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Planning and the unthinkable: Inertia, imagination and climate change along the Upper Adriatic coast

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ABSTRACT

The paper addresses the study of coastal futures through the combination of scenario planning, cartographic visualization, and real estate valuation. When addressing and reflecting on the territorial impacts of climate change at the global scale, the real estate sector plays an inertial role in different contexts, and in particular in coastal ones most exposed to rising seas, as the Upper Adriatic area between the Gulf of Trieste and the Venice Lagoon. It is becoming increasingly clear that the reflection and possible gradual planning and programming by public bodies of a controlled retreat from these areas in view of the predicted rising seas finds an obstacle not only in the protection of areas and sites of inestimable cultural and naturalistic value, but also of real estate assets. The paper reports the development of a methodological framework that –through the integration of parcel-level real estate data, hydrological risk scenarios, and typologies of spatial vulnerability– could act as reference and trigger for public agencies, planners, or climate adaptation practitioners in programs of awareness-raising or exploratory modelling. Starting from the visualization of the plausible effects of flooding and sea level rise in the coming decades and reflecting on a possible scenario for the Upper Adriatic coastal area in 100 years from now, the paper engages with a potential epochal shift in the way of structuring and inhabiting this territory, considering not only timely issues as climate action and climate justice, but foreseeing a transition that takes into account also a strategic dimension as the economic one.

1. Introduction

The inertia that habit brings to our lives has a strong influence on the choices we make as individuals and communities in relation to the territories we live in as well as on the possibility to reshape or abandon them in relation to epochal challenges as climate change. If, on the one hand, our inability to think the unthinkable in terms of climate change is not linked to a lack of information, but to deeper cultural causes, to a real lack of imagination, on the other it finds precise reasons in the influence and role that the real estate sector plays in different contexts, and in particular in coastal ones most exposed to rising seas. Think of the economic value of assets threatened by rising seas in metropolitan locations such as New York City, Mumbai or Tokyo, but also of tourist realities that boomed in the 20th century, from Miami to the Mediterranean coast of Spain.

The research described in this paper aims at investigating the dialectic between the seemingly unthinkable radical future that climate change confronts us with and the nature of planning itself, deeply imbued with a tension towards the evolution of territories.

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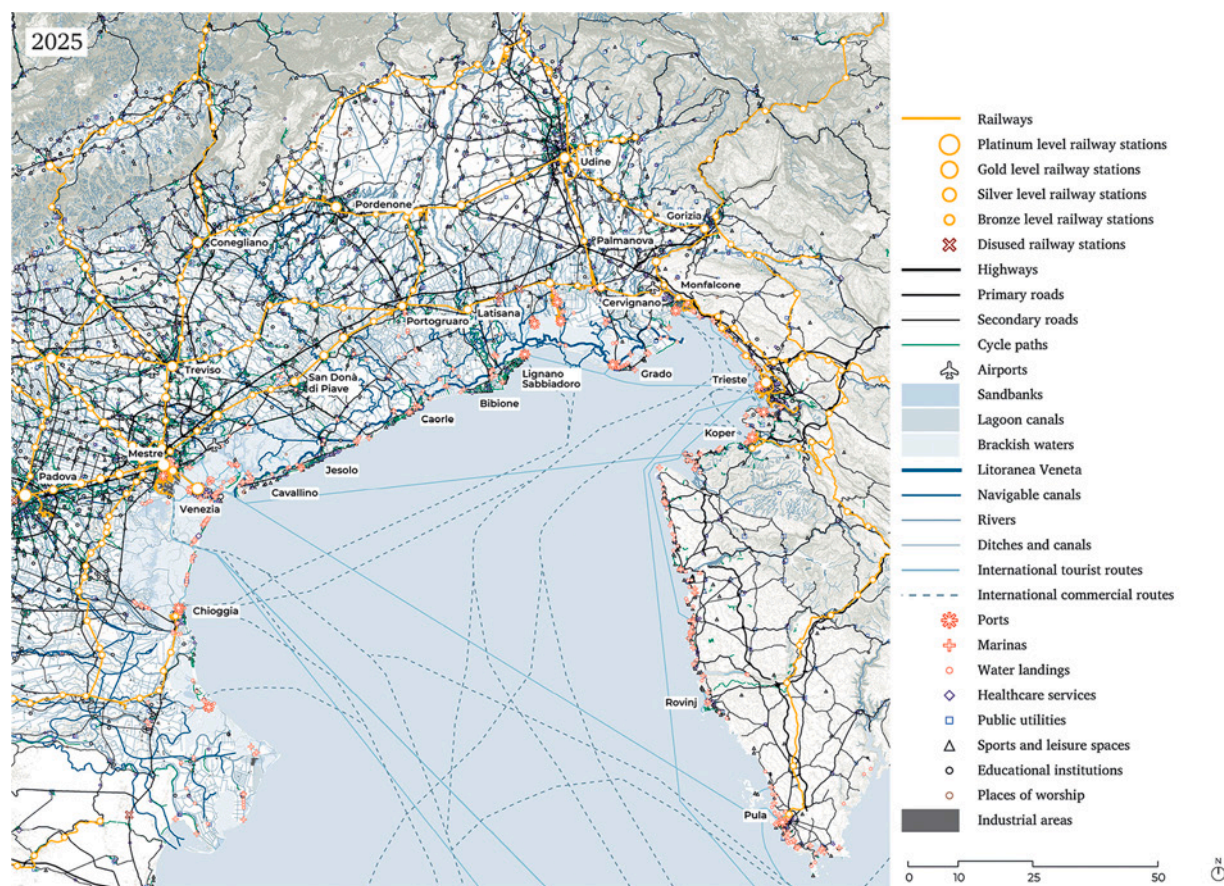


Fig. 1. Map of the Upper Adriatic region, including the main infrastructural networks and welfare facilities. The authors.

The research has also the ambition of reflecting over a wicked problem (Moser et al., 2012; Rittel & Webber, 1973; van den Ende et al., 2023): the tangled relationship between planning, collective good and life and private interests that span from the individual to the corporate dimension. This through a search for new methodologies that engage with the anthropological and existential dimension, to innovate ways to spark a collective conversation over topics and futures that are deemed unthinkable. How can we openly discuss subjects that existentially we tend to remove, that it seems cannot be faced?

The research focuses on a geographical context, the Upper Adriatic between the Gulf of Trieste and the Venice Lagoon, which is affected by forecasts of a substantial rise in the average sea level which potentially jeopardize cultural and environmental assets of immeasurable value—such as Venice and Aquileia—as well as huge real estate assets, as the ones concentrated in seaside destinations as Bibione, Jesolo and Lignano Sabbiadoro (Figs. 1-2).

Therefore, the challenge that we face is not only a possible spatial reorganisation in a territory largely characterized by demographic shrinkage, but also the potential disappearance of physical and immaterial cultural traces stratified over millennia. A reflection over a retreat towards less threatened areas is nearly absent from the public debate, while unlimited growth still seems to be the only dominant paradigm, posing itself as an obstacle towards the achievement of environmental, social and economic sustainability objectives. On a global scale, it is increasingly evident that reflecting on the question of how to deal with colossal damage following climate change is an urgent economic and political matter that will not be solved by market mechanisms and cannot be handled only by insurance companies. Consequently, there is a universal need to reflect on plausible territorial solidarity mechanisms, on how and where to plan a retreat in the face of rising waters that should be encouraged and gradually implemented.

The proposed approach, offering a cartographic visualisation of the forecasts regarding the hydraulic risk that climate change poses to real estate, aims not only to expand knowledge but also to inspire action. Scenario planning, engaging with complexity and uncertainty through the visualization of potential long-term losses, can indeed provide a key role for strategic foresight, public deliberation, risk communication, and policy prioritization for the Upper Adriatic region, particularly in adapting to major challenges as climate change and sea level rise (SLR).

In the second section of this paper are discussed the research main questions and operational tools, while in the third are made explicit the methodological steps and introduced visualisations of the potential consequences of climate change in territorial and subsequently real estate value terms. The fourth section critically examines the first outcomes of the regional mapping activity and

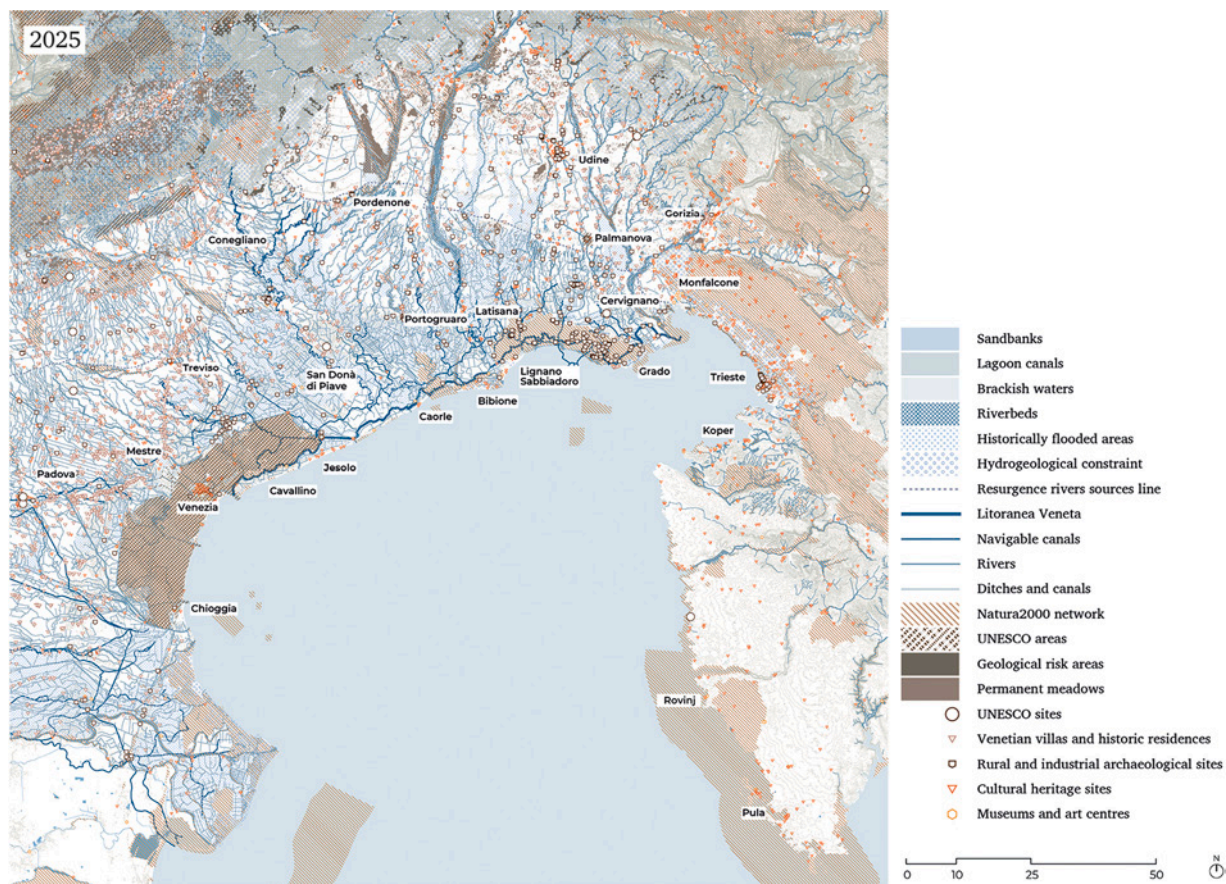


Fig. 2. Map of the Upper Adriatic region, including the main natural and cultural features. The authors.

links it to climate change-related global trends. The conclusion, starting from the visualisation of a possible scenario foreseen for the Upper Adriatic coastal territories in 100 years, reflects more at large on the challenges faced by a gradual planning and programming by public bodies of a possible controlled retreat from these areas in view of the predicted rising seas.

2. Visualising the loss

Habit, along with established and pervasive social constructs and cultural models, is a key factor in limiting our capacity to face and relate to the unthinkable. The first thinker to overtly challenge the dimension of the unthinkable has been Herman Kahn in the early 1960's, when in *Thinking about the unthinkable* (Kahn, 1962) he discussed scenarios related to nuclear warfare. While this menace is still timely, more recently Ghosh (2016) has linked the unthinkable to another epochal challenge, climate change. In his *The Great Derangement. Climate change and the unthinkable*. Ghosh investigated the role that literary forms and conventions play in defining the dominant narration and limiting our field of action in relation to the future effects of climate change. More than this, in his view the interplay between memories and imagination would turn both for individuals and political bodies unthinkable the possibility to abandon the places that represent our roots and provide us with a sense of stability. What Ghosh refers to is strongly linked to the intellectual legacy of Halbwachs (1941, 1950) and his belief that the collective memory of social groups literally deposits on sites, that there can be no such memory without a spatial linkage.

During the last three decades of globalization, the increasing influence of real estate interests and construction lobbies has pushed a seemingly endless growth in many coastal territories, regardless of evidence of risks for public safety – in the form of droughts, heat islands, storms, floods, landslides– both in the short and long term.

Yet, the sheer value of properties in the most at-risk areas would almost certainly decrease if owners were made attentive of probable future scenarios with systematic and widespread information campaigns. If still in the early 2000's a kind of 'scientific reticence' was inhibiting the communication of a threat of a potentially large SLR (Hansen, 2007), since then a growing number of studies, both at the Italian and international level (Carraro, 2008; Mechler et al., 2019; among the many), have addressed the issue of loss and damage and economic evaluation of the effects of climate change-related phenomena.

Along with academic studies, nonprofit research and technology organizations such as First Street Foundation (FSF) address the

relationship between flood risk –and climate change at large– in the U.S.A. and its impact on the real estate sector, which is considered worth over 45 trillion dollars. [First Street Foundation \(2023\)](#) underlined how “not only has flood risk across the United States changed significantly from what it once was, but it will continue to change in the near- and long-term future due to climate change. In some areas, the risk that was previously associated with a 1-in-100-year event may now occur as often as every 10 years in the most severe case, and in the next 30 years may be better characterized as an even more frequent event (1-in-5-year event for instance).”

In the European context, experiences as the Dutch “Safety First” project investigated how to engage with epochal changes in climate, land use, governance and socio-economic trends, and how these will impact flood safety. “Safety First” implemented a decision support system (DSS) relying on maps and images to make intuitively accessible the long-term goal of climate-proof Netherlands through a set of spatial adaptation responses. Awareness of the potential futures has been raised by systematically estimating water safety policy options in face of different patterns of climate and socio-economic scenarios for year 2100 in the frame of a workshop with stakeholders ([van Drunen et al. 2011](#), 494). Experiences as the “Safety First” one can be considered as ‘rehearsal space’ for climate futures, related with scenarios and scenario planning in a time of epochal challenges. Rehearsal intended as a way of coming to terms, of anticipating pressing socio-economic transformations and to imagine shared and effective alternatives to potentially disruptive futures ([Tyszczyk, 2021](#), 2).

The tangled conditions previously exposed concur to make the Upper Adriatic a significant setting for the investigation of possible futures through the development of scenarios, and especially through the means of visualisation. Visualisation that engages in the first instance with the potential effects –first of all floods and SLR– of climate change in this specific territory and in an evaluation of the economic value of the real estate assets menaced by the above-mentioned effects. While recent studies ([Badreldin et al., 2025](#)) have developed high-resolution multi-hazard exposure models and visualization addressing risk assessment and loss estimation in a specific location of the region, from a scientific point of view the innovative intent of this paper –starting from the theories related to scenario thinking– is to operate for the first time for the whole geographical context of the Upper Adriatic a cartographic visualization that crosses forecasts regarding the hydraulic risk brought by climate change with values related to real estate, serving as a reference framework for future transdisciplinary collaborations between researchers, policymakers, and stakeholders in coastal territories.

3. Methods and data

A simulation ([Loberto & Spuri, 2023](#)) developed in the frame of the *Banca d'Italia* –the Italian Central Bank– studies has calculated the impact of flood risk on real estate wealth in Italy. Building on their approach, this research resumes and refines Loreto and Spuri’s methodology to estimate the impact of flood risk on real estate wealth focusing on the Veneto and Friuli Venezia Giulia regions’ coastal areas. In addition to fluvial and pluvial flood scenarios, this study integrates the effects of SLR, considering a total loss of real estate value for properties located below the projected sea level thresholds.

Therefore, this research proposes a cartographic method that integrates data on hydraulic risk and SLR with residential property values, on a parcel-by-parcel basis, for the Upper Adriatic coastal strip. The objective is to produce a spatial representation of the vulnerabilities and environmental and economic challenges expected under two risk scenarios: 30-years and 100-years.

I. Sources and data used

- a) 2011 parcels: ISTAT (*Istituto Nazionale di Statistica*, National Statistical Institute) census plots ([ISTAT, 2011](#)) represent the minimum geographic unit of analysis. They contain data on the floor area of residential buildings, which are useful for estimating economic values at risk;
- b) OMI property values: we used data from OMI (*Osservatorio del Mercato Immobiliare*, Real Estate Market Observatory) from *Agenzia delle Entrate* (Internal Revenue Service). Each zone is associated with an average €/m² value for residential properties. Since the boundaries of OMI zones ([OMI, 2025](#)) and ISTAT parcels do not coincide, we applied a normalization factor based on the percentage of overlap between the two geometries;
- c) ISPRA hydraulic hazard scenarios: the flooding scenarios derive from the ISPRA (*Istituto Superiore per la Protezione e la Ricerca Ambientale*, Institute for Environmental Protection and Research) database ([ISPRA, 2021](#)). We considered two levels:
 - high probability (return time 30 years)
 - medium probability (return time 100 years)
- d) SLR scenario and Digital Terrain Model (DTM): in terms of SLR, we referred to recent Intergovernmental Panel on Climate Change (IPCC) scenarios ([IPCC, 2023](#)). The reference surface was obtained through the TINITALY ([Tarquini et al., 2023](#)) Digital Terrain Model (10 m resolution).

I. Processing procedure

- a) Step 1 - Calculation of real estate value per parcel: all ISTAT parcels located below 5 m above mean sea level (AMSL) –considered as low elevation coastal zones (LECZs)– were selected. While early studies defined LECZs as areas below 10 meters AMSL, since measurements below this value could not be considered globally trustworthy ([McGranahan et al., 2007](#), 22), recent studies relying on more sophisticated technology define as higher-risk coastal areas the ones below 5 AMSL ([MacManus et al., 2021](#), 5765). Each

Table 1

Potential economic loss calculated in euros for the Upper Adriatic coastal territories related to the three out of four ecologies which will be affected by floodings in relation to the 30- and 100-years scenarios.

Ecology	Potential economic loss – ISPRA high frequency scenario – SLR 30 cm (year 2055)	Potential economic loss – ISPRA medium frequency scenario – SLR 100 cm (year 2125)
Ecology 1	19.397.272.197 €	26.337.127.463 €
Ecology 2	6.529.020.655 €	3.982.624.650 €
Ecology 4	12.388.317.881 €	14.330.015.839 €

The authors.

was assigned an economic value calculated multiplying the residential area by the normalized average OMI value. The result of this operation is a database in which each parcel has a record with its total real estate value;

- b) Step 2 - Intersection with risk scenarios: we overlaid the ISTAT/OMI database to ISPRA hydraulic risk scenarios to assign each parcel an exposure condition;
- c) Step 3 - Identification of areas subject to SLR: starting from the TINITALY DTM (10 m resolution), we identified the parcels affected by two different SLR scenarios:

- + 30 cm (scenario for year 2055 combined with ISPRA high probability)
- + 100 cm (scenario for year 2125 combined with medium ISPRA probability).

The parcels were classified according to their elevation relative to the predicted SLR, distinguishing those potentially submerged from those not involved in each scenario. It is important to underline how these are potential flooding areas based on the sheer parcels' height above or below the sea level, since the possible exact sea water entry points have not been precisely calculated.

I. Classification into four operational ecologies:

Following the previous operations, we identified four operational ecologies. Ecologies that conceptually follow the definition given by [Banham \(1971\)](#) in his groundbreaking study on Los Angeles. For each of the two scenarios (2055 - SLR +30 cm; 2125 - SLR +100 cm), the following interpretive grid was applied:

- a. Ecology 1 - Floodlands: these are the areas that will be very often or permanently submerged. These same areas could be potentially adapted through radical and disruptive technological, design, and regulatory measures. In the summary table ([Table 1](#)), their real estate value is considered entirely lost.
- b. Ecology 2 - Amphibious belt: these are territories subject to recurrent risk but potentially adaptable through already consolidated strategies. The lost value ([Table 1](#)) of the amphibious zone is the total value of the parcel multiplied by the percentage of the parcel inundated. The economic value of this ecology is higher in the 30-years scenario than in the 100-years one because as the sea level will rise, many amphibious areas will be included into Ecology 1, becoming unrecoverable. In fact, the classification is exclusive and hierarchical: each particle is assigned to the most severe ecology compatible with its condition.
- c. Ecology 3 - Dry zone: territories not affected by the floodings and by SLR, but potentially subject to climate-related migration and speculative pressure.
- d. Ecology 4 - Islands of concentrated value: areas deemed to be submerged but characterized by very high cultural or real estate value. These are ecologies of exception, where memory, symbolic capital, and ground rent are concentrated and where selective defensive interventions can plausibly be expected and implemented. To identify parcels belonging to Ecology 4, an objective criterion was adopted based on their inclusion on the UNESCO World Heritage Sites List and the economic value of the estimated real estate loss. Specifically, submerged parcels with an economic loss greater than 150 €/m² were included in this category. This threshold parameter was defined based on the statistical distribution of OMI values in the Upper Adriatic coastal territory, in order to isolate real estate cores with high symbolic, tourist or historical value - such as the center of Venice, Jesolo, some areas of Grado or Lignano Sabbiadoro. The use of this threshold made it possible to: separate the simple quantitative losses (classified in Ecology 1) from the strategic and rent-intensive ones; highlight the places where collective memory, real estate capital and symbolic capital are concentrated; foresee possible selective defensive policies. Consequently, in the summary table ([Table 1](#)) Ecology 4 increases in value in the SLR scenario at 100 cm because the greater number of submerged particles exceeds the economic threshold for selection.

II. Results

The following maps ([Figs. 3-4](#)) show the localization of the four ecologies in relation respectively to the 30-years and 100-years scenarios.

4. Discussion

The initial outcome of the research described in this paper resulted for the first time in a cartographic visualization that quantifies

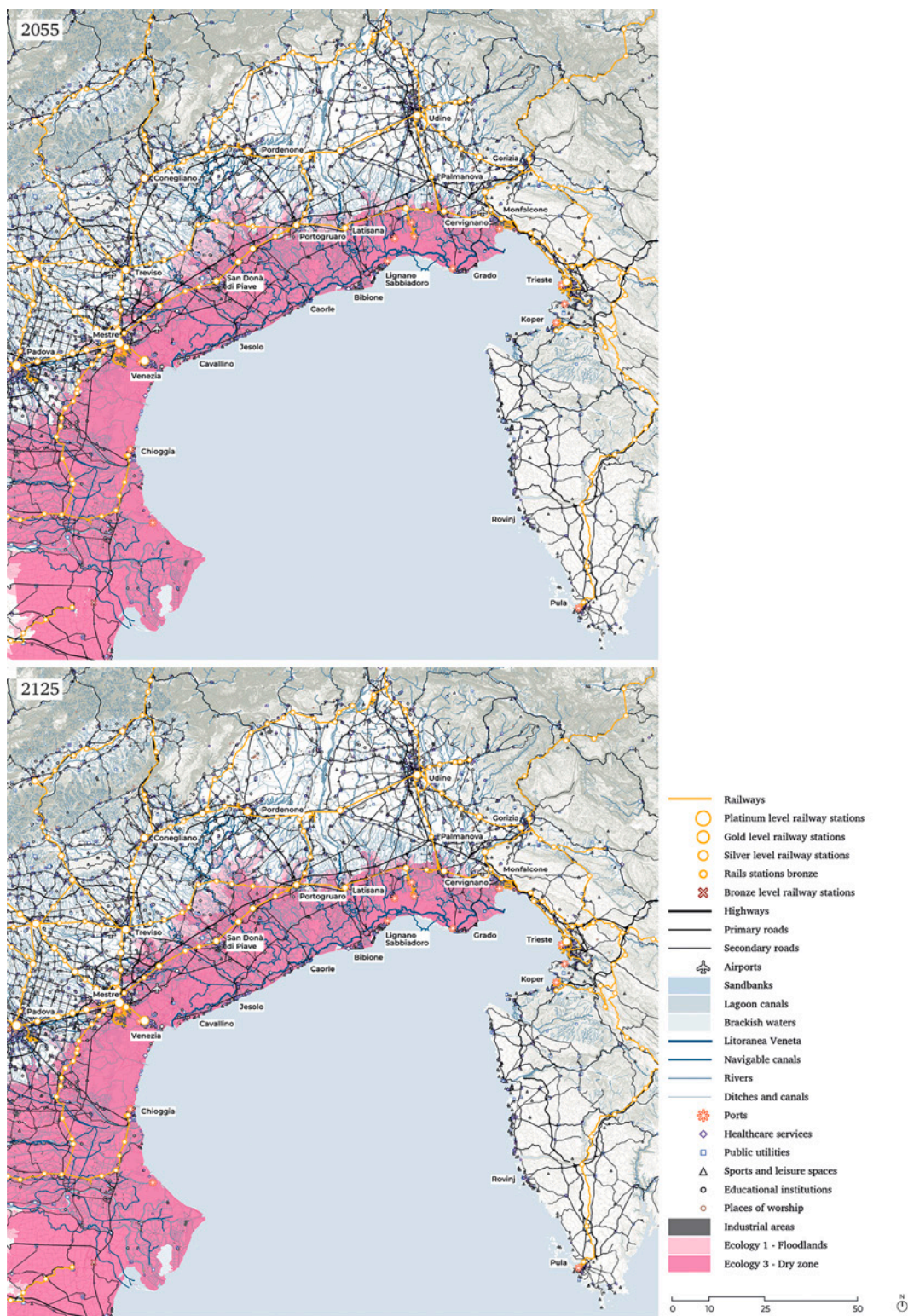


Fig. 3. Maps of the Upper Adriatic region showing how the main infrastructural networks and welfare facilities will be impacted by potential floods and SLR in the 30- and 100-years scenarios. The authors.

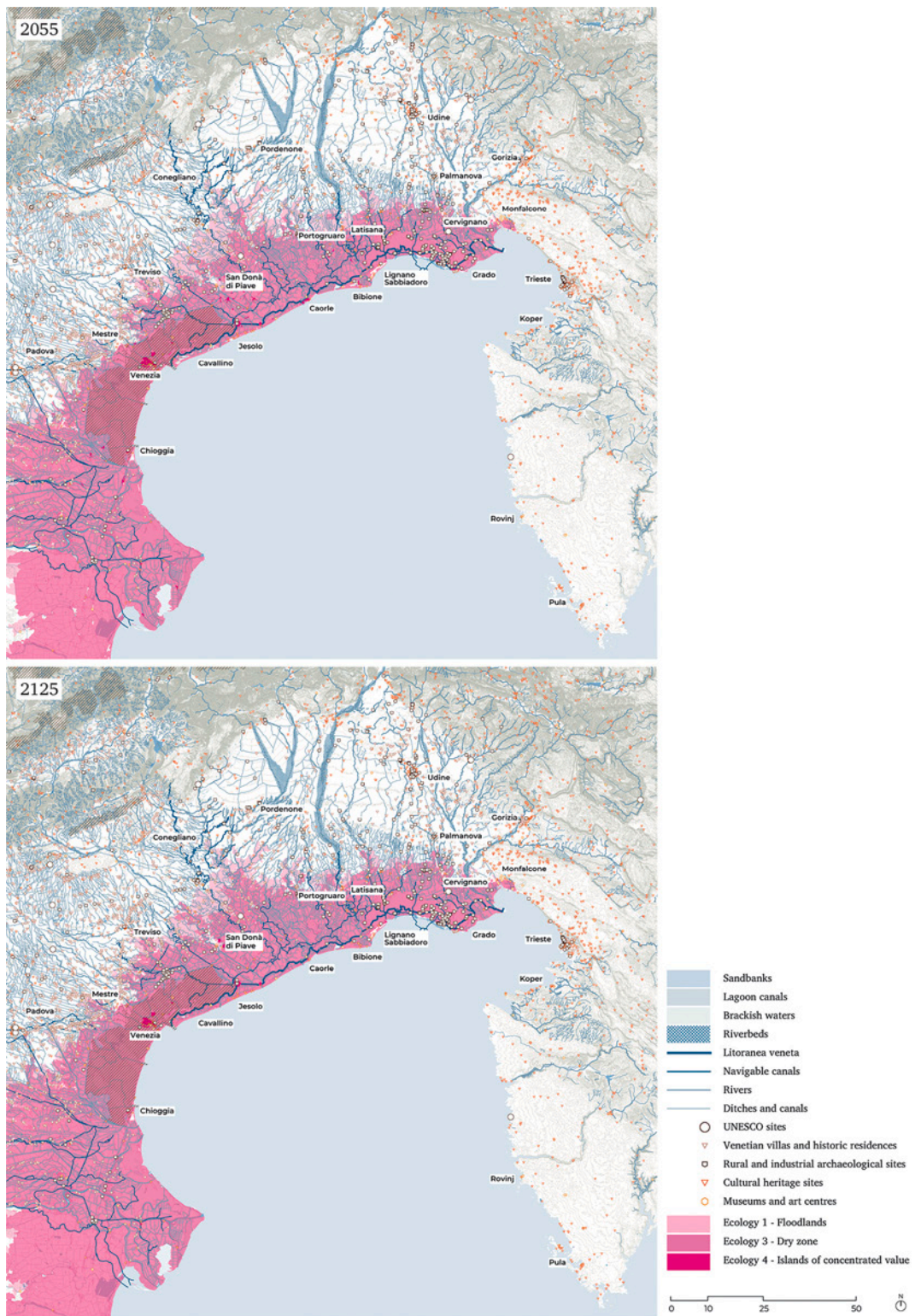


Fig. 4. Maps of the Upper Adriatic region showing it will be impacted by potential floods and SLR in the 30- and 100-years scenarios, highlighting the islands of concentrated value in terms of real estate and heritage sites. The authors.

the value of real estate assets potentially exposed to risk brought by extreme flooding phenomena related to climate change and SLR in the coastal territories that face the Upper Adriatic. A research approach that intertwines theoretical issues related to scenario thinking with an operative activity of measurement that resulted in data synthesis and representation.

The potential total loss in real estate terms for the coastal areas of Veneto and Friuli Venezia Giulia regions (Table 1) over 30 years –around 38 billion euros– and 100 years –around 44 billion euros– is particularly significant when compared to the total 2022 GDP of the regions, which amounted to more than 223 billion euros – 180,6 billions for Veneto and 43 billions for Friuli Venezia Giulia respectively (Regione Friuli & Giulia, 2024; Regione Veneto, 2024).

The magnitude of the numbers calculated and of the scenarios opened might bring to mind a systemic financial collapse as the one described for now only in novels such as Markley (2023) or Robinson's *The ministry for the future*, where Jurgen, a Swiss insurance expert, takes these notes during an internal meeting following the publication of an alarming climate change report:

Insurance companies in a panic at last year's reports. Pay-outs at about one hundred billion USD a year now. going higher fast, as in hockey stick graph. Insurance companies insured by re-insurance. These now holding short end of stick (tall end of stick?). Can't charge premiums high enough to cover pay-outs, nor could anyone afford to pay that much. Lack of predictability means re-insurance companies simply refusing to cover environmental catastrophes, the way they don't insure war or political unrest etc. So, end of insurance, basically. Everyone hanging out there uninsured. Governments therefore payer of last resort, but most governments already deep in debt to finance, meaning also re-insurance companies. Nothing left to give without endangering belief in money. Entire system therefore on brink of collapse (Robinson, 2020: 54).

While these lines are just a work of fiction, their likelihood is supported by studies that have shown how more frequent and extensive floods will impact the landscape and livability of coastal communities way before SLR will permanently submerge coastal lands (Dahl et al., 2017) and by official statistics as the one of US National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information that reported how during 2023 were recorded 28 separate billion-dollar weather and climate disaster events, compared to three in 1980 (NOAA, 2024). The devastation brought by natural phenomena of increasing magnitude, as hurricane Milton that hit Florida in October 2024, seems to confirm and reinforce this trend, making explicit the impact on the real estate assets of the increased frequency of extreme events and flooding.

As Ghosh (2016: 10) underlined, the dominant global culture deriving from a legacy of imperialism and capitalism that has shaped the world “generates desires that are among the principal drivers of the carbon economy”. If in the past the coastal ones were *territoires du vide* (Corbin, 1988), perceived as hostile and dangerous places, since the mid 19th century proximity to water has become increasingly desirable –up to turning into a status symbol– across the globe. In turn, real estate development along the coast has universally become not only a sign of wealth and power, but also a statement of conquest and control over unstable environments.

Although well-known at least since the mid 20th century, climate change has become a politically visible issue only since the 1980s. To the early 1990s dates the establishment of the United Nations Framework Convention on Climate Change (UNFCCC) and the proposal by the Alliance of Small Island States (AOSIS) to provide compensation and insurance for losses due to SLR. In a recent report, the IPCC further underlined how “there is increased evidence that climate hazards associated with extreme events and variability act as direct drivers of involuntary migration and displacement and as indirect drivers through deteriorating climate-sensitive livelihoods (high confidence). Most climate-related displacement and migration occur within national boundaries, with international movements occurring primarily between countries with contiguous borders” (IPCC, 2022: 64).

If on one side there is a growing awareness by public bodies of the need to reflect on a gradual planning and programming of a controlled retreat in view of the predicted rising seas, these activities seem to find an apparently insurmountable obstacle not only in the struggle to protect areas and sites of inestimable cultural and high naturalistic value, but also in the interest of tourist and building lobbies, individuals and families towards defending their real estate assets.

Several research experiences in the past years have tried to overcome this inertia (Smith et al., 2011), underlining the groundbreaking role of rapidly urbanising coastal locations as prototypes of cities that will face epochal challenges related to infrastructure provision and enhancement of social capital, potentially encountering in the near or more remote future scarcity of potable water supply, increased intensity of flood events, storm surges and rising sea levels, that will affect a wide range of issues, from welfare services provision to biodiversity.

It is therefore increasingly evident how we need to conceive, test and implement tools and methods (Vogel & O'Brien, 2022) to stress existing worldviews and perspectives and to question consolidated patterns, putting in motion transformations that embrace both individual and collective capacities.

As a possible way out to this condition of impasse, the intent of this research is not to depict a dystopian narrative. As Kahn (2010) underlined in his *Climatopolis: How Our Cities Will Thrive in the Hotter Future*, the future of cities and territories will be related not only to natural advantages and disadvantages, to their good or poor position to reduce the risks associated with climate change, but also to the competition among them to accomplish fundamental shifts in their structure and functioning. Mitigation first and adaptation later will indeed require many costly investments and ultimately may prove to be insufficient to solve the challenges caused by global climate change. The governing institutions might allocate large resources to relocate settlements or, alternatively, make an attempt to implement mitigation measures that require, at least in the short term, fewer investments. Yet, mitigation and adaptation might prove more effective if carefully conceived and planned, engaging with the unfolding of a series of scenarios that could be collectively and overtly discussed and serve as basis for more informed decisions by legislators, planners and citizens at large. Decisions that engage not only with timely issues as sustainability, climate action and climate justice, but that can foresee a path towards a set of spatiotemporal transitions that consider also strategic and essential dimensions as the economic one.

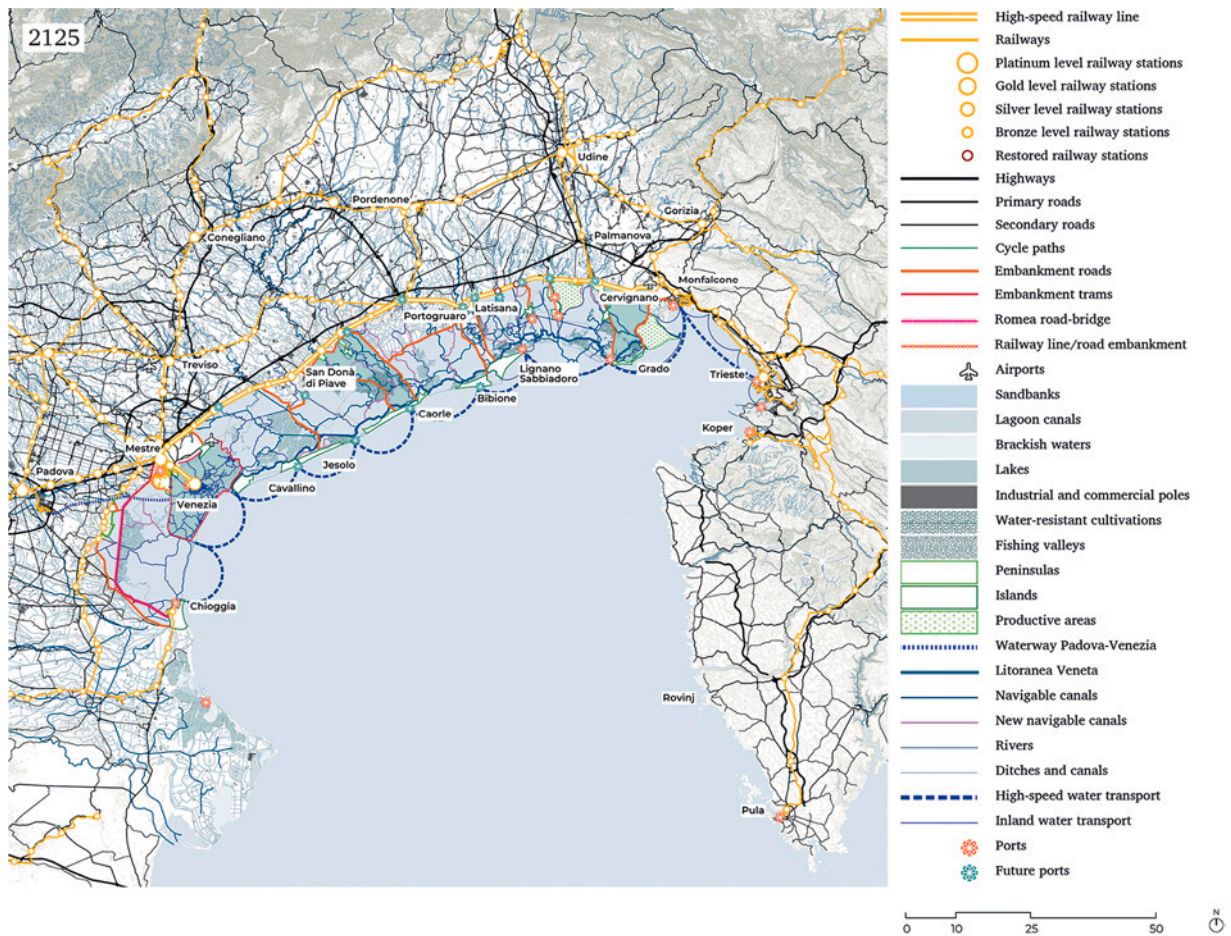


Fig. 5. A visualisation of the Upper Adriatic region showing the proposed reconfiguration of the coastal area from the Venice lagoon to the mouth of Timavo River near Monfalcone in 100 years. The authors.

5. Conclusion

While looking at a specific context –the one of the Italian Upper Adriatic coastal area– the research exposed in this paper has the ambition of addressing a cross-scalar futuring, with the awareness that regardless specific geographical, political and socio-economic conditions, it is possible to recognize at the global scale recurrent patterns of coastal exploitation, so that an in-depth local-oriented reflection and set of proposals might acquire global significance.

The four ecologies previously described, and in particular their categorization into “amphibious belts”, “zones of concentrated value”, and “dry zones”, may suggest and support differentiated strategies for managed retreat, selective protection, or anticipatory land-use planning. With further development, this approach could contribute to the co-design of adaptive pathways, especially in regions where climate-related relocation or spatial reconfiguration remains politically and socially sensitive. Therefore, relying on the territorial readings and economic estimations previously exposed, we reflected on and visualized in spatial terms (Fig. 5) how a gradual planning and programming of a controlled retreat by public institutions in the Italian Upper Adriatic region area might reconfigure this stretch of coastal areas. We intend this effort in visualization as a basis to facilitate discussion and raise a set of pressing questions, ranging from the nature of processes underlying and the knowledge generated by scenario planning and their capacity to inform and catalyse plans and public policies to the estimation of potential obstacles in the implementation and resources required to initiate such massive transformations.

As radical as it may seem, given the proposed reconfiguration and controlled flooding of large parts of the territories reclaimed for agricultural purposes in the first half of the 20th century, the scenario we visualized for year 2125 is not utopian. In fact, it takes into consideration not only the preservation of cultural heritage of global meaning –such as the UNESCO sites of Venice and its lagoon and Aquileia– and the management of polluted brownfields –such as the ones in the areas of Porto Marghera in Veneto and Torviscosa in Friuli Venezia Giulia, but also the predictable inertia that the islands of concentrated real estate value will oppose to a planned adaptation. These islands, that correspond to touristic destinations as Grado, Lignano Sabbiadoro, Bibione and Jesolo, could be mainly



Fig. 6. Map depicting the lagoons and wetlands located between Ravenna and Trieste (1434). State Archive of Venice.

identified as seaside pockets of land, kept dry by a reconfigured infrastructural system. Sea-side edges of an amphibious strip approximately 30 kilometres deep –from the coast to the Venice-Trieste railway line– where ancient and innovative productive practices, from fishing valleys to saline water-resistant cultivations, are hosted.

The infrastructures that run parallel to the coast, and particularly the Venice-Trieste railway line, would become the edge between the amphibious strip and the dry land. This main transportation backbone –considering also the A4 highway– would be doubled along the coast implementing a new maritime route serving residents and tourists, offering a valuable alternative to terrestrial travel especially in the high season and providing a safe option in case of fires –as the ones that devastated the Karst between Trieste and Monfalcone in 2022– and other climate-related emergencies.

It is important to underline how such a dramatic territorial reconfiguration of this area would imply not only massive infrastructural works, but also the radical mutation of contemporary demographic and economic patterns. As a matter of fact, town and villages –especially in the Friuli Venezia Giulia lowlands– that today suffer of a significant decrease in population and of a rather stagnant economy would find themselves to benefit from the new *status quo*, being strategically positioned along the edge of the drylands and of the reconfigured amphibious strip. An amphibious strip acting on the threshold between memory and future, a reminiscence and new embodiment of the sequence of lagoons that in the past centuries punctuated the Upper Adriatic from Ravenna to Trieste (Fig. 6), reminding us how many events and phenomena are as a matter of fact of cyclical nature and how mankind has constantly reconfigured territories to adapt them to new needs and challenges.

The coastal areas of Northeastern Italy testify of these processes with rare historical depth and precision –thanks especially to the myriads of documents and maps hosted in the State Archives of Venice and Trieste– and prove once more their paradigmatic role and global relevance in the reflection over the epochal challenges that climate change is facing us with.

CRediT authorship contribution statement

Ludovico Centis: Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Alvise Pagnacco:** Software, Methodology, Investigation, Data curation. **Federico Vascotto:** Visualization, Data curation.

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Declaration of Competing Interest

The authors declare that they have no competing financial interests or personal relationships that could influence the work reported in this paper.

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Data availability

Data will be made available on request.

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