

Nature-Based Solutions (NBS) for Resilient Landscapes and Cities: Innovative Strategies and Scientific Advances

A proposal for a Special Issue on “*Environmental Research*”

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Justifications

During the past couple of years, the environment unit within the Directorate-General (DG) Research and Innovation of the European Commission launched the concept of nature-based solutions (NBS) as a way of making ecosystems and nature an integral part of sustainable development. DG Research and Innovation commissioned an interdisciplinary Expert Group on ‘Nature-Based Solutions and Re-Naturing Cities’ to define and operationalize the concept and to identify research needs and priorities (EC, 2015). This Expert Group delivered its report during 2015 and defined nature-based solutions as *living solutions inspired by, continuously supported by and using nature, which are designed to address various societal challenges in a resource efficient and adaptable manner and to provide simultaneously economic, social and environmental benefits*.

NBS are conceptualized as closely connected to related concepts such as sustainable science, ecosystem services, coupled human and environment, and blue and green infrastructure and result in multiple co-benefits for health, the economy, society and the environment. Thus they can represent more efficient and cost-effective solutions than traditional approaches to development. NBS can be linked to a sustainable use of nature and ecosystems protection; to sustainability and multi-functionality of ecosystems; and to the design and management of new ecosystems. Innovative uses of existing ecosystems should also be considered (such as the role of urban woodland in climate change adaptation and the role of green infrastructure in building social cohesion).

Four principal goals that can be addressed by NBS have been identified:

- *Enhancing sustainable urbanization* through nature-based solutions can stimulate economic growth as well as improve the environment, making cities more attractive and enhancing human wellbeing.
- *Restoring degraded ecosystems* using nature-based solutions can improve the resilience of ecosystems, enabling them to deliver vital ecosystem services and meet other societal challenges.

- *Developing climate change adaptation and mitigation* using nature-based solutions can provide more resilient responses and enhance carbon storage.
- *Improving risk management and resilience* using nature-based solutions can lead to greater benefits than conventional methods and offer synergies in reducing multiple risks.

Based on these four goals, seven main nature-based solutions are recommended to be taken forward:

1. Urban regeneration through nature-based solutions
2. Nature-based solutions for improving well-being in urban areas
3. Establishing nature-based solutions for coastal resilience
4. Multi-functional nature-based watershed management and ecosystem restoration
5. Nature-based solutions for increasing the sustainability of the use of matter and energy
6. Nature-based solutions for enhancing the insurance value of ecosystems
7. Increasing carbon sequestration through nature-based solutions

In the various reports and publications issued by the European Commission, as well as in presentations by EC officers, a range of examples of NBS have been presented. These include: urban agriculture for local food production and social cohesion, green roofs for climate adaptation, regeneration of abandoned industrial land by afforestation or park creation, rain gardens for storm-water regulation, green spaces for promoting human health, use of permeable surfaces and vegetation in urban settings, and so forth. Moreover, the integration of green infrastructure in climate adaptation policies is often mentioned: NBS provide opportunities for adaptation to climate change, thus increasing landscape and cities' resilience to environmental risks, such as droughts, floods and heat waves, as well as opportunities for small-scale climate mitigation through increased carbon storage.

NBS focus on the benefits to people and the environment itself allowing for sustainable solutions that are able to respond to environmental change and hazards in the long-term. NBS go beyond the traditional biodiversity conservation and management principles by "re-focusing" the debate on humans and specifically integrating societal factors such as human well-being and poverty alleviation, socio-economic development, and governance principles (Eggermont et al. 2015)

Nature-based solutions can help us to remain within a safe operating space for humanity, improve local ecological and social sustainability, and guarantee long-term productivity. Different countries worldwide have the opportunity and responsibility to apply nature-based solutions as a guiding economic strategy geared toward shifting our natural resource use (Maes and Jacobs 2015).

Here, we propose a Special Issue on the nature-based solutions (NBS) for *Environmental Research*, with a focus on landscapes and cities across the globe. The issues to be covered include:

- (1) Landscapes and cities resilience under environmental and anthropogenic change
- (2) Nature-based solutions in urban areas: governance, planning, management and design
- (3) Enhancing ecosystem services through nature-based solutions
- (4) Nature-based solutions for health, wellbeing and social cohesion
- (5) Using NBS for climate change adaptation and mitigation
- (6) Integration of NBS for disaster risk management

In preparing this proposal, we will be sending out a general call for papers to several listservs, including IUFRO, NASA's LCLUC, FLUXNET, EU PIs, etc. Our aim is to involve authors of original research, reviews, and synthesis studies. These potential authors will contribute to the Special Issue by illustrating general theories and methods, generating and analyzing natural and social datasets, developing integrated modeling techniques, and presenting state-of-the-art research results. We believe that this focus issue will play a critical role in improving our understanding of the current knowledge, research gaps, and future research needs for **nature-based solutions in response to global change**.

The *Environmental Research* journal draws expertise together from biophysical, environmental, and socioeconomic sciences to explore basic and applied research questions concerning the effects of global warming/climate change on the environment and for human benefit. This mission is consistent with our goal of promoting integrated research and education on global change ecology and the environment. We will follow the journal's high-standard reviewing process and place quality as our first criteria. A guest editorial committee will be formed to work with and assist the ER editorial board and the Managing Editor during manuscript review and evaluation. For those authors whose native language is not English, we have a professional English editor to help improve language usage and writing before the manuscripts are submitted. This could be in addition to a similar service that the publisher may provide.

Proposed Plans

Guest Editors

Dr. Raffaele LAFORTEZZA, University of Bari, Italy & Michigan State University, USA

Dr. Jiquan CHEN, Michigan State University, USA

Dr. Cecil KONIJNENDIJK VAN DEN BOSCH, Swedish University of Agricultural Sciences, Sweden & (from July 2016) the University of British Columbia, Vancouver.

Dr. Thomas RANDRUP, Swedish University of Agricultural Sciences, Sweden & Norwegian University of Life Sciences.

Number of submissions: ~20 manuscripts

Potential topics

1. Back to Nature-Based Solutions: a renewed vision of human and nature
2. European perspective of NBS
3. Designing and planning new NBS
4. Asian perspectives (China, Japan, Malaysia, etc.)
5. African perspectives
6. North American Perspectives
7. South American perspectives
8. NBS in a disastrous cases
9. NBS in Chinese cities
10. Adaptations for the changing globe
11. Other case studies

Proposed timetable

09/30/2016	Deadline for submissions
11/30/2016	Reviews completed
12/31/2016	Revisions submitted
02/28/2016	Recommendations for accepted manuscripts

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