Tackling Grand Challenges: the role of Collective Action in preserving the Mediterranean coastal ecosystem

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Abstract

Grand Challenges like climate change and biodiversity loss require collective multistakeholder actions. Addressing these complex issues involves overcoming normative value differences among stakeholders. This paper investigates the use of rhetoric to pursue meta-consensus as a mean to foster collaboration, trust, and shared governance, creating sustainable solutions and aligning diverse stakeholder objectives for effective collective action. The paper presents the preliminary results of stakeholder analysis and engagement in two Mediterranean sites to propose nature-based solutions enhancing coastal resilience to climate change. Findings highlight differences among stakeholders through mapping, prioritization, and engagement activities, aiding navigation towards meta-consensus and effective collaboration. By understanding stakeholders' perceptions and encouraging them to impersonate others, we can better address conflicts and foster mutual acknowledgment.

Framing of the research. *Complex challenges like climate change, ecological degradation, social inequality and public health came to be known as Grand Challenges (Ferraro et al., 2015; George et al., 2016; Gümüsay et al., 2020). Grand Challenges can be defined as specific barriers that, if removed, would solve significant societal problems with a high likelihood of global impact through widespread implementation (George et al., 2016). These challenges are generally global, affecting large populations (George et al., 2016; Ferraro et al., 2015) and are inherently complex, involving multiple factors, high uncertainty, and temporal non-linearities (Ferraro et al., 2015; George et al., 2016; Bridoux and Stoelhorst, 2022; Lants et al., 2024). Grand Challenges are usually urgent, requiring prompt solutions to prevent further harm and create long-term solutions (Bridoux and Stoelhorst, 2022). Among the main contemporary Grand Challenges the "triple planetary crisis" - referring to climate change, biodiversity loss, and pollution - is considered one of the greatest challenges that human societies have ever faced (Passarelli et al., 2021). Coastal ecosystems are affected by the triple planetary crisis. These ecosystems play a crucial role for socio-economic wealth and provide crucial services to mitigate the impacts of climate change (Reed et al., 2022). However, they are under increasing stress from pollution, overdevelopment, and climate impacts, which include rising sea levels and intensifying storms.*

Such complex challenges generate competition among people priorities (Passarelli et al., 2021). Indeed, different stakeholders prioritize time and profit returns differently (Passarelli et al., 2021; WEF, 2023). For example, economic actors prefer to forego long term investments for climate adaptation in favour of short term returns, while social acotrs and civil society recognise the need for long term investments, provided they do not have interest in short term returns. Investing in sustainability and ecological restoration requires a trade-off between short term economic returns in favour of collective long-term benefits (WEF, 2023). This conflict is then value-laden because it entails reconciling economic imperatives with ethical obligations (Bowen and Heath, 2005) or local needs with global obligations (Potz, 2004), addressing priorities' diversity among people (Gümüsay et al., 2020; Schwoon et al., 2024). These factors, along with normative value differences, affect the importance and urgency stakeholders attach to the challenge, which stimulate slowdowns, uncertainties, and non-optimal solutions (Lantz et al., 2024).

The inhomogeneity among people perspectives exacerbates the intrinsic temporal uncertainty, non-linearity of non-human agents' behavior (Lantz et al., 2024). Such complexity makes pivotal navigating diversity within collective actions combining various sectors, governments, businesses, academia, and non-profit organizations (Ferraro et al., 2016).

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Conference Proceedings
ISBN 978-88-94-7136-7-1
DOI 10.7433/SRECP.SP.2025.01

Conflicts can be harnessed as catalysts for better outcomes, bringing different perspectives and improving problem solving through reciprocal acknowledgment, stimulating knowledge sharing, drive innovation, and promote sustainable development (George et al., 2016; Bridoux and Stoelhorst, 2022). As for all Grand Challenges, preserving the costal ecosystem cannot be addressed by a single agent (Ferraro et al., 2015; Bridoux and Stoelhorst, 2022). Management studies recognize the need for collective multistakeholder actions to address grand societal challenges (Arenas et al., 2020; Ferraro et al., 2015), as innovative responses to such challenges (Moog et al., 2015).

The success of these collective actions requires coordination, active collaboration, trust, reciprocity, shared governance and leadership toward a common goal (Bridoux and Stoelhorst, 2022). Thus, designing collective action involves developing common ground among stakeholders, creating a shared perspective, and overcoming normative value differences (Ferraro et al., 2018; Lantz et al., 2024). A solid branch of research focuses on establishing common ground using rhetoric as a mean to shape public discourse, to trigger institutional change, and to stimulate social cohesion motivating action (Burke, 1969). Indeed, rhetoric harnesses the fundamental role of language in shaping individual and collective reality, redefining how the world is interpreted and experienced (Hassan and Prasad, 2025).

Rhetoric can help build common ground among stakeholders about ecosystem-based solutions for coastal ecosystems degradation. Indeed, rhetoric shapes identity through narratives and symbols, framing roles and capabilities (Spaneth and Urbano, 2025). It can redefine cognitive categories or introduce new ones, thus reframing social dynamics influencing public perception and the category itself (Lee and Stiruk, 2025). This aligns to a better collective framing of time and nature which, through scientifically robust framing, can help the convergence of normative values stimulating trust among actors. Ultimately, the rhetoric exercise nurtures legitimacy (Hassan and Prasad, 2025; Erkama and Vaara, 2010), that sparks from the sense of urgency and appropriateness of actions (Lants et al., 2024).

Among the techniques to harness rhetoric to create common ground among stakeholders, the concept of meta-consensus was born to overcome the barriers of normative values differences and develop common solutions (Schwoon et al., 2024). Meta-consensus is achieved through the creation of common ground as "the set of presuppositions that actors, as a result of their ongoing sensemaking and interaction with others, take to be true-and believe their partners also take to be true" (Cornelissen and Werner, 2014). To this purpose, meta-consensus starts from making actors accept to take part in the dialogue, allowing them to enter a safe space of equal confrontation and share a first common purpose (Ferraro et al., 2018). A second step seeks to shift the rhetoric perspective from the substantive to the procedural level, harnessing a participatory architecture approach (Ferraro et al., 2015). To this purpose, a fundamental leading figure are the designated bridging stakeholders, helping participants to agree on basic dialogue rules. (Ferraro et al., 2018; Schwoon, 2024). Achieving meta-consensus then allows a shift from procedural to substantive communication to design common solutions (Schwoon, 2024). Despite this workflow being hard to run in real life, it is an ideal optimal aspiration (Ferraro et al., 2018) and has shown to be promising in structured engagement processes, provided the right emphasis on the role of the bridging stakeholders (Schwoon, 2024).

Successful cases applying meta-consensus seek to focus on stakeholder diversity and the set up of clear communication mechanisms to the purpose of letting different view emerge for reciprocal acknowledgment. (Schwoon, 2024). This process favours to the alignment of objectives and the balancing of goals and priorities, which constitute the backbone of the common ground at the base of collective action.

Purpose of the paper. *Focusing on two pilot sites in the Mediterranean area, where stakeholders must cooperate to address climate change and its impacts on the coast, provides a unique opportunity to examine how divergences, conflicts, and different priorities are reconciled through meta-consensus.*

Taking advantage of this context, the present work and its follow-up, seek to explore the research gaps in literature about meta-consensus for collective action. Despite its potential, several gaps remains, comprising (i) how contextual factors, such as stakeholder compositions and power dynamics, influence the formation of meta-consensus, (ii) how trust, built through meta consensus, translates into sustained collaboration; and (iii) how employing experimental methods enable to test and generalise meta-consensus (Lantz et al., 2024; Schwoon et al., 2024).

Methodology. *Context: The research is developed in the context of the European project AMMIRARE financed by Interreg Italia Francia Marittimo in 2024. The project aims at preserving the coastal ecosystem in Mediterranean area from climate change impacts. Facing the climate change effects AMMIRARE will test nature-based solutions (NbS) -as defined in UNFCCC COP27- in two pilot sites to preserve coastal health. But the implementation of these solutions requires the consensus of the local stakeholders such as companies, sports organisations, institutions. The project pilot sites are the Municipality of Cecina in Tuscany and the Marine Protected areas of Portofino in Portofino. These are two of the most Italian tourist sites. Cecina and Portofino manage the climate change impacts from over twenty years. Coastal erosion and extreme events threaten the fragility of these territories. Cecina and the surrounding area host around 115,000 tourists every year from different Italian regions (Chamber of Commerce north-west,2023). The main impact on Cecina's coast concerns the phenomenon of erosion, which has caused the shoreline to recede by more than 100 metres since 1938. Additionally, the municipality and the local enterprises should manage the presence of seagrasses Posidonia Oceanica whose benefits for the ecosystem and the local economy are scarcely perceived by the community (Ruiz-Frau et al.2018). Portofino hosts around 150.000 tourist yearly (Liguria Region 2024) and is one of the main Italian destination from European and American tourists. Portofino offers various activities: yachting, diving, sport and professional fishing represent a significant economic induced activity. Among the main negative effects of climate change are unusually strong sea storms and the introduction of alien species that may compete for colonisation of the substrate.*

For the cited reasons these sites represent a research opportunity to test the collective action initiatives to achieve a meta-consensus about the solutions aimed at improving the coastal resilience to climate change.

Method: Narrative analysis is the qualitative method adopted to achieve the research purpose. In the context of social sciences, narrative research is both a data gathering and interpretive or analytical framework (Ntinda, 2019).
Snowball sampling (Parker et al. 2019) methodology is applied to identify the local stakeholder to engage.

Data collection: The research is built upon close collaboration between the research team with key managers of Tuscany and Liguria Regions, local municipalities and administrations. We used different types of sources to triangulate our findings using cross-checks (Eisenhardt, 1989; Yin, 2003).

The following data sources have been used in this research:

Secondary data sources: Regarding the context analysis and the stakeholder to involve, we started by collecting information through desk research based on various sources, either directly or indirectly related to the pilot sites. Among other things, these sources included the municipalities and marine protected area websites, chamber of commerce annual reports and dataset, tourist operators guide, environmental reports (for instance "Atlante delle coste" published by ISPRA in 2023), five newspaper articles, scientific articles. An extensive amount of materials was either produced or collected by the research team to analyse the health of the two pilot sites and identify stakeholders to involve.

Observations: Observation in field is one of the main sources for collective action development and allows to assess the process of learning and knowledge to achieve meta- consensus.
To collect observational data, researchers enacted diverse observer roles throughout the project. Observational data were collected in the following settings and involved all research team: (i) during technical project meetings; (ii) during in site visits; (iii) during the workshop and other engagement events.

Interviews: The interviews, which provided qualitative information, began in the early months of the project. Regular interviews conducted for each pilot site, involving multiple stakeholders. The interviews were conducted partly in person and partly online and lasted an average of 45 minutes each. Two interviews were completed, registered and drafted in a report.

Totally, from 2024 to 2025, research team attended 10 meetings including two in site visits with around 150 pages of report (table n.1).

Process description: The team held four technical project meetings involving the components of both the Tyrrhenian pilot cases, plus a national representative between March 2024 and March 2025. The purpose to introduce the project and ensure alignment among the partners throughout the project.
A preliminary collection of data within the pilot cases served to describe the context. For both cases, a first introductory meeting was followed by an interview and a site visit. This process was conducted between March and July 2024, involving the respective regional authorities, the local municipalities, the national parks/protected areas representatives and the scientific partners. By constructing the pilot cases context, the team was able to compile a list of relevant local stakeholders, selected and classified following the criteria by Mitchell et al., 1997 to identify salience of each in relation to the respective coastal ecosystem. The list was later validated and expanded through a subsequent meeting with local partners between July and September 2024.
Subsequently, the team engaged the selected stakeholders set in both pilot cases in structured workshops designed to gather their sentiments and opinions within the frame of the project between December 2024 and March 2025.

Data analysis: By coding the interviews and the feedback from the workshops and meeting, we investigated the main stakeholders' misalignments to overcome for an effective collective action. Through axial coding aggregate dimensions emerged, which have been triangulated with the secondary data collected. The aggregate dimensions represent the issues on which the misalignment between stakeholders is greatest and on which engagement actions need to be focused.

Table n. 1 List of collected data (observation and interviews)

Territorial context	Data	Meeting topic	Setting for observation data	Involved Stakeholder	mode
Tyrrhenian area	21-22 March 2024	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	In person
	3 July 2024	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	In person
	3 December 2024	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	On line
	11 March 2025	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	In person
Cecina pilot site	5 March 2024	technical project meetings	First local project meeting	Tuscany Region, Cecina Municipality, research team	In person
	18 April 2024	in site visits	Technical project presentation	Turscany Region, Cecina Municipality, Municipality consultants, research team, National institution, 2 universities	In person
	30 July 2024	interview (45 minutes)	Context description and stakeholder list sharing	Cecina Municipality, research team	On line
	10 December 2024	participative workshop	Collection of Stakeholder perception	Turscany Region, Cecina Municipality, Municipality consultants, research team, 14 stakeholders	In person
Portofino pilot site	08 May 2024	technical project meetings	First project presentation	Liguria Region, Marine Protected area, research team	On line
	16 July 2024	technical project meetings	Context analysis	Liguria Region, Marine Protected area, research team	On line
	19 September 2024	Interview (45 minutes) and in site visit (1 day)	Context description and stakeholder list sharing	Liguria Region, Marine Protected area, research team	In person
	5 March 2025	participative workshop	Collection of Stakeholder perception	Liguria Region, Marine Protected area, research team, 18 stakeholders	On line

Results. *In the very beginning, the team analyzed local pilot cases and identified stakeholders, categorizing them into policymakers, economic activities and industry associations, scientific entities, NGOs and other associations. (tab. n.2 a-b) During the stakeholder mapping process, the team conducted some field visits and repeated contacts with the purpose of better understanding pilot cases, territorial complexity and contextualise stakeholders' claims. Despite some differences among the cases, similar stakeholders share similar claims.*

Table n.2a Stakeholder mapping results. Portofino pilot case.

Policymakers		Economic activities		Scientific bodies	NGO/associations			Total
Local and regional authorities	Resources management authorities	Industry associations	Unions		Environmental/ cultural associations	Foundations	Volounteer organisations	
6	3	18	2	5	19	3	4	60
9		20		5	26			60

Table n.2b Stakeholder mapping results. Tuscany pilot case

Policymakers		Economic activities			Scientific bodies	NGO/associations			Total
Local and regional authorities	Resources management authorities	Industry associations	Unions	Economic activities		Environmental/ cultural associations	Foundations	Volounteer organisations	
2	5	5	2	7	1	1	0	1	24
7		14			1	2			24

The Portofino case stands out for having twice the participation compared to the Cecina case, primarily due to the significant involvement of NGOs and associations. This was expected, given the complexity of the Portofino territory and insights gathered from in-situ interviews. The Portofino pilot case includes a Marine Protected Area, established due to strong advocacy from local diving groups. Unlike Cecina's underwater morphology, Portofino offers extensive habitats

for marine species, providing a unique experience for divers. This complexity and fragility have led to the emergence of several local environmental groups and a strong research ecosystem.

Another difference between the two case studies is the tourism industry. In Portofino, it is mainly constituted by high-spending visitors, whereas Cecina has a more diverse clientele. Consequently, greater tension is observed in Portofino due to the clash between structured environmental awareness and the demands of a high-quality, high-expectation tourism industry. In fact, during in-situ discussions, the Marine Protected Area representative mentioned that conflicts with local beach clubs are often significant. Highlighting this contrast is one of our primary objectives to design the correct leverages and achieve meta-consensus.

After stakeholders were mapped, they were classified according to their salience using criteria based on power, legitimacy, and urgency. A final score rating defined the saliency of each stakeholder as high, medium, low, or none (see tab 3.a-b).

Tab. 3a. Stakeholder classification results. Portofino case

Salience	Policymaker and institutions	Economic activities	Research bodies	NGO/associations	Total
High	6	15	0	25	46
Medium	3	4	3	1	11
Low	0	0	3	0	3
Total	9	19	6	26	60

Tab 3b Stakeholder classification results. Cecina case

Salience	Policymaker and Institutions	Economic activities	Research bodies	NGO/associations	Total
High	4	10	0	2	16
Medium	2	2	1	0	5
Low	1	1	0	0	2
None	0	1	0	0	1
Total	7	14	1	2	24

Generally, we assessed that institutions gain salience because of their coercive power and territorial management responsibility, economic activities gain legitimacy from their physical exposure to natural events which increase their vulnerability. NGO/associations and Research bodies acquire saliency because of their legitimacy, provided that their existence and action are justified by their mission to protect the natural ecosystem and its recognition by society.

The engagement activities gathered a total of 190 comments in the frame of the Cecina pilot case, and 34 comments in the Portofino pilot case. After the two engagement events, responses were recorded, aggregated and refined. We asserted that the comments, both positive and negative, mainly regarded the following aggregated dimensions: Environmental aspects, Social/cultural aspects, Political-administrative aspects, Economic Aspects, Technical aspects. The main findings for each stakeholder group are hereafter identified.

Entrepreneurs and beach club managers have the imperative of maintaining high quality of service and revenue, which sometimes conflicts with other actors and aspects of sustainability. During the engagement process, economic actors showed trust in the effectiveness of solutions for their specific purposes, but contrasting opinions emerged on the economic impacts. The greatest fears are about aesthetic impacts and the reduction of "marketable" space on the shores. Especially from the aesthetic perspective, results are contrasting; some fear that providing a more natural-looking experience may conflict with tourists' expectations, leading to negative economic impacts, while others think that this renewed look would improve the landscape. One economic actor expressed the following opinions about a NbS in the Cecina case: "(this solution) is effective to protect the shoreline from storm surges" but "the presence of natural waste and Posidonia seagrass represents a problem of beach usability for the beach industry." This ambiguity was retrieved also in other stakeholder categories, especially among institutions and civil society (though the latter mainly shows a positive stance).

Institutions and local authorities are interested in preserving the areas and their economic profitability, but they aim to harness the issue to maintain their political power. Some municipalities expressed fear because the solutions are "not attractive for tourism" and provide a "neglected beach appearance". The fear of reduced space and the unattractiveness of a natural-looking beach was shared by other stakeholders. They also fear putting the burden of maintenance costs on beach clubs, probably fearing a political backlash. Nonetheless, institutions and authorities are unanimously confident that these solutions are effective and can increase global environmental quality because they provide defense while reconstructing a habitat lost to erosion.

Scientific bodies and research centers deeply understand the need for ecosystem preservation and consider the intervention a valuable scientific hub to conduct research and collect valuable information, following the streams of ongoing coastal ecosystem monitoring projects. Scientific and technical bodies also share concerns about the required competencies and means for managing solutions, citing "maintenance costs" and the "need for maintenance" as disadvantages.

Non-governmental bodies and associations push for the realization of the actions. Aside from their moral obligations toward ecosystem preservation, sport associations, diving centers, and other related bodies think that their activities would benefit from the interventions, along with helping in their missions of spreading the culture of attachment to the natural landscape. They share with scientific bodies the concern that beach clubs may show disinterest and antipathy towards proposed solutions, fearing that the beach economy will struggle to understand the benefits of these actions. Additionally, there is a worry that civil society will not grasp their purpose initially. Local institutions also emphasized the need to increase awareness of the solutions' benefits.

Contrary to the fears of economic actors and associations, beach users and coastal residents generally have a positive attitude and think that a more natural look would improve the landscape's attractiveness and economic revenues. They are confident that these solutions would improve the cultural stance for sustainability and environmental preservation. Among local communities and beach users, there is a shared feeling that solutions may bring the co-benefits of increased value and attractiveness of a natural-looking beach. Some think that the increase in beach attractiveness may improve the overall quality of life.

Given stakeholders' personal aspirations, inviting them to impersonate other stakeholders in the second round of engagement allowed for developing a novel perspective on reciprocal acknowledgment. Among our results, we assessed a shared understanding of the fears of economic actors. Indeed, there is a division concerning the aesthetic impact on beach attractiveness, despite the majority having a positive stance. Many think that a reduction in the available shore for beach clubs may be a problem for the local economy. On the contrary, there is mild optimism about the positive cultural impact on environmental awareness that may increase economic value.

Our initial results show a preliminary divergence in perspectives. It emerged a significant contrast between the positions held by those benefiting from the status quo and those advocating for change. Local authorities and economic players show scepticism for potential losses in economic income and political support. Conversely, associations and scientific bodies strive to implement the solutions, driven by a combination of moral obligations, material objectives, or the real potential for scientific research on nature-based solutions. These initial divergence highlights how each group's opinions are intertwined with the primary goals, laying the groundwork for understanding the dynamics of consensus formation.

During the second round, initial signs of convergence could be noticed, as the actors started to mildly acknowledge the positions of those with opposing views, testifying the emergence of meta-consensus. This gradual softening of stances through iterative dialogues encourages the participants to reframe their position, making meta-consensus a higher-tier agreement that evolves through continuous interaction and reflective debate.

Overall, all the actors agree that the solutions would be effective to preserve the ecosystem and show a positive attitude towards their realisation. Yet, some significant differences persist. Economic actors and institutions fear that the unusual shoreline appearance would discourage tourists, while beach users seem not to be bothered by this aspect. It is worth noting that the aesthetic aspect is the most ambiguous due to conflicting comments even within the same category. Similarly, while institutions fear that beach clubs may be unfairly burdened by managing and maintaining solutions (likely due to political backlash), scientific bodies consider realization and maintenance a difficult task, so they consider it crucial to conduct awareness campaigns aimed at economic actors and civil society.

Recognising the dynamicity of meta-consensus provides new insights into stakeholder engagement. By designing structured engagement processes to stimulate acceptability and focused on clarifying contentious issues - such as the aesthetic result and impact on the tourism economy, the burden of maintenance responsibilities - it is possible to promote a strong consolidation of viewpoints. By means of this, meta-consensus balances competing interests as long as facilitating a sustainable collective action.

Research limitations. *The study is based on preliminary results from two pilot cases located on the west coast of the Italian peninsula, which limits the variety of territorial and socio-economic contexts, whereas the process could be replicated in other European territories in the Mediterranean area. Consequently, the main limitations are related to the limited temporal scale and geographical scope of the study, as well as inherent biases from participants' understanding of the rules and expertise in the specific field. The current work focuses on applying the same framework to other pilot cases to provide stronger results and allow for comparability. The research progress is still ongoing, and many other research activities will be implemented. Further developments for the study could emerge from a multi-site analysis and a broader, more varied involvement of stakeholders.*

Managerial implications. *Through our work, we were able to frame stakeholders' differences and aspirations within the context of the applied nature-based solutions in the project. By focusing on mapping stakeholders, studying territorial complexity, and engaging with them, we were able to understand how different actors react to the application of various selected nature-based solutions. We acknowledge that different stakeholders have varying perceptions, influenced by their inherent objectives and nature. Additionally, we recognize that when stakeholders impersonate other actors, they somewhat acknowledge each other, showing similar stances. This is promising for the process of meta-consensus.*

These results can bring insightful managerial implications. Conducting a thorough stakeholder screening and relating it to territorial complexity can provide a clear image of advisable actions and potential caveats. Interfacing with stakeholders allows for deeply understanding their stances, aspirations, and fears, highlighting potential contrasts and conflicts that may hinder the successful application of an action. Conversely, encouraging stakeholders to impersonate other actors helps understanding how they acknowledge each other, emphasizing the barriers to be overcome to achieve

meta-consensus. This process helps to achieve legitimacy, it educates and empowers stakeholders, encourages dialogue, and allows for designing highly effective and least regrettable solutions.

Originality of the paper. *This paper explores meta-consensus in marine coastal ecosystem preservation. Building meta-consensus starts with understanding people's feelings, opinions, and priorities to foster trust, legitimacy, and collaboration. The paper's originality lies in designing a stakeholder engagement process aimed at developing meta-consensus for NbS implementation. The main objective was to understand differing views and their causes to design a strategy for navigating differences and building meta-consensus.*

The focus was on mapping stakeholders, the complexity of the territories, and their challenges and objectives. This involved framing pilot cases and iterative interactions, such as in-situ interviews, to develop a deep understanding of each case. Stakeholder engagement activities aimed to grasp stakeholders' thoughts and feelings on proposed solutions, confronting them with their roles and aspirations. Highlighting contrasts and differences among stakeholders is a key challenge in establishing meta-consensus, which is a significant contribution of this work.

Further development of this approach will contribute to the literature on meta-consensus and the challenges of overcoming conflicts in collective actions for ecosystem preservation, by constructing a balanced view among stakeholders' priorities and their reciprocal acknowledgment.

Key words: *Collective actions, grand challenges, meta-consensus, nature-based solutions, stakeholder engagement*

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