BOOK OF ABSTRACTS

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I. SESSION DESCRIPTION

ID: B10b

Research on urban ecosystem services. The state of the art and challenges for future research/ La investigación sobre servicios ecosistémicos urbanos. Estado del arte y desafíos al futuro

Format: Hybrid

Hosts

	Name	Organisation	E-mail
Host	Luis Inostroza	Mendel University in Brno	luis.inostroza@mendelu.cz

Abstracts

Scientific research on urban ecosystem services (UES) has grown exponentially during the last decade. Key aspects of urban sustainability such as green and blue infrastructure, human health, urban resilience and vulnerability, climate change, environmental inequality, urban planning and design have been related to ecosystem services science. This transdisciplinary work has allowed a better understanding of some of the most complex aspects of urban systems while also opening new research avenues based on the tremendous contribution that biodiversity and Nature-based solutions can make to sustainable urban development to improve the quality of urban life. This session will review both conceptual and operational aspects referring to research on urban ecosystem services in Latin America and the world. The objective is to promote a discussion about consolidated scientific findings (the state of the art), the new scientific findings that appeared in recent years (scientific innovation) and the research challenges towards the future. The session welcomes the presentation of case studies, methodological studies and new techniques (for example, citizen science for analysing cultural services, remote sensing for analysing regulation services, etc.). La investigación científica sobre servicios ecosistémicos urbanos ha crecido exponencialmente durante la ultima década. Aspectos claves de la sostenibilidad urbana como infraestructura verde y azul, salud humana, resiliencia urbana y vulnerabilidad, cambio climático, inequidad ambiental, planificación y diseño urbano han sido relacionados con la ciencia de los servicios ecosistémicos. Este trabajo transdisciplinario ha permitido no solo comprender de mejor manera algunos de los aspectos más complejos de los sistemas urbanos sino también ha abierto nuevas posibilidades de solución sobre la base del tremendo aporte que pueden hacer la biodiversidad y las soluciones basadas en naturaleza al desarrollo urbano sostenible y la mejora de la calidad de vida urbana. En esta sesión se

revisarán tanto aspectos conceptuales como operacionales referidos a la investigación sobre servicios ecosistémicos urbanos en Latino América y el mundo. El objetivo es propiciar una discusión sobre los hallazgos científicos consolidados (el estado del arte), los nuevos hallazgos científicos aparecidos en los últimos años (innovación científica) y los desafíos de investigación hacia el futuro. La sesión esta abierta tanto para la presentación de casos de estudio, estudios metodológicos y nuevas técnicas (por ejemplo, ciencia ciudadana para el análisis de servicios culturales, teledetección para el análisis de servicios de regulación, etc.).

Goals & Objectives

To review the state of the art, the new findings and challenges regarding urban ecosystem services research Reflejar el estado del arte y los desafios de investigacion sobre los servicios ecosistemicos urbanos

Planned Output

Some selected presentations will be invited to participate in a special issue (SI) in Ecosystem Services (Elsevier) dedicated to research on urban ecosystem services. Las mejores presentaciones serán invitadas a participar de un numero especial en la revista Ecosystem Services" dedicado a la investigación sobre servicios ecosistémicos urbanos.

Session Format

Sesion estandard de 1.5 – 2 hrs

Acceptance of voluntary contributions

Yes, I allow any abstract to be submitted to my session for review.

Relation to ESP Working Groups or National Networks

Biome Working Groups: BWG 10 – Urban systems.

II. SESSION PROGRAMME

Date of session: Tuesday 7.10

Time of session: 14:00 – 15:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
14:00 – 14:10	Luis	Inostroza	Mendel University in Brno	Introduction to the session
14:10– 14:25	Malte	Bührs	Ruhr University Bochum	Potential of citizen science data driven species distribution models for habitat quality assessment in metropolitan

Time	First name	Surname	Organization	Title of presentation
				areas – Insights from the IMECOGIP-toolbox
14:25–14:40	Lars	Gruenhagen	Ruhr University Bochum	Which toolset (InVEST/IMECOGIP Toolbox/i-Tree Eco) to use? – A comparative method assessment of carbon storage in urban street trees as an ecosystem service
14:40–14:55	Marta	Derek	University of Warsaw	"This is my magical place here". Walking interviews as a method to understand CES trade-offs in urban green spaces
14:55–15:10	Ursula	Cardenas	Louvain research institute for Landscape, Architecture, Built environment	An Integrated Framework for Understanding the Contribution of Ecosystem Services to Urban Metabolism Assessments. Case Studies in London and Lima
15:10–15:25	Francisco	De la Barrera	Universidad de Concepción & CEDEUS	Valoración de servicios ecosistémicos locales en amplio gradiente latitudinal: coincidencias y discrepancias de la aplicación de metodologías basadas en expertos, mediciones y consulta social
15:25–15:30	Luis	Inostroza	Mendel University in Brno	Discussion

III. ABSTRACTS

1. *Type of submission*: Abstract / Resumen

B. Biome Working Group sessions / Sesiones del Grupo de trabajo sobre Biomas: B10b - Research on urban ecosystem services. The state of the art and challenges for future research/La investigación sobre servicios ecosistémicos urbanos. Estado del arte y desafíos al futuro

Valoración de servicios ecosistémicos locales en amplio gradiente latitudinal: coincidencias y discrepancias de la aplicación de metodologías basadas en expertos, mediciones y consulta social

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Other author(s): Valentina Salinas, Alfonsina Puppo, Helen de la Fuente, Sergio Gonzalez

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Los espacios verdes urbanos contribuyen al bienestar de las personas y han sido ampliamente investigadas como indicadoras de la sustentabilidad urbana. Sin embargo, existe una alta diversidad de tipologías de espacios verdes (ej. tamaños o estructura de la vegetación), que a su vez pueden responder de manera diferente de acuerdo a su contexto climático, variando su capacidad de proveer servicios ecosistémicos (SE). El objetivo de este trabajo es primero analizar cómo se estructuran los espacios verdes (EV) en términos de su vegetación y su provisión de SE, contrastando una valoración de expertos, mediciones biofísicas, mediciones basadas en datos remotos y cuestionarios aplicados a vecinos/as. 11.340 EV de 7 ciudades fueron clasificados en su estructura usando clasificación basada en objetos de imágenes Sentinel-2 abarcando un amplio rango latitudinal (18,5°-53°S). Se consultó a 20 expertos completar una matriz para un amplio set de servicios ecosistémicos. Para la medición biofísica remota se obtuvo la cobertura vegetal de cada EV, se calculó el almacenamiento de carbono usando el índice de vegetación mejorado y la temperatura superficial del suelo (LST) se derivó de imágenes Landsat 8 y Sentinel-2. In situ (94 EV) se registró la temperatura en terreno usando una cámara térmica y se hicieron mediciones a la vegetación (ej. DAP y área de dosel) para derivar volúmenes y biomasa, y así calcular el carbono secuestrado. Del mismo modo se registró la presencia de especies melíferas y frutales. En los mismos 94 EV se aplicaron cuestionarios. Como resultados, las medidas in-situ tienen a validar evaluación de expertos y la valoración social, especialmente para SE

derivados de la biomasa, pero con algunas excepciones, que remarcan la necesidad de considerar otros factores socio-materiales, hacer un uso prudente de las valoraciones de expertos y reconocer la acción co-productora de los sistemas socioecológicos.

Keywords: captura de carbono, regulación térmica, parques urbanos, CBO

2. *Type of submission*: Abstract / Resumen

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An Integrated Framework for Understanding the Contribution of Ecosystem Services to Urban Metabolism Assessments. Case Studies in London And Lima

First author(s): Ursula Cardenas Mamani

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Understanding the importance of the city's physical, biological, and social heterogeneities, as well as its processes and activities, is important to overcome current resource and energy consumption trends in cities. Policymakers and urban planners have adopted the Ecosystem Services (ES) concept to recognize nature's role in cities. Yet, the relationship between human activities and ecological processes in urban spaces is underexplored. Urban Metabolism (UM) addresses these environmental challenges by scrutinizing the interplay between anthropogenic processes in cities. The ES concept contributes by including ecosystem processes and functions. This research assesses the contribution of ES in UM assessments by proposing a framework that builds on Natural and Social capital interrelationships, and utilizes "Pressures", "Drivers" and "State" factors, and evaluates ES supply and demand flows, which can be embedded in the Economy-Wide Material Flow Analysis (EW-MFA), one of the most used mass-balanced methods for assessing resource demand in the UM field.

The framework is applied and tested in Lima and London, two cities with contrasting biophysical and socio-economic profiles that also significantly concentrate population and economic activities, providing opportunities to express the contribution of ES to the urban-scale dynamics of resources and emissions. Our simulations forecast spatio-temporal variations of such dynamics in both cities until 2050, based on current resource flow/emission assessments and land-use data. These scenarios contemplate urban sustainability drivers like the Paris Agreement's main objectives, city-scale policy targets, and fluctuating socio-economic indicators like population density and income, which can evolve positively or negatively over time. The application of the framework is these two

contrasting cases unravels the sensitiveness of the framework to properly accounting for diverse biophysical and socioeconomic conditions. The resulting insights can guide policymakers and urban planners, raising awareness of nature's value in anthropogenic contexts, and promoting the integration of UM and ES knowledge in urban planning.

Keywords: Urban Metabolism,Urban Ecosystem Services, Material Flow Analysis

3. *Type of submission*: Abstract / Resumen

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"This is my magical place here". Walking interviews as a method to understand CES trade-offs in urban green spaces

First author(s): Marta Derek

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Public urban green spaces (PUGS) are an important part of urban social-ecological system. They deliver a wide range of urban ecosystem services, with regulating and cultural as the most valued by urban dwellers. As PUGS are multifunctional landscapes, synergies and trade-offs between different ES cannot be negotiated effectively if some services are unknown or ignored (Daniel et al. 2011). This is likely to be the case for cultural ecosystem services (CES) due to its subjective character. The aim of this presentation is to analyse trade-offs of cultural ecosystem services in PUGS using the method of walking interviews. This method is considered to be very useful in sustainable and inclusive planning, where practitioners are having to pay increasing attention to how people value and use the spaces in which they live (Evans, Jones 2011). Walking interviews can also help in detecting complex interactions in the neighborhood environment (Lauwers et al. 2021).

Five PUGS of Warsaw, Poland, were chosen as case study areas. Each case represented different type of urban green spaces. For every area we performed at least five walking in-depth interviews with different experts. This qualitative tool was supported by a GIS technique: tracks chosen by the experts were recorded, and places of their particular attention were mapped. In this way, we identified and mapped hotspots of CES provision in every case study.

The results can help us to better understand the trade-offs between CES in different types of urban green areas. The delivered outcomes can be supportive for sustainable urban development.

Keywords: cultural ecosystem services, urban green spaces, Poland, walking interviews, social-ecological system

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Potential of citizen science data driven species distribution models for habitat quality assessment in metropolitan areas – Insights from the IMECOGIP-toolbox development

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Urban green infrastructure (GI) plays a crucial role in supplying essential ecosystem services (ES). Thereby, GI can capitalize on its diverse habitat structures and high biodiversity, which are both fundamental prerequisites for the provision of ES. Nonetheless, the absence of spatially modeled assessments of habitat quality at a small scale in urban areas is primarily attributed to insufficient data availability and poor data quality. Overcoming these challenges, the combination of citizen science (CS) data and Remote Sensing in species distribution models (SDM) enables the evaluation of habitat quality in urban GI at a finer resolution.

In this study, an ensemble of different machine learning algorithms CS datasets were utilized encompassing multiple avian species that are expected to exhibit distinct responses to urban conditions. We chose birds as indicative species, as they accurately reflect the state of their habitats. To elucidate biodiversity patterns and species distributions in the Ruhr Metropolis, environmental predictors such as bioclimatic variables, digital surface models, and land use-derived information were incorporated to predict habitat suitability.

The SDM-based evaluation of habitat quality assumes a pivotal role in determining the impacts of planning on biodiversity in diverse urban areas. Currently it is being implemented in the IMECOGIP toolbox for ES assessments. Through the integration of habitat quality assessment, the IMECOGIP toolbox emerges as an indispensable resource for urban planners, citizens, and scientists alike, as it addresses the urgent issue of biodiversity loss in urban areas, fortifies cities' resilience against the backdrop of climate change, and contributes to the preservation of ES supply facilitated by urban biodiversity.

Keywords: IMECOGIP, Species Distribution Model, habitat quality, citizen science, remote sensing

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Which toolset (InVEST/IMECOGIP Toolbox/i-Tree Eco) to use? - A comparative method assessment of carbon storage in urban street trees as an ecosystem service

First author(s): Lars Gruenhagen

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Urban street trees are suffering from their environment as a result of global environmental changes. Climate change, including increasing temperatures, more irregular precipitation and traffic emissions, has a severe impact on already harsh conditions in urban areas. For impact assessment, trees are increasingly being recorded in digital tree inventories with their most important measured values such as breast height diameter and location. Street trees are also an important part of green infrastructure, they provide different ecosystem services (ES). Due to carbon storage capabilities, street trees mitigate greenhouse gas emissions by absorption, e.g. carbon dioxide. Therefore, carbon storage is an important component in urban sustainable transformation.

To estimate the carbon storage of street trees, there are three different well-known geospatial data-based and fine scale urban ES assessment methods:

1. The raster-based program InVEST,

2. The vector polygon QGIS based IMECOGIP Toolbox from the Project with the same name,

3. The vector point based American program i-Tree Eco from i-Tree Cooperative.

The study aim is to compare the different input data, the assumptions in methods, location of calculations, results and their presentation with their causes in an explanatory and justifying manner. Each method has its individual advantages and disadvantages e.g. in the result presentation. The digital tree inventory of Bochum, Germany serves as a representative urban case study. It contains all essential entries, is updated regularly and is freely available.

Based on this comparison, information for those responsible in the cities shall be given: Which methods are more efficient to estimate carbon storage?

Keywords: Keywords: Street trees, Ecosystem Service assessment, Carbon storage, InVEST, i-Tree Eco