

Innovating with nature and people: insights and recommendations for integrated design of blue Nature-based Solutions

POLICY BRIEF #1
APRIL 2024



Krause T^a, O'Leary BC^{b,c}, Boyd E^a, Espinoza Cordóva F^a, N'Guetta A.^a

^aLund University Centre for Sustainability Studies, Sweden; ^bDepartment of Environment and Geography, University of York, UK; ^cDepartment of Ecology & Conservation, University of Exeter, UK

This policy brief outlines how marine and coastal Nature-based Solutions (blue NBS) can help address biodiversity loss and climate change by providing a series of recommendations for integrating blue NBS into complex social-ecological systems.

Nature-based Solutions are management measures that protect and restore ecosystems while placing people and nature, as well as benefits to society, at the centre of decision-making. Blue NBS are expected to contribute to improved environmental health, and support societal wellbeing as well as climate change mitigation and adaptation efforts. This brief aims to facilitate understanding of how blue NBS can be implemented to contribute to the holistic management of marine and coastal social-ecological systems.

Introduction

Protecting and restoring nature is critical for the wellbeing of people and the future of human society^{1, 2}. However, climate change has direct and indirect negative impacts on ecosystem health, biodiversity, and human wellbeing^{3,4}.

Marine and coastal ecosystems are increasingly affected by climate change and biodiversity loss, experiencing escalating exposure to severe climate change impacts, such as sea-level rise, intensified storms, warming/heat waves, and acidification². With over one-third of the world's population (2.75 billion people) living in coastal areas⁵ and, therefore, particularly vulnerable to the adverse effects of climate change on these areas^{2,6}, urgent protection and restoration of marine and coastal ecosystems are necessary.

NBS is an umbrella term for human interventions inspired and supported by nature. They seek to address multiple societal challenges, including climate change and biodiversity loss. NBS translate into management measures that protect and restore ecosystems while placing people and nature, as well as benefits to society, at the centre of decision-making.

In marine and coastal ecosystems, blue NBS are expected to improve environmental health and support societal wellbeing as well as climate change mitigation and adaptation efforts⁷.

Blue NBS can reduce the vulnerability of marine and coastal social-ecological systems, thereby building adaptive capacity, reducing exposure to climate hazards, and reducing sensitivity to impacts.

Although NBS alone will not solve the underlying drivers of unsustainable development, which have deep roots in how economies are structured and social values are shaped, NBS can contribute to resolving some societal impacts from biodiversity loss, climate change, and other societal challenges. Moreover, NBS can help scientists and policymakers identify the underlying drivers of environmental degradation and disentangle the social benefits of ecosystems. It can ultimately be used as a communication tool to showcase the importance of environmental protection and restoration for people and society.

It is imperative to adopt a holistic approach to climate change adaptation and mitigation that recognises the important role of marine and coastal ecosystems in adaptation and mitigation as well as other societal challenges such as poverty and food security.



Innovating with nature and people: insights and recommendations for integrated design of blue Nature-based Solutions

Tailor blue NBS to specific ecological and social contexts and consider spatial and temporal scales

For blue NBS to achieve positive impacts, a better understanding of how diverse NBS actions, such as ecosystem protection and restoration, can alleviate or solve social problems, such as the vulnerability of certain groups to climate change impacts, is needed.

Situate blue NBS in local contexts. The success of blue NBS in providing diverse social, ecological, and economic benefits relies heavily on how, where, and with who they are envisioned, designed, and implemented. Finding these optimal conditions demands a sound scientific understanding of underlying ecological processes, local stressors, and existing as well as projected climate change impacts. It also requires understanding contextually specific needs and values held by society and a receptive policy environment that allows for and facilitates open dialogues and participatory processes to design and implement blue NBS.

Recognise spatial and temporal scales for multiple benefits of blue NBS. Spatial and temporal scales are important components for effective blue NBS implementation because understanding how interventions in one area impact another area further upstream or downstream aids in comprehending the broader effects of specific management interventions as well as trade-offs between them. Developing blue NBS requires a broader land- and seascape approach, considering ecological connectivity, species' migration patterns, changing resource usage over time, and the needs of various stakeholder groups that access and use certain natural resources, for instance fisheries, differently.

Understand spatial dynamics. Land-based activities, like agricultural run-off and pollution, often cause environmental degradation and negative impacts on marine and coastal ecosystems. From a spatial perspective, some interventions, including terrestrial and/or blue NBS, in coastal urban areas and agricultural areas in watersheds that connect to the sea can help mitigate drivers of ecosystem degradation in other areas, thus effectively alleviating ecosystem degradation beyond their immediate target area.

Address the underlying drivers of negative change across a larger spatial area and over time. Without addressing the underlying drivers of change, blue NBS cannot deliver their intended objectives, resulting in imperfect or less effective solutions to a given problem. Here, state-of-the-art scientific evidence and models can provide important support tools to understand spatial and temporal ecological feedback and interactions.



Acknowledge the complexity of the climate-biodiversity-society nexus and involve people early in the NBS project cycle

Interactions between people and ecosystems are complex. Society and ecosystems continuously change, and the design of blue NBS requires an interdisciplinary approach that acknowledges the vast number of social-ecological interactions. Climate change increases this complexity and highlights an incomplete understanding of feedback loops between biodiversity loss and climate change, as well as their broader societal impacts.

Implementing interventions before substantial ecosystem degradation is a more cost-effective option. Active ecosystem restoration can be complex, time-consuming, and resource-intensive, with varying suitability for projects. Where marine and coastal ecosystems are still in good condition, proactive protection of marine and coastal ecosystems against current and future stressors is one of the most preferred blue NBS options. It may also be easier to carry out than reactive restorative approaches from a social-economic perspective.

Successful restorative activities must account for long-term social and ecological dynamics. While coastal wetland restoration may seem like a feasible blue NBS at present in some contexts, their design must be informed by future changes in climate conditions, temperature and sea level rise, or severe storms to maximise their long-term effectiveness in protecting coastal areas or supporting biodiversity. Involving people early on in the design of blue NBS will help to align future societal demands and changing preferences and increase the likelihood of success of blue NBS.

Collaboration and co-development of knowledge are crucial for blue NBS' success. Stakeholders and civil society must be involved in the conceptualisation, design, implementation, monitoring, evaluation, and adaptation of NBS projects. Interdisciplinary research collaborations amongst policymakers, practitioners, and researchers will help achieve holistic blue NBS. The success of any blue NBS will depend on stakeholder participation and support along with other enabling conditions such as a receptive policy environment, time, and resources. Involving local populations in blue NBS is crucial to account for existing social-ecological interactions and uses of coastal and marine resources. Meaningful inclusion, joint deliberation, and transparent and participatory design and decision-making also increase the legitimacy, social acceptance, and success of blue NBS.

Enhance communication among various stakeholder groups. Improving communication channels among various stakeholder groups, including businesses, civil society, and politicians, to share the blue NBS process, project outcomes, experiences, and market new initiatives is crucial for the legitimacy and effectiveness of NBS. Moreover, better communication can increase access to diverse funding streams, bolster local and political commitment, and facilitate institutional coordination.

Invest in education and awareness. Ensuring that the benefits from marine and coastal ecosystems for society and human wellbeing and the drivers of their degradation are widely recognised can increase people's acceptance and support for blue NBS.



Innovating with nature and people: insights and recommendations for integrated design of blue Nature-based Solutions

Blue NBS policy recommendations

Blue NBS are not a silver bullet for addressing societal challenges. We must recognise and accept that biodiversity loss, climate change, and social inequalities and inequities are the symptoms of the current global economic system built on expansion and growth.

To facilitate a transformational change in integrating environmental management with social welfare and intergenerational equity, and to make a real difference from present-day actions, blue NBS must be seen as one part of the larger range of possible solutions required for safeguarding marine and coastal ecosystem functions and services that are vital for hundreds of millions of people globally.

Blue NBS can be multipurpose, no-regret solutions. The protection of marine and coastal ecosystems is a precautionary NBS, while ecological restorative activities are reactionary. The world needs both. However, any management intervention can lead to positive, negative, and neutral outcomes depending on the viewpoint of those assessing them, particularly when considered from multiple angles. For example, restoring a coastal habitat to enhance biodiversity, mitigate climate change and increase coastal protection may have adverse economic outcomes for some stakeholder groups.

In choosing whether or not to implement blue NBS and how, it is important to consider and place the action within the specific ecological and social context, involve stakeholders, consider potential outcomes and interactions with other interventions, and balance trade-offs.

To enhance legitimacy and support for blue NBS more generally, it is crucial to continuously communicate and openly discuss the intentions and potential benefits of blue NBS with diverse stakeholder groups, for example, through success stories. Carry out education and awareness campaigns among society at large to bring people along and achieve a sufficient degree of knowledge of how ecosystem degradation impacts people at present and in the future and how blue NBS can help stop and reverse this negative trend.

To garner support for actions locally, engage with diverse stakeholders early on to embed them and their knowledge and views in implemented actions. Tailor language during all communication and engagement activities to align with the values, perspectives, and understanding of your audience.

For more information about the topics discussed in this policy brief, please refer to the accompanying policy guideline⁸.

References ¹ IPBES. (2022) <https://doi.org/10.5281/zenodo.3831673> | ² IPCC. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. <https://www.ipcc.ch/report/ar6/wg2/> | ³ Richardson et al. (2023) <https://doi.org/10.1126/sciadv.adh2458> | ⁴ Rocha et al. (2015) <https://doi.org/10.1098/rstb.2013.0273> | ⁵ Honsel et al. (2023) <https://doi.org/10.1017/cft.2023.3> | ⁶ Simeoni et al. (2023) <https://doi.org/10.1016/j.scitotenv.2022.160687> | ⁷ O'Leary et al. (2023) <https://doi.org/10.1016/j.nbsj.2022.100044> | ⁸ Krause et al. (2024). *Innovating with nature and people: insights and recommendations for integrated design of blue Nature-based Solutions* in O'Leary et al. (2024) Deliverable 4.3 'Nature-based Solutions Policy Guidelines.

Acknowledgment This policy brief is based on research conducted as part of the MaCoBioS project (www.macobios.eu) supported by the European Commission's H2020 programme (2020-2024). It represents the scientific and engagement work of the project's consortium. The authors are grateful to all researchers and stakeholders for their contributions.

Suggested citation Krause T, O'Leary BC, Boyd E, Espinoza Córdova F, N'Guetta A (2024). Policy Brief No.1. Innovating with nature and people: insights and recommendations for integrated design of blue Nature-based Solutions. In O'Leary, BC, Krause, T, Espinoza Córdova, F, N'Guetta, A, Fonseca, C, Frehen, L, Boyd, E (Eds), *Deliverable 4.4 – Nature-based Solutions Policy Briefs* (pp. 4-8). MaCoBioS.