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Identifying success factors for integrated coastal zone management: Development of a regional coastal plan in Morocco.

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ABSTRACT

Integrated coastal zone management (ICZM) is a policy framework that aims to achieve sustainable development in the context of limited space and resources of (densely populated) coastal areas, by balancing environmental protection, societal needs, and economic development. In this paper, we first reflect on key components influencing the success of ICZM. Second, we compare our understanding to the process of preparation of a coastal plan for the Tangier-Tetouan-Al Hoceima region in Morocco. Finally, we extend and generalize our conclusions to ICZM as a relevant policy framework, by identifying factors that influence the context-specific interpretation of ICZM in Morocco. We argue that ICZM depends on the integration, implementation, coordination between science and policy, and appropriate governance. In the Moroccan case, a variety of institutions first need to agree on the governance structure and priorities, as a base for a clear direction for the regional ICZM. This calls for a change of stakeholder engagement for certain steering institutions and leadership by 'wilaya'. The coastal plan preparation process showed a lack of balance between stakeholder participation and institutional coordination, and increased bureaucratization which covers accountability for decision-making. Although coastal governance is supported by the national government, it is still unknown to what extent it is supported at the regional level which oversees the ICZM. We conclude that besides leadership, political support, and institutional commitment, broader stakeholder engagement is crucial for the decisions that shape the future of the coastal zone, which indicates that governance is the most important success factor for ICZM.

1. Introduction

Integrated coastal zone management (ICZM) is a "dynamic process for the sustainable management and use of coastal zones" (UNEP/MAP/PAP/RAC, 2008). ICZM is not a brand-new concept, but one that has been relevant for the last thirty years (Jiang et al., 2023). Back in the 1990s, one of the leading scholars in integrated coastal governance, B. Cicin-Sain underlined that "*in the past several years there has been growing realization that the world is facing a series of environmental crises – some global in nature which threaten the future viability of life on earth, and some more local in nature which threaten the attainment of development and quality of life*" (Cicin-Sain, 1993). Already back then, the challenges of climate change and sea level rise were being considered, with an explicit need for a holistic and balanced approach between different institutions and interests (Vellinga and Klein, 1993).

The problems of unsustainable consumption of space and resources and ongoing biodiversity crises in coastal areas are even more pronounced today due to the current state of the climate. Greenhouse gas

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emissions continue to grow, and it is likely that warming will exceed 1.5°C before 2050. With increasing emissions and temperature, extreme events occur more often, relative sea level rises, cyclones and storms intensify and floods in coastal and low-lying regions increase (IPCC, 2023).

ICZM is a process that consists of decisions taken to reach three main goals: to accomplish sustainable development of coastal and marine areas, to reduce vulnerability to natural hazards, and to maintain biodiversity and key ecological processes, under the overarching imperative of integration (Cicin-Sain, 1993). Article 5 of the ICZM Protocol of the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean lists the following objectives of ICZM: sustainable development through rational planning, coastal zone and ecosystems preservation, sustainable use of water and natural resources, reduction of the effects of natural hazards and climate change, and coherence between authorities and initiatives that affect the use of coastal zones (UNEP/MAP/PAP/RAC, 2008). How is ICZM successfully realized, and what are the factors determining the effectiveness of reaching objectives of ICZM? To address these questions, we will take a close look at some of the key success factors for ICZM: integration, implementation, coordination between science and policy, and appropriate governance.

Integration has been reported as one of the key success factors for ICZM. According to Cicin-Sain et al. (1998), the continuum of coastal management integration can be seen as consisting of five stages: fragmented, communication, coordination, harmonization, and integration stage. However, there are several dimensions of integration that need to be considered (Cicin-Sain, 1993). Specifically, the integration among:

a. different geographies, spatial and temporal components (Prem, 2010; Haasnoot et al., 2013; Caviedes et al., 2020; Werners et al., 2021; Caviedes et al., 2022);
b. different sectors and levels of government (Markandya et al., 2008; Prem, 2010; Bell et al., 2013; Malchykova et al., 2019; Albotoush and Shau-Hwai., 2019);
c. various sources of data and technology (Fabbri, 1998; Bell et al., 2013; Murata et al., 2019; Hietala et al., 2021; Perillo et al., 2021; Yu et al., 2021; Kandrot et al., 2022; Saad et al., 2022);
d. legal frameworks and approaches, different sectoral policies and strategies (Nagabhatla et al., 2019; Ramieri et al., 2019; Kies et al., 2020; Le Tissier, 2020; de Lima et al., 2022; Stori et al., 2023);
e. different branches of science and policy (Forrest, 2006; McFadden, 2007; Shipman and Stojanovic, 2007; Billé, 2008; Portman et al., 2012; Bremer and Glavovic, 2013; Cantasano et al., 2017; Sienkiewicz and Mair, 2020).

All of these dimensions of integration should be taken into consideration, which in turn contributes to the complexity of any ICZM process. In addition, ICZM as a framework is strongly focused on participatory approaches and depoliticizing processes (Bell et al., 2013; Voyer et al., 2021), which can result in the marginalization of cultural and social values. This can be an issue because the omission of such values, e.g. of coastal cultural heritage (Khakzad et al., 2015), may result in a lower social acceptance and impact of policies (Vanclay, 2023).

Another important and closely related success factor is **implementation**. A lack of implementation is one of the key problems hindering effective ICZM. Preparing ICZM plans and programs that do not get implemented is a waste of money, time, and resources (Sorensen, 1993). Non-implementation can be a result of a lack of coordination between regulatory authorities with different levels of government (Markandya et al., 2008; Malchykova et al., 2019), and of leaving ICZM to local or regional authorities (Shipman and Stojanovic, 2007; Buono et al., 2015; Warnken and Mosadeghi, 2018). The authorities often struggle to implement ICZM just as similar environmental regulations due to limited capacity, resources, or competing demands (Young, 2013; Rosendo et al., 2018). Besides institutional coordination, additional challenges for ICZM implementation are stakeholder engagement (Billé, 2008; Bell et al., 2013; Khelil et al., 2019) and different economic and political interests, which impact the level of construction in coastal areas (Sanò et al., 2010; Sanò et al., 2011; Lincke et al., 2020) and therefore affect climate change adaptation (Lincke et al., 2020; Stori et al., 2023).

The third success factor that we will examine is a good **coordination** between **science** and **policy**, which contributes to the success of ICZM (Shipman and Stojanovic, 2007; Billé, 2008; Cantasano et al., 2017; Sienkiewicz and Mair, 2020). Although ICZM is based on scientific knowledge of coastal dynamics and ecosystems (Forrest, 2006), and science is recognized as an important base for coastal planning according to the ICZM Protocol principles (UNEP/MAP/PAP/RAC, 2008), McFadden (2007) claimed that science had disappeared from ICZM. According to McFadden, ICZM does not sufficiently emphasize the fundamental need for integrating interdisciplinary scientific knowledge for good governance of coastal areas. However, linking scientific knowledge to policymaking is a challenge (Cash et al., 2002; Pielke Jr, 2007), as there are various scientific disciplines and other forms of knowledge that should influence policymaking, such as managerial, lay, traditional and indigenous knowledge (Coffey and O'Toole, 2012). These different knowledge types integrate with decision-making via participatory processes. Any knowledge gaps that remain after this process are strategically filled by additional scientific research (Bremer and Glavovic, 2013). Scientific information needs to be salient, credible, and legitimate (i.e. relevant, believable, fair) to be valuable to decision makers, so that they get the information they need to resolve a certain issue (Cash et al., 2002). Since policy decisions are not only influenced by science, but also depend on the balancing between values, priorities and different interests, there is a need not only for knowledge sharing across different disciplines (Alterman and Pellach, 2021), but also for a transdisciplinary co-creation of science and policy (Sienkiewicz and Mair, 2020).

The final success factor regards **governance** - *"the institutions, structures, and processes that determine who makes decisions, how and for whom decisions are made, whether, how and what actions are taken and by whom and to what effect"* (Graham et al., 2003; Lockdown, 2010; Bennett and Satterfield, 2018). Governance regards different committees, councils and boards that make decisions (Graham et al., 2003; Bennett and Satterfield, 2018; PAP/RAC, 2021), which links it with management – actions and resources that result from governance (Lockwood, 2010; Bennett and Satterfield, 2018). Governance can be monocentric or polycentric – including single or several powers of decision-making (Ostrom, 2017; Huitema et al., 2019; Plan Bleu, 2023), the latter being particularly relevant for broad societal challenges, such as climate change and sustainability (Morrison et al., 2019). Governance in ICZM means ensuring that local stakeholders and civil society participate in a transparent decision-making process (UNEP/MAP/PAP/RAC, 2008), and it needs to be fine-tuned to local contexts and power relations (Ernoul, 2010; Ernoul and Wardell-Johnson, 2013), given that both national and local power relations play a key role in governance networks (Maes et al., 2018). Stakeholder participation is commonly recommended (Debelić, 2018), but it should be complemented by political will and appropriation by civil society (Billé and Rochette, 2015). Decisions in ICZM are shaped by power relations between stakeholders (Klimašauskaitė and Tal, 2020), since power relations and politics easily challenge the functioning of governance systems and have an impact on environmental governance (Bennett and Satterfield, 2018). Finally, the key attributes of salience, credibility and legitimacy are not only important to overcome boundaries between science and policy, but between local, national, and global levels of governance, as well (Cash et al., 2002).

After this reflection on key components influencing the success of the ICZM, we are ready to delve into the case study of the process of preparation of ICZM coastal plan preparation for the Tangier-Tetouan-Al Hoceima region in Morocco. What factors contribute to a successful realization of the ICZM process? By checking how the ICZM works in

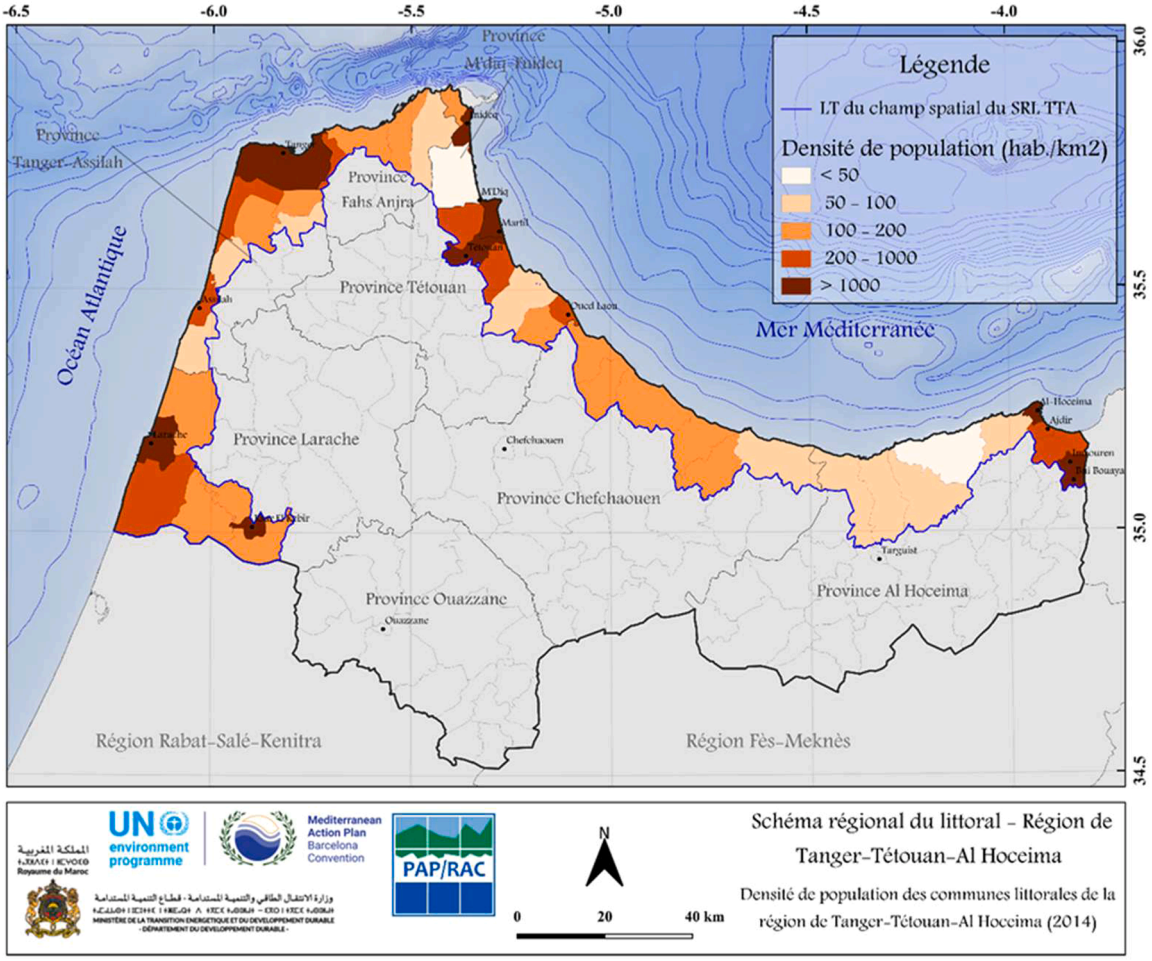

Fig. 1. Tangier-Tetouan-Al Hoceima is one of Morocco's most densely populated regions, particularly its coastal zone (delimitation of the spatial domain prepared for the regional coastal plan).

real life by zooming in on the process of preparation of the coastal plan we will identify factors that influence the context-specific interpretation of the ICZM in Morocco, which is the key research objective of this article.

2. Study Area

With some 447 km of coastline stretching along the Atlantic ocean-front, the Strait of Gibraltar, and the Mediterranean coastline, the Tangier-Tetouan-Al Hoceima (TTA) region's coastline faces major societal and economic challenges, such as dense population, industry and logistics, resort and tourism, fishing, and agriculture pressures, that are associated with increasing exposure to risks related to climate change (Agharroud et al., 2023). TTA is one of Morocco's most densely populated regions, with a population density of more than four times the national average. (Haut-Commesariat au Plan, 2023). In the past few decades, the population and economic activities moved to the coastal areas and this heavy urbanization makes the coast more exposed to coastal risks, shown by extensive literature on these ever-increasing pressures (Snoussi et al., 2008; Snoussi et al., 2009; El Mrini et al., 2012; Satta et al., 2016; Aitali et al., 2020, Ivčević et al., 2021, Plan Bleu, 2022; Agharroud et al., 2023) (Fig. 1). TTA is newly created region (in 2015) characterized by stark physical and socio-economic differences that has a legal, administrative, and financial autonomy and is a result of Morocco's efforts to decentralize government and governance to its regions (Agharroud et al., 2023).

Morocco adopted its Coastal Law 81–12 in 2015, the main framework for the protection and sustainable development of the coastal zones, which is in line with the main guidelines of ICZM, as stipulated in the ICZM Protocol of the Barcelona Convention. The Coastal Law requires the elaboration of a National Coastal Plan and Regional Coastal Schemes (*Schéma Régional du Littoral (SRL)*, or regional ICZM coastal plan). Such SRL needs to consider the delimitation of non-buildable zones and zones in which certain activities are prohibited or subject to certain restrictions, and "adopting an integrated management approach that takes into consideration the coastal ecosystem and climate change" (Loi n° 81–12 relative au littoral, 2015; Benmassaoud and Ibnkhaldoun, 2020). Although Morocco has focused on climate policy and adaptation (Idllalène and Van Cauwenbergh, 2016), those objectives are not explicitly mentioned in the Coastal Law, and climate action still needs to be translated into concrete measures and implementation on the ground (Idllalène and Van Cauwenbergh, 2016). This leaves the hope that the ICZM is a framework for linking scientific results with operative planning for coastal adaptation and other policy goals (Perelli, 2018). Since ratifying the ICZM Protocol in 2012, and adopting these legal and institutional frameworks, Morocco seems to have the prerequisites to implement climate change adaptation strategies in coastal management (Agharroud et al., 2023). For this reason, the coastal plan of the Moroccan region TTA seems to be a relevant and current case study for the question of ICZM and the factors that contribute to its success.

3. Methods

3.1. Context

Within the process of ICZM plan preparation for the TTA region under the MedProgramme,[2] participatory workshops were organized according to the UNEP/MAP/PAP/RAC methodological guidelines for ICZM (UNEP/MAP/PAP/RAC, GWP-Med and UNESCO-IHP, 2015). Moroccan Coastal Law was supplemented by Decree no. 2–15–769 (December 15, 2015) and set the composition, number of members, and functioning of the national and regional commissions, which oversee developing regional coastal plans. According to this legislation, the Regional Commission of the Integrated Coastal Management of the region TTA was signed by the Wali (regional governor) on September 21, 2021. The Commission consists of sixty-eight stakeholders, and the Regional Environment Directorate acts as the Commission's secretariat. The workshops were organized with the support and direct secretariat's engagement. Five participatory workshops were organized from March 2022 to June 2023 in Tangier: four workshops regarding the preparation of the coastal plan and following the methodology of ICZM, and one workshop regarding climate change risks and adaptation.

3.2. Participant observation

Based on the first workshop, the stakeholders defined the priority themes of the coastal plan: the coast – its uses and spatial development, blue and green economy, risks and pollution, water, governance, and equitable society. The stakeholders raised concerns that the process and project focused too much on climate change and on gender, compared to other issues in the coastal areas that stakeholders deemed more relevant. Although the workshops are the part of each ICZM coastal plan drafting process, they brought up some fundamental questions regarding the ICZM process. To dig deeper into these, a set of questionnaires and interviews was integrated into the process to better understand the stakeholders' expectations and respond to them, with the overall aim of enhancing stakeholder engagement and increasing the success of the regional ICZM coastal plan. French, UNEP/MAP's co-official language, was the language of workshops, questionnaires, and interviews. Although administrative language of Morocco, it was not mastered by all stakeholders equally. Translation to official languages Arabic and Amazigh was not provided.

3.3. Questionnaires

Short paper questionnaires were distributed to the participants after each workshop, except for the introductory one that was on defining the priority themes. Besides questions on the content of the workshop and the key message taken, questionnaires included questions on ICZM objectives and their relation to the TTA coastal plan, the development of sustainability indicators, and the future vision of the coastal plan in the next twenty years. The suggestions regarding the TTA coastal planning process are directly linked with the research question on factors determining ICZM's successful realization. All questions were open-ended. People filled in the questionnaires by themselves, directly at the end of the workshops. The anonymous questionnaires allowed for individual input on the coastal plan preparation process from all stakeholders, since the number of participants per workshop and different levels of institutional interest in the process resulted in a small number of stakeholders actively participating during the workshops.

Table 1
Participatory workshops, number of participants by gender and number of filled in questionnaires.

	Workshop	Women	Men	TOTAL	Nb of questionnaires	Response rate (%)
1	Inception	17 (35 %)	32	49	/	/
2	Diagnostic	33 (33 %)	68	101	42	42
3	Climate change adaptation	28 (47 %)	32	60	17	28
4	Co-construction	19 (27 %)	52	71	21	30
5	Planning	24 (36 %)	43	67	32	48

Table 2
Three groups of institutions interviewed: steering – advice – administrations.

	Steering institutions	Advice	Administrations
1	Wilaya of the Region TTA - General Secretariat of Regional Affairs	Urban Agency of Tangier	Province of Fahs Anjra
2	Wilaya of the Region TTA - Environment and Risk Management Division	National Institute of Fisheries Research	Province of Tetouan
3	Regional Council TTA	Hydraulic Basin Agency Loukkos*	Prefecture of M'diq Fnideq
4	Regional Directorate of Environment	Abdelmalek Essaâdi University*	Province of Larache*
5	Regional Directorate of Equipment, Transport, Logistics and Water	National Agency for the Development of Aquaculture*	Province of Al Hoceima*
6	Regional Directorate of Water and Forests and the Fight against Desertification in the Rif	Chamber of Maritime Fisheries of the Mediterranean	Province of Chefchaouen*
7	Regional Inspection of Urbanism, Architecture and Land Use	National Agency of Ports and Tangier Port	**interviews held online*

3.4. Interviews

A complementary and non-anonymous method used were individual interviews. They were designed to further discuss the TTA coastal plan preparation process and the suggestions for the ICZM's success. As it was not possible to conduct interviews with all sixty-eight stakeholders from the Regional Commission of the Integrated Coastal Management of the region TTA, and in order to carry out the interviews within a reasonable timeframe given the limited resources, the focus was on commission members representing institutions which are most concerned with the steering of the integrated coastal governance – such as the wilaya (governorate), the TTA regional council, regional branches of the respective national ministries of environment and water, as well as the provincial administrations and a selection of advisory institutions. The selected stakeholders for interviews were reached through the Regional Environment Directorate since this institution acts as the Commission's secretariat. The interviews were conducted between the fourth and fifth workshop (January-February 2023), fourteen interviews were held in person, in the offices of the interviewed institutions, and six interviews

[2] MedProgramme is financed by the Global Environment Facility and implemented by the Mediterranean Action Plan/United Nations Environment Programme (UNEP/MAP). MedProgramme aims to operationalize priority actions to reduce key transboundary environmental stresses in Mediterranean coastal zones, building climate resilience and water security, and improving the health and livelihoods of coastal populations. In Morocco, all activities related to the coastal plan's preparation were organized under the auspices of the Ministry of Energy Transition and Sustainable Development - Regional Environment Directorate. Among international partners implementing these activities are two UNEP/MAP Regional Activity Centres (RACs): the Priority Actions Programme (PAP/RAC) and the Plan Bleu (PB/RAC), with additional activities held by GWP-Med and UNESCO IHP.

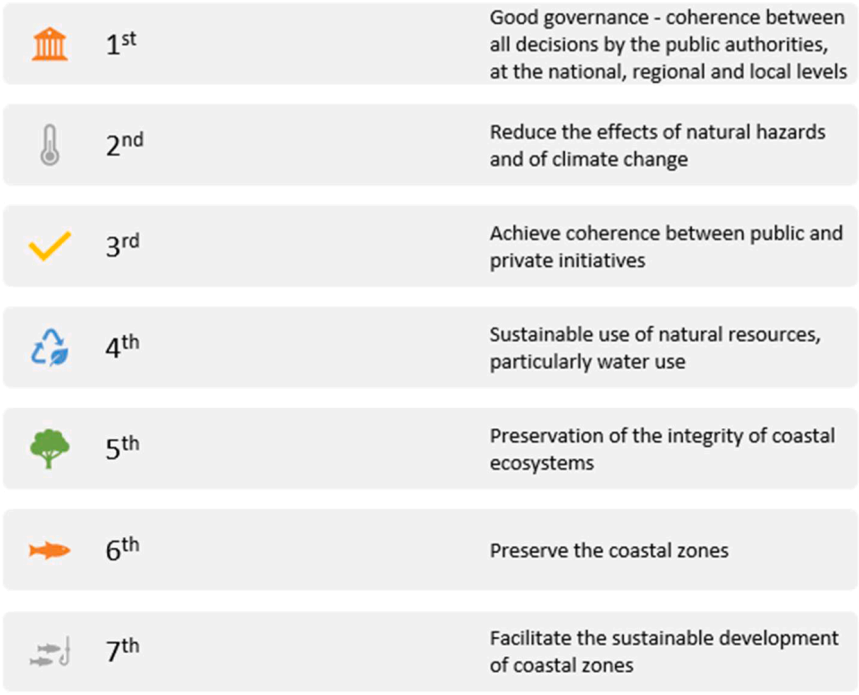

Fig. 2. Stakeholders consider good governance and reduction of the effects of natural hazards and climate change as the most difficult objectives of ICZM to reach in the region TTA (©Mentimeter replies obtained during the fourth, co-construction workshop in Tangier, 8 March 2023).

were held online via videoconference. Interviews were held following an interview guideline for which the ethical approval was obtained by the Vrije Universiteit Brussel's ethical committee for social sciences. Thirteen questions in the interview guide were sorted into five main groups: the main issues in the coastal areas of the region TTA, the ICZM process and the coastal plan, the challenges of implementation, the form and utility of participation processes, and the coastal risk management measures in the region TTA. The full list of questions used in interviews is provided in the Appendix.

3.5. Data analysis

Data was analysed qualitatively. Table 1 provides statistics on participants and answers to questionnaires after each of the workshops. Table 2 lists the institutions from which representatives were interviewed - there were twenty interviews conducted, and the interviewees were grouped into three categories – steering, advice, administrations. The interviews were fully transcribed, and the verbatim of the interviews and the questionnaires can be found in the supplementary data. Manual qualitative coding was conducted and the recurrent patterns from the questionnaires and the interviews allow for a direct reporting of the key results.

4. Results

Throughout the process of the regional ICZM coastal plan for the region TTA, **governance** crystallized as a particular challenge and the key ICZM success factor.

Based on the first workshop, governance was identified among the priority questions and challenges and chosen as a priority theme in the coastal plan, along with the coast – its usage and spatial development, blue and green economy, risks and pollution, water, and equitable society. During the second workshop, when asked about the key information that influenced their opinion about ICZM, among the answers was the reinforcement of consultation processes for good governance and the lack of coherence between the stakeholders related to the ICZM. The need for developing and promoting the ICZM Protocol was recognized, as well as its socio-economic, environmental and governance aspects. Also, the preparation of the coastal plan is detected as an example of the good ICZM practice. At the end of the third workshop, some of the participants described the ICZM as a participatory approach and foresight which takes into consideration particularities of each zone and territory, as the mandatory process with a strong implication of all the actors involved needed for its success, and as the process that represents integration, transversality, and governance. During the fourth workshop, the participants expressed opinion that a good governance is among the ICZM objectives the most difficult to reach in the region TTA regarding the preparation of the coastal plan, followed by the reduction of the effects of hazards and climate change (Fig. 2). After the workshop, the stakeholders were asked for ideas on how to improve governance related to the coastal plan over the following twenty years. The main ideas relate to an administrative body dedicated to coastal management (either in the form of an independent agency, a steering or sub-technical committee, or a dedicated department in charge of specific data gathering and sharing). This body would be endowed with strong and binding mechanisms, with dedicated resources and prioritisations of actions, which means that it must be more than an administrative body. Given the current governance structure where it is only clarified that the Regional Commission is chaired by the Wali of the region or representative, and that the Regional Environment Directorate has a role of the Commission's secretariat, more structure, hierarchy, and elaboration on decision-making processes is indeed needed.

During the interviews, the stakeholders reiterated that governance is a key success factor, but what it actually means to stakeholders and how it relates to participatory processes, remains open. Governance is considered to relate to decision-makers only: "*What needs to be strengthened is the local authority, the wilaya, the provinces, they need to be more integrated. They are the primary decision-makers, they are the governance…*" (1F_Advice); or to all stakeholders: "*It is necessary to find mechanisms of participation of each actor and its responsibility, it is the governance*" (6M_Steering). It also relates to participation or engagement: "*The [Coastal] Law has not been able to address the issue of participation in the SRL process, this is a weakness among weaknesses. To achieve an SRL the law must prescribe the modalities and the whole process, which*

are the intervening ones, the deadlines, when I make the comparison with the other development schemes […] All this process is well established by the law, which is not the case for SRL. To remedy this weakness, it is necessary to have a very strong institutional support, the backing, the administrative and scientific part, and we have forgotten raising awareness of the citizens, to engage the civil society because the land is in the interest of everyone, so the interest is very high. Based on the experience of Rabat, we must establish a system of governance more or less effective and relevant." (3M_Steering) Many stakeholders consider some of ICZM's objectives very difficult to achieve, particularly governance, as stated: "*ICZM - It is a tool for governance of the coast and the objective of sustainable development, it is necessary to have coherent reflections and actions, it is necessary to have instruments for balances between human and natural aspects, in order not to overexploit the resources.*" (18M_Administration). However, some institutions are not sufficiently engaged, particularly not the key institution for the process – wilaya: *"[…] we need leadership, which is missing. This work must also be carried at the wilaya level. It is the Wali who must carry the process […] When the Wali's administration intervenes, the participation and quality of the other administrations automatically improves. The SGAR (General Secretariat of Regional Affairs) is very important, it is the SGAR which must ensure the coordination and the convergence of the interventions of the State at the level of the region. […] it is the SGAR that must ensure coordination at the regional level, it is a secretariat at the service of the Wali, it is the service which will help the Wali to coordinate and converge"* (3M_Steering).

Secondly, the stakeholders indicated via questionnaires that the **integration** in an ICZM coastal plan preparation is "a delicate business" and it needs to be "built together". "It would be better if there were more integration and consultation with stakeholders". "The integrated approach, which tackles issues in a transversal manner" is among the challenges in the region TTA. However, there are different ICZM components listed that need to be integrated: scientific and sectoral knowledge (fisheries sector, marine spatial planning, ecosystem approach), administration (national strategies into ICZM), and social equity (women in decision-making processes and in coastal planning). Among the weaknesses of the process is "the failure to integrate ministerial bodies in the plan preparation committee, especially urbanism", "the [lack of] quality and availability of data and the integration of territorial experts", "the lack of integration of [separate thematic] diagnostic reports". The interviews confirmed integration as an ICZM success factor and related it to clear visions and to synergies: "*You can't protect the coast without an integrated vision. […] there are several administrative strategies that share the same coastline. We therefore need to invite all the stakeholders who benefit from the coast to have a clear political vision of investments, types of investments and pollution, to have an integrated vision.*" (2F_Steering); "*For integrated management, it's above all about having a clear vision of what we're going to do in the coastal zone, on each coastal section.*" (7M_Steering); "*Management means, firstly, that resources must be preserved and developed, but the efforts of the various stakeholders must be in synergy. Each department knows an enormous amount, but sometimes it's the synergy that's lacking. It is through this integrated management that we hope to preserve these coastal zones and make them a lever for socio-economic development.*" (6M_Steering)

Thirdly, the stakeholders recognize the relevance of **science** in the ICZM and think that it would be good "to develop the science-policy interface approach". They also consider as an important weakness of the regional ICZM process the non "participation of regional scientists in the preparation of the regional coastal plan". What is still missing and forms a knowledge gap is the scientific foundation for the public maritime domain which depends on the type of coastline, morphology, currents, and sea level variations: "*The issue of the 100 m where it cannot be built on poses a major problem, given that we have not identified scientifically the public maritime domain and the coastline is very important. And these 100 m will certainly meet with more resistance and discussion and scientific analysis than the rest.* […] *A scientific committee or council needs to be set up to provide support, because this type of work is scientific in nature. The university needs to be involved.*" (3M_Steering). In addition, marine pollution and fisheries, and a cross-border pollution related to Spain and Strait of Gibraltar, call for bigger participation of regional scientists: "*There is a technical team, but they need to be supplied with more scientists from the region. We also need to involve civil society working in the field, associations, as this is a participatory approach. What's more, the marine environment is not well represented in this [coastal plan] process, in the discussions, neither fishing nor ocean pollution. They have said that it is difficult to define the public maritime domain, and they have not included data on cross-border pollution, which is the most vulnerable area.*" (8M_Advice)

The final success factor relates to **implementation**, particularly to the difficulties encountered with the implementation of ICZM Protocol in Morocco. The results indicate that legal articulation is important for successful implementation. However, the coastal plan "*has to be a binding and enforceable document - you have to consult it, so it's not just an optional reference document.*" (13F_Steering) As stated by the stakeholders, the implementation depends on the decision-makers and the conflict of interest: "*The difficulties of implementation are at the level of decision makers and conflicts of use and interest.*" (15M_Administration); "*For the implementation, it is necessary to raise awareness of the elected officials*" (19M_Advice). Implementation also might depend on the creation of an entity for the coastline: "*For the implementation it is necessary to create, establish an agency for the coastline and monitoring, which will take care for the continuity of this project.*" (10M_Advice); "*The implementation can be strengthened with the creation of an entity that must watch over the coastline, which manages the coastline.*" (4M_Administration).

5. Discussion

In this paper, we argue that ICZM depends on the integration, implementation, coordination between science and policy, and appropriate governance. However, not all of the components have the same relevance for the ICZM process and success. Lessons learned from the case study of the coastal plan preparation for Moroccan region TTA based on the ICZM Protocol of the Barcelona Convention in the Mediterranean indicate that governance is the biggest challenge to tackle. The question of governance remains the key issue of the ICZM and its application in the form of the ICZM coastal plan, to make it useful, maintain its relevance, and to avoid producing only one more document that will be lost among the others in different administrations' shelves.

Based on the work done by and according to Cicin-Sain et al. (1998) five stages of coastal management **integration**, the region TTA is placed somewhere in the middle, at the coordination stage, since the stakeholders communicate in a coordinated way, but to advance towards the harmonization and integration stage, a variety of institutions, particularly the steering ones, need to multiply meetings to discuss both actions and decision-making, i.e., both coastal management and governance. The main institutions first need to agree on the governance structure and on priorities for sustainable development, which will draw a clear direction for the regional ICZM. This calls for the change of stakeholder engagement for certain steering institutions, as particularly mentioned wilaya and more specifically General Secretariat of Regional Affairs. Finally, the work done shows that integration is, and will likely remain, weak without serious negotiations between the steering institutions and territorial administrations, because the round table discussions solve only a part of a problem by forming a common vision and prioritization for planning. After this consultation process, a political process of key institutions is needed, because in the end someone needs to decide (Billé, 2008).

The ICZM's **implementation** in the region TTA so far is weak as well. Besides ICZM's implementation being left to regional authorities (Buono et al., 2015), and besides the lack of coordination between different levels of government (Markandya et al., 2008), we can agree with Rosendo et al. (2018) that local and regional authorities often face challenges in implementation due to the lack of resources and limited capacities. We agree that ICZM facilitates the balancing of social

participation and institutional coordination (Bell et al., 2013), although we cannot confirm the successful balance in the case of the region TTA. The process in TTA showed flaws in decision-making that prevent implementation among the coastal stakeholders, with a lack of local accountability (Shipman and Stojanovic, 2007), and increased bureaucratization (Young, 2013).

Regarding **science**, the global, holistic scientific vision needs to be clear to all stakeholders. Science indeed is present, relevant, and recognized, but it is not as relevant for ICZM as a governance framework, as argued by McFadden (2007). In the TTA case study, it is closer to the transdisciplinary co-creation of knowledge between science and policy (Sienkiewicz and Mair, 2020) than to integration of interdisciplinary scientific research into ICZM. Scientific knowledge is still quite sectoral, maybe due to researchers' lack of interest to engage in interdisciplinary research. Scientific knowledge shared with policymakers indeed needs to be salient, credible, and legitimate (Cash et al., 2002) and these three attributes were respected in the ICZM plan preparation for the region TTA. National and local well-renowned experts produced scientific reports for stakeholders, considering different concerns and values. The salience of scientific contributions to the process was additionally increased by focusing on the priorities detected by the stakeholders themselves, particularly on the topics of coastal spatial planning, coastal risks, economy, and governance, diverting the initial project's focus from climate change and gender, which were considered less relevant by regional and local stakeholders and left to national government to deal with. Although science and international policy proposed top-down approaches requiring ICZM planning to reflect climate change adaptation, the local stakeholders from the bottom up had different views on priorities and called for better governance. Morocco has an ambitious climate policy and aspires to pioneer the climate agenda and the question is whether this ambition 'trickled down' to the region TTA and the stakeholders or is this a capital and national government-driven process. This does not mean that climate change in ICZM is not relevant for the region TTA, but that the stakeholders first want to know which institutions and structures make decisions, how and for whom, and how are the actions regarding the coastal zones they are managing being implemented (Bennett and Satterfield, 2018). With this approach, the scientists positioned themselves as honest brokers of policy change, and not climate change advocates (Pielke Jr, 2007). This all leads us to conclude that the process of preparation of the ICZM coastal plan is a valuable process for the creation of dialogue between science and policy communities.

Governance is the biggest issue for ICZM, it is actually a higher term than ICZM because ICZM is a type of management – and management relates to actions that result from governance (Lockwood, 2010). Governance is not government, it is made of processes and relations among institutions that define how power is implemented, what are the ways of making decisions, and how stakeholders and general citizens can get their voices heard. As Bennett and Satterfield (2018) proposed in their framework for environmental governance, governance must be effective – improving the functioning of the system, equitable – based on inclusive stakeholder participation, responsive – able to adapt to change, and robust – having legitimate, connected, nested and polycentric institutions. In our case, although it might at first seem that region TTA and Morocco represent examples of robust-nested and polycentric governance, we argue that there is still considerable space for improvement. Governance is supported and driven from the top by the national government, but it is still unknown to what extent the responsibility is supported at the regional level who oversees the ICZM, both regarding legal recognition and political will. The engagement of different administrations and decision-makers is not clearly set in the process. Public participation or engagement does not seem to have an impact on the overall ICZM project objective, as in Ernoul (2010), probably because of the lack of leadership by the key institution of wilaya (SGAR). We agree with Maes et al. (2018), reasoning on network governance in the context of disaster risk management, that although governance networks enhance participation, they also dilute political responsibility and obscure accountability – which seems to be our case. In addition, actors responsible for the ICZM process in Morocco need to work on avoiding cronyism, conflicts of interest, and bureaucratic paralysis, which can undermine the environmental regulation and ICZM policy implementation (Young, 2013). Finally, regarding the governance framework, despite the call from several participants for one overarching coastal management agency, we consider – as suggested by Markandya et al. (2008) – that this is only one of the possible options for governance structure. Examples show different governance structures, such as establishing a Coastal Commission, Council and Forum (Bell et al., 2013) or the recent case of the three boards with similar divisions of roles (Coordination, Partnership, Advisory) for the Coastal Plan for Split-Dalmatia County, Croatia (Obalni plan SDŽ, 2021). Based on these examples, a governance structure with three boards was proposed for the case of the TTA: a restricted group of Steering Institutions, consisting of the six most integrating and relevant regional bodies, a group of territorial Administrations, and an Advice board - broad panel of sectoral, scientific, and civil society members. Regardless of which governance system different coastal areas choose for themselves, negotiations are of key importance to advance governance since the functioning and the integration of knowledge, stakeholder participation, and implementation need to be clearly outlined between the boards. However, all of this will not be enough without a strong political will, leadership, and mandate – the starting ingredients for the ICZM (Idllalène and Van Cauwenbergh, 2016).

Although participation is its force, this study also illustrates the limitations of stakeholder engagement, which makes it fail in terms of equitable governance (Bennett and Satterfield, 2018). The stakeholders that contribute to the work of the Regional Commission of the Integrated Coastal Management of the region TTA are pre-established by the decision of the regional governor (Wali) and are mainly from the regional administrations. The Commission's Secretariat was nominating appropriate NGOs and participants and played a key role in setting the scope and limit of the project. We did not have the opportunity to invite other stakeholders and enlarge consultations with civil society representatives and regional scientists, which would be expected for a formal administrative procedure of coastal plan preparation. There was no 'feedback loop' for stakeholders to influence this process, which should ideally be the case in a truly participatory context, although that can be lengthy and time-consuming. The project, which is a fruit of international cooperation, brings certain dynamics and imposes some constraints on the participatory process, as well as funding constraints. Similarly, the relationship between regional and national levels, as well as institutional relations within the region, particularly between wilaya and the other steering institutions, could be more explicit. It is not negligible that TTA is a big region, composed of sub-regions, and participatory processes at that scale are challenging by nature, in addition to stakeholder fatigue experienced. There is also an open question on what stakeholder engagement and participation mean. At which level do the stakeholders need to participate in the process so that we can state that they are actively engaged and how to organize the participation? Establishing clear relations between different institutions included in the ICZM process contributes to solving the problem of coastal governance in the region TTA and beyond. This was formulated by one of the stakeholders engaged in the participatory process: "*ICZM - It is a tool for governance of the coast and the objective of sustainable development, it is necessary to have coherent reflections and actions.*"

6. Conclusion

The ingredients for a successful ICZM policy, based on the drafting of the ICZM coastal plan in Morocco, cannot be reduced to power relations and political will only. Political decisions, if directed in line with the objectives of ICZM, facilitate integration, facilitate, and speed up implementation and data sharing between institutions. They also

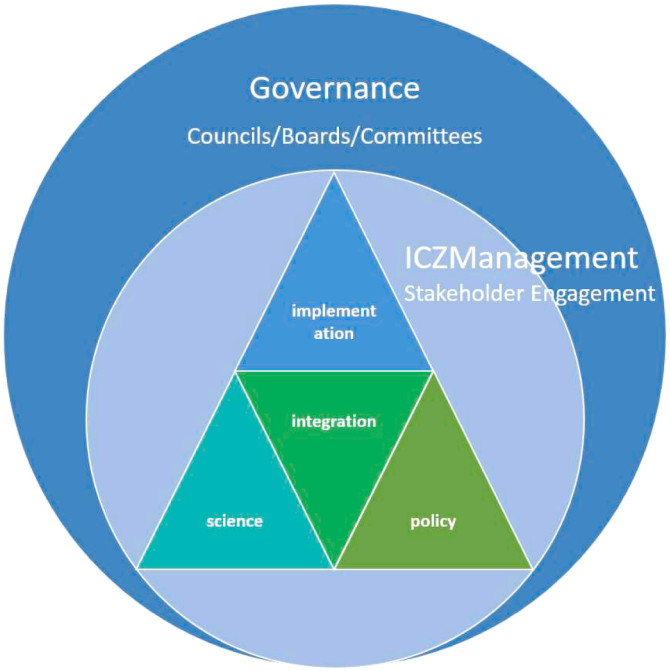

Fig. 3. Relationship between integrated coastal zone management and governance that contribute to sustainable development of coastal areas.

influence law enforcement, the provision of dedicated budgets for implementation, scientific research, innovation, and governance structures, and show the path, adopt a type of governance, and decide on the levels of stakeholder engagement - ideally, participatory processes also inform some of these phases. Political will indeed does a lot, but more is needed. Integration is a slow and tiresome process that takes a lot of time, energy, and institutional commitment to be put into place. Implementation depends on those three ingredients, in addition to resource constraints. Scientific knowledge produced for policy and shared with policymakers needs to be legitimate, credible, and relevant to serve the purpose. However, to be credible and relevant, science should not reduce the choice of alternatives that stakeholders and policymakers concerned with the problem have in front of them because the policy only partly depends on scientific information and evidence. Only through transdisciplinary co-creation of knowledge between stakeholders, academic, and non-academic actors can policymakers truly adhere to solutions for common problems. It is important to engage in the quest for solutions with civil society because in that way bigger parts of society would follow the lead towards sustainability, which increases the complexity of the system but remains feasible in engaged communities. Finally, there is governance, which indeed is of higher order than ICZM management in the scope (Fig. 3). Governance includes not only a detailed algorithm on who, when, how, and where decisions are made, but also what type of stakeholder participation and which level of engagement is expected and includes responsibility for the decisions made that will influence the path and the speed of sustainable development.

CRediT authorship contribution statement

Ante Ivčević: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft. **Daria Povh Škugor:** Funding acquisition, Investigation, Methodology, Writing – original draft. **Maria Snoussi:** Investigation, Methodology, Writing – original draft. **Michaël Karner:** Investigation, Writing – original draft, Project administration. **Matthieu Kervyn:** Investigation, Supervision, Writing – original draft. **Jean Hugé:** Conceptualization, Methodology, Supervision, Writing – original draft.

Declaration of Competing Interest

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

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Appendix

Appendix - List of questions in the interview guide:

1. What is your background - profile and role within the institution?
2. What are the main projects you work on a daily basis?
3. What are the main issues and concerns in the coastal zone of the TTA region?
4. What is integrated coastal zone management (ICZM) and the SRL (regional coastal plan) for you? And what are its main objectives and challenges?
5. Do you think that the Barcelona Convention Protocol on ICZM is relevant? What are its strengths and weaknesses?
6. What are the difficulties encountered in implementing the Barcelona Convention ICZM Protocol?
7. With regard to the Barcelona Convention Protocol on ICZM, how can Morocco's implementation be strengthened?
8. In your opinion, what type of participatory processes have been activated in the preparation of the SRL TTA and for what purpose?
9. Do you think that the active participation of categories of stakeholders is important for making existing and future policies more effective? If you have examples of how participation has been effective, please provide them.
10. Do you think that certain coastal risk management measures should be introduced and which ones? Please be as specific as possible.
11. Does your institution support measures such as coastal retreat or managed withdrawal, and under what conditions?
12. For a quantitative analysis of adaptation options, we will need to know the assets and people exposed to the various coastal risks. From whom can we obtain this information? How long would it take?
13. In the case of interventions to reduce the risk of damage from coastal events, we will need information on the costs of these measures. Who can provide this information? How long will it take?

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.envsci.2025.104027.

Data availability

Data will be made available on request.

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