Defining nature-based solutions for coastal climate change in Aotearoa New Zealand

Shane Orchard[1]

Introduction

There is now substantial variation in how nature-based solutions (NbS) are defined and what they signify – but that hasn't deterred an explosion of interest in the underlying concepts and their applications. In broad terms, this family of environmental management approaches addresses societal challenges in a holistic way.

On the international front, there has been a steady accumulation of publications on the application of NbS to a wide range of contexts (e.g., urban restructuring, agriculture) and disciplines (e.g., benefits accounting) (Faivre et al. 2017; Brill et al. 2021).

Many of these publications identify principles, or propose evaluation models or performance indicators to guide the design and implementation of NbS. At the same time, moves are underway to sharpen the definition of NbS and strengthen the consistency and quality assurance aspects of projects that are undertaken under the auspices of NbS. This set of initiatives has a focus on supporting the potential of NbS as a transformative approach to sustainable development. They are also expected to influence the evidence base for what NbS entails and can accomplish, in turn influencing the levels of policy and funding support that are made available for NbS (Cohen-Shacham et al. 2019).

As we progress the NbS discourse here in Aotearoa New Zealand there is a need to consider these global developments to inform national NbS policy and guidance. In doing so we have the ability to influence and optimise the outcomes associated with the implementation of NbS concepts.

This article provides an overview of international trends and recent developments before discussing some of the key implications for environmental practitioners, researchers, policy developers and funders interested in NbS.

(1) Independent consultant at Waterlink and Research Associate at the University of Canterbury

Different takes on NbS

NbS definitions

The terminology used to identify NbS lies at the heart of its call to action. Its communication is also essential for the mainstreaming and upscaling of NbS while preventing misuse of the term. For example, greenwashing may become commonplace if NbS are associated with relatively minor greening components in projects that otherwise contribute to the degradation of natural environments. Such projects may remain part of the problem rather than a 'solution' for the maintenance of natural environment values and resources faced with challenges such as climate change. At the same time, NbS can be applied across a range of contexts and scales so it is important that a degree of flexibility and adaptability is retained and recognised.

There are three main definitions of NbS in the contemporary literature (Table 1). The European Commission definition is arguably the least specific since any type of benefit to nature would appear to meet the objectives alongside the provision of social and economic benefits (European Commission 2020). The European Parliament definition has some similarities, but with the notable addition of a focus on addressing societal challenges in sustainable ways (European Parliament 2017). This serves to clarify the overall intent of NbS as a tool to support sustainability at various scales (Faivre et al. 2017). The IUCN definition provides more specific attention to the protection of nature in the design of NbS. This can be interpreted as an extension of the European Parliament focus on sustainable outcomes but goes further by reinforcing the need to maintain effectiveness over time. Projects that are inspired by nature, or mimic nature (i.e., biomimicry), are not regarded as NbS unless they clearly qualify on other grounds (Cohen-Shacham et al. 2016).

Implications of definitional differences

A lack of consensus in the meaning of key terms has a significant impact on the substance of NbS projects and their

NbS Definitions	References
European Commission Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient and systemic interventions.	Maes and Jacobs (2015)
European Parliament Actions inspired by, supported by or copied from nature that aim to help societies address a variety of environmental, social and economic challenges in sustainable ways. Most nature-based solutions do not have a single objective, but aim to bring multiple co-benefits.	European Parliament (2017)
International Union for Conservation of Nature (IUCN) 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.	IUCN Resolution 069 IUCN (2016)

Table 1: Definitions of nature-based solutions (NbS) in the contemporary literature.

outcomes. The major definitional differences boil down to variance in the extent of the benefits to nature. This includes attention to the distribution, intensity, additionality and permanence of the effects that are attributable to the NbS. The level of attention to these aspects also influences the degree to which they are required to be measured. In turn, this influences the evidence base for NbS as a framework for integrated solutions – and over time will ultimately define it.

One of the key arguments in the IUCN position involves maximising the potential of the NbS concept as a game-changer for sustainable development, in contrast to being just one of several terms broadly equated with greening initiatives, or the exploitation of nature for human needs (Cohen-Shacham et al. 2016). To address these aspects, IUCN has proposed eight principles that contribute to NbS in the sense of a definitional framework (Cohen-Shacham et al. 2019; Cohen-Shacham et al. 2016).

Another useful perspective was suggested by UNEP (2021) in relation to climate mitigation whereby agreed standards could play a safeguarding function against the potentially undesirable consequences of poorly-designed initiatives (Figure 1), and this same thinking can be applied to other NbS.

Potential role of standards

In a recent development, the IUCN has developed a Global Standard for NbS (hereafter the 'Standard') (IUCN 2020a). It is based on eight criteria and 28 indicators informed by the IUCN NbS principles (Figure 2). The Standard is currently framed as a tool to assess the extent to which an intervention would qualify as a NbS, and as a facilitative design tool to be used to strengthen the robustness of any proposed solution (IUCN 2020b). Another aspect of the rationale for a standard is the identification and promotion of good practices.

Such a focus requires that situational and value-laden dimensions of NbS are considered in the evolution of good practice concepts, and this is provided for in the IUCN Standard through the creation of a governance entity to support ongoing development and review (IUCN 2020a). With

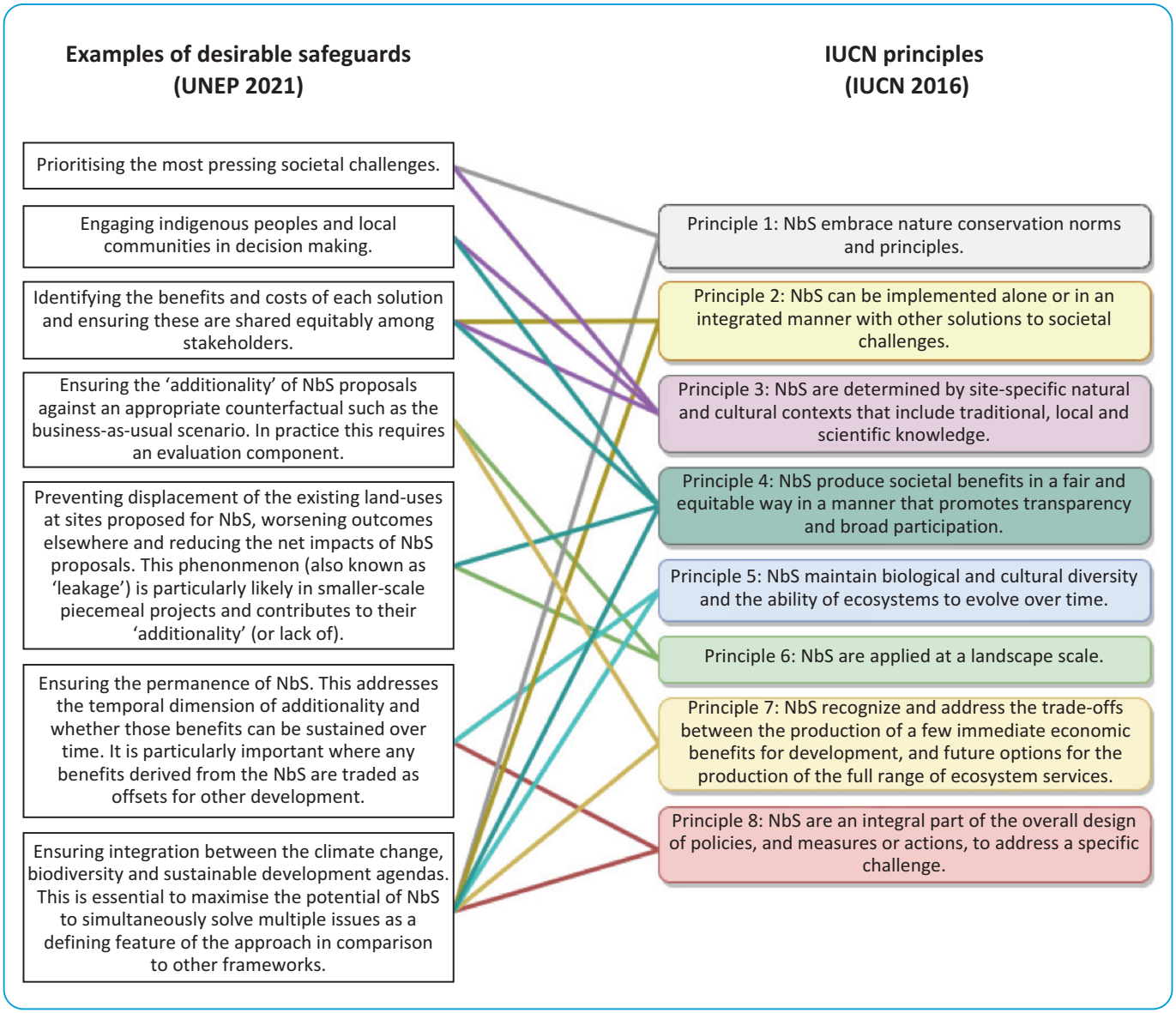

Figure 1: Undesirable consequences from poorly designed climate mitigation strategies (UNEP, 2021) mapped against the eight preliminary principles for nature-based solutions (NbS) proposed by the IUCN (Cohen-Shacham et al. 2016; IUCN 2016).

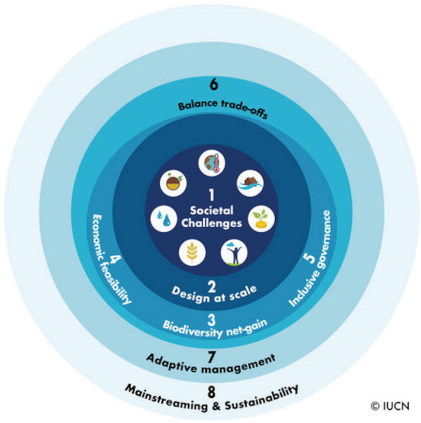

Figure 2: Relationships between the eight criteria that make up IUCN's Global Standard for Nature-based Solutions (IUCN 2020a).

this in mind the Standard may evolve further and could be adapted for a variety of contexts and purposes over time.

Application to coastal climate change

Coastal climate change is an example of a societal challenge that is perfectly suited to NbS. It also exemplifies the principle of natural environments being themselves impacted by climate change alongside their potential role in reducing risks to anthropogenic environments and values (Orchard 2014). Furthermore, they may assist both climate mitigation (e.g., carbon sequestration) and climate adaptation objectives (e.g., reduction of wave erosion risks), and some forms of NbS are able to deliver both (Kabisch et el. 2016).

Conversely, the failure to incorporate natural environments in climate change responses is form of maladaptation with major negative consequences for both biodiversity and society because of the need to maintain the natural capital that underpins ecosystem services (Costanza et al. 1998; Daily & Matson 2008). This is a key reason for the IUCN's strong stance on combating the climate change and biodiversity crises simultaneously to ensure that planetary life support systems do not continue to degrade.

Coastal environments near the land-water interface are particularly vulnerable to climate change because of their exposure to both hydrometeorological hazards and incremental drivers of change such as sea-level rise. The popularity of coastal areas for intensive land uses and settlement (Small & Nicholls 2003) also contributes to a 'perfect storm' for climate change adaptation by driving competition for space and presenting complex interactions between current land and water-use rights and the changing landscape. The implementation and upscaling of NbS is particularly challenging in these settings but important opportunities are likely to arise in the context of natural hazard management and recovery from natural disasters (Orchard & Schiel 2021). At the same time, many important species and resources are already protected under law. This not only provides an agreed policy standpoint for nature-based interventions, but also recognises the legacy effects of historical and often anthropogenic decline. NbS can provide a framework for solving these complex and often intertwined aspects of climate change at the necessary scales (Seddon et al. 2021).

Takeaways for Aotearoa New Zealand

At this early stage of NbS promotion and adoption it is important to take stock of the international dialogue and distil its significance. These aspects challenge the potential utility and value of NbS alongside other environmental management frameworks. In the near future, new developments may include clarity over the interventions that practitioners should associate with NbS and clearer direction for policy makers and funders looking to harness the concept in the development of specific strategies. The international literature remains fast-evolving and inconclusive at the current point in time, despite notable recent developments.

It is hoped that the brief overview provided here will support a discussion around the best ways to advance the NbS concept in our unique social-ecological contexts here in Aotearoa New Zealand.

References

Brill, G, et al. (2021). *Benefit accounting of Nature-based Solutions for watersheds: Guide*. United Nations CEO Water Mandate and Pacific Institute. Oakland, California.

Cohen-Shacham, E, et al. (2016). *Nature-based Solutions to address global societal challenges*. Gland, Switzerland: IUCN.

Cohen-Shacham, E, et al. (2019). Core principles for successfully implementing and upscaling Nature-based Solutions. *Environmental Science and Policy*, 98, 20-29. doi:10.1016/j.envsci.2019.04.014

Costanza, R, et al. (1998). The value of the world's ecosystem services and natural capital. *Ecological Economics*, 25(1), 3-15. doi:10.1016/S0921-8009(98)00020-2

Daily, GC, & Matson, PA (2008). Ecosystem Services: From theory to implementation. *Proceedings of the National Academy of Sciences of the United States of America*, 105(28), 9455-9456. doi:10.1073/pnas.0804960105

European Commission. (2020). *Nature-based solutions*. European Commission [online]. Available at doi.org/10.1016/j.oneear.2020.04.016

European Parliament. (2017). *Nature-based solutions: Concept, opportunities, and challenges*. www.europarl.europa.eu/RegData/etudes/BRIE/2017/608796/EPRS_BRI(2017)608796_EN.pdf

Faivre, N, et al. (2017). Nature-Based Solutions in the EU: Innovating with nature to address social, economic and environmental challenges. *Environmental Research*, 159, 509-518. doi:10.1016/j.envres.2017.08.032

IUCN. (2016). Resolution 69 on defining Nature-based Solutions (WCC-2016-Res-069). IUCN Resolutions, recommendations and other decisions. 6-10 September 2016. *World Conservation Congress Honolulu, Hawai'i, USA*. portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2016_RES_069_EN.pdf.

IUCN. (2020a). *Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS*. First Edition. Gland, Switzerland: IUCN.

IUCN. (2020b). *Global Standard for Nature-based Solutions: Guidance*, Version 1.0. Gland, Switzerland: IUCN.

Kabisch, N, et al. (2016). Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action. *Ecology and Society*, 21(2), 39. doi:10.5751/ES-08373-210239

Orchard, S (2014). Potential roles for coastal protected areas in disaster risk reduction and climate change adaptation: a case study of dune management in Christchurch, New Zealand. In R. Murti & C. Buyck (Eds.), *Safe Havens: Protected Areas for Disaster Risk Reduction and Climate Change Adaptation*. Gland, Switzerland: International Union for the Conservation of Nature.

Orchard, S, & Schiel, DR (2021). Enabling nature-based solutions for climate change on a peri-urban sandspit in Christchurch, New Zealand. *Regional Environmental Change*, 21(3), 66. doi:10.1007/s10113-021-01791-1

Seddon, N, et al. (2021). Getting the message right on nature-based solutions to climate change. *Global Change Biology*, 27(8), 1518-1546. doi.org/10.1111/gcb.15513

Small, C, & Nicholls, RJ (2003). A global analysis of human settlement in coastal zones. *Journal of Coastal Research*, 19(3), 584-599.