BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: T13a

Trade-offs in implementing nature-based solutions

Hosts:

	Name	Organisation	E-mail
Host:	Nadja Kabisch	Leibniz University Hannover, Physical Geography and Landscape Ecology	nadja.kabisch@phygeo.uni-hannover.de
Co-host(s):	Luis Inostroza	Mendel University in Brno	luis.inostroza@mendelu.cz

Abstract:

Global environmental changes, such as climate change and urbanisation, have numerous direct and indirect effects on human health and wellbeing especially during extreme weather events like heat waves and floods. Nature-based solutions (NBS) have been introduced to address societal challenges such as those resulting from global environmental changes, providing alternatives to standard grey solutions and manifold benefits in the form of ecosystem services. NBS are systemic solutions that use nature and green elements to restore or create feedback loops between social, ecological, and technological systems in the urban landscape and deliver multiple co-benefits such as restoring, sustaining, and establishing human health and wellbeing. Conceptualisations of the relationship between how NBS provide ecosystem services and their co-benefits for health and wellbeing mostly illustrate the positive – solution-oriented effects, but less discuss the challenges and potential trade-offs with implementing specific NBS. Such trade-offs could be related to the creation of potentially adverse health effects such as contributing to allergenic pollen production or to mosquito-borne diseases (e.g. West-Nile Virus) which may be related to the implementation of green-blue infrastructure increasing mosquito abundance in cities. In this session, we will discuss such potential trade-offs to health and well-being related to NBS

implementation and potential strategies to cope with them in social-ecological-technological systems, with a special focus on urban ecosystems.

Goals and objectives of the session:

Present and discuss urban case studies of potential trade-offs to health and well-being related to NBS implementation and potential strategies to cope with them.

Planned output / Deliverables:

Case study learning and exchange, potential joint perspective paper.

SESSION PROGRAM

Room: Success Avenue 1

Date of session: 20th of November 2024

Time of session: 11:00-12:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
11:00-11:05	Nadja Luis	Kabisch Inostroza	Leibniz Uni Hannover Mendel University in Brno	Session introduction
11:05-11:20	Carl	Anderson	Leibniz University Hannover	A systematic review of urban ecosystem disservice classification systems and frameworks
11:20-11:35	Charlotte	Stijnen	Faculty of Geosciences, Utrecht University	Uncovering rivers, dreams and dilemmas: An urban river daylighting case study in New York City
11:35-11:50	Uta	Schirpke	Eurac Research	Simulating urban heat mitigation in a virtual city to support the implementation of nature-based solutions in European cities
11:50-12:05	Atila	Kálmán	Széchenyi Egyetem (University Győr)	The multiple benefits of stormwater management in the implementation of nature-based solutions - the effectiveness of the Green City programme

Time	First name	Surname	Organization	Title of presentation
12:05-12:20	Giorgiana	Raluca Barbu	Faculty of Geography, University of Bucharest	Climate resilience through nature-based solutions: A network analysis approach
12:20-12:30	Nadja Luis	Kabisch Inostroza	Leibniz Uni Hannover Mendel University in Brno	Closing general discussion

II.ABSTRACTS

The first author is the presenting author unless indicated otherwise.'

1. A systematic review of urban ecosystem disservice classification systems and frameworks

First authors(s): Carl C. Anderson

Other author(s): Andreas Metzemacher, Blal Adem Esmail

Affiliation: Leibniz Universität Hannover, Institute for Environmental Planning, Herrenhäuser Str. 2, 30419 Hannover, Germany

Contact: anderson@umwelt.uni-hannover.de

Urban green spaces and green features are beneficial for protecting biodiversity and contributing to human well-being in the form of ecosystem services (ES). Although there are numerous benefits to urban vegetation, trade-offs also occur – sometimes referred to as ecosystem disservices (ED). To maximize ES among residents with diverse values, experiences, and world-views, it is important to focus on concurrently minimizing ED through appropriate planning and management supported by interdisciplinary research. Conceptual frameworks and classification systems have been proposed to guide such research, but it is unclear to what degree these have been taken up, how much they converge or diverge from each other, and their applicability across contexts. We conduct a systematic, but targeted, literature review of existing ED classification systems and frameworks in the context of urban ecosystems to take stock of this emerging body of research. We find strong uptake of several highly cited classifications and frameworks, but also substantial variation among articles both within and across fields. We draw on lessons learned from the reviewed articles to create a composite framework that combines ES and ED and includes key factors such as human perception and

both proactive and reactive ecosystem management. We call for increased consideration of ED research that recognizes its interconnection and ultimate role for maximizing ES, based on replicable conceptual understandings of this critical concept.

Keywords: ecosystem disservices, ecosystem services, urban green infrastructure, public perception, urban greening

Keywords: Urban Green Spaces, Regulating Ecosystem Services, Cultural Ecosystem Services, Synergies and Trade-offs, Spatial Analysis

2. Uncovering rivers, dreams and dilemmas: An urban river daylighting case study in New York City

First authors(s): Charlotte Stijnen
Other author(s): Katinka Wijsman, Niki Frantzeskaki
Affiliation: Department of Spatial Planning and Human Geography, Utrecht University
Contact: c.a.e.stijnen@uu.nl

As cities embrace nature-based solutions (NBS) to address urban challenges, they will also have to embrace and deal with the inherent trade-offs that come along with the planning and governance of urban NBS. Our prior literature scoping review of empirical evidence on urban NBS trade-offs indicates three groups of trade-offs; rigid, governance and functional trade-offs, which manifest differently across the planning cycle stages with differentiated implications for environmental justice. Scrutinizing urban NBS trade-offs through a justice lens helps to uncover the political dynamics involved in the planning and governance choices of urban NBS, and the differentiated ramifications thereof for diverse constituencies. Urban river daylighting – which involves removing historic streams from underground pipes and bringing them back to the surface – causes a vast change in the urban landscape, thereby posing an interesting context in which to analyze urban NBS trade-offs. This research looks into the planning and design stage of an urban river daylighting project in The Bronx, New York City to unpack the trade-offs at play. To analyze how trade-offs manifest in this project, interviews were held with actors directly and indirectly involved with the planning and design of the daylighting, as well as short interviews with local residents, employees in the neighborhood, and park users, on their opinions of the project. The case of Tibbetts Brook shows how issues of land-use and spatial restrictions cause concessions, how differentiated perspectives of benefits and costs associated with the daylighting plans are expressed, as well as the challenges of organizing an

inclusive process under a project timeline. Daylighting Tibbetts Brook highlights the complexity of renaturing cities and the interconnected infrastructural, social and ecological factors which cause dilemmas, while also showcasing how restoring Tibbets Brook holds potential for ecological and social reparations.

Keywords: urban river daylighting, trade-offs, inclusive, planning, cities

3. Climate resilience through nature-based solutions: A network analysis approach

First authors(s): Giorgiana Raluca Barbu
Other author(s): Mihai Răzvan Niță, Andreea Niță
Affiliation: Doctoral School of Geography, Faculty of Geography, University of Bucharest, Romania
Contact: giorgianabarbu11@gmail.com

Nature-based solutions are essential for climate resilient city planning. Prioritising biodiversity in decision-making processes helps to maximise ecosystem services, build resilient communities and promote investment in nature-based initiatives. However, the implementation of nature-based solutions is a difficult process, with many challenges: at the regulatory level, at the financial level or in practice. Here, we show that projects targeting nature-based solutions are a key – component in the review and implementation of public policies in the field of biodiversity and adaptation to climate change. Thus, we highlight the potential of analysing the link between the scientific results of these projects and the policy objectives within the framework of the EU Biodiversity Strategy 2030 and the EU Strategy for Climate Change. In this study, we propose an approach regarding the implementation of nature-based solutions in different geographical areas. Our study is based on: (1) Analysis of 130 projects funded under Horizon 2020 and Horizon Europe, using keywords to identify them; (2) Establishing the elements of analysis, which include partner countries in projects, the number and type of partners, the level of funding, the type of nature-based solutions, and their geographical distribution; (3) Analysis of the needs for nature-based solutions in policy documents; and (4) Network analysis in the planning of nature-based solutions. The results of our study show that network analysis plays an important role in supporting decision-makers, facilitating the visualization of relationships among the actors involved in the implementation of nature-based solutions, and providing information on the complementarities and trade-offs within the green initiatives.

Keywords: nature-based solutions, climate resilience, projects, network analysis, public policies

4. The multiple benefits of stormwater management in the implementation of nature-based solutions - the effectiveness of the Green City programme

First authors(s): Attila Kalman
Other author(s): Máté Chappon, Katalin Bene
Affiliation: Széchenyi István University
Contact: at.kalman@gmail.com

Urban areas are facing significant challenges from the adverse effects of climate change due to land use changes caused by urbanization. The increase in grey paved surfaces increases run-off, thus the risk of flash floods, but also increases the heat island effect of these areas significantly, as well as their negative impact on biodiversity. Future urban development requires sustainable, holistic approaches to mitigate and adapt to these changes. The focus of this paper is to measure and quantitatively assess the Hungarian “Green city” development program in the scope of nature-based solution implementation.

The project has created green spaces in nearly 200 cities. The aim was to increase biodiversity, improve ecosystem services and mitigate the negative impacts of climate change on human living conditions. The newly created or expanded green spaces were essentially designed to achieve this objective. The objective and subjective benefits of the projects, cost and carbon quantification of the investments were assessed and evaluated in a multi-criteria evaluation methodology. Data about the projects were collected from open-source government databases.

Besides other parameters, the lack of and the implementation of rainwater management during project design and development were assessed, compared with regular, tap-water based irrigation. Carbon-footprint based, and remedial cost-based evaluations were calculated to show the effectiveness of the projects. Many projects lacked the holistic approach and multi-benefit design, which controversially resulted in negative social and/or environmental impacts. The "Green City" program provides valuable insights into the role of nature-based solutions, combined with rainwater management in urban development strategies aimed at combating and adapting to climate change. The study quantifies the importance of a holistic design and the possible multiple benefits of implementation. Specifically, it devotes considerable attention to

rainwater harvesting and formulates proposal to policy makers for future developments to achieve balanced environmental, social, and economic benefits.

Keywords: nature-based solution, rainwater retention, sustainability, green-house-gases, stormwater management

5. Simulating urban heat mitigation in a virtual city to support the implementation of nature-based solutions in European cities

First authors(s): Uta Schirpke
Other author(s): Alberto González-García, Sandra Rome, Ignacio Palomo
Affiliation: Eurac Research, Bozen/Bolzano, Italy
Contact: uta.schirpke@eurac.edu

Nature-based Solutions (NbS) are a promising way to halt the decline of urban green spaces (UGS) and to support the provision of multiple ecosystem services. The new EU Nature Restoration Law therefore requires EU Member States to restore 20% of ecosystems and to increase urban green space in cities and towns by 3% by 2040 and 5% by 2050. Among a wide range of co-benefits of NbS, there is a particular need to improve the vegetation-based mitigation of the urban heat island (UHI) effect across European cities, UHI amplified by global warming. However, to implement most effective NbS, a better understanding of the characteristics of UGS is still needed. In this study, we aim to evaluate the effectiveness of NbS with regard to a future increase in heat waves. In specific, we address (1) how differences in configuration and distribution of UGS (i.e., size, tree canopy cover, and spatial arrangement) will affect urban heat mitigation, and (2) what the limits of NBS against extreme future heatwaves are. Based on the average characteristics of European cities, we designed a virtual city and simulated the heat mitigation of UGS using InVEST under three climate change scenarios and different characteristics of NbS, hypothesizing that different combinations of size, tree canopy cover, and spatial distribution of UGS will have different effects on the urban heat mitigation. Furthermore, we evaluate the results with regard to potential beneficiaries and NbS implementation costs. The outcomes of this study can support the future design of UGS in cities accounting for issues related to environmental efficiency, justice, and transformative change.

Keywords: Urban heat island, Urban cooling, Urban green spaces, Nature-based solutions, EU Nature