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RESEARCH ARTICLE

The governance of the coastal region: evolutionary changes in the conceptualisation and integration of landscape in Portuguese coastal planning institutions

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Abstract

Context Coastal landscapes are unique and fragile socio-ecological systems, yet despite political and scientific efforts toward integrated coastal governance, challenges such as fragmented approaches, multiple boundaries, and inadequate policy integration persist. While landscape governance offers significant potential for rethinking coastal governance by emphasising the integrative power of landscapes, many scientific discussions still employ a binary perspective, limiting its full potential. Additionally, research on how the conceptualisation and integration of landscape has evolved in European coastal planning institutions remains scarce.

Objectives This article aims to advance coastal landscape governance research by examining the evolution of the conceptualisation and integration of landscape in Portuguese coastal planning institutions, assessing whether the narrow view found in national laws is reflected at the policy instrument level.

Methods We used multiple explanatory case study research to explore the evolution of the conceptualisation and integration of landscape within Portuguese coastal planning institutions from 1978 to 2021, employing qualitative content analysis.

Results Findings indicate that coastal plans have increasingly failed to use the integrative potential of landscapes fully. This decline is accompanied by a growing tendency to associate landscape valuation with Nature Protected Areas.

Furthermore, the analysed instruments revealed an increase in references to the landscape over time. However, differing conceptualisations of the landscape emerged, with the unexpected finding that a holistic conceptualisation did not always correspond to high levels of integration. Instead, landscape integration primarily focused on aspects such as multifunctionality, connectivity, and fragmentation.

Conclusions Our research underscores the urgent need for more empirical research in coastal landscape governance. From a broader perspective, such research could demonstrate the benefits of leveraging the integrative power of landscapes in coastal governance, potentially contributing to a paradigm shift towards coastal landscape governance.

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Introduction

In many coastal countries, the governance of coastal regions has become a prioritised research and political area (Partelow et al. 2020). This prioritisation is due to the process of coastalisation, which involves the increasing migration of populations and activities to coastal areas (Lagarias and Stratigea 2023). Coastalisation became particularly prominent during the twentieth century, intensifying the pressures of human activities on an intrinsically fragile and dynamic socio-ecological system (Schlüter et al. 2019). One notable example of this pressure is the increasing scarcity of intact coastal regions worldwide (Williams et al. 2022), which the authors define as those experiencing relatively low human pressure, a trend also observed in European coastal regions. Additionally, climate change impacts—such as rising sea levels, extreme weather events, inundations, and aggravation of levels of erosion—further threaten most of these regions and the welfare of their inhabitants (IPCC 2022). Coastal landscapes are unique, dynamic, and fragile environments shaped by the interplay of natural, cultural, social, and economic factors, with changes occurring over multiple timescales, as well as their symbolic and perceptual significance, making them subject to unique pressures and complex governance challenges.

Despite sustained political and scientific efforts to govern coastal regions from an integrated perspective (Cicin-Sain and Knecht 1993; Kay and Alder 2005; Tocco et al. 2024), significant shortcomings persist. These include the prevalence of sectoral or fragmented governance and planning approaches limited by political-administrative boundaries (Pérez-Cayeiro et al. 2019). Other challenges include policy integration and multi-level governance (Eger et al. 2021), as well as the lack of integration between land and sea interactions (Innocenti and Musco 2023). Furthermore, unstable political and scientific discourses (Flannery and McAteer 2020), limited economic and financial resources and insufficient attention to the regional scale also hinder coastal governance (Cabana et al. 2023). Increasingly, the importance of involving local communities in decision-making processes related to coastal governance is recognised (Van Assche et al. 2020; Claudet et al. 2024). Celliers et al. (2023, p. 1419) highlight the necessity of engaging stakeholders with 'agency' in coastal decisions. They define agency as "*the capacity of individuals and collective actors to change the course of events or the outcome of processes*".

A critical issue is the absence of a specific coastal governance arena in many coastal countries. This arena requires institutions (regulations, norms, laws, policies, and plans) and actors (individuals, groups or organisations, formal or informally) capable of recognising and incorporating the boundaries, dynamics and values of coastal socio-ecological systems into the governance system from an evolutionary perspective (Beunen et al. 2015; Van Assche et al. 2020). The urgency of climate-related challenges confronting most coastal nations demands a reassessment of our approach to conceptualising and operationalising coastal governance (Schlüter et al. 2020; Gonçalves and Pinho 2024b).

We argue that landscape sustainability science (Wu 2013, 2021), through the lens of landscape governance debate (Görg 2007; Kozar et al. 2014; Van Oosten et al. 2021), offers significant potential for revaluating coastal governance, especially its coastal institutions. By using the concept of landscape (Antrop and Van Eetvelde 2017) as a medium for governance and planning, it can operate across various scales and temporal levels, involving multiple sectors and actors. Landscape governance goes beyond the traditional role of landscape as merely an object of planning and management (Van Rooij et al. 2021). Furthermore, the landscape sustainability science debate highlights the advantages of the contemporary conceptualisation of landscape (Antrop and Van Eetvelde 2017) in integrative planning and management processes (Wu 2013; Westerink et al. 2017; Hersperger et al. 2020; Van Rooij et al. 2021). Today, the concept of 'landscape' encompasses not only natural-ecological characteristics but also their sociocultural identities, thereby contributing to a sense of place (Wu 2013, 2021). This comprehensive concept is particularly relevant for coastal governance, as it underscores the integrative power of landscapes, the importance of incorporating knowledge of landscape systems, and the role of landscapes in promoting

human well-being (Hersperger et al. 2020). Coastal landscape governance builds on landscape governance debate, but its object is the coastal landscape. Several methods exist to identify its boundaries, depending on the scientific discipline (Simensen et al. 2018).

If coastal plans leverage the integrative power of landscapes, they can effectively address sustainability by fostering stakeholder collaboration and incorporating adaptive management to navigate uncertainties (Hersperger et al. 2020). As one of the key strategies for sustainable coastal planning (Creed et al. 2018), adaptive management provides a systematic approach that integrates science, stakeholder engagement, and iterative learning to address the complexities of coastal socio-ecological systems (Tompkins and Adger 2004). This flexibility is particularly critical in the context of climate change, as it allows coastal plans to respond dynamically to evolving conditions and uncertainties. Grounding these plans in a deep understanding of landscape functioning further recognises coastal landscapes as complex socio-ecological systems, enhancing resilience, multifunctionality, and connectivity, while fostering the interconnectedness of humans and their landscapes (Steiner 2012; Hanspach et al. 2014; Antrop and Van Eetvelde 2017). Furthermore, landscapes contribute to human well-being through recreational opportunities, cultural heritage, and community-based stewardship initiatives, ensuring a more comprehensive and sustainable approach to coastal planning (Termorshuizen and Opdam 2009; Plieninger and Bieling 2017).

At the European level, the concept of landscape has also evolved significantly. This evolution is evidenced by the Council of Europe Landscape Convention (Council of Europe 2000, 2016), which promotes landscape protection, management, and planning among its signatories-countries (Council of Europe 2000, 2016). The Convention defines landscape as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" (Council of Europe 2000, article 1a). This definition aligns with the current landscape science debate as it recognises the landscape as a complex socio-ecological system reflecting a combination of biophysical, socio-economic, and cultural features (Forman and Godron 1986; Ahern 2006; Wu 2013; Kristensen and Primdahl 2020). It also acknowledges landscape as a visual, sensorial, aesthetic, and perceptual experience dependent on the perceiver (Nogué and i Font 2007).

Despite advancements in the conceptualisation of the landscape and the existence of a formal European definition that embraces all landscapes, outstanding and ordinary, recent research has shown that many discussions still frame landscapes in a binary manner—either as nature or culture and as either physical or social constructions (Van Eetvelde and Aagaard Christensen 2023; Van Eetvelde et al. 2024). These binaries often reinforce a dichotomy that does not fully capture the complex, evolving relationship between human societies and their landscape. In coastal governance, for instance, the binary distinction between land and sea further complicates decision-making and policy development, as coastal landscapes are often framed in terms of either terrestrial or maritime dimensions. The governance of the coastal landscape should move beyond these simplistic dichotomies, nature/culture, physical/social constructions, and land/sea, as they have significant implications for coastal planning and management (Walsh 2018). These binaries also limit the potential for future coastal landscape imaginaries (Nogué and Wilbrand 2018) as actors become attached to outdated visions and resist new, more integrated perspectives (Walsh 2020).

Also, these binary perspectives do not fully capture the nuanced evolution of the conceptualisation of landscapes over time and are likely reflected in the governance of landscapes in many European countries (De Montis 2014; Walsh 2020). Consequently, institutions often fail to fully leverage the integrative potential of landscapes, as demonstrated by Hersperger et al. (2020). The authors found that landscape science contributes considerably to European strategic planning. However, most plans fall short of utilising the full integrative potential of the conceptualisation of landscape in terms of governance.

The persistence of a binary perspective on landscapes can significantly impact their governance. For example, in the Wadden Sea, the binary relationship between nature and culture has created challenges, as spatial policies tend to emphasise one aspect over the other, leading to conflicts between conservation and cultural heritage (Egberts 2019). The author claims that this dichotomy can be overcomed by adopting a landscape-based approach that emphasises the interconnectedness of nature and culture. This approach

involves reframing the region as a maritime-agricultural landscape, which captures the dynamic interactions between human activities and the natural environment over time.

Furthermore, this narrow view often results in fragmented or siloed approaches, leading to inadequate policy responses that overlook landscape dynamics and functions. Such an approach can reduce adaptability, increase conflicts, and undermine effective governance. This lack of an integrated perspective is particularly critical for coastal landscapes, which are among the most dynamic and complex environments on the planet. Coastal landscape governance involves managing both land and sea, culture and nature, physical and social elements, frequently with overlapping jurisdictional boundaries and diverse goals and interests from stakeholders.

Despite the relevance of this topic, research specifically addressing changes in landscape conceptualisation within European coastal planning institutions remains scarce, although relevant examples exist (Crawford 2019; Egberts 2019; Döring et al. 2021). Recent research (Gonçalves and Pinho 2024a) confirmed that current national coastal legislation in Portugal is dominated by a narrow view of the landscape, despite Portugal signing the Council of Europe Landscape Convention in 2000 and a holistic understanding of landscape having influenced major environmental laws in the past. Our main goal is to identify and leverage the explanatory power of shifts in landscape thinking within coastal planning to inform future policies for more effective coastal landscape governance in Portugal and, potentially, in other European countries as well. Using explanatory case study research, we seek to explore how the conceptualisation and integration of landscape in coastal planning institutions evolved. Our main goal is to deepen our understanding of how shifts in landscape thinking affect coastal planning to inform future policies for more effective coastal landscape governance in Portugal and potentially other European countries.

Methods

Selection of the case study and the coastal planning institutions

Portuguese coastal planning institutions are currently divided according to the five NUTS II regions. We selected the Northern Region of Portugal because, in 1978, the landscape architect Ilídio de Araújo developed the study "*Landscape Recognition of the Coastal Zone between Caminha and Cortegaça*" (LRCZCC 77/78), a rare and underexplored applied research work in Portugal. The unit of analysis in our case study is coastal planning institutions, and the time frame spans between 1978 and 2021, as this period encompasses the development of the Plans under analysis (Table 1). A brief description of each Plan and an example of their strategy maps are available in Appendix 1.

It is important to note that the LRCZCC 77/78 was never completed and implemented. However, despite its unfinished state, this early study remains significant for its landscape perspective on the coastal zone. Additionally, the POOC-CE 2007 was excluded from the content analysis because its 2007 modification focused solely on the so-called *beach plans*, which are not relevant to our research objectives.

Content analysis framework

After identifying the coastal planning institutions, we conducted a qualitative content analysis (Elo and Kyngäs 2008). Our analysis focused mainly on the textual elements of the plans, with a comprehensive list of all documents assessed provided in Appendix 3. Each assessment item was recorded according to the framework outlined in Table 2. Our framework was adapted from Hersperger et al. (2020) to our particular case study, building on on Runhaar et al. (2024), Bürgi et al. (2022), Simensen et al. (2018), and Nogué et al. (2016) (for the complete protocol adaptation, see Appendix 2). Hersperger et al. (2020) developed a protocol consisting of 16 questions based on the conceptualisation of four key aspects: (1) Plans leverage the integrative power of landscapes, (2) Plans are grounded in knowledge of landscape functioning, (3) Plans highlight the contribution of landscapes to human well-being, and (4) Plans address landscapes in all main sections, along with

Table 1 Coastal planning institutions developed since 1977 until today

Issued	Time-horizon	Plan (abbreviation in Portuguese)		Institution (type)	Area covered (land)	Actor/authority
1977/78	n.a	Study: Landscape recognition of the coastal zone between Caminha and Cortegaça (1977–78), not concluded and implemented	LRCZCC 77/78	Study/Strategic	Caminha-Cortegaça (3 km buffer from the coastline)	Directorate-General for Urbanisation Services (DGSU) – North Region
1999	10 years	Coastal Zone Management Plan Caminha-Espinho (Resolution of the Council of Ministers n.º 25/99)	POOC-CE 1999	Plan/Regulation with binding rules	Caminha-Espinho (0.5 km buffer from the coastline)	Ministry of the Environment/ Water Institute
2007	10 years	[Plan modification] Coastal Zone Management Plan Caminha-Espinho (Resolution of the Council of Ministers n.º 154/2007)	POOC-CE 2007	Plan/Regulation with binding rules	Caminha-Espinho (0.5 km buffer from the coastline)	Ministry of the Environment/ Water Institute
2021	10 years	[Plan review] Coastal Zone Management Programme Caminha-Espinho (Resolution of the Council of Ministers n.º 111/2021)	POC-CE 2021	Programme/Strategic	Caminha-Espinho (0.5 km–1 km buffer from the coastline)	Ministry of Environment and Climate Action/National Environmental Agency

Table 2 Content analysis framework for assessing the conceptualisation and integration of landscape into Portuguese coastal plans institutions (adapted from Hersperger et al. 2020 based on Runhaar et al. 2024, Bürgi et al. 2022, Simensen et al. 2018, and Nogué et al. 2016)

Item	Justification	Coding
0. Explicit use of the world "Landscape" (Paisagem, in Portuguese)		
01. When was the Plan developed or approved?*	Knowing the exact timeframe of the Plan's approval is critical for understanding the context in which the Plan was created. By identifying when the Plan was developed or approved, we can evaluate whether it aligns with contemporary landscape discussions, especially following the adoption of the Council of Europe Landscape Convention, or if it adheres to paradigms that were current at the time of its development	Year
02. How often does the Plan contain the word landscape (paisag*)?**	By quantifying the occurrence of the word' landscape,' we can estimate the Plan's commitment to addressing landscape concerns. The frequency of the term can reflect the importance of landscape in the development of the Plan	Exact count
1. How has the conceptualisation of landscape ("paisagem") in Portuguese coastal planning institutions evolved since 1978?		
03. Does the Plan define the concept of landscape?	This question serves as a foundational inquiry to determine the Plan's approach to and understanding of the landscape	(a) Yes (b) No, move to question 5
04. Which conceptualisation of landscape is used?	This question aims to understand the perspective of the landscape adopted in the Plan, which is crucial as it determines the inclusiveness of considerations within the decision-making process. A holistic perspective, which integrates biophysical, socio-cultural, and aesthetic aspects of landscape, promotes comprehensive and balanced planning. In contrast, focusing solely on one perspective—whether biophysical, socio-cultural, or aesthetic—may limit the Plan's ability to address the diverse needs and values associated with landscapes	(a) Biophysical (b) Socio-cultural (c) Aesthetic (d) Holistic
05. If the Plan does not define 'landscape,' is it possible to identify the conceptualisation that is used in its development?	This question aims to explore if, even in the absence of an explicit definition of the landscape, it is feasible through contextual analysis of its content to determine its conceptualisation	(a) Biophysical (b) Socio-cultural (c) Aesthetic (d) Holistic (e) Not possible
06. Does the Plan identify the boundaries of the coastal landscape?	This question aims to understand whether the Plan adopts political-administrative boundaries or takes advantage of the integrative power of the conceptualisation of landscape	(a) Yes, the Plan identifies its boundaries from a landscape perspective (b) No, the Plan uses existing political-administrative boundaries or buffer zones

Table 2 (continued)

Item	Justification	Coding
07. Does the Plan identify coastal landscape types and/or coastal landscape character areas in its intervention area?	The identification of landscape types and/or coastal landscape character areas is typically aligned with a scientific perspective of the concept of landscape. This question aims to determine if the identification of these elements aligns with the perspective used in the Plan's development (Simensen et al. 2018)	(a) Yes (b) No
08. Does the Plan consider all areas within the defined coastal landscape boundary as relevant, or does it focus only on specific parts, such as outstanding natural or cultural features?	This question seeks to determine whether the scope of the plan considers all landscapes within the defined boundary as relevant, or if it prioritises certain parts of the landscape, such as outstanding natural or cultural features	(a) Yes, the Plan considers all the landscapes within the plan's boundary relevant (b) No, the Plan explicitly focuses only on part of the landscape (c) No, the Plan does not mention it
09. Does the Plan involve multiple actors in its development?	The European Landscape Convention (ELC) emphasises the importance of multiple stakeholders in the definition and implementation of landscape policies. Different stakeholders have different values, and thus, multiple stakeholder engagement can frame and express goals for landscape development in different ways, stimulate complementarity in conservation activities and increase the sense of belonging	(a) Yes, multiple actors are involved, discussing a landscape vision (b) Yes, multiple actors are involved, but without a focus on the landscape (c) Only mandatory state actors are involved (d) Not addressed at all
10. Does the Plan establish a widely accessible participatory landscape-monitoring information system?	To facilitate shared learning and adaptive planning, landscape-monitoring information needs to be widely accessible. Information collected in participative processes ideally supplements the data collected by government entities	(a) Yes, the Plan establishes a participatory landscape-monitoring information system that is widely accessible to actors and to the local community (b) Yes, but the accessibility of the participatory landscape-monitoring information system is limited to certain actors (c) No, the Plan does not establish a participatory landscape-monitoring information system (d) No, the Plan does not establish a landscape-monitoring information system at all
11. Does the Plan effectively involve the participation of local communities?	Landscape inhabitants need the ability to participate effectively in the planning and management of their region, which necessitates developing skills and organising events that facilitate participation at the landscape scale	(a) Yes, local communities are actively engaged throughout the planning process (b) Yes, local communities have been consulted at key stages of the planning process (c) No, local community participation is minimal or not effectively integrated (d) Not addressed in the Plan

Table 2 (continued)

Item	Justification	Coding
12. Does the Plan incorporate adaptive management practices that facilitate learning from outcomes and adjusting based on changes in the coastal landscape?	Landscape processes are dynamic, and adaptive management is a means of adapting to these changing conditions. Adaptive management enables people to learn from the outcomes of management strategies and thus improve future planning	(a) Yes, the Plan includes adaptive management practices that allow for ongoing learning and adjustments based on changes in the coastal landscape (b) Partially, the Plan includes some elements of adaptive management, but it lacks comprehensive mechanisms for learning from outcomes and adjusting based on coastal landscape changes (c) No, the Plan does not incorporate adaptive management practices for learning from outcomes or making adjustments based on coastal landscape changes
2. How has the integration of landscape ("paisagem") in Portuguese coastal planning institutions evolved since 1978?		
2.1. Integration Based on Knowledge of Landscape Functioning		
13. Does the Plan promote landscape multifunctionality?	Multifunctionality is a complex concept which refers to the fact that one particular area can serve several purposes or that an area can be comprised of several smaller areas dedicated to specific uses. Multifunctionality is most clearly expressed through the multiple ecosystem services provided by the landscape, in complex land-use forms and in land-use rights. In general, multifunctionality is often considered as positive. Maintaining or developing multifunctional landscapes can thus be seen as one of many strategies towards sustainable development at the landscape level	(a) Yes, the Plan actively promotes landscape multifunctionality as a strategy for its development (b) Yes, but the promotion of landscape multifunctionality is limited to certain areas of the Plan (c) No, not addressed at all
14. Does the Plan consider multiple scales for its development?	Landscape systems are hierarchically structured and scale-dependent. The scales to consider are the spatial scale (the extent or area covered), the temporal scale (i.e. years, decades or centuries) and the institutional scale (i.e. municipalities and regions). Landscape systems are best characterised on multiple scales and can be analysed through a hierarchy of nested scales	(a) Yes, the Plan considers multiple scales (spatial, temporal, and institutional) in its development (b) Yes, but the consideration of multiple scales is limited to certain aspects of the Plan (c) No, not addressed at all
15. Does the Plan adopt a systems-level resilience?	Resilience refers to a system's "capacity for renewal in a dynamic environment" and can be applied to landscape systems. In the context of landscapes, the term resilience is usually used positively. However, the resilient response of landscapes is not always desirable	(a) Yes, the Plan adopts a systems-level approach (b) Yes, with specific references regarding problems, goals, tasks (c) No, not addressed at all

Table 2 (continued)

Item	Justification	Coding
16. Does the Plan incorporate an understanding of temporal dynamics, addressing how landscapes change and evolve?	Landscapes change continuously, and temporal dynamics are therefore an essential property of landscapes: changes make landscapes. This is also recognised in the formal definition of landscape in the European Landscape Convention. Spatial planning aims to guide the temporal dynamics of landscapes and the resulting spatial patterns in land use	(a) Yes, the Plan recognises the evolution and dynamism of landscapes, incorporating adaptive management strategies (b) Yes, but the recognition of landscape evolution and dynamism is limited to certain aspects of the Plan (c) No, the Plan does not explicitly recognise the evolution and dynamism of landscapes in its planning or management options
17. Does the Plan promote landscape connectivity?	Connectivity is a concept in the scientific fields of landscape ecology and conservation biology, which defines the degree to which the landscape facilitates or impedes the movement of species between habitat patches. Fragmentation refers to hampering processes in the landscape, as a result of subdividing spatial units, which may become too small to function properly	(a) Yes, the Plan actively promotes landscape connectivity for the entire Plan (b) Yes, but the promotion of landscape connectivity is limited to certain aspects of the Plan (c) No, not addressed at all
18. Does the Plan integrate the landscape structure in its development?	The spatial configuration and composition of land-use are central aspects in the scientific field of landscape ecology. The spatial structure of the landscape interacts continuously with the ecological processes that shape it (Antrop & Van Eetvelde 2017)	(a) Yes, the Plan addresses the spatial relationship between patches, corridors and the matrix (b) Yes, with specific references regarding problems, goals, tasks (c) No, not addressed at all
19. Does the Plan identify the driving forces of landscape change?	This question is included to determine whether the Plan acknowledges and addresses the underlying factors influencing changes in the landscape. By assessing how comprehensively these driving forces are considered, the question aims to evaluate the Plan's ability to address root causes and develop strategies that mitigate negative impacts or harness positive influences on the landscape (Bürgi et al. 2022)	(a) Yes, the Plan identifies and addresses direct and indirect driving forces influencing landscape change (b) Yes, the Plan partially addresses some driving forces of landscape change (c) No, the Plan does not address the driving forces of landscape change
20. Does the Plan identify landscape values?	This question aims to the diversity of landscape values that are recognised in the Plan. Evaluating how a plan identifies and addresses different landscape values ensures a comprehensive approach to landscape assessment (Nogué et al. 2016)	(a) Yes, the Plan addresses several landscape values (b) Yes, partially addresses landscape values (c) Not addressed at all
2.2. Integration demonstrating the contribution of landscapes to Human Well-being		

Table 2 (continued)

Item	Justification	Coding
21. Does the Plan promote landscape-based recreation?	Recreation is one of the key services or values of landscapes in many European regions. Typical landscape related recreational activities are walking, hiking, cycling, picnicking, skiing and water sports	(a) Yes, the Plan actively promotes landscape-based recreation for the entire Plan (b) Yes, but the promotion of landscape-based recreation is limited to certain activities or areas (c) No, not addressed at all
22. Does the Plan promote the protection and/or enhancement of landscape-related cultural heritage?	Landscapes are important objects of our society's cultural heritage. They are part of our common heritage and integrate a variety of values, both natural and cultural	(a) Yes, the Plan actively promotes the protection and/or enhancement of landscape-related cultural heritage (b) Yes, but the promotion of landscape-related cultural heritage is limited to certain aspects (c) No, not addressed at all
23. Does the Plan promote landscape stewardship practices?	Landscape stewardship refers to the care and maintenance of a landscape. People develop a stewardship role for landscapes, and thus, landscapes contribute to the formation of local cultures whilst providing ecosystem services. Community-based and collaborative landscape initiatives are a manifestation of this stewardship. These initiatives can be diverse; however, their common aim is to maintain the value of landscapes. They can comprise of projects, platforms, initiatives or a set of activities which foster a broad range of landscape values	(a) Nature conservation (existing, promoted) (b) Cultural heritage (existing, promoted) (c) Landscape beauty (existing, promoted) (d) Sense of place, place identity Social well-being (existing, promoted) (e) Rural livelihood (existing, promoted) (f) Regulating services (existing, promoted) (g) Promotion of tourism (existing, promoted) (h) Organic food production, urban agriculture or communitygardens (existing, promoted) (i) No reference
2.3. Integration of Landscape in all main sections of plans		
24. In which plan section of the landscape included?	Main sections of a plan are: Introduction, goals, measures. This assessment indicates if the plans regards landscape within the urban region as a background for other activities (introduction), or as a pillar for the development of the urban region (visions and goals), something that should be actively be managed (measures and policy recommendations) and monitored	(a) Introduction (b) Inventory and analysis of biophysical and socio-economic processes (c) Visions and goals, Key Strategic domains (d) Regulatory norms, measures or policy recommendations (e) Funding schemes (f) Monitoring and evaluation

their corresponding items. For our case study, we expanded this framework to include additional items, resulting in a total of 24 questions.

As already mentioned, the primary goal was to understand how the conceptualisation and integration of landscape into coastal planning have evolved. While the framework adapted for the content analysis is grounded in contemporary landscape research, it may not fully capture the landscape thinking of 1978, which differed from current European thinking, especially before the adoption of the Council of Europe Landscape Convention (Antrop and Van Eetvelde 2017). Nevertheless, Gonçalves and Pinho (2024a) have shown that the landscape discourse in Portugal from 1974 to 1986 closely aligns with today's scientific understanding of landscape, particularly in relation to the principles outlined in the Council of Europe Landscape Convention (Council of Europe 2000, 2016). This alignment reinforces the relevance of applying the adapted framework to historical contexts such as the LRCZCC 77/78, providing a robust foundation for analysing the evolution of landscape integration in coastal planning.

Results

Applying the framework described in Table 2, this section evaluates the evolving conceptualisation and integration of landscape in Portuguese coastal planning institutions from 1978 until 2021. We organise this section as follows. First, we summarise the main results from the application of the content analysis framework in Table 3. Next, we delve into the detailed findings, structured around the two core research questions: how has the conceptualisation of landscape evolved over time? and second, how has its integration into coastal planning institutions changed? These findings are further elaborated in the following subsections.

Our analysis reveals two key findings. First, although references to the landscape have increased over time, there has been a decline in leveraging its integrative power within coastal planning institutions. Second, this decline is accompanied by a growing tendency to associate landscape valuation with Nature Protected Areas—an association we would have expected to be stronger in the past rather than in the present. Early conservation efforts predominantly focused on preserving the natural landscape, with landscape protection primarily concerned with outstanding coastal landscapes within the legal framework of protected areas. This association was particularly strong historically, as seen in the establishment of protected areas like the Areas of Outstanding Natural Beauty in Britain (1956), the Naturpark in Germany (1957), and the Parcs Naturels Régionaux in France (1967) (Antrop 2013) Third, differing conceptualisations of the landscape emerged, with the unexpected finding that a holistic conceptualisation did not always correspond to high levels of integration. Instead, landscape integration primarily focused on aspects such as multifunctionality, connectivity, and fragmentation.

The evolution of landscape conceptualisation in coastal planning institutionssince 1978

The content analysis revealed an increasing frequency of the word 'landscape' (paisag*) in the documents over time, a trend that aligns with the growing number of documents produced for each Plan since 1978 (see Appendix 4 for a list of the legal documents required for the Plan's approval). However, despite this increase, only the POC-CE 2021 explicitly defines the concept of landscape, describing it as "*an essential component of the human environment, expressing the diversity of our common cultural and natural heritage. It forms the basis of local identity, performs important public functions in ecological, environmental, social, and cultural fields, and contributes to human well-being and the strengthening of local identity*" (Resolution of the Council of Ministers n.º. 111/2021, 4.2.2.1—Natural Heritage and Landscape).

Although the LRCZCC 77/78 and the POOC-CE 1999 did not provide clear definitions of landscape, our content analysis enabled us to deduce their conceptualisations. The LRCZCC 77/78, for example, primarily focused on the biophysical and socio-cultural aspects of the landscape, also with a strong emphasis on aesthetics. This emphasis on the biophysical and cultural elements was also evident in the Baseline Studies of the POOC-CE 1999, although the aesthetics dimension was less prominent. Even though there are similarities in the conceptualisation of landscape in both plans, the approved version of the POOC-CE 1999 places

Table 3 Synthesis of principal results from the application of the content analysis framework

	COASTAL PLANNING INSTITUTIONS		
FRAMEWORK ITEM	**LRCZCC 77/78**	**POOC-CE 1999**	**POC-CE 2021**
0. Explicit use of the world "Landscape"			
01. When was the Plan developed or approved?*	1978 (the study was never concluded nor implemented).	1999	2021
02. How often does the Plan contain the word landscape (paisag*)?**	46	53	384
1. How has the conceptualisation of landscape ("paisagem") in Portuguese coastal planning institutions evolved since 1978?			
03. Does the Plan define the concept of landscape?	No, move to question 5.	No, move to question 5.	Yes.
04. Which conceptualisation of landscape is used?	n.a.	n.a.	Holistic.
	COASTAL PLANNING INSTITUTIONS		
FRAMEWORK ITEM	**LRCZCC 77/78**	**POOC-CE 1999**	**POC-CE 2021**
05. If the Plan does not define 'landscape,' is it possible to identify the conceptualisation that is used in its development?	Yes. Holistic conceptualisation.	Yes. Focus on biophysical and socio-cultural variables.	n.a.
06. Does the Plan identify the boundaries of the coastal landscape?	No, but the author describes its limits.	No.	No.
07. Does the Plan identify coastal landscape types and/or coastal landscape character areas in its intervention area?	No, but it is possible to deduce them based on the study information.	Yes.	Yes.
08. Does the Plan consider all areas within the defined coastal landscape boundary as relevant, or does it focus only on specific parts, such as outstanding natural or cultural features?	Yes, the Plan considers all the coastal landscape relevant.	No, the Plan explicitly considers only part of the coastal landscape relevant.	No, the Plan explicitly considers only part of the coastal landscape relevant.

Table 3 (continued)

09. Does the Plan involve multiple actors in its development?	Not addressed at all.[it was not expected to do so in 1978]	Only mandatory state actors are involved.	Yes, multiple actors are involved, but without a focus on the landscape.
10. Does the Plan establish a widely accessible participatory landscape-monitoring information system?	No, the Plan does not establish a landscape-monitoring information system at all [it was not expected to do so in 1978].	No, the Plan does not establish a landscape-monitoring information system at all.	No, the Plan does not establish a landscape-monitoring information system at all.
11. Does the Plan effectively involve the participation of local communities?	Not addressed in the Plan [it was not expected to do so in 1978].	Not addressed in the Plan.	No, local community participation is minimal or not effectively integrated.
12. Does the Plan incorporate adaptive management practices that facilitate learning from outcomes and adjusting based on changes in the coastal landscape?	Not addressed in the Plan [it was not expected to do so in 1978].	No, the Plan does not incorporate adaptive management practices for learning from outcomes or making adjustments based on coastal landscape changes.	Partially, the Plan includes some elements of adaptive management, but it lacks comprehensive mechanisms for learning from outcomes and adjusting based on coastal landscape changes.
2. How has the integration of landscape ("paisagem") in Portuguese coastal planning institutions evolved since 1978?			
2.1. Integration Based on Knowledge of Landscape Functioning			
13. Does the Plan promote	Yes, but the promotion	Yes, but the promotion	Yes, but the promotion of
	COASTAL PLANNING INSTITUTIONS		
FRAMEWORK ITEM	**LRCZCC 77/78**	**POOC-CE 1999**	**POC-CE 2021**
landscape multifunctionality?	of landscape multifunctionality is limited to certain areas of the Plan.	of landscape multifunctionality is limited to certain areas of the Plan.	landscape multifunctionality is limited to certain areas of the Plan. Also, there is a strong emphasis on the concept of ecosystem services as a goal to be achieved.
14. Does the Plan consider multiple scales for its development?	No, not addressed at all.	Yes, but the consideration of multiple scales is limited to certain aspects of the Plan. It only addressed institutional scales, from the local level to the regional level.	Yes, but the consideration of multiple scales is limited to certain aspects of the Plan. It only addressed institutional scales across several levels: national, regional and local.

Table 3 (continued)

15. Does the Plan adopt a systems-level resilience?	No, not addressed at all	No, not addressed at all	No, not addressed at all
16. Does the Plan incorporate an understanding of temporal dynamics, addressing how landscapes change and evolve?	Yes, but the recognition of landscape evolution and dynamism is limited to certain aspects of the Plan.	No, it only explores the year of the development of the studies.	Yes, but the recognition of landscape evolution and dynamism is limited to certain aspects of the Plan.
17. Does the Plan promote landscape connectivity?	Yes, but it does not explicitly use the concept. It defines the Special Ecological and Agricultural Areas) that can considered precursors of the National Ecological and National Agricultural Reserve. The study also wanted to protect the 3km buffer as a Natural Park.	Yes, the Baseline Studies wanted to establish a coastal green corridor along the intervention area. However, the proposal was not incorporated into the approved version of the Plan. The Baseline Studies also highlighted several areas to be included in the Protected Areas System, which were also not included in the final Plan. The Plan used the National Ecological and Agricultural Reserve to define its Coastal Protection Area, which	Yes, the Plan promotes landscape connectivity through waterlines, particularly in areas included in the National System of Classified Areas. The Plan used the National Ecological and Agricultural Reserve to define its territorial model. However, only part of it was included in the most restrictive category: Terrestrial Protection Zone - Coastal Protection Strip.
	COASTAL PLANNING INSTITUTIONS		
FRAMEWORK ITEM	**LRCZCC 77/78**	**POOC-CE 1999**	**POC-CE 2021**
		was the most restrictive category. It uses the waterlines to promote green corridors.	
18. Does the Plan integrate the landscape structure in its development?	No, not addressed at all	Yes, but it is closely tied to the spatial configuration of land use.	Yes, but it is closely tied to the spatial configuration of land use.

Table 3 (continued)

19. Does the Plan identify the driving forces of landscape change?	No, the Plan does not address the driving forces of landscape change	No, the Plan does not address the driving forces of landscape change	No, the Plan does not address the driving forces of landscape change
20. Does the Plan identify landscape values?	Yes, the study addressed several landscape values (natural, aesthetics, historical, social use, productive, visual) as it was its main goal.	Yes, partially addresses landscape values with a strong focus on natural values.	Yes, partially addresses landscape values with a strong focus on natural and biodiversity values.
2.2. Integration demonstrating the contribution of landscapes to Human Well-being			
21. Does the Plan promote landscape-based recreation?	Yes, but the promotion of landscape-based recreation is limited to certain activities or areas.	Yes, but the promotion of landscape-based recreation is limited to certain activities or areas.	Yes, but the promotion of landscape-based recreation is limited to certain activities or areas.
22. Does the Plan promote the protection and/or enhancement of landscape-related cultural heritage?	Yes.	Yes, but mainly from a visual integration perspective.	Yes, but mainly from a visual integration perspective
23. Does the Plan promote landscape stewardship practices?	No reference.	No reference.	No reference.
2.3. Integration of Landscape in all main sections of plans			
24. In which plan section of the landscape included?	a) Introduction b) Inventory and analysis of biophysical and socio-economic processes c) Visions and goals, Key Strategic domains	a) Introduction b) Inventory and analysis of biophysical and socio-economic processes c) Visions and goals, Key Strategic domains	Generic address across all sections

Colour Legend	**Addressed**	**Partially addressed**	**Not addressed**

a stronger emphasis on nature conservation and the protection of the outstanding natural coastal landscape. Despite the holistic definition of landscape in the POC-CE 2021, the approved Plan also closely adheres to the conservation-centric approach advocated in the POOC-CE 1999, though with a stronger emphasis on prioritising biodiversity protection and enhancement. None of the documents acknowledge the perceptual and symbolic aspects of the landscape, indicating a predominantly positivist understanding of the concept. For instance, although the POC-CE 2021 mentions the need to establish Landscape Quality Objectives—a concept from the Council of Europe Landscape Convention (Council of Europe 2000, 2016) that involves public authorities articulating community aspirations regarding the landscape and its features—it delegates this responsibility to the Municipalities and their Municipal Director Plans, rather than defining them directly and guiding municipal strategies from a

regional landscape based-vision as advocated in the literature (Wu 2013; Nijhuis et al. 2020).

While the POC-CE 2021 mentions the concept of landscape, only the LRCZCC 77/78 explicitly addresses the importance of using landscape boundaries in the plan development. However, none of these documents incorporate the sea area within their definition of landscape. The POC-CE 2021 intervention area extends to the −30 m bathymetric line, and the programme includes proposals for the sea, however they do not include the seascape analysis or explore the relationship with the terrestrial landscape.

The LRCZCC 77/78 describes the boundaries of the coastal landscape between Caminha and Cortegaça, though it does not present a graphical representation: "*It is not easy to define the precise contours of a geo-economic-social compartment in the landscape of northwest Portugal that can be designated as a "coastal strip." However, in some areas, particularly north of the mouth of the Cávado River, such compartmentalisation is quite clearly delineated. But south of that river and up to the Douro, the landscape broadens into a wide plain that runs into the chain of hills formed by the Valongo anticline, stretching about 40 km from the Laúndos hills to the southern end of the Serra de Pias"* (de Araújo 1978). A map of the locations mentioned throughout the results sections is presented in Fig. 1 to help visualise and support the argumentation discussed in this section.

The author clarifies that the LRCZCC 77/78 does not aim to develop a comprehensive landscape planning proposal, which would require defining precise coastal landscape boundaries. Instead, it focuses on studying and characterising the landscape values within a critical 1 km area affected by urban sprawl, using a 3 km buffer. This buffer was intended to apply more restrictive measures to protect the coastal landscape, prioritising urban development beyond this area. The LRCZCC 77/78 was divided into Five Volumes, each corresponding to a major river basin, which, in our view, could potentially represent distinct landscape units in its development. The POOC-CE 1999 and POC-CE 2021 also employed buffers as intervention areas, as these areas are defined by law. Similar to the LRCZCC 77/78, the POOC-CE 1999 initially used a 3 km buffer in its Baseline Studies. However, due to legal requirements, the approved Plan focuses on a 500-m buffer, excluding port jurisdiction areas. Additionally, in the Baseline Studies, the Plan also defined five landscape units based on variables such as physiography, geology, land use, and notable sites for nature conservation. Unlike the LRCZCC 77/78, these landscape units do not align with the major river basin boundaries but rather reflect the juxtaposition of the various variables mentioned. The POOC-CE 1999 describes the Plan as a regional plan, recognising the importance of not strictly adhering to municipal administrative boundaries. Its Baseline Studies suggest that these landscape units could facilitate the systematisation of intervention and management strategies for the coastal zone in conjunction with investment programs tailored to the different realities and pressures of the coastline. However, this novel idea was not incorporated in the approved version. Compared to the POOC-CE 1999, the POC-CE 2021 was legally required to incorporate port jurisdiction areas and had the legal option to extend its buffer from 500 m to 1 km. Despite this opportunity to protect a larger susceptible and dynamic coastal area, the Plan only extended the intervention area to include the estuaries of the Minho, Lima, Âncora, Neiva, Cávado, Ave, and Douro rivers without presenting specific criteria for this extension in the assessed documents. The POC-CE 21 notes the notable landscape diversity between Caminha and Espinho, encompassing two distinct landscape units: the Entre Douro e Minho and the Porto Metropolitan Area. However, it does not provide criteria for their identification and visual representation, nor does it indicate whether these units are based on any other study. Based on our knowledge, we cross-referenced this with the "*National Landscape Character Assessment*" for Continental Portugal developed by Cancela-d'Abreu et al. (2004) and confirmed that the POC-CE 2021 analysis was likely drawn on this study. However, it is relevant to clarify that although the POC-CE 2021 refers to two landscape units, Cancela-d'Abreu et al. (2004) actually references two broader Regional Landscape Groups (Entre Douro e Minho and the Porto Metropolitan Area), each encompassing several landscape units. No detailed information regarding these Regional Landscape Groups or landscape units was provided or utilised in the POC-CE 2021 strategy and territorial model development.

Considering the Council of Europe Landscape Convention (Council of Europe 2000, 2016), which emphasises the importance of all landscapes and the

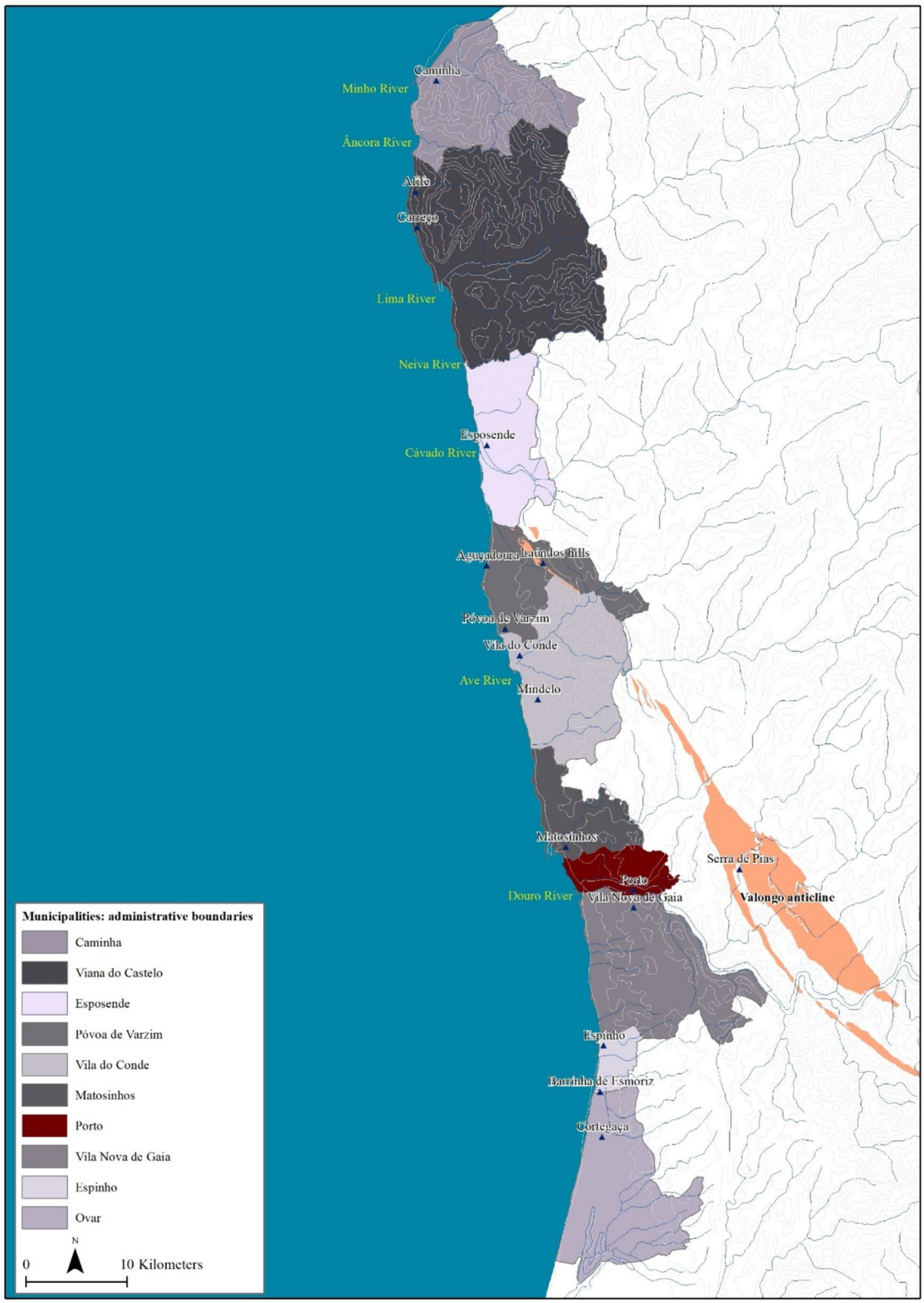

Fig. 1 Map of locations referenced in the results section

involvement of diverse actors in formulating sectoral policies, one might expect a more significant involvement of citizens and stakeholders in the development of the POC-CE 2021, along with a strong focus on coastal landscape assessment and planning directives. However, while there were some improvements compared to the POOC-CE 1999—where only State actors were involved—the involvement of local communities in 2021 remained minimal. Also, the Government still identified the most relevant actors and their participation was primarily limited to consultation rather than genuine participation. These assessment criteria do not apply to the LRCZCC 77/78, as it was a study conducted at a time when public participation was beginning to emerge as a concern at the European and national levels (Pinho 1985; Kay and Alder 2005).

Similarly, the concept of 'adaptive management' was not addressed by the LRCZCC 77/78, despite the author's recognition of the intrinsic dynamism of landscapes, particularly coastal ones, due to the continuous interactions between land and sea. Adaptive management involves adapting to uncertainty and changing conditions in a flexible and ongoing manner (Holling 1978; Kato and Ahern 2008). While the POOC-CE 1999 acknowledged the dynamism of the coastal landscape, it did not incorporate adaptive management practices, either generally or from a landscape perspective. This reflect that, at the time, the concept of adaptive management was not yet widely adopted in coastal management, both in Portugal and globally, as the concept only gained significant traction after Rio 92, alongside the rise of Integrated Coastal Zone Management (Tompkins and Adger 2004). The POC-CE 2021's vision for a "*resilient, developed, and sustainable coastal zone*" included an integrated and adaptive management model aimed at balancing coastal defence, protecting natural, cultural, and landscape heritage, and promoting economic enhancement of territorial resources. However, the actual implementation of adaptive management within the Plan was not effective, as demonstrated by Valente (2021). Also, along with the content analysis, it was evident that the adaptive management goal was mainly strongly linked to coastal risk management.

Despite the introduction of a monitoring system in POC-CE 2021, which was the first for such coastal plans, the focus was heavily on biodiversity and coastal risk monitoring. This system consisted of two types of indicators: (1) Performance Indicators, which were designed to track the implementation of the POC-CE 2021 Execution Programme and were directly tied to specific interventions and actions outlined in the Plan; (2) Outcome Indicators, which aimed to measure the extent to which the strategic objectives of the POC-CE 2021 were being met, as reflected in the Territorial Model and the Directives. A significant shortcoming of this monitoring system was the absence of outcome indicators specifically addressing the landscape. The performance indicators, though related to the landscape, were limited to specific interventions like "Interventions for the Enhancement of Coastal Landscapes". Examples of such interventions include the creation of nature trails, boardwalks, urban parks or the removal of invasive species. This narrow focus on landscape enhancement and recreational projects, rather than a broader and more integrated approach to landscape planning, indicates a limited operationalisation of the landscape concept. This operationalisation contrasts sharply with the more comprehensive concept of landscape outlined in the POC-CE 2021. The Plan's failure to develop a robust set of landscape-focused outcome indicators suggests that while the landscape was recognised as relevant, it was not fully integrated into the Plan's territorial model, directives and execution programme. Additionally, the monitoring system was not widely accessible to citizens participating in the monitoring process for any of the indicators.

The evolution of landscape integration in coastal planning institutions since 1978

Integration based on knowledge of landscape functioning

Regarding the integration of the landscape based on knowledge of landscape functioning, our findings show that multifunctionality, and landscape connectivity and fragmentation were the most commonly addressed factors. All three plans aimed to develop multifunctional landscapes that serve multiple purposes within the same area, although none explicitly used the concept of 'landscape multifunctionality'. While the planning and management of the coastal

landscape with a view to hosting multiple functions is omnipresent, this multifunctionality is somewhat underdeveloped and could be strengthened with clearer methodologies. The POC-CE 2021, being the most recent Plan, places significant emphasis on promoting ecosystem services. However, neither multifunctionality nor ecosystem services are fully integrated into its territorial model or directives, as they are only referred to as a goal to be achieved through the Plan's implementation without clear guidance.

Regarding landscape connectivity and fragmentation, all plans address these concepts, though to varying degrees and with different approaches. As mentioned earlier, while the primary goal of the LRCZCC 77/78 was to characterise landscape values, the author introduced two chapters focusing on 'Landscape Protection' and 'Planning' in Volume 1 and 5, respectively. In these chapters, the author identified the main areas to be safeguarded and proposed measures to be implemented based on landscape knowledge, functions and values. Although the LRCZCC 77/78 did not explicitly use the concept of 'landscape connectivity and fragmentation', its proposal was built upon Decree-Law 613/76, which established a New Nature Protection Regime and Creation of National Parks in Portugal (see Appendix 5). The LRCZCC 77/78 Landscape Protection/Landscape Planning proposal included two significant categories: Special Ecological Areas and Special Agricultural Areas. In the LRCZCC 77/78, the Special Ecological Areas included the protection of estuaries and their marshes, all the streams with more than 2 km of course, coastal lagoons, dunes, beaches, coastal rocks, and the coastal heath of *Cisto-Ulicetum humilis*. The Special Agricultural Areas included all the soils with the highest agricultural suitability. These categories would have played a crucial role in safeguarding the most ecologically sensitive and productive areas of the 3 km buffer used if the study had been implemented. They can be considered precursors to the National Agricultural Reserve (Decree-Law 451/82) and National Ecological Reserve (Decree-Law 321/83), created in 1982 and 1983, respectively. The National Agricultural Reserve was established to protect "*the soils with the greatest aptitude for the production of agricultural goods indispensable for national supply, for the full development of agriculture and for the balance and stability of the landscape*" (Decree-Law 451/82). The National Ecological Reserve aimed to protect "*all areas essential to the ecological stability of the environment and the rational use of natural resources, with a view to proper land use planning*" (Decree-Law 321/83), namely the coastal ecosystems and the interior ecosystems (see Appendix 6 for more detail). In both reserves, urban development and construction were prohibited, and significant opposition was faced by the local Government (Schmidt et al. 2013). This opposition led to the regulation of the National Ecological Reserve not being fully established until 1990 (Decree-Law 193/90). This idea was also present in the LRCZCC 77/78, as the author considered that the Special Ecological Areas and Special Agricultural Areas would play a significant role in safeguarding the landscape structure and character against urban developments. Indeed, if they had been implemented in 1978, they could have been a game-changer in the evolution of the coastal landscape in the Northern Coastal Region.

Furthermore, it can be argued that by safeguarding the most ecologically sensitive and productive areas, these reserves help to ensure the continuity of ecological processes, habitat connectivity, and the movement of species across the landscape, while also protecting the best soils for agriculture. Also, today, the National Ecological and Agricultural Reserves are the backbone of most Green Infrastructure proposals in Portugal. Another relevant measure of the LRCZCC 77/78 was the definition of a 500-m buffer where most of the urban areas should be contained. In this buffer, the Special Forest Areas should be protected or enhanced to create a barrier against sea winds and promote soil protection and regeneration. The Special Forest Areas within this buffer could also contribute to landscape connectivity, serving as a corridor that connects different natural areas, providing a continuous habitat and mitigating the fragmentation caused by urbanisation.

The Baseline Studies of the POOC-CE 1999 also emphasised the importance of protecting natural areas of high value and utilising the remaining areas as a green corridor, with the Public Maritime Domain serving as a structuring link element. The Public Maritime Domain refers to a public protection strip of 50 m along the coastline extending 30 m deep seaward. The Plan also highlighted that a proposal for the classification of the Northern coastline of Viana de Castelo, along with the Mindelo Ornithological Park, was underway. Additionally, it proposed extending

the Protected Coastal Landscape of Esposende to include the mouth of the Lima River and Aguçadoura. The Barrinha de Esmoriz was also identified for potential protection at either the regional or national level. However, none of these proposals, including the green corridor, were incorporated into the approved version of the Plan.

It is essential to highlight that the LRCZCC 77/78 had earlier proposed classifying the entire coastal area between Caminha and Cortegaça as a Natural Park and designating the coastal strip from the Minho estuary to the Lima estuary as a Protected Landscape. These forward-thinking recommendations preceded the POOC-CE 1999 and demonstrated early recognition of comprehensive protection of the entire coastline, and not just the most outstanding coastal areas. The author considered that Protected Areas could be used as a tool for balancing economic development with recreation, nature conservation, and landscape protection. For instance, of all these proposals, only the Mindelo Ornithological Park received recognition as the Regional Protected Landscape of Vila do Conde Coastline and Mindelo Ornithological Reserve in 2009 despite the fact that since 1957, attempts have been made to protect this coastal area without success. Currently, the POC-CE 2021 continues to pursue the LRCZCC 77/78 and the POOC-CE 1999 vision by proposing the creation of a Protected Landscape along the Northern coastline of Viana de Castelo between Afife and Carreço but delegating the responsibility for its creation for the Municipality.

The National Ecological Reserve and the National Agricultural Reserve, which were already in force at the time the POOC-CE 1999 was developed, were automatically incorporated into the definition of the Coastal Protection Area within the Plan (Appendix 7). This area corresponds to the most restrictive category, aimed at preserving notable or characteristic locations and landscapes of the natural and cultural heritage of the coastal zone, as well as the spaces necessary for maintaining ecological balance. Later, in the POC-CE 2021, with the legal mandatory transition from a Plan to a Program (see Appendix 1), the POC also considered the National Ecological Reserve and the National Agricultural Reserve for defining its territorial model. However, it did not explicitly delineate these areas in its territorial model (Appendix 8). This omission allows municipalities more flexibility to alter their boundaries, although such changes remain subject to control by the Northern Region Coordination and Development Commission. The POC-CE 21 focuses on enhancing the connectivity of coastal areas integrated into the National System of Classified Areas, and on promoting green corridors along the waterlines, an approach also emphasised by the POOC-CE 1999.

Regarding the use of multiple scales, neither institution fully utilised the integrative potential of landscape systems. Landscape systems are inherently hierarchical and scale-dependent, encompassing spatial, temporal, and institutional dimensions. None of the plans explored their intervention areas across different spatial scales, missing the opportunity to understand how various landscape elements interact across these scales. Specifically, the LRCZCC 77/78 did not consider multiple scales at all. The POOC-CE 1999 addressed institutional scales by incorporating the urban perimeters of Municipal Director Plans into its framework, but. it would have been more effective to define these boundaries directly. This contrasts with the approach of the LRCZCC 77/78, which aimed to define criteria and identify areas for urban expansion from a regional perspective. This strategy would not only ensure the protection of the coastal landscape but also constrain municipalities' expectations for development on the dunes and other socio-ecological sensitive areas. In contrast, the POC-CE 2021, being the most recent Programme, effectively engaged with multiple institutional scales by aligning its strategy with higher-level plans in the current Portuguese planning system and establishing guidelines for the local level, as demanded by law. In terms of temporal dynamics, the LRCZCC 77/78 only explored the humanisation of the landscape through its settlement evolution. The POOC-CE 1999 assessed the land use of the 3 km buffer but only for one year (1995), not exploring the landscape change dynamics. The POC-CE 2021 evaluated land use changes since 1999 and assessed the evolution of sections of the coastline based on available cartographic information. The option of focusing on land use change is one of the most used research methods to trace landscape change (Mohr et al. 2024), as it reduces the landscape complexity. However, it has limitations (Medeiros et al. 2021) as it does not fully embrace the contemporary conceptualisation of the landscape.

The assessment of driving forces, which include socio-economic, political, technological, natural, and

cultural factors (Bürgi et al. 2022), is closely related to understanding landscape change. However, these driving forces were not explicitly addressed in any of the plans. All three plans focused on identifying the main problems or strengths of the area and occasionally related these to land-use changes but did not explicitly explore the underlying multiple internal or external dimensions driving those changes.

System-level resilience was the least frequently mentioned characteristic of landscape functioning, addressed only in the POC-CE 2021 but not from a landscape resilience perspective. "*Landscape resilience represents a spatially explicit approach that applies resilience theory to understand landscape dynamics in response to disturbances and their ecological and socio-economic consequences*" (Wu 2021). In POC-CE 2021, the concept was often used as a buzzword, primarily linked to the need to enhance resilience against coastal erosion, overtopping, and coastal flooding, especially in the context of climate change. However, the Plan lacked specific directives on how to achieve this resilience and how to operationalise it within Municipal Director Plans.

The assessment of landscape structure was included in the Baseline Studies of the POOC-CE 1999 and POC-CE 2021, but it was also closely tied to the spatial configuration of land use. However, the configuration aspects—such as the size, shape, and spatial arrangement of individual patches—were not assessed. None of the plans explored landscape structure in quantitative terms, such as through statistical analysis or landscape metrics (Wu 2004). Additionally, as previously mentioned, they did not attempt to understand landscape structure and functions from a multi-scale perspective, despite the fact that their analysis has also contributed to enhancing landscape connectivity. The LRCZCC 77/78 demonstrated a strong focus on evaluating biophysical and socio-economic variables to understand the different landscape suitabilities. This approach is closely related to the concept of landscape structure, as it involves assessing the spatial organisation and potential interactions between various landscape components. However, while the Plan addressed these variables, it did not explicitly frame them within the broader context of landscape structure as understood in landscape research, where considerations such as spatial configuration, connectivity, and the interaction between ecological and cultural processes and landscape patterns are also crucial.

One of the strategic objectives of POC-CE 21 focuses on the "Protection and Conservation of Coastal Biophysical Systems and the Landscape". This objective encompasses various specific directives intended to be incorporated into the Municipal Director Plans (Appendix 9). However, while the Plan outlines several landscape-related norms, these guidelines are highly generic. The Plan asserts that landscape values, vistas, and landscape structural elements, along with the overall coastal landscape character, must be protected. However, it does not clarify what specific values or character are being referred to, nor does it provide guidance on how this protection should be achieved. Also, the Plan repeatedly refers to the conservation of environmental and landscape values, suggesting that it remains closely tied to the idea of the landscape as a remarkable element. Furthermore, the landscape is not reflected in the territorial model of the Plan. It only highlights the Areas of Special Interest for Nature Conservation, which includes areas within the Natura 2000 and the areas integrated into the Portuguese National System of Classified Areas, reinforcing its deviation from the Council of Europe Landscape Convention (Council of Europe 2000, 2016).

Integration demonstrating the contribution of landscapes to human well-being

All three documents recognised the contribution of landscapes to human well-being, particularly emphasising the role of landscape-based recreation and tourism. Both the POOC-CE 1999 and the POC-CE 2021 placed greater emphasis on the coastline, while the LRCZCC 77/78 strategy, although it also recognised this relevance, aimed to promote 'Recreation Reserves' across the entire 3 km area.

The LRCZCC 77/78 supports the protection and enhancement of landscape-related cultural heritage, recognising that landscapes are crucial to our shared cultural heritage and encompass both natural and cultural values. It also highlights the relevance of viewpoints and panoramic roads as cultural landscape elements. In contrast, the POOC-CE 1999 and POC-CE 2021 focus on integrating architectural or cultural elements into their guidelines, which reduces the

broader potential for protecting and enhancing landscape-related cultural heritage.

Landscape stewardship (Plieninger and Bieling 2017; Angelstam et al. 2021) seeks to enhance multiple landscape values in a synergetic manner, involving inter-sectoral coordination and alignment of activities, policies, or investments. It is inherently self-organised and participatory, valuing diverse perspectives and ways of knowing to ensure that landscapes are managed sustainably for the benefit of both current and future generations (Bieling et al. 2020). While none of the documents addressed this concept, it would only have been expected in the most recent Plan, the POC-CE 2021, especially given that Portugal signed the Convention.

Integration of landscape in all main sections of plans

Notwithstanding its age, the LRCZCC 77/78 was by far the most detailed and systematic in its approach to addressing the landscape, being the only Plan that specifically examined the coastal region from a landscape perspective. The POOC-CE 1999 added a chapter describing the main characteristics of the identified landscape units in the Baseline Studies. In contrast, the POC-CE 2021 merely referenced the term 'landscape' throughout its documents without providing concrete assessments or specific guidelines on how to integrate the concept into Municipal Director Plans or how to protect the values and the coastal landscape character mentioned.

Discussion

Our research aimed to explore the evolution of how landscape has been conceptualised and integrated within coastal planning institutions in the Northern Region of Portugal since 1978. The findings reveal a significant increase in references to the term "landscape" within coastal plans. However, this is coupled with a decreasing focus on the integrative potential of landscape science, contradicting the findings of Hersperger et al. (2020) on strategic spatial planning. While Hersperger et al. (2020) work emphasises the substantial role of landscape science as a key integrative tool in strategic spatial planning across various European contexts, our study shows that, in the case of Northern Portugal, landscape remains more of a rhetorical tool rather than being fully integrated into practical planning frameworks. This discrepancy suggests a need for further comparative research to explore the factors that contribute to this divergence in landscape integration. Additionally, this gap between the rhetorical emphasis on landscape and its practical application in coastal planning institutions reflects broader challenges on coastal governance, where the landscape is mainly approached as a coastal scenery (Rangel-Buitrago & Ben-Haddad 2024).

Despite Portugal ratifying the Council of Europe Landscape Convention (2000, 2016), our findings show that Northern coastal planning institutions do not fully align with its principles. This trend mirrors a pattern observed across other European regions where policies struggle to fully integrate landscape into their governance frameworks (Olwig 2007; De Montis 2014, 2016). A crucial element of the Convention is the conceptualisation of landscape, which ensures that all landscapes and their diverse values are comprehensively addressed, moving beyond earlier conservation policies focused solely on protecting and enhancing outstanding coastal landscapes (Antrop 2013). This broader conceptualisation resonates with the multidisciplinary nature of landscape research, and the different methods available to characterise and assess landscape boundaries and values (Simensen et al. 2018).

However, while this multiplicity can help capture the complex socio-ecological dimensions of coastal landscapes, it can also presents challenges in fully operationalising this concept in governance systems. Insights from a relational and more-than-representational (Waterton 2018) understanding of coastal landscapes offer promising directions for future coastal management, as advocated by Döring and Ratter (2021). A relational perspective emphasises the connections and interactions between people and landscapes, rather than treating them as separate or isolated. The more-than-representational approach extends beyond maps and scientific descriptions to include the emotional, social, and lived experiences of coastal landscapes (Lorimer 2005). Together, these perspectives encourage a shift from a purely science-based approach to one that also considers the relational, emotive and perceptions of humans of their coast (Döring and Ratter 2021). Also, as argued by several scholars (Kelly et al. 2019; Schlüter et al. 2020; Cabana et al. 2023), coastal governance

reforms are urgently needed, with one of the principal shortcomings being the failure to address the coast as a socio-ecological system, reinforcing the need for further research on how to operationalise this concept of multiple coasts within governance frameworks. In many coastal countries, as in Portugal, coastal planning instruments are geographical limited by buffers (de Andrés et al. 2023). Integrating the socio-ecological dynamics of landscapes into coastal governance could offer more resilient and adaptive management solutions for addressing the complex challenges faced by many coastal landscapes worldwide (de Andrés and Barragán-Muñoz 2022; Gonçalves and Pinho 2024b). However, the governance structure itself needs to be rethought to incorporate these boundaries and develop landscape planning instruments that can address multiple scales and temporal dynamics, system-level resilience, and adaptive management.

Another relevant finding is that the evolution of Portuguese coastal planning can be understood through key legislative milestones, strongly influenced by leading actors and dominant European discourses and policies (Table 4) (Pinto and Partidário 2012; Gonçalves and Pinho 2024a). The LRCZCC 77/78 introduced a holistic *Landscape Model*, promoting an integrated approach to planning from a landscape perspective. However, by the POOC-CE 1999, a shift in focus had occurred, with a narrower emphasis on the *Nature Conservation Model*, reflecting a trend toward reducing landscape integration in coastal planning strategies and strongly focusing on the outstanding landscape, or on areas that were already included in the Portuguese National System of Protected Areas. More recently, the POC-CE 2021 has prioritised a *Biodiversity Conservation Model*, aligning with the dominant approach in Portugal since 2000, which has been deeply influenced by European Commission directives, particularly following the introduction of the Natura 2000 network.

A key takeaway from our study is the limited use of the landscape concept in today's Portugal's coastal planning institutions, namely in the POC-CE 2021, which fails to leverage the integrative potential of the landscape. The POC-CE 2021 aligns more with a restricted biodiversity conservation approach rather than embracing a holistic view, which contradicts the broader international trend toward landscape-based governance systems (Görg 2007; Van Oosten et al. 2018) and the advantages of landscape sustainability science (Wu 2021). Despite the urgency of safeguarding and enhancing biodiversity, an integrated landscape-based strategy (Kristensen and Primdahl 2020) is fundamental for coastal regions, with a long-term landscape vision (Voskamp et al. 2023) that integrates local knowledge and values to ensure that coastal planning aligns with the unique characteristics and needs of each region. This way can contribute not only to biodiversity protection but also to sustainable development and enhanced community well-being (Gonçalves and Pinho 2024b).

Additionally, more research is needed to explore the underlying reasons why coastal plans, despite recognising the value of the landscape both in itself and as a governance approach, fail to fully integrate it into their planning and management strategies as envisioned by earlier models. Understanding these gaps could shed light on the disarticulation between policy recognition and practical implementation, offering insights into how coastal landscape policy integration can be better achieved in future planning efforts. Further research should focus on comparing the national discourses of the main coastal actors (politicians, planners, and government officials) with those from other European coastal regions regarding their understanding of the landscape concept (de Koning 2024). These perspectives and knowledge they bring can significantly influence the development of coastal landscape institutions. Such a study could reveal how institutional knowledge influences coastal landscape

Table 4 Relation of the documents assessed and the four models for the Portuguese landscape discourses (adapted from Gonçalves and Pinho 2024a)

National level	Period	1971–1974	1975–Early 1980s	Mid 1980s–Late 1990s	Early 2000s–present
	Model	Wilderness model	Landscape model	Nature conservation model	Biodiversity conservation model
Northern Region of Portugal	Plan	Not applicable	LRCZCC 77/78	POOC-CE 1999	POC-CE 2021

planning outcomes and provide valuable insights for improving coastal landscape governance frameworks. Furthermore, the role of local community perceptions of landscape (Quintas-Soriano et al. 2023), which remains underexplored in Portugal, also deserves greater attention. As demonstrated, current coastal institutions tend to focus predominantly on natural and physical values, overlooking the importance of how people experience, perceive and interact with the coastal landscape.

Moreover, our findings resonate with global literature on the importance of landscape connectivity and fragmentation in landscape planning (Forman 1995; Antrop and Van Eetvelde 2017). An essential aspect of our findings is the influence of landscape architecture theoretical knowledge on shaping key landscape instruments that remain relevant today, such as the National Ecological Reserve and the National Agricultural Reserve. These instruments serve as an essential landscape planning instrument (Pena et al. 2013) and form the basis for most greenways/green infrastructures (Ahern 2002) in Portugal. As the debate increasingly emphasises nature-based solutions for coastal planning, these instruments may provide valuable insights for integrating ecological and landscape considerations into various planning frameworks across other geographies. Further research is needed to explore how these landscape instruments can be adapted to address contemporary environmental and planning challenges across different European contexts.

The findings also emphasise the hypothetical role that the LRCZCC 77/78 may have played in the evolution of the coastal landscape. Further research is needed to evaluate the potential impacts of Araújo's proposals on this evolution and to compare these effects with those of the POOC-CE 1999 and the POC-CE 2021.

This research highlights the broader relevance coastal landscape governance may play in reshaping the coastal governance debate. Lessons from the evolution of coastal planning in Northern Portugal demonstrate the necessity for further research to understand how the concept of landscape has evolved, how it has been integrated, and whether this evolution aligns with international discussions.

Finally, our findings emphasise the need for more policy guidelines on operationalising research into practice, as the evolution of coastal landscape governance in Portugal has shown a divergence from prominence to decline.

Concluding remarks

This research aimed to advance coastal landscape governance by examining how the concept of landscape has evolved and been integrated into coastal planning institutions in the Northern Coastal Region of Portugal from 1978 to the present. The empirical results reveal that, despite advancements in European landscape research driven by the Council of Europe Landscape Convention (Council of Europe 2000, 2016), coastal planning in Northern Portugal still falls short of fully leveraging the integrative potential of landscapes. Notably, we found that the study (LRCZCC 77/78) developed almost fifty years ago was more comprehensive and could have significantly transformed the coastal landscape if it had been completed and implemented. This insight highlights a missed opportunity and emphasises the need to revisit and reintegrate such visionary landscape approaches into current coastal governance.

Our research stresses the need for more evident integration across different knowledge systems in coastal planning. Coastal governance must foster collaboration among different knowledge systems, scientific, experiential, and lay, and recognise that these various forms of knowledge contribute to the resilience, multifunctionality, and sustainability of coastal landscapes, as advocated by Gonçalves and Pinho (2024b). This integration of different forms of knowledge is crucial, considering that the concept of the landscape itself carries multiple meanings and varying methods for delineating its boundaries. Such complexity poses significant challenges to governance systems that are traditionally structured around sectoral and politically administrative planning instruments, which are often inadequate to address the integrative nature of landscapes.

Despite the limitations of generalising from a case study research, conceptual and policy shifts are inherently embedded in the specific contexts of individual places. A strength of our evolutionary study is that it highlights the urgent need for more empirical research in coastal landscape governance. From a broader perspective, such research could demonstrate the benefits of leveraging the integrative power of landscapes in

coastal governance, potentially contributing to a paradigm shift towards coastal landscape governance.

Further research is needed to explore the landscape and planning imaginaries that underlie planning documents, particularly with regard to the nature/culture and land/sea dichotomies. This research could provide deeper insights into how these dichotomies have been shaping coastal governance and the conceptualisation and integration of landscape into planning. The chronological perspective employed in this study also presents a valuable framework for understanding the evolution of these imaginaries over time, which could inform future research on how shifts in landscape thinking impact planning practices. Future research should also explore how governance institutions can move beyond political-administrative boundaries to embrace landscape units, multi-scale systems, and adaptive governance. Specifically, it should focus on identifying the necessary instruments and actors for this transformation, which could facilitate more integrated and effective coastal landscape governance.

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Declarations

Conflict of interest The authors declare no competing interests.

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