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Editorial: Nature-based solutions, climate mitigation, biodiversity conservation

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Editorial on the Research Topic
Nature-based solutions, climate mitigation, biodiversity conservation

Humanity is facing two main risks: climate change and the loss of nature and its biodiversity. These two risks are also linked due to anthropogenic activities. As such, it is imperative that we identify and quickly implement a strategy that would simultaneously reduce both risks and ensure humanity's survival.

The International Union for the Conservation of Nature defines Nature-Based Solutions (NbS) as "actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (Hilmi, Sutherland et al.). According to the European Commission (2020) NbS are: "Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social, and economic benefits and help build resilience" (Hilmi, Sutherland et al.).

NbS are important measures that can help reduce global warming. Unlike purely technological solutions such as carbon capture and storage, NbS always makes an important contribution to sustainable development, and they can be implemented in both marine and terrestrial ecosystems.

Nature-based solutions: coastal waters and open seas

It is important to differentiate blue carbon from NbS, which are broader than blue carbon, as they refer to "benefits to biodiversity while simultaneously delivering beneficial ecosystem services to support the achievement of societies' objectives and to tackle societal challenges" (Hilmi, Sutherland et al.). Furthermore, "NbS have direct implications and benefits for stakeholders and direct resource users" contrary to blue carbon which benefits "manifest at the global scale" (Hilmi, Sutherland et al.). Thus, carbon sequestration may work via three ways: 1- ecosystems, 2- ocean fauna, and 3- bright spots which correspond to overlapping zones of both climate mitigation and fisheries opportunities.

Concerning coastal waters, "coastal blue carbon has been widely adopted in international frameworks, most prominently in the UN Framework Convention on Climate Change (UNFCCC), to mitigate climate change" (Hilmi, Sutherland et al.). However, coastal vegetated ecosystems play a "disproportionate and substantial contribution (…) to global carbon sequestration" (Hilmi, Sutherland et al.) compared to the deep ocean value.

To that extent, "Tropical marine ecosystems provide a wide range of provisioning, regulating, supporting and cultural services to millions of people. They also largely contribute to blue carbon sequestration. Mangroves, seaweeds, and seagrass habitats are important because they store large amounts of organic carbon while fish play a fundamental role in the carbon transport to deep waters. Protecting and restoring tropical marine ecosystems is of great value to society because their decline impairs the vital services they provide, such as coastal protection and seafood supplies" (Hilmi, Carranco et al.).

Beyond coastal waters, open seas comprise most of the ocean ecosystems services. Deep-sea blue carbon can be defined as "carbon fluxes and storage including carbon transferred from the atmosphere by the inorganic and organic carbon pumps to deep water, carbon sequestered in the skeletons and bodies of deep sea organisms, carbon buried within sediments or captured in carbonate rock" (Hilmi, Sutherland et al.).

However, deep-sea blue carbon as well as NbS strategies suffer from external factors, especially a "lack of scientific knowledge and verification, technological limitations, potential environmental impacts, a lack of cooperation and collaboration, and underdeveloped governance" (Hilmi, Sutherland et al.). Thus, "the deep sea can be viewed as a more holistic nature-based solution, including many ecosystem services and biodiversity in addition to climate" (Hilmi, Sutherland et al.).

Macroeconomic and financial solutions

"The transition to a green economy requires significant resources, both from private investors and public policy makers with important implications for employment and living standards" (Braga and Ernst). "Green macroeconomic policies are essential in accelerating the transition through three channels: they can strengthen the price signals from externality pricing; they can mobilize additional public and hybrid funding for green transition projects; and they can soften the social and labor market impact of the transition for those workers currently still employed in polluting industries" (Braga and Ernst).

Macroeconomic factors obviously play a mixed role in climate change mitigation and biodiversity protection. On the one hand, economic growth has long been a primary driver of both the expanding demand for natural assets and the rising emissions of greenhouse gases and other pollutants. At the same time, however, technology-driven economic development, in the context of the quest for greater efficiency, also holds the hope of decoupling economic growth from these consequences. Achieving this decoupling is one of the main challenges for macroeconomic policy today. If policies that influence and direct economic growth and development can be chosen or designed with an eye on their consequences for climate and biodiversity, this could accelerate decoupling and ease pressures on the climate and global ecosystems.

The financial markets have a pivotal but as yet relatively undeveloped role to play in climate change mitigation and biodiversity protection. One of the unfortunate realities is that neither governments nor philanthropists have been able to marshal sufficient resources to fund the investments necessary to achieve needed climate mitigation or biodiversity protection goals. This situation is not likely to improve. The financial markets, however, have sufficient resources to fund the trillions of dollars of projects that need to be undertaken.

Conclusion

NbS are essential for the future of humanity as they have potential to mitigate some of the harmful effects of climate change and contribute to the wellbeing of humans. They are very diverse and can thus benefit both the environment and humans on a large scale.

However, "NbS themselves have limits in efficacy and contributions to climate change" (Hilmi, Sutherland et al.), both in shallow and deep waters. Indeed, "microbes and microbial processes have yet to emerge as a focus of blue carbon initiatives" (Hilmi, Sutherland et al.). Moreover, human activities, such as deep-sea mining activities, "may interfere with carbon sequestration or release carbon" (Hilmi, Sutherland et al.), which is due to the fact that "a country's GHG emissions rise rapidly as its economic activity rises, relative to global activity, meaning that fast-growing countries contribute most heavily to current GHG emissions" (Chami et al.).

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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