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# Learning How to Live with Risk—The Role of Co-Design for Managing City–Port Thresholds in Castellammare di Stabia, Naples, Italy

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**Abstract**

City–port thresholds are increasingly exposed to multi-risk, including climate change impacts, pollution, and obsolescence of buildings and infrastructure as well as socio-economic marginalization. This paper aims to understand what role co-design—and more generally collaborative planning processes—can play in enabling communities and institutions to learn how to live with risk when managing water, city–port interfaces, and coastal public spaces. To do so, this paper analyses the experience of a co-design workshop held in Castellammare di Stabia, in the Metropolitan Area of Naples, organized within the framework of the research MIRACLE and SPArTaCHus. The results of the workshop show that co-design can act as an effective instrument for developing strategies aimed at the regeneration and valorization of underused, abandoned, or polluted spaces in the coastal thresholds of City–Port areas—wastescapes—that are exposed to multiple risks. In these complex territories new methods are needed to understand, describe and interpret the fuzzy boundaries between the city and the port to collaboratively envision sustainable strategies for urban regeneration of coastal wastescapes.

**Keywords:** City–Port areas; risk; multi-risk; thresholds; wastescapes; co-design; urban living labs; water; habitat



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## 1. Introduction

In an era marked by accelerating climate change and the intensification of environmental risk phenomena, coastal and port cities are increasingly exposed to multi-risk [1], including climate change impacts, pollution, buildings and infrastructural obsolescence as well as socio-economic marginalization. In this context—characterized by continuous adaptation to climate change perspectives—underused, abandoned or contaminated areas—often defined as wastescapes [2]—at the threshold between water and land emerge as both origin of crisis and potential resources for alternative visions for sustainable and circular urban futures [3].

This paper investigates how participatory and contextual urban regeneration practices such as co-design workshops developed under the umbrella methodology of Urban Living

Labs (ULLs) [4–10] can act as effective instruments to engage with all stakeholders in multi-risk contexts, transforming risk, neglect and marginality into trigger points to develop shared strategies of care, reuse and site-specific regeneration processes.

The research builds on the contemporary debates on regenerative territories [11,12], Urban Living Labs methodology, City–Port porosity and vulnerable thresholds [13], intersecting with the themes of situated urban design and re-use strategies, urban commons and community resilience in vulnerable coastal territories.

This paper aims to answer to the following research question (RQ): What role does co-design play in enabling communities and institutions to learn how to live with risk when managing water, city–port interfaces, and coastal public spaces?

To answer the RQ, this research paper analyses the experience of a co-design workshop held in Castellammare di Stabia, in the Metropolitan Area of Naples. This area is selected as an emblematic territory for exploring the relationships between water, environmental and anthropogenic risk, and forms of living in equilibrium with nature. Located within a complex geographical context—between Mount Vesuvius, the mouth of the Sarno River, and the Tyrrhenian coast—the city of Castellammare di Stabia faces multiple critical issues: hydrogeological instability, water pollution, illegal building practices, obsolete water infrastructures, urban fragmentation, and degradation of the coastal front, as well as a significant lack of high-quality public spaces and citizen services at the land–water threshold (Figures 1–4). Recently recognized by the EU as part of the thematic focus of compact cities (See: https://www.urbanagenda.urban-initiative.eu/partnerships/compact-cities, accessed on 13 January 2026), the Municipality of Castellammare di Stabia faces complex urban challenges arising from the interplay of demographic, economic, and governance dynamics. In this context, multi-level governance and the coordination of transport, housing, and environmental policies are crucial in shaping urban development, as it happens in small and medium-sized cities where liveability, public space quality, and the integration of socio-economic and environmental objectives remain key concerns. At the same time, this territory—in between hills and water—represents a fertile laboratory for experimenting with new strategies for urban adaptation to climate change and multi-risk conditions towards the redefinition of increased quality of public space and the reuse of existing assets.

In Castellammare di Stabia, the presence of thermal springs, culverted watercourses, abandoned riverbeds, and other diffused problems related to water level changing over time due to climatic issues, are the signal of a misalignment between urban life and water dynamics. Historical urbanization processes have produced a fragile landscape in which water has often been concealed, poorly managed, or reduced to a nuisance. This has had profound effects on both the environment and living conditions: structural damage to buildings, soil degradation, flooding, and loss of landscape value. Starting from these criticalities, the city can today initiate a process of urban and territorial regeneration, also in collaboration with the university, aimed at redefining the relationship between water, public space, and the city in a territory increasingly confronted with multiple risk conditions. The paper builds on an ongoing collaboration between two applied research projects developed by the Architecture Departments of two Italian universities. Grounded in a shared regenerative and more-than-human perspective, the article brings together the MIRACLE and SPArTaCHus projects, both operating—among others—in the territory of Castellammare di Stabia, where spatial analysis, participatory design, and experimental governance tools are jointly explored.

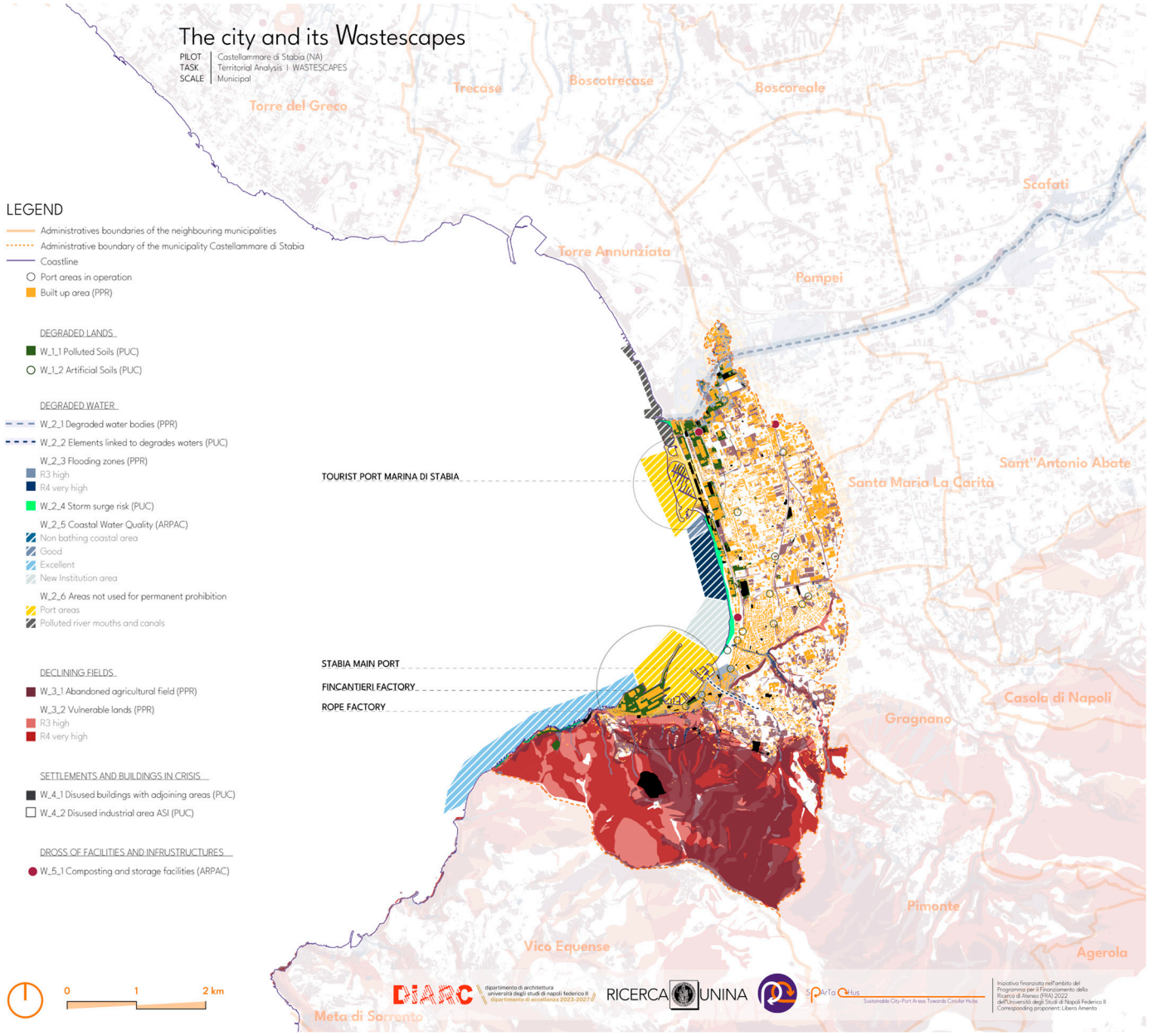


**Figure 1.** Castellammare di Stabia (Naples) and its wastescapes. Map developed by Massimiliano Gatani and Flavio Costantino, within the framework of the SPArTaCHus project for the co-design workshop held in Castellammare. The map points out the deep interconnection between the multiple dimensions of risk and the city and its uses (both land and water). Wastescapes emerge as areas where this complexity materializes.

MIRACLE (Multi-risk Integrated Resilience Approach for Coastal Landscapes and Environment) focuses on selected coastal areas of Italy. The project studies coastal multi-risk contexts aiming to transform fragilities and vulnerabilities into drivers of territorial innovation—an opportunity to rethink ways of dwelling and living together in the water-related landscapes of the future. MIRACLE explores precisely this paradigm shift, proposing an integrated and participatory approach to planning in risk-prone territories. Through three territorial transects—Verona–Venice, Po Delta–Rimini, and Bagnoli–Naples—the project develops experimental urban laboratories where citizens, decision-makers, and researchers collaborate in the co-design of adaptation strategies, integrating local knowledge and technological tools to understand and manage risk complexity. From multi-risk

analyses to vulnerability maps and the development of adaptation scenarios, the project proposes a methodology that intertwines environmental, social, and cultural dimensions.

**Figure 2.** Castellammare di Stabia (Naples) and its wastescapes: the topographical setting of Castellammare di Stabia, highlighting the relationship between the urban fabric and the surrounding hills. Photo by Libera Amenta, 2025.

**Figure 3.** Castellammare di Stabia (Naples) and its wastescapes: the city–port coastal threshold, showing physical barriers, infrastructural edges, and access conditions. Photo by Libera Amenta, 2025.

**Figure 4.** Castellammare di Stabia (Naples) and its landscape: from the hills towards the river mouth. Photo by Libera Amenta, 2025.

SPArTaCHus (Sustainable City–Port Areas Towards Circular Hubs), reinterprets City–Port Areas as engines for new circular and sustainable models in balance with nature. The project explores the threshold areas between city and port as transitional landscapes [14]. The project deepens this study in the Metropolitan Area of Naples with two focus areas: one in Pozzuoli and another one in Castellammare di Stabia—where urban, industrial, and ecological systems intersect and sometimes interfere. By focusing on wastescapes, the project identifies in underused or abandoned industrial and infrastructural areas potential territories to trigger urban regeneration processes, since they hold potentialities for circular transformation. Through a research-by-design approach [15], SPArTaCHus engages with the changing conditions of fragile coastal ecosystems through co-creation activities in co-design workshops, didactic activities and co-exploring fieldworks including collaborative moments of discussion about the possible visions for these territories. The outcome is a Circularity Catalogue, an operational and conceptual tool to guide designers, decision-makers, investors, and citizens in the development of circular hubs and innovation incubators. By reconnecting people, spaces, and flows, SPArTaCHus aims to promote more resilient and inclusive urban ecosystems, advancing a holistic vision of sustainability rooted in local potential and global circularity.

## 2. Materials and Methods

### *2.1. Water as an Interpretative Lens*

Water and its related multi-risk conditions have been utilized as an interpretative lens to give shape to the workshop setting assuming land-water territories as a laboratory for experimenting with circularity (Olivadese & Dindo, 2024; Granceri Bradaschia et al., 2024; Hein, 2020) [16–18]. The very existence of spaces shaped by the constant interaction between land and water defines a liminal condition that continuously challenges stability and exposes the limits of traditional models of territorial management and governance [13,19].

These areas force us to reconsider consolidated concepts of safety, urbanization, and spatial planning, because they operate in contexts where the boundary between natural and artificial is increasingly blurred.

In general, the Italian case represents an emblematic example of this complexity. From the exceptionally high tides that periodically affect Venice to the increasingly devastating floods of recent years in Emilia-Romagna and other regions across northern, central, and southern Italy, it becomes clear that water-related risks are not purely natural phenomena. They emerge as the result of an interplay between environmental and anthropogenic processes: uncontrolled urbanization, soil sealing, loss of wetlands, and a disconnection between spatial planning and natural hydrological cycles [20–22]. In this context, water assumes both a symbolic and practical function: it is not only a physical element, but a revealing substance, capable of exposing the systemic and interconnected nature of contemporary multi-risk conditions. Prolonged droughts amplify urban heat islands; floods trigger landslides and infrastructural collapse; rising groundwater levels compromise buildings and urban networks [23,24]. Each water-related event thus becomes an indicator of the environmental, social, and infrastructural vulnerabilities that accumulate and intertwine over time.

The vulnerability of water territories is not limited to the physical dimension. It reflects equally fragile and complex social, economic, and institutional conditions. Inequalities in access to safe and resilient public spaces, regulatory fragmentation, rigid administrative boundaries, and difficulties in coordinating adaptation policies all contribute to multiplying risks [25,26]. In such contexts, risk management cannot be considered merely a technical or engineering problem: it also becomes a matter of social justice. Who decides how water should be used, protected, or managed? Which actors have a voice in decision-making processes, and which are excluded? [27] This brings to the forefront the notion of publicness, understood as equitable and shared access to safe, dynamic, and resilient public spaces, which become arenas of confrontation between ecological fragilities and collective rights. Managing these spaces is therefore not only a technical or administrative responsibility, but also an ethical and political imperative: they represent a testing ground for the capacity of communities to govern inclusively and sustainably.

In this context, the urgency of a paradigm shift in urban and territorial planning becomes evident. Traditional logics, rooted in a "terrestrial" conception of territory and supported by static zoning tools, reveal their inadequacy when confronted with the fluidity, dynamism, and temporality of water processes [28,29]. Managing water as a risk element—often addressed solely through containment measures or emergency interventions—is insufficient to respond to the complexity of contemporary phenomena. Overcoming this logic means adopting more fluid, relational, and adaptive approaches, capable of embracing uncertainty and transforming it into an opportunity for urban regeneration and innovation.

### *2.2. Co-Design as a Method*

The research approach on which the co-design workshop has been built draws on the Urban Living Lab (ULL) framework [5], conceived as a place-based and iterative setting that enables collaboration among residents, academics, institutional actors, and local stakeholders. Within this framework, knowledge production and spatial experimentation emerge through ongoing interaction, positioning the ULL as a provisional common in which learning processes unfold through practice. Urban design is thus mobilized as a relational device, capable of bridging social, political, and ecological dimensions. Bringing together multi-stakeholder partnerships, co-design approaches in ULLs encourage collaborative creation, break down knowledge hierarchies, support on-the-ground initiatives, and develop solutions adapted to local conditions [30].

At the heart of this collaborative process, this paper analyses the methodological framework and the results of a co-design workshop held on 14 April 2025 at the former Royal Palace of Castellammare di Stabia, namely Reggia di Quisisana, on the hills of the city, to the south. The workshop has served as an empirical moment to explore the relationship between water and land, and pose new questions on the habitability of City–Port thresholds and accessible coastal public spaces in the case study of Castellammare di Stabia towards more circular futures. The workshop was articulated through successive stages of inquiry, sense-making, and speculative exploration, combining multi-risk analysis, vulnerability mapping, and shared narrative practices. By interweaving expert insights with situated experiences and students' contributions, participants transformed both quantitative data and experiential knowledge into spatial imaginaries and adaptive design responses, emphasizing care-oriented practices, reuse strategies, and the activation of collective memory.

### *2.3. City–Port Threshold Areas as a Field of Experimentation*

The frameworks of the two research projects MIRACLE and SPArTaCHus both contributed to structure the co-design workshop critically analyzed in this paper. To address the complexity of the territorial systems, both projects adopt a methodology articulated into three operational phases—understanding/knowing, mapping, co-designing—that has been applied at the structure of the urban laboratory held in Castellammare di Stabia.

MIRACLE (Multi-risk Integrated Resilience Approach for Coastal Landscapes and Environments) is a research-action project that addresses multi-risk as a key to rethinking the planning and management of Italian territories most vulnerable to climate change and complex environmental phenomena. The methodological approach of MIRACLE is based on three fundamental principles: integration, participation, and adaptation.

The initiative stems from the awareness that traditional planning tools are no longer adequate to interpret and manage the systemic, interconnected, and multi-level nature of contemporary risks—hydraulic, seismic, geological, ecological, as well as social and economic—and proposes a new integrated and participatory approach capable of connecting scientific knowledge, local perceptions, and design action.

MIRACLE aims to develop an innovative cognitive and operational framework for integrated risk management and climate change adaptation, with particular attention to water territories—coastal cities, deltas, riverine and lagoon landscapes—where risk phenomena manifest in convergent ways. The main objective is to build territorial resilience based not only on technical solutions, but also on collective, inclusive, and multiscale processes capable of transforming vulnerability into a design and social resource.

Castellammare di Stabia emerges as a stratified urban system in which the widespread presence of water—thermal springs, culverted streams, underground aquifers—represents both a resource and a source of risk. The hydrogeological setting is made vulnerable by a lack of maintenance of slopes, building infiltrations, subsidence linked to uncontrolled groundwater extraction, and inadequate water regulation. In some cases, these criticalities have led to evacuations and demolitions.

The coexistence of natural wealth and structural fragility defines the "water paradox": a city that possesses an extraordinary water heritage but experiences it as a threat rather than a resource. This is compounded by social and administrative factors—illegal construction, bureaucratic delays, poor maintenance—that have undermined the effectiveness of prevention policies.

The project SPArTaCHus (Sustainable City–Port Areas Towards Circular Hubs) focuses on the circular regeneration of the heritage of disused areas at the city–port interface through the merging of different theoretical approaches.

SPArTaCHus explores circular City–Port areas using a mixed-method perspective combining Urban Political Ecology, Urban Metabolism, and Urban Resilience. Urban Political Ecology provides a framework for understanding how social, cultural, and power structures affect the relationship between people and their environment [31]; the Urban Metabolism lens [14] allows us to understand how material and energy flows shape City–Port Areas (CPAs) and connect them to global networks. It also reveals the socio-ecological inequalities associated with these resource flows [32]. Extending this perspective, Territorial Metabolism [33,34] situates CPAs within their regional contexts, showing how local ecological processes interact with broader territorial dynamics.

Urban Resilience in City–Port systems develop at key moments of change, shaped by different actors working at various scales and in different places [35].

SPArTaCHus aims to restore local habitats through Nature-based Solutions (NbS), enhancing the quality of life for more-than-human environments. By prioritizing ecological integrity in design, it supports the maintenance of biotic interactions that contribute to resilience across the city (Forman, 2014) [36]. In this way, the research highlights pathways for CPAs to move toward circularity, sustainability, and resilience, reconnecting people, spaces, flows, economies, and ecologies within a dynamic and balanced system.

In this context, MIRACLE contributed to structuring the workshop by introducing the multi-risk lens as a cross-cutting interpretative framework, guiding the phases of analysis and mapping toward an integrated reading of hydraulic, environmental, and social vulnerabilities, as well as toward the recognition of local risk perceptions. SPArTaCHus, in turn, provided the conceptual and operational framework to explore city–port threshold areas as socio-ecological and metabolic spaces, bringing attention within the workshop to flows, wastescapes, and nature-based solutions as design levers for circular regeneration and for improving the quality of both human and more-than-human communities.

Crucial in the SPArTaCHus research is the intertwining of the multi-risk lens with the scattered presence of wastescapes in the city–port thresholds (Figure 5). Wastescapes [3,37,38] become a fertile laboratory to experiment with the regeneration process to ensure a better quality of life and, at the same time, of the public spaces that allow access to the sea.

### *2.4. Structure of the Workshop*

The workshop was organized within the MIRACLE and SPArTaCHus research projects and involved researchers and students from the University of Naples Federico II and IUAV University of Venice, both formal project partners. Participating students were involved through ongoing teaching activities in urban and territorial design.

Three working groups (Figure 6) explored water as a common framework in the case study of Castellammare di Stabia. This approach was useful to rethink the relationships between the city, the landscape, and the infrastructures. Each group addressed different conditions—coastal, riverine, and hidden water systems—but shared a vision of water as an active resource rather than a limit. Together, they proposed integrated strategies to reconnect fragmented spaces, enhance ecological continuity, and improve urban habitability.

The first working group focused on the northern coastal strip between the sea and the infrastructural system, redefining the shoreline as a permeable ecological threshold between the urban fabric and the sea. The second worked on the river mouth and infrastructural margins between Castellammare di Stabia and Torre Annunziata, transforming a rigid boundary into a connective river landscape. The third investigated the inner city, uncovering buried waterways and forgotten springs to rebuild links between the historic center, the coast, and the hinterland.

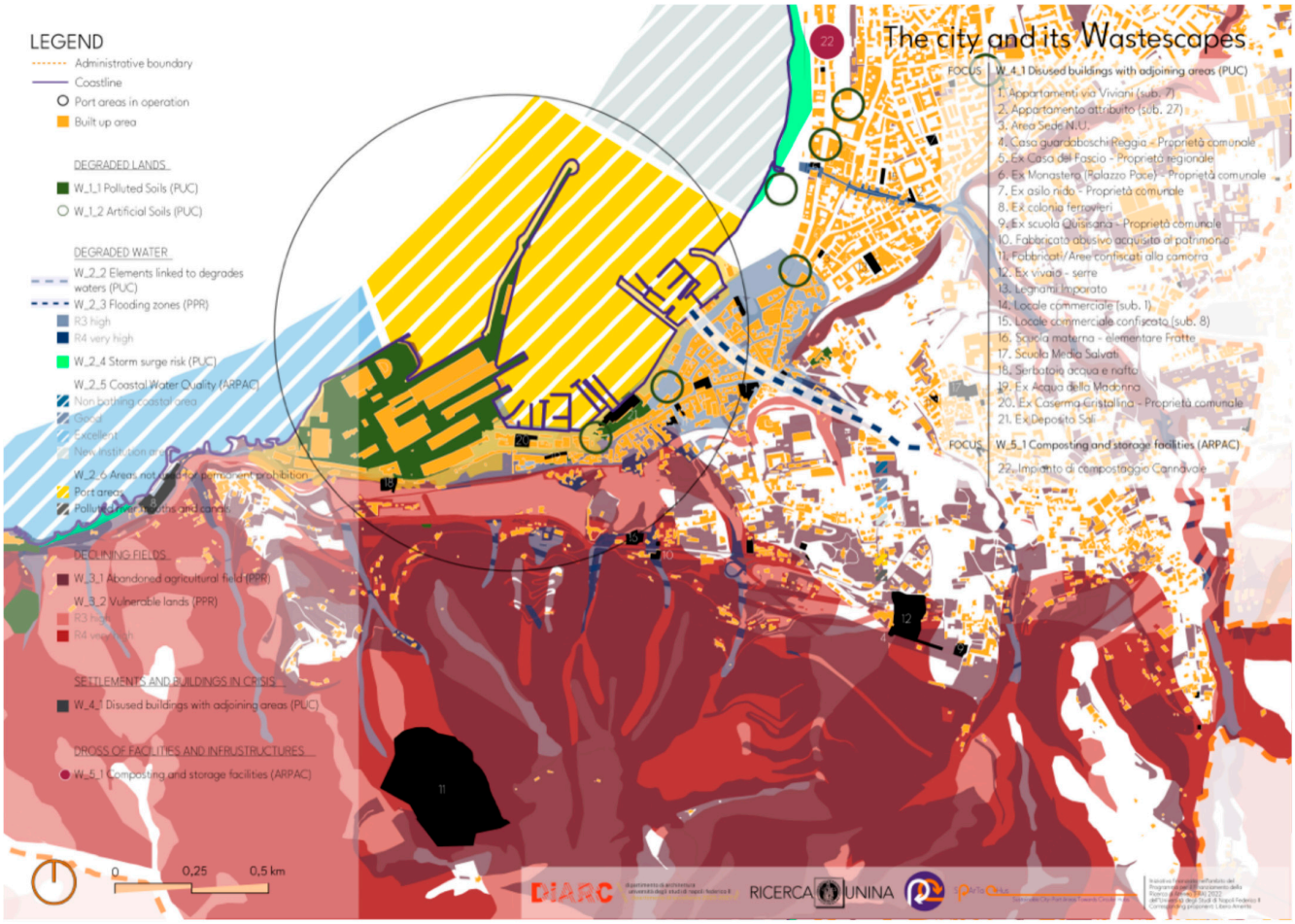


**Figure 5.** Multi-risk and wastescapes in Castellammare di Stabia (Naples). Baseline maps used during the analytical phase of the workshop (understanding/mapping)). Maps by Massimiliano Gatani and Flavio Costantino, developed within the framework of the SPArTaCHus project.

Multi-risk and wastescapes maps developed through in-depth desk research by the two research teams of the MIRACLE and SPArTaCHus projects were provided to each working group as a shared knowledge base (Figure 7).

In these maps, the dimension of coastal wastescapes was juxtaposed with the multi-risk dimension of the territory in order to highlight critical hotspots where environmental, hydraulic, and spatial vulnerabilities overlap and where design actions are most needed. These analytical materials were complemented by a set of co-design tools—colorful markers and pencils, post-its, tape, and transparent paper—supporting collective interpretation, discussion, and the translation of data into spatial visions and design scenarios.

The work of each group was structured through a sequence of phases, each guided by a specific set of questions that progressively oriented analysis and design. Participants were first asked to reflect on how risk is perceived and experienced, and how it can be mapped within the territory by intersecting multi-risk conditions with the spatial dimension of coastal wastescapes to identify critical hotspots. The process then moved toward understanding what has already been done—or is currently being done—to address these risks, considering existing projects, policies, and spatial responses. Finally, each group worked on constructing a shared scenario, reframing risk not only as a condition to be mitigated but as a transformative potential, capable of generating new spatial, ecological, and social opportunities for the territory.


**Figure 6.** Working group sessions during the co-design workshop, illustrating the collaborative mapping and scenario-building process. Picture by L. Amenta.

The final phase consisted of a plenary session in which each group presented the results of their work. This restitution involved the participation of the Urban Planning Councillor of the Municipality of Castellammare di Stabia, as well as other stakeholders invited to the workshop, allowing for a shared discussion and collective reflection on the proposed scenarios and strategies.

The results presented in Section 3 are structured according to these three phases: (1) collaborative knowledge construction and risk perception mapping; (2) review of existing policies and spatial responses; and (3) co-design of adaptation scenarios, followed by a plenary restitution.

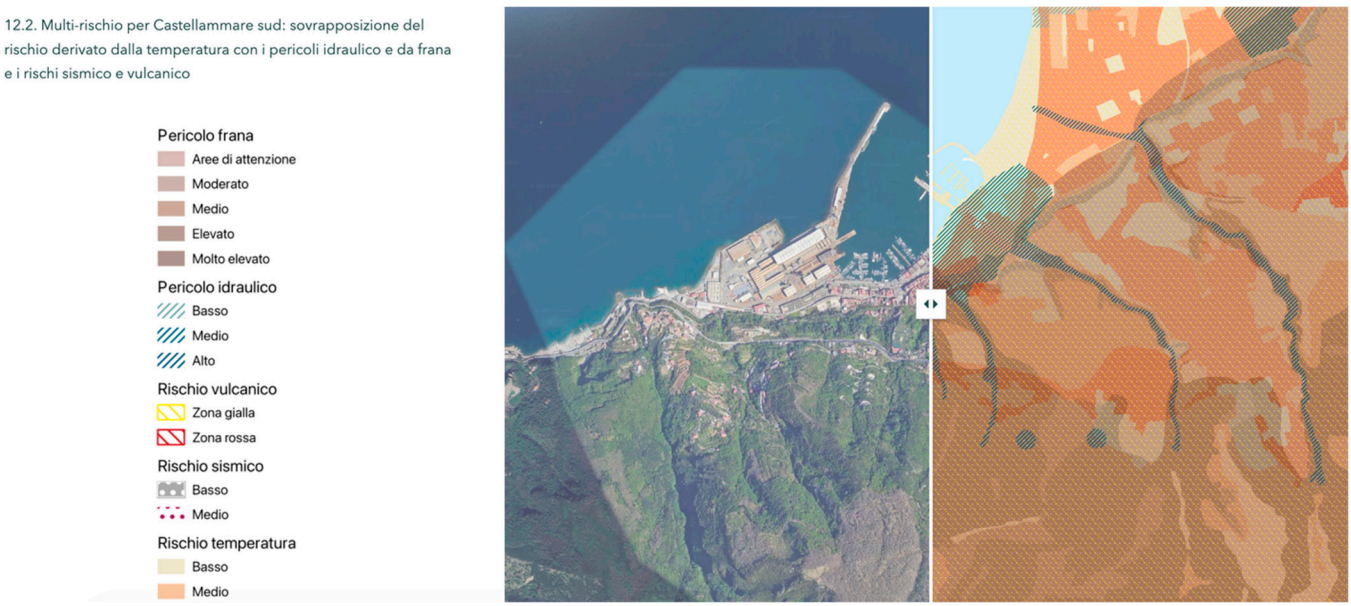


**Figure 7.** Multi-risk map used as a shared analytical reference during the initial phase of the workshop. The image, connected to the story map of the Miracle project, shows a base map of the port of Castellammare di Stabia with overlapping risk layers related to seismic and volcanic activity, hydraulic risk, and landslides. Regarding the legend: for landslide risk, dark brown indicates a high level of hazard. For hydraulic risk, the legend ranges from lowest to highest. Volcanic risk marks the red zone as the most exposed. Seismic risk is also represented on a scale from lowest to highest, as are temperature variations. Elaboration: MIRACLE Research Group, IUAV University.

## 3. Results

The results are presented in the three phases described in Section 2.4.

The co-design urban lab held in Castellammare di Stabia contributed to promote urban laboratories as spaces for participatory experimentation, where citizens, administrations, and territorial actors can co-design adaptation and regeneration scenarios for multi-risk coastal territories. It aimed to share with all stakeholders a multi-risk approach to the regeneration of the coastal territory that integrates physical–environmental and socio-cultural aspects, overcoming the sectoral fragmentation of urban policies.

An integrated knowledge of the territory has been reached by combining objective data, represented in the desk-produced maps provided to the participants, with subjective perceptions, specific expertise of experts and by recognizing the cognitive value of local experiences. The participation of representatives of local administrations contributed to sharing the awareness that it is necessary to move towards collaborative and adaptive governance models capable of addressing uncertainty and ongoing environmental change in multi-risk contexts.

Results of the co-design workshop can be summarized as follows.

- Collaborative construction of knowledge and understanding the multi-risk territory of Castellammare di Stabia

Environmental, socio-economic, and infrastructural additional data have been collected and added on the available desk-produced maps and integrated with local perceptions and knowledge. The aim has been to build an inclusive and shared knowledge framework capable of representing territorial complexity through vulnerability maps and multi-source risk scenarios.

- Co-mapping the risk perception in the territory of Castellammare di Stabia

Through the co-design workshop, participants have been stimulated to share with the group how they perceive risk in their daily life and work in the territory of Castellammare di Stabia. Together with the researcher facilitating the work of the groups, they have been stimulated to reflect on how this risk perception can influence spatial practices.

- Co-designing adaptation scenarios to multi-risk and wastescape conditions in the case of Castellammare di Stabia

The collected information on the maps has been transformed into operational proposals and spatial strategies combining mitigation and adaptation and represented on the maps in forms of sketches, strategic directions and noted on post-its. Spatial solutions—such as the provision of green and blue infrastructures, resilient public spaces, and temporary reuse strategies—have been co-developed and evaluated together with local actors, eventually producing the bases for a shared catalogue of actions and recommendations for administrations.

### *3.1. Risk Perception Maps*

A fundamental aspect addressed by the co-design laboratory is risk perception, often neglected in planning processes (Figure 8). In Castellammare di Stabia, this perception has historically been shaped by a culture of emergency rather than prevention: until 2012, reconstruction was permitted in areas classified as high risk (R3–R4) (as previously shown in Figure 5).


**Figure 8.** Risk perception map collaboratively produced by workshop participants during the co-mapping phase, integrating subjective perceptions with baseline multi-risk data. Some of the most significant elements are highlighted as follows: in yellow, the residential system; in dashed pink, the industrial areas. Red dots indicate landmarks, while arrows show the need for connections—particularly in orange and green, pointing toward the sea. The dotted area represents the beach. Elaboration: Working groups of the workshop held in Castellammare di Stabia.

The entry into force of the Basin Plan marked a turning point, imposing construction limits and encouraging relocation approaches. However, the community retains a fragmented memory of risk, shaped by memories of landslides, bureaucratic difficulties, and the distance between citizens and institutions.

Through the laboratory, participants—administrators, technicians, citizens, students—developed perceptual maps inspired by Kevin Lynch's principles, to represent the city's "mental images" in relation to risks. What emerged was a plural reading, where hydraulic risks, degradation of historical heritage, and lack of accessibility intertwine, demonstrating how subjective perception can become a cognitive and decision-making tool (Figure 5).

### *3.2. Co-Designed Adaptation Scenarios*

Within the MIRACLE laboratory, working groups explored three complementary design trajectories, united by a shared objective: reinterpreting Castellammare di Stabia as a water territory, where risk, perception, and regeneration intertwine in a vision of adaptation and cohesion.

Through this lens, the groups developed regeneration strategies that place public space at the center as a site of adaptation, cohesion, and reconnection among different parts of the city.

The first working group developed an adaptation scenario (Figure 9) focused on the northern strip between the mouth of the Sarno River and Marina di Stabia, in which water becomes the generative principle of a new relationship between city and sea. Here emerges the idea of the "mirror strip," a margin that ceases to be a boundary and becomes an ecological, reflective, and permeable threshold. Conceived as a green and blue infrastructure, the strip accommodates natural water management through permeable surfaces and public spaces capable of absorbing, filtering, and returning resources. Reconnection between inner urban fabrics and the coastal front occurs through a continuous system of parks, paths, and collective spaces, where ecological dimensions translate into urban and social form. In this new coastal landscape, water is no longer a barrier but an opportunity for openness—an element of balance and regeneration that redefines the relationship between citizens and the sea.

The second adaptation scenario (Figure 10), developed along the boundary between Castellammare di Stabia and Torre Annunziata, addresses the theme of the threshold as a relational space. The "suspended boundary"—marked by rigid infrastructures, abandoned industrial areas, and social voids—is reinterpreted as a dynamic hinge, a place where water and landscape become tools of mediation. The mouth of the Sarno, currently perceived as a limit, is transformed into a river park capable of combining hydraulic risk mitigation with public use, restoring accessibility and ecological continuity. Transversal connections, soft mobility, and the reactivation of industrial margins are integrated into a unified vision, where the relationship between infrastructures and open spaces generates new forms of habitability. Water once again acts as a connective element, linking fragmented parts, reconnecting margins, and redefining the perception of the boundary as a shared resource.

The third working group focused its research on the "water paradox," addressing the contradictions of a city crossed by buried water networks, culverted channels, and forgotten thermal springs (Figure 11). In this context, water emerges as hidden memory and latent infrastructure, capable of suggesting a new urban ecology. The adaptation scenario proposes reopening and renaturalizing watercourses, restoring their visibility and public function through pedestrian paths, green spaces, and diffuse drainage systems. Abandoned buildings along these routes are reimagined as cultural and social catalysts, nodes in a network of "green and blue branches" connecting the historic center with the coast and the

hinterland. In this way, water becomes central again not only as physical matter, but as relational infrastructure, capable of building ecological continuity and collective identity.


**Figure 9.** First strategic adaptation scenario developed by the working groups during the co-design phase, translating identified risk hotspots into spatial proposals. The proposal works on re-conceptualize the "mirror strip" as a transitional zone capable of accommodating both urban dynamics (in orange) and the flows and multifunctional processes coming by water (in blue). Elaboration: Working groups of the workshop held in Castellammare di Stabia.

### *3.3. Experimental Conclusions*

Through these three adaptation scenarios, the co-design workshop, according to the structure of an urban living laboratory, demonstrated that addressing multi-risk in coastal territories means going beyond mere emergency management, toward building an integrated and long-term vision—starting from bottom-up and temporary initiatives—that links a shared knowledge with perception and co-design.

The MIRACLE and SPArTaCHus methodologies are grounded in a process that unites technical expertise with collective imagination, where knowledge informs decision-making, mapping deepens understanding, and co-design enables transformation. Applying them

in the co-design workshop, the experience gained in Castellammare di Stabia demonstrated that the complexity of risks—hydraulic, seismic, environmental, and social—is inseparable from the spatial and cultural dynamics of the territory that both generate and shape them. Water, in this sense, emerges as a common language for interpreting the relationships between territory, infrastructure, and dwelling, helping to restore continuity within a fragmented landscape. Moreover, wastescapes are reframed as opportunities to re-establish land–water relationships, fostering more resilient public spaces and new forms of equilibrium among more-than-human communities.

Interpreting risk as an opportunity for social cohesion enabled a shift beyond sectoral approaches, introducing an integrated planning framework in which administrative boundaries are transcended in favor of broader ecological and social networks. Within this process, public space assumes a central role as an operational tool for strengthening resilience, fostering inclusion, and cultivating a sense of belonging.


**Figure 10.** Second strategic adaptation scenario. Elaboration: Working groups of the workshop held in Castellammare di Stabia. This relates to Figure 8 and focuses more on the strategy, proposing interventions to mitigate flooding through retention basins, and the creation of a Sarno Park (shown in green), which would also function as an ecological system and a means of adapting to risk.

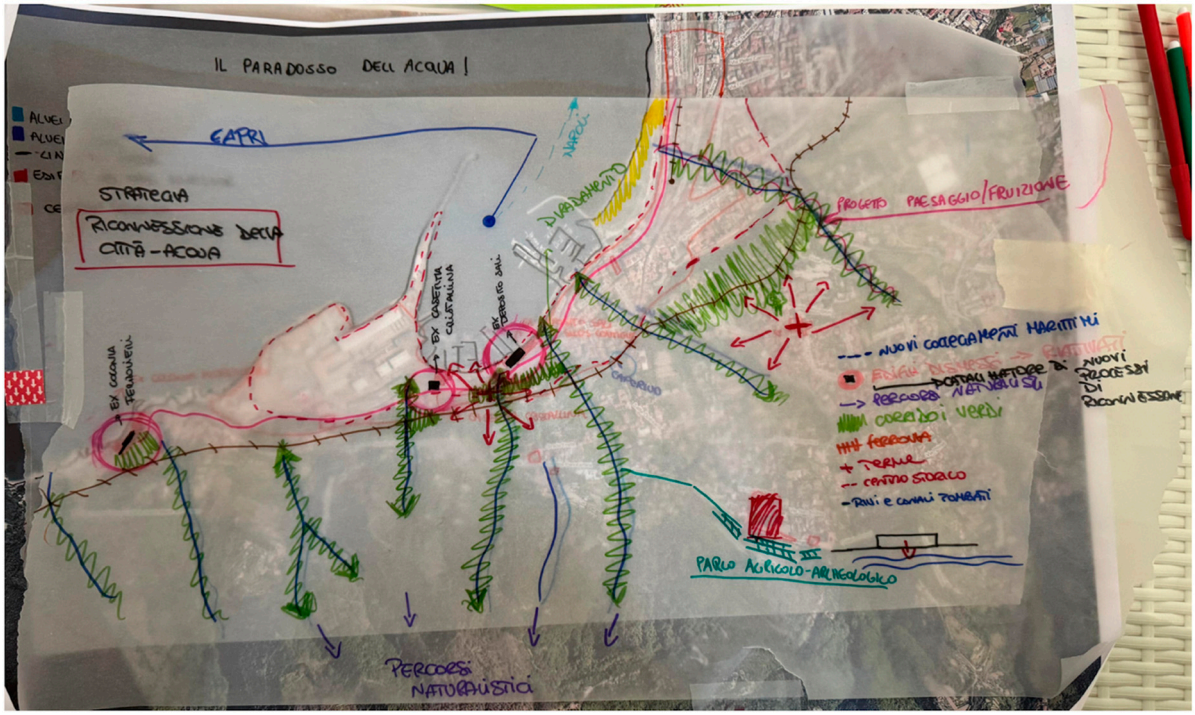


**Figure 11.** Third strategic adaptation scenario. Elaboration: Working groups of the workshop held in Castellammare di Stabia.

## 4. Discussion and Conclusions

Co-design workshops, according to the Urban Living Lab methodologies, are conceived in the MIRACLE and SPArTaCHus research projects as fertile arenas for dialogue and co-creation among different stakeholders, allowing experimentation with design tools and co-designed strategies at different scales, from landscape to neighborhood, producing possibly replicable models for other urban realities. They provide an informal setting in which different stakeholders can openly discuss the strengths and weaknesses of a given territory, fostering shared understanding and the generation of innovation. At the same time, Urban Living Labs present critical aspects, as they are often time-consuming both in terms of structuring materials in preparation for the workshops and ensuring effective stakeholder engagement, requiring significant coordination efforts and long-term commitment.

By bringing into dialogue expert knowledge, situated experiences, and students' contributions, the process of development of the co-design workshop held in Castellammare di Stabia demonstrates how quantitative evidence and experiential forms of knowing can be productively recomposed into shared spatial imaginaries and adaptive design propositions, towards a strategic vision aimed at coexistence with risk. Rather than producing fixed solutions, the outcomes highlight the value of care-oriented practices, reuse strategies, and the reactivation of collective memory as enabling conditions for long-term regenerative trajectories. In this sense, the research underscores the potential of co-design not only as a methodological device, but as a transformative practice capable of reframing risk, uncertainty, and marginality as drivers of collective learning and spatial re-articulation.

In managing multi-risk coastal territories, a vision that integrates multiple levels of analysis—ecological, social, and infrastructural—is needed. It is not merely about protecting vulnerable areas from water, but about considering water itself as a structuring element of the city and territory. Adaptive design strategies, green infrastructures, restoration of wetlands and natural watercourses, together with participatory governance models, can help transform water territories from fragile spaces into resilient systems capable of absorbing and modulating the impact of extreme events.

This requires rethinking the very concepts of risk and vulnerability. Risk is not an objective and univocal entity, but a socially constructed phenomenon, linked to perceptions, cultural practices, and institutional arrangements. Vulnerability, in turn, does not concern only the physical fragility of ecosystems or infrastructures, but also includes social, economic, and political dimensions. Investing in equity, social cohesion, and participation means reducing overall vulnerability and increasing collective capacity to face uncertainty. In this sense, every urban intervention, emergency plan, or infrastructural project should be evaluated not only based on technical effectiveness but also considering its ability to strengthen social justice and inclusion.

Viewing territory through a liquid perspective thus compels us to rethink traditional paradigms of urban planning and management. Water shows us how risk, vulnerability, and resilience are interconnected concepts, requiring integrated, flexible, and participatory approaches. Only through a vision that recognizes water as a vital resource, but also as a structuring and transformative element, will it be possible to build cities and territories capable of living with fluidity, uncertainty, and environmental change. In this process, technical innovation must go hand in hand with social justice, inclusion, and community participation, transforming fragilities into opportunities for regeneration and social cohesion. To reach this aim, this co-design workshop builds on the approach adopted by projects such as SPArTaCHus and MIRACLE, which work precisely on participation and perception, recognizing how crucial it is to involve communities in the construction of changing scenarios.

Risk perception maps become cognitive and design devices capable of revealing narratives and priorities often invisible to technical instruments.

The impacts of the co-design process can be observed across three interrelated levels—cognitive, operational, and political–social—contributing to a lasting transformation of planning and risk management practices.

At the cognitive level, co-design supports the development of an integrated interpretative framework for territorial multi-risk. By combining scientific data, spatial mappings, and situated knowledge emerging from local actors, the process enables a more comprehensive understanding of vulnerabilities and interdependencies. Comparative readings of different territorial contexts, including City–Port areas such as Castellammare di Stabia, allow for the identification and systematization of recurring risk patterns, informing adaptive approaches that can be transferred to other contexts.

At the operational level, co-design laboratories function as active devices for territorial regeneration. They trigger processes of reuse, remediation, and revalorization of public and post-industrial spaces, particularly in contexts characterized by spatial fragmentation and environmental stress. In Castellammare di Stabia, this approach has supported strategies aimed at re-establishing land–sea relationships, reactivating large disused areas, and redefining spaces of interaction between port and city through the development of new public and ecological infrastructures.

At the political and social level, the co-design process contributes to the reconfiguration of governance practices related to risk and climate adaptation. The co-production of knowledge with citizens, institutions, and stakeholders enhances environmental awareness and fosters more inclusive forms of participation in the definition of urban strategies. The outcomes of the laboratories—both in terms of recommendations and operational tools—are returned to public administrations as guidance for more integrated, adaptive, and socially grounded territorial policies.

Overall, the impacts of co-design extend beyond the implementation of individual projects, fostering a broader cultural shift in territorial management. By promoting relational, process-oriented, and adaptive planning approaches, co-design supports a transition

toward models of coexistence with risk that recognize territory as a dynamic system shaped by ecological, social, and spatial interdependencies.

While this study provides an initial empirical exploration of co-design as a methodological approach for managing multi-risk conditions in city–port coastal territories, several avenues for future research remain open. Further investigations could examine the long-term impact of co-design processes on governance structures and on the effective spatial implementation of adaptation strategies. Comparative research across different city–port contexts would help assess the transferability and scalability of the proposed framework, identifying context-specific variables and structural constraints. Additionally, longitudinal studies are needed to evaluate how co-designed adaptation scenarios evolve over time and whether they meaningfully influence planning instruments, institutional practices, and community resilience in the medium and long term.

**Supplementary Materials:** Further information on the MIRACLE research project can be downloaded at: https://www.anteferma.it/aob/index.php/antefermaopenbooks/catalog/book/MIR_DMO_o, accessed on 4 March 2026; and at: https://storymaps.arcgis.com/stories/f6f607ad8bf14521b3fd34b1a6d6b2d8, accessed on 4 March 2026. Further information on the SPArTaCHus research project can be downloaded at: https://www.docenti.unina.it/teacher/4c4942455241414d454e54414d4e544c42523833483636433132394 3/profile/research, accessed on 4 March 2026.

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