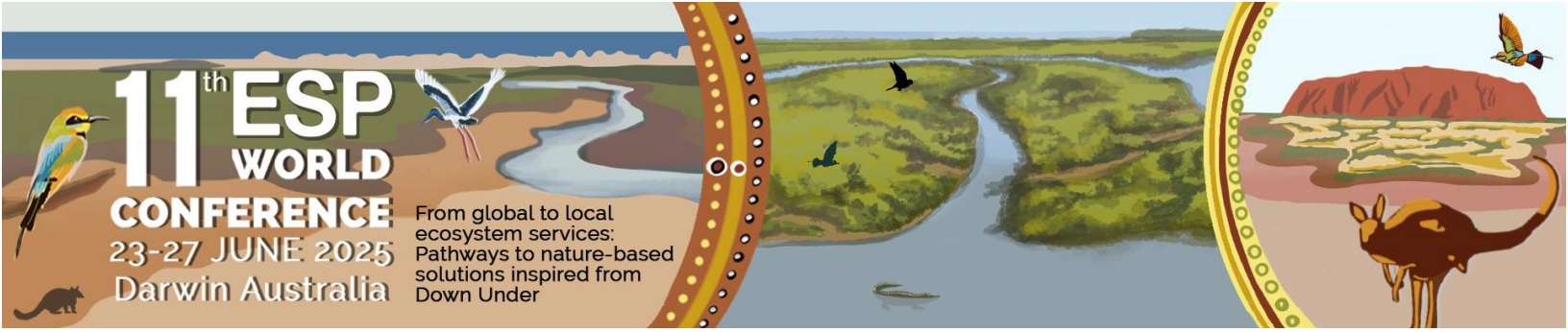


BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: R2

Methods and practices of urban and regional ecological restoration and management

	Name	Organisation	E-mail
Host:	Feng Li	Research Center for Ecological Restoration, School of Architecture, Tsinghua University, Beijing, China	feng_li@mail.tsinghua.edu.cn

Abstract:

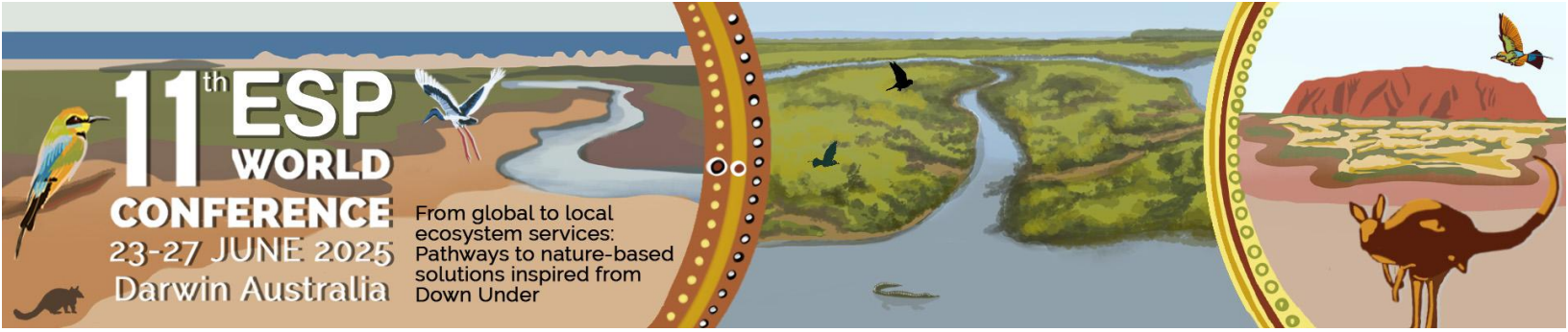
Urbanization and industrialization threaten regional ecosystem services through habitat and biomass loss and environmental pollution. To help restore the health and vitality of ecosystems, the United Nations General Assembly approved the 2021–2030 United Nations Decade on Ecosystem Restoration in 2019. Simultaneously, ecological restoration and management, especially Nature-based Solutions (NbS), have attracted increasing attention from scholars and decision-makers worldwide. This session aims for a comprehensive and systematic discussion on urban and regional ecological restoration and management methods and practices across different scales, natural, social, and economic conditions, including rural areas, cities, national parks and protected areas, across various spacial scales and population densities. Through discussion to accurately understand and adopt the best practices, theoretical frameworks, and key technical approaches in regional ecological restoration and management, to better support global sustainable development.

Goals and objectives of the session:

Share globally advanced methods and best practices of ecological restoration and management, foster academic exchanges and disseminate successful experiences to promote global sustainability.

Planned output / Deliverables:

Summary Report, Best Practices Collection

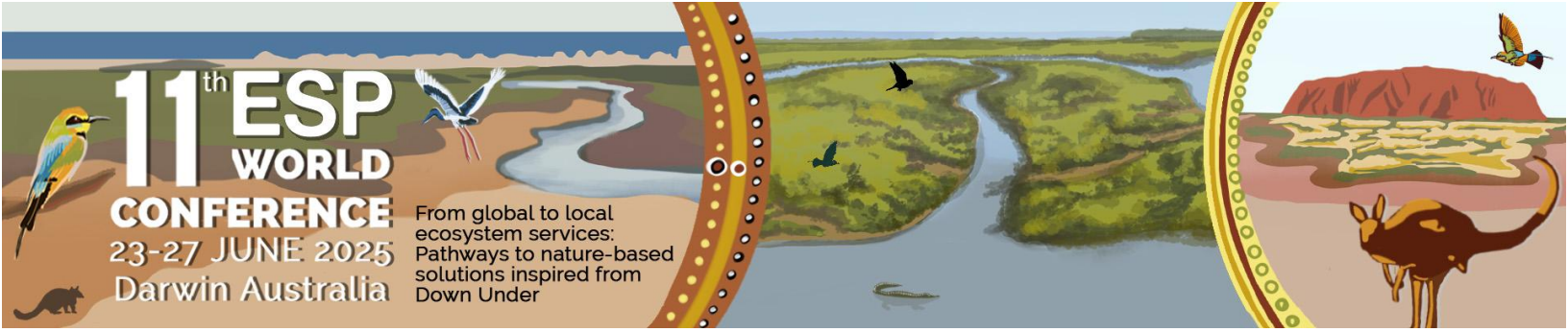


II. SESSION PROGRAM

Room: Damibila 1
Date of session: 25 June, Wednesday
Time of session: 16:00-18:00

Timetable speakers:

Time	First name	Surname	Organization	Title of presentation
16:00-16:15	Pooja	Ameet	Transport Department, Sindh Mass Transit Authority, Pakistan	Leveraging Social Data Science for Sustainable Urban Mobility: A Data-Driven Approach
16:15-16:30	Isabel	Ely	Research Institute of the Environment and Livelihoods, Charles darwin university, Australia	Evaluating nature-based solutions through aquatic food web monitoring in the East Branch of the Finniss River, NT, Australia.
16:30-16:45	Guojie	Zhang	Guangzhou Urban Planning Survey & Design Institute, China	Policy Embeddedness, Spatial Reconstruction and Technological Empowerment Practice and Reflection on Ecological Planning in Guangzhou
16:45-17:00	Agata	Cieszewska	Department of Landscape Architecture, Warsaw University of Life Sciences, Poland	Urban laboratory: a tool for co-design NbS solutions in medium-sized cities.
17:00-17:15	Daniele	La Rosa	Civil Engineering and Architecture, University of Catania, Italy	Addressing urban issues with NBS and ecological restoration - An integrated approach based on spatial equity
17:15-17:30	Zheneng	Hu	Tsinghua University, China	Power of ecological zoning: Is the land green use efficiency in counties impaired?
17:30-17:45	Ziyao	Wang	Research Center for Ecological Restoration, School of Architecture, Tsinghua University China	Identifying and Validating Ecological Management Zones Based on Ecosystem Service Bundles and



Time	First name	Surname	Organization	Title of presentation
				Future Land Use Simulation: A Case Study in Beijing, China
17:45-18:00	Zhiyuan	Ma	Research Center for Ecological Restoration, School of Architecture, Tsinghua University China	Spatial and temporal changes in the contribution of the ecosystem to sustainable development goals in China

III. LIST OF ABSTRACTS

The first author is the presenting author unless indicated otherwise.

1. Leveraging Social Data Science for Sustainable Urban Mobility: A Data-Driven Approach

First authors(s): Pooja Ameet

Other author(s): No

First author affiliation: Research Assistant, Karachi Mobility Project, Sindh Mass Transit Authority

Contact: pooja.dembani@gmail.com

Keywords: Urban mobility, social data science, public transport, sustainability, data-driven policy

Urban mobility is an important determinant of sustainable urban development, impacting economic development, social justice, and environmental sustainability. In this research, we examine how the application of social data science methods can contribute to improving the planning and implementation of urban mobility initiatives. Through the integration of large transportation data sets and socio-economic factors, we estimate mobility behavior, accessibility issues, and the success of policy measures.

In its case study of Karachi, the study uses predictive analytics and machine learning to analyze public transport effectiveness and passenger behavior. The report identifies critical drivers of

ridership, including mobility gaps, mobility constraints based on gender, and the impact of digital platforms to enhance transit use. The research also suggests a data-driven approach to decision-making for policymakers for sustainable and inclusive urban mobility interventions.

This study adds to the emerging literature on the convergence of data science and urban planning, providing practical recommendations for cities looking to maximize transport systems while resolving social and environmental issues.

2. Evaluating nature-based solutions through aquatic food web monitoring in the East Branch of the Finniss River, NT, Australia.

First authors(s): Isabel Ely

Other author(s): Professor Stephen Garnett, Larissa Schneider, Carla Eisemberg, Vinuthaa Murthy

First author affiliation: Charles Darwin University

Contact: isabel.ely@cdu.edu.au

Keywords: Nature-Based Solutions, Mine Rehabilitation, Aquatic Food Web, Metal Contamination, Ecological Restoration.

The Rum Jungle mine site in Australia's Northern Territory represents a legacy of mining-induced environmental degradation, particularly through acid mine drainage and metal contamination. Recent rehabilitation efforts have embraced nature-based solutions (NbS) to restore ecosystem function, reduce contaminant mobility, and enhance long-term sustainability. This study evaluates ecological restoration practices at Rum Jungle, focusing on their effectiveness in supporting aquatic ecosystem recovery downstream in the Finniss River.

Key NbS strategies include hydrological re-engineering to stabilize flow regimes, revegetation with native plant species to reduce erosion and promote soil health, and organic amendments to support microbial and plant communities. These approaches are underpinned by Indigenous

knowledge and community engagement to ensure culturally and ecologically appropriate outcomes.

To assess ecological recovery, metal concentrations of Cu, Mn, Zn, As, Cd and Pb were measured across multiple trophic levels in the Finniss River—including algae, macroinvertebrates, fish, and riparian trees. Results indicate limited bioaccumulation in higher trophic levels; however, several metals remain at ecologically concerning levels in some sites. These findings highlight ongoing legacy mine site rehabilitation challenges, particularly in mitigating chronic exposure risks to aquatic biota.

Despite these concerns, early signs of recovery—such as increased vegetation cover and improved hydrological stability—suggest that NbS contributes positively to the landscape's resilience. This case study underscores the importance of integrated, adaptive restoration strategies that combine ecological engineering, Indigenous stewardship, and long-term monitoring to support sustainable recovery in post-mining environments.

3. Policy Embeddedness, Spatial Reconstruction and Technological Empowerment Practice and Reflection on Ecological Planning in GuangZhou

First authors(s): Guojie Zhang

Other author(s): Rui Yang, Yongtao Yan

First author affiliation: Lead author

Contact: 1538278095@qq.com

Keywords: Ecological space; Low-carbon city; Planning practice; Land use constrain; Guangzhou

Ecological space plays an important role as a carbon sink. Scientific and reasonable ecological space planning can effectively promote low-carbon development in cities. Starting from clarifying the concept of low-carbon cities, this study takes Guangzhou as an example to discuss the practical logic of ecological spatial planning for low-carbon cities through three different

dimensions of "policy-space-technology". The research has found that the process of ecological spatial planning and construction of low-carbon city in Guangzhou is incremental, which changes from passive defense to active construction and comprehensive planning. In policy terms, from "urban first, green later" to "green first, urban later", the low-carbon ecological concept has been integrated from multiple aspects such as planning goals, planning scales, planning perspectives and planning strategies. In spatial terms, ecosystem value and potential recovery is increasingly concerned, which consisted in the changes from false artificial landscaping and ecological transformation with small-scale and high investment to the natural spatial reconstruction of "production-life-ecology". In technical terms, the integration of diverse data and spatiotemporal monitoring networks have achieved precise identification and normalized restoration of key regional ecological issues. Big data technology can effectively improve the capacity and level of urban low-carbon governance. Overall, Guangzhou has achieved an adaptive transformation towards ecological spatial planning under the background of carbon constraints. However, there are still problems such as insufficient implementation of planning, lack of technical feasibility and economic applicability of spatial planning schemes. In order to promote the orderly development of low-carbon eco-cities fundamentally, it is necessary that strengthening planning transmission and land use constrain, promoting regional collaboration to reduce economic costs, and perfecting the low-carbon ecological concept of spatial planning in the future.

4. Urban laboratory: a tool for co-design NbS solutions in medium-sized cities.

First authors(s): Agata Cieszewska

Other author(s): Gabriela Maksymiuk, Agnieszka Sosnowska, Joanna Adamczyk, Magdalena Kuchcik, Dorota Pusłowska-Tyszewska, Renat Giedych, Martyna Kaniewska-Gołek, Kacper Rybicki, Olga Balcerzak, Warsaw University of Life Sciences, Department of Landscape Architecture

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Keywords: urbanlab, NbS co-creation, climate change adaptation

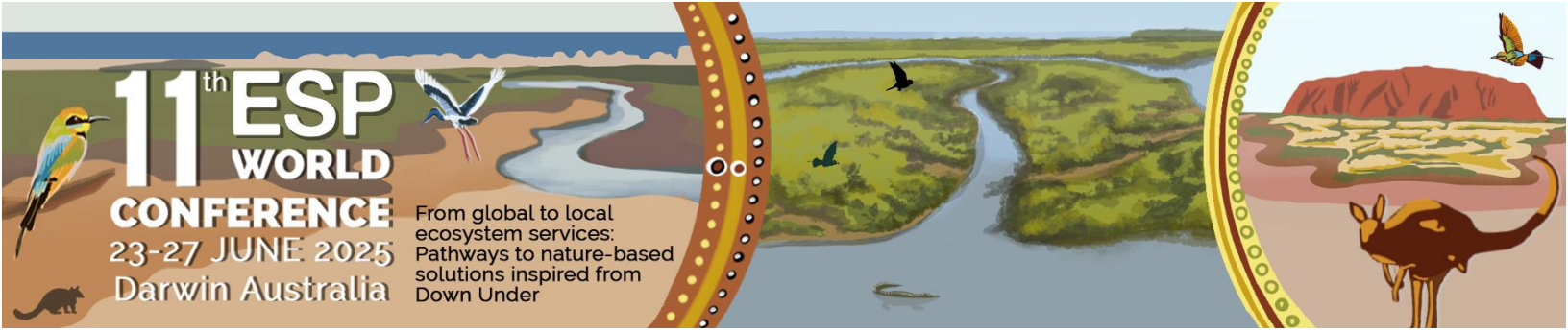
Urban laboratories serve as platforms for experimenting with innovative solutions in the realm of smart cities. Cities today face climate change and resilience challenges. Nature-based Solutions (NbS) are recognized as a key approach in Climate Change Adaptation for urban areas, but it is essential to implement these solutions in a way that ensures acceptance by local communities.

As part of the Integrate NbS project (Driving Urban Transition program), urban space transformation is achieved through co-creation with stakeholders, focusing on NbS to enhance the resilience of medium-sized cities to climate change. In the Polish case, we are testing the "living laboratory" methodology in Mińsk Mazowiecki (40,000 inh.). This co-creation laboratory will host six meetings with a group of 20 local stakeholders, including city officials, businesses involved in spatial development (developers, property managers), and active residents.

Three meetings have been held so far. In the first session, we introduced NbS through a serious board game, fostering connections and laying the foundation for collaboration. Subsequent sessions focus on identifying the city's environmental challenges and collaboratively planning the most effective solutions. The final workshops will involve co-creating these solutions and collectively preparing a roadmap for climate resilience.

One of the main challenges we have faced is forming a group of participants willing to collaborate on the city's transformation while also understanding the impact of NbS on urban development. Another challenge is selecting the most effective NbS to address Mińsk Mazowiecki's key issues. These include excessive concrete coverage (city center, new housing estates), flooding after extreme rainfall, and public spaces that are not adapted to more frequent hot days.

The integrated urban lab in Mińsk Mazowiecki will serve as a model for collaborative environmental problem-solving through NbS. In this approach, planners serve as facilitators rather than authoritative experts, guiding the collaborative urban transformation process.



5. Addressing urban issues with NBS and ecological restoration – An integrated approach based on spatial equity

First authors(s): Daniele La Rosa

Other author(s): Viviana Pappalardo, Carlo Gerundo, Marialuce Stanganelli, Michele Grimaldi

First author affiliation: University of Catania

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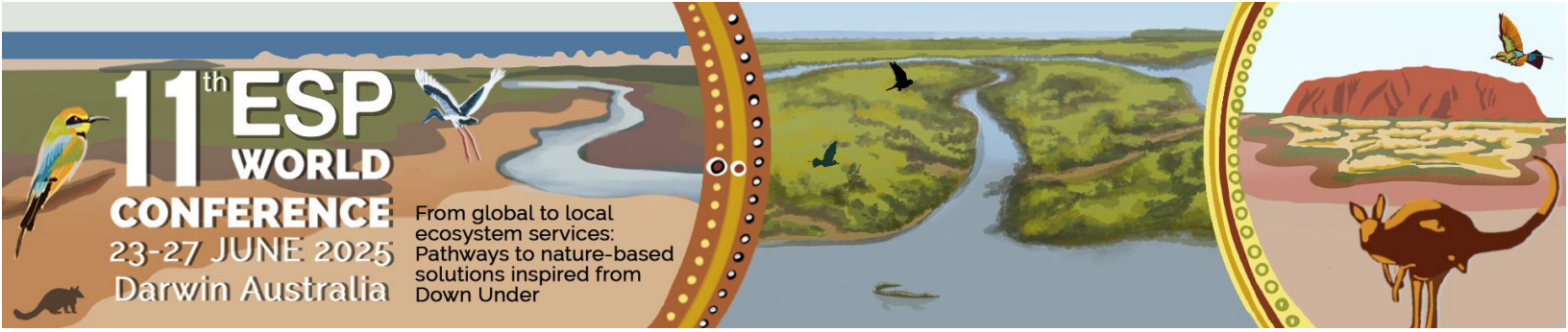
Keywords: multiple benefits, urban planning, spatial, cities, scenarios

Cities are systems increasingly sensitive to issues such as climate change, flooding, environmental quality, lack of or unequal access to urban functions and services, public health, and general well-being. Addressing these issues through the implementation of nature-based solutions offers many ecological and socio-economic benefits, as demonstrated by the vast amount of research. To integrate NBS into urban planning, it is essential to understand their potential benefits and co-benefits to support effective decision-making.

The multifunctional benefits of NBS have been widely theorized, but their integrated evaluation and quantification are still an open field of research, especially when assessing different types of benefits simultaneously. Furthermore, the benefits generated by NBS should also address issues of spatial justice, as benefits can be generated in specific portions or districts of cities only, thus limiting the potential number of beneficiaries and increasing social inequalities.

This research aims to analyze and quantify the multi-dimensional benefits of NBS scenarios in dense urban contexts, with a spatial equity approach. In particular, this contribution presents and discusses knowledge gaps in research and practice that cause the decoupling of equity and spatial justice principles in the planning, design and physical implementation of NBS. Second, a method for quantifying the multiple benefits of NBS scenarios for various urban issues is proposed. Third, the scenarios are evaluated in terms of spatial equity to optimize their spatial location within the entire urban setting. The methodology is tested for the cities of Catania and Naples (Italy), characterized by a very compact and dense urban fabric, with limited quantity green areas.



6. Power of ecological zoning: Is the land green use efficiency in counties impaired?

First authors(s): Zheneng Hu

Other author(s): Jianjiao Gong

First author affiliation: Tsinghua University

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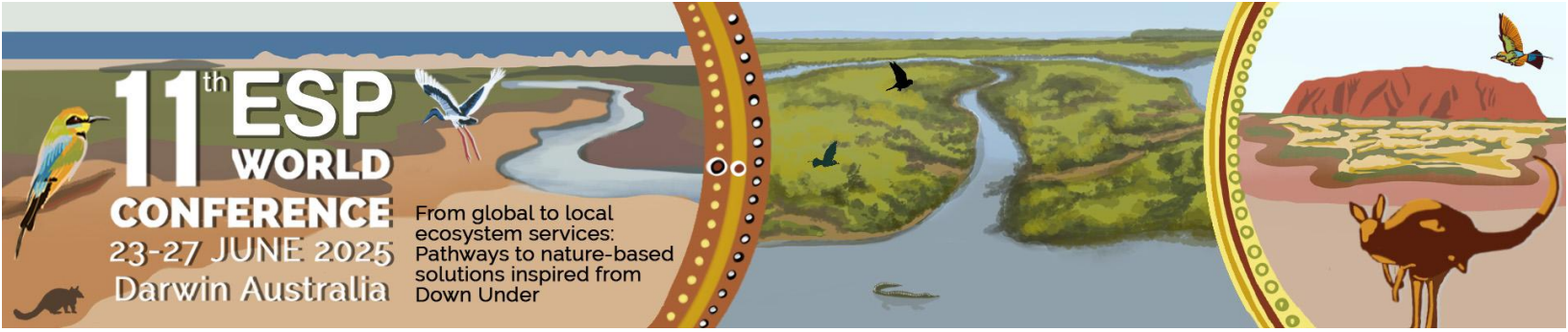
Keywords: Ecological zoning; National Key Ecological Function Zone Policy; Land green use efficiency; Carbon emission

The land green use efficiency (LGUE) is a crucial metric for assessing the effectiveness of land resource allocation. As a prominent example of ecological zoning policy, the National Key Ecological Functional Zone Policy (NKEFZP) is designed to reorganize the distribution of land resources. Accordingly, shifts in LGUE will serve as a central focus for evaluating the policy's performance. To this end, we utilize county-level panel data from 2005 to 2020 and employ a difference-in-differences model to investigate the impact of the NKEFZP on LGUE. The results indicate that NKEFZP has significantly enhanced LGUE, and the policy effect exhibits heterogeneity, mainly determined by the combination of implementation batch, ecological quality, and financial support. Mechanism analysis reveals that the concentration of production activities and the cultivation of human capital are pivotal channels for improving LGUE in NKEFZP. Expansion analysis shows that the improvement of LGUE caused by NKEFZP can not only reduce the total carbon emissions, but also reduce the carbon emission intensity. This paper provides references for other developing countries to ensure the improvement of LGUE while implementing ecological zoning policies.



7. Identifying and Validating Ecological Management Zones Based on Ecosystem Service Bundles and Future Land Use Simulation: A Case Study in Beijing, China

First authors(s): Ziyao Wang

Other author(s): Feng Li

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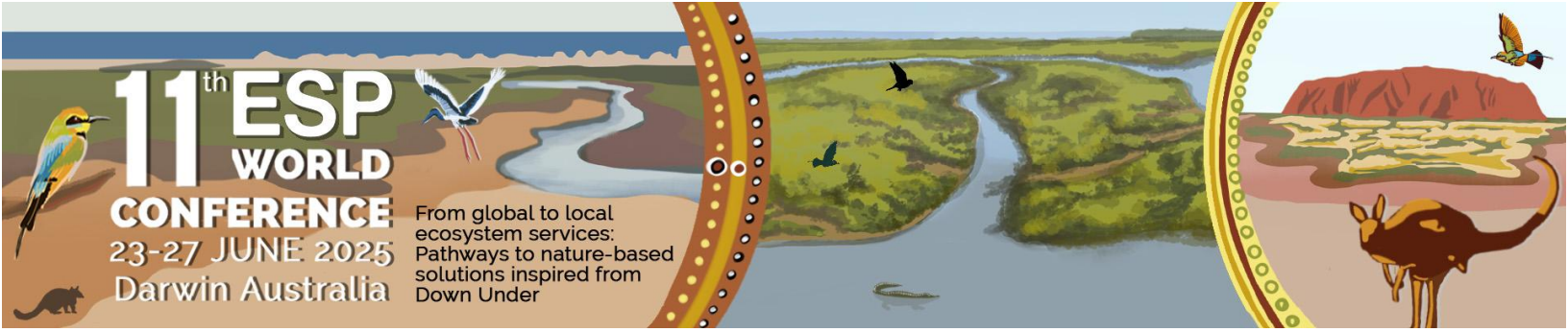
Keywords: Ecological management zones, Ecosystem services, Ecosystem service bundles, Land use change, PLUS model

Ecological management zones (EMZs) play a crucial role in enhancing ecosystem service (ES) management and promoting sustainable regional development. This study proposes a comprehensive framework for EMZ identification and validation by integrating historical ecosystem dynamics with future land use projections. We applied this framework to Beijing, China, and selected five vital ESs for the study area namely, water yield (WY), carbon sequestration (CS), habitat quality (HQ), soil conservation (SC) and water purification (WP). The framework involves two key components. First, EMZs are delineated based on the historical evolution of five ES types and the dynamic assessment of ES bundles. Second, land use and ES changes under multiple future scenarios are simulated to assess the robustness of the identified EMZs. The results reveal significant spatial heterogeneity among ESs, with water yield exhibiting a trade-off relationship with the other four ES types. Based on an analysis of ES bundle evolution trajectories, we identified four types of EMZs: ecological conservation zone, ecological restoration zone, ecological transition zone and sustainable construction zone. Through strategic EMZ planning, it becomes possible to augment the area of forestland and grassland, alleviate the contradiction between arable land and construction land, and enhance the supply of various ESs. This framework offers a novel, data-driven approach to ecological management by providing planners and decision-makers with a scientifically robust method for optimizing urban and regional ecological restoration and management.



8. Spatial and temporal changes in the contribution of the ecosystem to sustainable development goals in China

First authors(s): Zhiyuan Ma

Other author(s): Feng Li

First author affiliation: Research Center for Ecological Restoration, School of Architecture, Tsinghua University, Beijing, China

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Keywords: restoration projects, sustainable development goals (SDGs), ecosystem services (ESs), China

Ecosystems are an important basis for promoting sustainable development goals (SDGs) through the provision of stable ecosystem services (ESs). In the past 20 years, China has implemented a series of ecological restoration projects, resulting in the improvement of the ecological environment. In this context, changes in ESs in China may affect the contribution of ecosystems to the SDGs. Based on the relationships between ESs and SDGs, numerous studies have assessed SDGs in various regions. However, these studies did not quantify the difference in the extent of the contribution of different ESs to SDGs. For this purpose, we constructed an approach for assessing the contributions of ecosystems to the SDGs in 31 provinces in China. The results show that the capacity of ecosystems in different provinces to contribute to the SDGs is on an upward trend. However, there are significant spatial differences in the contributions of provinces to the SDGs. This study aims to provide theoretical support for ecosystem management and the promotion of the SDGs.