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FACT SHEET

Nature-based solutions (NBS) - case studies and challenges

- **NBS integrate science, policy, and practice and create biodiversity benefits** in terms of diverse, well-managed ecosystems (Eggermont et al., 2015).
Examples: greening roofs or walls to cool down city areas during summer, to capture storm water, to abate pollution, and to increase human well-being while enhancing biodiversity.
- NBS are also seen as open innovations that require engagement with multiple actors, providing **co-benefits that bridge social and economic interests** and as thus, can stimulate new green economies and green jobs (Raymond et al., 2017).
- They are **increasingly promoted across funding schemes and projects** (e.g., European Commission, 2015). **EU Commission** expert group identified four goals that offer exciting opportunities for promoting systemic and sustainable nature-based solutions, which will help Europe to achieve its aim of being a world leader in responsible innovation, while meeting the needs of society.
The **four goals** are:
 1. enhancing sustainable urbanisation
 2. restoring degraded ecosystems
 3. developing climate change adaptation and mitigation
 4. improving risk management and resilience
- NBS should exploit win-win situations but will have **to cope with Trade-offs and Uncertainties** (Eggermont et al., 2015)

- NBS should account for multiple interests (in particular environmental, societal, and economic ones)
 - Few win-win situations where all goals are simultaneously met. Documenting and analyzing the possible synergies and trade-offs between ES and stakeholders' expectations will therefore be at the heart of identifying and implementing NBS.
 - Otherwise, NBS could generate problems instead of solutions (e. g., species introduced for pest control can become invasive, if corresponding controls are lacking).
- **Calling for Innovative NBS Should **Not** Imply Losing Track of Existing Ones** (Eggermont et al., 2015)
 - NBS are often referred to as innovative, but they should not include exclusively “new” solutions. Whilst the NBS concept offers new opportunities and brings added-value, it also encompasses existing ideas and requires inclusion of lessons from the past. Local and traditional knowledge should also be considered when exploring NBS.
 - Traditional management systems (e. g., for agriculture, forestry, aquaculture, fishing) and their principles should be re-assessed in light of NBS criteria, as they often include sustainable, locally-adapted and biodiversity-enhancing practices.
- **Proposed operational parameters for NBS** (Cohen-Shacham, IUCN, 2016)
 - a) Ecological complexity. This parameter supports interventions that would maintain or promote complexity at different ecological scales.
 - b) Long-term stability. This parameter would support interventions that can persist over many years.
 - c) Scale of ecological organisation. This parameter would support implementation at a scale that helps mediate the ‘upstream and downstream’ relationships, dependencies and benefits. Nature-based Solutions to address global societal challenges
 - d) Direct societal benefits. This parameter would support the delivery of an attributable and substantial stream of direct societal benefits.
 - e) Adaptive governance. This parameter would ensure that the NbS intervention
- Critically reflect on the concept from the viewpoint of NBS contributions to sustainable development in Europe (Nesshöver et al., 2017)
 - Like many umbrella concepts, NBS bring new **challenges and opportunities** from the perspectives of science, policy and practice.
 - For example, **stakeholder participation and the adoption of a truly systemic perspective is extremely difficult** considering the fuzziness and uncertainties regarding the basic concept.
 - NBS therefore also offer opportunities for **encouraging mainstreaming of environmental targets into sectors in policy, business and practice** that

might not traditionally consider or value the environment, thereby strengthening the potential for strong sustainability in decision making

- To have the best chance of success, NBS projects should be based on a well-balanced, clear, widely accepted and implementable set of key principles. The considerations set out above can serve as a starting point and a foundation. The [IUCN \(2012\)](#) definition of NBS, (see [Table 1](#), [Cohen-Schacham et al., 2016](#)) also provides a reference point

- **NBSs as soil solutions and landscape solutions. (Keesstra et al: 2018)**

- Soil solutions aim to enhance the soil health and soil functions through which local ecosystem services will be maintained or restored.
- Landscape solutions mainly focus on the concept of connectivity. Making the landscape less connected, facilitating less rainfall to be transformed into runoff and therefore reduce flood risk, droughts and erosion problems.

Case study: Organic farming changes the fate of agriculture land in Mediterranean orchards (Keesstra et al: 2018)

- To reduce soil erosion with the strategies to increase biodiversity, protect traditional cultivars and breeds and achieve sustainability from a biophysical and socio-economic point of view
- Contribute to initiatives like the “4 per mille” that are associated to the SDGs. To counteract [carbon emissions](#) by promoting [carbon sequestration](#) in soils.
- The landscape is more attractive for tourism and adds to the [cultural heritage](#) of these areas.

Case study: Rewilding in Slovenia (Keesstra et al: 2018)

- Rewilding has shown to have both soil as well as landscape benefits.
- soil organic matter content, total nitrogen, bulk density and aggregate stability all improved
- Flood risks have been reduced; erosion reduced by 90%, and runoff discharge as well

Efficacy of eco- engineering solutions for nature- based coastal defence (Morris et al. 2018)

- Interdisciplinary research among scientists, coastal managers and engineers is required to facilitate the experimental trials needed to test the value of these shoreline protection schemes, in order to support their use as alternatives to artificial structures.
- Uptake of nature- based coastal defence depends on its acceptance as an alternative to traditional engineering solutions. Support needs to come from a number of stakeholder groups including coastal managers, engineers and the public (Nesshöver et al., [2017](#)).

Urban natural environments as a public health tool (van den Bosch & Sang, 2017)

- Strong evidence for improved affect as well as on heat reduction from urban natural environments. These conditions may mediate the effect seen on cardiovascular disease (CVD)-related mortality by exposure to natural environments.

The Effectiveness, Costs and Coastal Protection Benefits of Natural and Nature-Based Defences (Narayan et al., 2016)

- Meta-analyses of sixty-nine studies, among five habitats world-wide (coral reefs, mangroves, salt-marshes, seagrass/kelp beds), show that these habitats reduce wave heights significantly
- Examples of nature-based defence projects are growing rapidly in number, but much better reporting of effectiveness and cost effectiveness is necessary, for better understanding of their viability.
- Data from post-project monitoring of the success or failure of restoration projects are not easily available.

References

Cohen-Shacham, E., Walters, G., Janzen, C., & Maginnis, S. (2016). Nature-based solutions to address global societal challenges. *IUCN, Gland, Switzerland*, 97.

Eggermont, H., Balian, E., Azevedo, J. M. N., Beumer, V., Brodin, T., Claudet, J., ... & Reuter, K. (2015). Nature-based solutions: new influence for environmental management and research in Europe. *GAIA-Ecological Perspectives for Science and Society*, 24(4), 243-248.

EU Commission (2015) <https://ec.europa.eu/programmes/horizon2020/en/news/towards-eu-research-and-innovation-policy-agenda-nature-based-solutions-re-naturing-cities>

Keesstra, S., Nunes, J., Novara, A., Finger, D., Avelar, D., Kalantari, Z., & Cerdà, A. (2018). The superior effect of nature based solutions in land management for enhancing ecosystem services. *Science of the Total Environment*, 610, 997-1009.

Morris, R. L., Konlechner, T. M., Ghisalberti, M., & Swearer, S. E. (2018). From grey to green: Efficacy of eco- engineering solutions for nature- based coastal defence. *Global change biology*, 24(5), 1827-1842.

Narayan, S., Beck, M. W., Reguero, B. G., Losada, I. J., Van Wesenbeeck, B., Pontee, N., ... & Burks-Copes, K. A. (2016). The effectiveness, costs and coastal protection benefits of natural and nature-based defences. *PloS one*, 11(5), e0154735.

Nesshöver, C., Assmuth, T., Irvine, K. N., Rusch, G. M., Waylen, K. A., Delbaere, B., ... & Krauze, K. (2017). The science, policy and practice of nature-based solutions: An interdisciplinary perspective. *Science of the Total Environment*, 579, 1215-1227.

Raymond, C. M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M. R., ... & Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. *Environmental Science & Policy*, 77, 15-24.

van den Bosch, M., & Sang, Å. O. (2017). Urban natural environments as nature-based solutions for improved public health—A systematic review of reviews. *Environmental research*, 158, 373-384.

van den Bosch, M., & Sang, Å. O. (2017). Urban natural environments as nature-based solutions for improved public health—A systematic review of reviews. *Environmental research*, 158, 373-384.