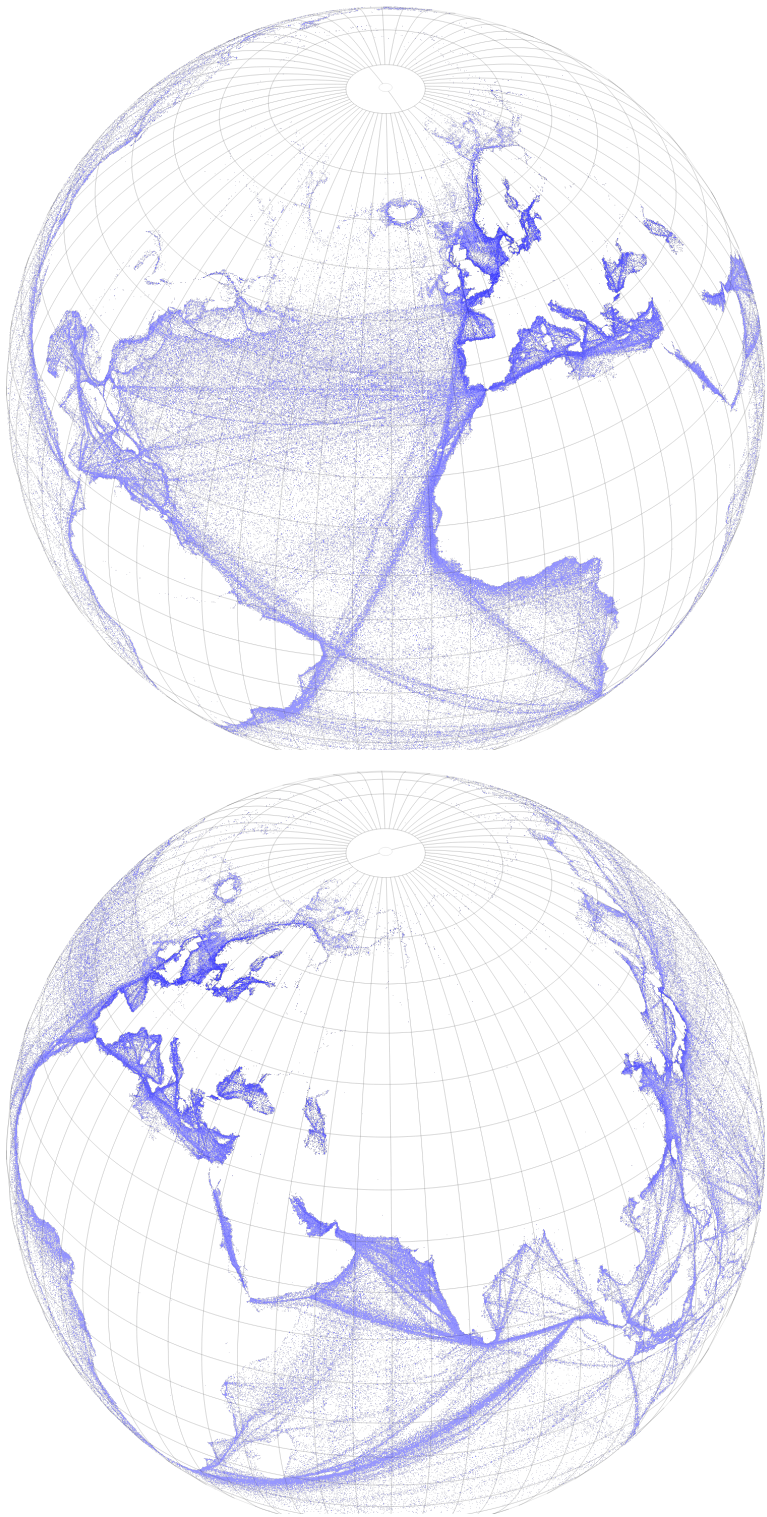


The four scales of the project



Abstract	5
Personal Motivation	7
Positioning / On the Bastards	9
Methodological Approach	10
1. Sea, Air & Borders	
1.1 Introducing Mediterranean	18
1.1.1 Mediterranean Climate	20
1.1.2 A palimpsest	24
1.2 Towards tropical conditions	28
1.2.1 Bio-Physical Problem Statement	40
1.3 A complex Legal System	43
1.3.1 Political Problem Statement	52
1.4 Bio-Political Problem Statement	55
1.5 Design Hypothesis	56
1.5.1 Conceptual Framework	58
1.5.2 Theoretical Underpinning	60
1.5.3 Research Questions	62
2. The Bastards	
2.1 An Open Atlas of the Adriatic Eco-Region	66
2.2 The Adriatic Bastards	80

2.2.1 Taxonomies of the Adriatic Territories	80
2.2.2 Transects/Bastards	92
2.2.3 Mapping the Risks of Tropicalisation	94
3. Padania Tropicale	
3.1 Territories of the Transect	122
3.1.1 An Amphibious Urban Landscape	122
3.1.2 The Padanian Cyborg	125
3.2 Pattern of Maladaptation	126
3.2.1 Five Lines of Inquiry	130
3.3 An inventory of Practices of Care & Transformation	132
3.4 Padania Tropicale	154
3.4.1 Counteracting the Pattern	154
3.4.2 From Practices to Strategies	158
3.4.3 Padania Tropicale Transformative Framework	160
4. Conclusion	
4.1 Conclusion	180
4.1.1 The Adriatic 'Masterplan'	180
4.1.2 The Mediterranean Covenant of Care	183
4.2 Reflection	185
Bibliography and Sources	188



1. Sea, Air & Borders

- 1.1 Introducing Mediterranean
 - 1.1.1 The Mediterranean Climate
 - 1.1.2 A palimpsest
- 1.2 Towards tropical conditions
 - 1.2.1 Bio-Physical Problem Statement
- 1.3 A complex Legal System
 - 1.3.1 Political Problem Statement
- 1.4 Bio-Political Problem Statement
- 1.5 Design Hypothesis
 - 1.5.1 Conceptual Framework

1.1 *Introducing Mediterranean*

Covering more than 2.51 million km² and surrounded by approximately 46,000 km of coastline, the Mediterranean Sea presents itself as a vast and complex body of water. The eighth-largest sea in the world, located at the crossroads of three continents - Asia, Africa, and Europe - it has been a pivotal arena of human history and, at the same time, an exceptionally rich biodiversity hotspot, fundamental to planetary balance.

With an average depth of about 1,500 meters, the basin displays an extremely varied bathymetric profile, featuring maximum depths of up to 5,270 meters near the western coasts of the Peloponnese, alongside much shallower areas such as the Adriatic Sea or the Gulf of Sirte (ترس چي لڤ). The surrounding coastlines also emerge with marked differences: mountainous or hilly profiles characterize areas such as the Lebanese coast, while flat low-lying landscapes barely above sea level define regions like the Nile Delta.

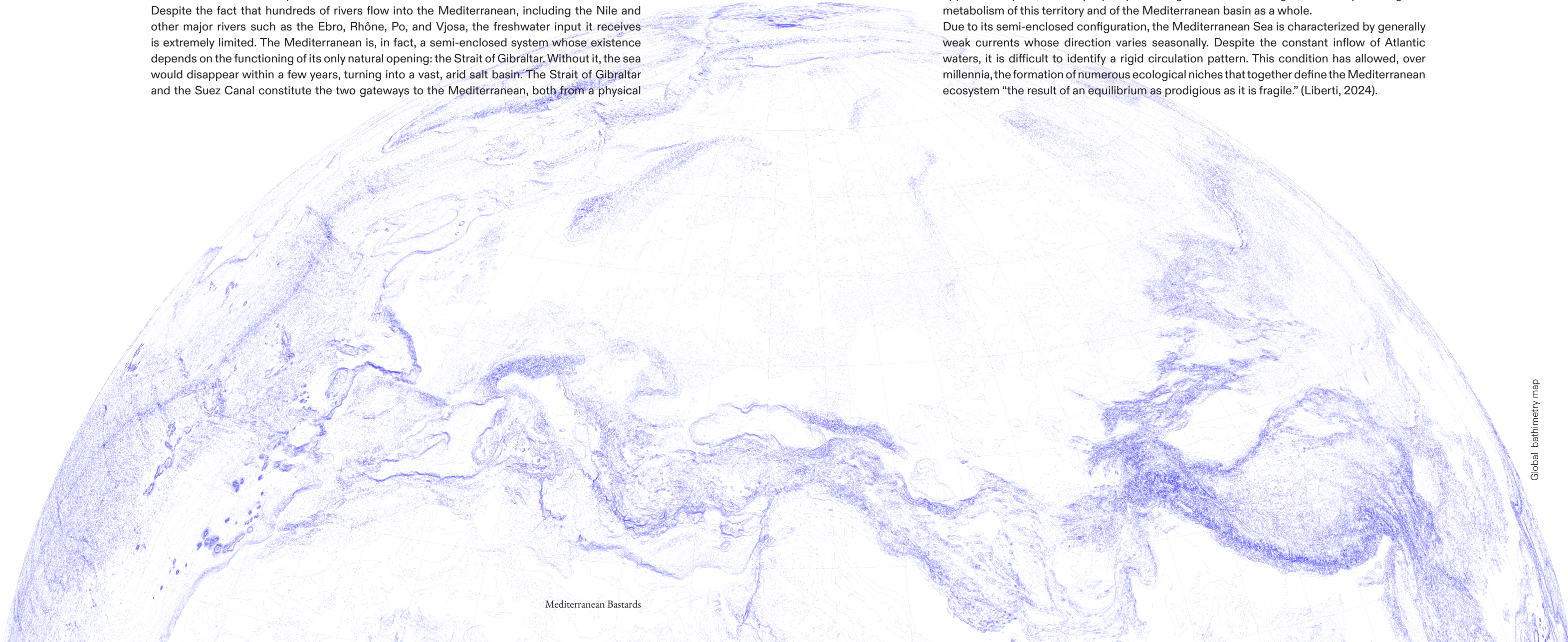
A close & interconnected system

Despite the fact that hundreds of rivers flow into the Mediterranean, including the Nile and other major rivers such as the Ebro, Rhône, Po, and Vjosa, the freshwater input it receives is extremely limited. The Mediterranean is, in fact, a semi-enclosed system whose existence depends on the functioning of its only natural opening: the Strait of Gibraltar. Without it, the sea would disappear within a few years, turning into a vast, arid salt basin. The Strait of Gibraltar and the Suez Canal constitute the two gateways to the Mediterranean, both from a physical

perspective, regulating water exchange and currents, and in terms of marine fauna and commercial routes. These two bottlenecks channel the fate of the Mediterranean, yet they differ profoundly in nature.

The Strait of Gibraltar, formed through natural geological processes and repeatedly closed and reopened following the Messinian Salinity Crisis, is approximately 13 kilometers wide and 280 meters deep. It represents the primary gateway for water, currents, and marine life and has historically embodied both the connection between the African and European continents and the symbolic edge of the ancient world - the legendary Pillars of Hercules. The Suez Canal, by contrast, is an artificial waterway located in Egypt, connecting the southern Mediterranean with the Red Sea. Inaugurated on November 17, 1869, and constructed under the direction of the French engineer Ferdinand de Lesseps, it was conceived for commercial purposes. Expanded in both width and strategic importance over time, it now accommodates approximately 20,000 ships per year along its 193.3 km length, inevitably altering the metabolism of this territory and of the Mediterranean basin as a whole.

Due to its semi-enclosed configuration, the Mediterranean Sea is characterized by generally weak currents whose direction varies seasonally. Despite the constant inflow of Atlantic waters, it is difficult to identify a rigid circulation pattern. This condition has allowed, over millennia, the formation of numerous ecological niches that together define the Mediterranean ecosystem “the result of an equilibrium as prodigious as it is fragile.” (Liberti, 2024).



Mediterranean Bastards

Global bathymetry map

1.1.1 Mediterranean Climate

The particular configuration of the basin and its surrounding coastlines, together with the effects of global climate trends, is at the origin of the formation of the so-called Mediterranean climate. From a climatic perspective, no less than from a geopolitical and cultural one, the Mediterranean is positioned within a transition zone, where mid-latitude and tropical variability are both significant and interact with one another.

According to the Köppen climate classification, the southern coast of the basin is characterized by a Subtropical Desert Climate, while the northern side falls within a Maritime West Coast Climate. The Mediterranean climate is influenced by global phenomena such as the North Atlantic Oscillation (NAO) and the Levantine Intermediate Water (LIW). At the same time, its distinctive geography, marked by mountainous coastlines, deep basin depressions, and flatter areas, enhances climatic variability at local and regional scales.

Over millennia, these conditions have generated the equilibrium upon which the Mediterranean climate has developed. This climatic connotation is already present in Köppen’s 1936 classification, which describes a climate found also beyond the Mediterranean region itself, characterized by hot, dry summers and cool, wet winters. Annual average temperatures vary significantly, with summer peaks that can exceed 30°C and winter minima that depend on location, though they rarely fall below 0°C.

This particular configuration, based on the cooling function of the basin, defines near-ideal conditions for the development of biodiversity and, at the same time, of human life. It is therefore a key element for understanding the historical stratification of the Mediterranean basin and the causes of the vitality and richness of its human and more-than-human populations.

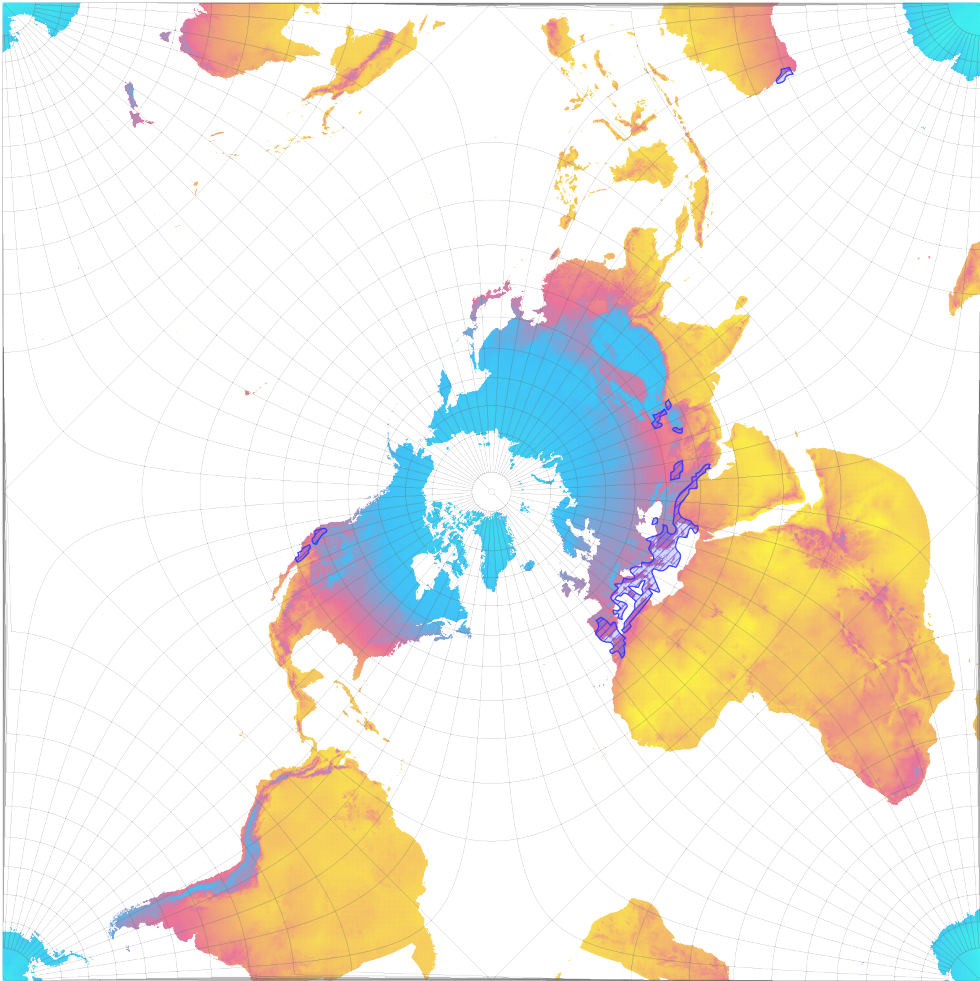
History of the Baisin

Although it is difficult to imagine the Mediterranean Sea as disconnected from human history, it is essential to note that the origin and evolution of the basin began long before the arrival of humans along its shores. On the page to the right, the main elements of Mediterranean history are presented within the metaphorical scale of a solar year, with January 1st corresponding to the physical birth of the basin and December 31st representing the present day.

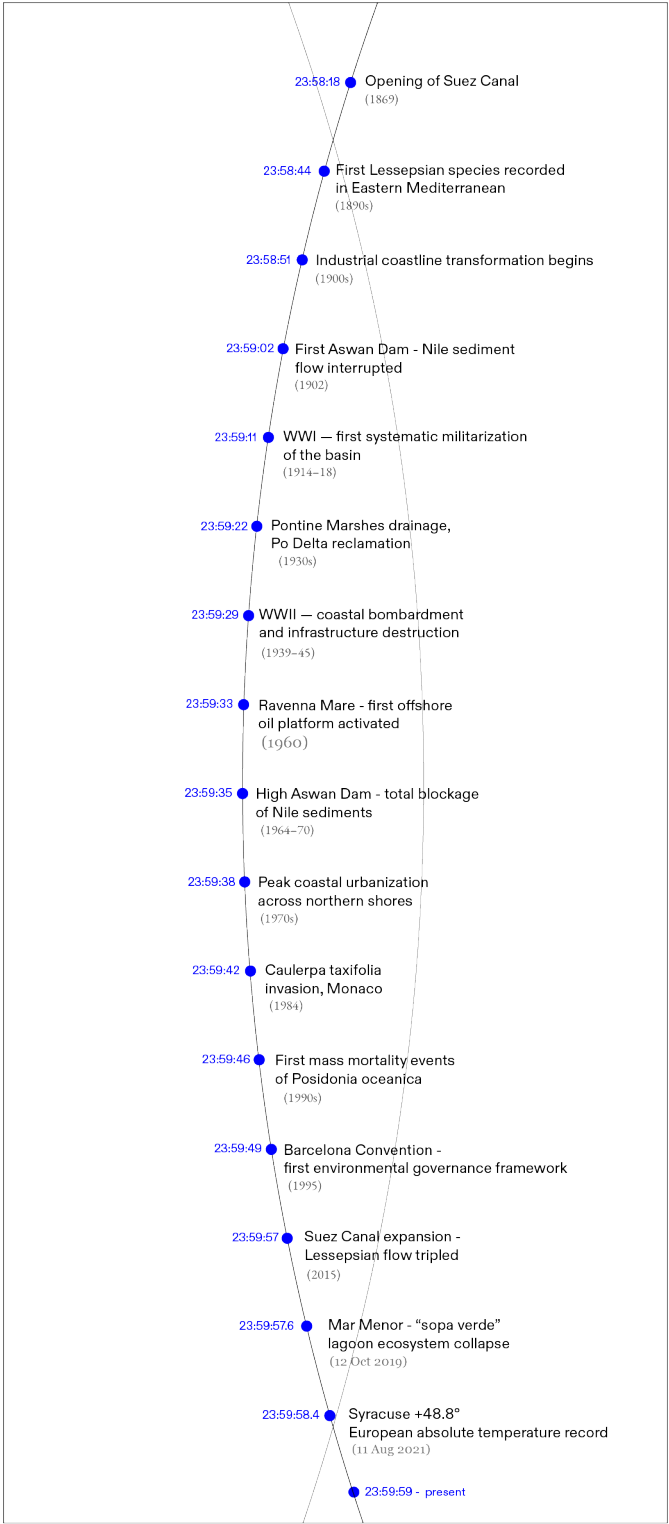
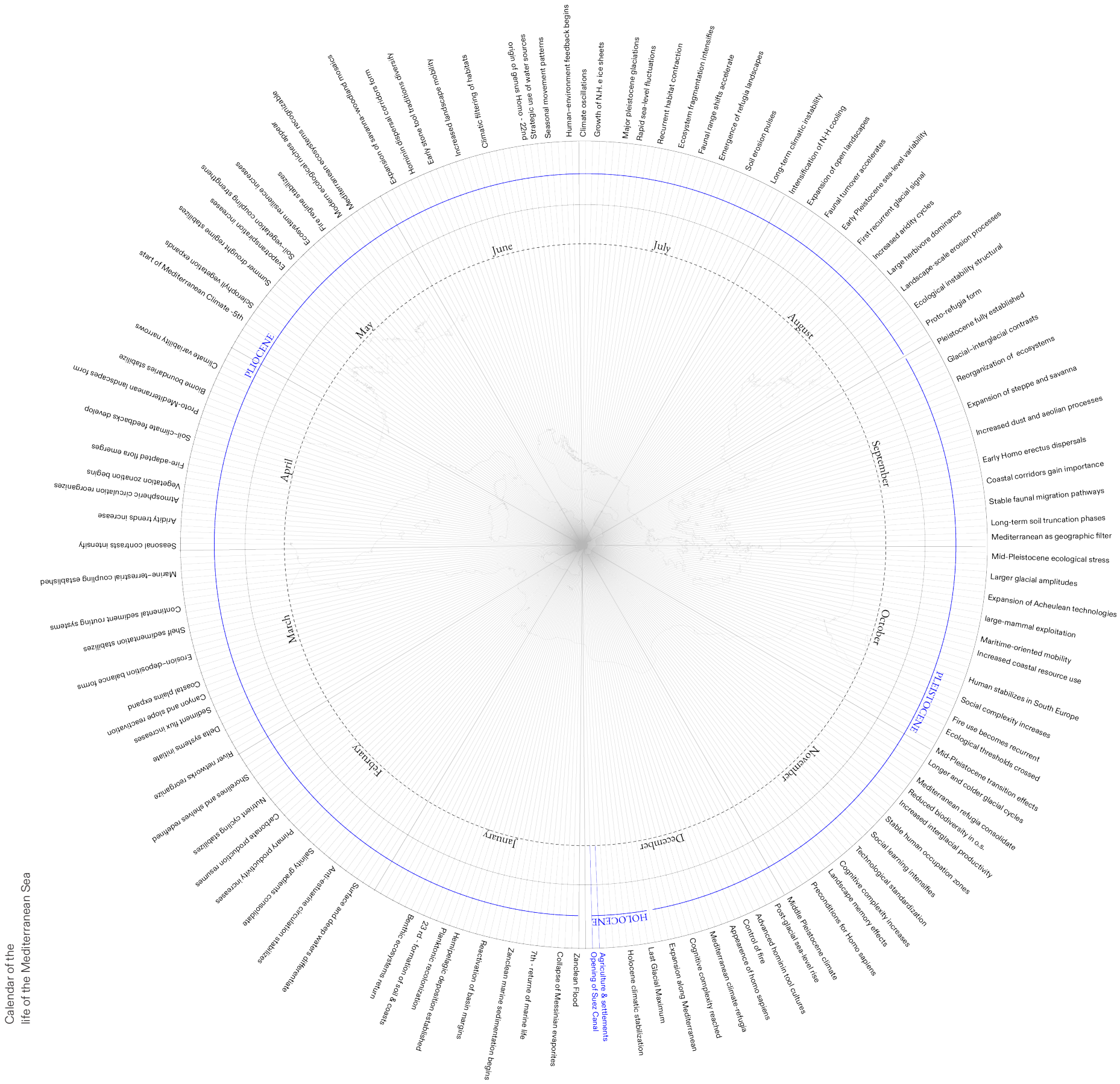
The Mediterranean as we know it today originated approximately 4.55 million years ago, following the Messinian Salinity Crisis, with the opening of the Strait of Gibraltar and the inflow of Atlantic waters. As it passed through different geological eras and as both climate and the Earth’s crust gradually stabilized, the basin soon began to be inhabited by animal and plant species. From around May 5th–7th on this timeline, it provided a regulation of what we now define as the Mediterranean climate, despite significant fluctuations caused by glaciations and periods of global warming.

These conditions enabled the development of the rich and complex Mediterranean ecosystem. Although the Mediterranean Sea contains only 0.32% of the total volume of all the world’s seas, it hosts approximately 7.5% of all marine animal species and 18% of marine plant species, of which 28% are endemic.

The arrival of Homo sapiens in the region can instead be placed between the “hours” of December 8th and 9th, while the first agricultural experiments appear on December 30th. The beginning of large-scale human exploitation and transformation of the basin culminates with the opening of the Suez Canal, around 6:00 p.m. on December 31st.



Mediterranean climate and global temperature



Anthropocene - History of the last 2 minutes

1.1.2 A palimpsest

The time of modernity, of nature, and of the sea refers to converging evolutionary trajectories and, at the same time, to different temporal cycles that have formed the basis for the development and prosperity of Mediterranean civilisations over the millennia. Along its coasts, in fact, some of the most important civilisations of ancient history emerged. Thanks to the particular benevolence of the Mediterranean climate and biosphere, these societies were able to live in conditions of prosperity for thousands of years.

The relationship with the Mediterranean is central to the study of the history of the various practices of human territorialisation and urbanisation. Around rocky coastlines, inlets, deltas, and plains, many of the practices that underpin the modern concept of the city developed, and Mediterranean landscapes are the result of the dialogue and superimposition of these practices. The Mediterranean is therefore a chimera, a hybrid resulting from the interaction between nature and culture, a prime example of the cultural landscape so dear to UNESCO and of the palimpsest theorised by Corboz.

The Mediterranean is where the olive tree is cultivated and cooking is done with its oil—a practice that originated on the Syrian coasts between 6000 and 5000 BC. It is where, at the end of a meal, an anise-based liqueur is often consumed, whether it is called ouzo (Greece), sambuca (Italy), pastis (France), arak (Lebanon–Syria), raki (Turkey and the Balkans), or hierbas (Spain). It is where cultivation takes place through terracing, dry-stone walls, and articulated water management systems; it is where Romans, Greeks, Phoenicians, and Mycenaeans developed, and where some of the most widespread religious movements in contemporary society took root.

“The Mediterranean is not only geography. Its boundaries are defined neither in space nor in time. We do not know how to determine them or in what way: they are irreducible to sovereignty or to history; they are neither state-based nor national,” writes Predrag Matvejević in his *Mediterranean Breviary*. Mediterranean culture is therefore solid and deeply rooted in its basin, yet also fluid and constantly shaped by migrations, transformations, and the integration of difference. When analysing Mediterranean territories from an urbanistic perspective, it is fundamental to attempt to read and understand the different layers of the palimpsest, the worldviews that have led to the formation of the contemporary Mediterranean, because “the landscape tells - or rather is - a story. It enfolds the lives and times of predecessors who, over the generations, have moved around in it and played their part in its formation.” as affirm the anthropologist Peter Ingold.



Al-Idrisi's world map from 'Alī ibn Hasan al-Hūfī al-Qāsimī's (1456)



1.2 Towards tropical conditions

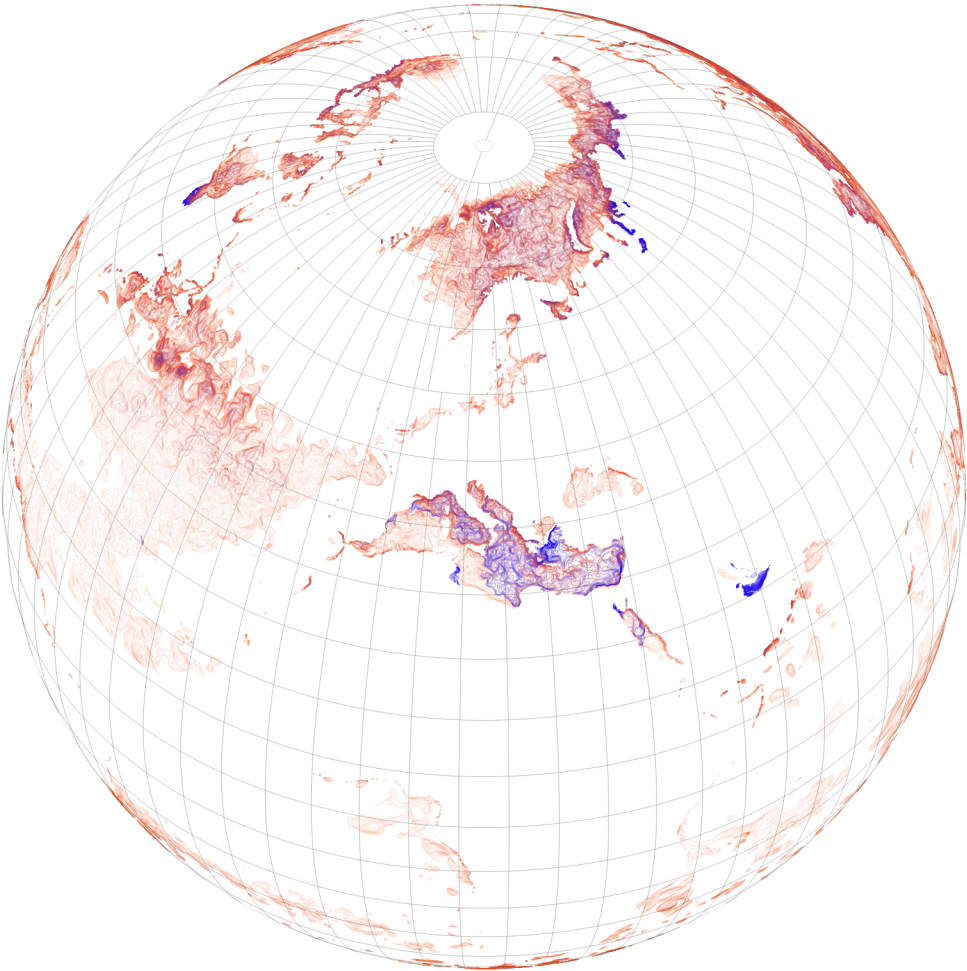
A Highly Exploited Sea

Following the Industrial Revolutions and the consolidation of the contemporary capitalist model - accompanied by demographic growth and the increasing exploitation of natural resources - the relationship between humans and the Mediterranean has profoundly changed. The opening of the Suez Canal, inaugurated on 17 November 1869, integrated the Mediterranean into global trade routes and marked the beginning of an intensification of human activities aimed at the intensive exploitation of marine resources for economic gain. Overfishing, mass tourism, anthropogenic modification of coastlines, extraction of subsoil resources, maritime trade and transport are just some of the processes that have characterised the relationship between modern - particularly European - societies and the Mediterranean. A sea and a complex ecosystem that, since the Second World War, has been subjected to continuous and increasing pressure from human activity.

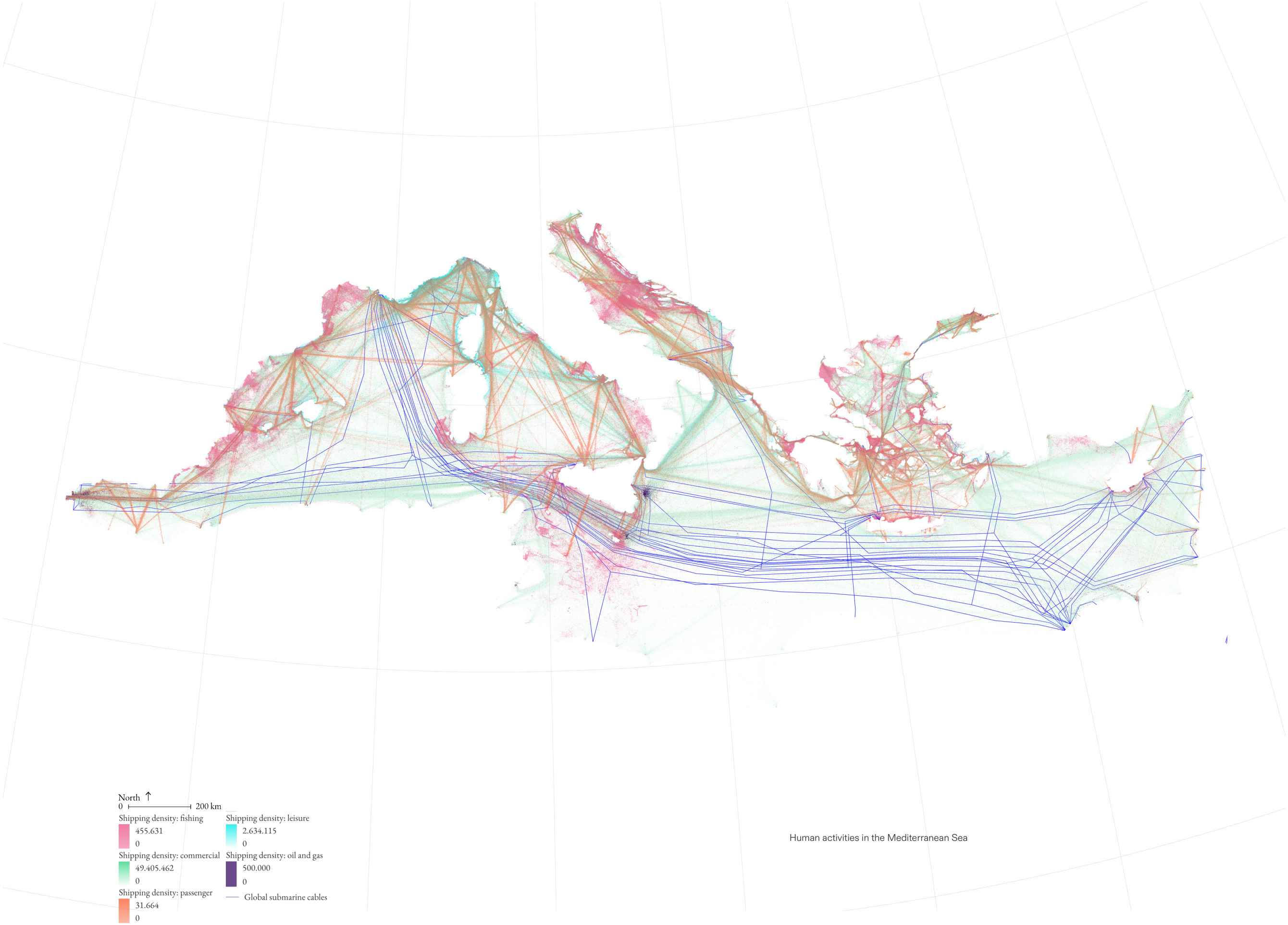
This pressure, translated into global anthropogenic processes such as global warming, exposes the deep fragilities of Mediterranean ecosystems and of their human and more-than-human inhabitants. The following pages aim to synthesise and critically frame the processes linked to climate change and human activity within the Mediterranean context, with particular attention to the socio-environmental dimension of the challenges it poses and to the interconnections between their causes and consequences. At the core of this reasoning lies the recognition of climate change as a complex problem, understood in the terms proposed by the French philosopher Edgar Morin, characterised by structural interconnectivity and multidimensionality.

History of the 8 Minutes

As previously stated, the distinctive configuration of the Mediterranean basin has enabled the development of a specific climate, highly favourable to both biodiversity and human life. This has generated an exceptionally rich and unique assemblage of ecosystems, within which natural inhabitants have coexisted for millions of years in this extraordinary semi-enclosed system, with the Mediterranean acting as a regulator and guarantor of balance and well-being. In the last “eight minutes” of the basin’s life - corresponding to the Anthropocene - this regulatory capacity, maintained over millennia, has been severely challenged, as has the survival of its climate and ecosystems. According to a comprehensive WWF report (The Climate Change Effect in the Mediterranean, 2021), the basin is warming approximately 20% faster than the global average due to its particular configuration. This accelerates and amplifies climate-related risks and impacts, resulting in processes such as sea-level rise - expected to exceed one metre by 2100 - as well as ocean warming and acidification. The consequences of these dynamics are further exacerbated by the limited adaptive and regulatory capacity of human societies, which remain largely unwilling or unable to mitigate the underlying causes of these changes.



Climate anomalies in the Oceans



Towards Tropical Conditions

Between 1982 and 2019, an accumulated warming of 1.3 °C has been estimated for the Mediterranean Sea surface temperature, with particularly pronounced increases in the eastern basin. Further warming of 0.6–1.3 °C for the western basin and 2.7–3.8 °C for the eastern basin is projected for the period 2050–2100. This warming is transforming the conditions of the entire basin, which is reaching average summer temperatures comparable to those of a tropical sea, along with extremely high salinity levels. This process, rooted in global warming and affecting every aspect of marine ecosystem life, can be defined as the tropicalisation of the Mediterranean. It is evident across all regions of the basin and can be clearly observed in maps documenting changes in marine ecosystem conditions (fig. 12).

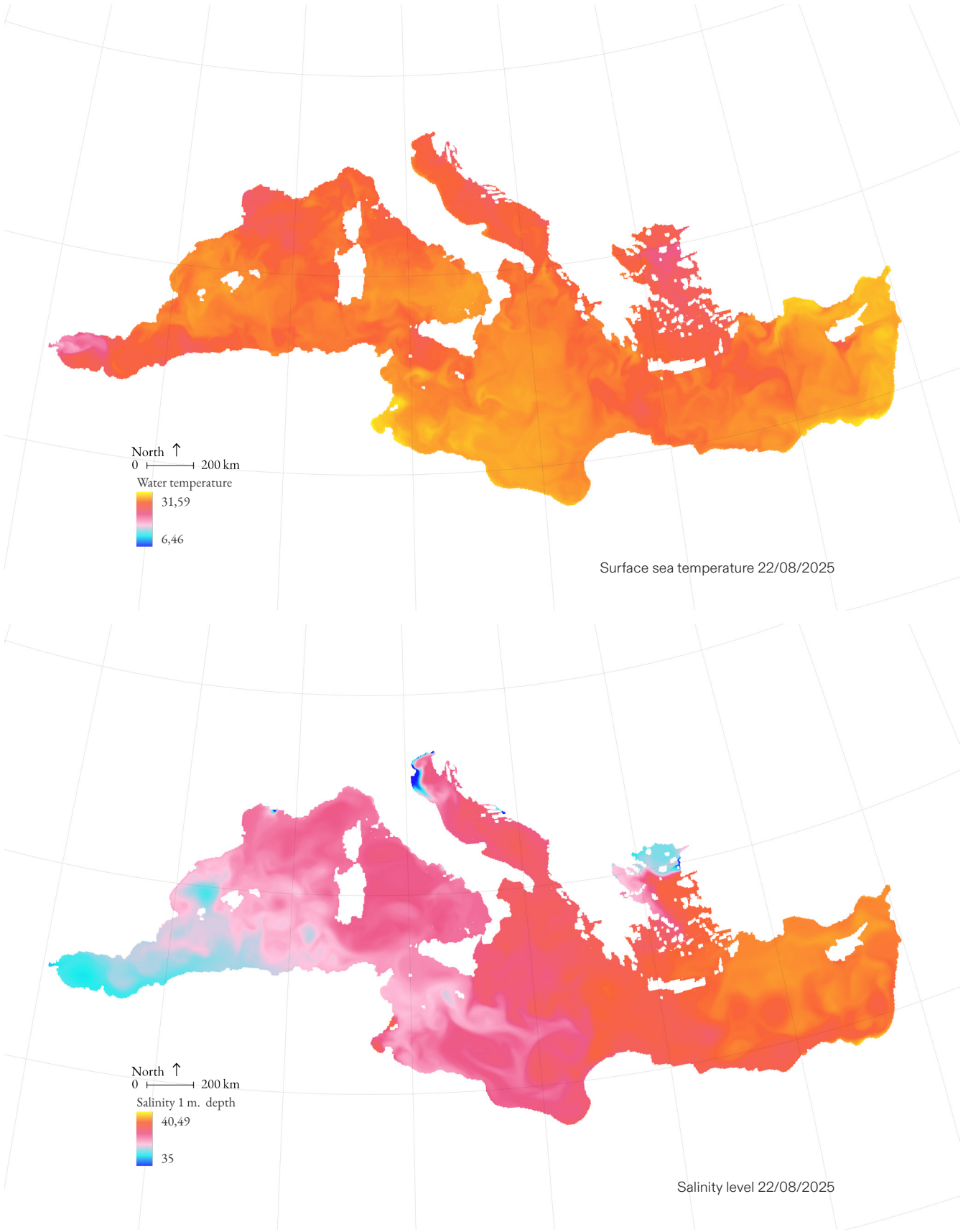
Connected to warming, there are a series of risks and cascading effects throughout the basin, particularly related to invasions by alien marine species. These species enter through the Suez Canal, whose continuous widening over the past decades has compromised the natural saline filter of the Egyptian bitter lakes, or through the ballast water of cargo ships—essentially harmful aquariums—infesting and altering the balance of native flora and fauna.

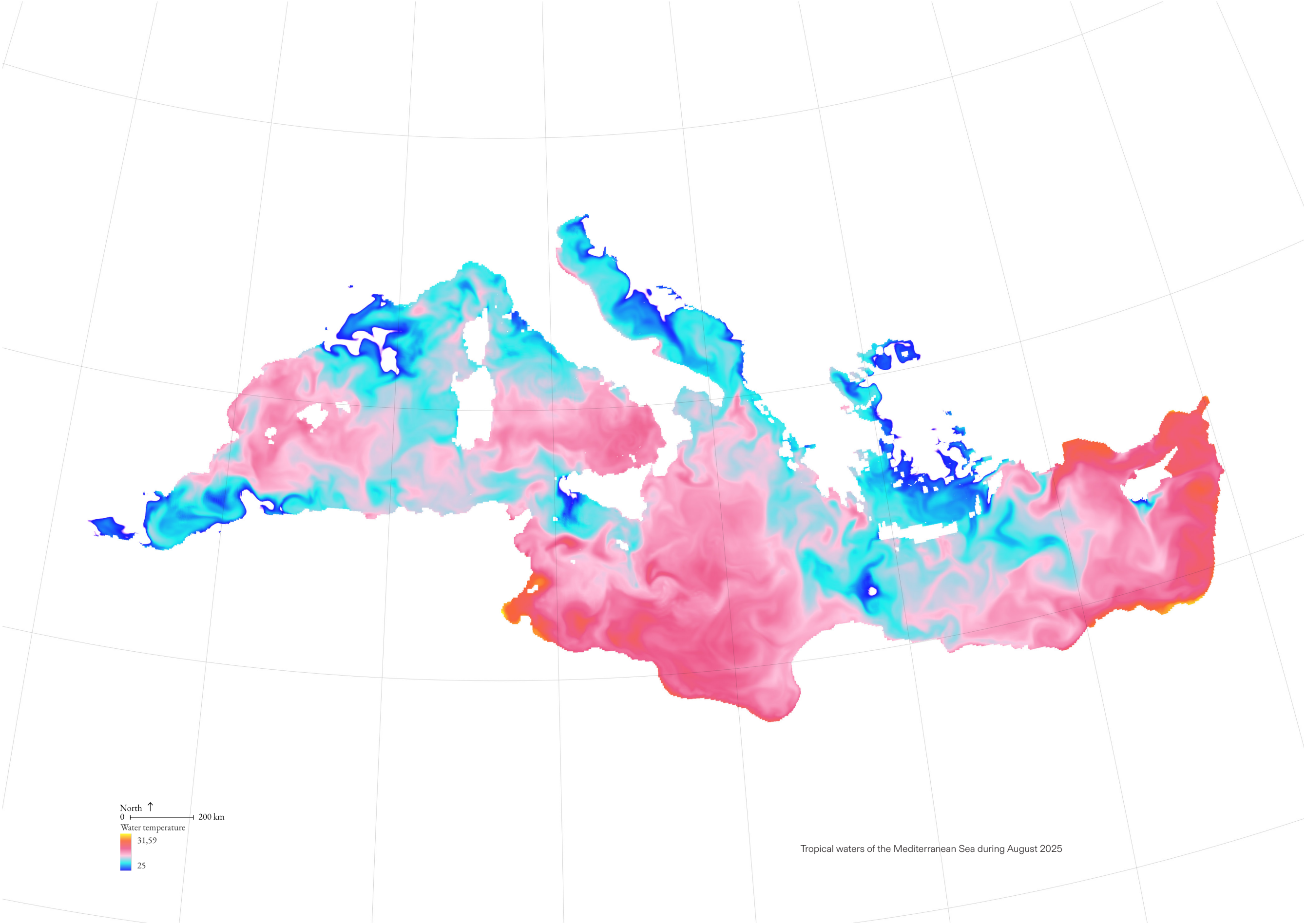
In the Mediterranean, 986 alien species have been recorded, 126 of which are fish, known as “Lessepsian species” after the French engineer who built the canal. The Mediterranean provides ideal conditions for their survival thanks to marine warming, which increases the winter survival of tropical species and accelerates their reproductive cycles.

Among the species most damaging to the local socio-environmental sphere are the Rabbitfish (genus *Siganus*), which destroys marine biomass; the Lionfish (genus *Pterois*), which preys on native species without being preyed upon itself; blue crabs (*Callinectes sapidus*), which destroy mollusks and mussels; and jellyfish, which infest Mediterranean waters and harm local tourism economies.

The invasion of alien species is not limited to animals; algae also threaten ecosystems. For example, *Caulerpa taxifolia*, native to the Gulf of Mexico, spread from an aquarium in the Principality of Monaco to the western Mediterranean, causing significant biodiversity losses, including the collapse of the Mar Menor ecosystem in Murcia in 2021.

All these processes jeopardize life and the existence of the Mediterranean as we know it, forcing ecosystems that have existed for millennia to retreat or disappear.





Tropical waters of the Mediterranean Sea during August 2025

A Multi-dimensional Challenge

Tropicalisation is a complex, multidimensional process, whose effects are observable across multiple scales, from the XL scale of the entire Mediterranean to the XXS scale of its human and more-than-human inhabitants. While its causes can be traced to anthropogenic processes with planetary-scale effects (global warming), its consequences operate at different levels and are interconnected through cause-effect relationships and/or synergistic interactions. Beyond being multi-scalar, tropicalisation is a socio-environmental problem, affecting both the environmental scale - with all inhabitants of the biosphere - and the socio-cultural scale, impacting many aspects of life for coastal populations.

According to the paper “Climate change risks on key open marine and coastal Mediterranean ecosystems” (2025), “all Mediterranean ecosystems face high risks under all climate scenarios,” with substantial differences between coastal ecosystems - which are most severely affected - and open-sea ecosystems. Sea-level rise, warming, and acidification produce varied and disparate effects, which translate into particularly dramatic impacts on coastal ecosystems even with a modest temperature increase of +0.8 °C. Among the most vulnerable are beaches, dunes, lagoons, deltas, wetlands, salt marshes, and coastal aquifers, which face high risks due to sea-level rise, erosion, salinisation, and invasions of alien species. Rocky coasts are relatively more resilient, yet still increasingly at risk. Open marine ecosystems, on the other hand, display more variable conditions: fish populations and Posidonia oceanica meadows are in sharp decline, whereas epipelagic and coralligenous ecosystems are more resistant and capable of responding to the effects of tropicalisation.

Beyond a technical assessment of the biophysical characteristics of each ecosystem, it is important to emphasise that the transformations of spatial-climatic conditions are intrinsically linked to increased risks for their inhabitants, as well as to human-related processes such as internal migration or rising political tensions that further fragment the Mediterranean context. Tropicalisation, in fact, operates within what Bruno Latour would call a “critical zone,” affecting every aspect of coastal life, from tides to the livelihoods of small-scale fishers on the Kerkennah Islands in Tunisia.

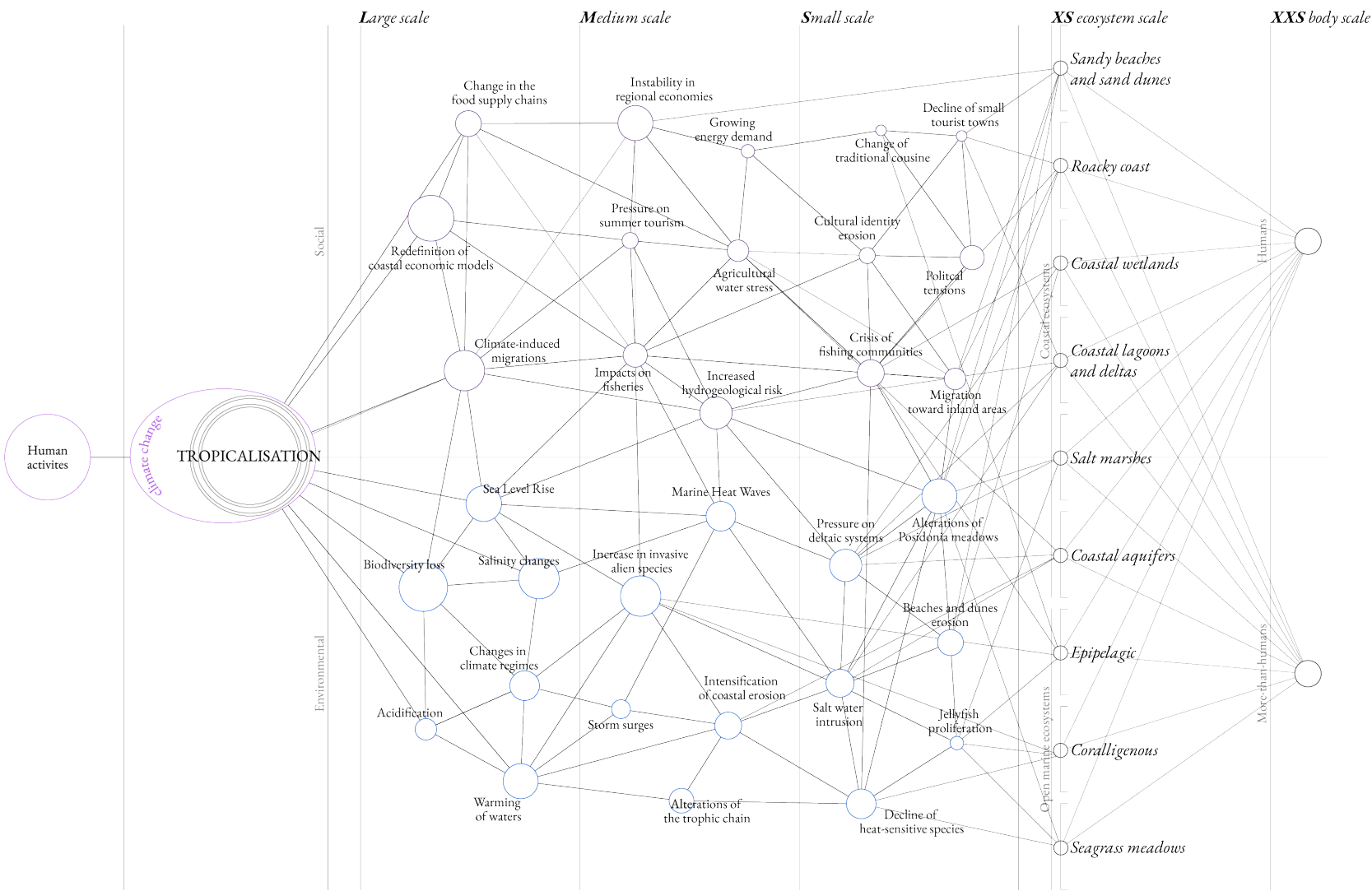


Diagram of the multi-scalar socio-environmental effects of tropicalisation in the Mediterranean context

Local Tropical Pressure

Unfortunately, there are numerous local-scale stories that reveal the multidimensional nature and dramatic impacts of tropicalisation. Stefano Liberti's book *Tropico Mediterraneo* collects many of these accounts with the aim of raising awareness of the environmental crisis affecting *mare nostrum*. One of the most emblematic cases is the transformation that has occurred in recent years within the aquatic ecosystems of the Po River delta, with significant repercussions across the entire socio-environmental sphere of the area.

Due to its particular geomorphological configuration, the Po River delta is a biodiversity-rich area, especially suitable for mollusk and mussel farming. Over the past fifty years - particularly since the introduction of *Tapes philippinarum* (a clam species native to the Philippines) in 1986 - the region has developed an economy strongly based on fishing and on the often intensive monoculture of clams, which has ensured substantial economic growth. Since 2017, however, this highly human-exploited ecosystem has been profoundly disrupted by the arrival of a new invasive species: *Callinectes sapidus*, commonly known as the blue crab.

The blue crab, a native species from the Atlantic coasts of the American continent, reached Adriatic waters through the ballast water of cargo ships, encountering warm waters similar to those of its native range and environmental conditions that had become increasingly favorable to its survival. From that moment on, it spread rapidly throughout Adriatic ecosystems, reproducing at a very high rate and preying on native species - particularly clams. This, in turn, triggered a severe crisis in the local economy, leaving thousands of fishermen without their primary source of livelihood and/or without the tools needed to adapt to the effects of such an abrupt transformation.

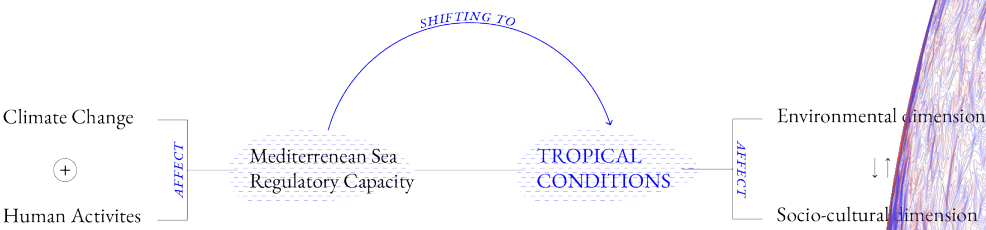
In his book, Liberti advances a further hypothesis that once again highlights the multidimensional nature of the tropicalisation process: the relationship between the Mediterranean cyclone that caused the devastating floods in Emilia-Romagna in May 2023, the use of the Po River as a drainage outlet for excess water, the consequent reduction in salinity levels in the delta, and the proliferation of the blue crab, which was able to feed on weakened mollusks and penetrate further inland into the delta. A near-perfect mechanism that led to the transformation of an entire ecosystem, of the territorial practices of its inhabitants, and that embodies the structural complexity of the Mediterranean tropicalisation process.



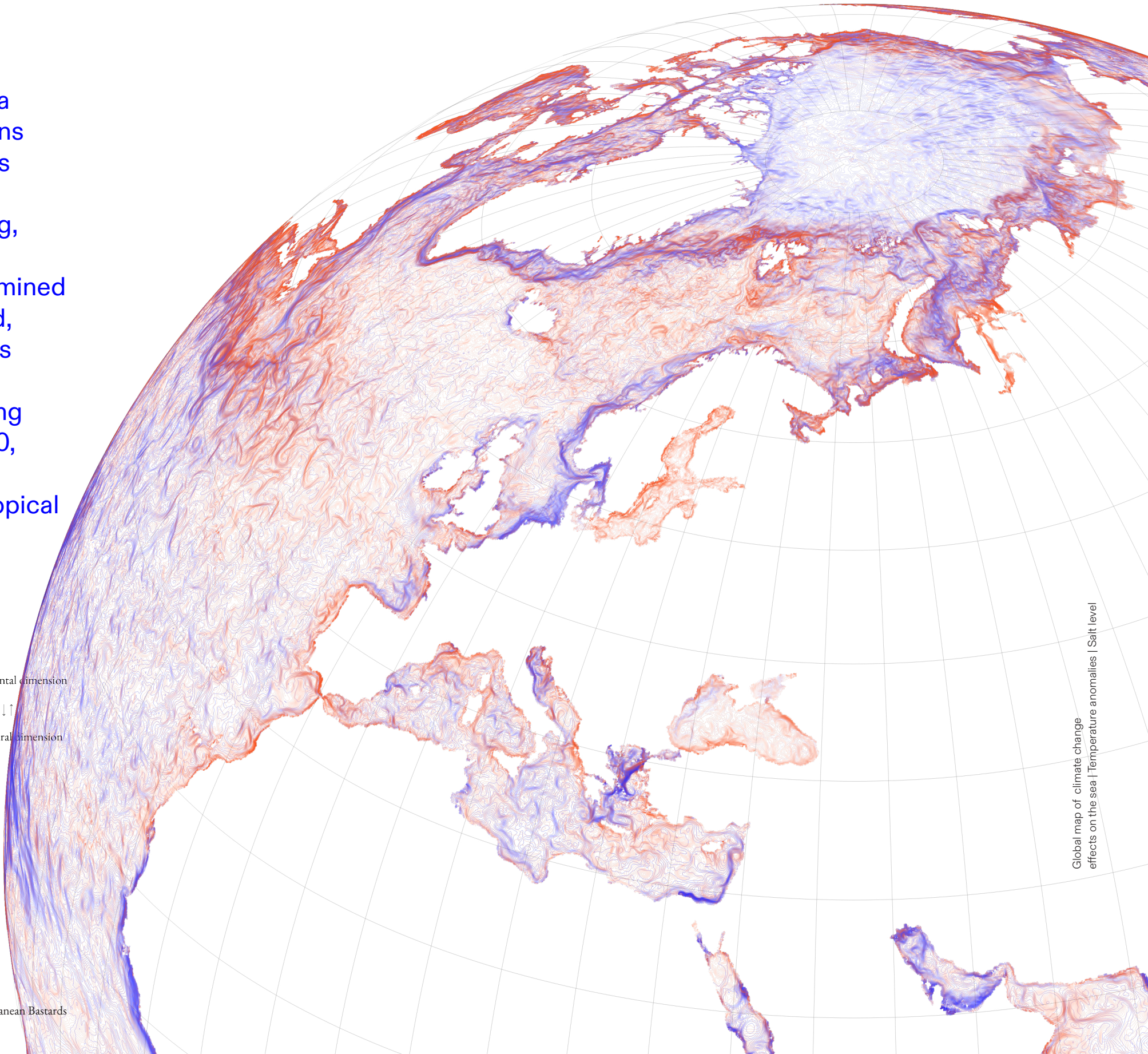
False colours satellatie image of Po Delta's "Valli da Pesca"

1.2.1 Bio-Physical Problem Statement

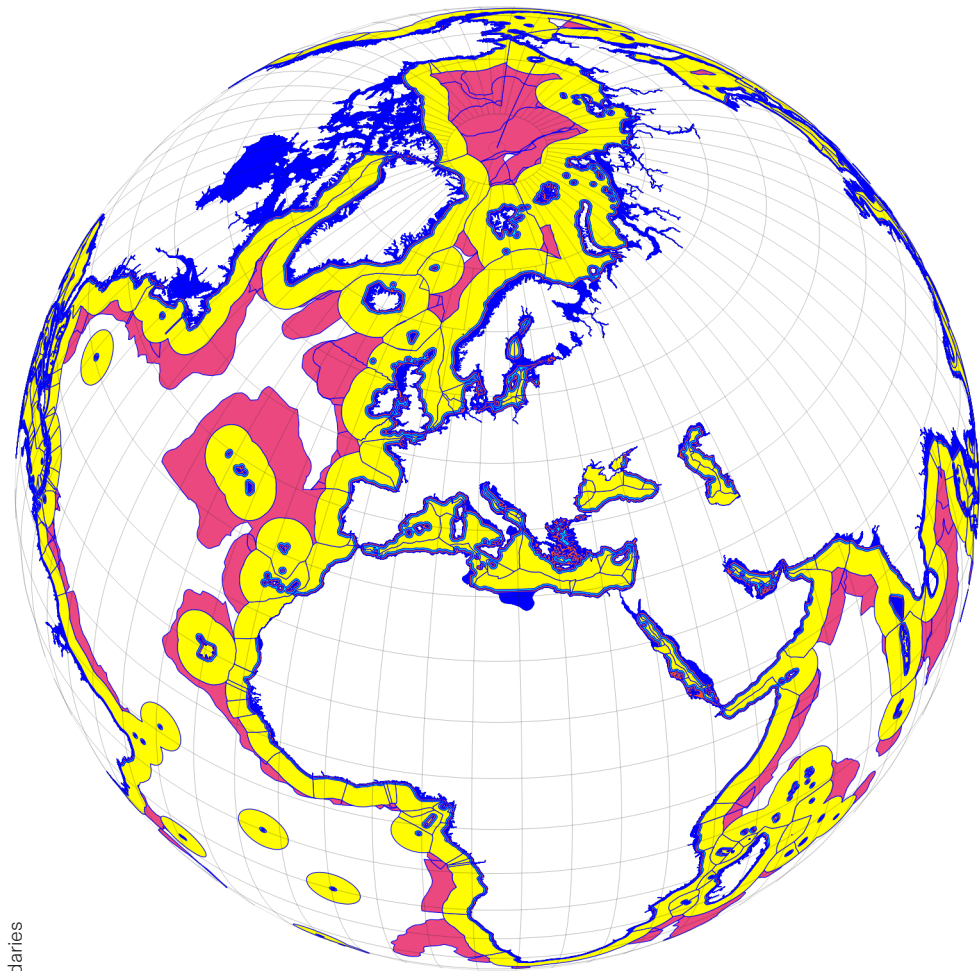
The Mediterranean Sea has long served as a regulator of climate and wellbeing for humans and for the biosphere, laying the foundations for the region’s shared history, heritage, and landscape. Human activities, global warming, and several systemic changes (such as the enlargement of the Suez Canal) have undermined the Mediterranean’s regulatory capacity and, consequently, its wellbeing, its biosphere, its landscapes, and its cultural fabric. Warming 20% faster than the global average and facing a projected one-metre sea-level rise by 2100, the basin is becoming the world’s fastest-warming and saltiest sea, drifting toward tropical conditions.



Mediterranean Bastards



Global map of climate change effects on the sea | Temperature anomalies | Salt level



Global maritime administrative boundaries

1.3 A complex Legal System

Laws of the Sea

Alongside the bio-physical processes associated with the tropicalisation of Mediterranean waters, a clear and pressing issue of governance and management can be identified. The following pages aim to provide an overview of the main criticalities in the organisation of the planning and governance frameworks that regulate the Mediterranean, with the objective of formulating a second - political - problem statement.

Marine and aquatic territories, despite lacking natural boundaries visible to the human eye, are divided by legal regimes established under the United Nations Convention on the Law of the Sea (UNCLOS), signed in Montego Bay in 1982 and entering into force in 1994. UNCLOS recognises different maritime zones that fragment and separate the aquatic territories of the planet. Starting from the territorial sea baseline, these zones project national administrative authority and sovereignty over marine waters and seabed resources up to 200 nautical miles, extending further to the continental shelf (beyond 200 NM) and to the high seas, where individual national laws and interests do not exercise sovereignty.

Substantial differences exist among these zones in terms of their legal and institutional value, as synthetically illustrated in the diagram below:

Internal Waters: all waters located on the landward side of the sea baseline. Here, the State exercises full sovereignty, equivalent to that over its terrestrial territory.

Territorial Sea: extending up to 12 nautical miles from the baseline. Within this zone, State sovereignty applies to the water column, the seabed and subsoil, and the airspace above.

Contiguous Zone: extending up to 12 additional nautical miles beyond the outer limit of the territorial sea. In this area, the State does not exercise full sovereignty, but holds limited powers of control and enforcement, particularly with regard to customs, taxation, public health, and immigration.

Exclusive Economic Zone (EEZ): extending up to 200 nautical miles from the baseline and often negotiated with neighbouring States. Within the EEZ, the coastal State holds sovereign rights related to the exploitation of marine resources (fisheries, energy production, hydrocarbons), as well as jurisdiction over marine scientific research and environmental protection.

Continental Shelf: which may extend beyond the 200 nautical miles of the EEZ. This zone is not present in the Mediterranean context and concerns exclusively the seabed and subsoil, including rights related to the exploitation of mineral resources.

High Seas: located beyond the continental shelf, this area is characterised by the absence of State sovereignty, where freedoms of fishing, scientific research, navigation, and overflight apply. This zone is also not present in the Mediterranean Sea.

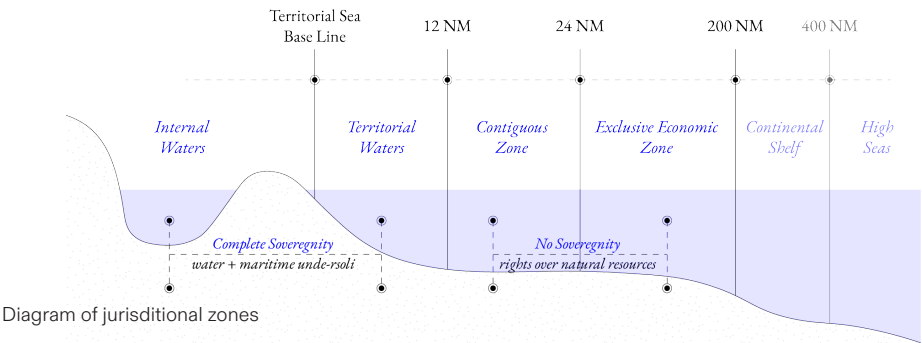


Diagram of jurisdictional zones

A Complex Legal System

The overlap and organisation of these zones set the rhythm of marine spatial planning, projecting national sovereignty into the sea according to economic and military logics. These logics of separation and management do not follow the natural characteristics of marine space, but rather reflect a purely anthropocentric approach, oriented toward the economic exploitation of marine resources. Twenty-two countries across three continents face the Mediterranean Sea, each delineated by their repetitive administrative projections, from Contiguous Zones to Exclusive Economic Zones (EEZs). Each country adopts its own specific planning approach, rooted in different national legislations that often emerged in distinct historical periods and within political systems whose democratic structures and environmental priorities can be radically divergent.

The European Union provides a partial overarching framework for planning along the northern coast, supported by climate agreements and the Sustainable Development Goals. However, coordination remains far from advanced, partly due to the non-participation of several Balkan countries in the EU, and becomes even more fragmented along the southern shore and, especially, the eastern coast, where ongoing political and military tensions hinder any form of cooperation or unified governance. In order to convey the complexity of the interests and approaches involved, the territorial governance systems of three countries overlooking the Mediterranean Sea are briefly presented below.

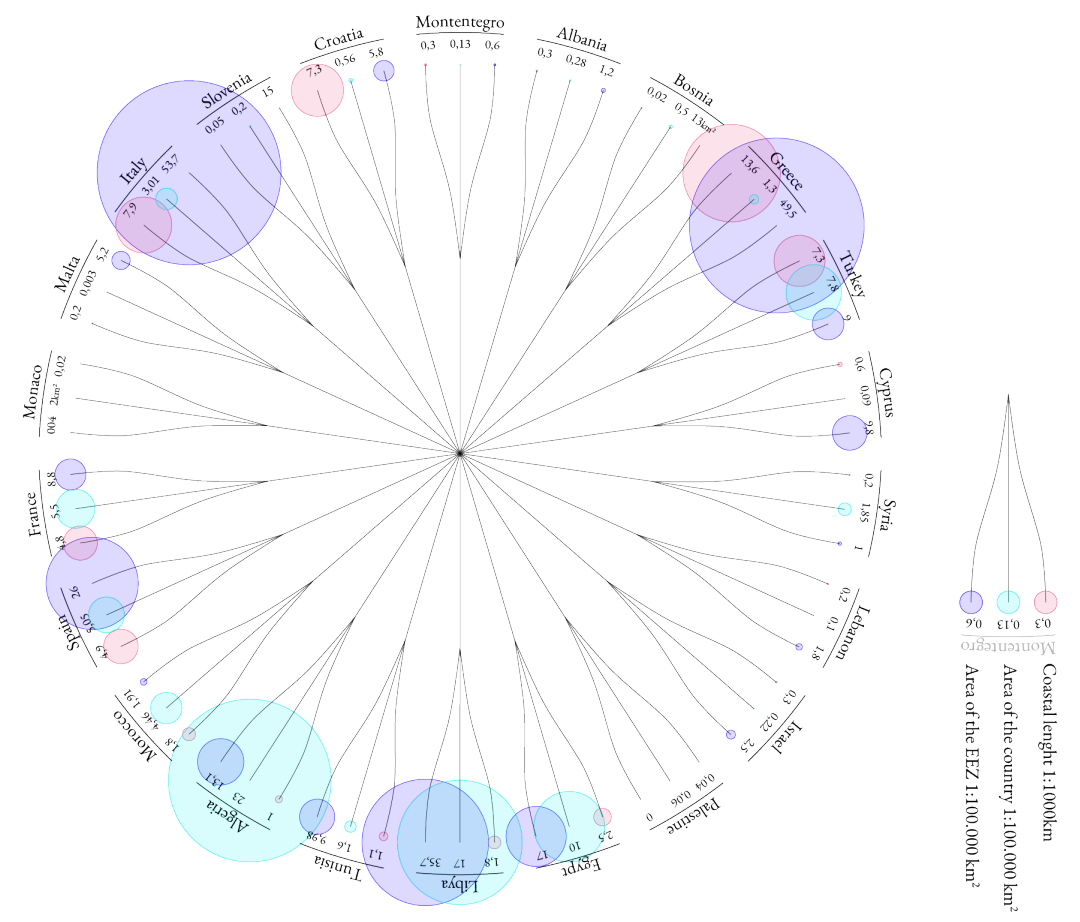
Italy: The National Urban Planning Law (Law 1150/1942) served as the primary framework for spatial planning in Italy until 2001. With the reform of Title V of the Constitution (2001), the competence over territorial governance was transferred to the Regions, giving rise to twenty different regional laws, each responding to distinct needs and political orientations.

Despite the approval of the Maritime Spatial Plan (2023), which transposes the European Directive 2014/89/EU and provides guidance for local planning of marine and coastal space, Italy still hosts fifteen different regional models and plans for the governance of marine territory. These, in turn, generate additional planning instruments at the municipal scale, with varying degrees of regulatory force.

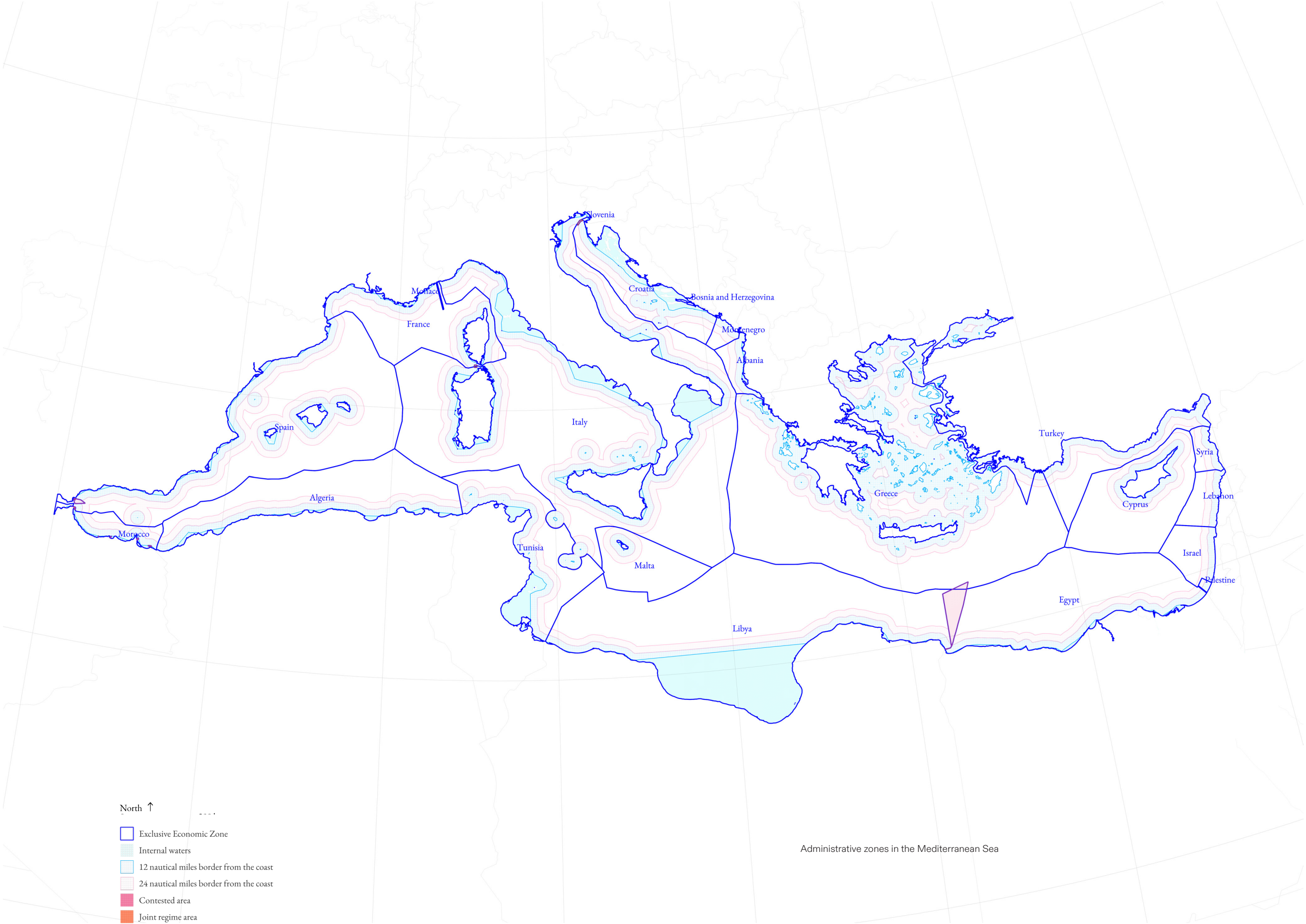
Algeria: The African state is the largest country bordering the Mediterranean, and its coastline hosts the majority of its population. Since independence (1962), its population has more than quadrupled, leading to complex challenges in territorial governance. The adopted planning instruments—the Master Plan for Development and Urban Planning (PDAU) and the Land Use Plan (POS)—have not always been effective and have had limited impact on controlling urban growth (1). Despite the coordination efforts of the Schéma National d'Aménagement du Territoire (SNAT 2030), the coexistence and competition between wilāyāt and municipalities make territorial governance complex, both on land and along the coast.

Nevertheless, water and coastal governance - regulated by Law 02-02 (2002) - includes some noteworthy elements, such as the adoption of the National Strategy for Integrated Coastal Zone Management 2015–2030, later renewed in 2021 as the ICZM Strategy 2020–2030. This strategy aims to coordinate the actions of various ministries and stakeholders in order to manage the coast in an integrated way and to align policies on urban development, environmental protection, sustainable use of coastal and marine areas, and territorial and maritime planning.

Cyprus: As an island state, Cyprus has a structural relationship with the sea, shaping its economy, ecology, and territorial organisation. Maritime space is vital for tourism, fisheries, and energy infrastructures, yet it is increasingly stressed by environmental change, including the rapid tropicalisation of the Mediterranean, evident in the spread of invasive species such as the lionfish. Despite the need for coordinated marine planning, the long-standing political division between the Greek Cypriot south and the Turkish Cypriot north fragments governance frameworks. This separation, reinforced by unresolved conflicts, makes cooperation on maritime spatial planning nearly impossible, hindering integrated management of shared marine ecosystems.



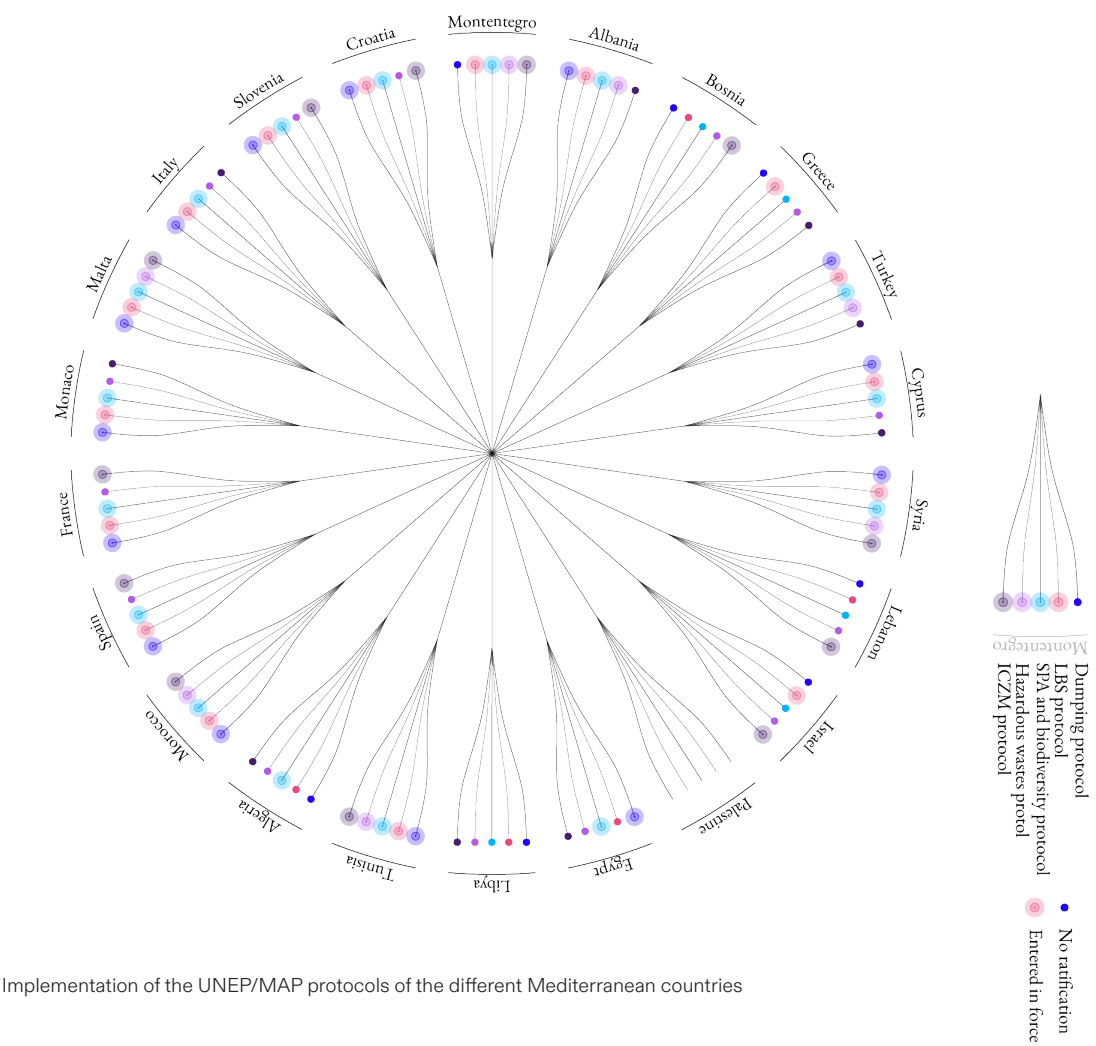
Overview of the 22 Mediterranean countries



An Attempt to Cooperation

The extreme complexity and fragmentation of the existing administrative frameworks for the governance of Mediterranean waters—briefly outlined here and deserving of further in-depth analysis—have, over the years, stimulated numerous attempts at cooperation and co-management within the institutional sphere. The most relevant and ambitious initiative from a spatial governance perspective is arguably the Mediterranean Action Plan of the United Nations Environment Programme (UNEP/MAP), established in 1975 with the aim of coordinating activities for the protection of the sea through a regional approach. UNEP/MAP played a fundamental role in the adoption, by 21 Mediterranean states (excluding Palestine), of the Barcelona Convention: a multilateral legal framework for the sustainable and healthy use of Mediterranean resources. Today, it represents “the comprehensive institutional, legal and implementation framework” to “fulfill the vision of a healthy Mediterranean Sea and Coast,” and over the past forty years it has worked to address the climate crisis and to coordinate actions and efforts among Mediterranean countries. Among its most significant achievements are protocols and amendments that provide a reference framework for national laws and strategies concerning the exploitation of marine resources and the protection of particularly fragile ecosystems. Equally important is the publication of long-term strategies for the future of the sea, such as the Mediterranean Strategy for Sustainable Development (MSSD) 2016–2025, which was revised and discussed at COP 24 in Cairo in December 2025. Through the analysis of Plan Bleu (MED 2050)—a visionary document linked to the MSSD 2016 - 2025 - the centrality of the climate challenge for the future of Mediterranean territories clearly emerges, particularly in relation to the fragility of their ecosystems and economies, as well as the importance of adopting a collaborative approach among member states in both adaptation and mitigation processes. Of particular interest is the construction of six scenarios projected to 2050, which outline possible future development trajectories for the Mediterranean region, linking environmental uncertainty to different forms of territorial governance. The interpretation of the results of this speculative exercise clearly reveals a correlation between cooperation and success in managing processes aimed at ecological and social transition, as well as between institutional fragmentation, inertia, and socio-environmental crisis. Starting from Scenario 1, “Inertia, Marginalisation of the Mediterranean, and Pragmatism,” Plan Bleu develops progressively towards Scenario 6, “The Mediterranean Sea: A Global Common.” Along this spectrum, it also analyses economically driven scenarios such as “Growth at All Costs in a Fragmented Mediterranean” (Scenario 3), as well as scenarios oriented toward sustainable development, such as Scenario 5, “Another Sustainable Development Model Specific to the Mediterranean.” In each case, the urgency and complexity of the Mediterranean’s socio-environmental challenges clearly emerge, highlighting the necessity of cooperation in order to act through targeted responses at the appropriate scale of change. Although the efforts and initiatives proposed by UNEP/MAP are remarkable and genuinely aimed at protecting the Mediterranean Sea through cooperation and co-management, their implementation remains fragmented and largely dependent on the willingness of each contracting state. Actions, proposals, and protocols are in fact ratified and translated

into national legislation in a discontinuous and uneven manner, thereby undermining the effectiveness of a truly unified approach (Fig. 22). Further undermining the aspiration for cooperation is the political and social instability of the region. Throughout the entire period of UNEP/MAP’s operation, the Mediterranean has been the stage for highly significant political and military conflicts - from the dramatic events in the Balkans, to the Middle Eastern coastline, and the Libyan and Egyptian contexts - further exacerbated by overlapping humanitarian crises, such as migration, and persistent economic instability. Within this highly polarised socio-political context, where exclusion and exploitation are commonplace, the insights and proposals of UNEP/MAP largely remain abstract, proving unable to mend the structural institutional and urban fragmentation of the 22 states bordering the Mediterranean Sea.



Implementation of the UNEP/MAP protocols of the different Mediterranean countries



False colours satellatie image of fisherman activity in the Adriatic Aea

Fossa di Pomo: a Cooperative Model

The potential of a cooperative approach to Mediterranean water management is underscored precisely by the few successful examples of cooperation that currently exist. Among these, the case of the Fossa di Pomo (Italian) or Jabuka Pit (Croatian) is particularly noteworthy. It is a deep depression, approximately 250 meters deep, located midway between Croatia and Italy. The events related to the pit are also described in *Tropico Mediterraneo* by Liberti and are recalled here to provide a concrete example of the importance of cooperation.

The Adriatic Sea is one of the Mediterranean regions most affected by the processes of tropicalisation, due both to the shallow depth of the sea and to a local economy that is strongly based on fishing and aquaculture practices. These practices, also discussed in the other analytical zoom-in, are at serious risk as a result of invasive species, human short-sightedness, and rising sea temperatures. Around the Fossa di Pomo, despite strong protests from local fishermen, a no-fishing zone was established in recent years, accompanied by two buffer areas located within the Italian and Croatian Exclusive Economic Zones (EEZs), where fishing is strictly limited and subject to authorisation.

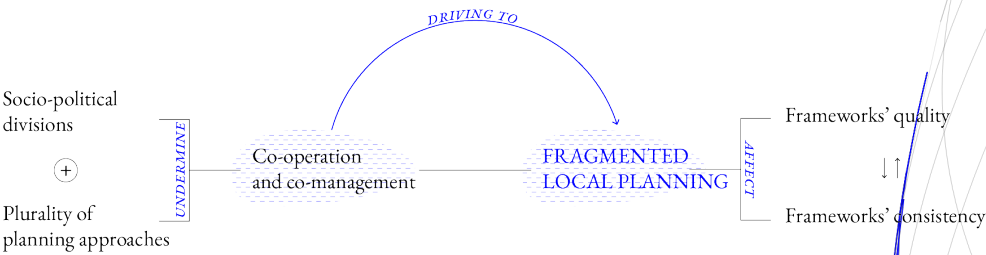
This process, which began in 2015 and concluded with the establishment of permanent restrictions in 2021, demonstrates both the extreme complexity of building dialogue between local stakeholders and different regional and national governments, and the crucial importance of cooperation itself. The Fossa di Pomo is, in fact, “the only truly effective area of absolute restriction in the Mediterranean”, where constant monitoring is carried out by authorities and - most importantly - by the fishermen themselves, who have come to understand its systemic and ecological importance.

The presence of restricted areas has enabled the regeneration of a so-called nursery area, where marine fauna can reproduce and grow undisturbed, particularly hake and scampi. This has led to an increase in marine biodiversity in the surrounding areas, as well as a rise in fish stocks available to local fishermen.

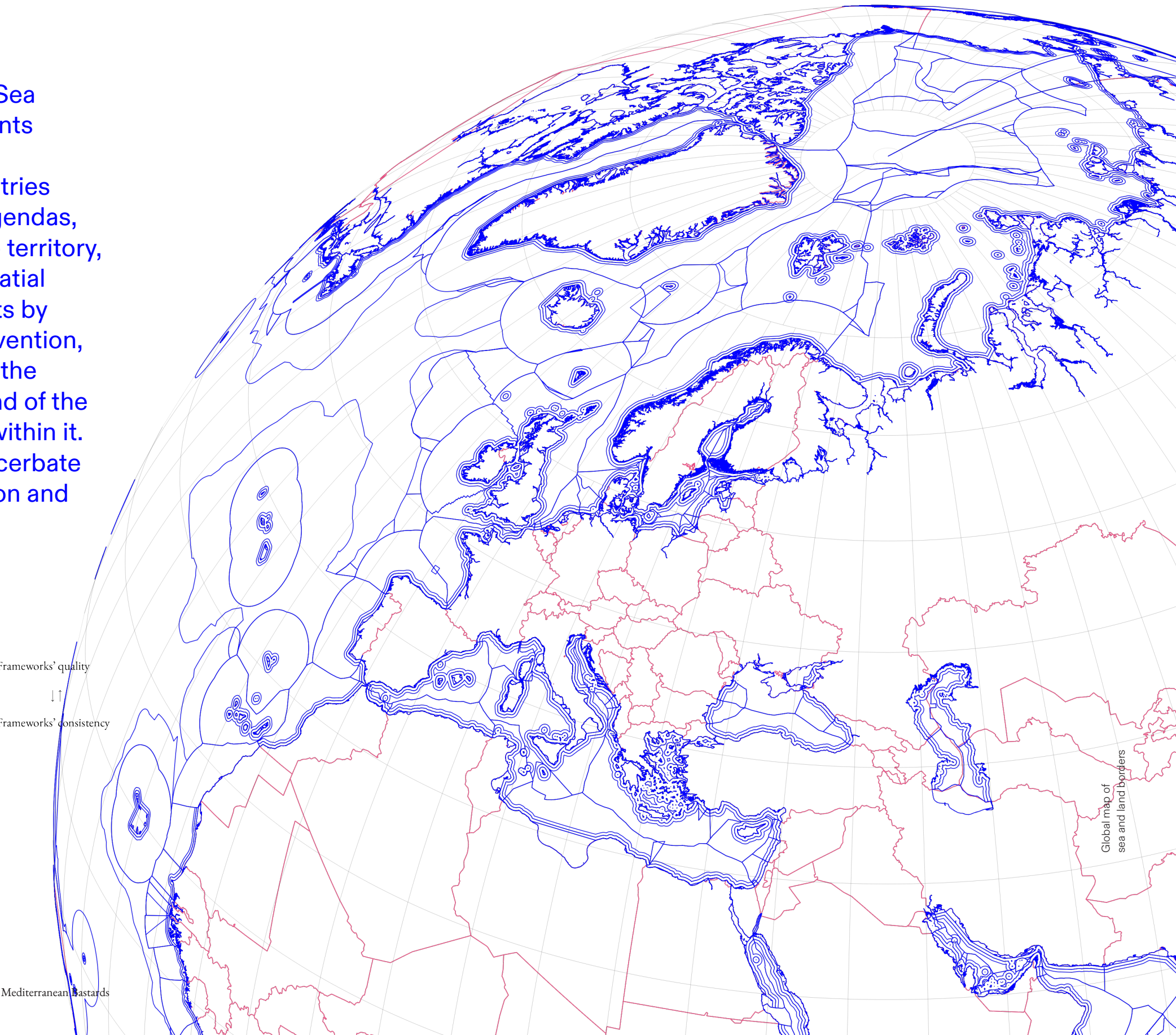
Beyond highlighting the importance of self-regulation mechanisms in the exploitation of natural resources and the need to limit industrial fishing processes, the experience of the Fossa di Pomo emphasizes the central role of cooperation in managing transboundary processes, such as the governance of aquatic territories in relation to climate change. This experience represents an important precedent with undeniable ecological success, which can be replicated in many other contexts, a small glimmer of hope within a sea of fragmentation and division.

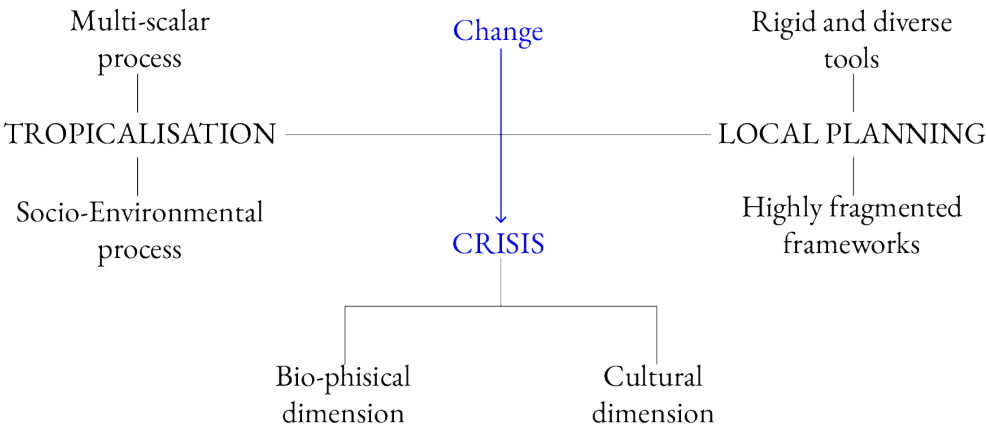
1.3.1 Political Problem Statement

Along the coasts of the Mediterranean Sea lie 22 countries, spanning three continents and internally divided into multiple local administrative units. Each of these countries projects economic interests, political agendas, and planning intentions onto the marine territory, within the complex system of marine spatial governance. Despite coordination efforts by frameworks such as the Barcelona Convention, this diversity results in fragmentation in the management and planning of the sea and of the transformative processes taking place within it. Political and social divisions further exacerbate this fragmentation, hindering cooperation and the development of long-term visions.



Mediterranean bastards





1.4 Bio-Political Problem Statement

Since the Great Acceleration[1], the Mediterranean Sea has lost much of its ability to regulate climate and wellbeing due to global warming and harmful human activities. Warming 20% faster than the global average and facing a projected one-metre sea-level rise by 2100, the basin is becoming the planet’s warmest and saltiest sea[2], drifting toward tropical conditions. Traditional planning tools, constrained by administrative borders, are unable to respond adequately to tropicalisation and fail to recognise the basin’s needs, the diversity of its bioregions, and the richness of its shared environmental and cultural heritage, elements and processes that traverse the Mediterranean’s coasts and waters, unrestricted by institutional boundaries. This undermines the Mediterranean’s ability to adapt and evolve, along with that of its inhabitants and its cultural fabric, because current planning systems are unable to think globally and locally at the same time. It is precisely in the gap between the extreme complexity and multiscalar nature of the challenges brought by climate change, first and foremost tropicalisation, and the structural rigidity of modern planning that change turns into crisis.

[1] Refers to the period of rapid global socio-environmental change since the mid-20th century (“Great Acceleration”)
[2] Based on the 2021 WWF report “The Climate Change Effect in the Mediterranean: Stories from an Overheating Sea,” highlighting Mediterranean warming, salinity increases, and advancing tropicalization.

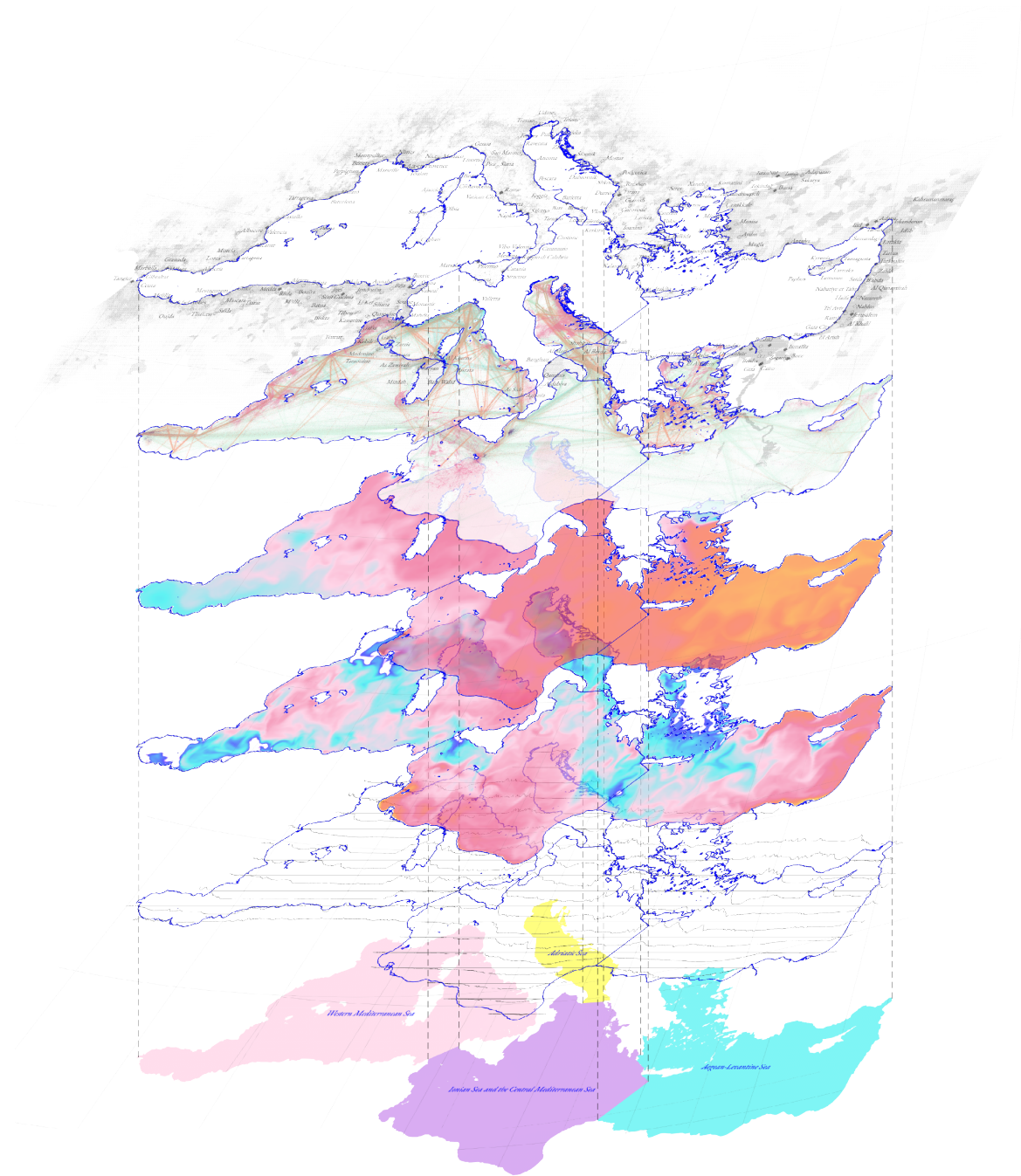
1.5 Design Hypothesis

Ecoregion as a Design Hypothesis

Reflecting on this gap and attempting to project the biophysical and political problematization into a more propositional design phase, I identified a layer related to the Mediterranean ecoregions (provided by the International Council for the Exploration of the Sea, ICES). This layer divides the Mediterranean Sea into four ecoregions, proposed by ICES “to support the implementation of the ecosystem approach” in Mediterranean waters. Their delineation does not follow administrative boundaries, but rather the natural body and organization of ecosystems, and aligns with theories defining terrestrial bioregions, realms, and biomes. Ecoregions function as a framework for research, assessment, and the understanding of ecosystems and the natural world; similarly to bioregions, they can also serve as a framework to “restore and maintain local natural systems,” as Peter Berg affirms in his introduction to bioregionalism (2002).

Projecting this problematization into a design perspective and confronting it with the concepts of ecoregions and bioregionalism, I began to ask: What if, instead of using EEZs, contiguous zones, and other juridical frameworks as the basis for planning the transition of Mediterranean aquatic territories, we used ecoregions instead? Ecoregions understood as both a tool and a lens through which to comprehend the effects of tropicalization and, at the same time, to interpret processes and practices of territorialization rooted in Mediterranean regions. Ecoregions whose boundaries are defined in relation to the ontology of the natural system they belong to; which internally share ecosystems and living conditions; and which, precisely for this reason, may display similar patterns in how they are affected by the process of tropicalization. Ecoregions that, by sharing specific natural and ecosystemic conditions, have likely shaped the ways in which humans interact with and exploit aquatic landscapes, as well as how they inhabit, cultivate, and transform their coastlines.

Moreover, from a practical perspective, due to their large scale, ecoregions can simplify complex governance processes by offering a post-anthropocentric alternative to address the structural administrative fragmentation of the Mediterranean area, while simultaneously providing a more “manageable” scale through which to rearticulate the unity of the basin. Ecoregions therefore represent a working hypothesis for addressing the dual biophysical and political challenge. They constitute a tool for responding to the effects of the climate crisis through adaptation and mitigation, by adopting a system of reference that operates at the same scale as the transformative processes affecting Mediterranean territories. Furthermore, a first - preliminary - overlay (Fig. 29) between ecoregional boundaries and the processes of climatic transition and spatial exploitation mapped in the previous sections clearly reveals a stronger correlation with ecoregional borders than with institutional ones, thereby reinforcing the validity and relevance of this hypothesis.



Ecoregions as a lens to read tropicalisation and human activities in the Mediterranean Sea

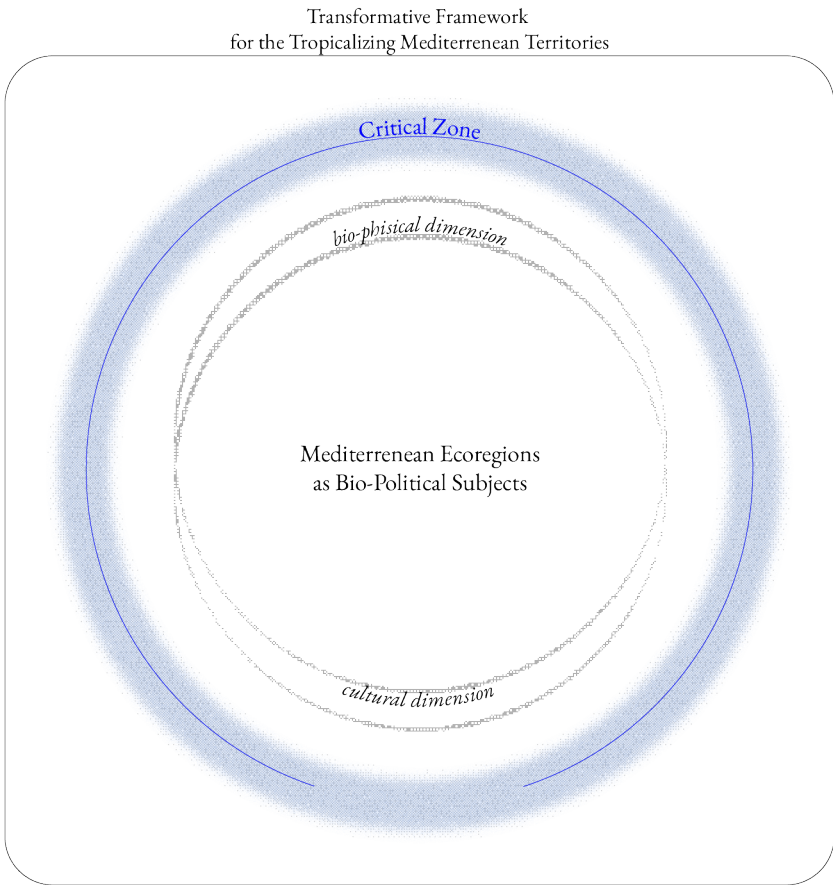
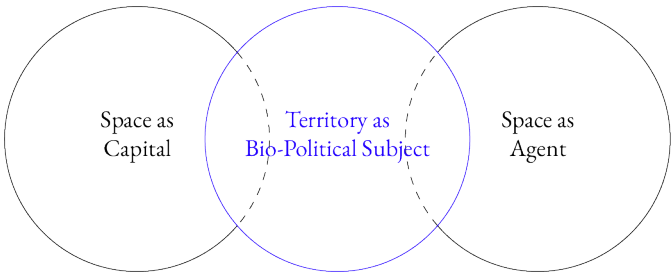
1.5.1 Conceptual Framework

Building upon the design hypothesis and the problematisation framework presented earlier, the conceptual framework is developed. Within it, the proposal that this thesis aims to explore is articulated: the recognition and adoption of Mediterranean ecoregions as subjects of biopolitics, through which to construct a project for the transition of their waters and coastlines. Here, the notion of territory is understood not merely as capital or as a passive support for human life, but also as agent-actant that shapes and conditions the lives of its human and more-than-human inhabitants. Territory is simultaneously the result and the generator of a continuous process of modification and interaction between its biophysical and cultural dimensions.

This ontological process - and the subsequent speculative phase - unfolds and is defined within the Critical Zone: the thin layer of the Earth where life exists and develops. Its multidimensionality and interconnectivity constitute the operational ground for defining a project of transformation of Mediterranean territories, as well as for exploring the potential of ecoregions as a speculative and innovative design instrument.

Reading ecoregions as subjects of biopolitics implies a paradigmatic shift from a human-centered approach to the governance of marine territories toward an approach that recognises space as nature and design as an enabling instrument. This perspective is grounded in three fundamental conceptual shifts, closely connected to the notion of the Rights of Nature that underpins the study cluster.

The first shift moves from the use of national and institutional boundaries toward the adoption of ecoregions as the primary administrative unit of reference, as it is within them that life is produced, organized, and placed at risk. The second shift entails a transition from an approach focused on the exploitation of natural resources to one oriented toward the regulation and care of the conditions that make life possible, through practices of stewardship and maintenance. The third shift concerns the expansion of the sphere of stakeholders to include the more-than-human inhabitants of the ecoregion.



1.5.2 Theoretical Underpinning

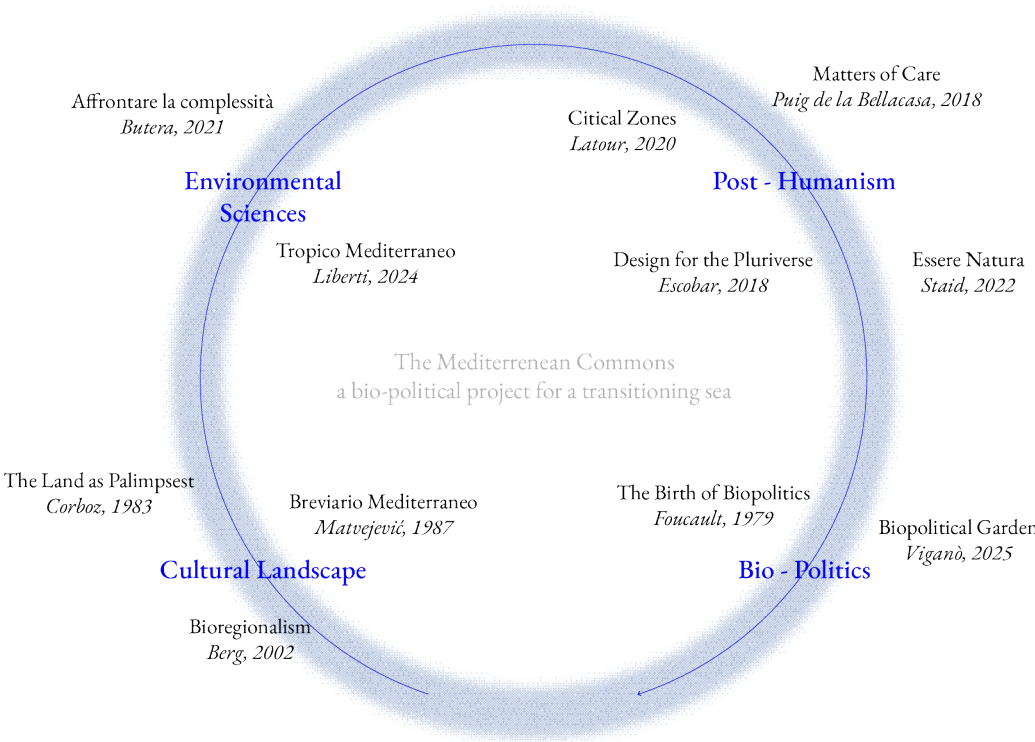
The foundation of the conceptualisation and of the design choices of the thesis lies in a process of reading and positioning with respect to authors and concepts related to the understanding of the biopolitical dimension of space and urban design. These references are synthesised in the theoretical framework shown on the right, which integrates the conceptual framework presented previously. The framework groups the reference literature into four main thematic fields, which constitute the pillars of this research. Their reading and understanding should not be interpreted as compartmentalised, but rather as the outcome of an organic learning-by-doing process.

Environmental Sciences - The understanding of the transformation processes of the Mediterranean and of the centrality of its climate forms the basis of the thesis problematisation. In addition to an analysis of environmental processes of major relevance, particular importance was given to interpretative approaches to these processes, both site-specific (Liberti) and more general (Butera). Understanding the multidimensional nature of the environmental challenge, the uncertainty it generates - within which we are required to design - and the endemic complexity of the climate crisis represents a key step in the development of the thesis.

Post-Humanism - The thesis is developed within the thematic cluster Rights of Nature, a stimulating research group which, through lectures, exchanges, and discussions, introduced me to a non-anthropocentric approach to design practice and to the understanding of territories. Several key concepts have expanded my understanding of the problem and stimulated critical thinking, including the critical zone, pluriversalism, Donna Haraway's cyborg, as well as reflections on care and on a multi-natural or multi-species approach to design. Although the understanding of these authors is still an ongoing process, I consider it essential in spatial design to observe the outcomes and modes of interaction between human and more-than-human actors in Mediterranean territories, as well as to include them among the stakeholders to be addressed through the speculative-propositional phase.

Cultural Landscape - Among the few concepts I am grateful to have learned during my Bachelor's studies - and during my previous, unsuccessful humanities-oriented academic experience - is Corboz's notion of the palimpsest. This concept frames landscape and territory as the result of processes of writing and rewriting, of interaction between nature and culture, between planet and biosphere. It proves indispensable for approaching the understanding of Mediterranean territories and is enriched by the reading of monographs dedicated to this specific spatial context (Mediterranean Breviary), as well as by reflections on the analysis and history of the region.

Bio-Politics - The understanding of Foucault's concept of space, developed through the reading of The Biopolitical Garden by Paola Viganò, represented a turning point in the formulation of a coherent approach to the project of transition of Mediterranean territories. For the French philosopher, space is a device that organises and regulates life, rather than a neutral background element. Space produces behaviors; it separates, orders, and normalises. Starting from this understanding, the biopolitical project, and the recognition of space as a subject of biopolitics, becomes a tool to emancipate its human and non-human inhabitants and to enable life and development within it.



Theoretical framework

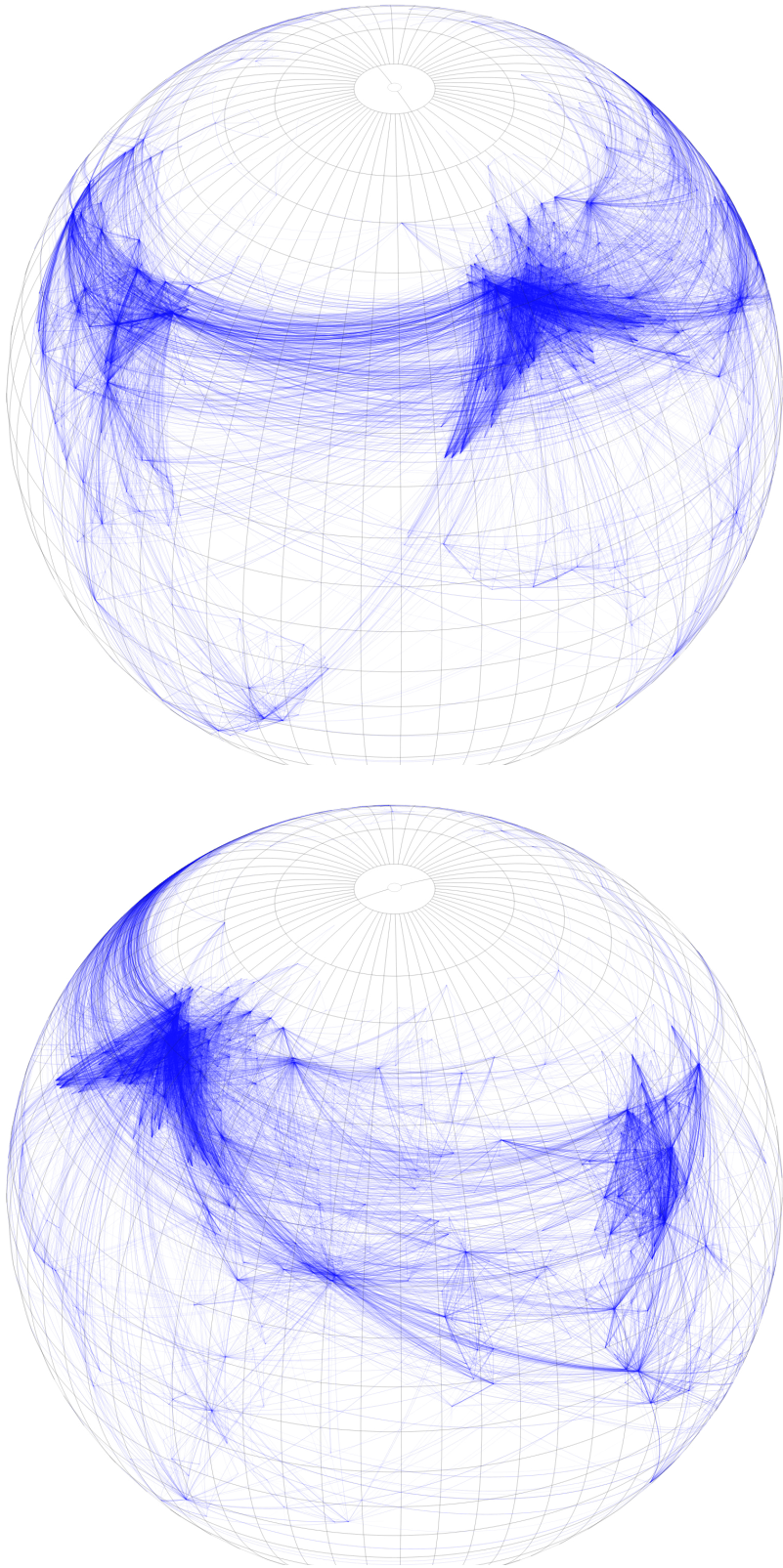
1.5.3 Research Questions

How can eco-regions recognition as bio-political subject inform design agency to foster transformative planning frameworks for a tropicalising Mediterranean?

Preliminary project goals - Originally written before A1 presentation [24.01.2026]
Design and research are oriented toward the proposal of transformative strategies for Mediterranean territories, pathways that aspire to integrate the effects of tropicalization within a post-anthropocentric evolutionary framework.
To this end, one of the main objectives is the mapping of tropicalization processes and the understanding - through cartographic analysis - of their effects on the biophysical-cultural complex of Mediterranean ecoregions.
This mapping is intended to inform the proposal of spatial strategies for the management of tropicalization, with particular attention to human practices of care in relation to marine and coastal territories.
These strategies will then be tested at the scale of an ecoregion - the Adriatic one - in a subsequent speculative design phase, carried out with the aim of assessing the robustness of the proposals and of illustrating transformative pathways at a more manageable scale.
Strategies and design proposals will be developed within a conceptual framework that recognizes territory as a subject of biopolitics, simultaneously understood as both capital and actor.
Strategies and design proposals will also be developed with the intention of informing designers and stakeholders about the urgency of the issues addressed, and of broadening their perspectives toward the importance of a non-anthropocentric approach to spatial planning.

Sub-Research Questions

Eco-Regions as a Entity:
What spatial characteristics define the Mediterranean Adriatic eco-region, and what risks does tropicalisation pose to both human and more-than-human inhabitants?
Eco-Region as a Laboratory:
Which implementation strategies can support adaptation and integration, and what situated practices of care can help redesign the relationship between humans and biosphere within a eco-region?
Eco-Regions as a Dispositif:
How can eco-regional understanding as actor and capital guide the formulation of adaptive strategies to confront the persistent impacts of Mediterranean tropicalisation?



Global map of
flight routes

2. The Bastards

- 2.1 An open atlas of the Adriatic eco-region
- 2.2 The Adriatic Bastards
 - 2.2.1 Taxonomy of the Adriatic Territories
 - 2.2.2 Transects/Bastards
- 2.3 Tropical Risks
 - 2.3.1 Atlas of the risks
 - 2.3.2 RisksXBastards
 - 2.3.2 The Cascade Effect

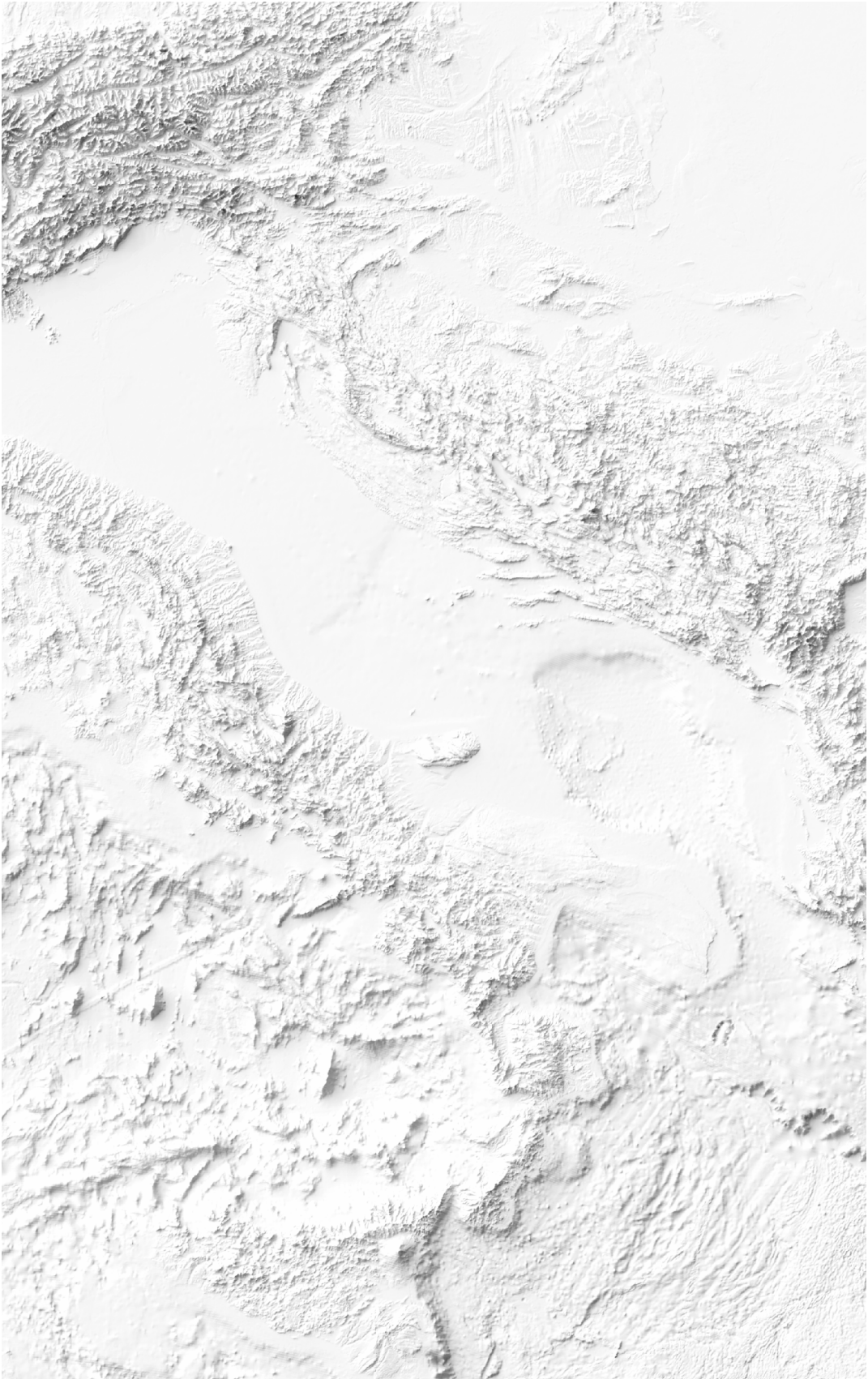
2.1 *An Open Atlas of the Adriatic Eco-Region*

What is the body of the Adriatic Eco-region, how far does it extend, where do its boundaries, epicentres and most fragile areas lie? How does life - human and more-than-human - unfold between its waters and along its coasts? These are rather ambitious questions to which the maps presented in the following pages attempt to provide an answer. An answer that does not claim to be complete or objective, but is the result of an open process of critical mapping, carried out following the lines of inquiry outlined in the previous chapter.

Starting from the morphology of the basin, maps on lithology, land use, coastal typology, navigation intensity, tourism and maritime trade follow in succession. Maps that move across different scales - a fundamental operation for understanding the boundaries of the eco-region's influence and interest - and that seek to combine information regarding both the biophysical and cultural dimensions of the eco-region. Different territorialisation processes are indeed shown throughout the pages of the chapter, in an attempt to illustrate and understand how the palimpsest of the Adriatic Sea and its socio-cultural dimension are lived and inhabited. A thematic focus is directed toward the relationship between economic processes and the territory of the eco-region, with particular attention to the sectors of tourism, fishing/ aquaculture and agriculture - economic activities deeply embedded in the Adriatic territory, which find the very reason for their existence in the exploitation of it.

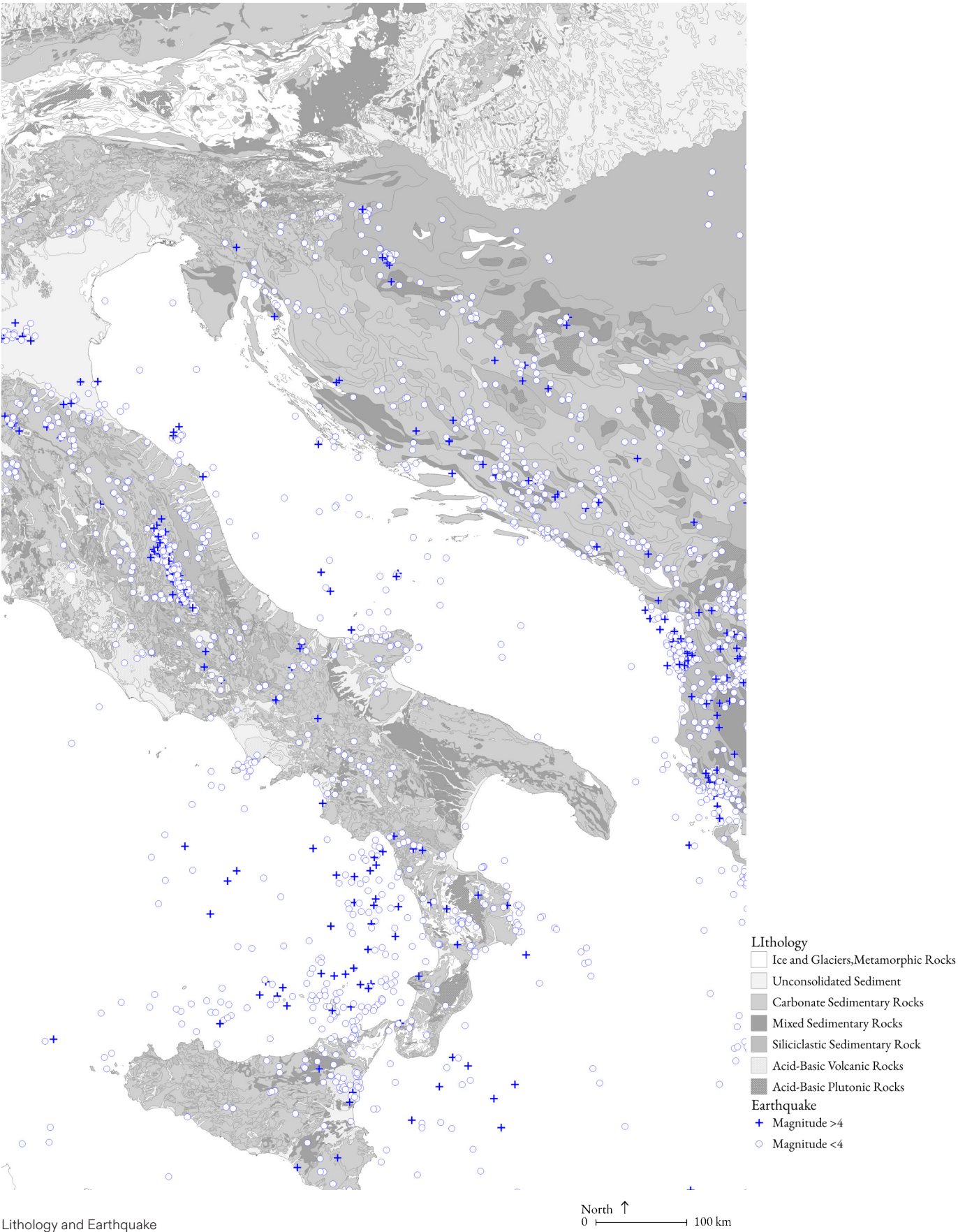
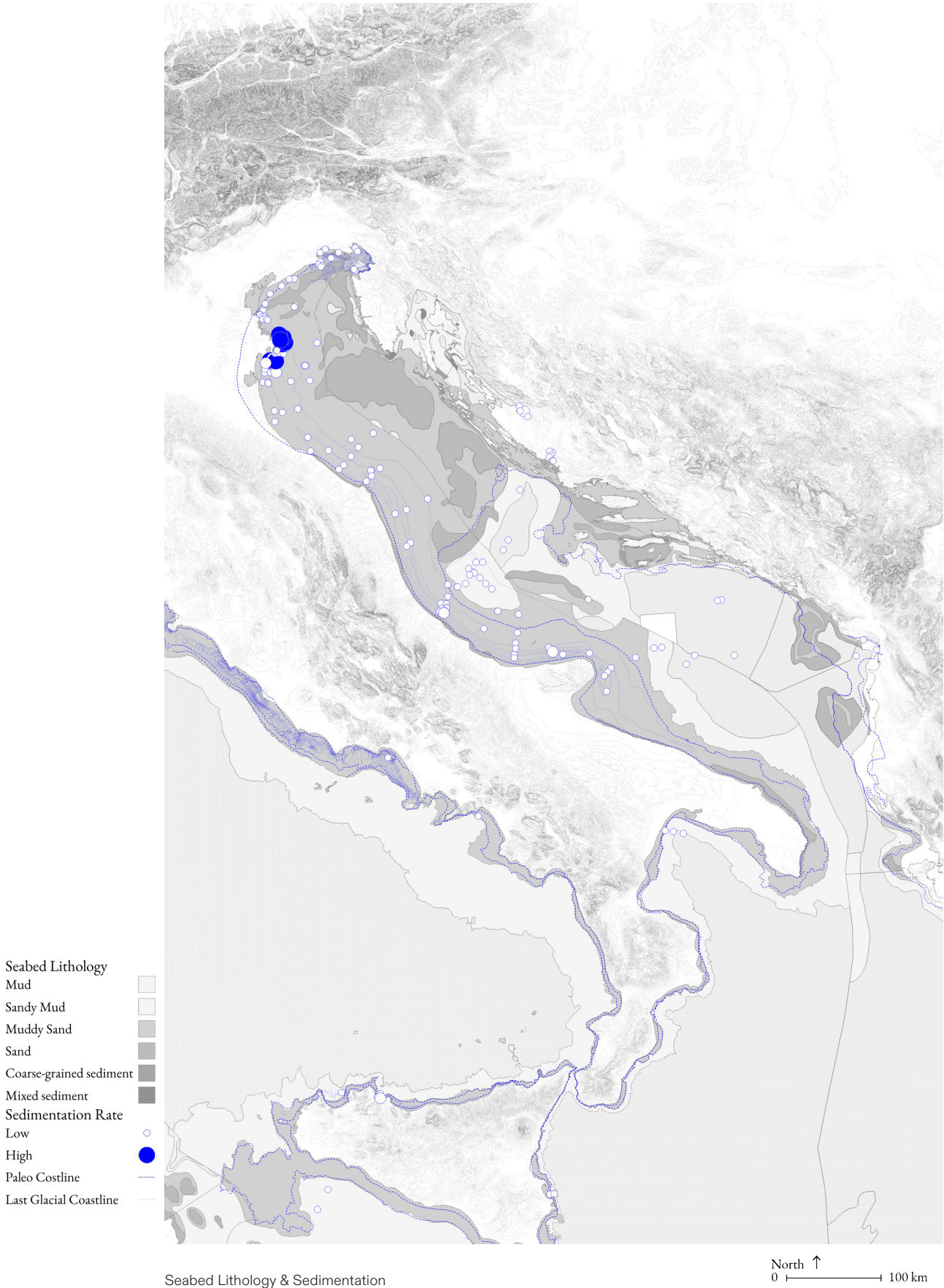
Contents of the following pages:

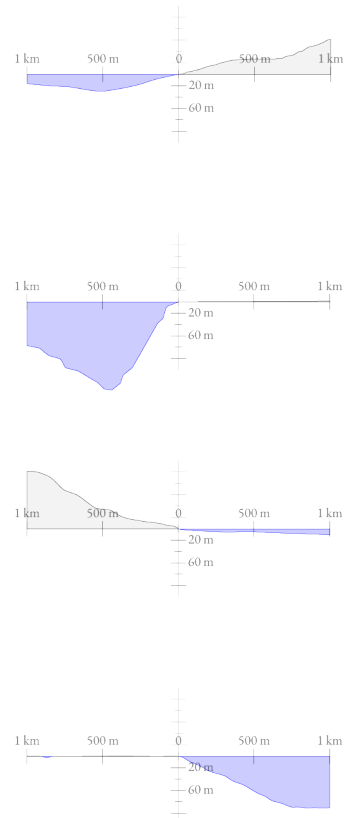
- 01 - Soil & Substrate
- 02 - Coast & Landuse
- 03 - Cities & Demography
- 04 - Ports & Logistics
- 05 - Tourism & Economy
- 06 - Fishing & Alien Species



View of the model of the Mediterranean Seabed

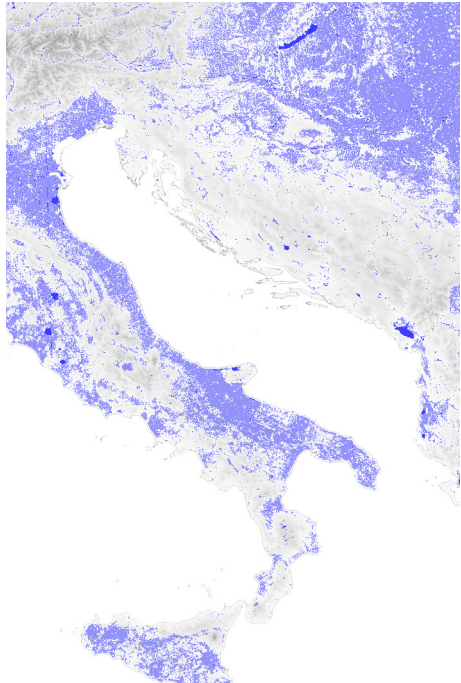
North ↑
0 ————— 100 km



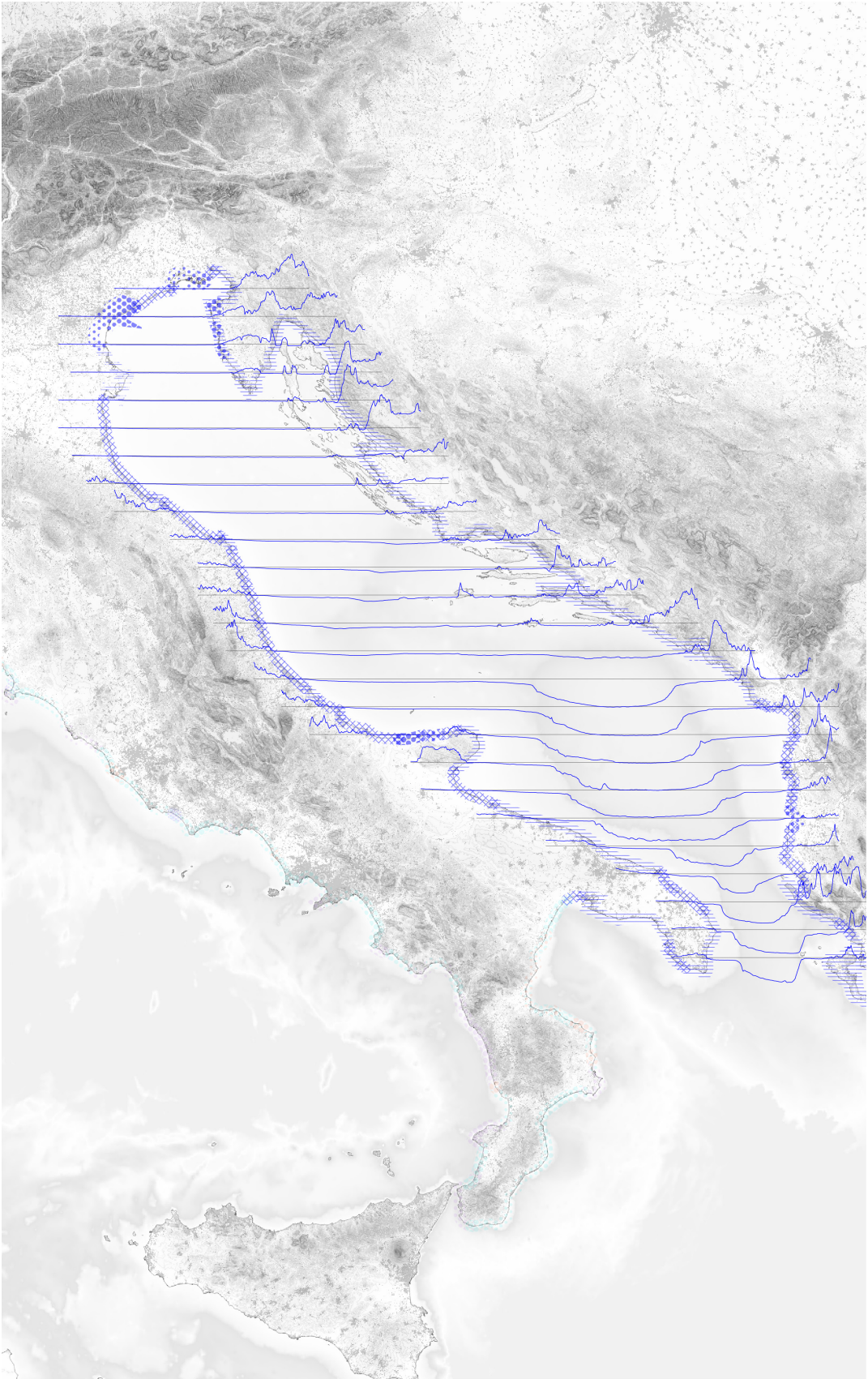
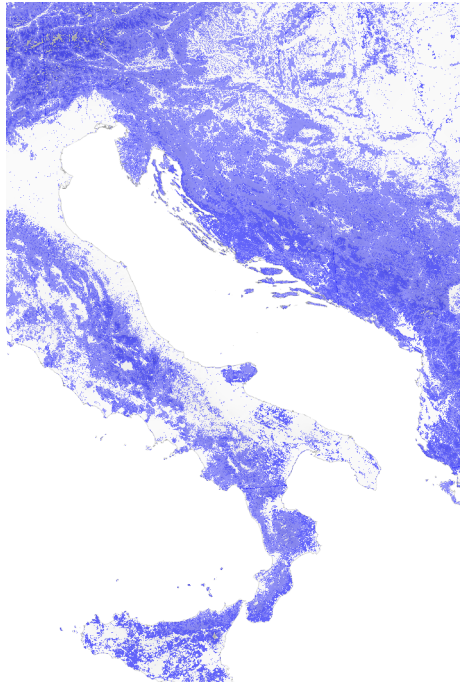


Different coast types

Agricultural landscape

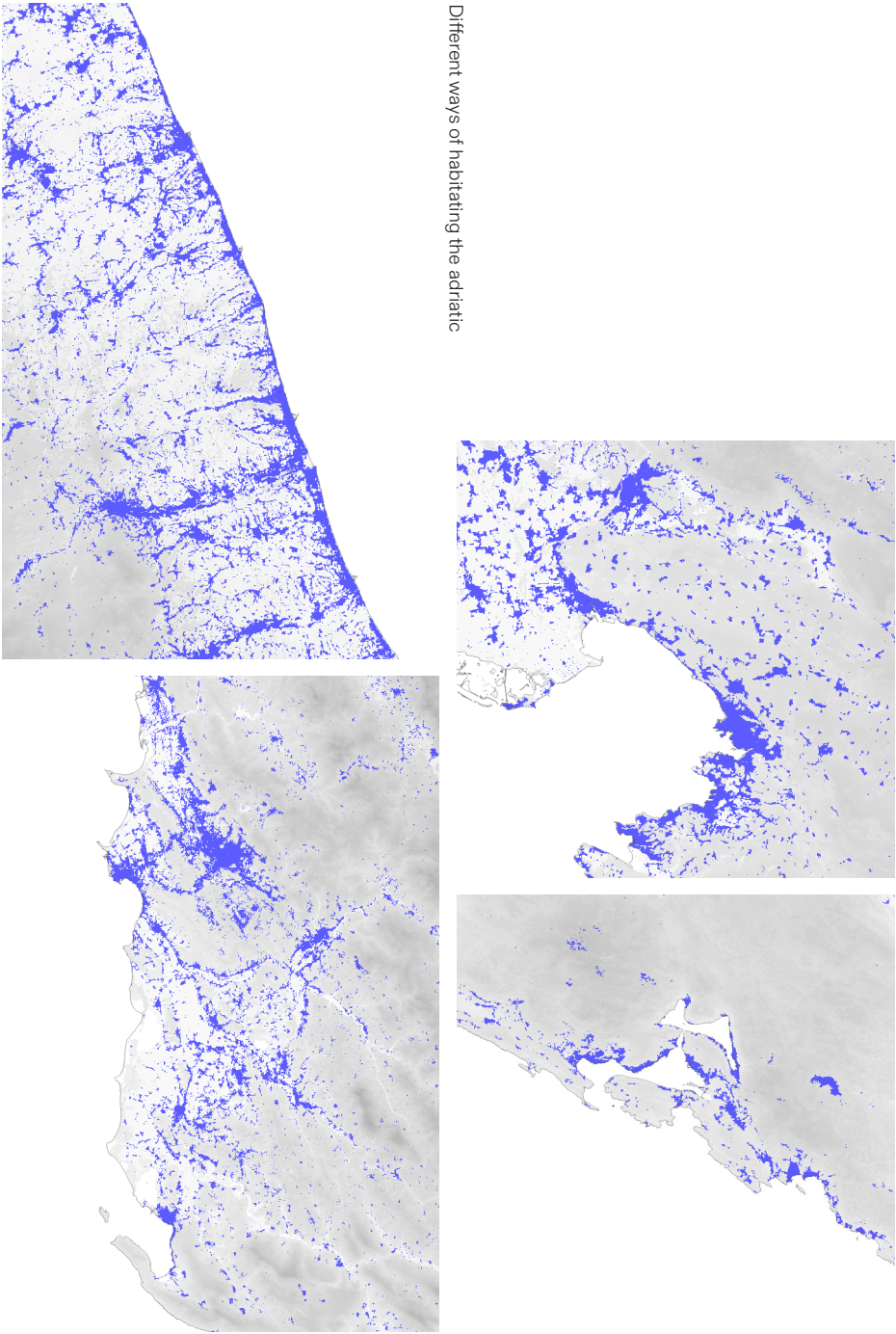
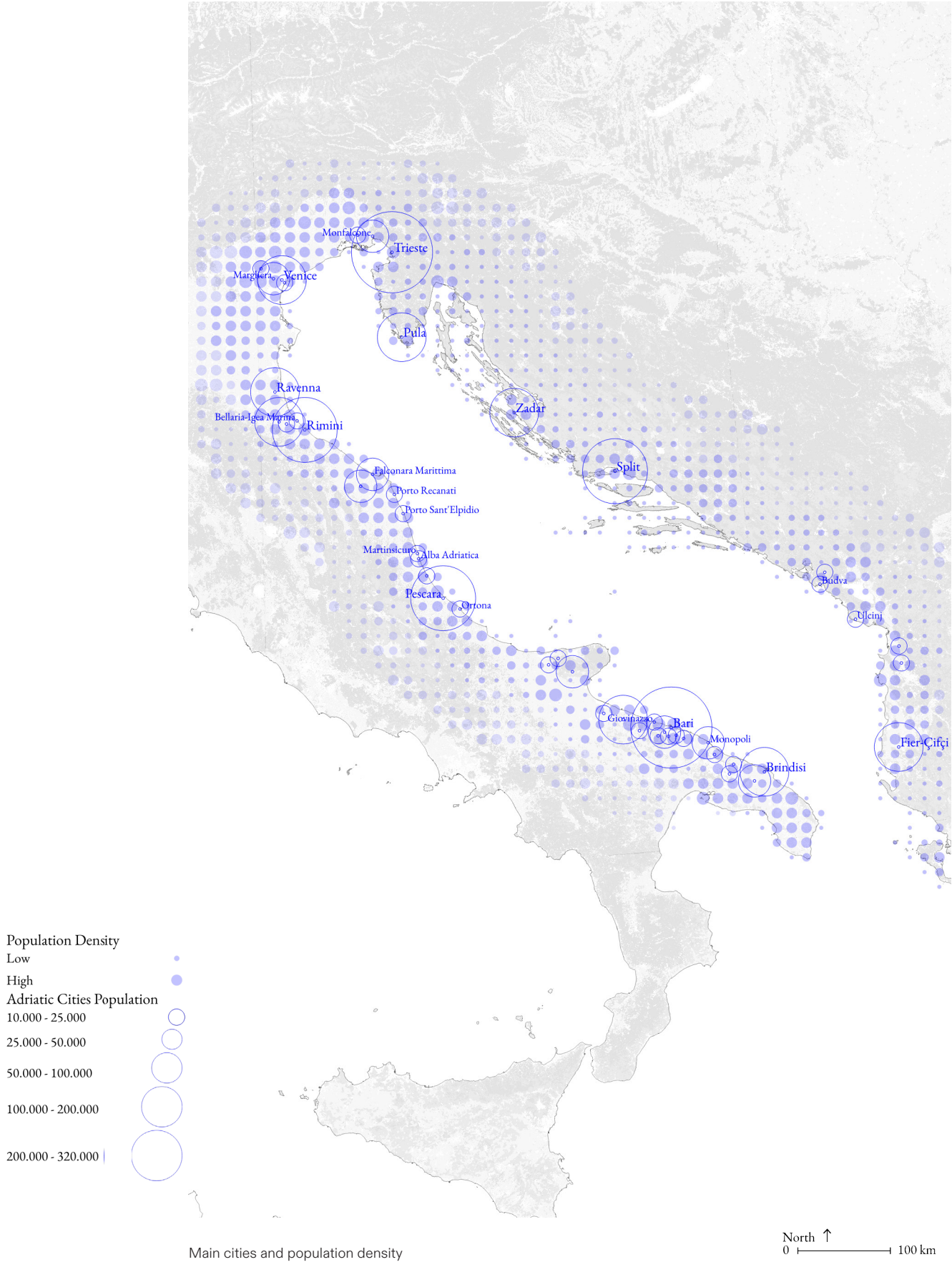


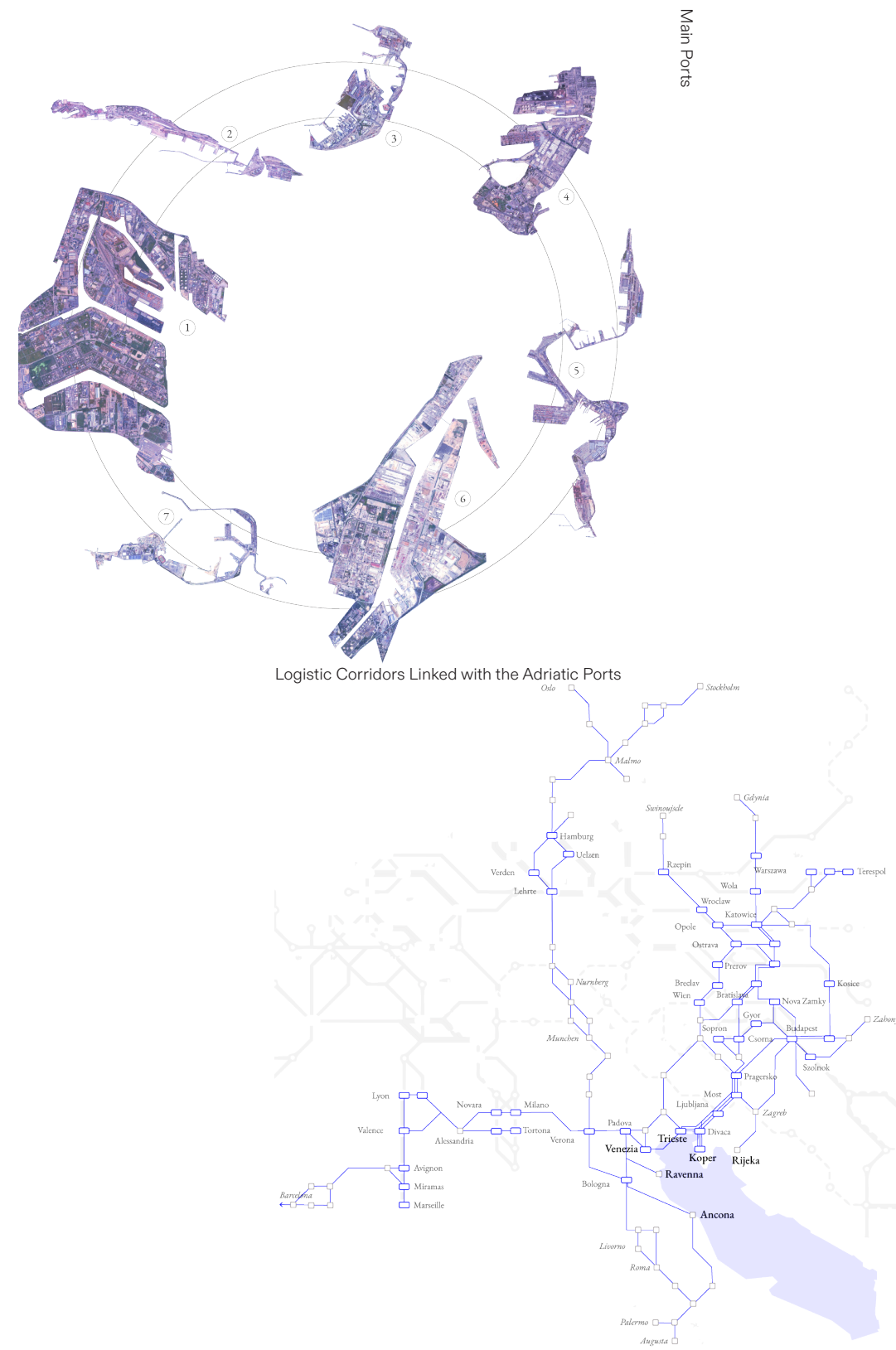
Natural terrestrial landscape



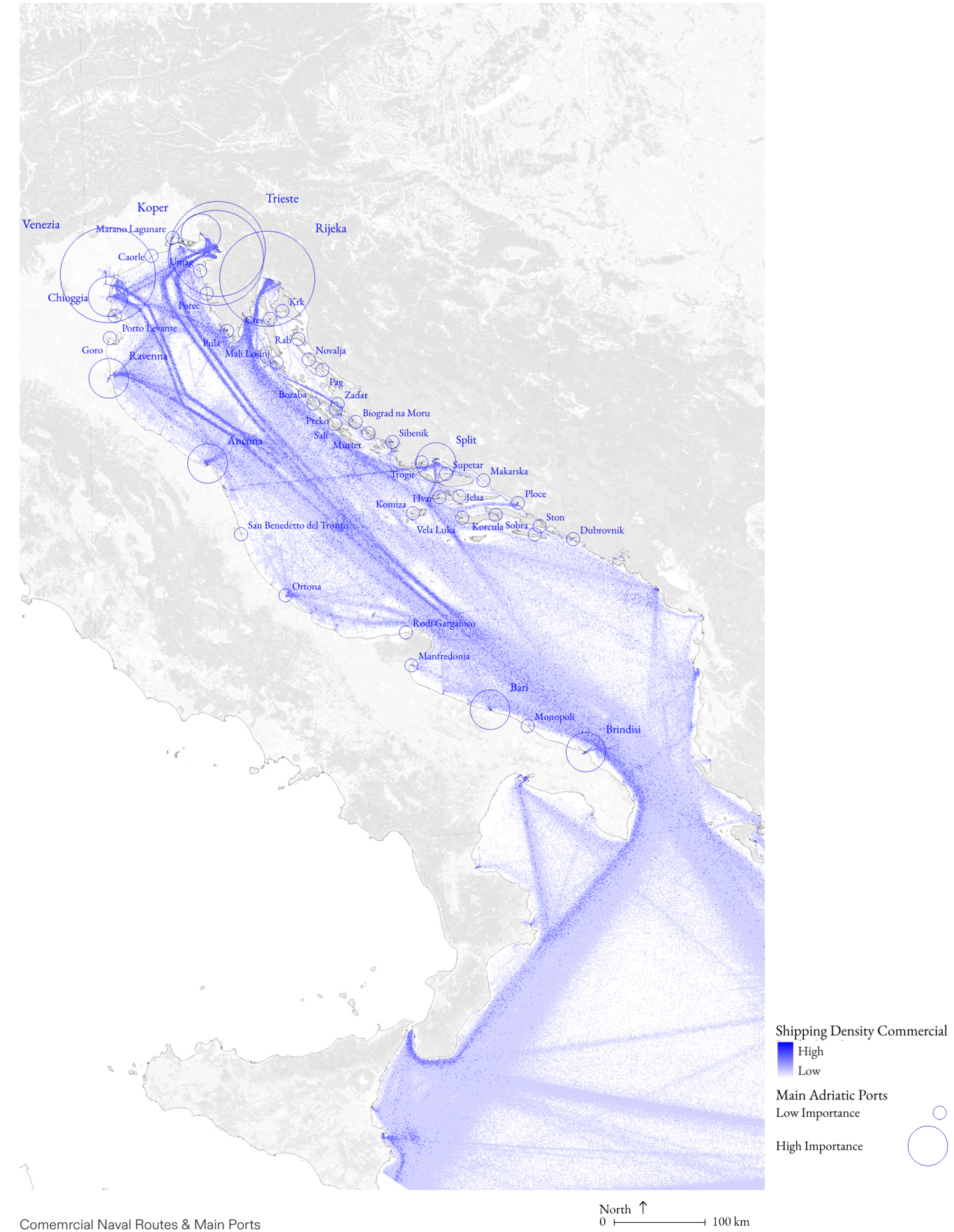
Coasts profile & Type

North ↑
0 100 km

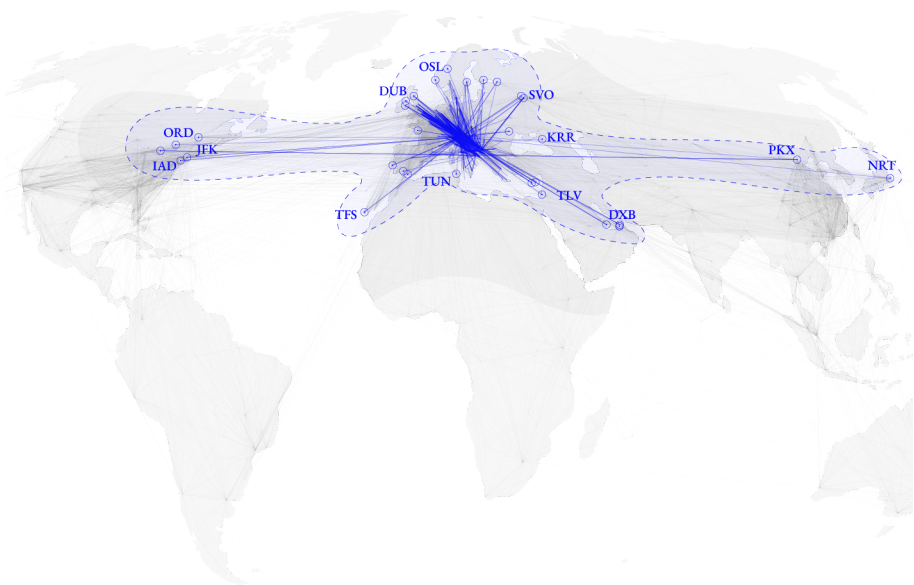
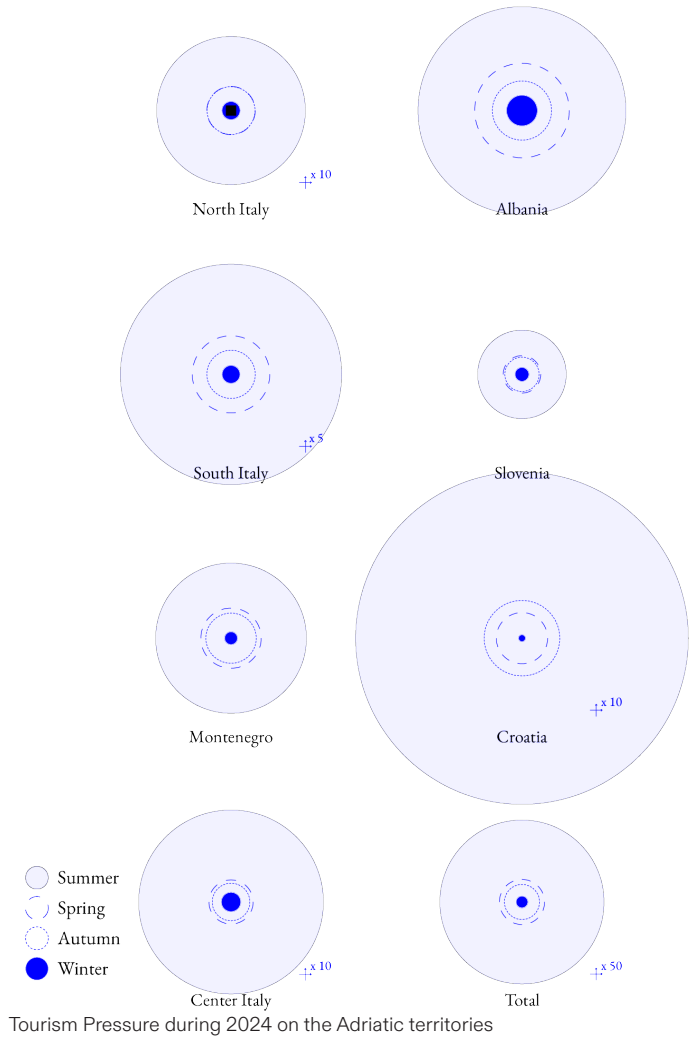




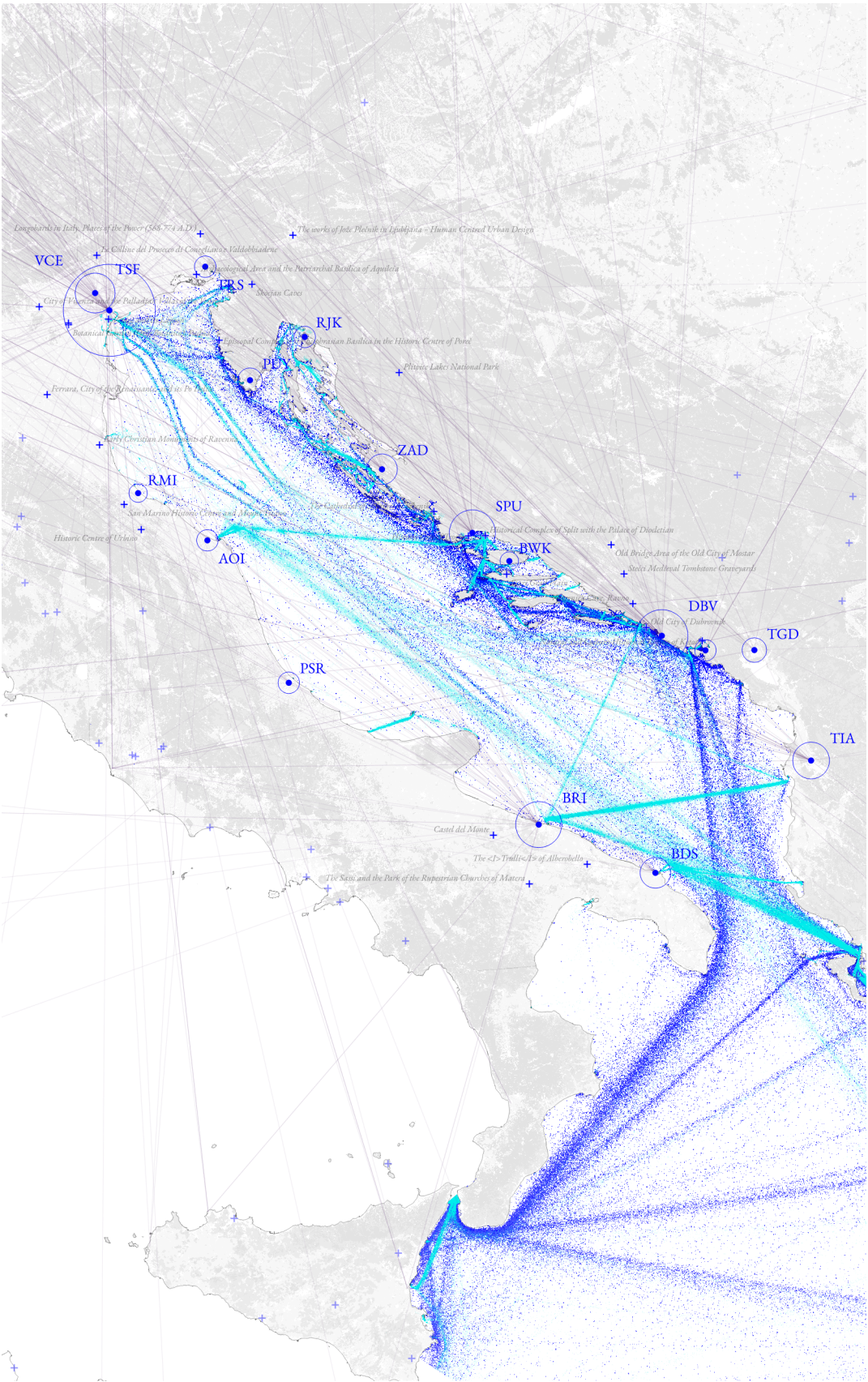
Mediterranean Bastards



Comemrcial Naval Routes & Main Ports

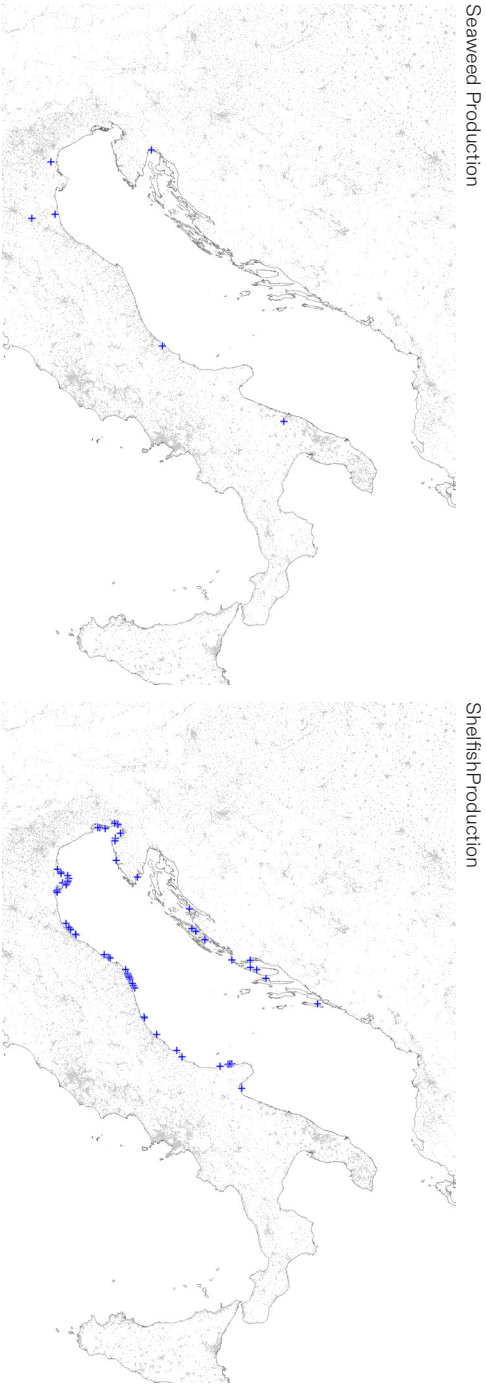
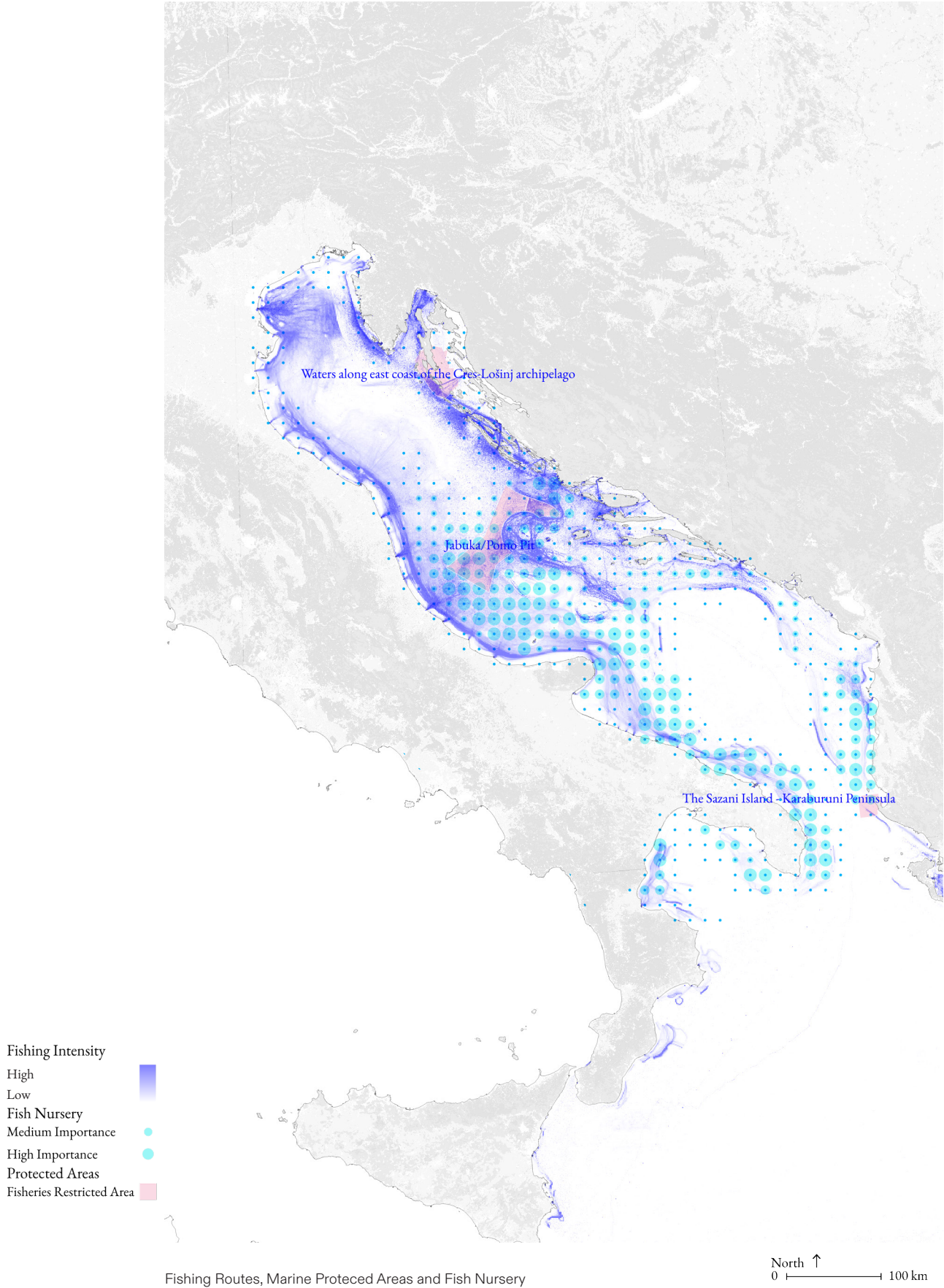


Flights Connections from the Adriatic



Leisure Naval Routes & Main Airports

North ↑
0 100 km



2.2 The Adriatic Bastards

2.2.1 Taxonnomies of the Adriatic Territories

The second part of the chapter presents an attempt to give structure and category to the body of the Adriatic eco-region, observed through the operational lens of spatial design and the thematic lens of Mediterranean tropicalisation. Through a structured spatial analysis combining data on the position, morphology and/or bathymetry, and human use of these spaces, it was possible to construct a taxonomy of the different Adriatic territories - both marine and terrestrial. This complex process, carried out in a GIS environment, identified 33 territorial categories (20 terrestrial and 13 marine), calculated on existing administrative units in the case of land areas, and on hexagons of 10 kilometres in diameter for marine areas (which lack local administrative reference units). For the purposes of the research, the taxonomy operates on two levels: it returns a categorisation that is complex yet manageable during the design phase, and it defines the boundaries of the eco-region's body in a more refined way than a simple areal buffer around the Adriatic coastline. These boundaries are naturally variable and dynamic depending on the thematic lens through which one chooses to approach the research, and - following the adopted approach - they yield a novel transnational geography that follows the body and characteristics of the territory and the territorialisation processes that inhabit it.

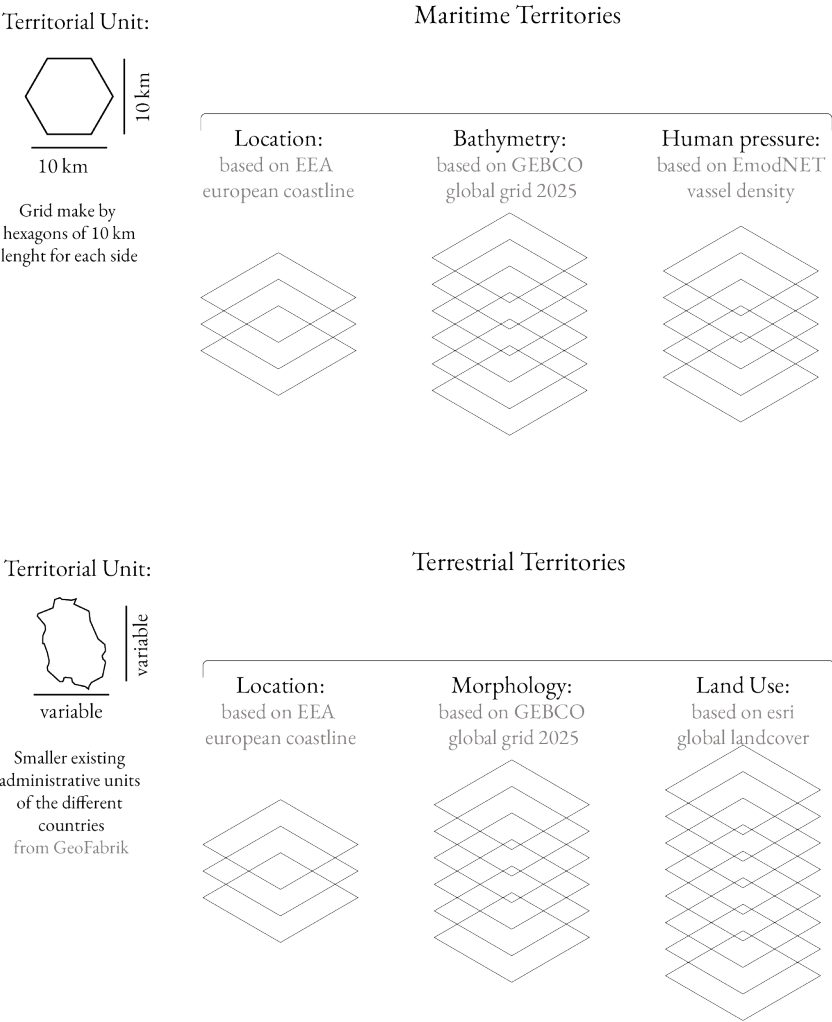
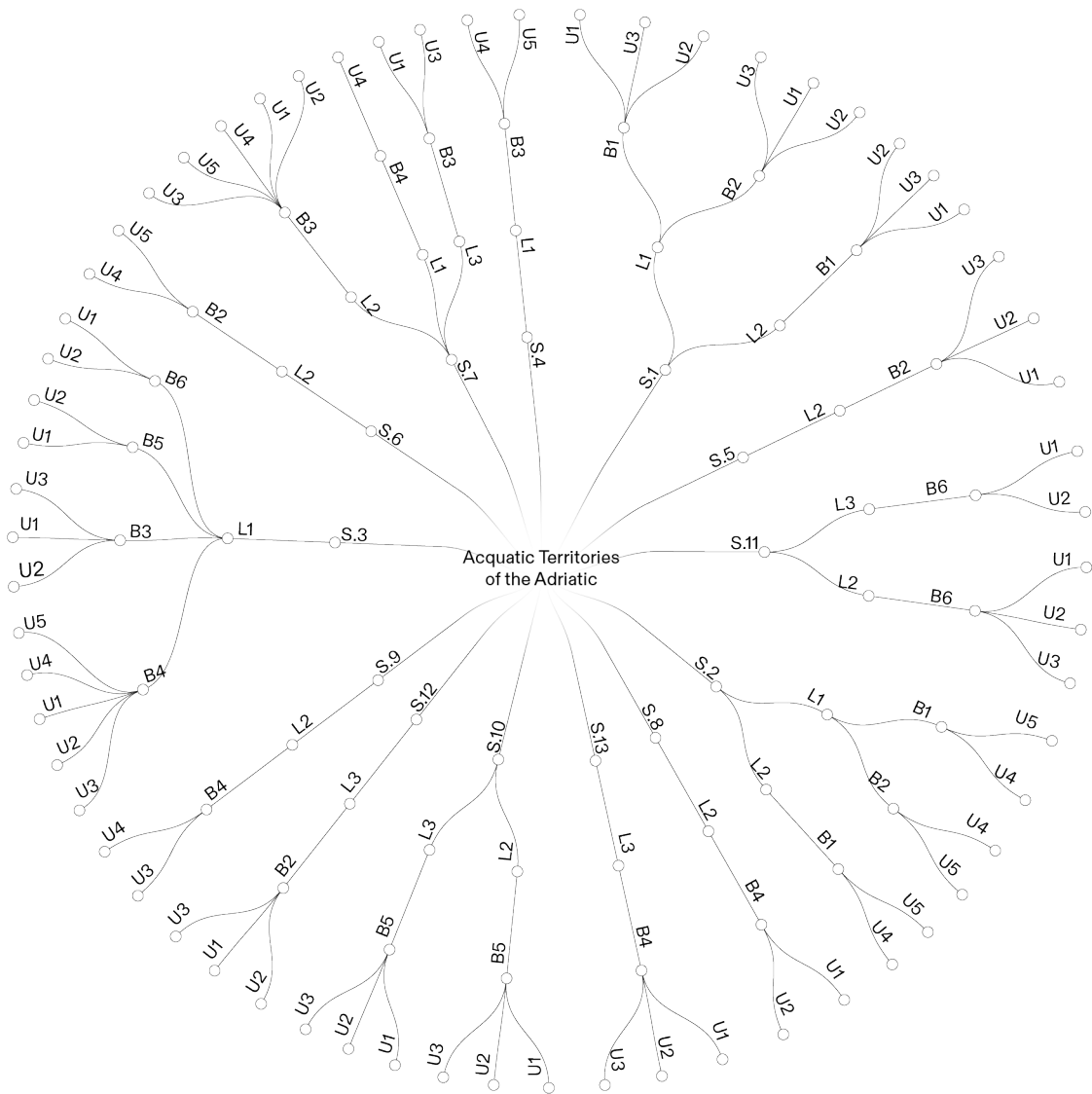


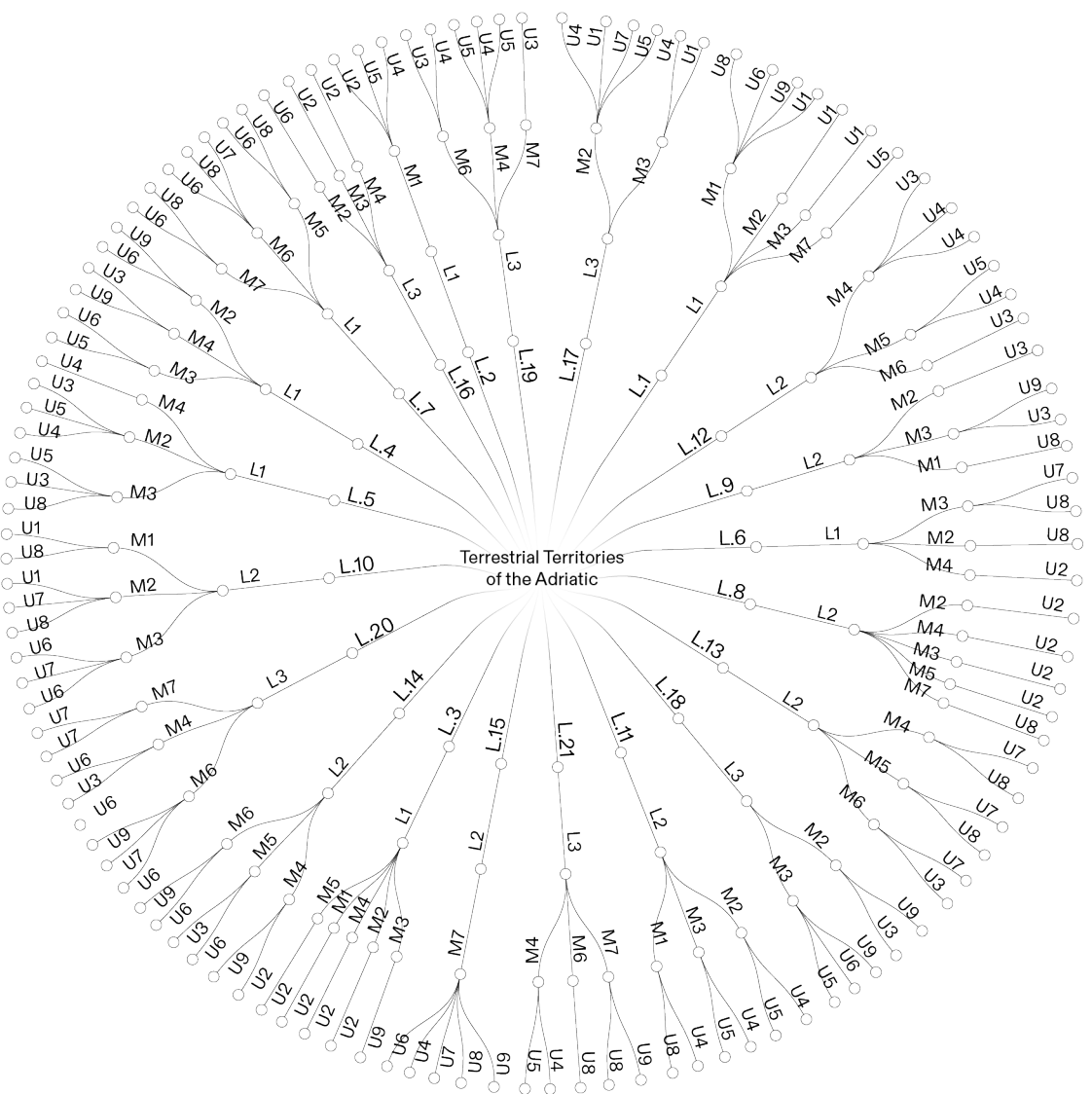
Diagram of the methodology and logic of the taxonomy



L1 — Coastal Waters — direct terrestrial influence
Within 10km from continental coast
L2 — Nearshore Waters — transitional marine zone
10-50km from continental coast
L3 — Offshore — pelagic open water
50km from continental coast
B1 — Littoral — wave-exposed shallow zone
Mean depth $\geq -20m$
B2 — Inner Shelf — flat stable seabed
-20 to -100m + std dev < 25

B3 — Rugged Shelf — complex bathymetric relief
-20 to -100m + std dev ≥ 25
B4 — Shelf Break — continental edge transition
-100 to -250m
B5 — Upper Slope — steep gradient descent
-250 to -600m
B6 — Abyssal — deep pressure darkness
Mean depth < -600m
U1 — Pristine — negligible anthropogenic pressure

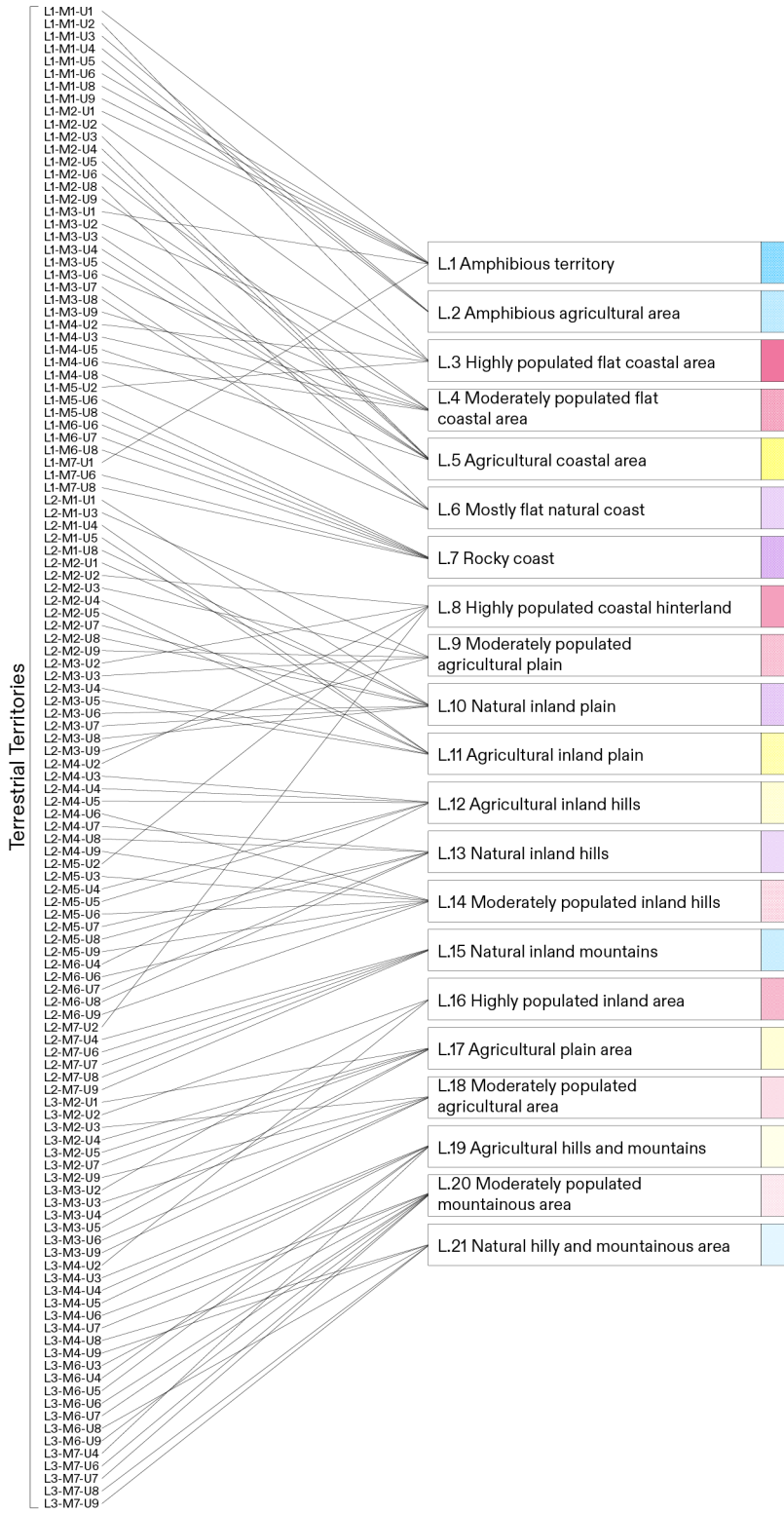
Mean use index 0-1
U2 — Low Traffic — occasional vessel activity
Mean use index 1-2
U3 — Moderate Traffic — regular maritime use
Mean use index 2-4
U4 — High Traffic — sustained cumulative pressure
Mean use index 4-8
U5 — Intensive Traffic — major corridor saturation
Mean use index ≥ 8



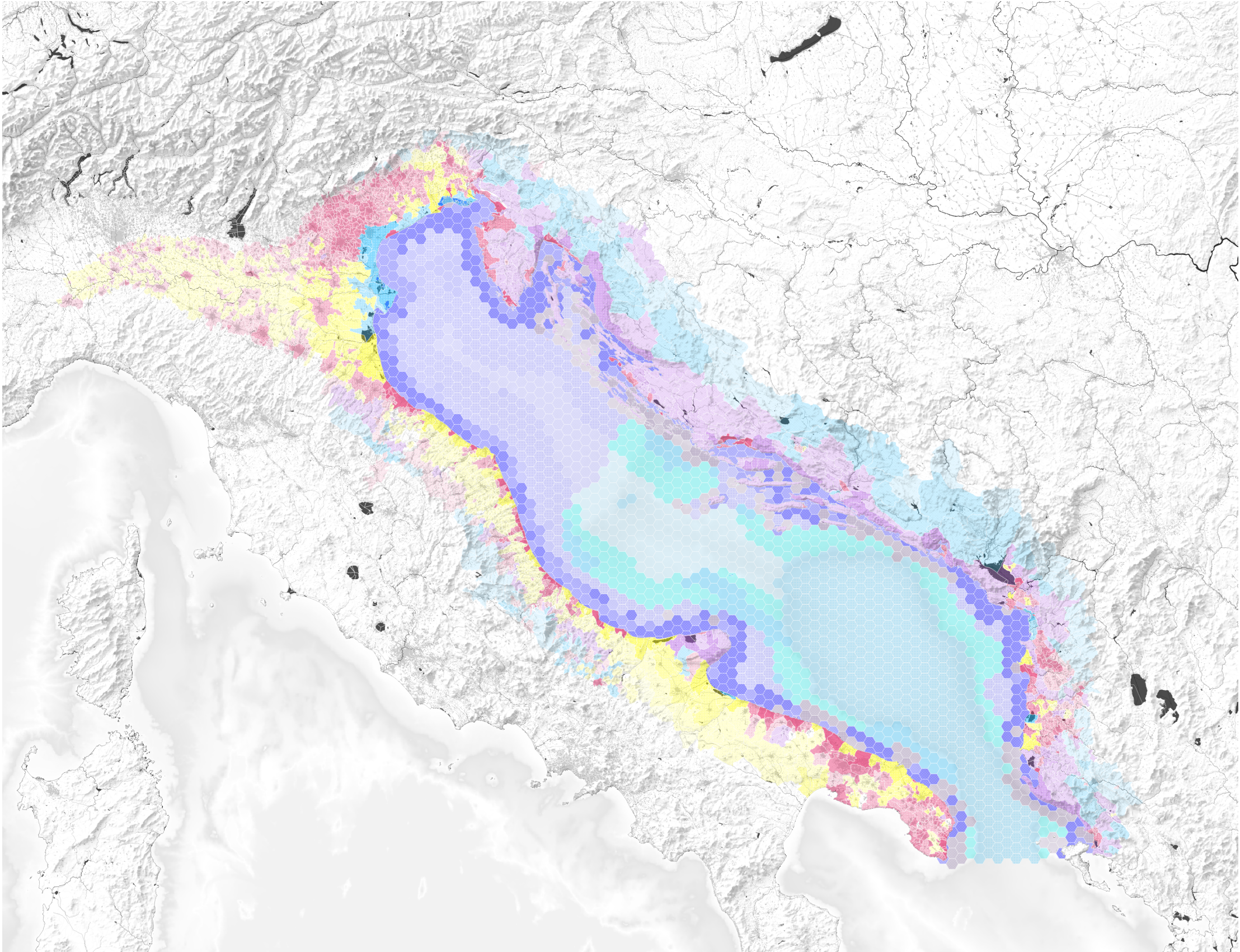
L1 — Immediate Coastal Zone
Directly on the coastline
L2 — Coastal Hinterland
0-25km inland / 25-50km + std dev low
L3 — Inland Coastal Territory
left of 25-50km / 50-300km + elevation $\leq 50m$
M1 — Coastal Depression
-49 to 0m dominant
M2 — Flat Plain
1-100m dominant + std dev < 25
M3 — Undulating Plain
1-100m dominant + std dev ≥ 25
M4 — Hilly Landscape

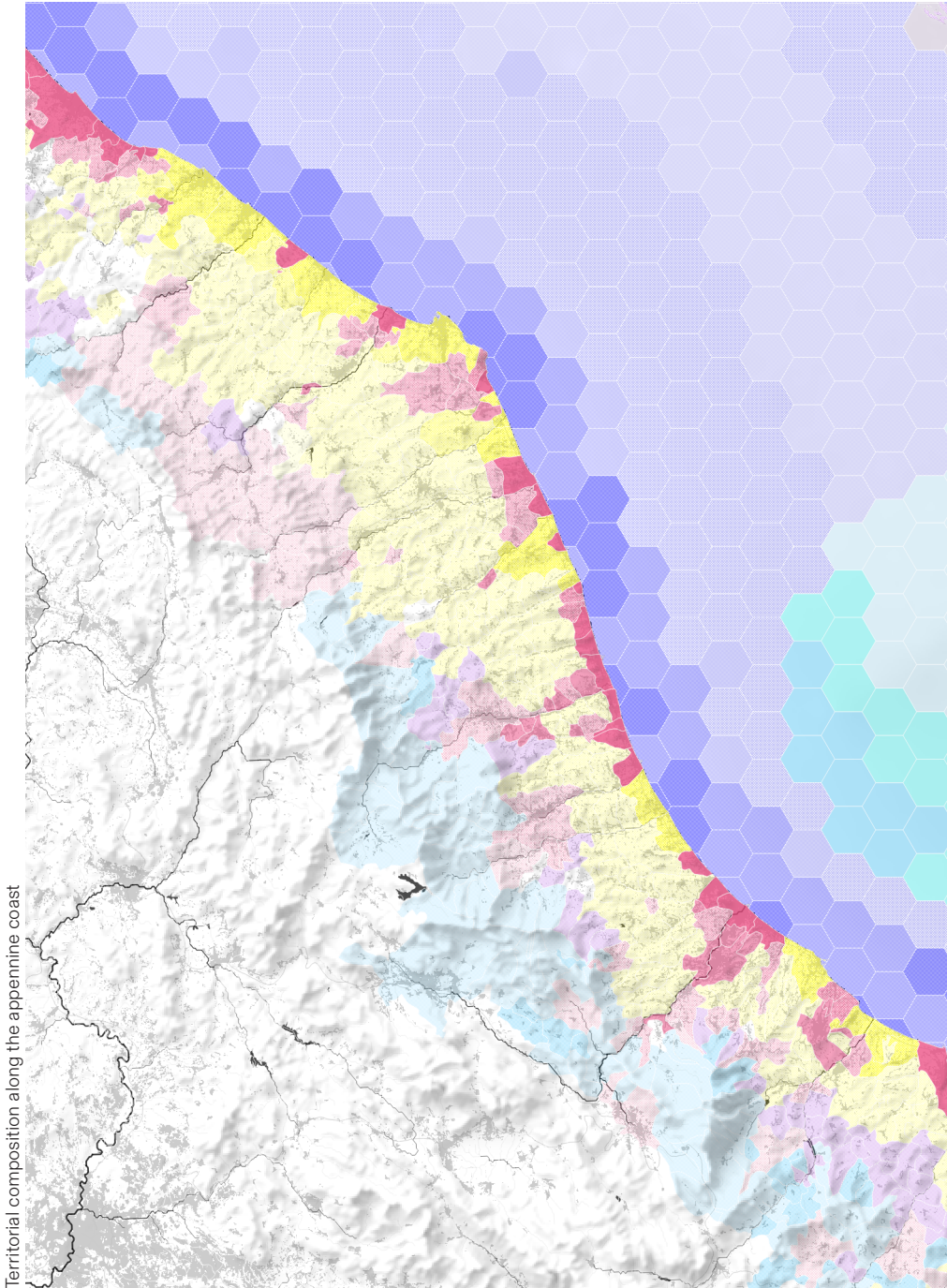
100-300m dominant
M5 — Plateau / Smooth Upland
300-600m dominant + std dev ≤ 150
M6 — Rugged Pre-Mountain Terrain
300-600m dominant + std dev > 150
M7 — Mountain Landscape
600m+ dominant
U1 — Water and Wetland System
Water + Wetland > 40%
U2 — Urban Landscape
Built-up > 30%
U3 — Urbanized Agricultural Landscape
50% + Built-up 15-35%
U4 — Agriculture with Natural Elements

Agriculture > 50% + Natural cover 15-50%
U5 — Predominantly Agricultural Landscape
Agriculture > 50% + Built-up < 15% + n.c. $\leq 50\%$
U6 — Natural Landscape with Urban Presence
Natural cover > 50% + Built-up 15-35%
U7 — Natural Landscape with Agricultural Use
Natural cover > 50% + Agriculture 15-50%
U8 — Predominantly Natural Landscape
N.c. > 50% + Built-up < 15% + Agric. < 15%
U9 — Mosaic Landscape
2 o + class > 20% : [N.c. / Built-up / Agric.]

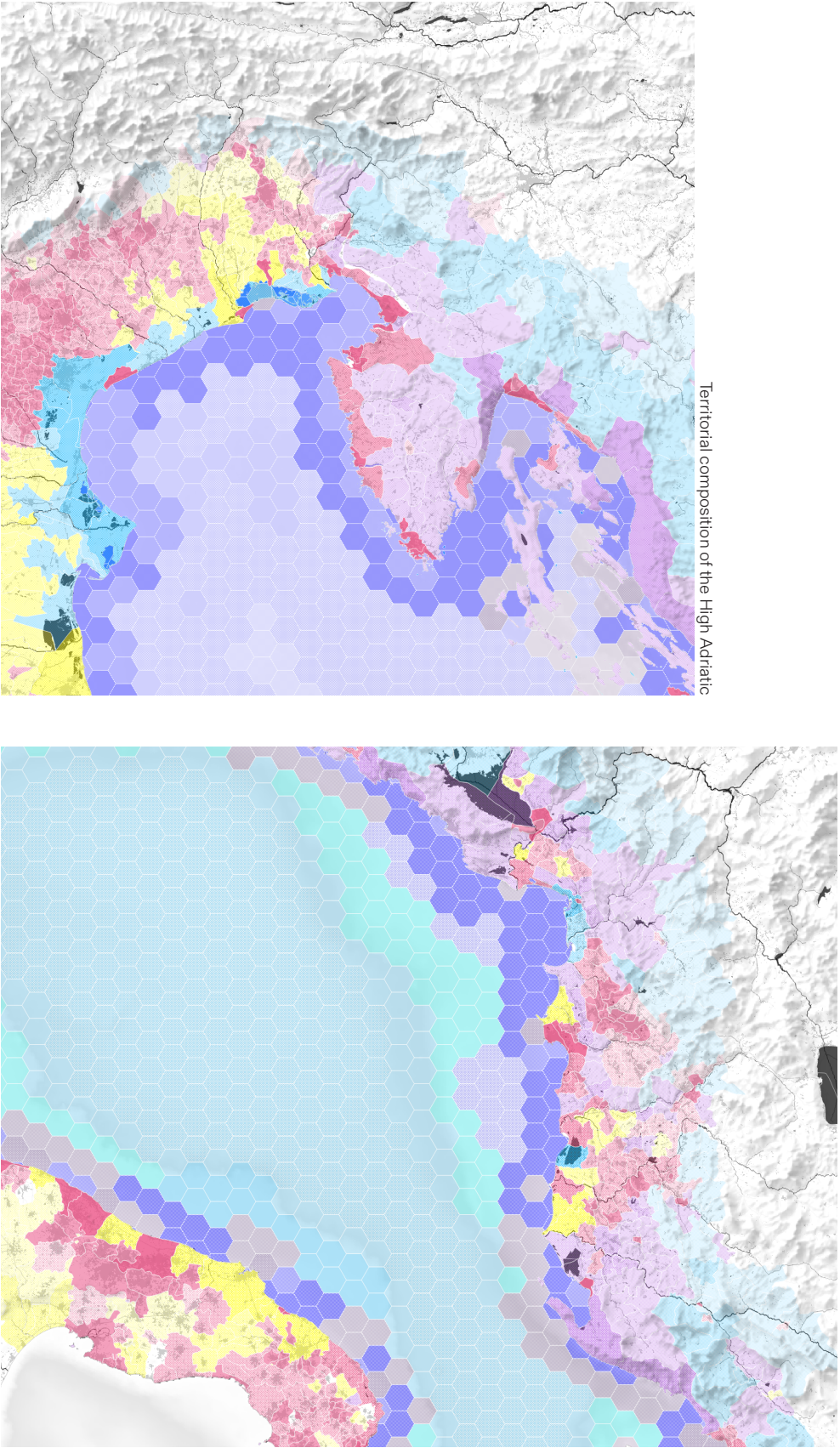


Taxonomy of the territories
of the Adriatic eco-region

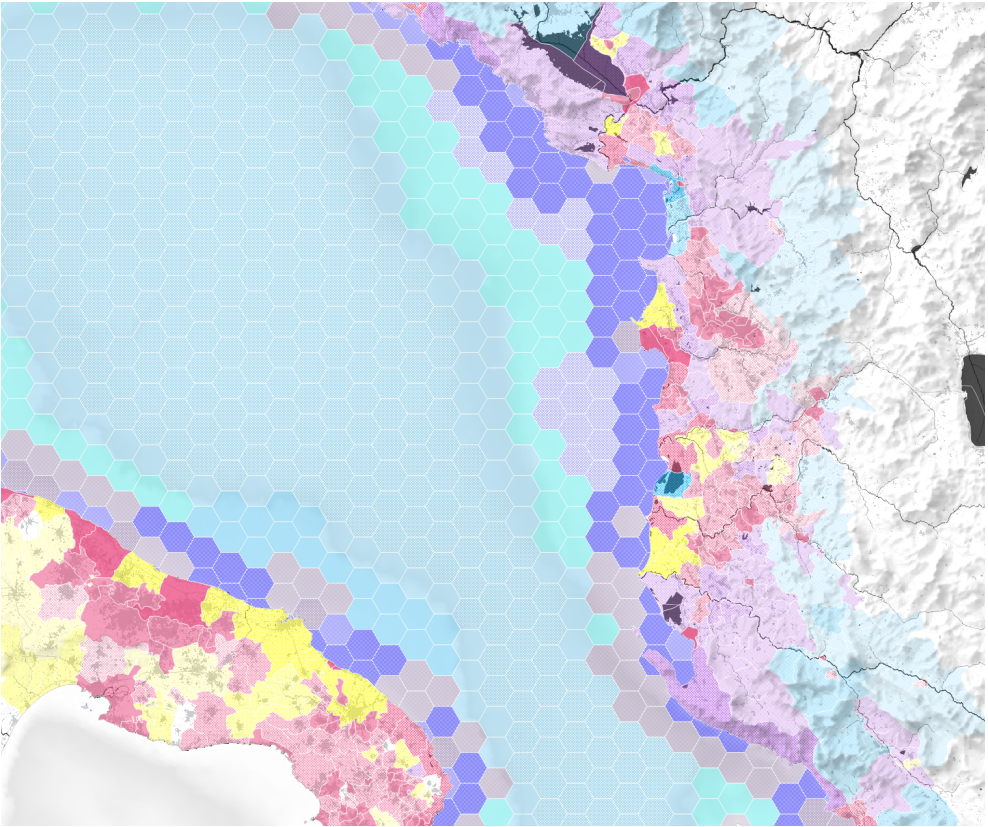




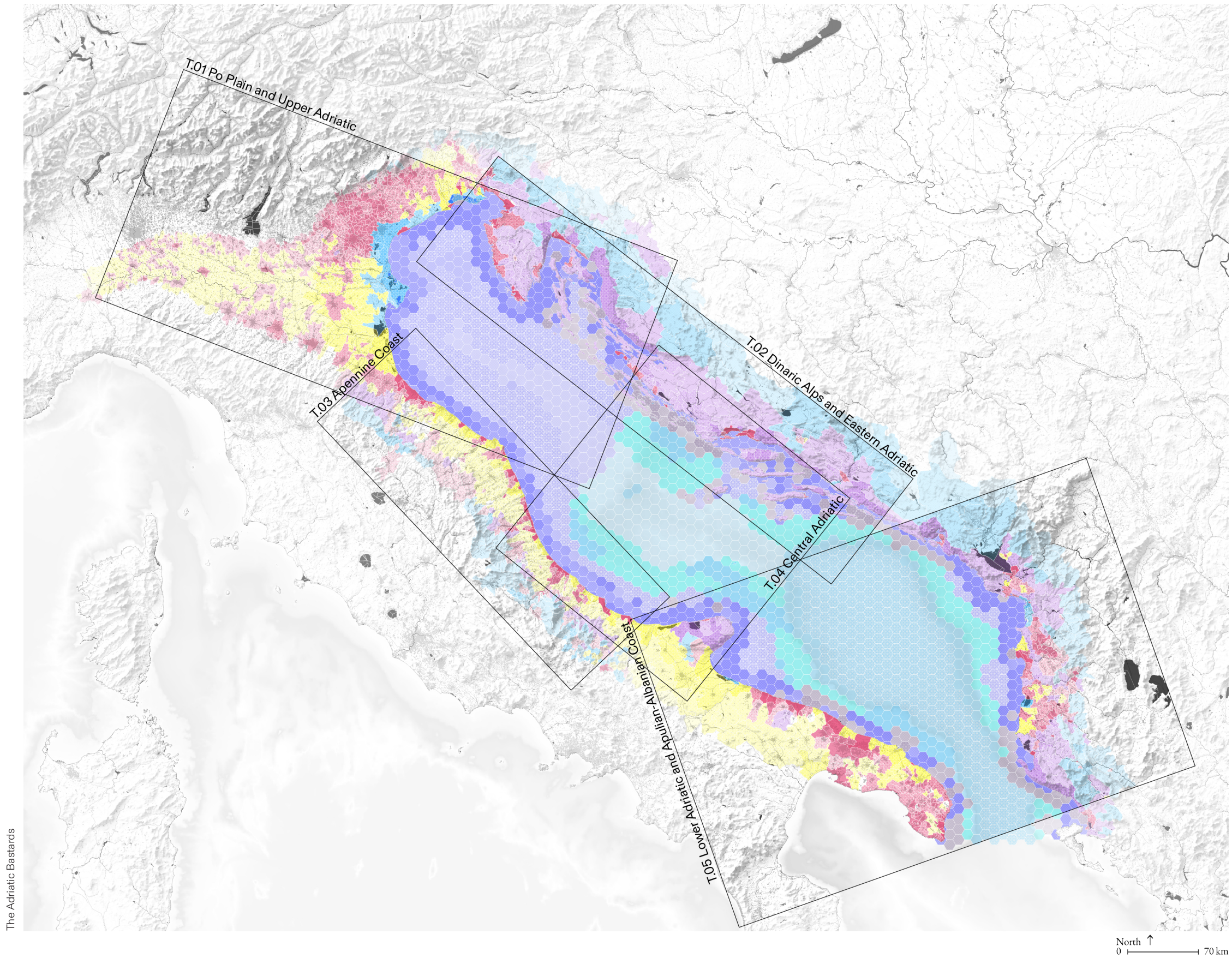
Territorial composition along the appennine coast



Territorial composition of the High Adriatic



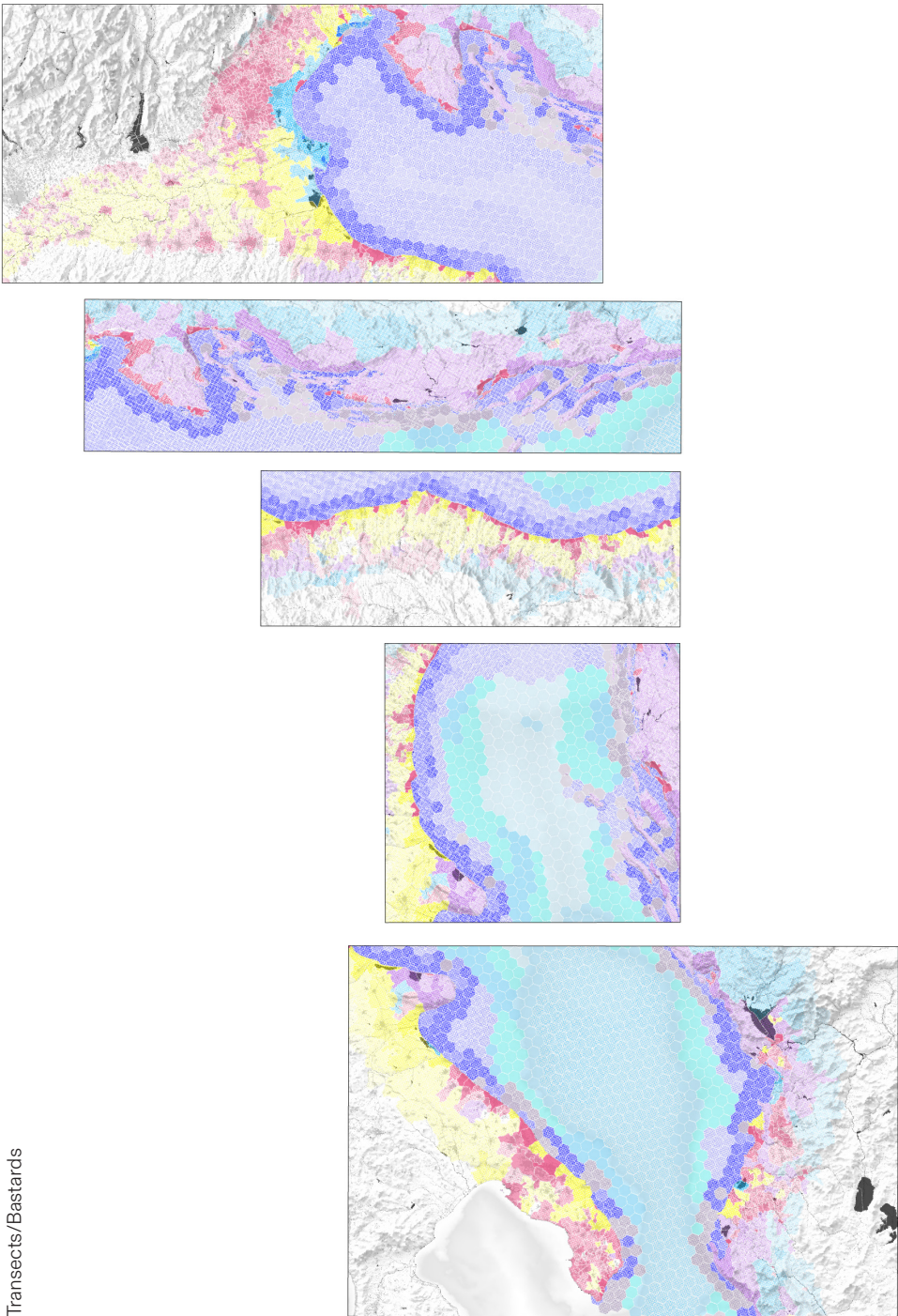
Territorial composition of the Lower Adriatic



The Adriatic Bastards

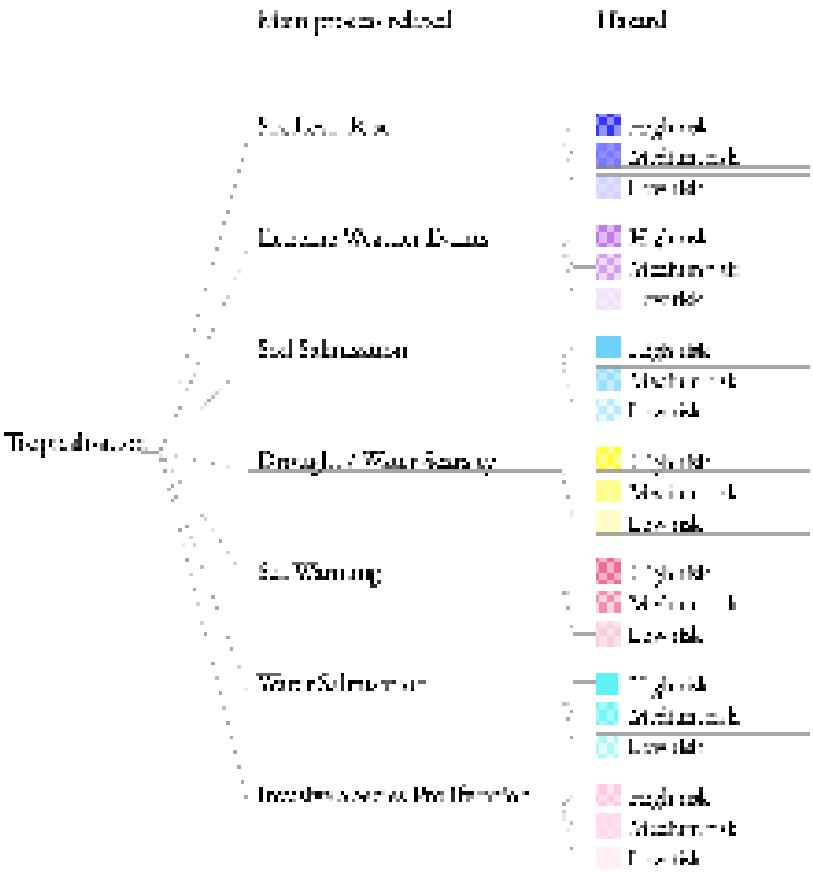
2.2.2 *Transects/Bastards*

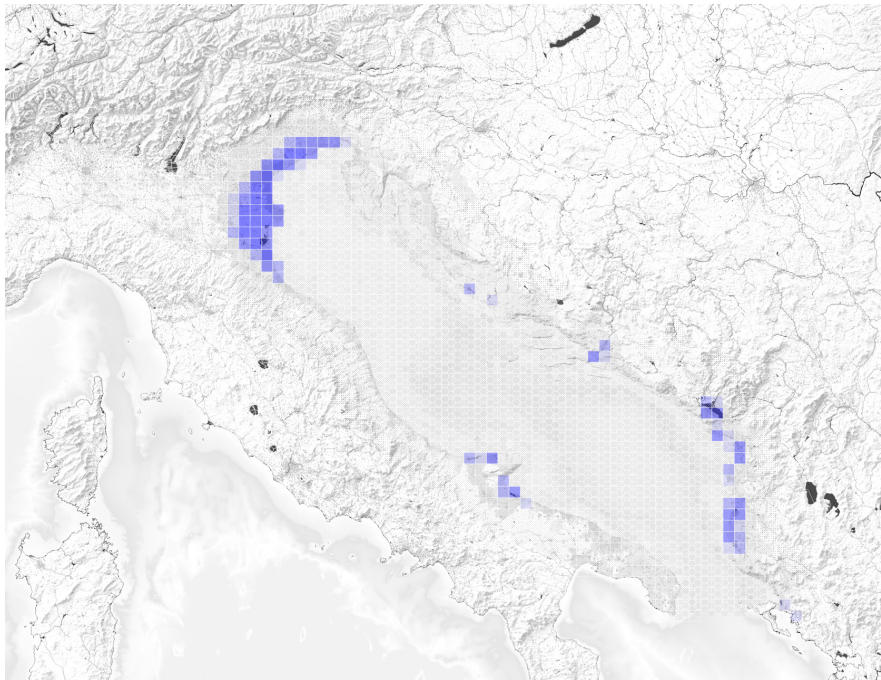
By overlaying the taxonomic categorisation of water and land territories, a new geography of the Adriatic eco-region emerges - a geography that follows the body, its form, its nature and the uses that humans make of it. A geography that traces new boundaries, at times thicker and at times thinner, new focal points and areas of interest. A geography that, when observed carefully, allows the identification of transects defined by similarity and homogeneity across the territorial taxonomic classes. Five transects/BASTARDS of sea and land that can serve as operative devices for a modern spatial-climatic governance. Bastards because their intrinsic nature is transnational, transregional and amphibious. Bastards that do not aspire to become new rigid administrative regions, but rather devices - operating at a broad territorial scale - to facilitate an ecologically informed planning practice capable of recognising the Rights of Nature and of its territory. Devices that allow the operationalisation of the eco-region's needs and the construction of transformative strategies for its marine and terrestrial territories, and for its human and more-than-human inhabitants. Following a more in-depth analysis of the tropicalisation-related risks for each transect, the next chapter contains the design and speculative exploration of one of these Bastards - the Po/North Adriatic one - and the attempt to spatialise the Rights of Nature within a territorial framework that proposes transformations and co-evolution with the Mediterranean and its tropicalisation.



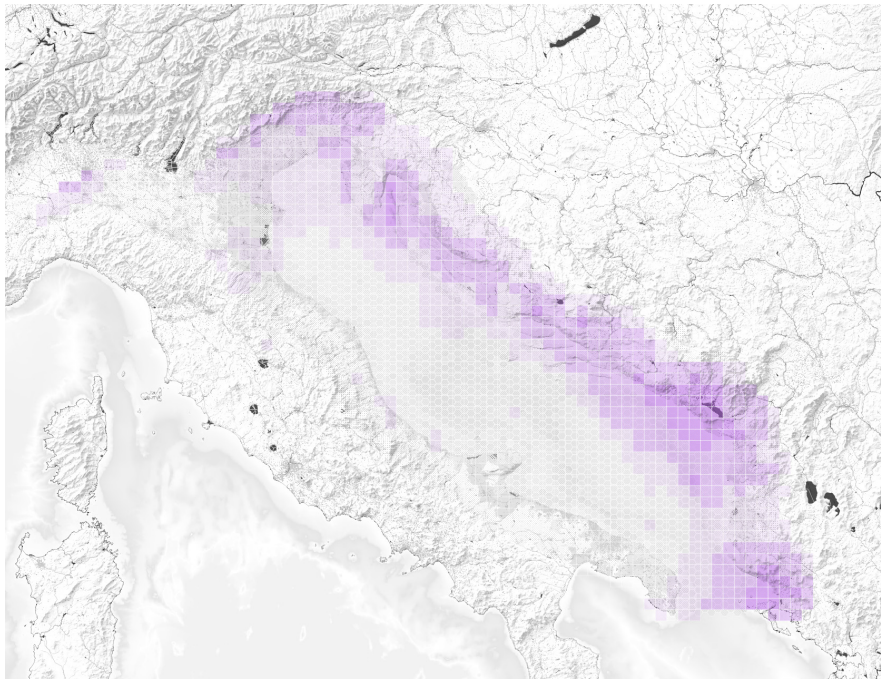
2.2.3 Mapping the Risks of Tropicalisation

The third part of the chapter presents an attempt to understand the extent of the risks posed by tropicalisation to the territories of the Adriatic eco-region, through their mapping and interpretation. Starting from a highly complex process such as the tropicalisation of the Mediterranean basin, 7 main sub-processes were identified, and from these - in a GIS environment - the layers related to the hazards they bring to the Adriatic context were constructed. Notes on the methodology used to build these layers will be incorporated into the report's appendix. In brief, each hazard was categorised on a rectangular grid of 15 km x 15 km extended across the entire eco-region area, following a classification into 4 levels - no hazard, low hazard, medium hazard, and high hazard. Subsequently, the hazards were cross-referenced with the 33 taxonomic classes to understand the degree of exposure of each class to the individual tropicalisation sub-processes. A necessary descent in scale follows, in order to reach a complete understanding of the risks of tropicalisation in the Adriatic context. At the scale of each Bastard, identified in the previous pages, a cross-section is presented showing the relationship between the hazards, the territorial classes encountered, the altimetric profile, and data relating to the socio-economic dimension - GDP and demographics - of the Adriatic territories under the stress of tropicalisation. This graphic tool is of central importance for understanding the territory and the risks running through it, and integrates with data on governance structures, providing an operational overview of the tropicalisation processes affecting the different Adriatic transects.



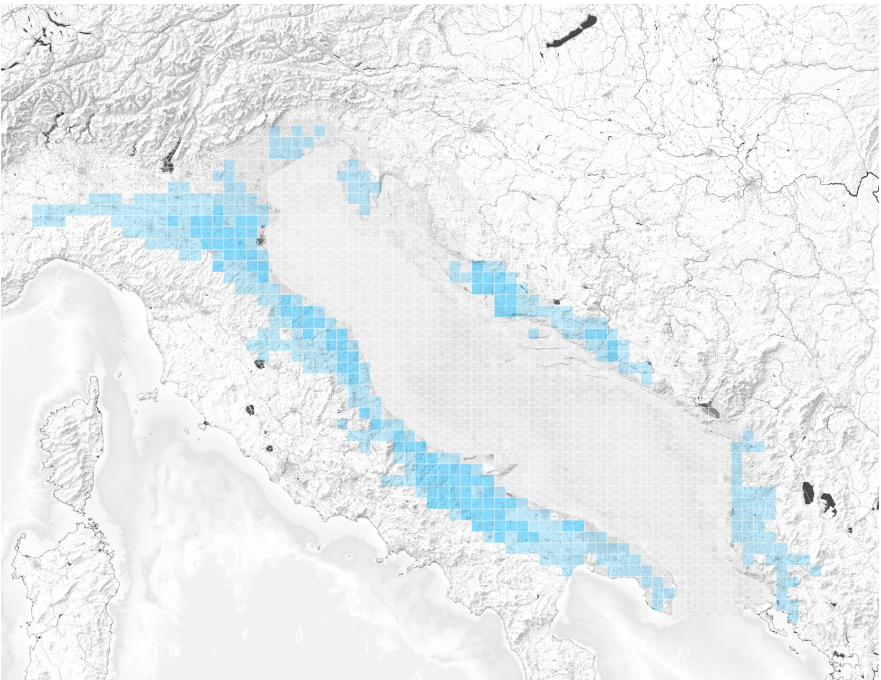


Sea Level Rise

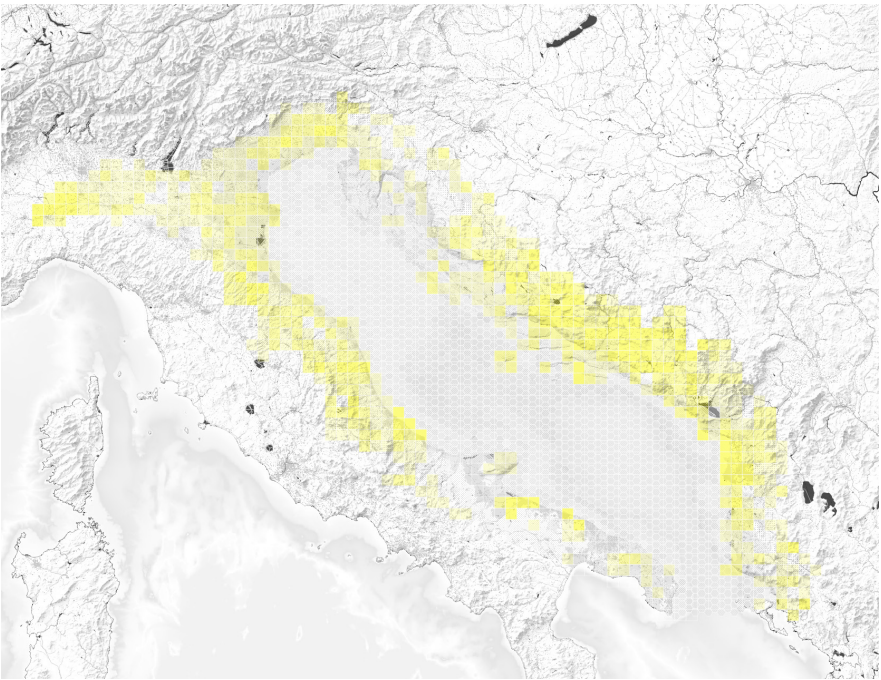


Extreme Weather Events

North ↑
0 70 km

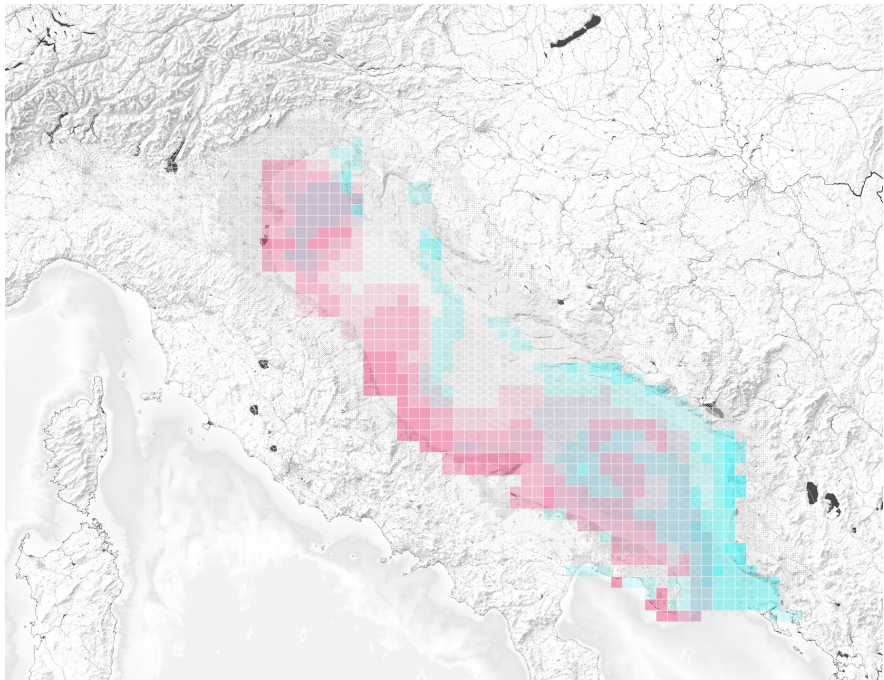


Soil Salinisation

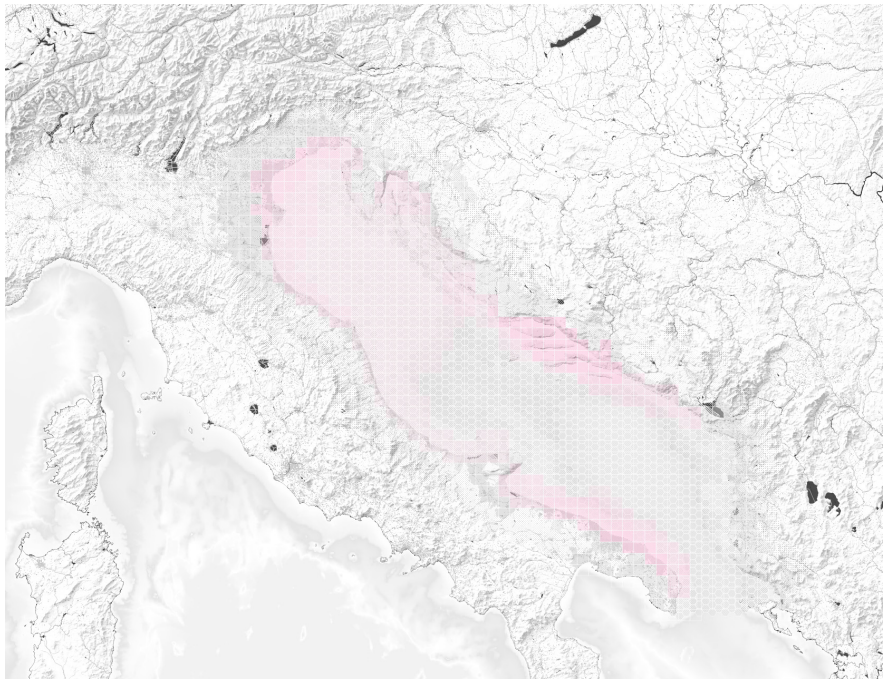


Drought/Water Scarcity

North ↑
0 70 km

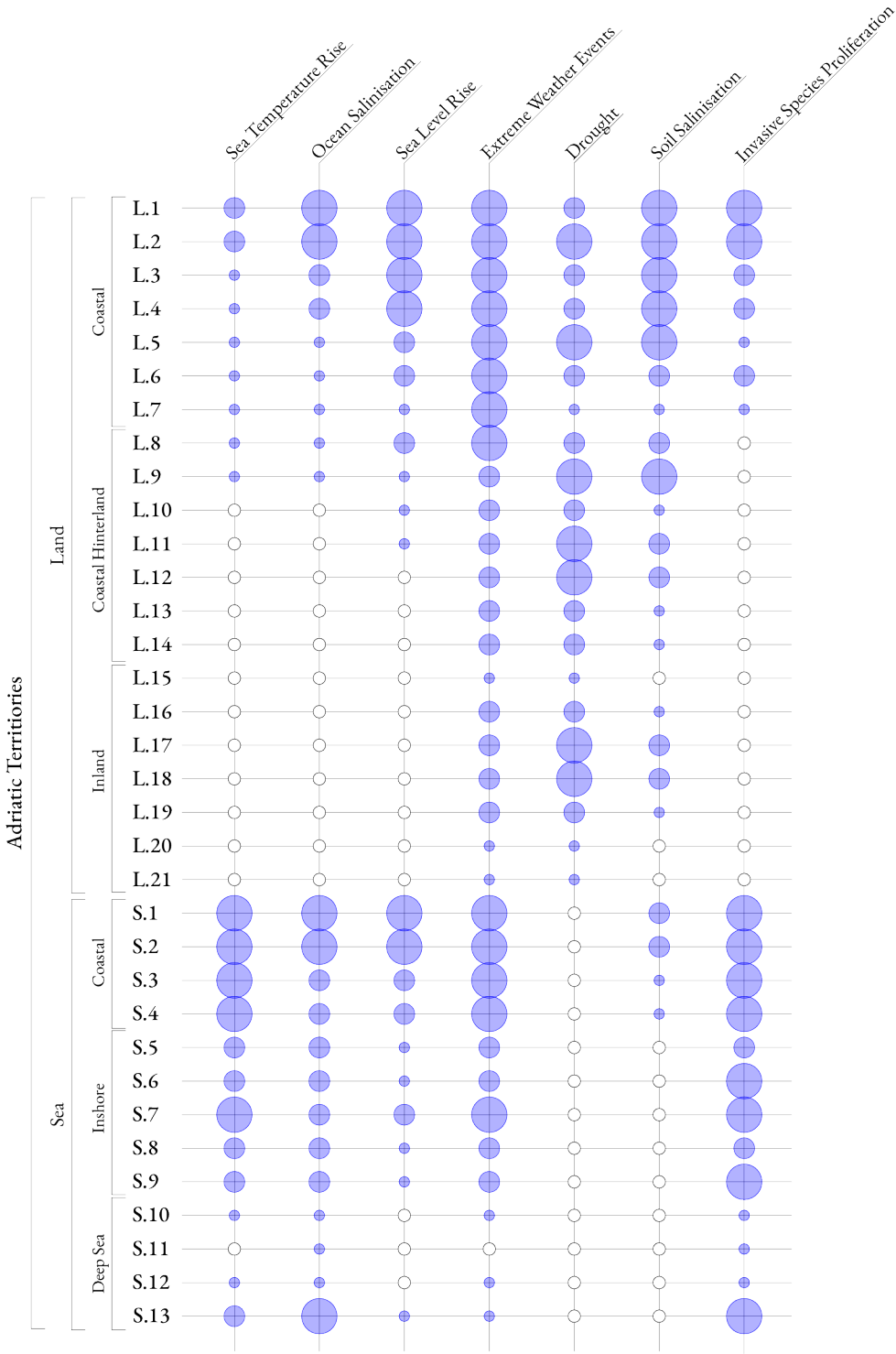


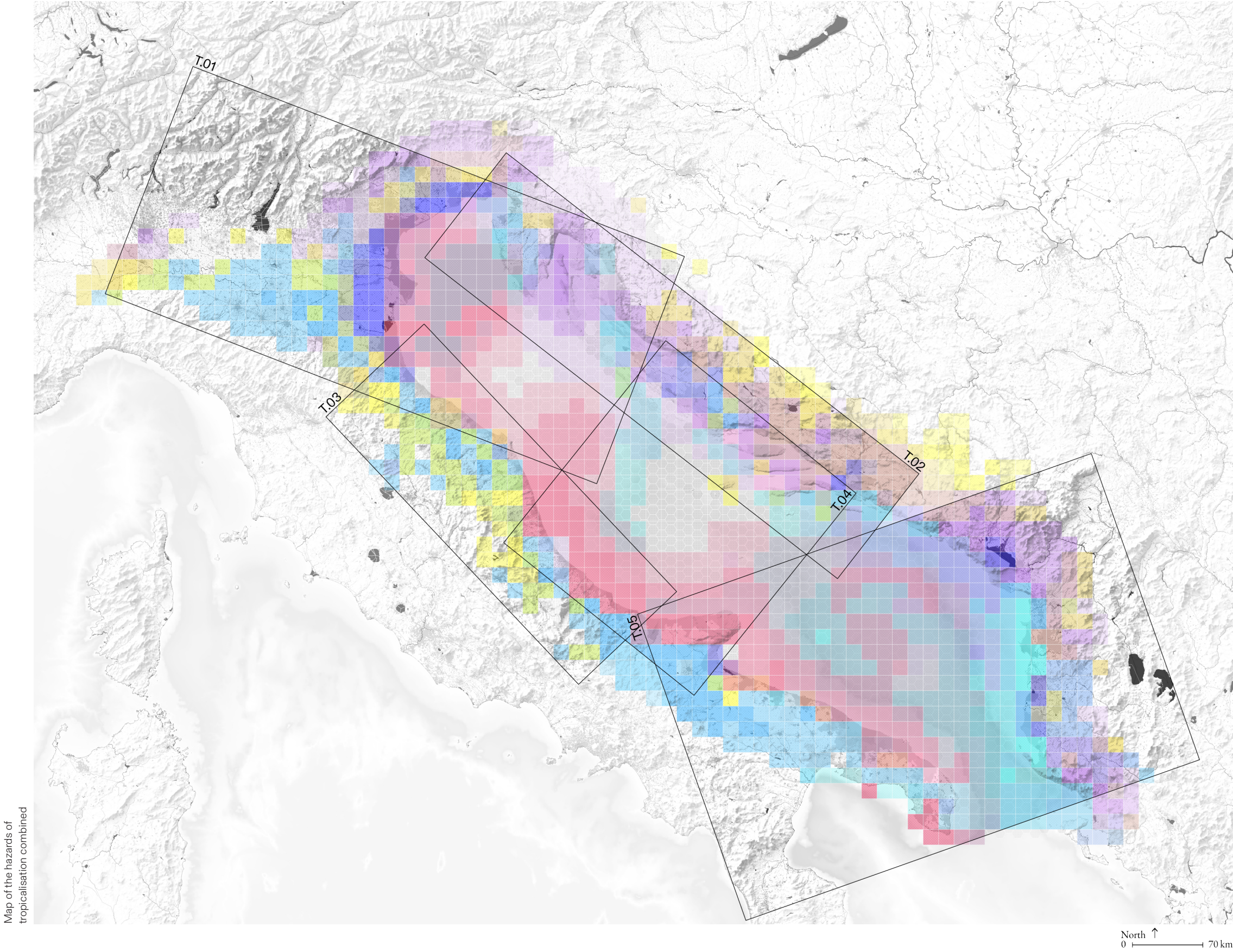
Sea Tropicalisation (Warming and salinisation combined)



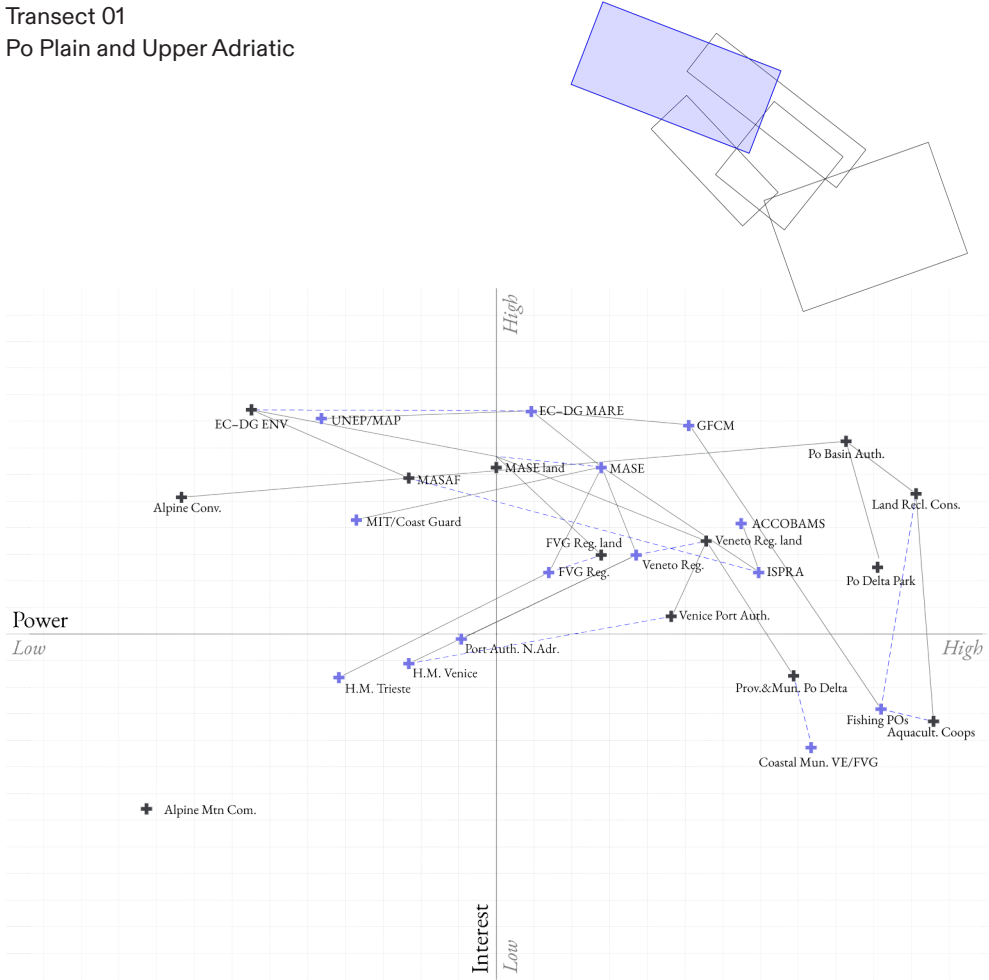
Invasive Species Proliferation

North ↑
0 70 km

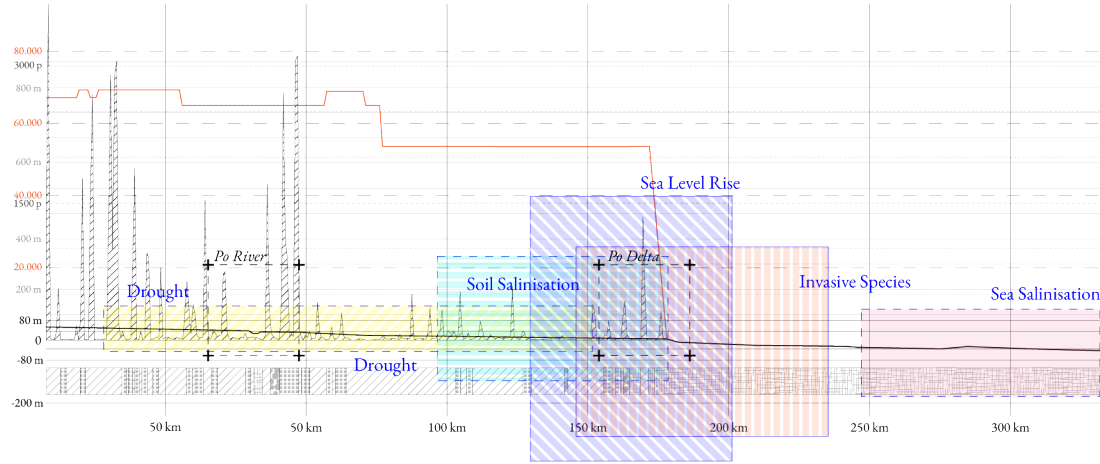




Transect 01
Po Plain and Upper Adriatic



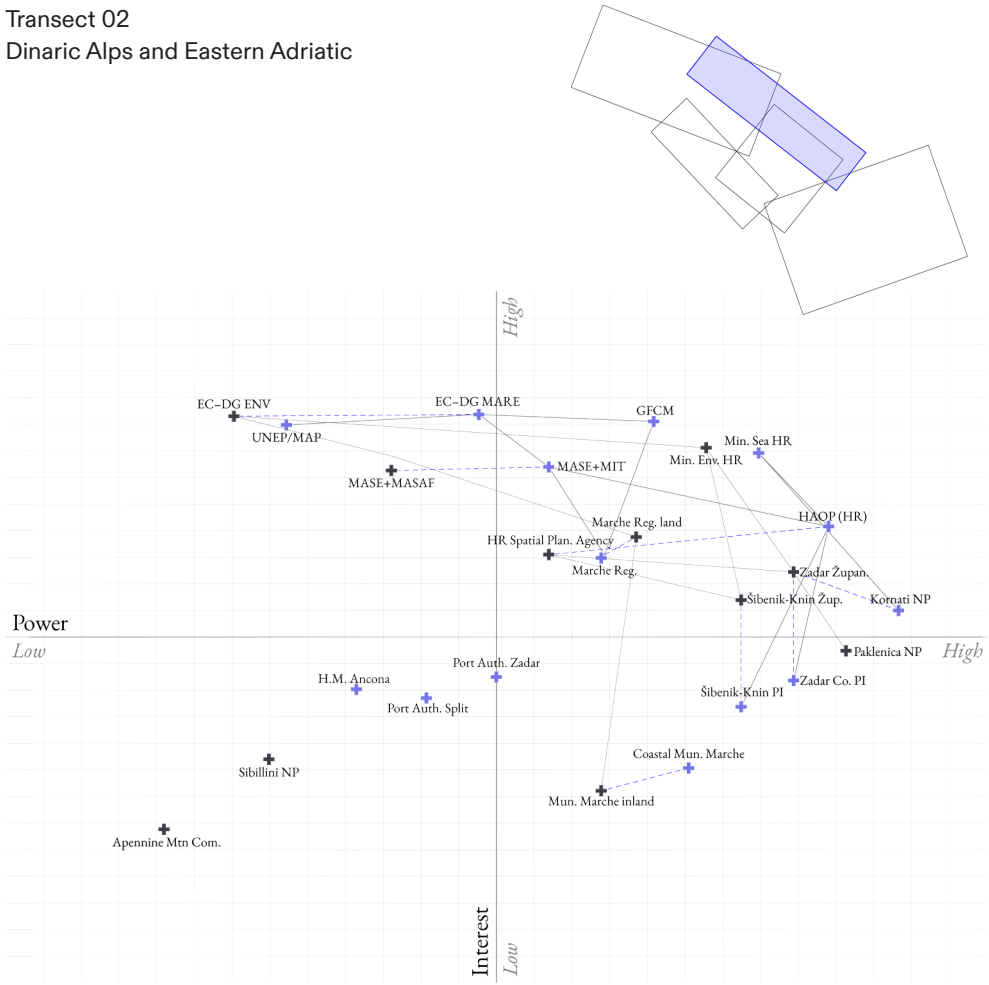
- Land governance actor +
- Sea governance actor *
- Collaboration —
- Cross-category collaboration - - -



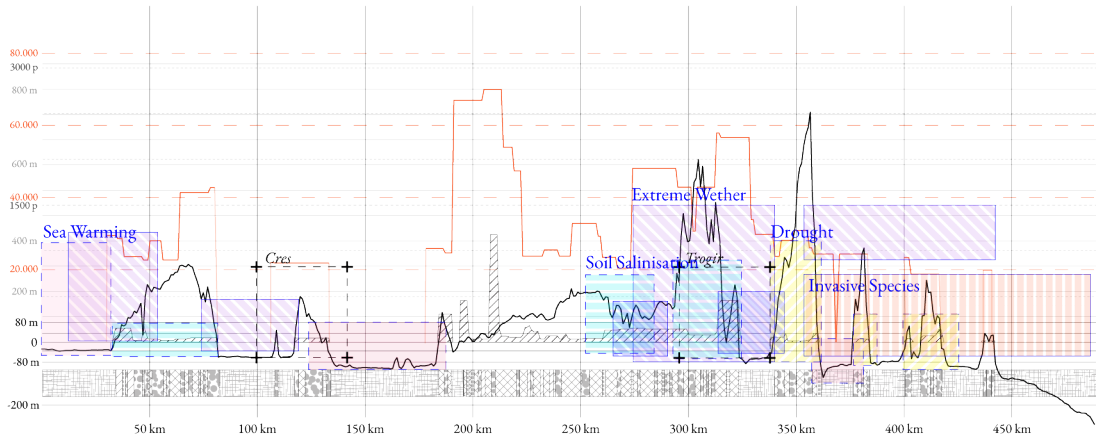
- Agriculture
- Water
- Forest
- City
- Terrain profile
- GDP Pro Capite
- Population density

Diagnostic section on tropicalisation risks

Transect 02
Dinaric Alps and Eastern Adriatic



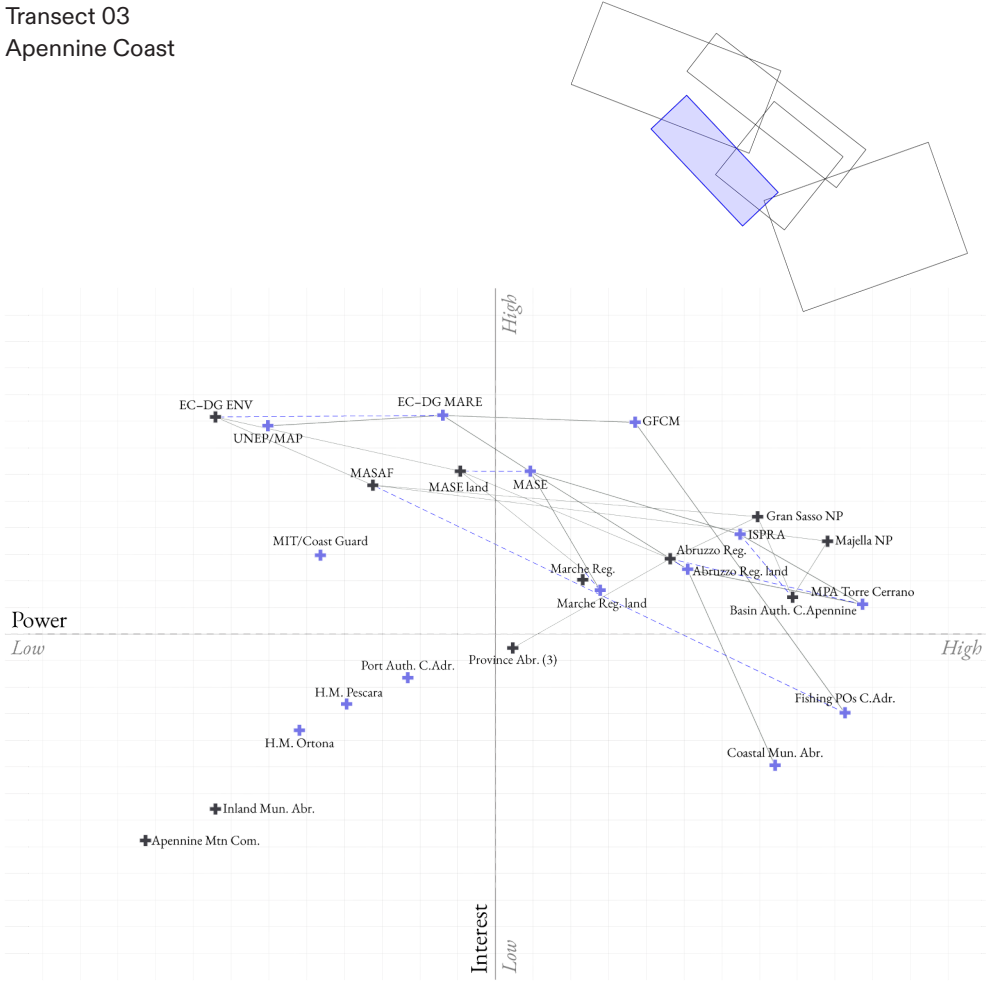
- Land governance actor +
- Sea governance actor +
- Collaboration —
- Cross-category collaboration - - -



- Agriculture
- Water
- Forest
- City
- Terrain profile
- GDP Pro Capite
- Population density

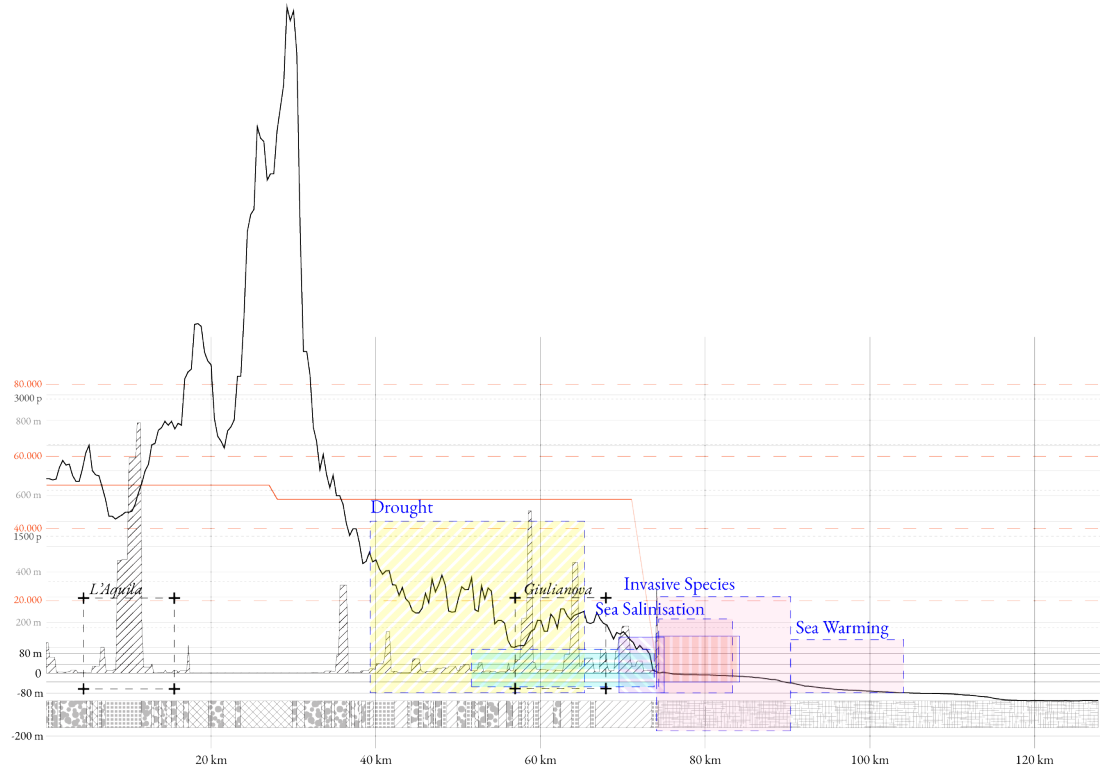
Diagnostic section on tropicalisation risks

Transect 03
Apennine Coast



- Land governance actor
- Sea governance actor
- Collaboration
- Cross-category collaboration

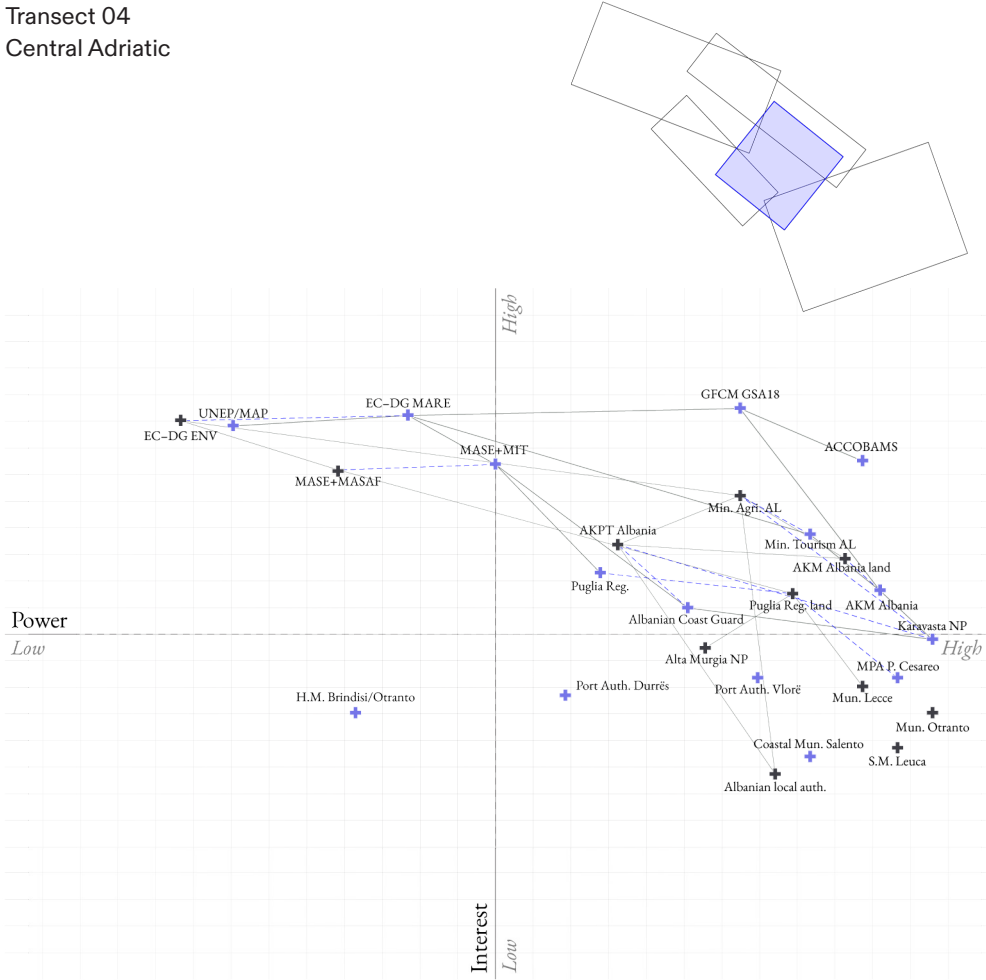
Governance actor diagram
of land and sea territories



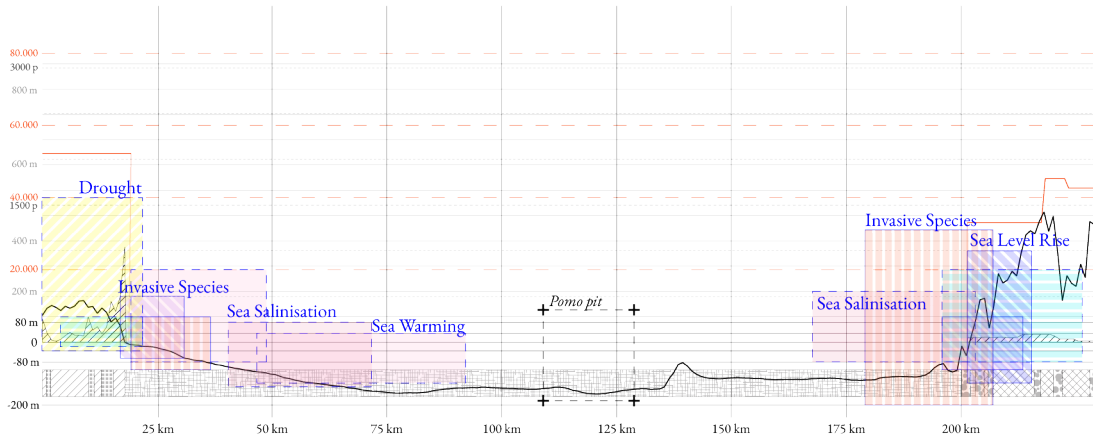
- Agriculture
- Water
- Forest
- City
- Terrain profile
- GDP Pro Capite
- Population density

Diagnostic section on tropicalisation risks

Transect 04
Central Adriatic



- Land governance actor +
- Sea governance actor +
- Collaboration —
- Cross-category collaboration - - -

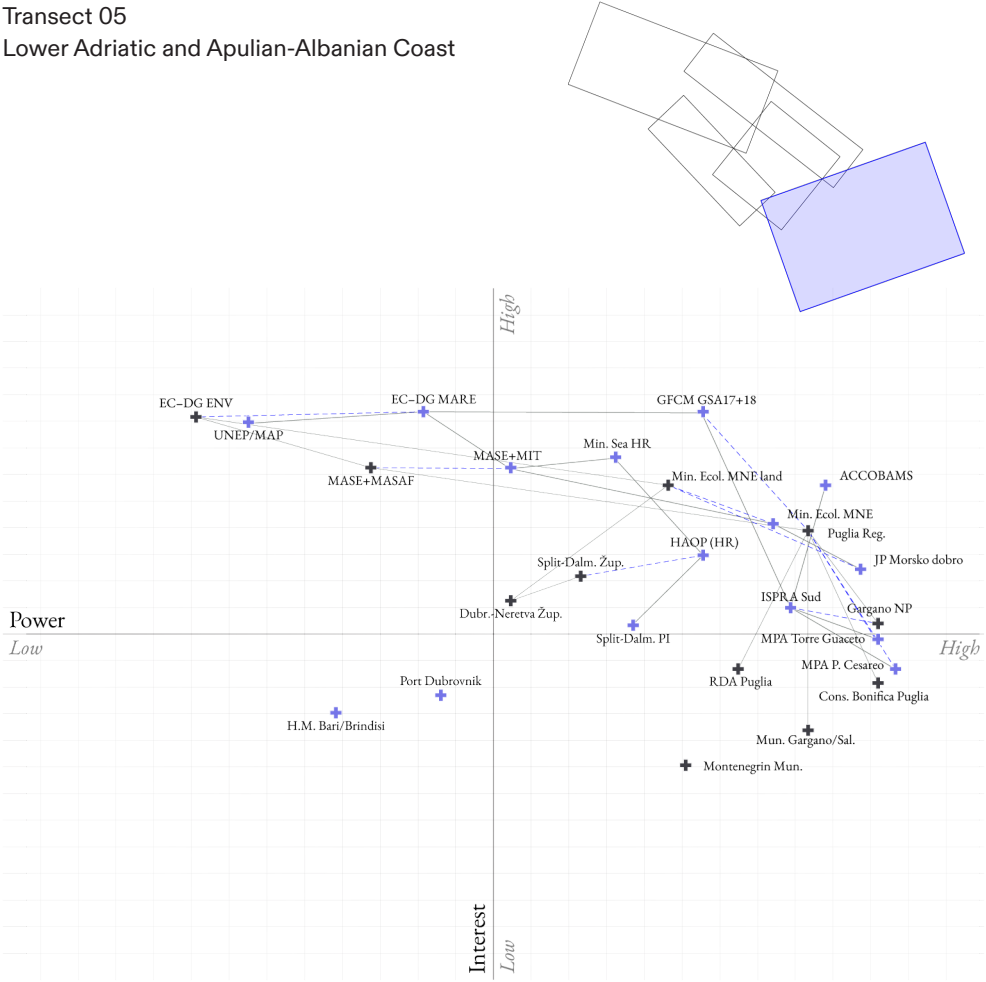


- Agriculture
- Water
- Forest
- City
- Terrain profile
- GDP Pro Capite
- Population density

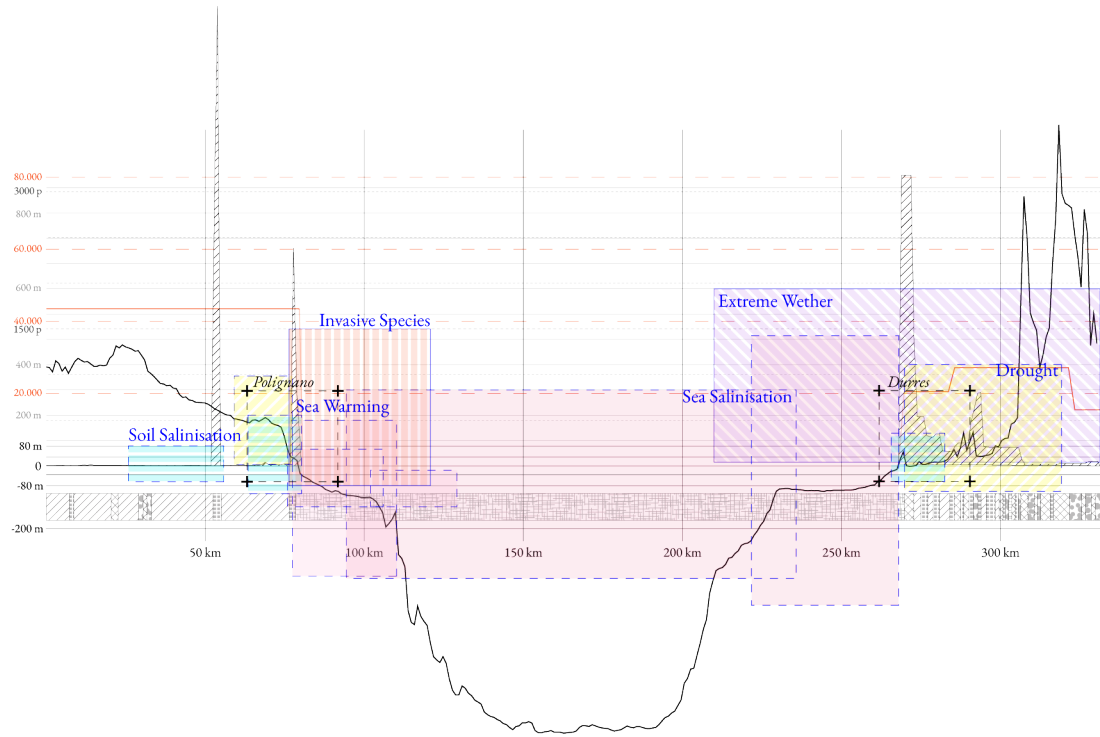
Diagnostic section on tropicalisation risks

Governance actor diagram
of land and sea territories

Transect 05
Lower Adriatic and Apulian-Albanian Coast



- Land governance actor •
- Sea governance actor •
- Collaboration —
- Cross-category collaboration - - -



- Agriculture
- Water
- Forest
- City
- Terrain profile
- GDP Pro Capite
- Population density

2.3.2 The Cascade Effect

For a complete and adequate understanding of the risks associated with tropicalisation, an integrated reading of its related hazards is essential. The transect sections, presented in the previous pages, serve precisely this function, linking social and economic vulnerability, altimetric profile and landscape typology, and showing the overlapping of hazards. They are not a mere stylistic exercise but a necessary tool for understanding the critical condition of the Bastards.

The reading of the spatial governance diagram for each transect is intended to be integrated with that of the sections. For each transect, it displays the complexity of the current governance system, with its shortcomings and the difficulties of communication between the different institutional actors. Comparing them together, a critical pattern emerges in the dynamics between actors - namely the poor communication and collaboration between the governance actors of sea and land. This structural rigidity implies an inability to dynamically and fluidly adapt to the hazards brought by tropicalisation, and reinforces the cascade effect of each of them.

The proposal of the Bastards as governing bodies for the territories of the Adriatic eco-region is formulated also to address this governance problem, and stems from an understanding of the real magnitude of the risks and the inevitable cascade effect they generate. The following chapter contains the attempt to propose a framework for responding to the risks of tropicalisation for the Po/North Adriatic transect - a framework built with the awareness of the irreversibility - in the short term - of global warming, and with the conviction that design can be an instrument to enable processes of transformation with it, rather than of stubborn protection of a productive equilibrium that is anything but natural.

Hazard

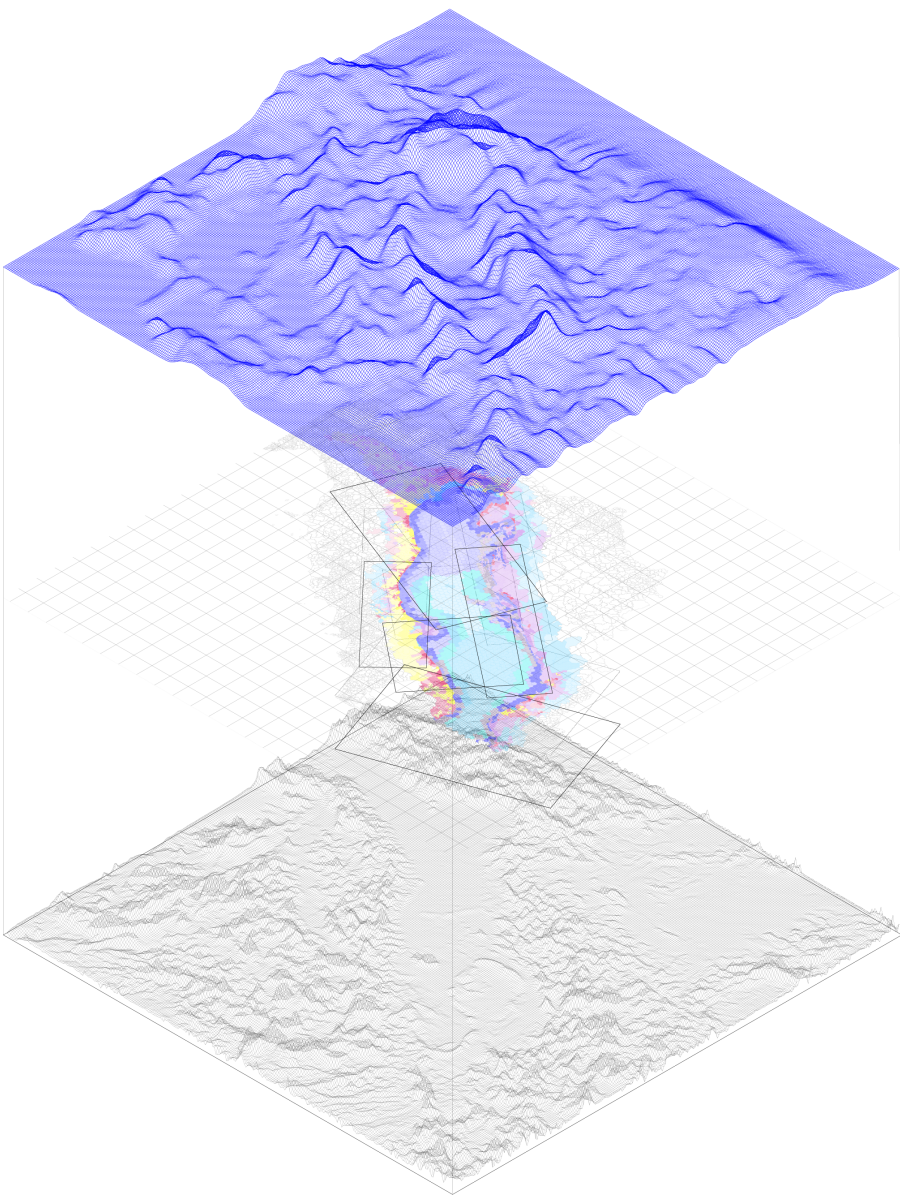
×

Exposure

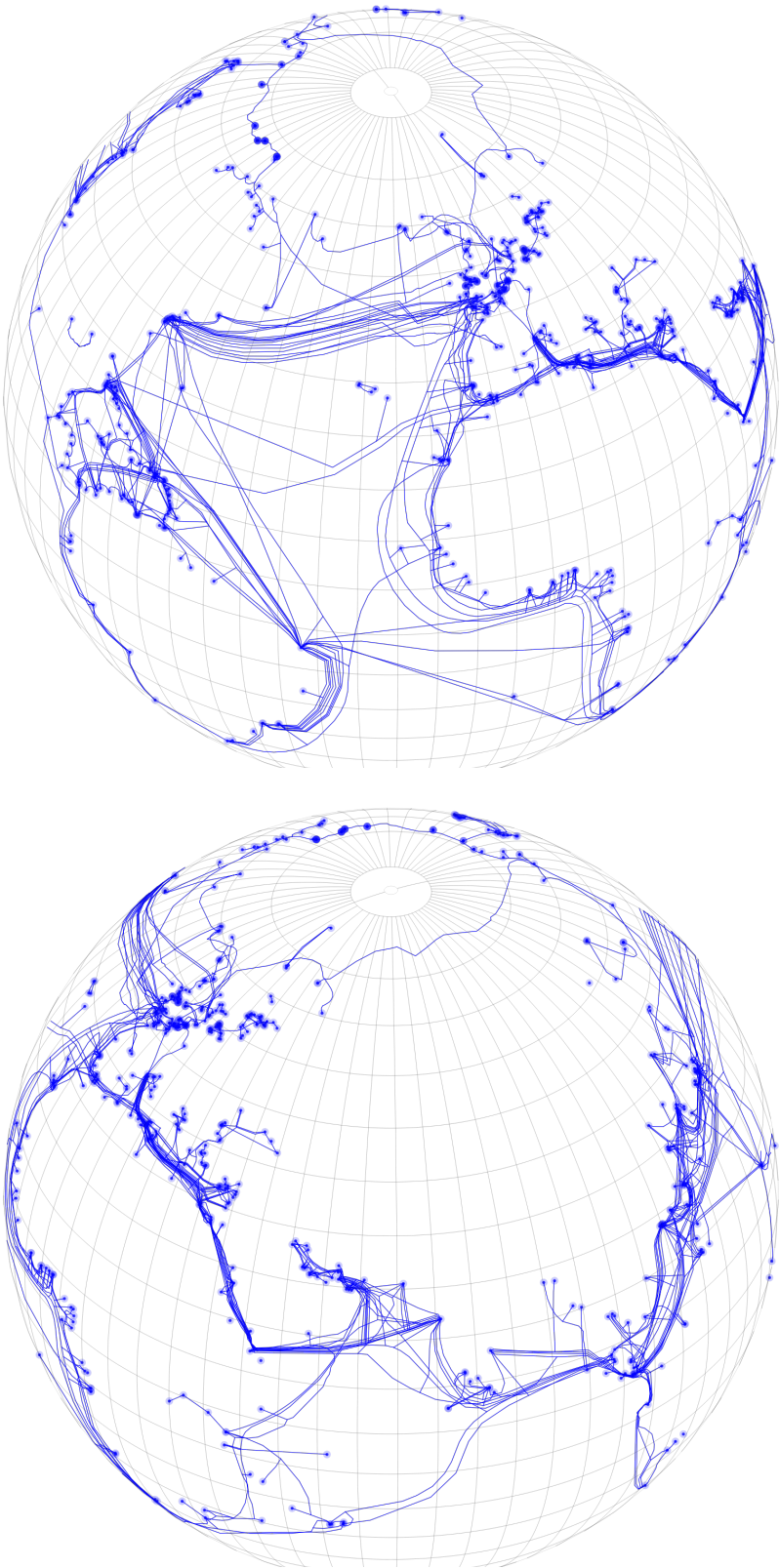
×

Vulnerability

Coping Capacity



The Cascade Effect of Tropicalisation Risks
Layer 1_Terrein profile
Layer 2_Adriatic territories taxonomy
Layer 3_Cascade of risks

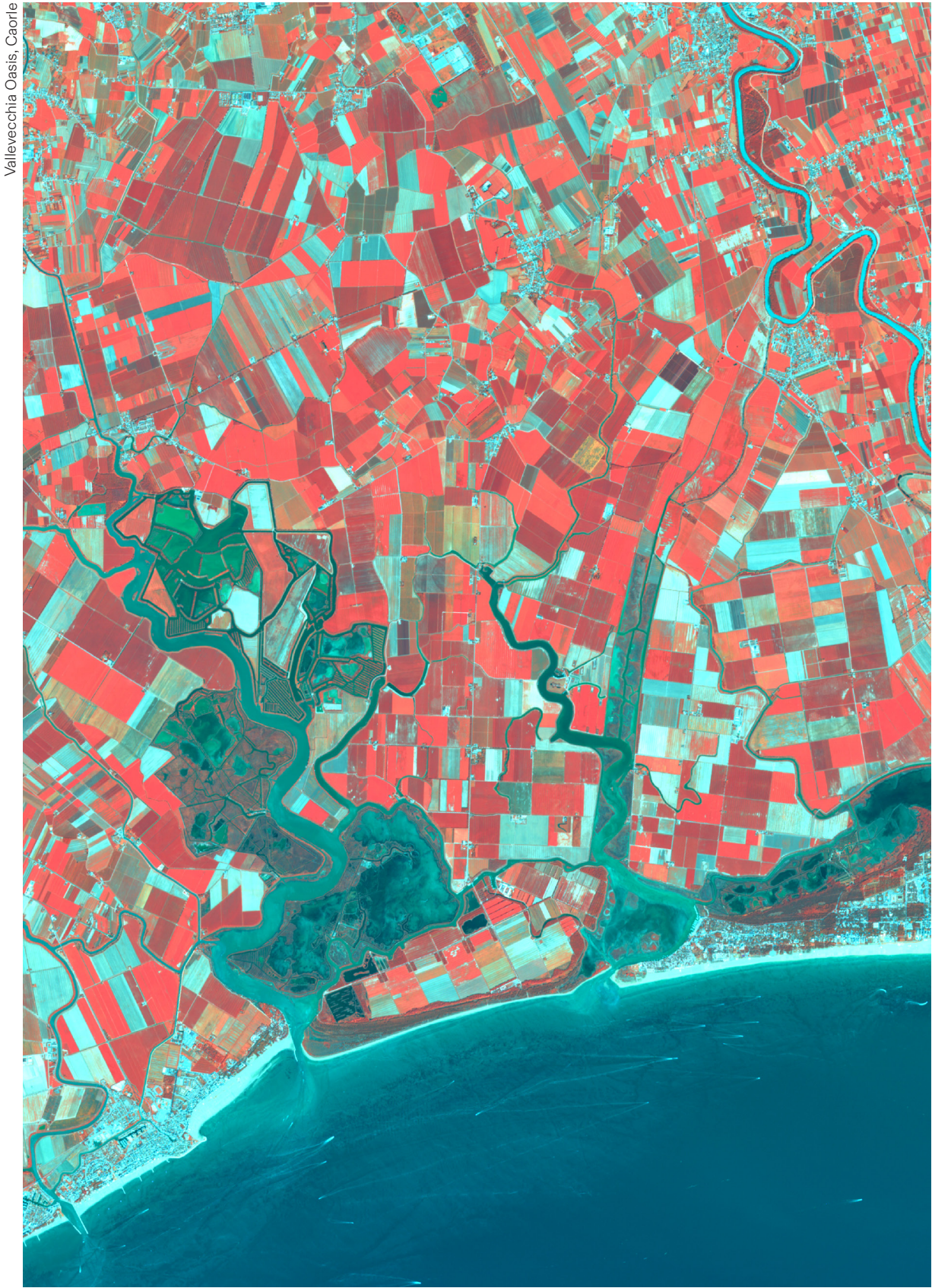


3. Padania Tropicale

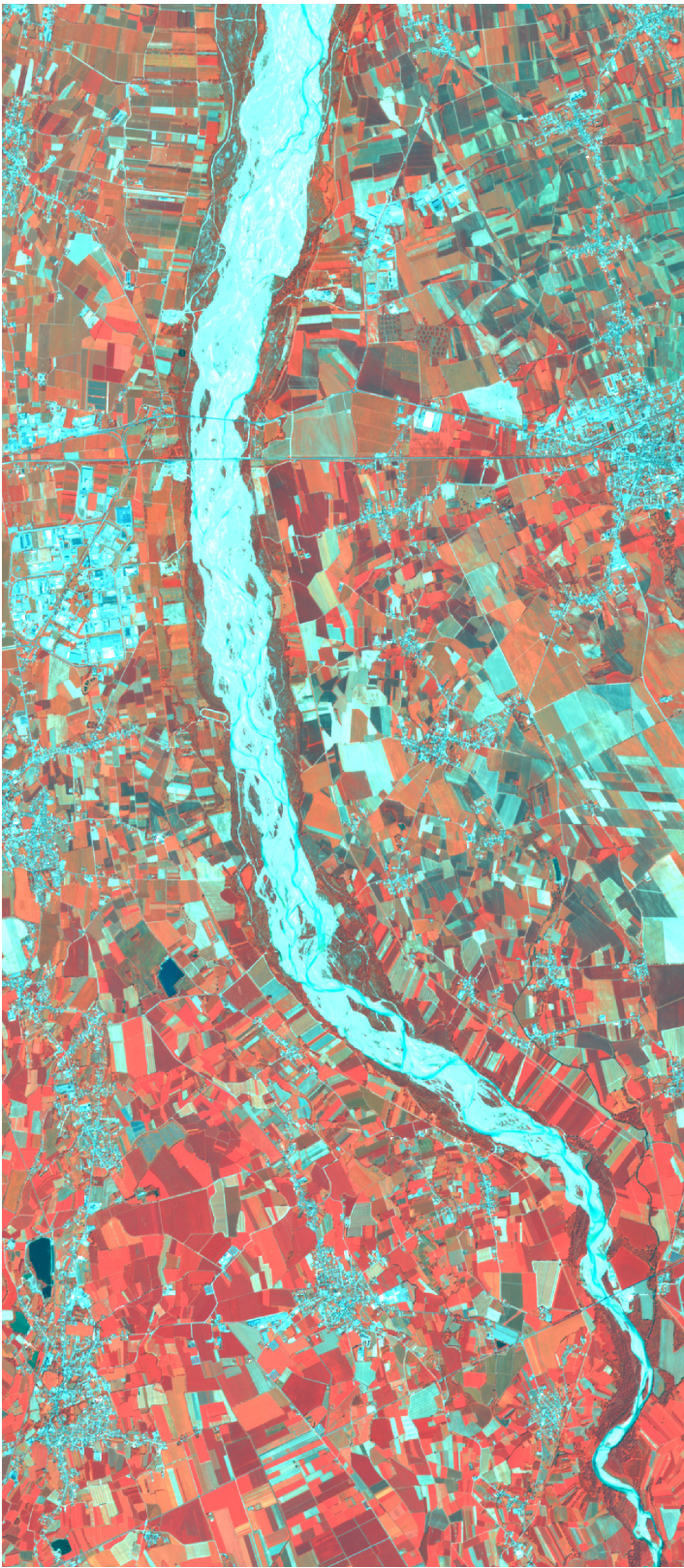
- 3.1 Territories of the transect
 - 3.1.1 An amphibious urban landscape
 - 3.1.2 The Padanian Cyborg
- 3.2 Pattern of Maladaptation
 - 3.2.1 Fives Lines of Inquiry
- 3.3 Inventory of Practices of Care & Transformation
- 3.4 Padania Tropicale
 - 3.4.1 Counteracting the Pattern
 - 3.4.2 From Practices to Strategies
 - 3.4.3 Padania Tropicale Transformative Framework



Lignano Sabbiadoro and Western Marano Lagoon



Vallevecchia Oasis, Caorle



Tagliamento River and the agricultural fabric



Po River Delta and 'Valli da Pesca'



Grado and Eastern Marano Lagoon

Jesolo, Cavallino Treporti and the Venice Lagoon



Acquaculture and coastal tourism in Chioggia

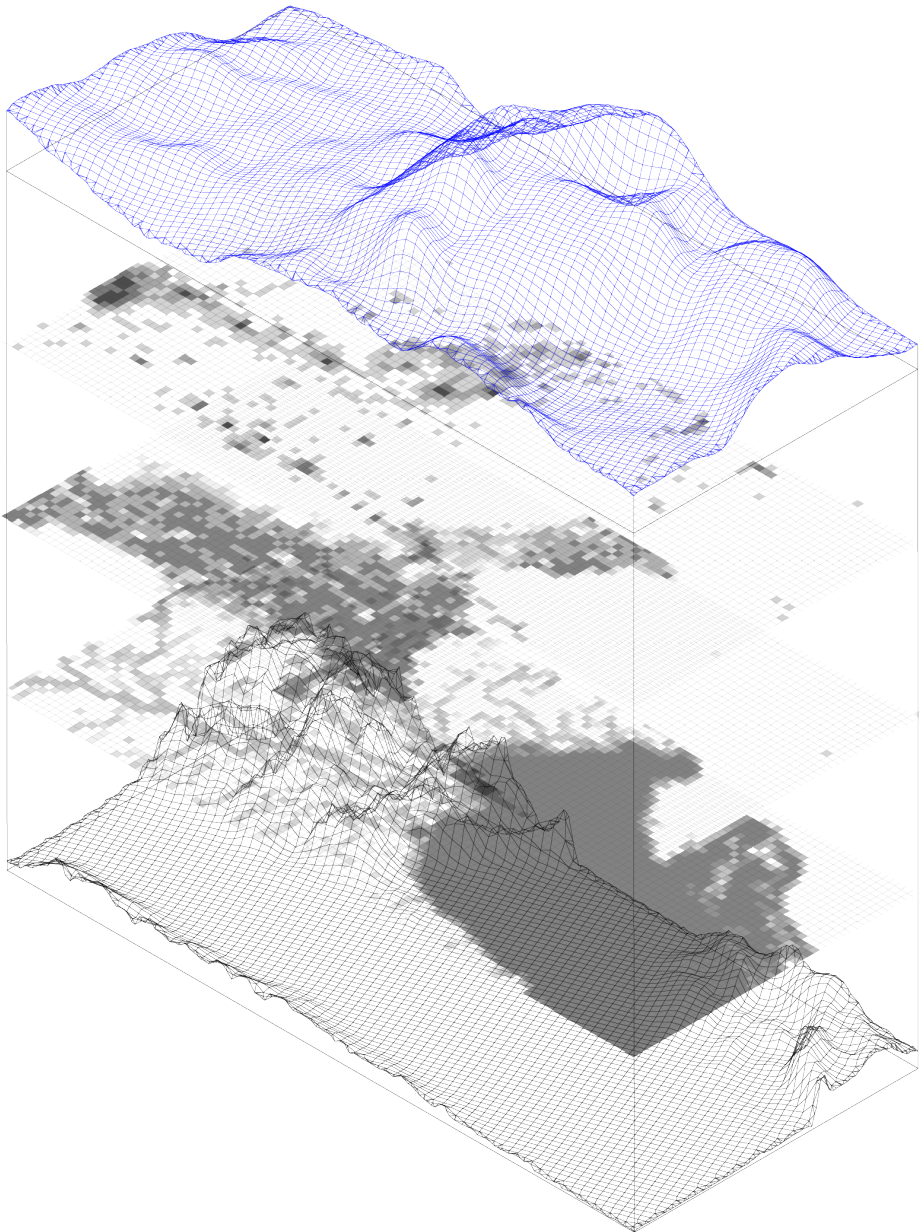
3.1 Territories of the Transect

3.1.1 An Amphibious Urban Landscape

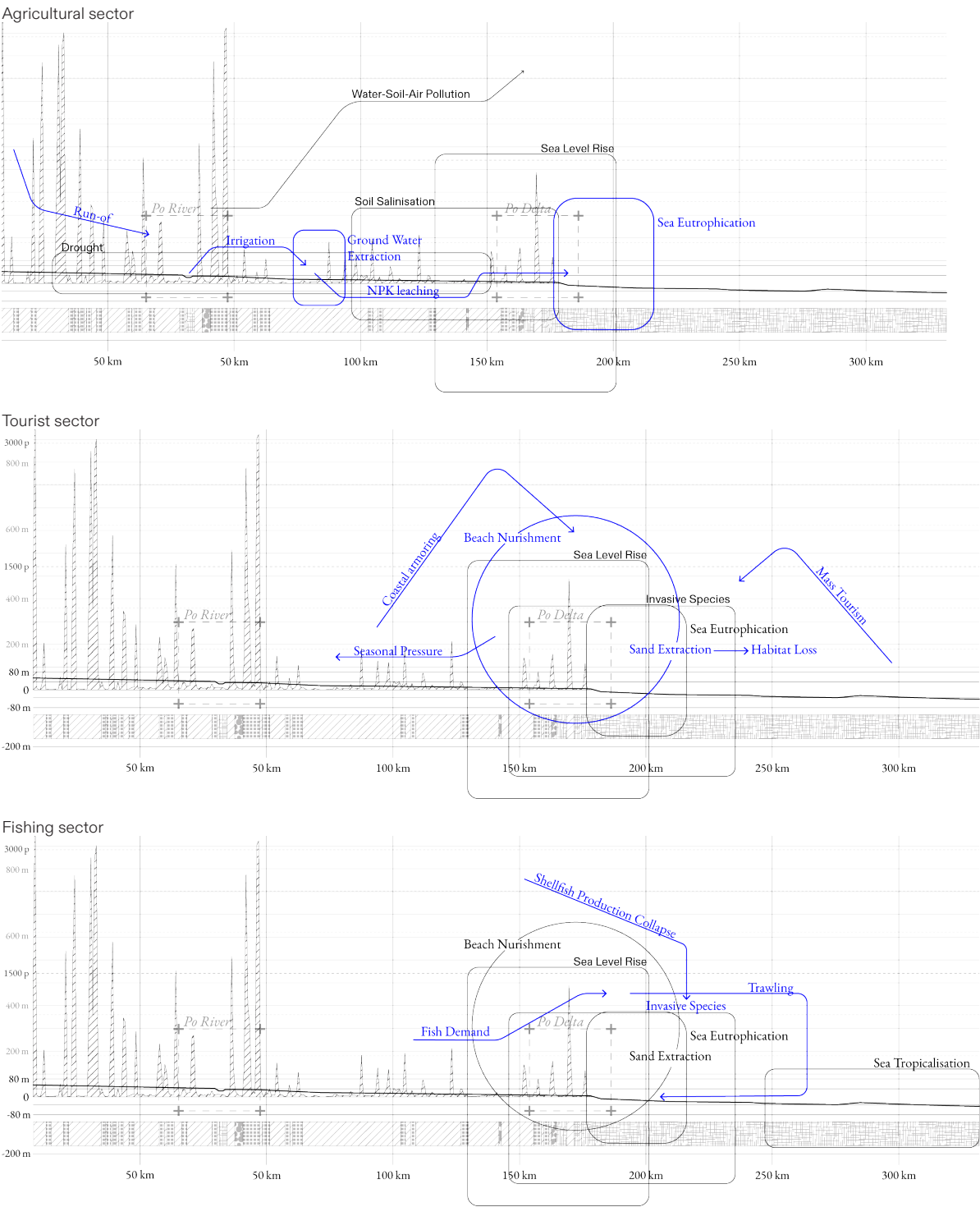
The Po/North Adriatic transect is an extremely complex one - the largest in scale and the least morphologically varied. Its terrestrial territories stretch for almost 300 kilometres into the Po Plain, along the banks of the River Po, through a standardised mosaic of agricultural fields, industrial areas and high-density settlements. Its marine territories mirror this condition, characterised by the shallow, sandy and heavily navigated plains of the Northern Adriatic - a result of the strategic importance of its port nodes. While both the marine and terrestrial hinterlands are highly standardised and homogeneous, the coastal strip emerges as a space of remarkable diversity and complexity.

The transect's coastal landscape is an amphibious urban one - where historic cities such as Venice and Ravenna alternate with lagoonal areas (Venice and Marano) and the imposing delta of the River Po. Here, historic urban fabrics of extraordinary cultural value intertwine with ecosystems of exceptional richness and fragility. Deltaic systems, lagoons, amphibious lands and brackish waters where humans have always been compelled to coexist with the ecosystem and its seasons, with the rhythms of the sea and the rain.

Although perhaps not representative of the Mediterranean stereotype - olive groves and maritime pines - the Po transect is an emblematic expression of the inextricable interconnection between nature and culture that unfolds along its coasts. Venice - the amphibious city par excellence - and its lagoon, as well as the fishing valleys of the Comacchio area (Po Delta), are perfect examples of the millennia-long coexistence between humans, land and the Mediterranean. They are, at the same time, emblematic symbols of the transformative effects of the Anthropocene and of modernity on the entire territory - a territory now placed under severe environmental stress by the risks of tropicalisation and by human pressure itself.



Axonometric view of the body and the risks of the Po-North Adriatic Bastard
Layer 1_Terrein profile
Layer 2_Water system
Layer 3_Agricultural landscape
Layer 4_Urban landscape
Layer 5_ Cascade of risks



3.1.2 The Padanian Cyborg

The Po transect is a territory entirely devoted to production - extremely standardised and exploited for profit and economic return. It is also my home, the place where I spent the first 24 years of my life, to which I feel I belong and which I believe I can read without superficiality across its different socio-cultural layers. It is a territory that, during the fieldwork carried out in the spring of 2026, revealed itself to me in a different light, with a different flavour. Observing the vast agricultural expanses and the regimented embankments of the River Po, I could not help but think of Haraway's concept of the cyborg, and of how evident the effects of human extractive action are within the Po Bastard and its productive landscapes - so often devoid of biodiversity.

This extractive action is analysed and represented on the left through systemic sections that show the extractive and maladaptive behaviour of three productive sectors - agriculture, fishing/ aquaculture and coastal tourism - which ground the foundations of their profit in the situated conditions of the territory. Sectors that do not dialogue with one another in terms of governance or logic, and that generate negative externalities across the entire eco-region, most critically for the marine ecosystem. In the Po context, even the land sector par excellence - agriculture - causes severe consequences for the health of coastal and marine areas. The industrialisation of agricultural processes and the overuse of fertilisers (NPK), with the consequent leaching of these into the sea, is the primary cause of eutrophication in the Northern Adriatic - a process that disrupts the balance of marine species, alters ecosystems and favours the proliferation of alien species that pose a serious threat to local fauna already under pressure from intensive fishing, and in particular from the widespread practice of trawling. Added to these two exemplary processes are multiple unsustainable dynamics now standardised across the agricultural and fishing sectors, further compounded by coastal tourism processes that place the marine ecosystem under enormous indirect pressure - particularly during the summer season - or that actively destroy marine ecosystems, as in the case of beach nourishment, with the sole objective of generating greater profit.

3.2 Pattern of Maladaptation

The complexity of the territorial and productive processes underway in the Po transect, and of their negative externalities, would require an entire additional thesis to be fully understood. The maladaptation pattern represents an attempt to systematise some of these dynamics, showing how the anthropocentric and standardised production practices of the agricultural, tourism and fishing sectors contribute to creating a system that is not only a cause of climate change itself, but that is structurally incapable of adapting to its consequences.

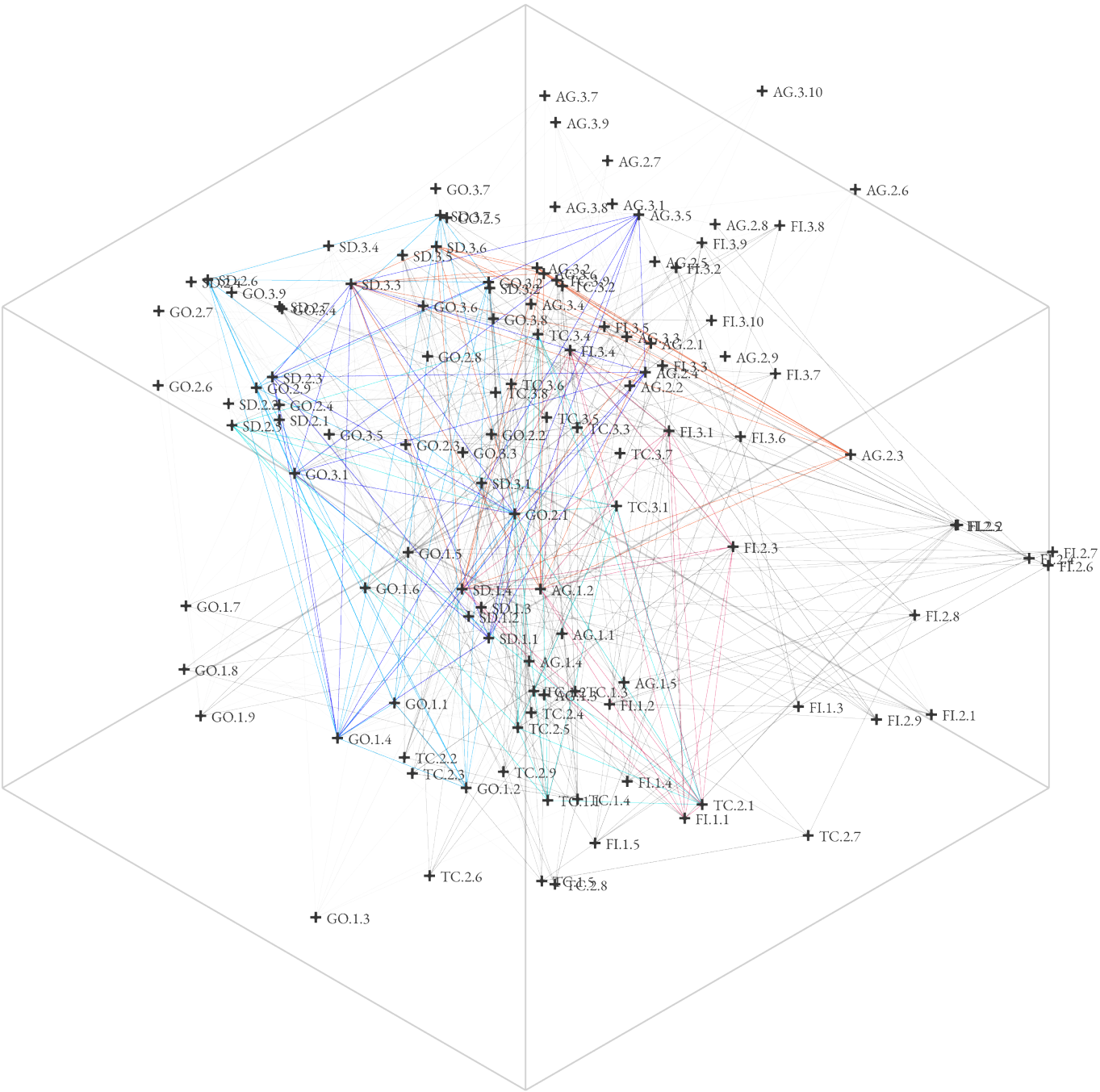
SD_1.1	Po River channelisation and levee system	GO_2.3	No public narrative of transformation
SD_1.2	Anthropogenic subsidence	GO_2.4	Absence of comm.-based management
SD_1.3	Sediment starvation (upstream dams)	GO_2.5	Democratic deficit in large infrastructure
SD_1.4	Adriatic eutrophication (Po nitrogen load)	GO_2.6	Insurance+liability gap for climate losses
SD_2.1	Soil impermeabilisation across Po plain	GO_2.7	Low part. monitoring of lagoon and delta
SD_2.2	Floodplain disconnection	GO_2.8	Regional competition stop adaptation
SD_2.3	Saltwater intrusion into delta aquifers	GO_2.9	No policy for de-intensification of agric.
SD_2.4	Reduction of freshwater discharge	GO_3.1	No link between research and local gov.
SD_2.5	Loss of deltaic landmass (subs. + erosion)	GO_3.2	No link climate migration with coast. use
SD_2.6	Increased storm surge frequency-intensity	GO_3.3	Knowledge gap in traditional practices
SD_2.7	Thermal stratification of N-Adriatic waters	GO_3.4	Absence of cross-border governance
SD_3.1	Coastline erosion acceleration	GO_3.5	No market for halophyte and new crops
SD_3.2	Flood risk amplification	GO_3.6	Economic lock-in of coastal tourism model
SD_3.3	Habitat fragmentation across the transect	GO_3.7	Absence of Adriatic spatial planning
SD_3.4	Nutrient cycle disruption (river to sea)	GO_3.8	No intergenerational transmission
SD_3.5	Loss of coastal sediment budget	FI_1.1	Bottom trawling on sandy Adriatic seabed
SD_3.6	Adriatic dead zones (anoxic events)	FI_1.2	Shellfish monoculture in Venice lagoon
SD_3.7	Collapse of migratory species corridors	FI_1.3	Invasive species treated as threat to kill
GO_1.1	Institutional fragmentation	FI_1.4	Overfishing and shifting stocks
GO_1.2	No single body governing the transect	FI_1.5	Dependence onallochthonous species
GO_1.3	Emergency response culture	FI_2.1	Intensive aquac. with effluent discharge
GO_1.4	Misaligned EU funding (CAP, cohesion)	FI_2.2	Anoxia events destroying benthic comm.
GO_1.5	Absence of infrastructure for new species	FI_2.3	Harmful algal blooms (mucilage)
GO_1.6	Separation of nat. protection & production	FI_2.4	Fleet capital investment in declining spec.
GO_1.7	No cooperative governance of lagoon	FI_2.5	No integrated multi-species aquac. syst.
GO_1.8	Absence of integrated coas. management	FI_2.6	Absence of shellfish restoration programs
GO_1.9	Siloed scientific monitoring	FI_2.7	Mussel longline sys. in eutrophic waters
GO_2.1	Planning inertia in flood and erosion zones	FI_2.8	Lagoon sediment disturbance
GO_2.2	Loss of amphibious knowledge	FI_2.9	Loss of traditional valley fishing

The pattern links processes related to the three sectors - referenced by the codes AG (agriculture), FI (fishing/aquaculture) and TU (coastal tourism) - with structural criticalities tied to the territorial composition of the transect itself (SD: structural drivers) and to its rigid governance system (GO: governance). In the three-dimensional representation of the pattern (shown on the following page), the negative synergies produced by these systems are illustrated through two opposing isometric views.

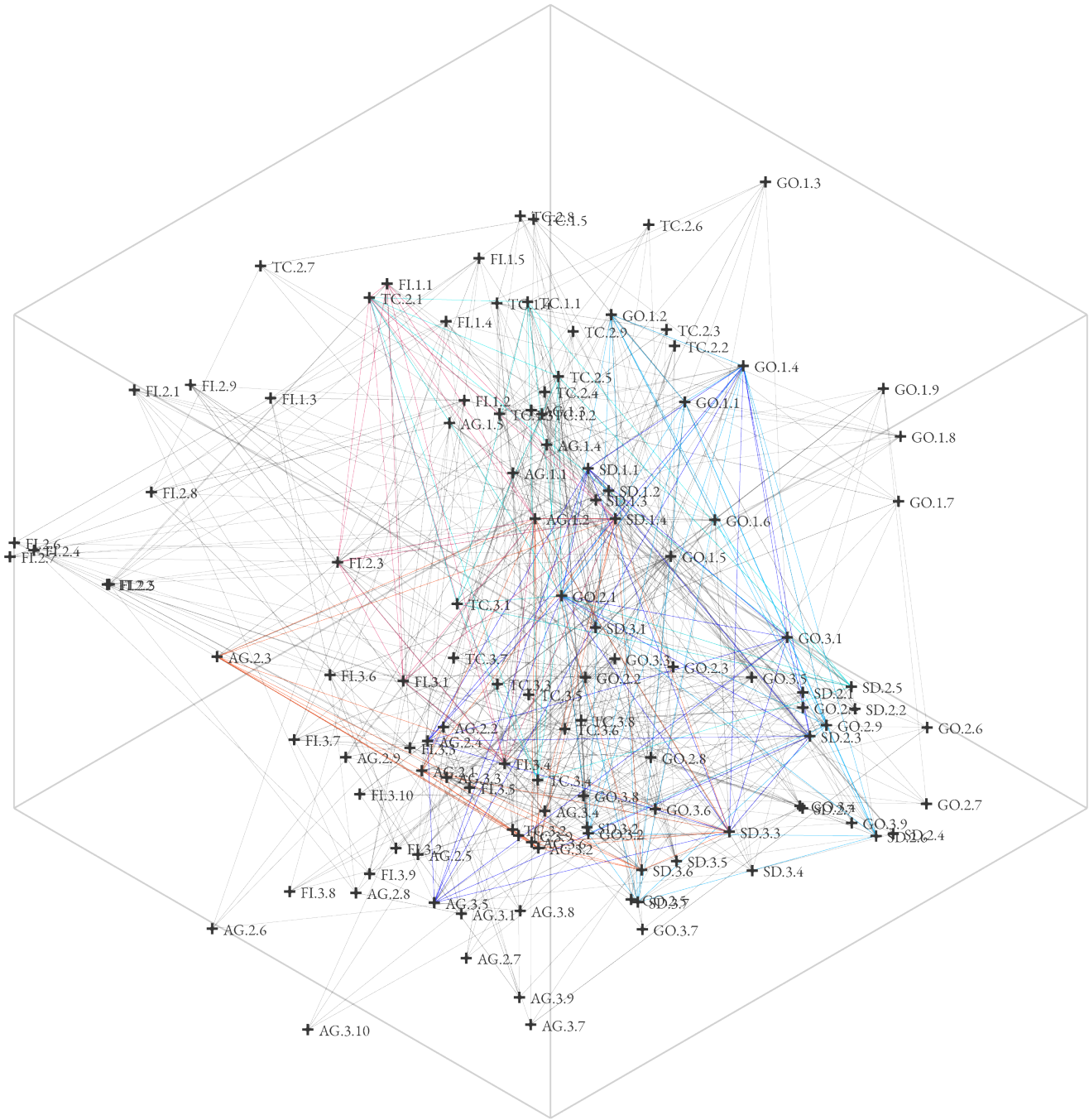
FI_3.1	Collapse of fish stock diversity	AG_3.7	Climate insurance gap for smallholders
FI_3.2	New thermophilic species	AG_3.8	No market infrast. for halophyte crops
FI_3.3	Loss of nursery habitat (seagrass, benthic)	TC_1.1	Beach nourishment as permanent cycle
FI_3.4	No policy link between agriculture-fishing	TC_1.2	Hard coastal armoring (groins, seawalls)
FI_3.5	Loss of fishing traditional practices	TC_1.3	Coastal cementification
FI_3.6	No invasive species processing infras.	TC_1.4	Mass tourism as economic monoculture
FI_3.7	No cooperative management of lagoon	TC_1.5	Large vessel traffic
FI_3.8	Illegal fishing intensification	TC_2.1	Fixed beach infrastr. in erosion zones
FI_3.9	Market dependence on single species	TC_2.2	Short-season economic dependency
AG_1.1	Intensive monoculture (maize, soy, wheat)	TC_2.3	Tropicalisation degrading bathing quality
AG_1.2	Nitrogen and phosphorus overuse	TC_2.4	No managed coastal retreat planning
AG_1.3	Irrigation from over-extracted aquifers	TC_2.5	Urban sprawl in flood and erosion zones
AG_1.4	Misaligned CAP subsidies (wrong crops)	TC_2.6	Loss of dune systems
AG_1.5	Forced drainage of wetlands to recover	TC_2.7	Chemical pollution from water traffic
AG_2.1	Passive abandonment of salinised soils	TC_2.8	Overtourism concentration in Venice
AG_2.2	Salt-resistant crop gap (no markets)	TC_2.9	Absence of eco-tourism infrastructures
AG_2.3	Deeper wells as drought response	TC_3.1	Accelerating erosion from subsidence
AG_2.4	Soil compaction from heavy machinery	TC_3.2	Thermal discomfort reducing season qual.
AG_2.5	Loss of crop rotation and polyculture	TC_3.3	Brand erosion affecting destination image
AG_2.6	Agro-chemical runoff into drainage	TC_3.4	No diversification from beach model
AG_2.7	Greenhouses in unsuitable zones	TC_3.5	No integration of tour. and nat. restoration
AG_2.8	No rice-aquaculture rotation	TC_3.6	Absence of links tourism-aquaculture
AG_2.9	Pesticide use on declining pollinators	TC_3.7	Touristification replaces fishing traditions
AG_3.1	Salinisation creep into agricultural land	TC_3.8	No planning for storm surge in tour. seas.
AG_3.2	Aquifer depletion feedback loop		
AG_3.3	Rural depopulation from agricultural crisis		
AG_3.4	Loss of traditional deltaic farming		
AG_3.5	Absence of supply chains for new crops		
AG_3.6	Collapse of cooperative farming networks		

SD_ Structural Drivers
AG_ Agriculture
FI_ Fishing
TC_ Coastal Tourism
GO_ Governance

SW isometric view of the Pattern



NE isometric view of the Pattern



3.2.1 Five Lines of Inquiry

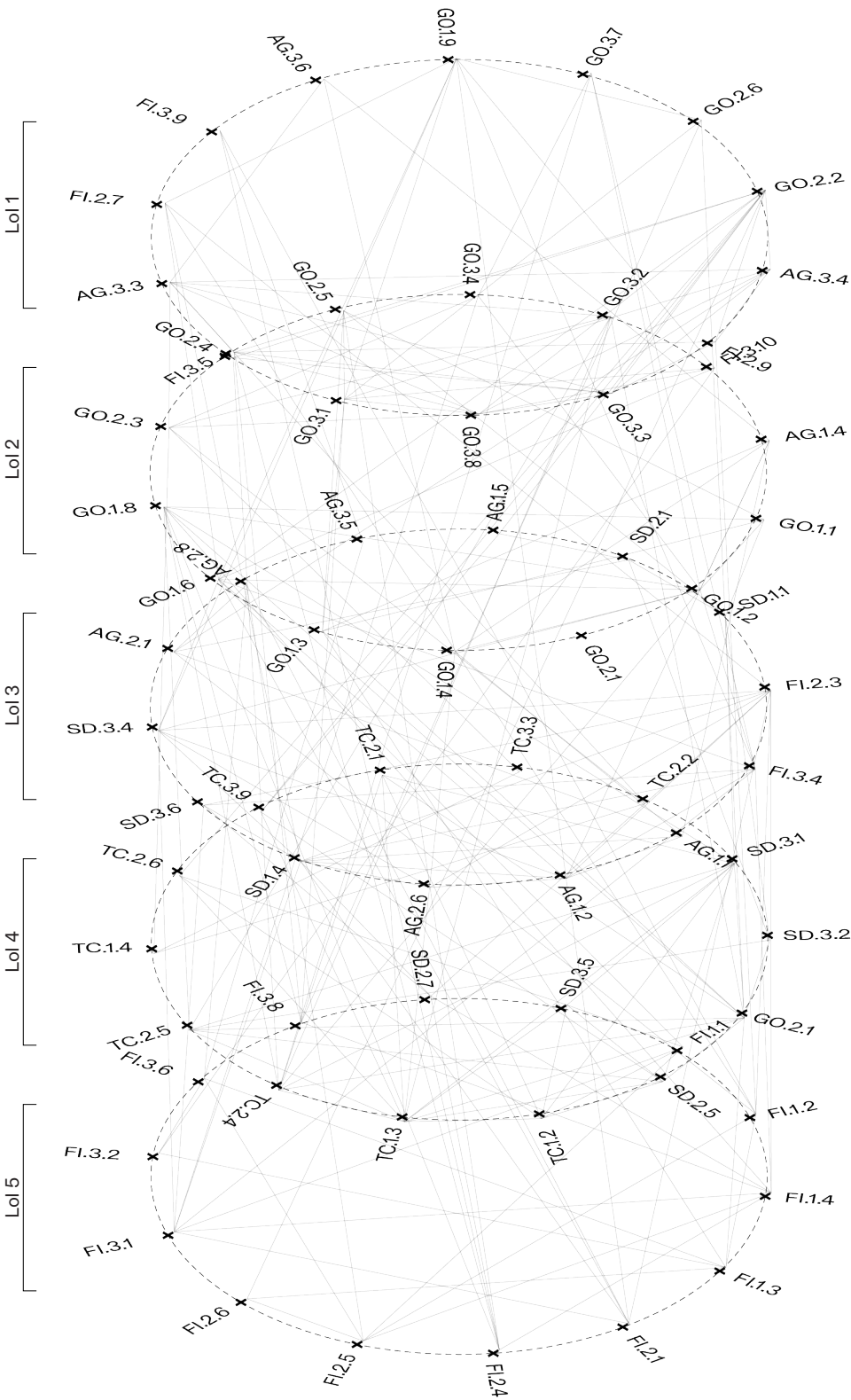
The pattern of maladaptation, although not immediately easy to read, reveals the incredible complexity of the processes underway and how issues related to the planning and territorial dimension are deeply entangled with the governance structures and productive apparatuses of the Po Bastard. A closer reading makes it possible to trace lines of inquiry that categorise some of these negative synergies, highlighting them through specific thematic lenses. Following the interpretative framework emerging from the thesis problematisation and from the fieldwork experience, five lines of inquiry are identified - attempting to synthesise and operationalise the insights of the pattern for a future design agenda.

The first line of inquiry relates to the lack of amphibious knowledge in the Po transect and the Northern Adriatic, and to how the industrialisation of its territories has standardised a landscape and a relationship with it oriented toward profit, extraction and domination - incapable of being fluid, amphibious or of fostering coexistence between terrestrial and marine ecosystems.

The second line of inquiry connects to the second problem statement of the thesis and to the lack - at the local scale - of efficient spatial governance systems. This is evident in the governance of land areas (divided between three regions and multiple provinces), of marine areas, and also of the different sectors operating within them, often in an almost competitive manner with one another.

The final three lines of inquiry relate instead to the three specific sectors observed, underlining how the processes of each productive system generate negative externalities across the entire ecosystem of the transect - both from a biophysical and a socio-cultural standpoint. It is worth noting, moreover, how the processes of each sector directly damage not only the ecosystem but also the productive capacity of the other sectors, through a process that physically moves from upstream to downstream - bringing eutrophication, agricultural runoff, coastal pressure and ecosystem collapse - rendering the territory of the Bastard extremely exposed, fragile and incapable of transforming alongside the consequences of tropicalisation.

- Lol 1: Amphibious knowledge-action gap
GO.2.2, AG.3.4, FI.2.9, GO.3.3, GO.3.8, GO.3.1, FI.3.5, AG.3.3, FI.2.7, FI.3.9, AG.3.6, GO.1.9, GO.3.7, GO.2.6
- Lol 2: Political and institutional fragmentation
GO.1.1, GO.1.2, GO.2.1, GO.1.4, GO.1.3, GO.1.6, GO.1.8, GO.2.3, GO.2.4, GO.2.5, GO.3.4, GO.3.2, FI.3.10, AG.1.4
- Lol 3: Agriculture production soil and runoff
AG.1.1, AG.1.2, AG.2.6, SD.1.4, SD.3.6, SD.3.4, AG.2.1, AG.2.8, AG.3.5, AG.1.5, SD.2.1, SD.1.1, FI.2.3, FI.3.4
- Lol 4: Tourism and coastal development
TC.1.2, TC.1.3, TC.2.4, TC.2.5, TC.1.4, TC.2.6, TC.3.9, TC.2.1, TC.3.3, TC.2.2, SD.3.1, SD.3.2, GO.2.1, SD.2.5
- Lol 5: Fisheries, aquaculture and shellfish farming
FI.1.1, FI.1.2, FI.1.4, FI.1.3, FI.2.1, FI.2.4, FI.2.5, FI.2.6, FI.3.1, FI.3.2, FI.3.6, FI.3.8, SD.2.7, SD.3.5

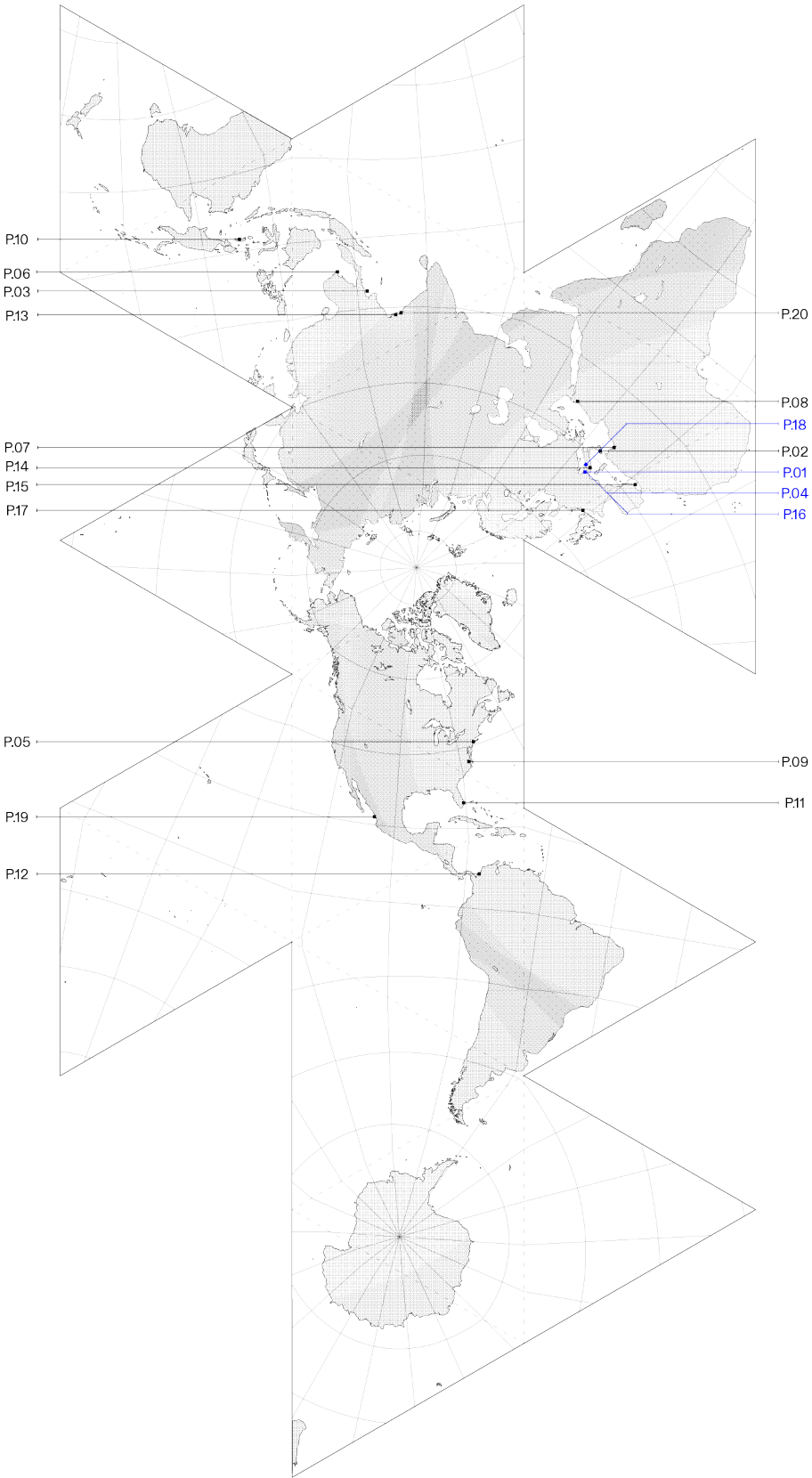


3.3 An inventory of Practices of Care & Transformation

Having highlighted the evident criticalities of the Po transect and the structural unsustainability of its productive practices, an inventory of alternative practices of care and transformation is presented - stimulating the imagination toward future scenarios of co-existence across these three sectors. Situated practices emerging partly from the Mediterranean context and partly from already tropical contexts, where coexistence with a warmer sea is embedded in the socio-cultural fabric. Practices that show how it is possible to take care of the marine ecosystem and how models of human/more-than-human stewardship are already consolidated realities in less "cyborg" contexts. Practices that connect specifically to the three sectors analysed and to their productive logics.

Each of the 20 practices is presented in the inventory according to a model freely inspired by the structure of the pattern language methodology, and is linked to a specific geographical and cultural context that presents interesting similarities with the Po transect. Alongside the drawing, text and location of each practice, an evaluation sheet is provided showing the sectors of reference, the spatial, material and institutional scale of intervention that these practices require in order to be enabled, and the time horizon they need in order to produce effects. Finally, an attempt is made to assess the magnitude of the positive impacts of each practice - for human and more-than-human inhabitants - from the local scale to that of the eco-region.

- P.01 | Eating invasive species
- P.02 | Tropical crops on former vineyards
- P.03 | Shipwrecks as artificial reefs
- P.04 | Halophyte production on salinised soils
- P.05 | Oyster reef restoration
- P.06 | Rice / shrimp / fish rotation
- P.07 | Blue crab fishery and supply chain
- P.08 | Community-driven adaptive agriculture
- P.09 | Clam farming with blue crab protection
- P.10 | Regenerative shellfish aquaculture
- P.11 | Reef Line
- P.12 | Coral gardening
- P.13 | Mangrove reforestation as coastal shield
- P.14 | Coastal pine forest and agroforestry
- P.15 | Posidonia oceanica planting
- P.16 | No Big Ships civic movement
- P.17 | Room for the River
- P.18 | Deltaic community-led agroforestry
- P.19 | Stormwater treatment wetlands
- P.20 | Managed coastal retreat

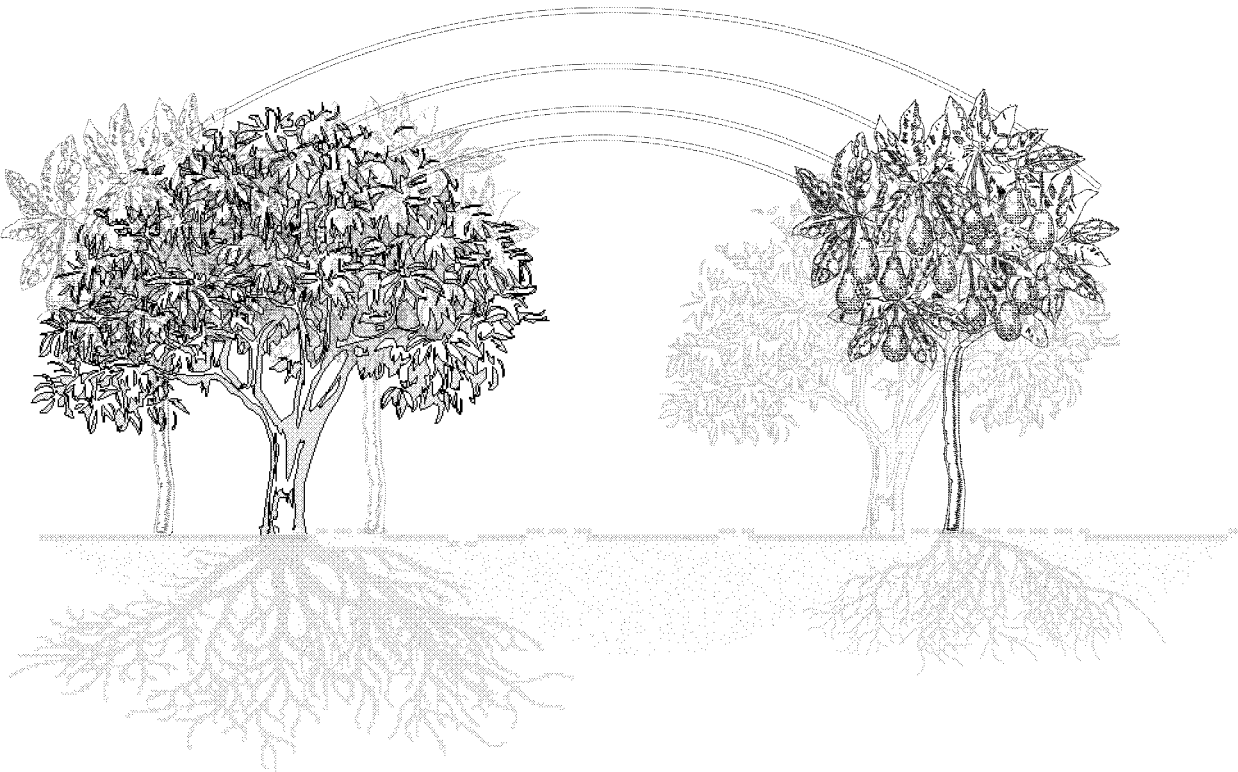
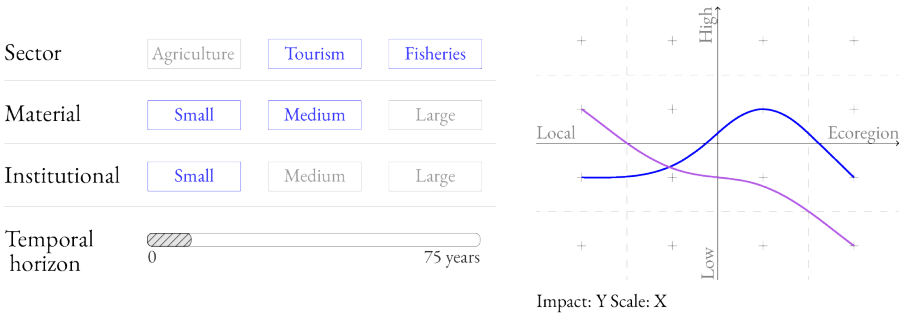




P.01

Eating invasive species

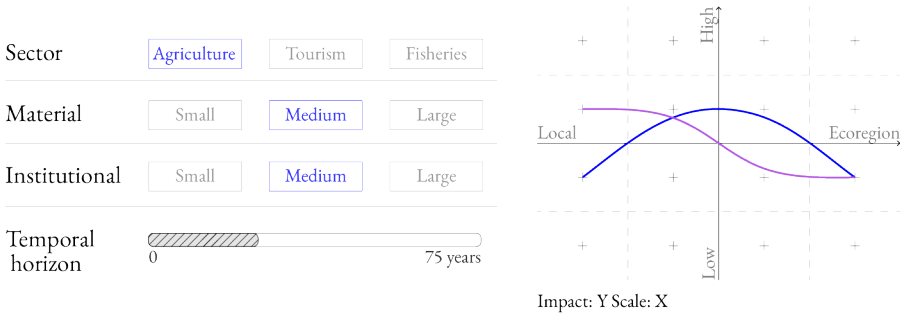
Blue crab, invasive algae and alien molluscs colonising the Venice Lagoon are transformed into fine dining ingredients at the Venissa restaurant on the island of Mazzorbo. The practice reverses the logic of emergency response: instead of fighting invasive species as a threat, it integrates them into local food culture as a resource. The blue crab, arrived from the Atlantic and devastating to native clam populations, becomes raw material for new recipes. The biological effect is limited but real: targeted fishing pressure on invasive species partially reduces their density. The cultural effect is more significant: it builds a narrative of transformation rather than loss, and opens a market for products previously without commercial value.

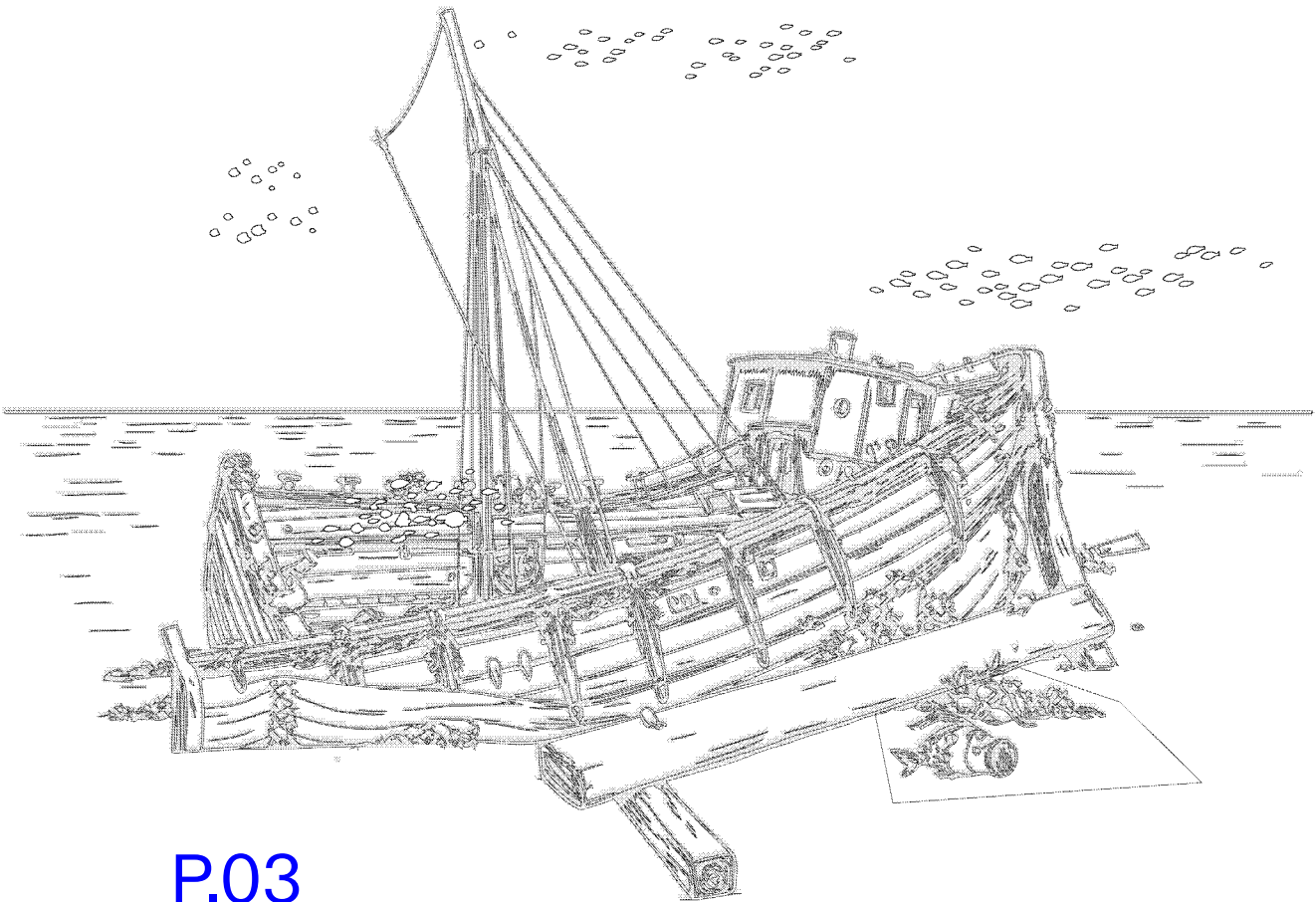


P.02

Tropical crops on former vineyards

In Sicily, farms that could no longer grow vines due to rising temperatures and drought have converted their fields to tropical crops. The practice transforms a productive crisis into an opportunity: the same climate change that destroys a traditional agriculture opens space for crops that were previously unviable (mango, avocado, papaya). The economic effect is significant: new supply chains, new markets, new productive identity for marginalised areas. The ecosystem effect is moderate: tropical crops do not reproduce the biodiversity of the traditional agricultural landscape but they occupy land that would otherwise be abandoned.

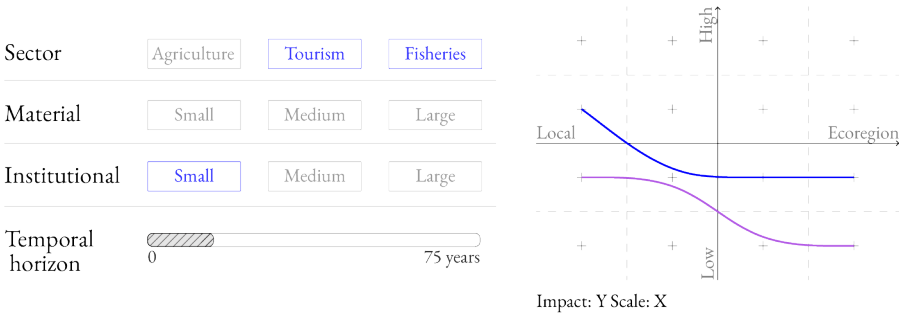




P.03

Shipwrecks as artificial reefs

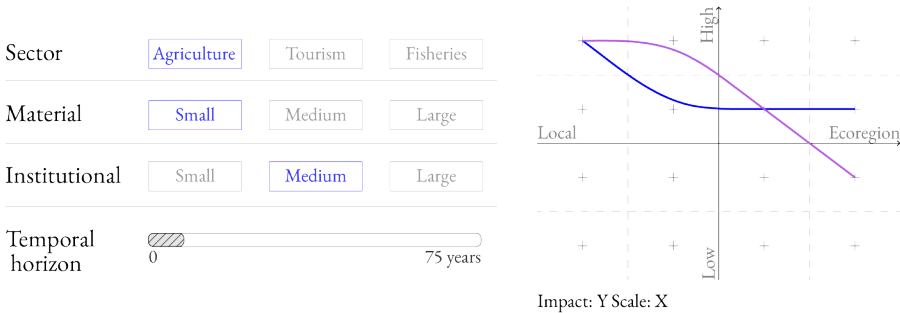
In Thailand and other tropical coastal contexts, decommissioned vessels are deliberately sunk to create artificial structures on the seabed. The wrecks become substrate for benthic colonisation, shelter for fish and destinations for dive tourism. The ecosystem effect is rapid and documented: within three to seven years a wreck generates structural complexity comparable to a small natural reef, increasing local biodiversity and creating nursery areas for commercial fish species. For the North Adriatic, where the seabed is flat and sandy and almost entirely lacking in structure, the practice has direct applicability: a few strategically placed wrecks can change the ecological profile of a marine area.

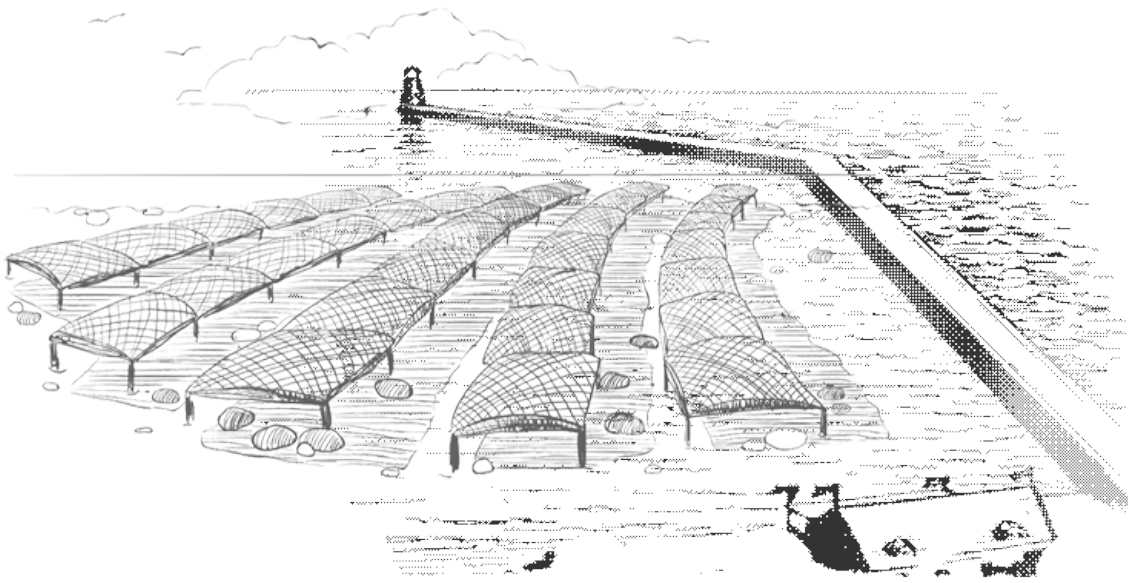


P.04

Halophyte production on salinised soils

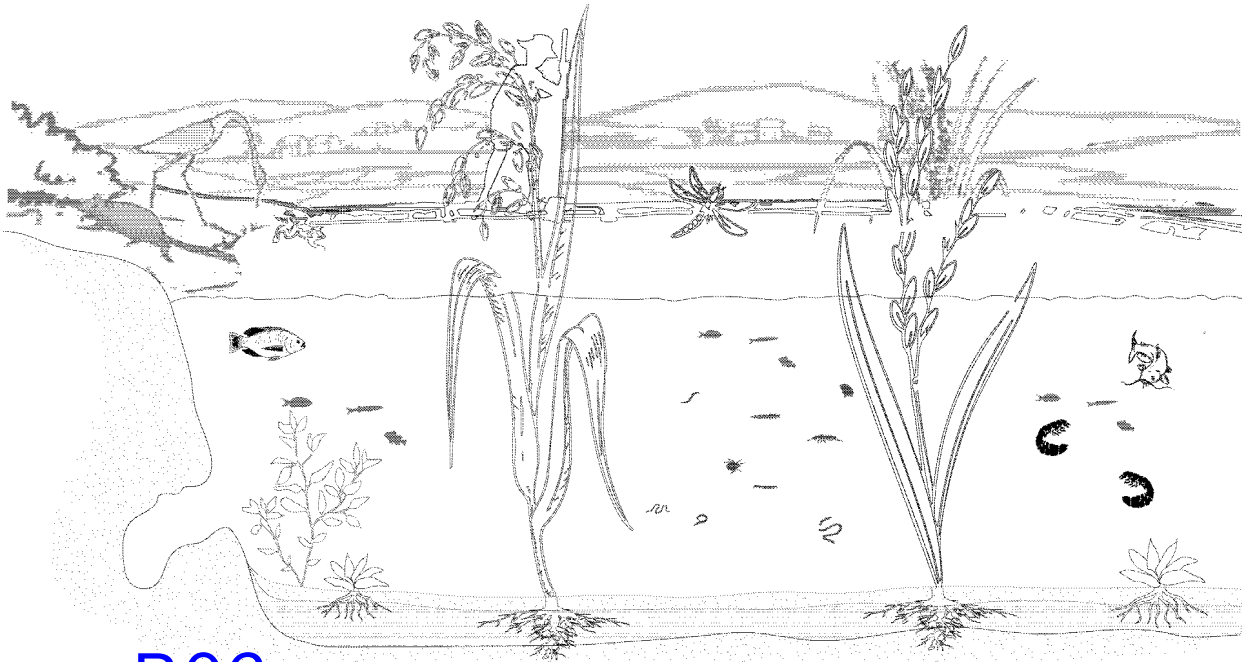
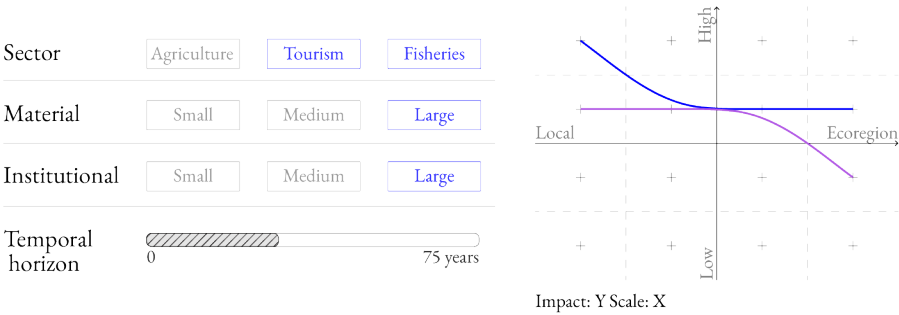
Local farmers in the Po delta and Venice Lagoon cultivates halophyte plants, including salicornia, atriplex, spartina and agretti, on agricultural soils rendered unproductive by the advancing saltwater front. The practice directly converts the salinisation crisis into a productive resource: plants that grow under high-salinity conditions are harvested and sold as niche food products or biomass. The ecosystem effect is high: halophytes stabilise the soil, sequester carbon, build habitat for coastal fauna and slow erosion. The social effect is immediate: it keeps otherwise abandoned land productive and generates new rural economy in an area of growing marginalisation.





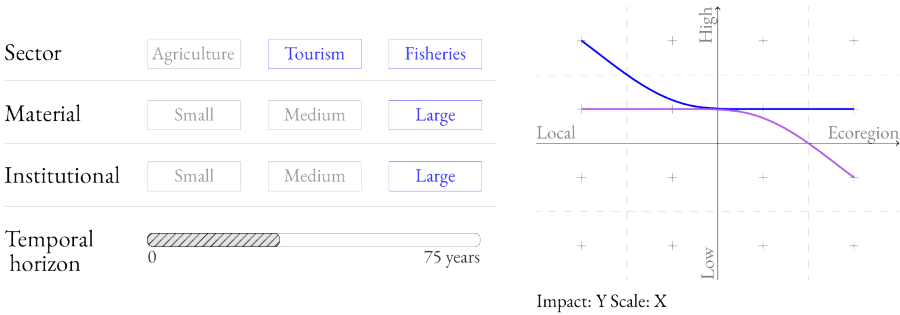
P.05
Oyster reef restoration

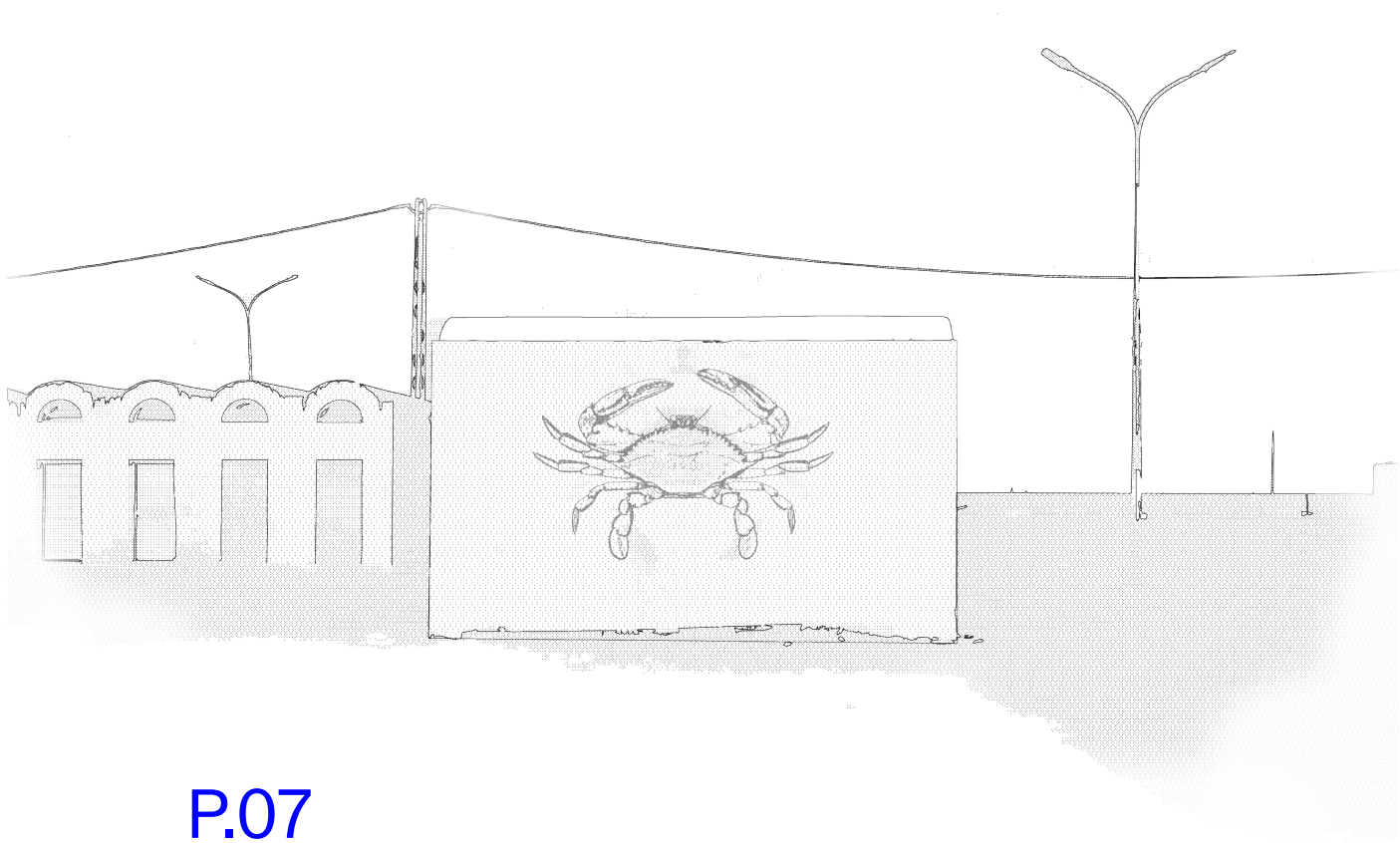
The Billion Oyster Project in New York works to restore native flat oysters in the harbour, historically devastated by pollution and intensive harvesting. Oysters are raised in protected tanks then transplanted onto artificial substrates in the harbour. The effect is multiple: each oyster filters up to two hundred litres of water per day, improving water quality; the reefs create structured habitat for dozens of species; oyster presence reduces wave energy and protects low-lying shores. In the Adriatic, where the European flat oyster was historically widespread before over-fishing, reef restoration could combine ecological function, bioremediation of eutrophication and the foundation for a local oyster economy.



P.06
Rice / shrimp / fish rotation

In the Mekong delta, agricultural fields at risk from flooding and salinisation have been converted to a seasonal rotation system alternating rice cultivation with aquaculture: in the dry season rice is grown; in the wet season or as the saltwater front advances the fields are flooded and shrimp, crabs and fish are farmed. The practice does not fight climate change but incorporates it into the productive cycle, transforming threat into resource. The ecosystem effect is very high: the system creates diversified habitat, reduces pesticide and fertiliser use, and maintains soil organic matter. For the Po delta, where salinisation is advancing across historic rice fields, the principle is directly transferable.

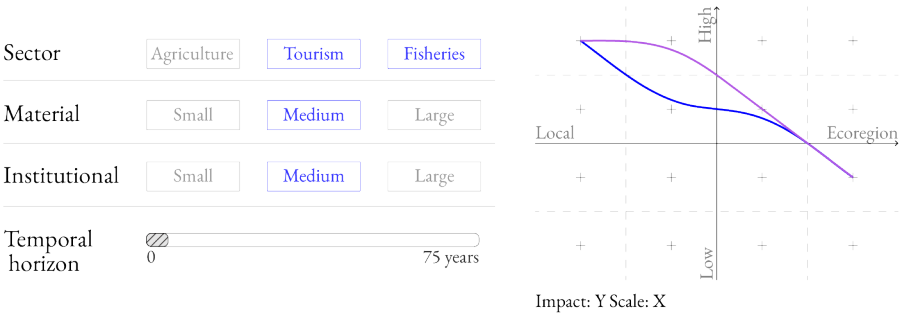




P.07

Blue crab fishery and supply chain

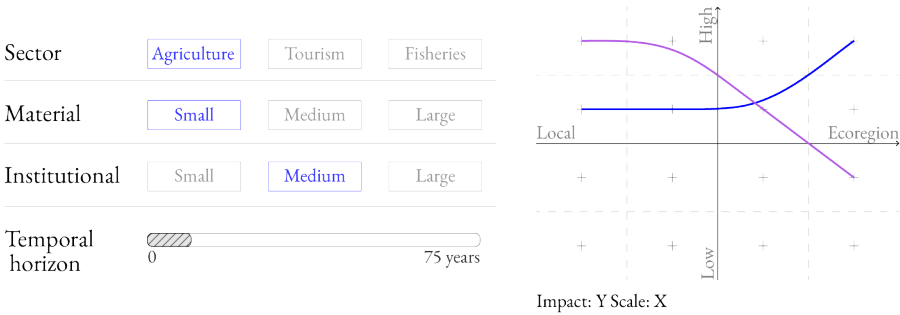
On the Kerkennah Islands in Tunisia, the invasion of blue crab devastated the nets of traditional fishers. Rather than simply trying to combat it, some cooperatives built a complete supply chain: dedicated trapping with specific gear, processing and freezing facilities, and export to European and Asian markets where blue crab is a premium product. The effect is double: reduction of predation pressure from the invasive species on the lagoon ecosystem, and creation of a new fishing economy. In the North Adriatic, where blue crab has nearly eliminated clam production in the Venice Lagoon and the Po delta, this model is immediately applicable.

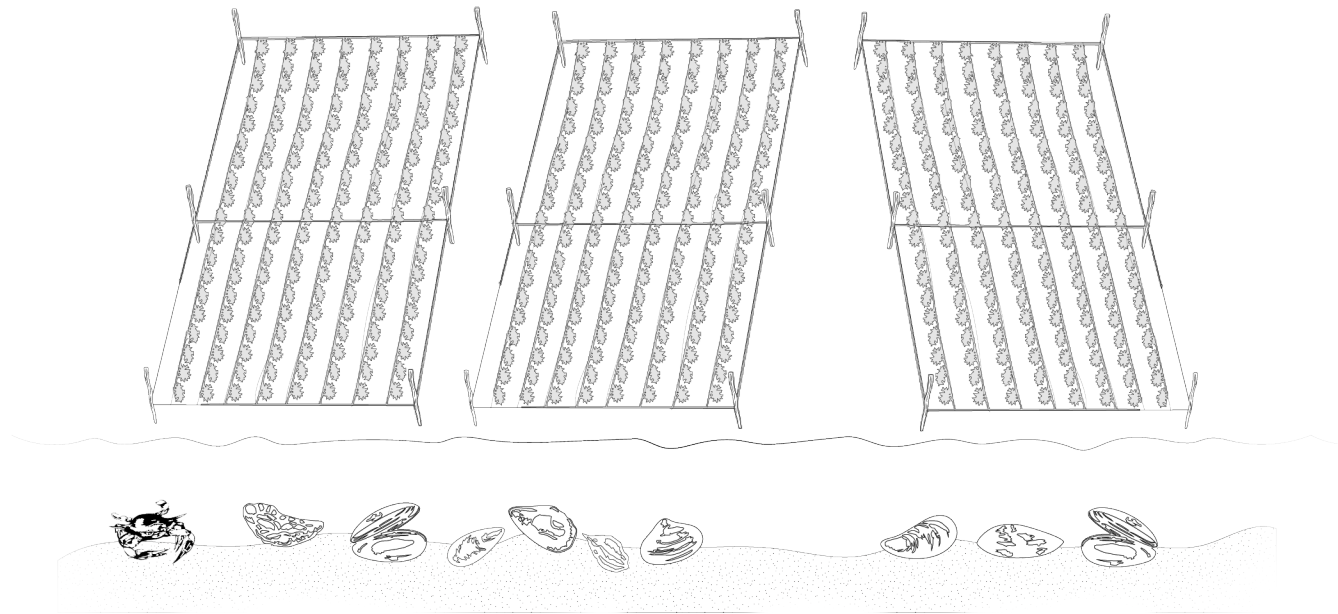


P.08

Community-driven adaptive agriculture

In the Nile delta, farming communities in the Kafr El Sheikh governorate responded to soil salinisation not with abandonment but with the collective introduction of salt-tolerant varieties including sea barley, quinoa, sea beet and halophytic forages. The process was bottom-up: communities experimented, shared knowledge with each other and built new inclusive productive supply chains. The effect is primarily social: it keeps rural communities productive in areas of crisis, builds shared local knowledge and creates collective resilience. The ecosystem effect is moderate but positive, with reduced fertiliser use and reintroduction of diverse crop varieties.

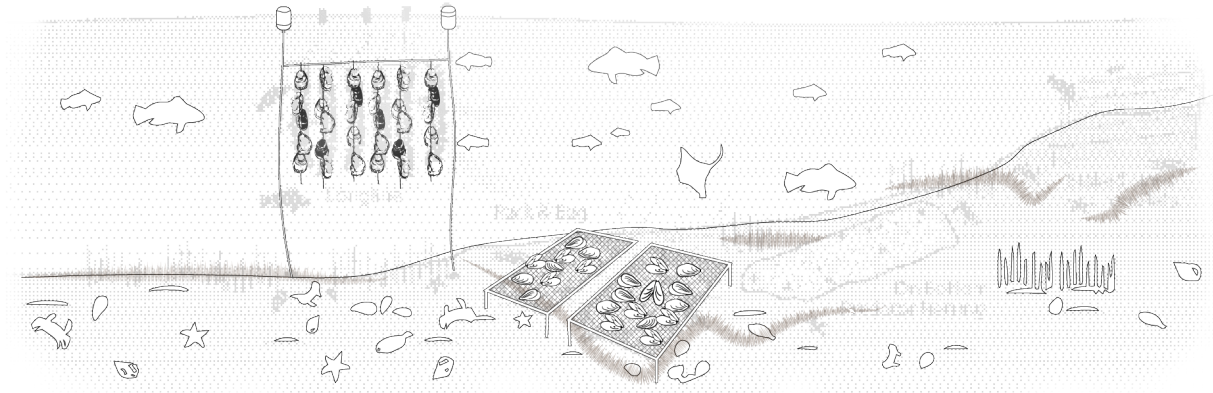
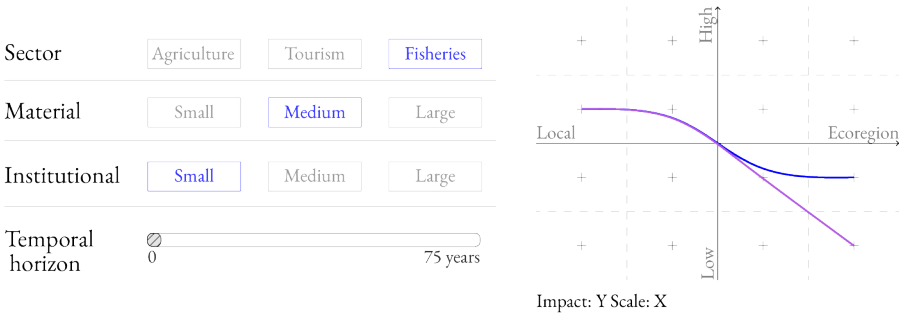




P.09

Clam farming with blue crab protection

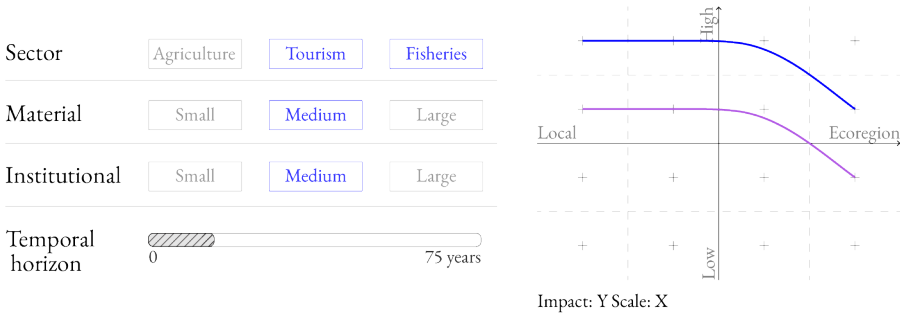
In Virginia, clam farmers responded to the blue crab invasion with a simple technical solution: protecting clams with metal mesh or plastic fabric covers placed on the seabed, physically preventing the crab from reaching them. The clams grow inside the cages in a biodiverse environment - the nets themselves become substrate for benthic organisms - while the blue crab remains free to move in the surrounding area. The effect is immediate: clam mortality drops dramatically and production is maintained even at high predator densities. In the Venice Lagoon and the Po delta, where blue crab is destroying clam aquaculture, this practice is the most rapidly deployable technical response available.

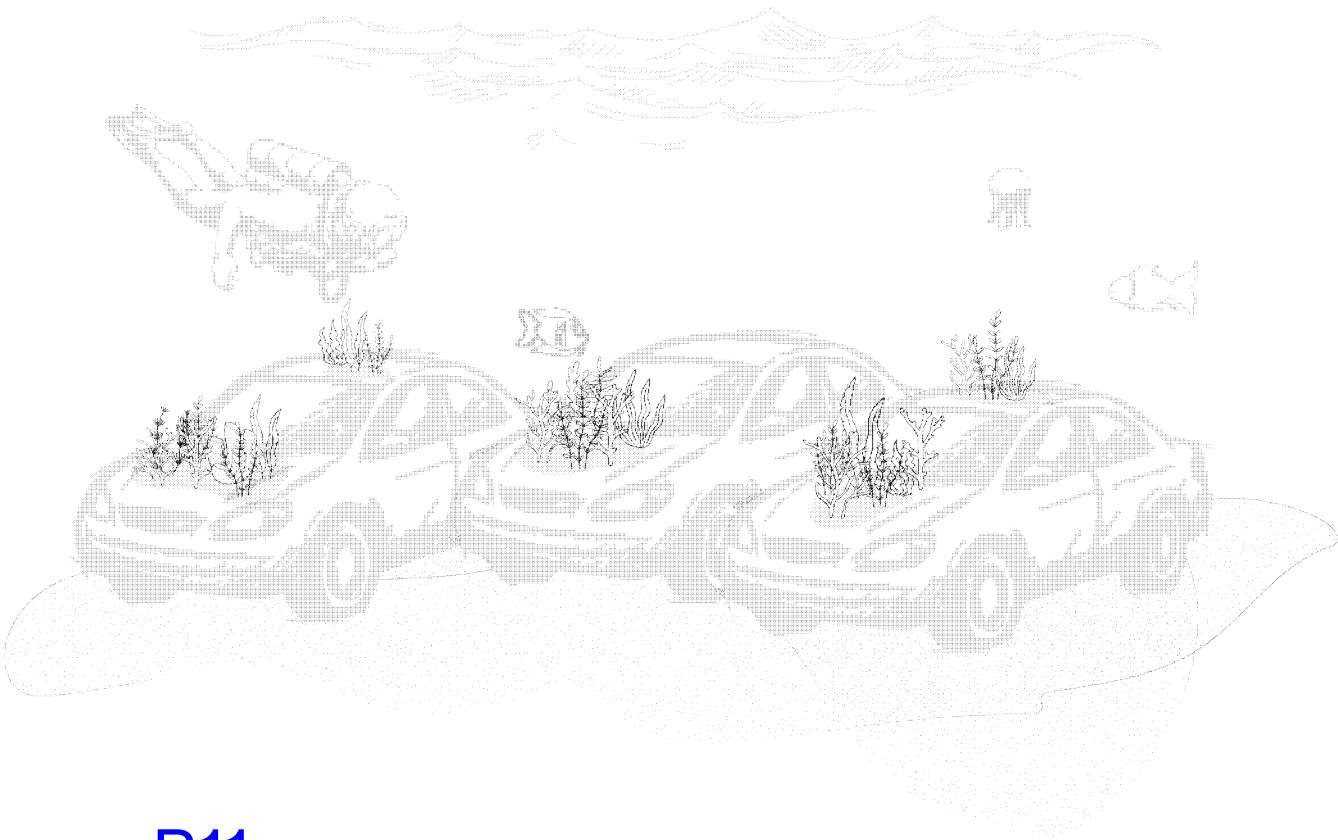


P.10

Regenerative shellfish aquaculture

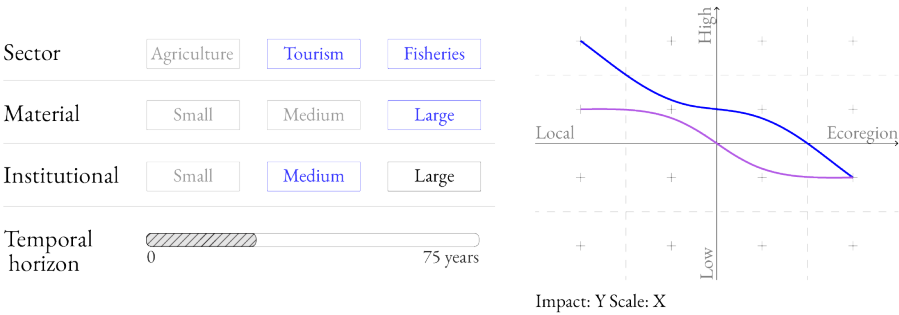
Regenerative shellfish aquaculture - mussels, oysters, scallops, clams - is a production system that requires no feed inputs, generates no significant nitrogen discharge and actively provides ecosystem services: shellfish filter water, removing dissolved nitrogen and phosphorus, sequester carbon in shells and create habitat structure for other species. In an Adriatic Sea facing chronic eutrophication, expanding regenerative shellfish production has a double function: economic and bioremediation. In Tanzania, The Nature Conservancy has demonstrated that shellfish aquaculture can function as ecological infrastructure in degraded tropical waters, not merely as food production.





P.11
Reef Line

The Reef Line project for Miami proposes purpose-designed submerged structures placed offshore to create underwater structural complexity in an environment of flat, featureless sandy seabed. The structures become substrate for corals, algae and invertebrates, shelter for fish fauna, wave attenuators and snorkelling and dive tourism destinations. The dual role - ecological infrastructure and tourism infrastructure - is the core of the practice: the reef generates biodiversity while simultaneously producing a sustainable tourism economy. For the North Adriatic, with its homogeneous seabed and near-total absence of structure, the principle is directly applicable.

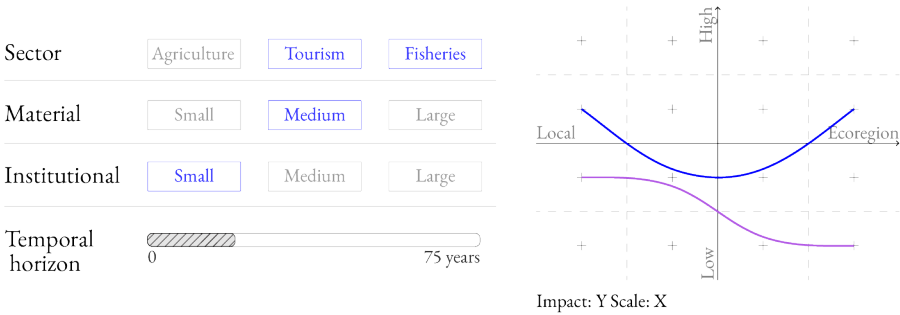


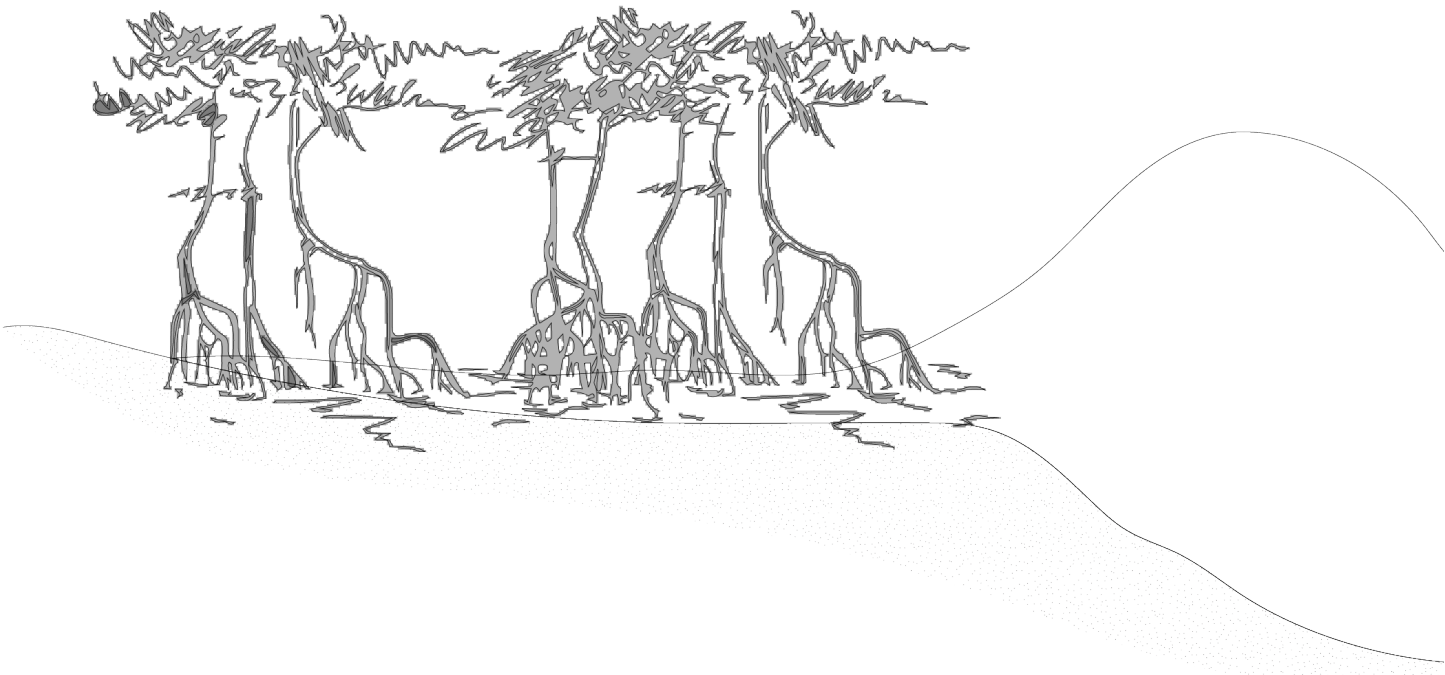
Coral gardening



P.12
Coral gardening

Coral gardening is a practice of active reef restoration: coral fragments are collected from healthy colonies, cultivated in underwater nurseries suspended on metal frames or ropes, then transplanted onto degraded seabeds. The divers - often volunteers or locally trained fishers - become sea gardeners. In Caribbean contexts the practice has demonstrated high survival rates and contributes to the recovery of coral ecosystems degraded by warming and acidification. In the Mediterranean it applies to native coral species including *Cladocora caespitosa* and gorgonians, with particular relevance for the Dalmatian coast and the Central Adriatic.



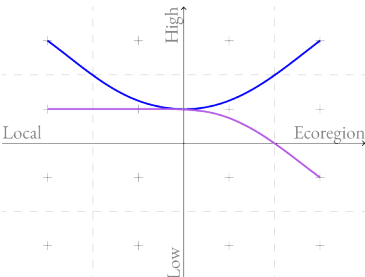


P.13

Mangrove reforestation as coastal shield

In Bangladesh, mangrove reforestation along the coast and in delta areas is used as green infrastructure for protection against storm surge and coastal erosion. The mangroves form a dense vegetation belt that dissipates wave energy, stabilises the seabed with their root systems, sequesters carbon and creates nursery habitat for fish and invertebrates. The Living Polder programme demonstrates that large-scale reforestation can substitute or complement civil engineering in coastal risk management. For the North Adriatic and the Po delta the principle transfers through analogous species - tamarisk, reedbed, salicornia - which perform similar functions in a temperate context.

Sector	Agriculture	Tourism	Fisheries
Material	Small	Medium	Large
Institutional	Small	Medium	Large
Temporal horizon	075 years		



Impact: Y Scale: X

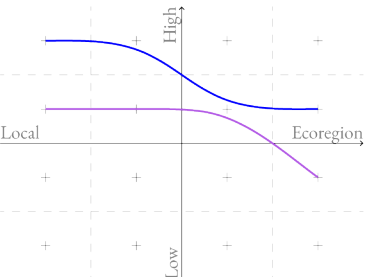


P.14

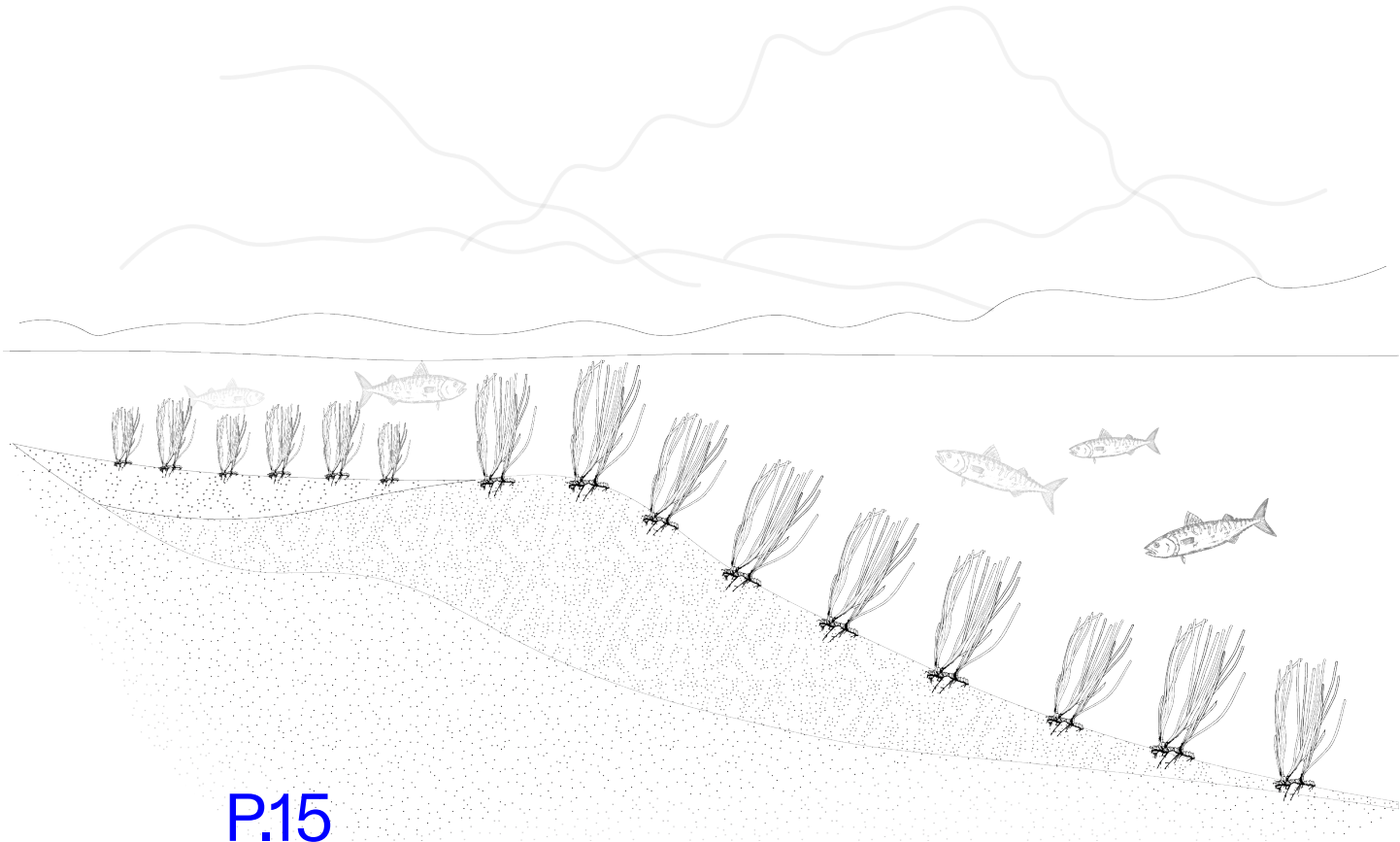
Coastal pine forest and agroforestry

In the Maremma of Tuscany, the Uccellina estate combined biological farming with buffalo and native cattle with maritime pine reforestation in a former coastal delta area. Over time the result became a nature park: extensive productive land management created landscape, biodiversity and tourism infrastructure without explicit planning intervention. The practice demonstrates that productive agroforestry can generate ecosystem as a by-product of farming. For the Po delta, where existing Ravenna pine forests and deltaic wetlands are already present, the model suggests integrating agro-silvo-pastoral production with ecological management as a landscape strategy.

Sector	Agriculture	Tourism	Fisheries
Material	Small	Medium	Large
Institutional	Small	Medium	Large
Temporal horizon	075 years		



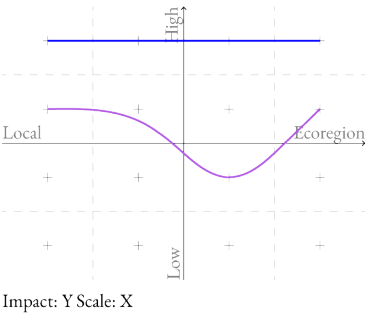
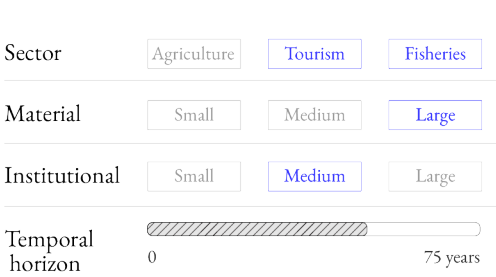
Impact: Y Scale: X



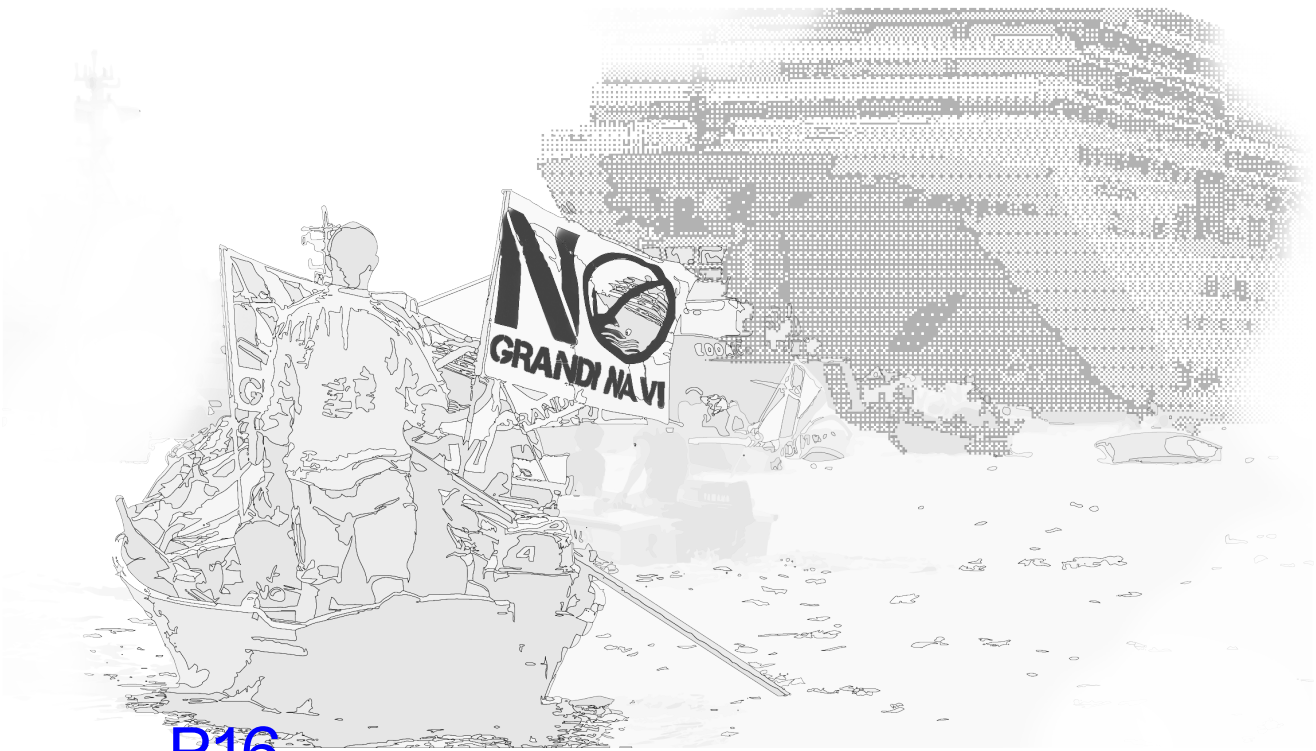
P.15

Posidonia oceanica planting

In Andalusia, the Proyecto Posidonia launched a large-scale community-inclusive programme of Posidonia oceanica transplanting in areas of documented meadow decline. Posidonia is the key species of the Mediterranean: it produces oxygen, sequesters carbon at one of the highest rates of any marine ecosystem, stabilises seabeds, creates nursery habitat for commercial fish species and attenuates waves protecting coasts. Its decline in the Adriatic is documented. The Andalusian programme demonstrated that fragment transplanting onto suitable substrates is technically feasible and that local community involvement - fishers, divers, citizens - is essential for achieving the necessary scale.



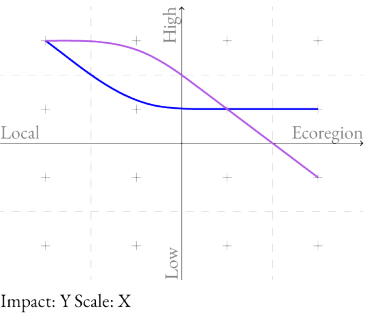
Impact: Y Scale: X



P.16

No Big Ships civic movement

The No Big Ships committee in Venice is a practice of ecosystem care through civic protest and tourism governance. The campaign achieved the exclusion of large cruise ships from the San Marco basin and the Giudecca Canal, recognising the damage that wave wash, acoustic and chemical pollution and disturbed seabeds were causing to the lagoon. The ecosystem effect is measurable: reduction of disturbance to lagoon seabeds and water quality improvement in several zones. The most significant effect is political and cultural: it establishes the principle that local communities are active agents of environmental stewardship, not passive observers of port authority decisions.



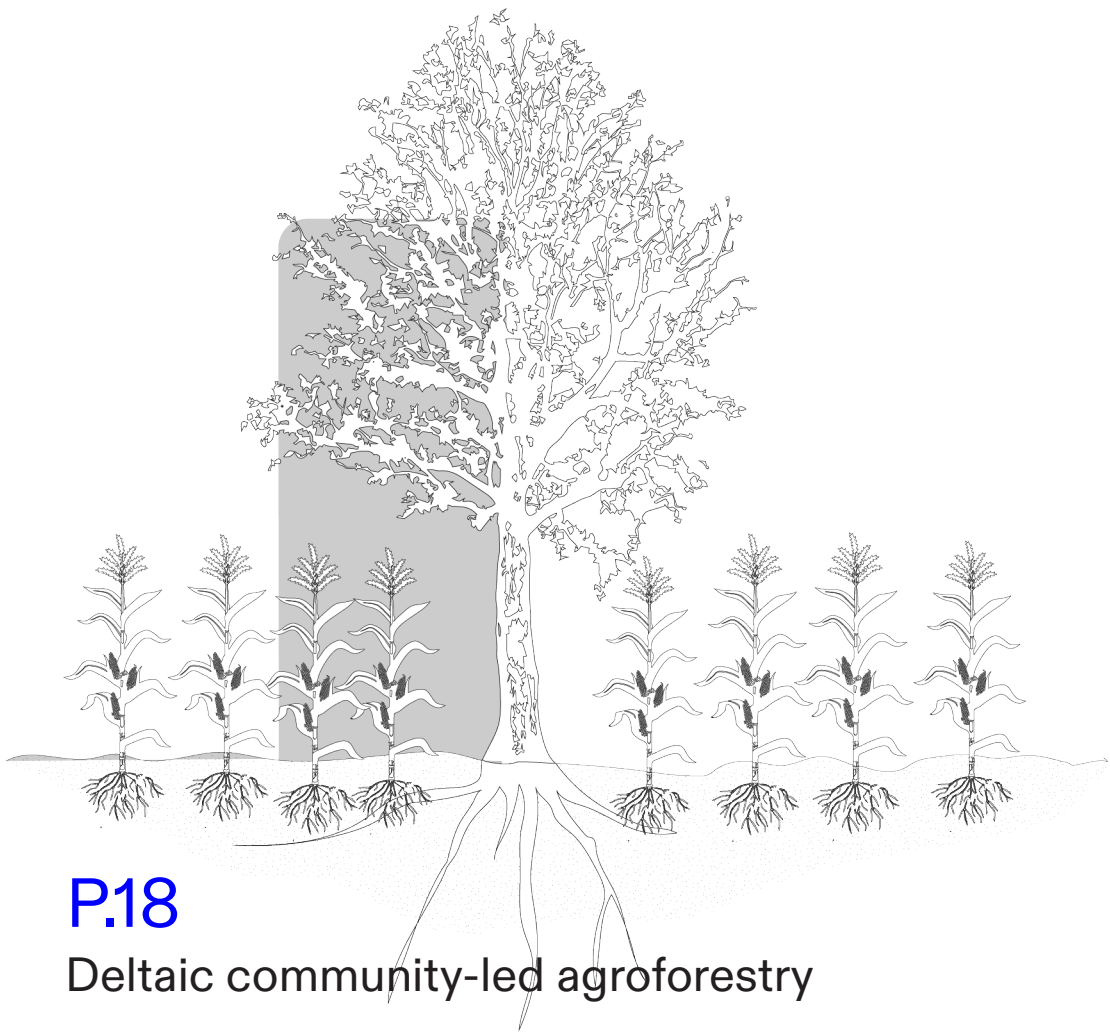
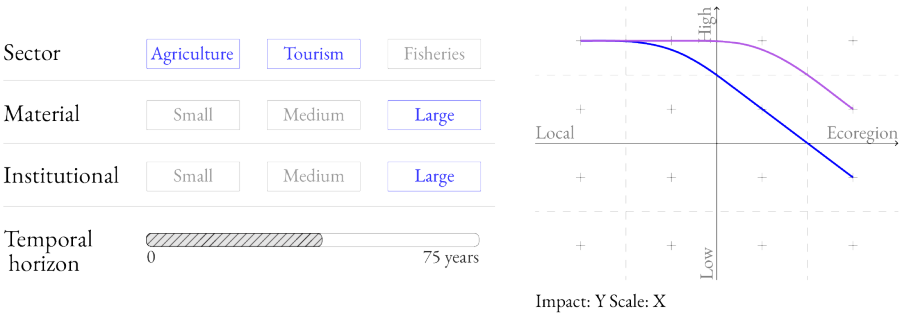
Impact: Y Scale: X



P.17

Room for the River

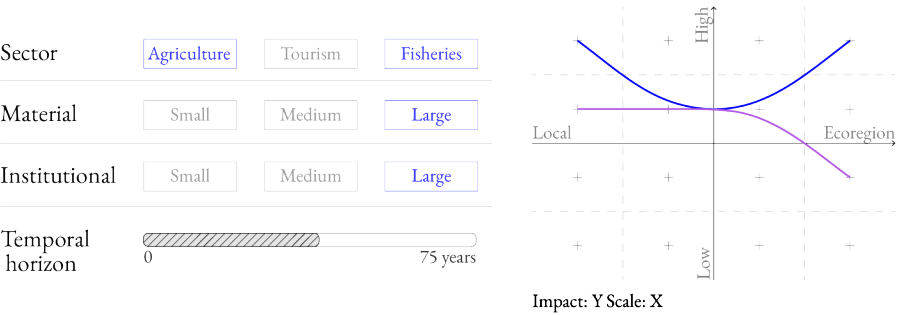
The Dutch Room for the River programme reversed two centuries of containment-based hydraulic engineering: instead of raising levees further to cope with floods, it lowered floodplains, relocated dykes outward, created inundable polders and restored meanders. The result is a significant reduction in flood risk, restoration of floodplain ecosystems, new amphibious landscapes and slow tourism infrastructure along the rivers. For the Po, narrowly channelled, elevated above the surrounding plain and disconnected from its alluvial floodplain, the principle represents the most systemic transformation possible: giving the river space means reactivating the entire deltaic system.

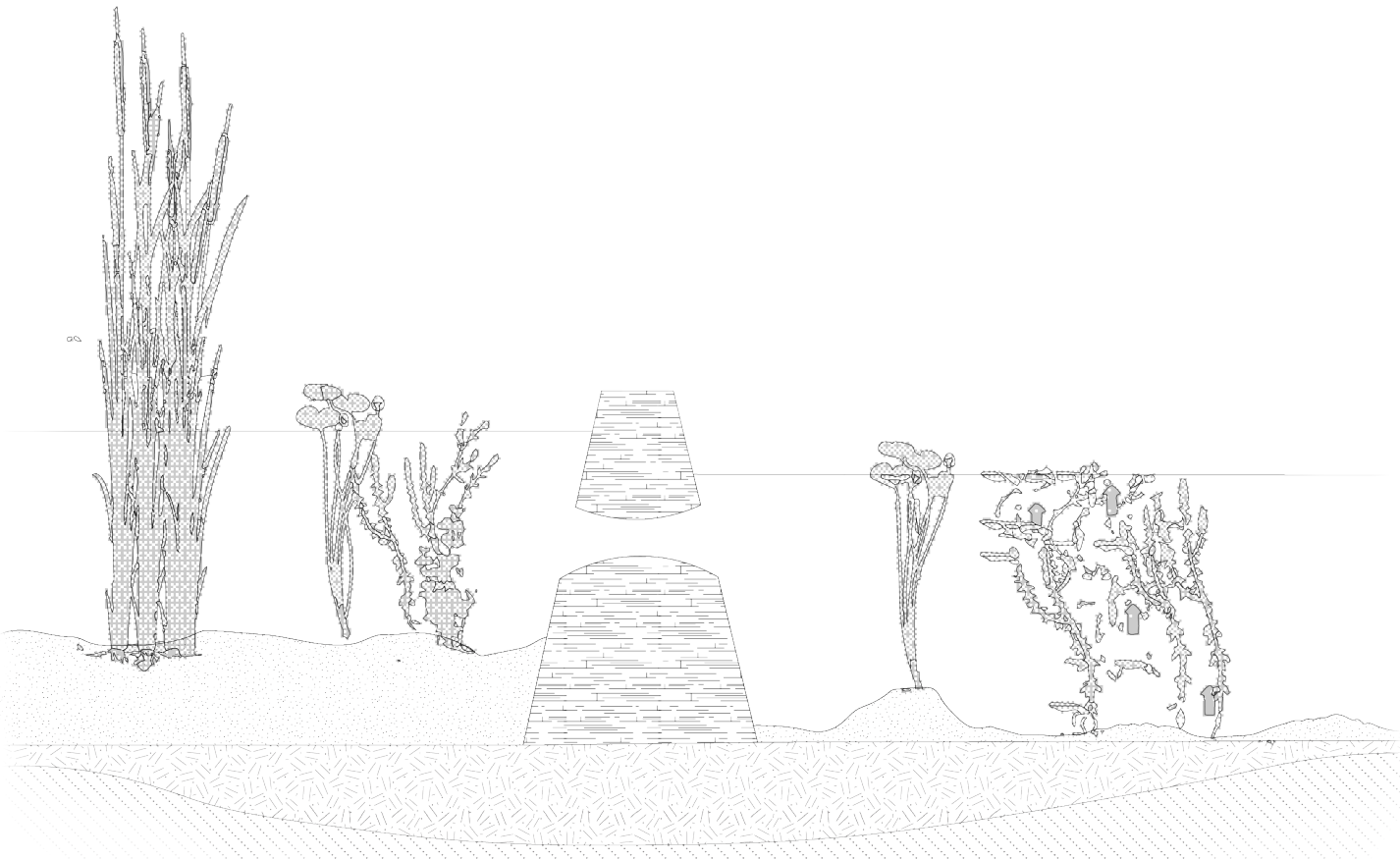


P.18

Deltaic community-led agroforestry

The Consorzio Uomini di Mazzarino is a community organisation that collectively manages a mixed territory of agricultural fields and water bodies in the Ferrara province of the Po delta. The practice integrates fishing, farming and ecosystem care within a single shared governance: access to resources is regulated internally by the community, revenues are distributed according to agreed rules, and maintenance of the territory including canals, embankments and water bodies is collective responsibility. The social effect is immediate and high: it maintains a cohesive rural community around shared productive and stewardship practices. The ecosystem effect is positive: integrated land and water management preserves the complexity of the deltaic landscape better than any individual management model.

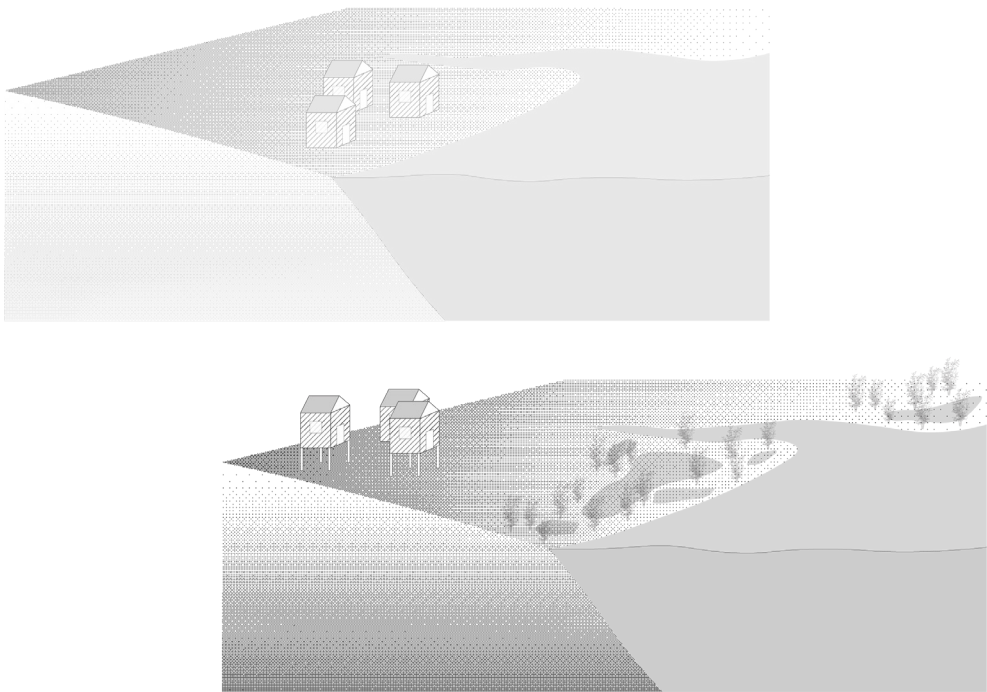
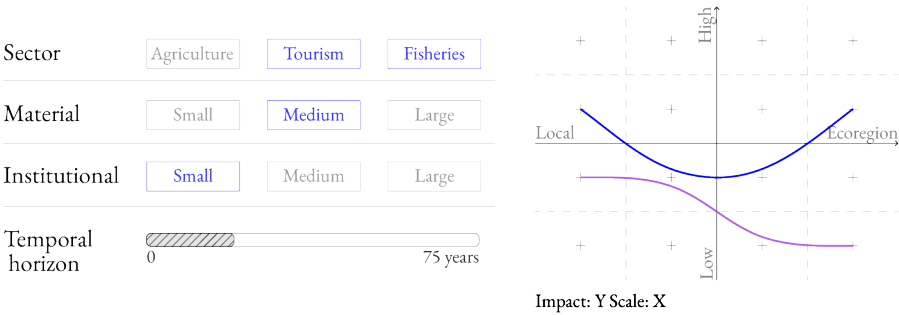




P.19

Stormwater treatment wetlands

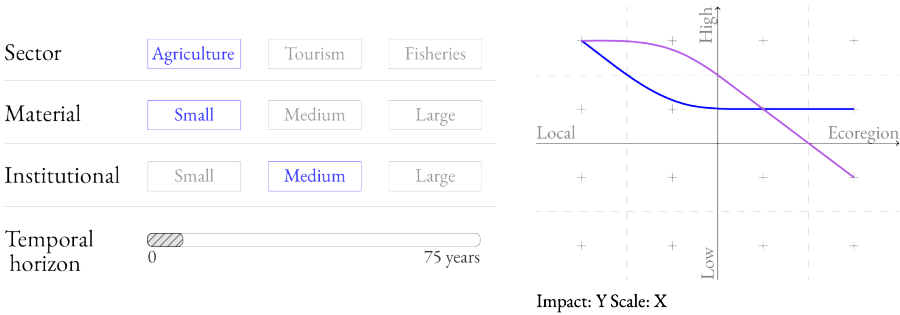
The Stormwater Treatment Areas in Florida are large-scale constructed wetlands placed between the agricultural fields of the Miami region and the Everglades system. They function as biological filters: agricultural drainage water loaded with nitrogen and phosphorus enters the wetland cells where emergent vegetation - bulrush, cattail - absorbs the nutrients before the water flows into the natural ecosystem. The ecosystem effect is maximum across all scales: reduction of local eutrophication, improvement of regional water quality, and reduction of the nutrient load reaching the sea. For the Po-Adriatic system, where agricultural nitrogen from the Po plain feeds the chronic recurrence of algal blooms, this practice is the most direct infrastructure response available.



P.20

Managed coastal retreat

Managed retreat is the practice of planning and managing the withdrawal of infrastructure and communities from actively eroding coastal zones or areas threatened by sea level rise, instead of continuing to defend a fixed shoreline. Structures in retreat zones are demolished, the coast is left free to migrate inland, and salt marsh, dunes and coastal habitat form naturally. The UK programme manages tens of kilometres of coastline with this approach; in the Netherlands the principle is integrated into national spatial planning. The ecosystem effect is very high: the new coastal habitats created by retreat - salt marshes, dune grasslands - serve as storm buffer, carbon sink and fishery nursery.



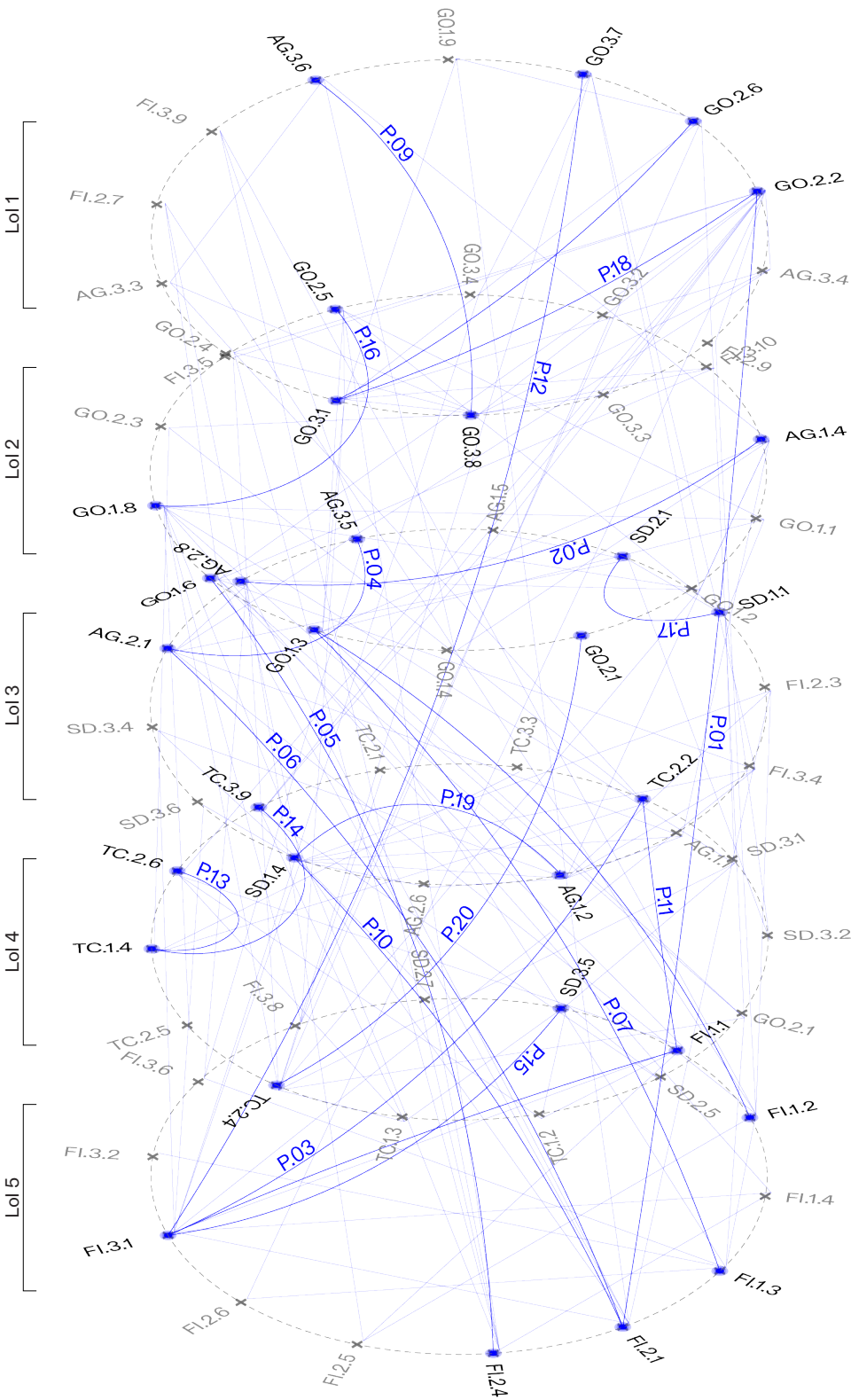
3.4 Padania Tropicale

3.4.1 Counteracting the Pattern

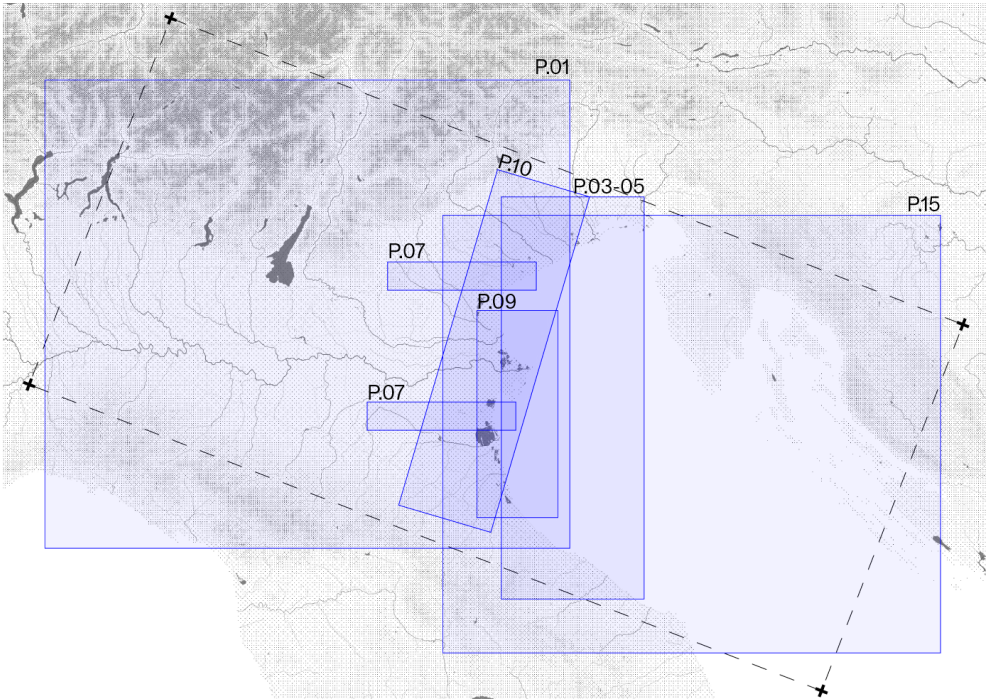
The research and collection of practices of care and transformation yielded numerous insights, offering interesting starting points for the construction of an alternative framework that recognises the natural systems of the Adriatic eco-region. As a first step toward the definition of a transformative framework for the Po Bastard, I sought to integrate the reading of the inventory with the lines of inquiry identified through the analysis of the maladaptation pattern. Each of these situated practices can be speculatively imagined as a tool for counteracting the processes of extraction and maladaptation embedded in the territories of the transect. Each practice acts on specific nodes, proposing an agricultural, tourism, fishing and stewardship model that allows the imagination of possible Mediterranean-tropical futures for the Po transect.

The diagram on the right shows the principal nodes of the five lines of inquiry on which the practices act. Given the different nature of the practices, it can be observed how some act predominantly within the dynamics of a single sector, while others work cross-sectorally - constituting transformation processes capable of generating systemic change at the scale of the transect and the eco-region.

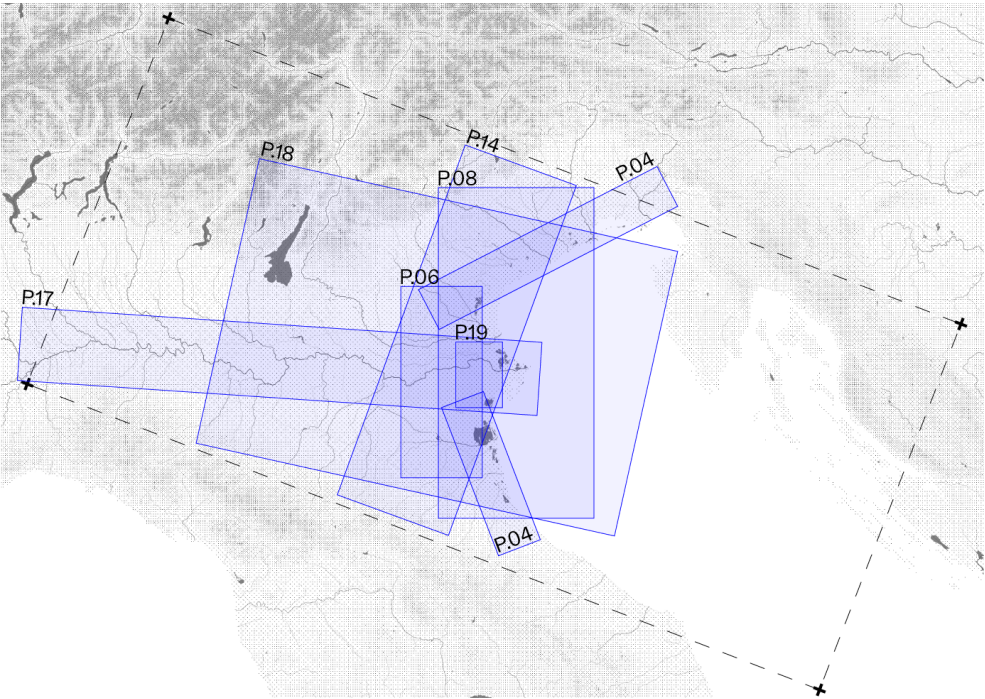
Following the integration between the inventory and the lines of inquiry, the two pages that follow present three maps showing the result of a speculative spatial projection of the practices onto the territory of the transect. A spatial projection structured according to the logic of the three sectors analysed and imagined as a response to the maladaptation pattern on the conceptual level, and to the risks of tropicalisation on the spatial level. An experiment that tests the possible applicability of tropical practices in the Adriatic context, and the scalability of those emerging from within the framework of the Po Bastard.



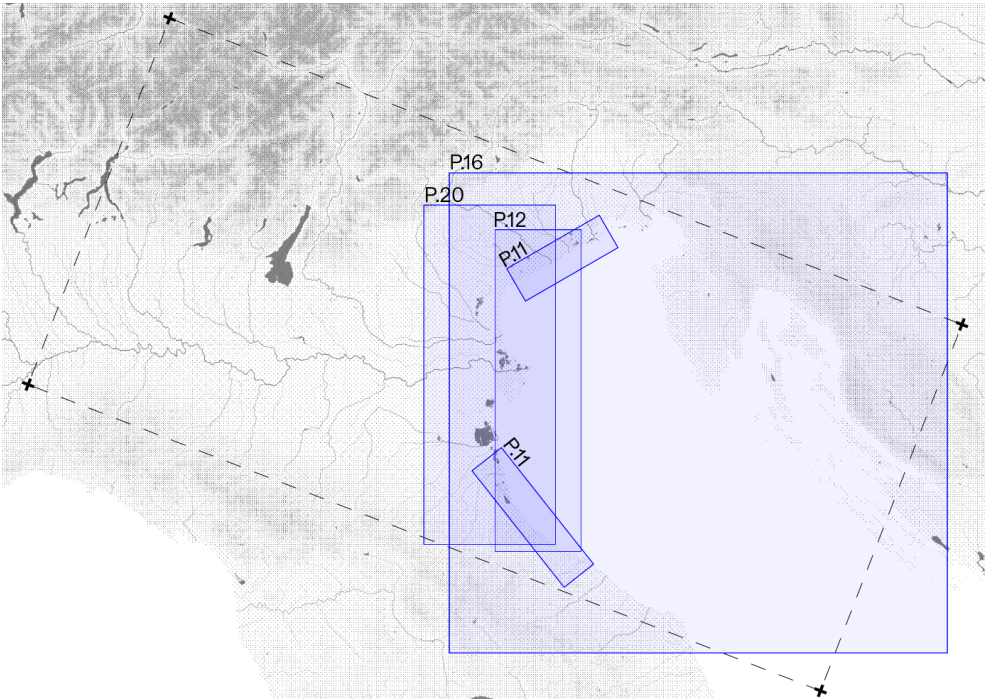
A. Fisheris practices projection



B. Agricultural practices projection



C. Tourism practices projection

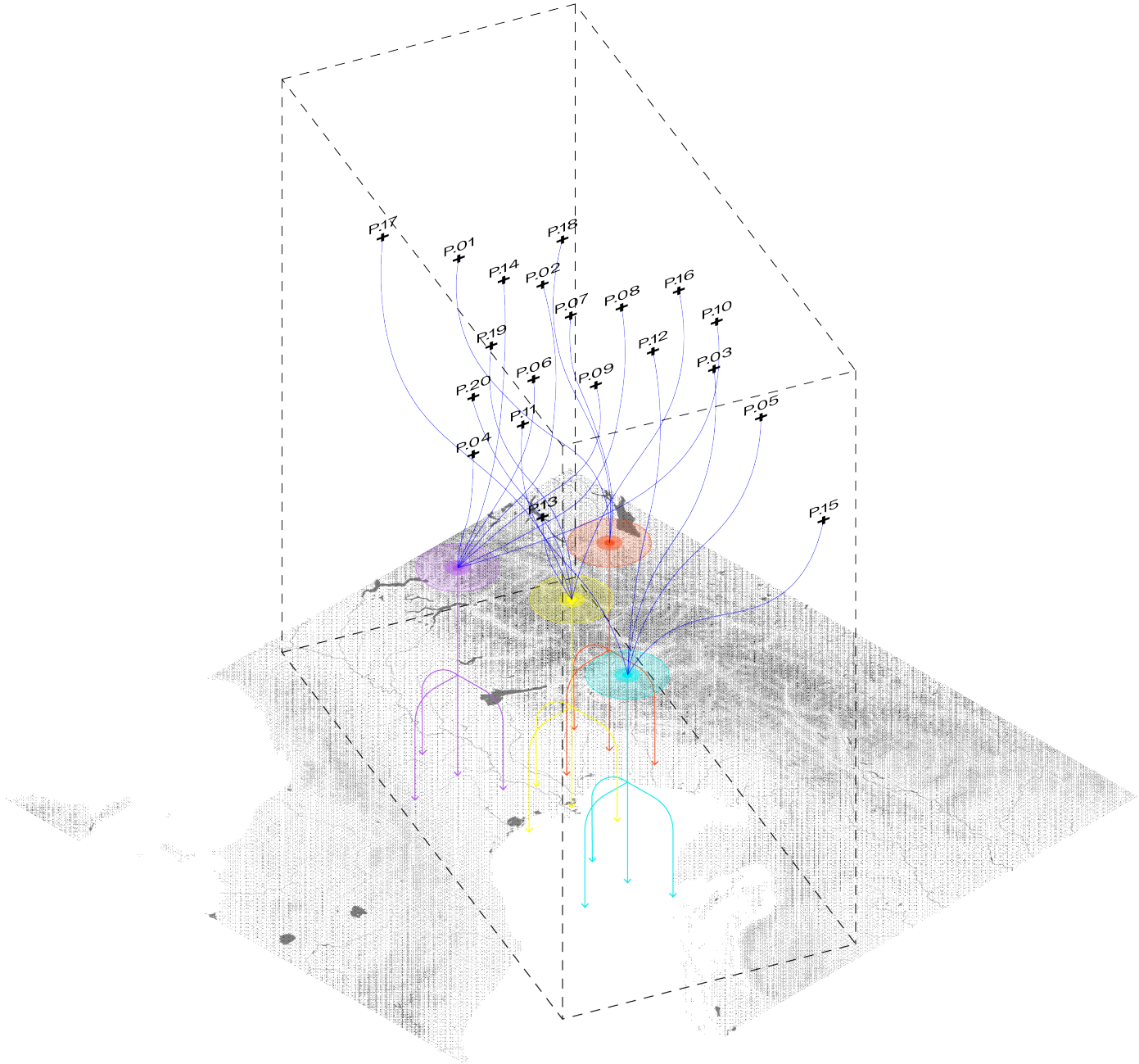


3.4.2 From Practices to Strategies

The projection of practices onto the space of the transect was originally intended to serve as a prelude to the proposal of spatial interventions that would allow processes of care and transformation to develop within the context of the Bastard. The difficulty in elaborating the subsequent step in the design phase led me to question the validity of the prefigured methodological choice, and brought me to acknowledge the necessity of envisioning strategies that acted at the scale of the transect for the construction of a transformative framework for its territory.

The axonometric diagram on the right shows how the construction of the inventory of practices, their comprehension and spatialisation within the context of the transect, informs the proposal of four transformative strategies for the project area. Strategies that act at the "regional" scale of the transect and that seek to systematically organise the practices according to a cross-sectoral and site-specific logic. Strategies that together constitute the transformative framework for a Tropical Padania and the territories of the Bastard - presented on the following page - giving rise to synergies of coexistence with the challenges of climate change, proposing a co-evolutionary reading of the relationship between humans and nature, between local communities and the biosphere, between territory and culture.

Following the presentation of the framework at the scale of the transect, four thematic zooms are proposed to show and test the strategies within a prototypical fragment of the transect, positioned at the interface between sea and land in the southern sector of the Po Delta - a rectangle of 35×70 kilometres. For each strategy, a design zoom at an XS scale is also presented, showing how the application of the practices forming the strategies within the amphibious landscape of the delta can give rise to interesting Spatial Bastards - new territorial elements that mix practices and logics originating from distant tropical contexts with the elements and inhabitants of the local biosphere.



3.4.3 Padania Tropicale Transformative Framework

North ↑
0 50 km

- 

A. Managed coastal retreat and renaturalisation

Accepts sea level rise by transforming at-risk reclaimed coastal lands into amphibious buffer zones, integrating wetland renaturalisation and stormwater treatment systems to reduce marine eutrophication.
- 

B. Aquatic acupuncture

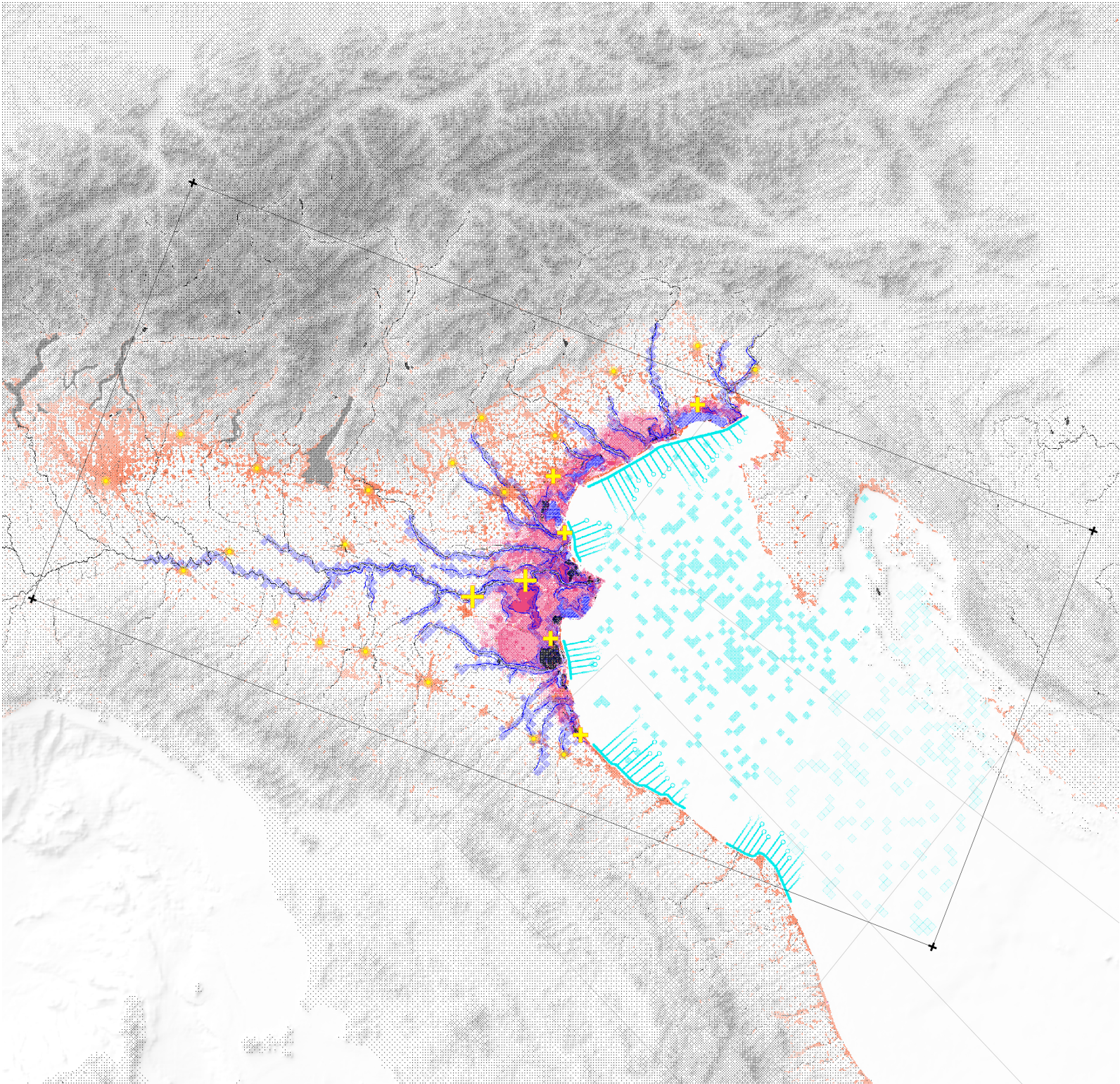
Systematic regeneration of the Northern Adriatic seabed through shipwreck artificial reefs, oyster-based nitrogen filtration and coral restoration - rebuilding marine biodiversity as a precondition for slow nature-based tourism.
- 

C. Processing infrastructure for new and invasive species

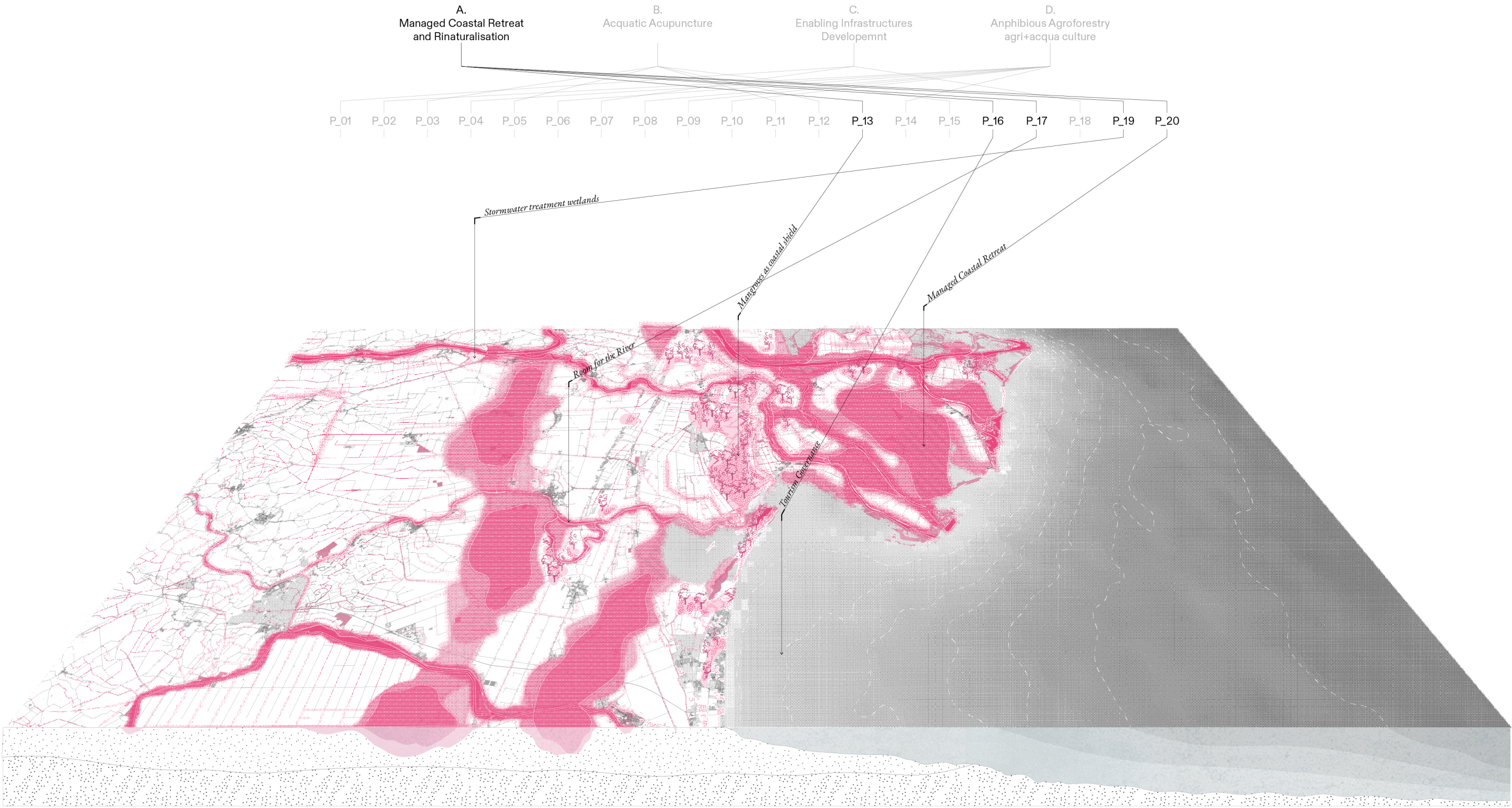
A network of territorial hubs that build new supply chains for invasive and salt-tolerant species, transforming ecological threats into local economic resources while fostering a culture of transformation toward the new tropical conditions.
- 

D. Amphibious agroforestry

Introduces regenerative production practices along the coastline and inland waterways - halophyte cultivation, integrated rice-aquaculture, shellfish farming and community-led land stewardship - forming a continuous amphibious productive landscape from the Po Plain to the coastal edge.



A | Managed coastal retreat and renaturalisation



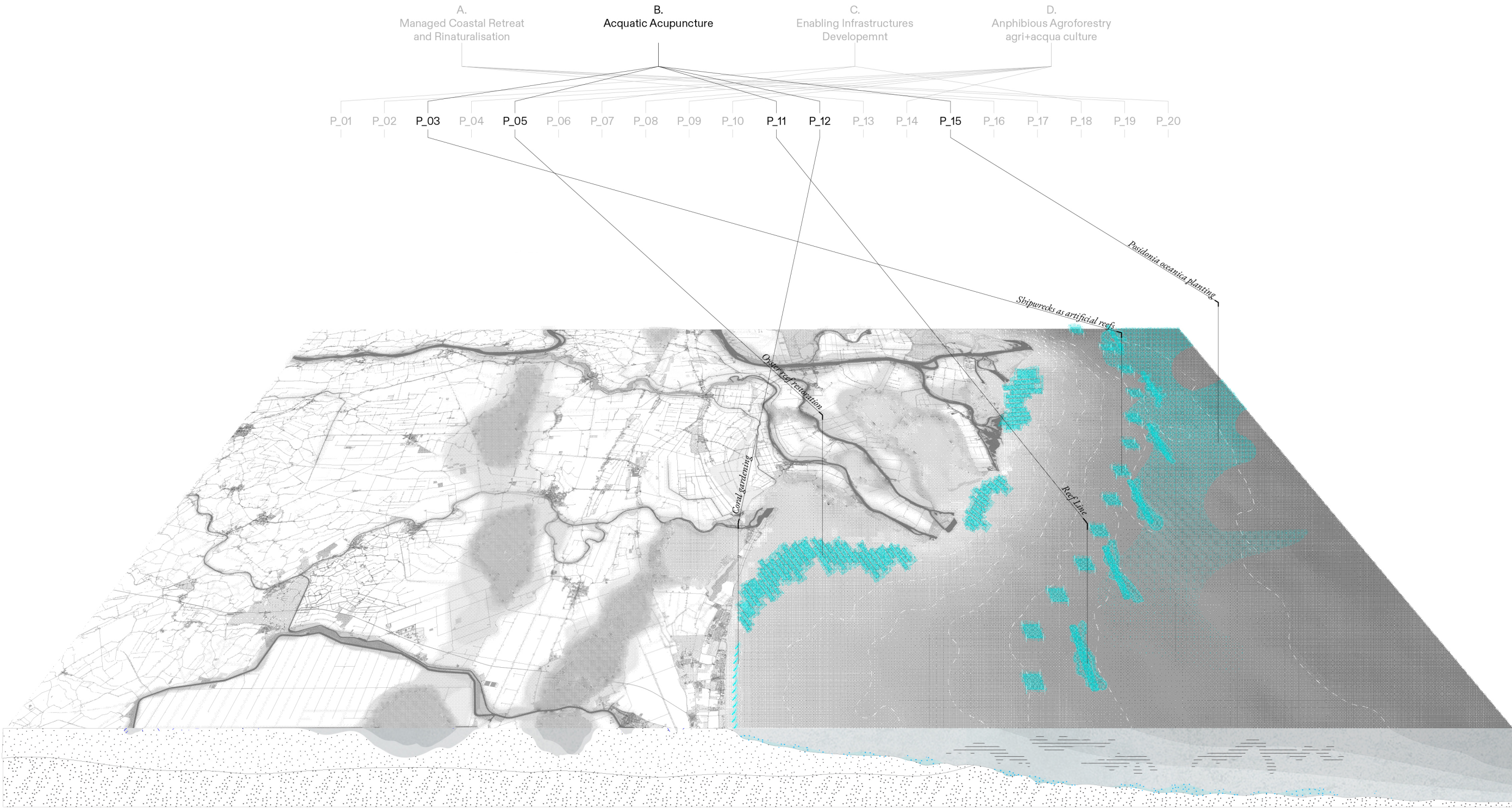
A. Managed Coastal Retreat and Renaturalisation

Practices:
P_13 - P_16 - P_17 - P_19 - P_20

Rather than resisting the effects of sea level rise, this strategy accepts and works with them - identifying coastal territories at risk, many of which are the result of historical land reclamation and coastal bonifica, and gradually transforming them into amphibious buffer zones. The retreat of settlements and productive activities in the long term is coupled with the renaturalisation of coastal edges through the reintroduction of pine forests, wetlands and transitional ecosystems. A key component of the strategy is the creation of a network of stormwater treatment wetlands, which intercept agricultural runoff before it reaches the sea - directly addressing the eutrophication of the Northern Adriatic while simultaneously contributing to the renaturalisation process.



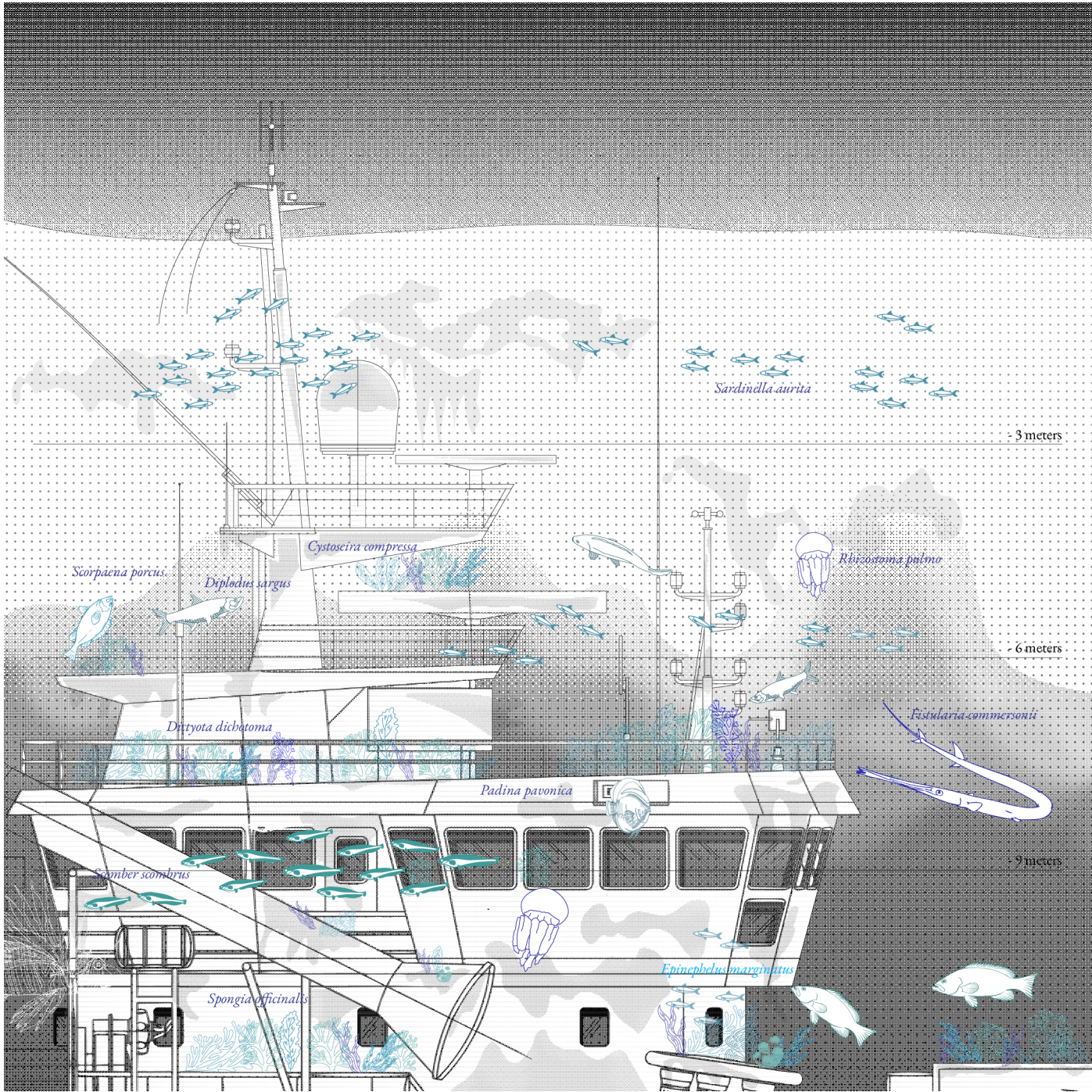
Spatial Bastard I - The restored adriatic mangrove (Barena)



B. Aquatic Acupuncture

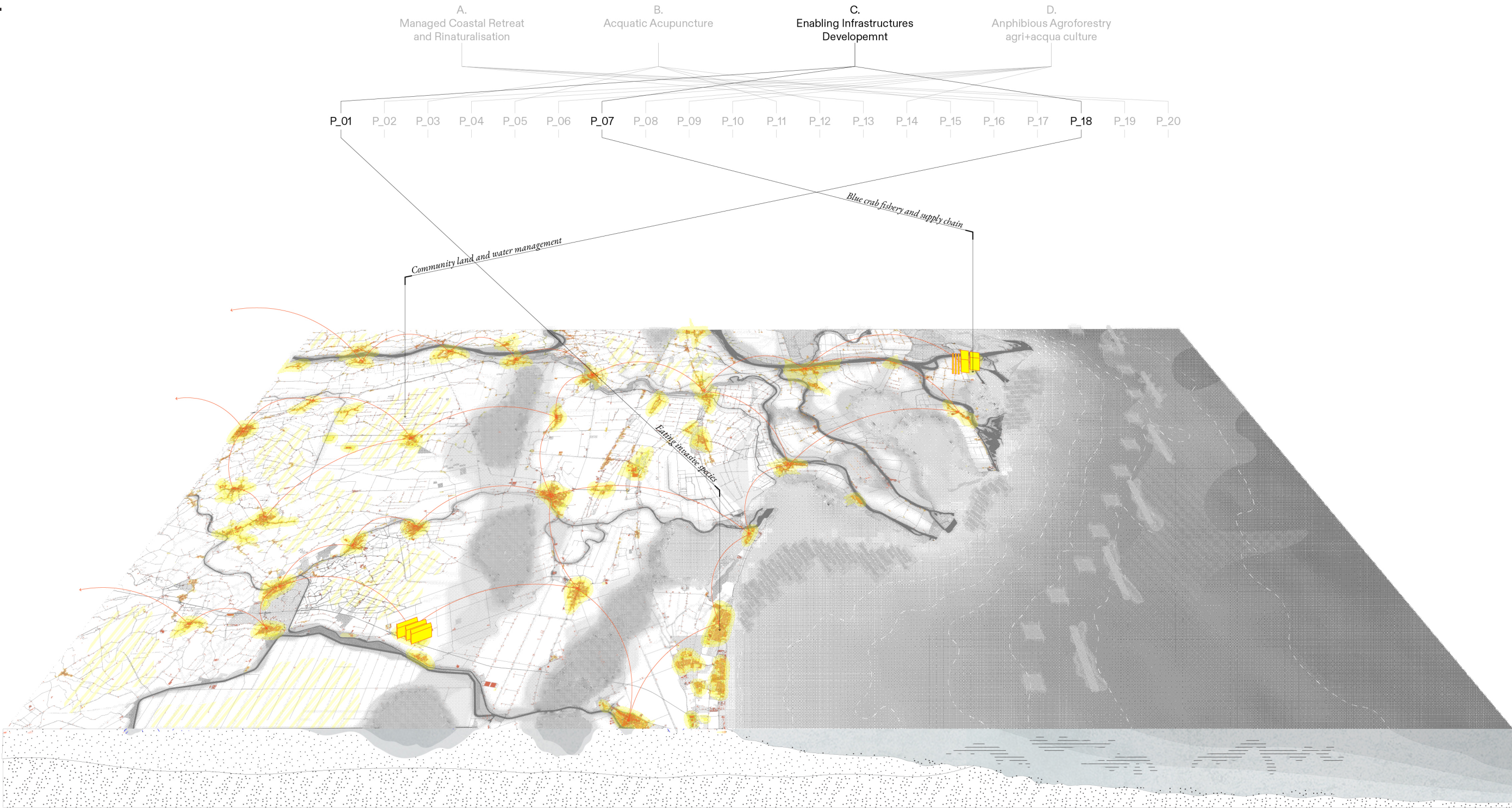
Practices:
P_03 - P_05 - P_11 - P_12 - P_15

The extremely poor condition of the Northern Adriatic seabed - heavily impacted by decades of intensive trawling and eutrophication - makes ecosystem regeneration a necessary precondition for any further intervention. This strategy proposes a systematic renaturalisation of the seabed through the strategic deployment of shipwrecks as artificial reefs and the cultivation of an Adriatic coral reef, creating the conditions for biodiversity to re-establish itself. In lagoonal and deltaic contexts, oyster farming is introduced as a natural nitrogen filtration system, absorbing excess nutrients and improving water quality. Only once the ecosystem has recovered can these same territories begin to host slow, nature-based tourism infrastructures.



Spatial Bastard II - Shipwrecks as maritime biodiversity oasis

C - Transformative Infrastructures Development



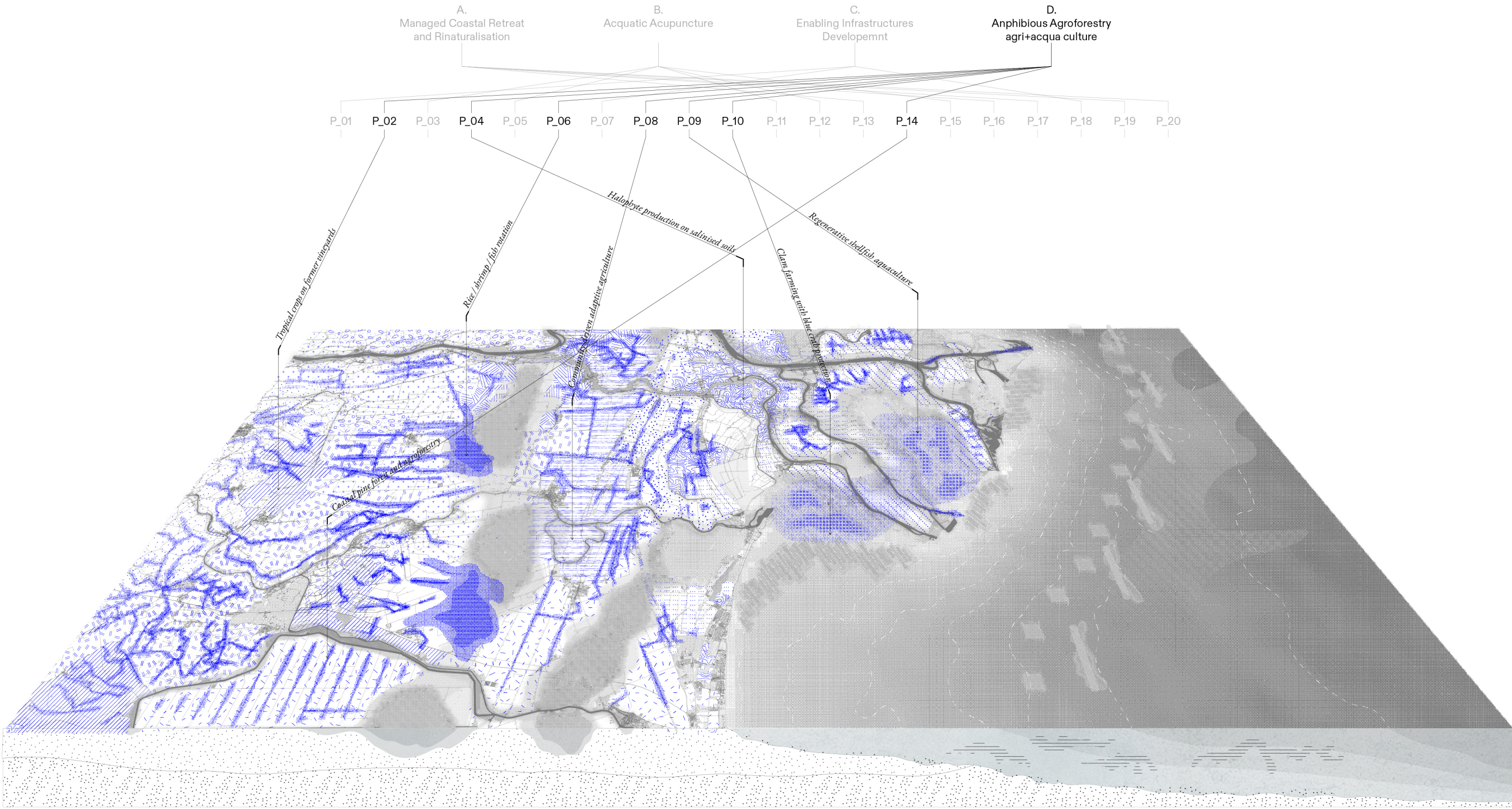
C. Transformative Infrastructures Development

Practices:
P_01 - P_07 - P_18

This strategy operates through the creation of a network of territorial hubs that act as enabling infrastructures for the transformation of knowledge, culture and economy across the transect. These hubs foster the development of new supply chains capable of processing and introducing the new species - both invasive and salt-tolerant - into local and regional markets, transforming what is currently perceived as a threat into an economic and cultural resource. In moments of crisis, these infrastructures can provide affordable food to schools and local communities, nurturing a broader culture of transformation. The strategy also facilitates the conversion of coastal tourism infrastructures toward slower, nature-based models, embedding them within the renaturalised landscapes produced by strategies A and B.



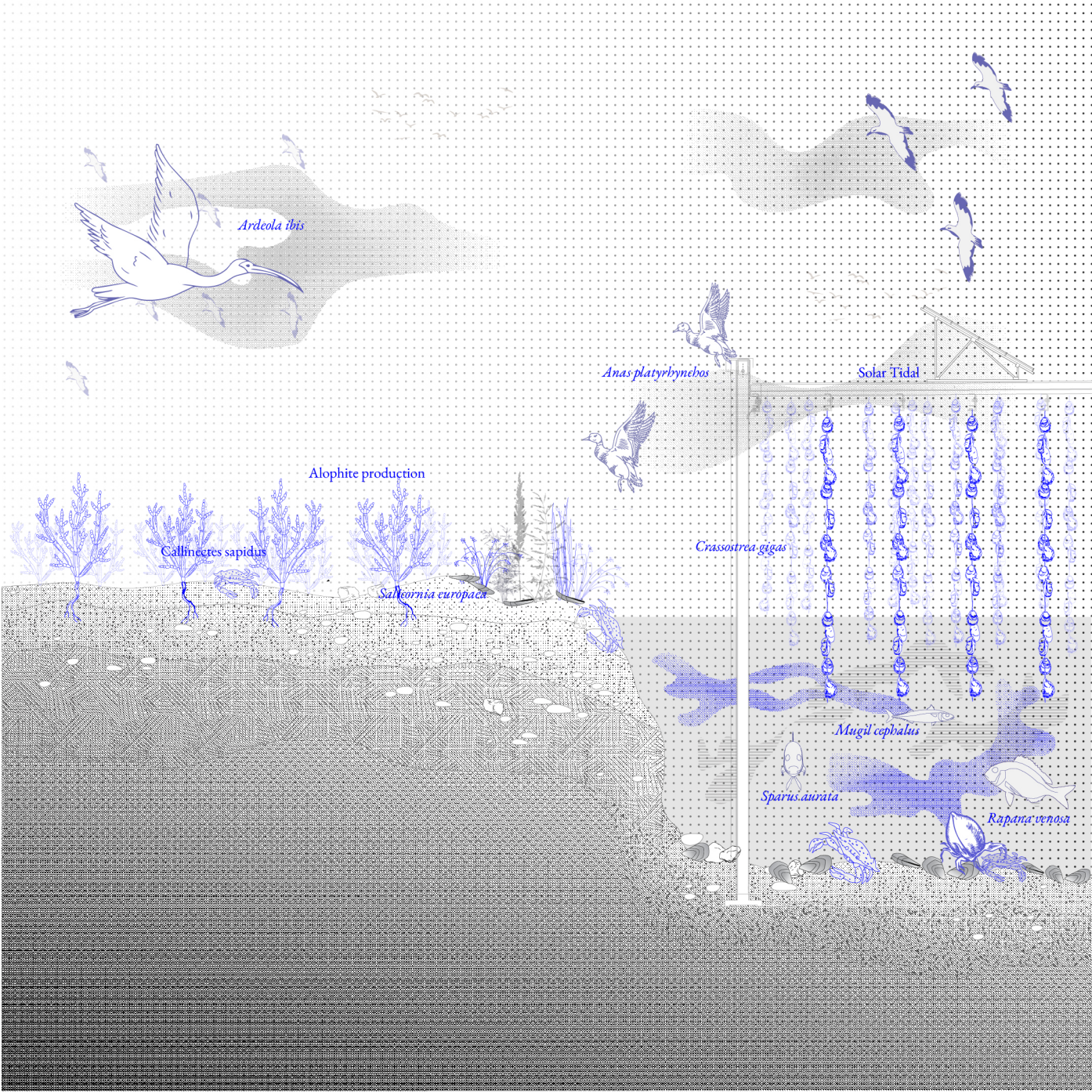
Spatial Bastard III - Resoration of old agricultural villas for amphibious eco-tourism



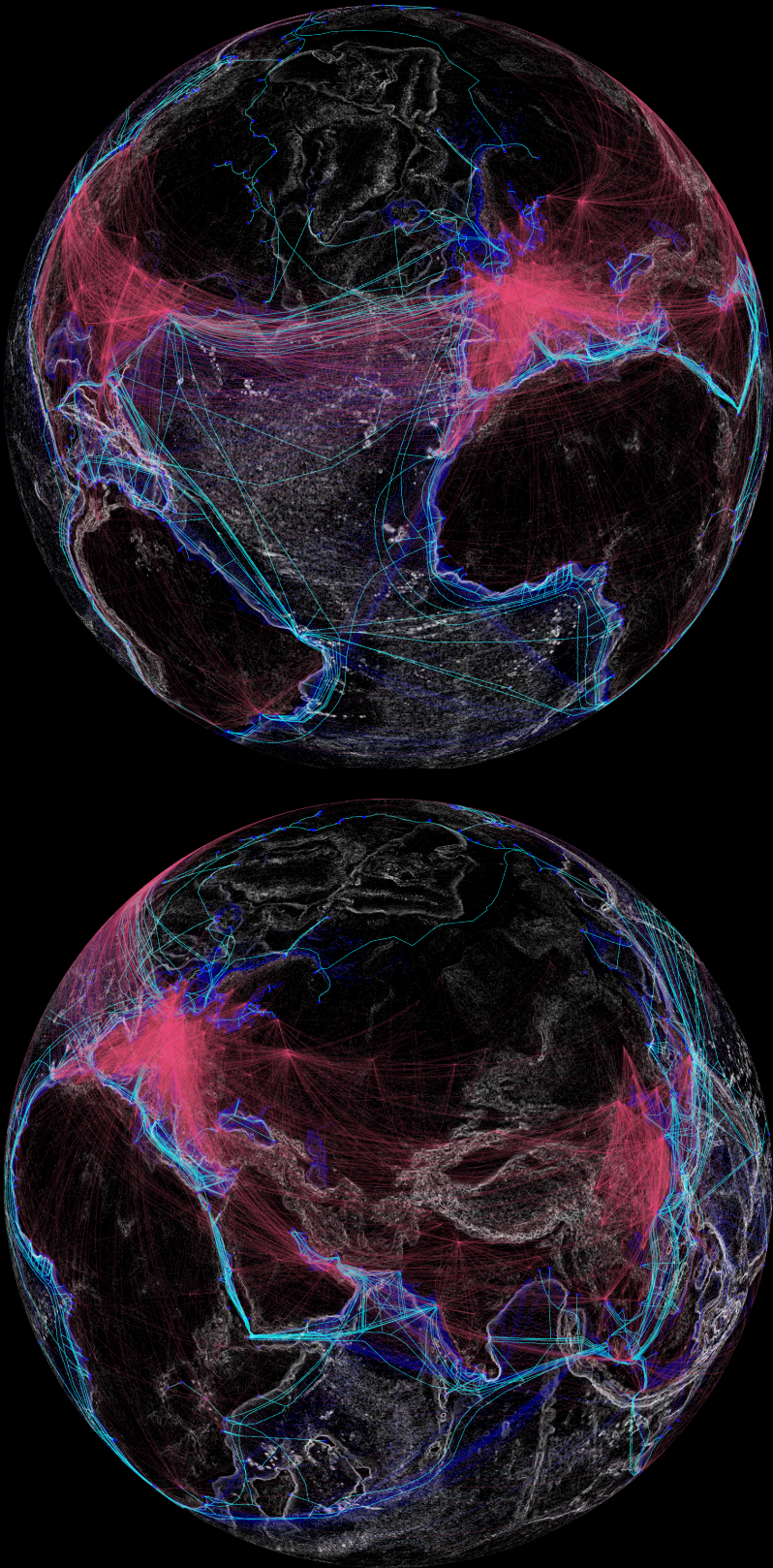
D. *Amphibious Agroforestry (agri + aqua/culture)*

Practices:
P_02 - P_04 - P_06 - P_08 - P_09 - P_10 - P_14 - P_18

Developing along and inland from the coastline, this strategy introduces regenerative production practices across the agricultural and aquacultural sectors. Along the coast, new shellfish farming models and fishing practices - such as solar tide systems - are integrated with the existing productive landscape. Abandoned agricultural fields are gradually converted toward the production of halophytes and salt and drought-resistant crops, while rice paddies are hybridised with aquaculture systems. Inland, the strategy unfolds along waterways, promoting the reforestation of riparian corridors and facilitating community-led land management - investing local care-takers with the rights and responsibilities of stewardship over agricultural land. This strategy connects directly to the managed retreat and room-for-the-river logic of strategy A, forming a continuous amphibious productive landscape from the inland plain to the coastal edge.



Spatial Bastard IIII - Resorative solar tidal oyster production & salicornia plantiations



Global map of
amphibious cyborg

4. Conclusion

4.1 Conclusion

4.1.1 The Adriatic Masterplan

4.1.2 A Proposal for a Mediterranean Covenant of Care

4.2 Reflections

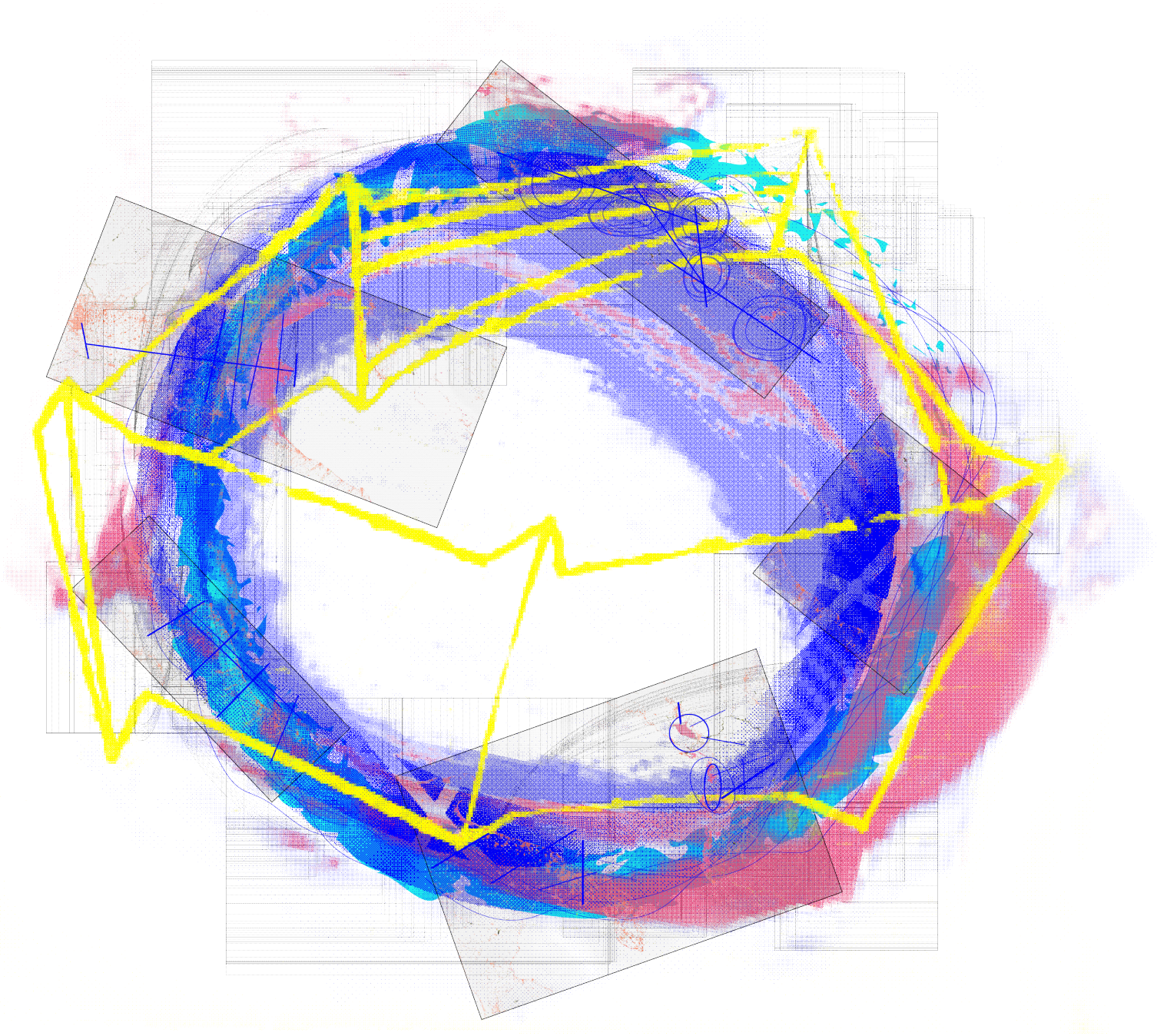
Bibliography & Sources

4.1 Conclusion

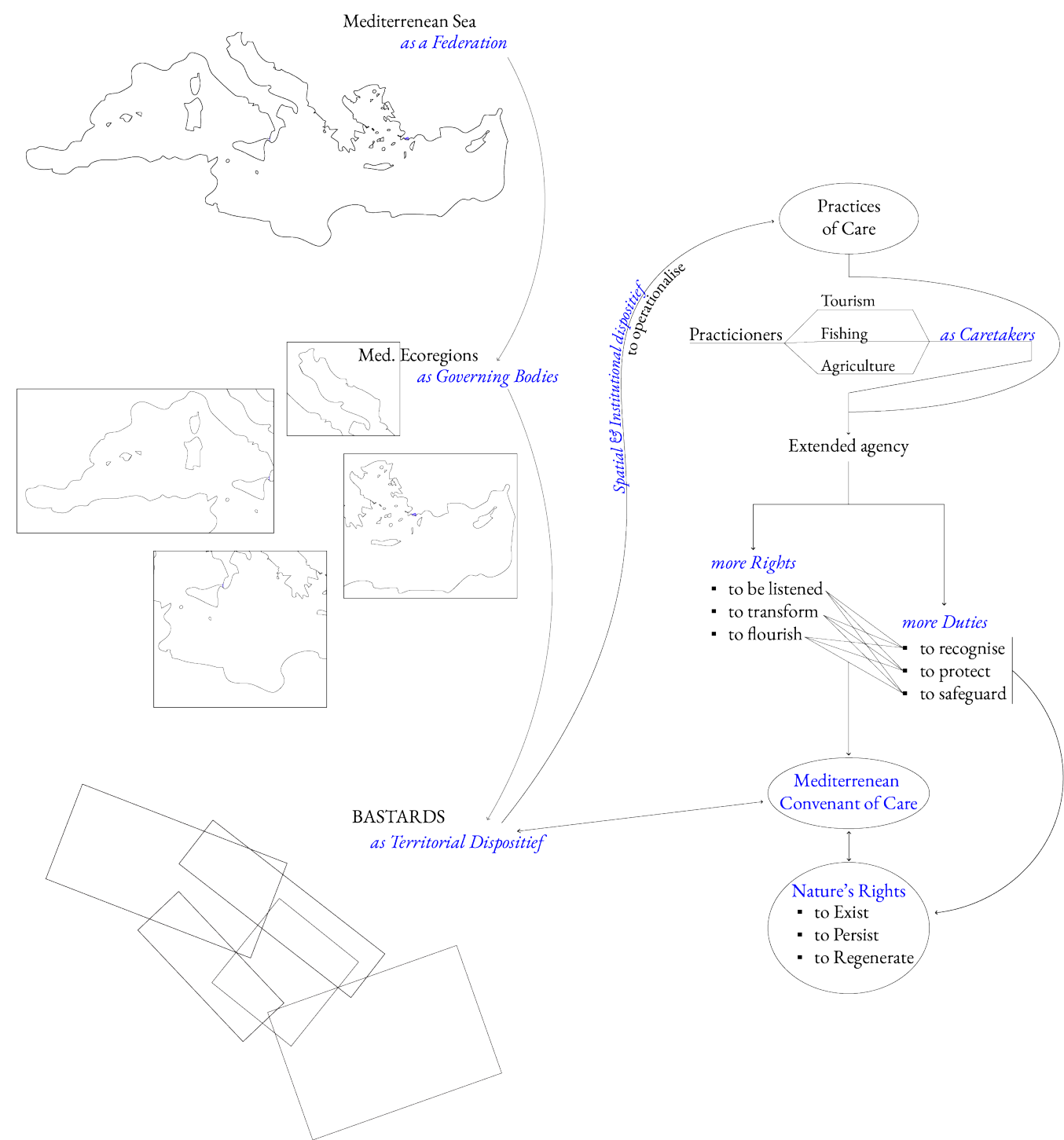
4.1.1 The Adriatic 'Masterplan'

The construction of the transformative framework for the Po/North Adriatic transect does not seek to impose itself as a rigid solution to the risks of tropicalisation, but rather as a design exploration that envisions possible pathways toward a socio-ecological co-evolution. It is a fluid proposal, a first speculative foray that aspires to stimulate discourse and further research on planning at the scale of aquatic-Mediterranean eco-regions. It is the outcome of a body of work that is certainly incomplete - given the limited time available - but that validates, at least in a first phase, the design hypothesis and the methodological construct of the transects. It is an exploration that highlights the value of eco-regions as a device for understanding the nature and extent of Mediterranean territories, and of the Bastards as an instrument for the operationalisation and construction of a transformative framework capable of fostering co-evolution with the risks of climate change. It is a project that aspires to be a seed - capable of stimulating the interest of other designers and practitioners - and of serving as a first building block toward the construction of a dynamic Adriatic Masterplan.

Just as with the Po transect, the same methodological approach can be extended to the other Bastards of the Adriatic eco-region, and the four envisioned strategies can be deployed across the waters of the entire eco-region. Applied, naturally, with different intensities and methodologies depending on the specificities of each territory, the risks present, and the biophysical and cultural uniqueness of the natural systems involved. Strategies and transformative frameworks that may take different names and forms, but that share a single central objective: to re-bastardise the Adriatic eco-region, its waters and its coasts.



The Adriatic 'Masterplan'



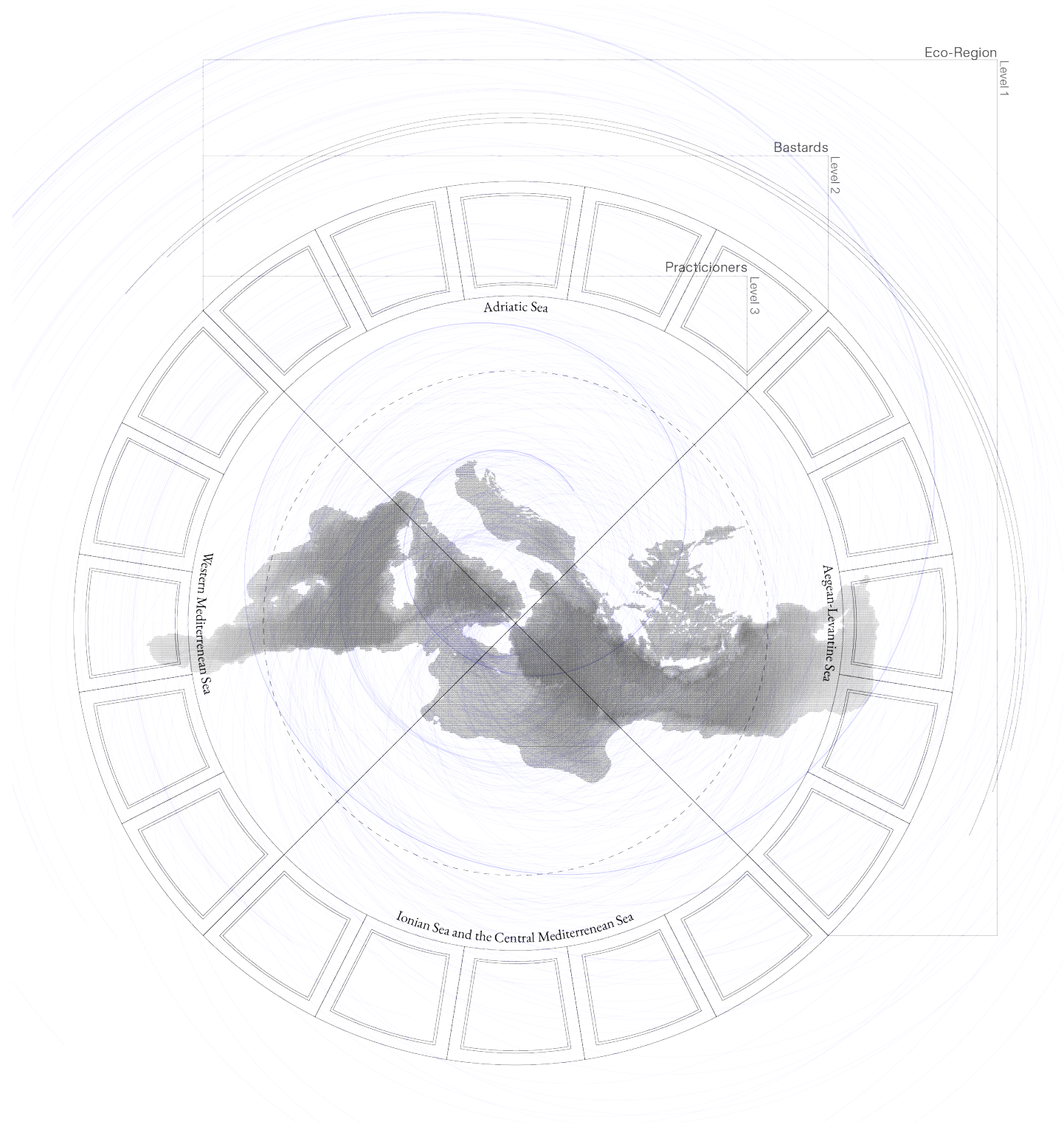
4.1.2 The Mediterranean Covenant of Care

Built upon the final exploratory design phase, the thesis concludes with a governance proposal - a proposal-reflection that ties together the concept of bio-regionalism with the Rights of Nature movement, and which I believe constitutes the most sincere outcome of the entire research. It is a governance proposal that is arguably utopian, but that offers a possible methodological foundation for a spatial planning practice that genuinely recognises Adriatic eco-regions as biopolitical subjects and, in doing so, acknowledges the implicit positive biopolitical potential of the design act itself.

It is a proposal that aspires to provide a simplified alternative to the complex and intricate existing governance system, and to operationalise the ambitions of the Mediterranean Action Plan at the scale of the entire basin.

The proposal is articulated as a metaphor, working along the lines of the celebrated Parliament of Things and drawing on the experience of the Embassy of the North Sea, imagining the Mediterranean as a union - or federation - of its eco-regions. Here, the four eco-regions become the principal governing bodies (the member states) of the union, coordinated and interconnected, yet endowed with specific autonomy. The projection of eco-regions to a regional scale then translates into the transects/Bastards (regions/provinces) of sea and land, which operationalise and translate the rights of the eco-region into the field of spatial governance, interacting with local ecologies and systems.

This is the real and adequate scale at which to act for a spatial transformation that fosters co-evolution - where planning can enable the adoption and integration of practices of care and operationalise them at the scale of the eco-region. At the scale of the Bastards, moreover, it becomes possible to operationalise a true paradigm shift: one that identifies in the extension of agency to practitioners - particularly those in the agricultural, fishing and tourism sectors, because their presence is embedded across all Mediterranean territories and because their productive capacity finds its rationale in the wellbeing of the eco-region's natural systems - the decisive turning point. Their investiture as caretakers of natural systems, with greater rights (to be heard and taken into consideration) and greater responsibilities (of stewardship, representation and attentiveness), is a fundamental step toward the definition of a human-nature Mediterranean stewardship and of a true Covenant of Care for Mediterranean territories - one that finally recognises the Rights of Nature and the territories with their more-than-human inhabitants as subjects of biopolitics.



Mediterranean Covenant of Care

Mediterranean Bastards

4.2 Reflection

On Transformation and the Mediterranean Culture

At the outset of the thesis project, my approach toward climate change - both as an entity and as a process - was radically different from what it is now, at its conclusion. Years of sustainability discourse, green roofs, adaptation and mitigation had cemented a flat approach to design that saw design with nature as a tool for creating proposals aimed at guaranteeing quality, resilient spaces for human beings. From this position, I approached the research on tropicalisation by prefiguring solutions to mitigate its causes and protect the Mediterranean and its coasts from its consequences.

Months of reading, podcasts, feedback sessions and discussions with cluster colleagues gradually moved me away from this standpoint, toward an approach that recognises in the transitional and critical condition the very heart of the urban and spatial problem. An approach that I feel I have transferred into the design exploration - one that seeks and envisions a co-evolutionary transformation of the territory and its inhabitants alongside the new conditions brought by climate change, rather than a protection of a pre-existing "natural" order that is ideal only and exclusively for human beings and their productive activities.

Who has the right to live in the lagoon? The "traditional" Adriatic clam - a species originally from the Philippines, whose seeds are reproduced in laboratories and transplanted into sterile monocultures - or the blue crab, the alien, the invader, carried by humans in ballast water and naturally seeking to adapt to an ecosystem new to it? What is nature and what is a cyborg? For whom do I design?

Rather than seeking to defend against and eradicate these alien species - often fished and incinerated out of ignorance, despite being edible - does it not make more sense to transform our approach to them, and to integrate their presence into healthier, more biodiverse natural systems? Does it not make more sense to update and transform our practices in relation to these new species and, more broadly, to the new conditions brought by global warming?

I believe this conceptual shift has profoundly marked the outcome of the thesis, and that it connects, at the same time, with the research conducted in the first instance on the cultural dimension of the Mediterranean territory. The culture of the Mediterranean and its peoples has always been bastard, fluid, amphibious - the result of a constant dialogue between the sea, the wind and its populations. It has always been a sponge culture, capable of constantly transforming itself while remaining anchored in its territory; capable of staying with the trouble. The Anthropocene, industrialisation, and the turistification of its territories and of the practices through which we approach them have erased this transformative capacity — all in favour of a "natural" equilibrium oriented toward profit, whose stubborn protection perhaps has far less justification than we have been led to believe.

On Amphibious Bio-regionalism and Rights of Nature

Designing and imagining futures in the current global crisis demands, I believe, a reflection on the boundaries and scales of contemporary territorial projects. Strategies, visions and frameworks - even the most enlightened ones - are often tied to administrative boundaries: national, regional, provincial, or, in the maritime context, exclusive economic zones, continental shelves, and so on. Sterile boundaries, anchored to a concept of the nation-state that is ecologically obsolete and inherently incapable of recognising the Rights of Nature. The concept of bio-regionalism offers, I believe, a clear and valid alternative to the current framework - grounded in decades of debate and lived experience (Cascadia being one prominent example) - yet inadequately recognised and explored within the discipline of urbanism. Within this already niche field, the spatial governance of maritime eco-regions is further overlooked still - and it is precisely this gap that the thesis addresses.

I believe that among the most relevant outcomes of the thesis is the operationalisation of this theme and the mapping of the body of the Adriatic eco-region. A body that is not limited to aquatic territories, but extends also to the terrestrial ones that the sea influences. A body that is then divided into operative transects that follow the same logic - amphibious - as the eco-region itself, and that can be used to understand and listen to its dynamics, spaces and culture. I believe that bio-regionalism and - in this case - eco-regionalism can serve as useful concepts and methodological processes for arriving at the recognition of the Rights of Nature. Not as a final destination, but as a construct useful for building governance models grounded in a co-evolutionary stewardship between humans and nature. It is precisely in the exploration of this hypothesis that the research makes, I believe, its principal contribution to the Rights of Nature movement - seeking to spatialise, within an evolutionary framework, a possible spatial operationalisation of it. A first reflection produced with a free and speculative mind, in a context that stimulated creativity and speculation - one that, despite its idealising tendency, draws on real data to demonstrate the concrete possibility of imagining alternative pathways oriented toward socio-ecological co-evolution.

On Spatial Design and Biopolitics

When I imagined my thesis project, its drawings and its final presentation, I always envisioned something with a *wow factor* - a detailed, bold and compelling urban design. The kind of project that opens the doors of those celebrated offices I so admired; the kind that gets you into OMA or Foster + Partners. Watching my thesis reach its conclusion, I have come to realise how far the final result is from what I had originally prefigured - and I could not be prouder of that. Mediterranean Bastards was born with the ambition of being my personal megaproject, and ended up becoming - to use a definition and concept offered by Prof. Camillo Boano - a minor project.

A proudly incomplete project that genuinely seeks to listen to the territory and to the voices of its natural systems. A project that recognises space and nature as subjects of biopolitics, and the design of territory as an act of biopolitical power. It is on this last point that I believe I have grown and changed the most as a designer - in the understanding that the highest ambition of a project lies not in the spatial product itself, but in enabling life and in designing the conditions that allow life - human and more-than-human - to express itself, flourish and transform. For this reason the subtitle - a biopolitical project - because the entire research seeks to propose a framework for transforming with and within the risks of climate change, and to envision the conditions that make this process possible. Biopolitical in the positive sense of the term, because it proposes a project of life rather than on life. And if achieving this required giving up a hyper-detailed masterplan and glittering renders, I can only be glad of it.

On Design, Care and the Act of Enabling

This final reflection connects in part to the previous one and proposes a response to a question at the heart of the research carried forward by all members of the cluster: how to design care? The thesis itself can be read as an attempt to answer this question - as a methodological exploration of how spatial design can recognise the Rights of Nature and foster care and stewardship. There are two principal insights that I believe deserve to be underlined. The first relates to the analytical phase and to the necessity of developing tools and methodologies for listening to the territory - for knowing it and understanding its needs. Reasoning carefully about the scale of intervention of the project itself, which must respond to the needs of the territory rather than to institutional boundaries. Listening to the needs of its natural systems and analysing the nature and extent of the dynamics and relationships woven between its inhabitants. The existing and emerging practices of the territory, and those coming from other cultures and contexts that can teach something or help us think differently. Practices of care and transformation embedded in human nature - which, although perhaps analysed too hastily in the thesis, are both the foundation and the subject of the proposed strategies. This, I believe, can be a methodological process that facilitates design with care at the regional scale: starting from practices, from practitioners and - in spatial terms - from the material infrastructure that practices need in order to consolidate and establish themselves. In this - perhaps partly due to my previous and somewhat disastrous training as an anthropologist - I believe that urbanism needs to hybridise with the human sciences, in order to understand the value of the immaterial dimension of territorialisation and care practices, and to develop methodologies for operationalising them in design terms. Practices that do not translate into solutions or toolkits - because they are the offspring of a situated knowledge born from the dialogue between nature and culture - but that can serve as guidelines for the emergence and sedimentation of new Bastards.

188

Bibliography

Bibliography

Abdel Fattah, B., & Wissem, I. (2016). Integrated Coastal Zone Management (ICZM) Approach: Algerian National Strategy Case. *قضية داصت قال مولع لادع عم ةلج م*, 20(1), 69–91. <https://asjp.cerist.dz/en/article/23679>

Aggoune, K. (2024). A dynamic urban landscape in Algeria: Actors, mechanisms and governance challenges. *Al-Basha’ir Economic Journal*, 10(2), 650–662. <https://doi.org/10.33704/1748-010-002-039>

AGFORWARD. (2015). Agroforestry for climate change adaptation and drought resilience. European Agroforestry Federation.

AGFORWARD. (2015). Alley cropping with saltbush in Mediterranean drylands. European Agroforestry Federation.

AGFORWARD. (2015). Olive agroforestry systems in Morocco, Tunisia and Algeria. European Agroforestry Federation.

Anghileri, E. (2025). Lagoon, islands. The countryside of Venice: An interdisciplinary exploration of the rights of nature as a spatial practice [Master’s thesis, Delft University of Technology]. TU Delft Repository. <https://resolver.tudelft.nl/uuid:f5cb2fe9-375e-4470-9862-374d99c534a7>

Arènes, A. (2022). Borders. In F. Aït-Touati, A. Arènes, & A. Grégoire (Eds.), *Terra Forma: A book of speculative maps* (pp. 102–121). MIT Press.

Arènes, A., Latour, B., & Gaillardet, J. (2018). Giving depth to the surface: An exercise in the Gaia-graphy of critical zones. *The Anthropocene Review*, 5(2), 120–135.

Berg, P. (1983). *BioRegion. Resurgence*, (98).

Berg, P. (2002). *Bioregionalism: An introduction*. Planet Drum Foundation.

Bianchi, C. N., & Morri, C. (2003). Global sea warming and “tropicalization” of the Mediterranean Sea: Biogeographic and ecological aspects. *Biogeographia – The Journal of Integrative Biogeography*, 24. <http://dx.doi.org/10.21426/B6110129>

Blue Marine Foundation. (n.d.). Community-led native oyster and seagrass restoration projects in Britain.

Blueat. (n.d.). Blueat – La Pescheria Sostenibile: valorizzazione del granchio blu e filiere ittiche sostenibili. <https://www.blueat.it>

Billion Oyster Project. (n.d.). Oyster restoration in New York Harbor. <https://www.billionoysterproject.org>

Bruyns, G., & Hasdell, P. (2017). Aquatic urbanisms: Water as planning and territorial instrument considering the 9-dash line policy. *UPlanD: Journal of Urban Planning, Landscape & Environmental Design*, 2. <https://doi.org/10.6092/2531-9906/5420>

Butera, F. M. (2021). *Affrontare la complessità per governare la transizione ecologica*. Edizioni Ambiente.

Cabiddu, M. A. (Ed.). (2020). *Diritto del governo del territorio* (3ª ed.). Giappichelli.

Chora. (n.d.). Taiwan Strait Conscious City. Chora Research.

Chora. (n.d.). Urban Flotsam: Adaptive urban systems and floating territories. Chora Research.

CONANP. (n.d.). Cabo Pulmo National Park: Transition from commercial fishing to conservation tourism.

Consorzio di Gestione di Torre Guaceto. (n.d.). Torre Guaceto Marine Protected Area: Tourism regulation and coastal conservation. <https://www.riservaditorreguaceto.it>

Corner, J. (1999). *Recovering landscape: Essays in contemporary landscape architecture*. Princeton

189

Architectural Press.

Corner, J. (2003). *Landscape urbanism: A manual for the machinic landscape*. Architectural Association.

Corner, J. (2014). *The landscape imagination: Collected essays of James Corner, 1990–2010*. Princeton Architectural Press.

Corner, J., & MacLean, A. (1996). *Taking measures across the American landscape*. Yale University Press.

Corboz, A. (1983). The land as palimpsest. *Diogenes*, 31(121), 12–34. <https://doi.org/10.1177/039219218303112102>

Couling, N., & Hein, C. (2020). Viscosity. In N. Couling & C. Hein (Eds.), *The urbanisation of the sea: From concepts and analysis to design*. Nai010 Publishers.

Couling, N., & Hein, C. (Eds.). (2020). *The urbanisation of the sea: From concepts and analysis to design*. TU Delft Open. <https://doi.org/10.7480/isbn.9789462085930>

Crampton, J., & Elden, S. (2007). *Space, knowledge and power: Foucault and geography*. Ashgate.

Deltares. (n.d.). *Tidal River Management in Bangladesh: Ecosystem restoration and flood adaptation strategies*.

Esposito, R. (1998). *Communitas: Origine e destino della comunità*. Einaudi.

Esposito, R. (2002). *Immunitas: Protezione e negazione della vita*. Einaudi.

Esposito, R. (2008). *Bios: Biopolitica e filosofia*. Einaudi.

Escobar, A. (2018). *Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds*. Duke University Press.

European Environment Agency. (n.d.). *Habitat restoration and management in the Ebro Delta coastal lagoons*. Climate-ADAPT.

Ferrari, M., Pasqual, E., & Bagnato, A. (2019). *A moving border: Alpine cartographies of climate change*. Quodlibet.

Hadjimitsis, D., Agapiou, A., Themistocleous, K., Mettas, C., Evagorou, E., Soulis, G., Xagoraris, Z., Pilikou, M., Aliouris, K., & Ioannou, N. (2016). Maritime spatial planning in Cyprus. *Open Geosciences*, 8, 1–15. <https://doi.org/10.1515/geo-2016-0061>

Haraway, D. (2015). Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making kin. *Environmental Humanities*, 6, 159–165.

Hassoun, A. E. R., Mojtahid, M., Merheb, M., et al. (2025). Climate change risks on key open marine and coastal Mediterranean ecosystems. *Scientific Reports*, 15, 24907. <https://doi.org/10.1038/s41598-025-07858-x>

Ingold, T. (2000). *The perception of the environment: Essays on livelihood, dwelling and skill*. Routledge. <https://doi.org/10.4324/9780203466025>

Latour, B. (1993). *We have never been modern*. Harvard University Press.

Latour, B. (2015). Waiting for Gaia: Composing the common world through arts and politics. In A. Yaneva & A. Zaera-Polo (Eds.), *What is cosmopolitical design?* Ashgate.

Liberti, S. (2024). *Tropico mediterraneo*. Laterza.

Longhin, E. (2021). Shaped by power: The machine-territory of the Piave River. *ARDETH*, 8(1), 165–181. <https://doi.org/10.17454/ARDETH08.13>

Mubi Brighenti, A. (2014). Mobilizing territories, territorializing mobilities. *Sociologica*, 1, 1–25. <https://doi.org/10.2383/77043>

Ostrea. (n.d.). New marine materials from oyster cultivation. Loom. <https://www.looms.world/stories/ostrea>

Puig de la Bellacasa, M. (2011). *Matters of care: Speculative ethics in more than human worlds*. University of Minnesota Press.

Pessotto, F., & Rebolino, L. (2022). *Bordoclima. New calligraphies of moving borders* [Master’s thesis, Politecnico di Torino]. <https://webthesis.biblio.polito.it/21876/>

Regolino, L. (n.d.). *Borderclimate: Climate borders and territorial transformations* [Master’s thesis, Politecnico di Torino].

Ricci, M. (2013). *Middle Sea City: The Med Net Atlas Project*. In A. Petrov (Ed.), *New Geographies: Mediterranean* (pp. 245–254). Harvard University Press.

Rigobello, A., & Evans, J. D. (2024). Design terroir: An eco-social, relational, bioregional approach to design. *DRS2024 Conference Proceedings*. <https://doi.org/10.21606/drs.2024.269>

Staid, A. (2018). *Dare forme al mondo*. Meltemi.

Taylor Shellfish Farms. (n.d.). Sustainable shellfish aquaculture.

The Tidal Garden. (n.d.). Cultivation of halophyte plants in the Venetian lagoon. Cavallino-Treporti.

Tuel, A., & Eltahir, E. (2020). Why is the Mediterranean a climate change hot spot? *Journal of Climate*, 33, 5829–5843. <https://doi.org/10.1175/JCLI-D-19-0910.1>

Venissa. (n.d.). Moeche: Traditional lagoon crab fishing and biodiversity practices. <https://www.venissa.it>

Viganò, P. (2020). Palimpsest metaphor: Figures and spaces of the contemporary project. *Urban Planning*, 5(2), 167–171. <https://doi.org/10.17645/up.v5i2.3251>

Viganò, P. (2023). *Il giardino biopolitico: Spazi di vita e transizione*. Donzelli.

World Bank. (n.d.). Restorative aquaculture and coastal resilience in Tanzania.

WWF Mediterranean Marine Initiative. (2021). *The climate change effect in the Mediterranean: Six stories from an overheating sea*. WWF.

WWF Mediterranean Marine Initiative. (2023). *Maritime spatial planning in the Mediterranean Sea*. WWF.

Xu, X., et al. (2020). Rice–fish–tree systems and ecosystem services in the Mekong Delta. *Science of The Total Environment*. <https://doi.org/10.1016/j.scitotenv.2020.143333>

GIS Data Sources & Spatial Databases

- Copernicus Climate Change Service (C3S). (2023). *ERA5 reanalysis data on single levels* [Dataset]. ECMWF. <https://cds.climate.copernicus.eu>
- Copernicus Emergency Management Service. (2024). *EFFIS — European Forest Fire Information System* [Dataset]. European Commission. <https://effis.jrc.ec.europa.eu>
- Copernicus Land Monitoring Service. (2023). *CORINE Land Cover (CLC) 2018* [Dataset]. European Environment Agency. <https://land.copernicus.eu/pan-european/corine-land-cover>
- Copernicus Marine Service (CMEMS). (2024). *Global Ocean Biogeochemistry Analysis and Forecast* [Dataset]. European Union. <https://marine.copernicus.eu>
- EM-DAT — The International Disaster Database. (2024). *CRED — Centre for Research on the Epidemiology of Disasters* [Dataset]. Université catholique de Louvain. <https://www.emdat.be>
- EMODnet — European Marine Observation and Data Network. (2024). *EMODnet Bathymetry portal* [Dataset]. European Commission. <https://emodnet.ec.europa.eu/en/bathymetry>
- EMODnet — European Marine Observation and Data Network. (2024). *EMODnet Biology* [Dataset]. European Commission. <https://emodnet.ec.europa.eu/en/biology>
- EMODnet — European Marine Observation and Data Network. (2024). *EMODnet Human Activities* [Dataset]. European Commission. <https://emodnet.ec.europa.eu/en/human-activities>
- ESRI. (2024). *ArcGIS Living Atlas of the World* [Geospatial platform]. Esri Inc. <https://livingatlas.arcgis.com>
- ESRI. (2024). *World Imagery Basemap* [Basemap layer]. Esri Inc. <https://www.arcgis.com>
- European Environment Agency (EEA). (2023). *Biogeographical regions of Europe* [Dataset]. <https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3>
- European Environment Agency (EEA). (2023). *Natura 2000 network viewer* [Dataset]. <https://natura2000.eea.europa.eu>
- European Travel Commission (ETC). (2023). *European tourism trends and prospects* [Report]. <https://etc-corporate.org/reports>
- Eurostat. (2024). *GISCO — Geographical Information and Maps* [Geospatial database]. European Commission. <https://ec.europa.eu/eurostat/web/gisco/geodata>
- Eurostat. (2024). *NUTS — Nomenclature of territorial units for statistics 2021* [Dataset]. European Commission. <https://ec.europa.eu/eurostat/web/nuts/nuts-maps>
- Eurostat. (2023). *Tourism statistics — nights spent at tourist accommodation establishments* [Dataset]. European Commission. https://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics
- Fick, S. E., & Hijmans, R. J. (2017). *WorldClim 2: New 1-km spatial resolution climate surfaces for global land areas*. *International Journal of Climatology*, 37(12), 4302-4315. <https://doi.org/10.1002/joc.5086>
- General Bathymetric Chart of the Oceans (GEBCO). (2023). *GEBCO 2023 grid* [Dataset]. GEBCO

- Copernicus Climate Change Service (C3S). (2023). *ERA5 reanalysis data on single levels* [Dataset]. ECMWF. <https://cds.climate.copernicus.eu>
- Copernicus Emergency Management Service. (2024). *EFFIS — European Forest Fire Information System* [Dataset]. European Commission. <https://effis.jrc.ec.europa.eu>
- Copernicus Land Monitoring Service. (2023). *CORINE Land Cover (CLC) 2018* [Dataset]. European Environment Agency. <https://land.copernicus.eu/pan-european/corine-land-cover>
- Copernicus Marine Service (CMEMS). (2024). *Global Ocean Biogeochemistry Analysis and Forecast* [Dataset]. European Union. <https://marine.copernicus.eu>
- EM-DAT — The International Disaster Database. (2024). *CRED — Centre for Research on the Epidemiology of Disasters* [Dataset]. Université catholique de Louvain. <https://www.emdat.be>
- EMODnet — European Marine Observation and Data Network. (2024). *EMODnet Bathymetry portal* [Dataset]. European Commission. <https://emodnet.ec.europa.eu/en/bathymetry>
- EMODnet — European Marine Observation and Data Network. (2024). *EMODnet Biology* [Dataset]. European Commission. <https://emodnet.ec.europa.eu/en/biology>
- EMODnet — European Marine Observation and Data Network. (2024). *EMODnet Human Activities* [Dataset]. European Commission. <https://emodnet.ec.europa.eu/en/human-activities>
- ESRI. (2024). *ArcGIS Living Atlas of the World* [Geospatial platform]. Esri Inc. <https://livingatlas.arcgis.com>
- ESRI. (2024). *World Imagery Basemap* [Basemap layer]. Esri Inc. <https://www.arcgis.com>
- European Environment Agency (EEA). (2023). *Biogeographical regions of Europe* [Dataset]. <https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3>
- European Environment Agency (EEA). (2023). *Natura 2000 network viewer* [Dataset]. <https://natura2000.eea.europa.eu>
- European Travel Commission (ETC). (2023). *European tourism trends and prospects* [Report]. <https://etc-corporate.org/reports>
- Eurostat. (2024). *GISCO — Geographical Information and Maps* [Geospatial database]. European Commission. <https://ec.europa.eu/eurostat/web/gisco/geodata>
- Eurostat. (2024). *NUTS — Nomenclature of territorial units for statistics 2021* [Dataset]. European Commission. <https://ec.europa.eu/eurostat/web/nuts/nuts-maps>
- Eurostat. (2023). *Tourism statistics — nights spent at tourist accommodation establishments* [Dataset]. European Commission. https://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics
- Fick, S. E., & Hijmans, R. J. (2017). *WorldClim 2: New 1-km spatial resolution climate surfaces for global land areas*. International Journal of Climatology, 37(12), 4302-4315. <https://doi.org/10.1002/joc.5086>
- General Bathymetric Chart of the Oceans (GEBCO). (2023). *GEBCO 2023 grid* [Dataset]. GEBCO Compilation Group. https://www.gebco.net/data_and_products/gridded_bathymetry_data

- Geofabrik GmbH. (2024). *OpenStreetMap data extracts — Europe* [Dataset]. <https://download.geofabrik.de/europe>
- Global Biodiversity Information Facility (GBIF). (2024). *Occurrence records — invasive species Mediterranean* [Dataset]. <https://www.gbif.org>
- Global Fishing Watch. (2024). *AIS-based global fishing effort dataset* [Dataset]. <https://globalfishingwatch.org/data-download>
- Hengl, T., & Wheeler, I. (2018). *Global lithological map* [Dataset]. OpenGeoHub Foundation. <https://www.opengeohub.org>
- ISRIC — World Soil Information. (2023). *SoilGrids WCS endpoint* [Dataset]. <https://maps.isric.org>
- Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA). (2023). *TINIItaly Digital Elevation Model* [Dataset]. <https://tinitaly.pi.ingv.it>
- Invasive Species Specialist Group (ISSG). (2024). *Global Invasive Species Database (GISD)* [Dataset]. IUCN. <http://www.iucngisd.org/gisd>
- Marine Regions. (2024). *VLIZ Maritime Boundaries Geodatabase* [Dataset]. Flanders Marine Institute. <https://www.marineregions.org>
- Meijer, J. R., Huijbregts, M. A. J., Schotten, K. C. G. J., & Schipper, A. M. (2018). *Global roads inventory project (GRIP)* [Dataset]. <https://www.globio.info/download-grip-dataset>
- NOAA National Centers for Environmental Information. (2024). *International Best Track Archive for Climate Stewardship (IBTrACS)* [Dataset]. <https://www.ncei.noaa.gov/products/international-best-track-archive>
- OpenStreetMap contributors. (2024). *OpenStreetMap* [Geospatial database]. OpenStreetMap Foundation. <https://www.openstreetmap.org>
- United Nations Environment Programme — Mediterranean Action Plan (UNEP/MAP). (2023). *State of the Mediterranean Marine and Coastal Environment* [Dataset]. <https://www.unepmap.org>
- University of California, Berkeley — Museum of Vertebrate Zoology. (2024). *GADM — Database of Global Administrative Areas, version 4.1* [Dataset]. <https://gadm.org>
- World Bank. (2024). *Global Shipping Traffic density* [Dataset]. <https://datacatalog.worldbank.org>
- World Bank. (2024). *World Bank Open Data — Maritime transport statistics* [Dataset]. <https://data.worldbank.org>
- WorldClim. (2020). *WorldClim 2.1 — Historical climate data 1970-2000* [Dataset]. University of California, Davis. <https://www.worldclim.org/data/worldclim21.html>

Note: All datasets were consulted between November 2025 and May 2026.