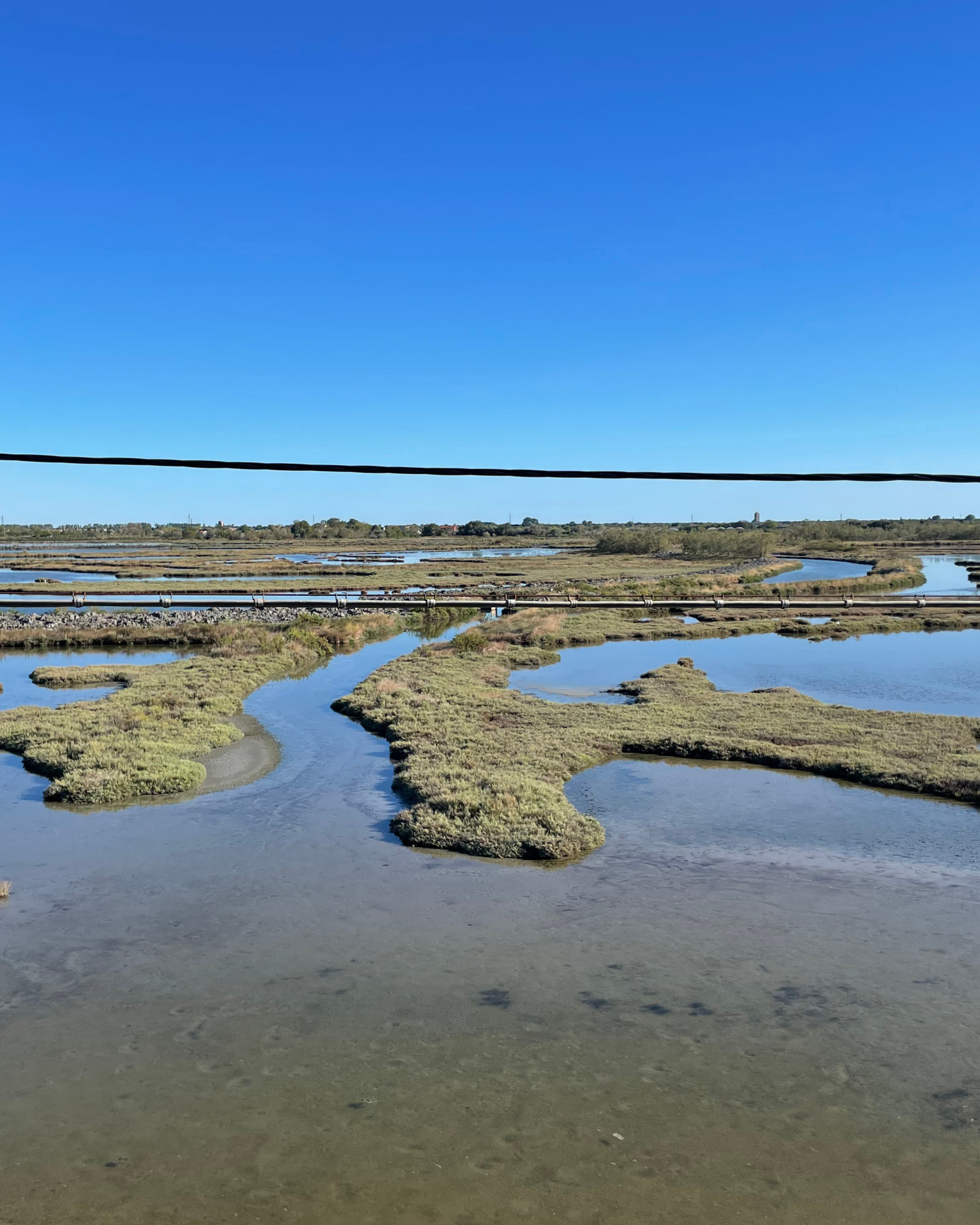


Blue Papers 2025 (Vol. 4 No. 2), pp. 91–100
10.58981/bluepapers.2025.2.07
Received 19.03.2024; Received in revised form 23.10.2025; Accepted 17.11.2025

Exploring the Venetian Lagoon: Toward A New Culture of Environmental Heritage

Maria Chiara Tosi, Luca Velo, Michela Pace & Mette Juhl Jessen

Abstract
Venice and its Lagoon, a UNESCO World Heritage property, epitomizes the challenges of water-related climate change. Historically, it has been an exemplary site of human life in close interaction with water. Today, with rising sea levels and intensifying storm surges, it offers a powerful case for developing cohesive, inclusive, and adaptive water management. The lessons emerging from Venice have relevance to other UNESCO heritage sites. In all its complexity, Venice underscores the need to recognize water's dynamic nature in governance and to avoid reliance on rigid, fail-safe solutions, instead emphasizing collaborative actions supported by political commitment. This article reframes the heritage of Venice and its lagoon as a dynamic, amphibious process, and argues that collaborative, adaptive governance is the only viable path to a sustainable future.

Policy Recommendations

- Recognize the dynamic practices and processes as central to the heritage of Venice and its Lagoon.
- Establish unified, adaptive governance models at the metropolitan level to harmonize overlapping regulatory bodies, align projects, and integrate ecological, economic and cultural strategies.
- Prioritize collaborative approaches in developing and implementing a management plan for the lagoon.
- Integrate approaches and visions across scales, from metropolitan management plans to local community initiatives.

KEYWORDS

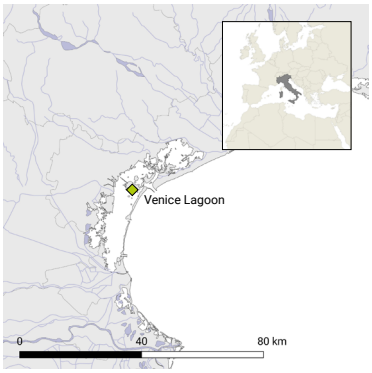
UNESCO World Heritage
amphibious
dynamic
collaborative
contradictory

WATER ICONS

CLIMATE

A B **C** D E

Cfa: Humid subtropical climate



< Fig. 1 New implementation of the salt marshes quay in front of the northern lagoon, Venice (Source: Luca Velo, 2021).

Introduction

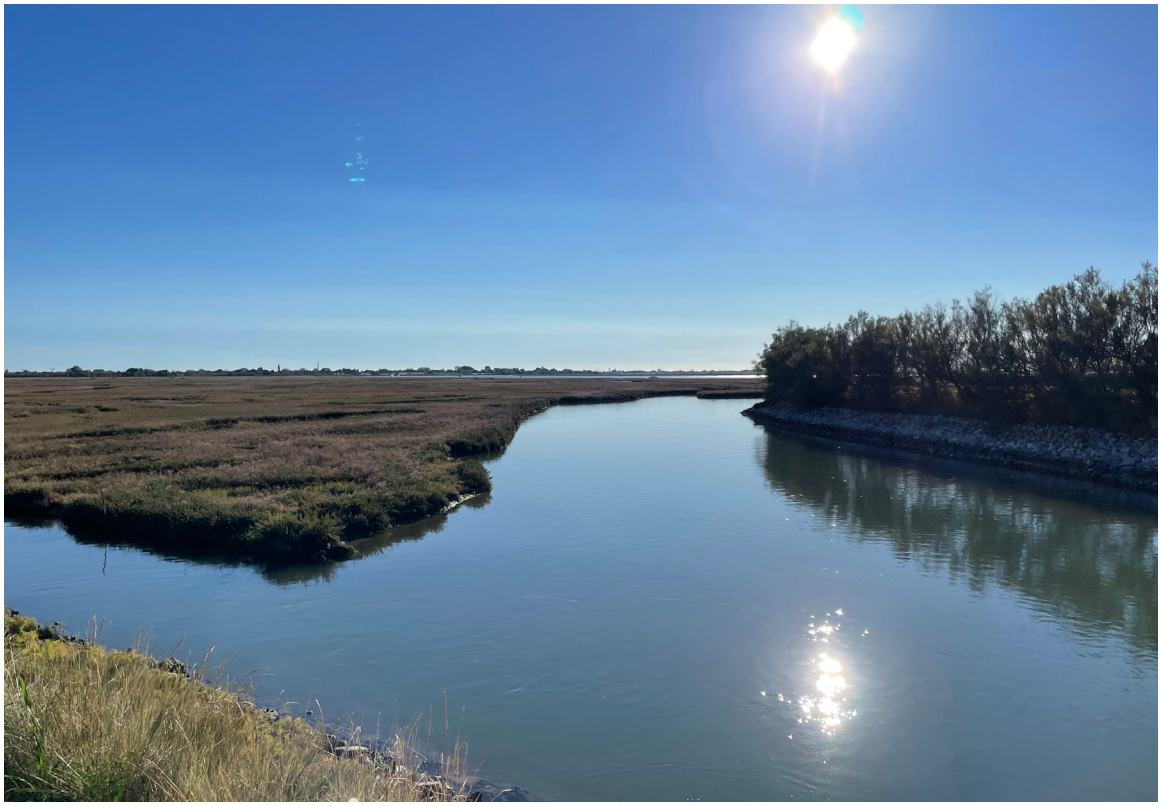
Venice and its lagoon exist in constant interaction with tides, sediments and storms. Climate change is intensifying and challenging these dynamics, making long-term adaptive planning urgent (IPCC 2023). The daily movement of water through canals, marshes and settlements is not only a physical process but also fundamental to life in Venice. As a UNESCO World Heritage property, "Venice and its Lagoon" challenges us to rethink heritage as more than monuments and buildings. Heritage here also includes practices, processes and relationships that adapt to shifting conditions (Riesto et al. 2022). The diverse visions, aspirations and projects related to heritage interpretation prompts reflection on what constitutes heritage – and for whom. This article examines the case of Venice and suggests how landscape and ecological systems can guide an approach to heritage that allows for uncertainty and change.

Defining the heritage of Venice and its lagoon is not straightforward. The lagoon is an amphibious environment where land and water interlace, and its value has long been contested. Multiple actors – including UNESCO, the EU, governments, local administrations, research centers, civic committees, fishers' cooperatives and cultural groups – advance competing visions. They focus on safeguarding monuments, protecting ecosystems, promoting tourism or sustaining everyday life, illustrating how narratives of memory, identity, authenticity and legacy are inherently flexible, shifting according to those who construct them and the agendas they pursue (Harvey 2001; Smith 2006). These terms have been mobilized across different contexts and periods to endorse understandings of heritage and to legitimize specific sets of values (Howard and Graham 2008). In addition, non-human actors – including tides, salt marsh vegetation and migratory birds – also shape the lagoon, but their roles are often overlooked. In this context, some local actors, such as fishing valleys, hunting associations and nature tourism promoters, play an ambiguous role: They help maintain a certain environmental balance, but deny the autonomy and agency of non-human species, treating them as profit tools. Only a few of them, such as Lipu Venezia, WWF Veneto and Laguna Viva, promote a cohabitant approach that foregrounds the ecological rights of non-human actors.

Heritage debates in Venice encompass built structures, canals, mudflats and islands, as well as the struggles, strategies and narratives of many actors. In the context of climate change, heritage becomes an arena in which questions of preservation, adaptation, ecology and the right to inhabit are negotiated, and sometimes contested.

Managing the Dynamic Environment of Venice and its Lagoon

From its origins, Venice's history has been tied to the delicate task of maintaining the lagoon's balance, a challenge that has sparked debate for centuries. The lagoon's distinctive environment shaped Venetian institutions early on, enabling the city to manage water with quite remarkable effectiveness. The Magistrato alle Acque, established in the early sixteenth century, monitored lagoon dynamics, coordinated decisions and implemented interventions such as sea defenses and river diversions (Grillo 1989; Bevilacqua 1995; D'Alpaos 2010; Bondesan and Furlanetto 2012). While today attention focuses on water levels, historically, the central concern was the balance of sediment dynamics. A well-known sixteenth-century dispute between Cristoforo Sabbadino, a hydrau-



^ Fig. 2 Canal routes, the lagoon and salt marshes (Source: Luca Velo, 2021).

lic engineer of the Magistrato alle Acque, and Alvise Cornaro, a humanist intellectual and landowner, illustrates these debates. Venice's brackish setting, where water and sediment entered from both sea and rivers, posed the acute problem of silting, particularly from the Brenta River. Both Sabbadino and Cornaro advocated diverting the Brenta outside the lagoon to reduce sedimentation. Their visions diverged however: Cornaro proposed sealing the lagoon off more firmly from the Adriatic, whereas Sabbadino argued for continued canal excavation and outward urban expansion toward the sea. In essence, the dispute contrasted a strategy of insulating Venice from natural dynamics with one of actively working with them (Tosi 2019; Bevilacqua 1995).

By the mid-twentieth century, new pressures tied to economic, industrial and residential growth emerged, clashing with the need to acknowledge the lagoon ecosystem's fragility. Industrial expansion at Porto Marghera, the excavation of shipping channels and large-scale land reclamation disrupted lagoon dynamics, accelerating the erosion of both natural and built environments (Montanelli 1969). The 1966 flood intensified concerns about flood hazards and sparked decades of debate over preservation and adaptation. The MoSE barriers, first conceived in the 1960s in the wake of the flood and only recently completed, revive the sixteenth-century question of whether Venice should be sealed off from natural dynamics or adapt to them. The MoSE project (Modulo Sper-

imentale Elettromeccanico) is a large-scale system of mobile barriers designed to protect the Venetian Lagoon from flooding caused by high tides (*acqua alta*). While the barriers promise security, they also raise concerns about ecological disruption (Benzoni and Scaglione 2020). Their limitations are increasingly evident: Barrier closures disrupt port operations, requiring ships to wait outside the lagoon and resulting in economic losses. Repeated closures also hinder the natural exchange of fresh and salt water, threatening the lagoon's ecological integrity (Umgiesser et al. 2004).

Since the 1980s, the Venetian Lagoon has been embedded in global heritage frameworks. UNESCO recognition brought cultural prestige and economic value, offering opportunities for both cultural and economic enhancement.[1] Yet climate change has highlighted how contested heritage can be. The status of environmental resources as common heritage has become a key battleground in the ecological transition, underscoring the importance of heritage within a multi-species safeguarding perspective (Celermajer et al. 2021). This has led to various mitigation and adaptation measures. For example, the protective measures taken by the EU Project LIFE VIMINE 2017-2020 (https://cigno.atlantedellalaguna.it/maps/1611/view) do not therefore appear to have disturbed the natural dynamics of the salt marsh vegetation, while fostering economic potential and social cooperation. At the same time, speculative practices – such as the privatization of some islands, and their conversion into luxury facilities including accommodations and restaurants – reveal how easily heritage can be turned into an extractive resource, generating new conflicts over ownership and accessibility.

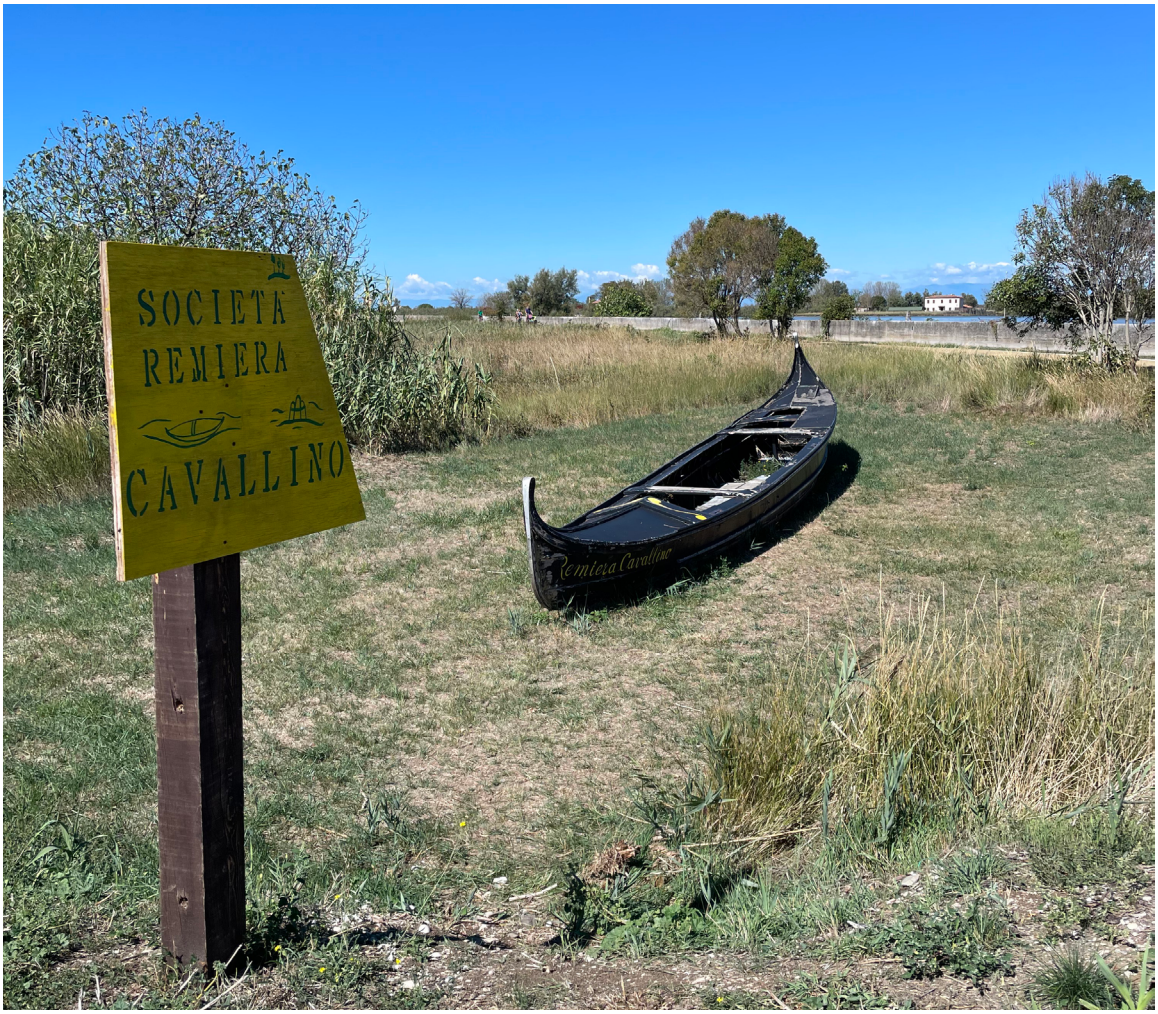
Contemporary Governance Challenges

Since its founding in the fifth century, Venice has a long history of balancing natural and human forces that frames today's challenges. Venice still depends on managing the delicate interplay of sea, land and sediment, but climate change makes this more difficult. Rising seas, more frequent storm surges and the loss of biodiversity place new demands on governance.

Despite extensive research and reflection on management, restoration and preservation over the past few decades (Tosi et al. 2023), the lagoon paradoxically suffers from a prolonged phase of administrative inertia marked by delays and contradictions. This stagnation has been exacerbated by the scandal and protracted construction of the MoSE system, which has fueled unmet expectations and public indifference, often shaped by overly simplistic and culturally inadequate positions (D'Alpaos 2019). The MoSE project monopolized both financial resources and political attention. Initiatives such as the lagoon's Morphological Plan (Umgiesser et al. 2004) – which identified as priorities the reinforcement of port channels and other lagoon structures using shapes and materials not permitted under current regulations – failed to gain approval from the Italian Ministry of the Environment. This decision reaffirmed that environmental rebalancing remains possible and that any future development must be compatible with it. At the same time, small-scale projects such as marinas, shipyards and embankments continue to treat the lagoon as an extractive site.

Adding to the challenges, stakeholders in the region struggle to influence public opposition and local – and even national – opinion, result-

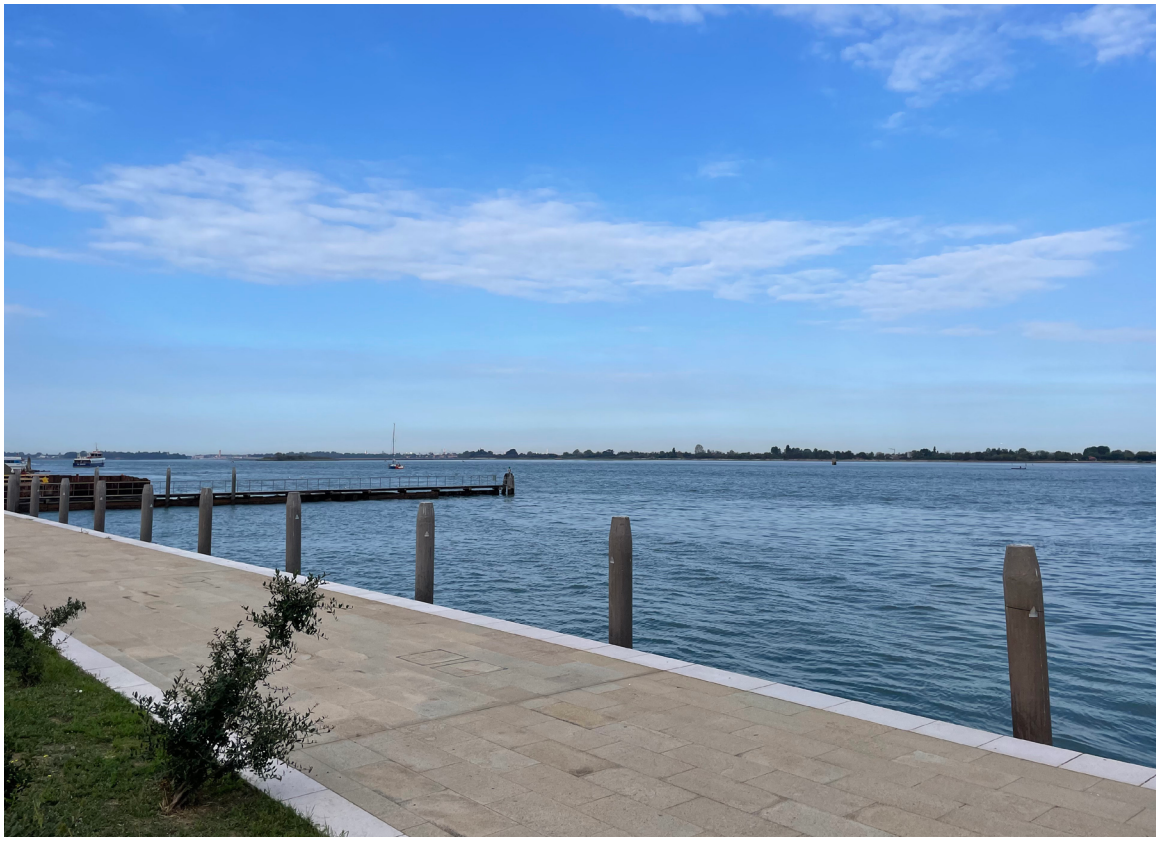
1. UNESCO declared Venice and its Lagoon a World Heritage Site in 1987, recognizing the presence of a widespread and diverse heritage: environment and landscape, archaeological, historical, architectural and ethnological (Ministry of Culture 2006).



^ Fig. 3 The entrance space in front of a traditional rowing association (Remiera), Cavallino Treporti (Source: Luca Velo, 2023).

ing in a failure to develop critical potential and informed demand for competent governance (Fabbri et al. 2020). Within this framework, numerous public and private initiatives are heavily altering the trajectory of the lagoon territory, often appearing as isolated, fragmented projects lacking a common strategy or unified perspective. Administrative frameworks, complicated by overlapping ordinary, special and commissioner-based regulations, further fragment governance, especially in key sectors such as water management and soil resources. Such issues are accompanied by interventions along the lagoon's edges, seemingly minor yet impactful, such as shipyard modifications along the Canal Salso and the new marina in Campalto, next to Marco Polo Airport.

Without shared planning anchored in common climate scenarios, responses remain reactive, often driven by short-term emergencies or entrenched economic concessions (Baldacci et al. 2022). Governance challenges connect directly to the city's social fragility. Over-tourism,



^ Fig. 4 A recent intervention: renovation for the new embankment, Punta Sabbioni, Northern Lagoon, Venice (Source: Luca Velo, 2023).

depopulation and the risk of Venice becoming a "museum city" are inseparable from ecological decline – including erosion, invasive species and salinization (De Marchi et al. 2022; Salerno 2020).

Since 2024, the new Lagoon Authority has overseen Venice's MoSE system, marking a significant change in the lagoon's governance. This authority introduces innovative and adaptive approaches to territorial and ecosystem planning, treating the Venetian Lagoon as a future laboratory for sustainable coexistence between land and water. Renewed efforts are essential today to navigate the complexity of competing projects and proposals, aligning them in cohesive strategies that address the region's fragilities while preserving its unique amphibious identity.

Stand-Alone Projects or Collaborative Actions?

Large strategic projects often dominate Venice's management, sidelining alternatives. The clearest example is the vast MoSE project, which illustrates the risk of trying to simplify lagoon management with one centralized solution. Venice's amphibious ecology depends on overlapping systems and adaptive practices. Simplification undermines resilience, and ensuring habitability, economic viability and ecological sustainability requires what Pes (2020)

calls a "difficult transition." Replacing the complexity of the lagoon's actors and projects with progressive simplification contradicts the principles underpinning one of the most fragile environments where land and water meet. Such myopia cannot safeguard the heritage of this site.

By contrast, collaborative and bottom-up initiatives show how adaptive strategies can emerge. Environmental restoration projects repopulate salt marshes, plant seagrasses and restore sediment flow. The EU Life Barene and Seresto projects have reintroduced native vegetation and promoted the spontaneous regeneration of tidal habitats, while Refresh has tested nature-based solutions for improving water quality and biodiversity. Similarly, under the EU Horizon framework, projects such as Waterland and RestCOAST explore integrated coastal management approaches, combining hydraulic engineering with ecosystem restoration to increase the lagoon's resilience to sea level rise. In parallel, governance projects foreground the cultural and ecological value of the lagoon, building alliances between professionals, communities and institutions (e.g., EU Interreg IT-HR CREW, GREW). These efforts create new forms of knowledge, care and economy, strengthening adaptation.

This broad range of initiatives reveals that there are as many Venetian Lagoons as there are projects seeking to shape it. Recognizing and engaging with this diversity can turn contestation into a resource for collaborative adaptation rather than a source of fragmentation.

Conclusion

Venice and its lagoon are more than a collection of heritage, imaginaries and challenges: They are a site of practices and processes. Preserving this heritage means recognizing historic strategies of governance and ecological dynamics that sustain amphibious life, and acknowledging the dynamic practices and processes as central to the heritage of Venice and its lagoon.

Climate change magnifies long-standing challenges, making adaptation inseparable from heritage. Salt marshes, tides and sediments are increasingly understood as heritage alongside buildings and monuments. Yet contemporary administrative inertia, combined with the prioritization of isolated safeguarding projects, places this heritage at risk. A clear articulation of what constitutes the heritage of Venice and its lagoon is becoming essential. Recent initiatives show that lagoon protection must be pursued through collaborative actions grounded in strong political commitment.

This calls for policy measures that recognize dynamic practices and processes as central to the lagoon's heritage, and that establish unified, adaptive governance models at a metropolitan level to harmonize overlapping regulatory bodies, align projects and integrate ecological, economic and cultural strategies. Such an approach would support collaborative development and the implemention of a lagoon-wide management plan, integrating approaches and visions across scales – from metropolitan planning to local community initiatives – and ensure coherent, inclusive and sustainable stewardship.

Acknowledgment

This contribution was peer-reviewed. It was edited by members of the editorial team of the UNESCO Chair Water, Ports and Historic Cities: Tino Mager, Zuzanna Sliwinska, and Carola Hein.

References

Baldacci, Cristina, Shaul Bassi, Lucio De Capitani and Pietro D. Omodeo, eds. 2022. *Venice and the Anthropocene: An Ecocritical Guide*. Wetlands.

Benzoni, Giovanni, and Salvatore Scaglione. 2020. *Sotto il segno del Mose. Venezia 1966–2020*. La Toletta edizioni.

Bertoncin, Marina. 2004. *Logiche di terre e acque. Le geografie incerte del Delta del Po*. Cierre edizioni.

Bevilacqua, Piero. 1995. *Venezia e le acque: una metafora planetaria*. Donzelli.

Bondesan, Aldino, and Paola Furlanetto. 2012. "Artificial Fluvial Diversions in the Mainland of the Lagoon of Venice during the 16th and 17th Centuries Inferred by Historical Cartography Analysis." *Géomorphologie: Relief, Processus, Environnement* 18 (2): 175–200. https://doi.org/10.4000/geomorphologie.9815.

Celermajer, Danielle, et al. 2021. "Multispecies Justice: Theories, Challenges, and a Research Agenda for Environmental Politics." *Environmental Politics* 30 (1-2): 119–40. https://doi.org/10.1080/09644016.2020.1827608.

D'Alpaos, Luigi. 2010. *L'evoluzione morfologica della laguna di Venezia attraverso la lettura di alcune mappe storiche e delle sue carte idrografiche*. Comune di Venezia.

D'Alpaos, Luigi. 2019. *SOS Laguna. Salviamo Venezia e la sua laguna dai prenditori ingordi e dai tecnici e politici senz'anima.* Mare di Carta.

De Marchi, Marta, Michela Pace, Maria Chiara Tosi and Luca Velo. 2022. *Laguna futuri. Esperienze e progetti dal territorio veneziano.* Quodlibet.

Fabbri, Gianni, Franco Migliorini and Giuseppe Tattara. 2020. *Venezia, il dossier UNESCO e una città allo sbando*. Libreria Editrice Cafoscarina.

Grillo, Susanna. 1989. *Venezia. Le difese a mare. Profilo architettonico delle opere di difesa idraulica nei litorali di Venezia*. Arsenale.

Harvey, David. 2001. "Heritage Pasts and Heritage Presents: Temporality, Meaning and the Scope of Heritage Studies." *International Journal of Heritage Studies* 7 (4): 319–38. https://doi.org/10.1080/13581650120105534.

Howard, Peter, and Brian Graham, eds. 2008. *The Ashgate Research Companion to Heritage and Identity*. Ashgate.

IPCC. 2023. "Sections." In *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by H. Lee and J. Romero, 35–115. IPCC. https://doi.org/10.59327/IPCC/AR6-9789291691647.

Ministry of Culture. 2006. Legge 20 febbraio 2006, n. 77 "Misure speciali di tutela e fruizione dei siti italiani di interesse culturale, paesaggistico e ambientale, inseriti nella 'lista del patrimonio mondiale,' posti sotto la tutela dell'UNESCO." https://storico.beniculturali.it/mibac/multimedia/MiBAC/documents/1524743501791_L77_aggiornamento_17.pdf.

Montanelli, Indro. 1969. *Montanelli Venezia*. Directed by G. Ponti. RAI Radio Televisione Italiana.

Pes, Luca. 2020. "Una transizione difficile. Venezia dal xx al xxi secolo." In *Venezia. L'istituzione immaginaria della società*, edited by G. Borrelli and M. Busacca, 11–26. Rubettino Editore.

Riesto, Svava, Linde Egberts, Anna A. Lund and Gertrud Jørgensen. 2022. "Plans for Uncertain Futures: Heritage and Climate Imaginaries in Coastal Climate Adaptation." *International Journal of Heritage Studies* 28 (3): 358–75. https://doi.org/10.1080/13527258.2021.2009538.

Salerno, Giacomo-Maria. 2020. *Per una critica dell'economia turistica. Venezia tra museificazione e mercificazione*. Quodlibet.

Smith, Laurajane. 2006. *Uses of Heritage*. Routledge.

Tosi, Maria Chiara. 2022. "Laguna Futuri." In *Laguna Futuri. Esperienze e progetti dal territorio veneziano*, edited by Marta De Marchi, Michela Pace, Maria Chiara Tosi and Luca Velo, 2022. Quodlibet.

Umgiesser, Georg, Donata M. Canu, Andrea Cucco and Cosimo Solidoro. 2004. "A Finite Element Model for the Venice Lagoon: Development, Set-Up, Calibration and Validation." Journal of Marine Systems 51 (1): 123–45. https://doi.org/10.1016/j.jmarsys.2004.05.009.

Maria Chiara Tosi urbanist and PhD, is a full professor of urbanism at Iuav University in Venice where she is also the director of the School of Doctorate Studies. She has been the principal investigator in many national and international research projects on the study of urban settlements, with a focus on the Venice Lagoon. She is the Iuav representative in the Academic Council of Venice International University, has been an expert for the Research Foundation Flanders FWO-Belgium and currently she is responsible for the double degree in architecture with the College of Architecture and Urban Planning of Tongji University.

Contact: mnrtso@iuav.it

Luca Velo architect and PhD, is an associate professor of urbanism at the IUAV University in Venice. He is involved in research and design experiences at the urban and territorial scale with a particular focus on environmental, landscape and territorial design issues in combination with policies. His research concentrates on the Venice Lagoon with specific attention to its ecosystems and transformations. He is the coordinator for Iuav of the Erasmus+ project: "*MeLiMed-Métropoles du littoral méditerranéen, enjeux climatiques et solutions de résilience*" with the schools of architecture ENSA Marseille, ULB Bruxelles and ENA Rabat.

Michela Pace architect and PhD, is a researcher and adjunct professor in urbanism at IUAV University in Venice. Her research focuses on the role of heritage in urban regeneration and land preservation projects that address the natural and built environments. She has explored the transition processes of cities and territories across a variety of countries, focusing on fragile environments and their relationships with spatial and economic consumption. She co-authored the book *The Production of Heritage: The Politicisation of Architectural Conservation* (Routledge 2019).

Mette Juhl Jessen is a landscape architect with a BA in comparative literature and is a PhD fellow in landscape architecture and planning at the University of Copenhagen. Her PhD research focuses on climate adaptation and regional planning in coastal areas. She investigates concepts of vulnerability and water in contemporary planning, looking for ways to shift perspectives and imagine new narratives. Mette is a member of the editorial board of the Nordic journal *Landskab* and a visiting PhD fellow at Iuav University in Venice.