

# Building with Nature

## A need for Building with Nature

Over the last decades, we have seen the ways that the footprint of human development increasingly affects life on our planet, changing societies, and disrupting ecosystems. On top of that, these developments are being aggravated by man-made climate change. The consequences have raised awareness that something must be done to counter climate change, halt biodiversity loss, and prevent further damage to society and the ecosystems we depend on.

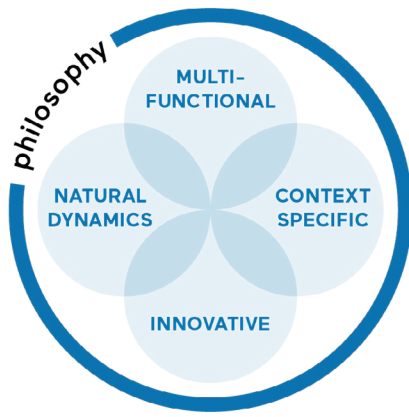
The Paris Climate agreement, the Sendai Framework for Disaster Risk Reduction as well as the United Nations Decade on Ecosystem Restoration are some concrete examples of global initiatives that aim to tackle these challenges. As the world population continues to grow to an approximate 9.7 billion people in 2050, nearly quadrupling in one century, human pressure on our planet will increase. This drives the necessity to think differently about how we approach infrastructure and socio-economic development, changing towards a sustainable system-based approach. As Henk Ovink, the Dutch special envoy for international water affairs puts it: “today’s social, economic, cultural, and environmental challenges are fundamentally interdependent, as are opportunities for development and growth.”<sup>1</sup>

In many of these global initiatives, Nature-based Solutions are considered an essential element to achieve sustainable development.

They are known 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.”<sup>2</sup> Nature-based Solutions have been identified as catalysts for achieving the sustainable development goals, which aim to achieve a sustainable and prosperous living for all people on our planet, contributing to 7 of the 17 goals.<sup>3</sup>

Although there is a consensus that Nature-based Solutions are the way forward with regard to sustainable development, we see that the uptake and upscaling remains rather limited. Building with Nature can be a solution in the mainstreaming of Nature-based Solutions since it offers and provides guidance on implementation and design based on practical project experience. Practical experience has been instrumental in developing useful knowledge and insights on the technical, ecological, social, financial, and institutional aspects of designing and implementing Nature-based Solutions.

1. Van Eekelen, E. and M. Bouw. (Eds). (2020). *Building with Nature: Creating, implementing, and upscaling Nature-based Solutions*. nai010 publishers.
2. Cohen-Shacham, E. et al. (Eds). (2016). *Nature-based Solutions to address global societal challenges*. IUCN.
3. The seven SDGs are: GOAL 6: Clean Water and Sanitation; GOAL 9: Industry, Innovation and Infrastructure; GOAL 11: Sustainable Cities and Communities; GOAL 12: Responsible Consumption and Production; GOAL 13: Climate Action; GOAL 14: Life Below Water; GOAL 15: Life on Land.



### The Building with Nature philosophy

Building with Nature is defined as “a conceptual approach to create, implement and upscale Nature-based Solutions for water-related infrastructure.”<sup>4</sup> Building with Nature represents a paradigm shift that promotes a different way of thinking, acting, and interacting to develop sustainable and adaptive water infrastructure. The Building with Nature philosophy centers around answering the “society’s infrastructural demands by starting from the functioning of the natural and societal systems in which the infrastructure is to be realized.”<sup>5</sup> This entails that Building with Nature is not limited to green infrastructure, but rather optimizes green, gray and hybrid infrastructure depending on the site-specific circumstances .

This shift in thinking, acting, and interacting integrates infrastructural development with system thinking on landscape scale to create solutions that provide added value for the developer, nature, and the local community alike. The urgency for sustainable development and the need for the renovation of aging infrastructures open up opportunities for Building with Nature as the catalyst for realizing innovative next-generation infrastructures, with the advantage that Building with Nature is broadly applicable to different settings and purposes.

Successful implementation of Nature-based Solutions is only possible when a project considers the surrounding natural and social system, proactively harnessing the forces of nature, as well as engaging relevant stakeholders at an early stage to maximize the positive outcomes of a project. All Building with Nature projects have four primary characteristics in common: they are inherently dynamic, multi-functional, context-specific, and innovative. These four characteristics highlight the importance of system understanding as the starting

point, which, building on solid proven principles and experience, will always lead to tailor-made and innovative solutions. Building with Nature aims to work with nature instead of against it, which means the solution embraces natural dynamics and will inherently evolve over time. This provides flexibility under changing climate conditions. It also requires a different (adaptive) system-based asset management approach, which might not fit with the traditional, mono-functional asset ownership and management practices. Furthermore, Building with Nature aims to maximize positive outcomes through context-specific design, addressing a multitude of functions and services which can lead to added value for local communities while being beneficial for multiple policy objectives. It is this out-of-box-thinking, considering different perspectives through multidisciplinary and cross-sectoral collaboration, that makes Building with Nature unique.

Building with Nature leads to an adaptive learning-by-doing mentality, where multidisciplinary academic knowledge is combined with practical knowledge. It recognizes that projects themselves are ideal opportunities for generating new knowledge which can be beneficial for future projects.<sup>6</sup> This is exactly why EcoShape was founded in 2007.

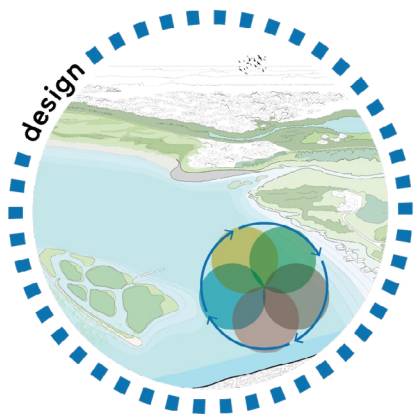


Figure 1: The Marconi salt marsh project, adding value by enriching a hard sea defense with a vegetated foreshore.

4. Van Eekelen and Bouw (2020).

5. De Vriend, H. J. et al. (2015). *Sustainable hydraulic engineering through Building with Nature*. *Journal of Hydro-environment Research*, 9(2), 159–171.

6. For more information: [ecoshape.org/en/get-inspired/](https://ecoshape.org/en/get-inspired/).



## Design

Dissemination of EcoShape's experience and knowledge provides inspiration and encouragement for further implementation of Nature-based Solutions around the world. To be able to implement Nature-based Solutions, EcoShape has developed a flexible five step approach, which is applicable to all project phases. The biggest opportunities are available when already using Building with Nature from the inception of a project idea. However, even in a later stage, it is still possible to introduce optimizations and create co-benefits. The five steps comprise of:

- Understand the system
- Identify alternative solutions
- Evaluate alternatives and select preferred solution
- Further refine the selected solution
- Prepare the solution for the next phase

The five steps embody the essence of Building with Nature through the proposed system-based approach, multidisciplinary collaboration, and early stakeholder involvement. First, a sound understanding of the physical, ecological, and social system is required to enable the identification of suitable design options for the site-specific context, tailored to the stakeholder needs. The goal is to establish what natural forces, materials, and interactions can be included in the design and what opportunities are available for nature to develop. Evaluating the different alternatives, which leads to a preferred solution that can be further refined, is necessary for uptake to the next project phase.

The design of a specific project can benefit from the experience and guidance that EcoShape gathered on so-called concepts. The concepts are possible applications of Nature-based Solutions in specific environments based on pilot experience. Concepts can be applied in various landscape settings, for which both inspiration,

vision and guidance on design and implementation is provided.<sup>7</sup>

The six landscapes treated by EcoShape are Sandy Coasts, Muddy Coasts, Lowland Lakes, Rivers and Estuaries, Cities and Ports. Different concepts are applicable in different landscapes. With an understanding of the natural and social system, it is possible to integrate multiple complementary concepts in a single project. Concepts can provide solutions in coastline and flood risk management, beneficial re-use of sediment, ecosystem restoration and spatial planning.

Furthermore, the EcoShape pilots and related studies have been thoroughly documented, which provide part of the evidence base which practitioners can use in their projects to learn from past experiences during the initiation, design, construction, and maintenance. In addition, the Building with Nature Platform provides access to a range of tools and knowledge pages which can be useful for project development.



Figure 2: The Delfland Sand Motor, the first large-scale Building with Nature project.



Figure 3: The Demak mangrove restoration project in Indonesia, combining coastal protection and sustainable aquaculture.

7. Van Eekelen and Bouw (2020); for more information: [ecoshape.org/en/get-started/](https://ecoshape.org/en/get-started/).





### Implementation & upscaling

Globally, the desire and willingness to implement sustainable solutions is increasing, but all actors are still in search for the best practices and way forward. While developing our pilot projects in a broad range of landscapes and social settings, EcoShape distilled six enablers that are essential for implementation and upscaling of Nature-based Solutions:

- Technology and system knowledge
- Multi-stakeholder approach
- Adaptive management, maintenance, and monitoring
- Institutional embedding
- Business case
- Capacity building<sup>8</sup>

The six enablers address the paradigm shift that is needed within society, where the institutional structures within government bodies need to work together differently, thereby creating an enabling environment to facilitate large scale implementation of Nature-based Solutions. Also the additional co-benefits of Nature-based Solutions, such as their contribution to disaster risk reduction and carbon sequestration are vital elements of the business case for Nature-based Solutions and should be treated as such. This requires a different way of valuing long-term investment in natural capital, thinking beyond the common policy horizon of four to five years. Building with Nature allows for dealing with various long-term uncertainties by using the resilience of nature, which is essential in adapting to changing climate and other conditions.

To achieve such an enabling environment for Nature-based Solutions, decision- and policy-makers need to trust in the technology to incorporate them in their portfolio of options. EcoShape's learning-by-doing approach has provided valuable information on how to "build" these solutions, and how they evolve over time.

The pilot projects always contained a research component to further solidify the knowledge base at a multidisciplinary level. The dynamic nature of Nature-based Solutions requires a different approach to deal with and manage risks and uncertainties and different maintenance approaches might be needed.

From the beginning, part of EcoShape's success was based on combining knowledge and expertise from the water sector. Different disciplines worked together, which created added value with the whole being greater than the sum of its parts. Until today, it focused primarily on the technical and practical aspects of Building with Nature projects. To stimulate and scale up implementation, it is also essential to connect with the other worlds, primarily the financial and institutional worlds, to achieve mutual understanding of the same issues and aspects.

These other worlds need reliable standardized approaches and guidance, for example in how to leverage existing funding and demonstrate the business case of Nature-based Solutions alternatives. Furthermore, to achieve a shift in infrastructure development, we need to train and educate not only the generation that is presently in office, but also future generations and the communities that benefit from Nature-based Solutions. In the next years, EcoShape will continue to collectively work on expanding the evidence base of Building with Nature for water-related infrastructure through learning-by-doing and targeted knowledge development on the six enablers, aiming to further accelerate the uptake and upscaling of Nature-based Solutions.



Figure 4: Ripening dredged sediment for dikes at the Clay Ripening Pilot Project.

8. In-depth guidance is available on the Building with Nature Platform: [ecoshape.org/en/enablers/](https://ecoshape.org/en/enablers/).



Figure 5: The Houtribdike Pilot Project investigated the behavior of a vegetated foreshore in a lake environment, resulting in upscaling of the concept.

### About EcoShape

EcoShape is a consortium of contractors, engineering firms, research institutes, NGOs, and governmental authorities that operates at the nexus of nature, engineering, and society. The partners work together on Nature-based Solutions projects, thereby sharing their wide range of expertise and learning from each other. EcoShape also developed an active community of practice sharing its experience with thousands of professionals.

Over the last decade, EcoShape has initiated and executed pilot projects while developing and documenting rigorous experimental and academic knowledge for different environments and local settings.

This experience allowed scale-up and market uptake in few cases. EcoShape has translated their knowledge and experience into several useful products to facilitate the design, implementation and upscaling of Nature-based Solutions.

Learn more at [ecoshape.org](https://ecoshape.org).

