

BOOK OF ABSTRACTS

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I. SESSION DESCRIPTION

ID: T20a

Disentangling equity in ecosystem services

Hosts:

	Title	Name	Organisation	E-mail
Hosts		Felipe Benra	UFZ/Leuphana (Germany)	felipe.benra@leuphana.de
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Abstract:

Inequity is one of the pivotal conservation challenges of our epoch, with far-reaching ramifications for human well-being and sustainable development. Under such challenges, the unequal access to natural capital and ecosystem services (ES) becomes apparent on different spatial levels - among and within countries, within regions, between urban and rural areas and within neighborhoods and different socio-economic and demographic groups. Despite the multiplicity of approaches and dimensions of equity and justice, clear methodologies to explore and assess levels of inequity in ES management are not fully developed yet. This session aims to address the underlying biophysical patterns and socio-economic drivers of unequal spatial, cross-scale and temporal distribution of ES benefits. In this session we invite talks exploring the linkages between ecosystem services and equity outcomes across different dimensions, including procedural, contextual (which includes recognition), and distribution. Moreover, the session will address linkages between beneficiaries, ecosystems and institutions and collect empirical evidence for distributional inequities, being rooted in societal groups being marginalized and left behind in the design, planning, and management of natural ecosystems and human-made nature-based solutions. The session will comprise two formats: i) standard presentations and ii) a discussion forum. We welcome talks focusing on the following topics and specific questions:

1) Advancements regarding conceptual understanding of equity in relation to ES:

- What theories of justices are applied in the field of ES research?
- What is considered a just outcome?
- Who needs to be recognised in ES management? What needs to be recognised (e.g., capabilities, preferences, plural values)? In short, what is the entitlement and for whom?
- Who decides what a just outcome is? Which actors are involved in the equity/justice assessment?

2) Methodological advancements:

- Based on which type of data can equity assessments be made?

- What type of data/outputs and related methods are needed to achieve integrated justice assessments across multiple justice dimensions?

Contributions can range from local to global scales and from urban and rural settings. Understanding equity issues is key for achieving sustainable futures and transformative change.

Goals and objectives of the session:

The goals are twofold: 1) For the standard presentation part of the session we aim at increasing and enriching the scientific exchange on recent scholar work for this increasing strand of literature. We will also discuss the option of a special issue (in the *Ecosystem Services* Journal), based on the contributions to this session. The session will be a “standard” session comprising a series of 10 minutes presentations divided into two blocks of 1.5 h: presentations (5x 10 min + 5 min question).

2) For the “Forum” part of the session we aim at collecting case studies that trace back ecosystem services injustices beyond assessments of distributional injustices. We aim to discuss and find common ground for one or a few synthesis papers to advance ES justice research based on cross-case study comparison from various empirical contexts. The forum discussion is reserved for ESP-equity working group members and anybody who wants to join this group. If you are interested in joining, please submit an abstract (clearly indicating that you are interested in this part of the session) and prepare a 3 min pitch presentation providing insights about your work. Authors selected for a 10 min presentation in the first part of the session will automatically be able to join the forum as well.

Planned output / Deliverables:

The planned outputs are twofold: For the standard presentation part of the session we intend to prepare a Special issue on ecosystem service equity (Target Journal: *Ecosystem Services*). For the “Discussion Forum” part of the session we intend to further develop the scholars’ network and planning of joint activities in the frame of the ESP “equity in ES research” working group, including joint research articles.

Voluntary contributions accepted:

Standard presentation part of the session: Yes.

Discussion forum part of the session: Yes

II. SESSION PROGRAM

Date of session: Tuesday, 11 October

Time of session: 11:00–12:30; 16:00–17:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
11:00– 11:10			Introduction	

Time	First name	Surname	Organization	Title of presentation
11:10– 11:25	Miriam	Montero–Hidalgo	Rey Juan Carlos University	Environmental Justice and Ecosystem Services: where we come from, where we are, and where we are going
11:25– 11:40	Giulia	Benati	Sapienza Università di Roma	Environmental injustices in the city of Rome: Assessing the accessibility to cultural ecosystem services based on geotagged social media data
11:40– 11:55	Celina	Aznavar	Universidad Autónoma de Barcelona	Assessing luxury and legacy effects on urban patterns of tree canopy, biodiversity and ecosystem services
11:55– 12:10	Felipe	Benra	Leuphana University Lüneburg	Methods to assess distributional inequality from the supply perspective
12:10– 12:25	Andres	Suarez	Universidad de la Costa	Addressing the ecosystem services inequality produced by large-scale avocado growing in northern Caldas, Colombia
16:05– 16:20	Pablo	Herreros Cantis	Urban Systems Lab – The New School	Applying a source-to-impact flood risk assessment to identify priority areas for green infrastructure interventions in a sewershed in Syracuse, NY
16:20– 16:35	Enrica	Garau	University of Girona	Understanding behaviours and (a)symmetries in power relation and ecosystem services flows among multiple stakeholders in a North–Western Mediterranean River Basin
16:35– 16:50	Adriana	Bernal–Escobar	Osnabrück University	Who is benefiting downstream? Experimental evidence on the relevance of upstream–downstream geographic distance for water provision
16:50– 17:30			Discussion Forum	

III. ABSTRACTS

Abstracts are ordered based on the session program. The first author is the presenting author unless indicated otherwise.

1. Type of submission: Abstract

T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services

Assessing luxury and legacy effects on urban patterns of tree canopy, biodiversity and ecosystem services

Presenting author: Celina Aznarez

Other author(s): Frederik Have Kallesøe, Jens-Christian Svenning

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Urban trees and other vegetation are vital to city dwellers' quality of life, as they provide multiple ecosystem functions and services (ES) while contributing to urban biodiversity. However, the uneven distribution of urban tree canopy and tree biodiversity in urban landscapes may cause unequal access and exposure among dwellers. Poor access to urban nature and related benefits can aggravate socio-environmental injustices. Hence, accounting for biophysical and social factors driving patterns of tree canopy cover and biodiversity in cities is key to addressing potential socio-environmental inequities. This research analyses how socioeconomic and demographic factors at the neighbourhood scale influence the spatial distribution of urban tree canopy, biodiversity and ES in Vitoria-Gasteiz, a European middle-sized city internationally recognized for its pioneering greening policies. We tested the luxury (based on wealth) and legacy (based on neighbourhood development age) effects hypotheses on urban tree canopy cover and biodiversity spatial patterns. Further, we modelled regulating ES (runoff control, air pollution removal, carbon sequestration and urban heat control) from the public tree city inventory using the i-Tree Eco tool, and we tested if ES supply is driven by the above-mentioned socioeconomic effects across the neighbourhoods. Our preliminary results indicate a positive association between tree diversity and high educational attainment, supporting the luxury effect hypothesis. Neighbourhood age was negatively associated with tree diversity and cadastral value, suggesting a limited pool of tree species in older neighbourhoods and a lower housing demand for such areas. ES were strongly positively associated with a higher percentage of canopy coverage per neighbourhood, without being directly related to luxury or legacy effects. This study constitutes a novel approach to understanding how the distribution of urban biodiversity and related ES may be influenced by biophysical and socioeconomic

factors. Our findings can contribute to inform more equitable and just urban greening plans and strategies.

Keywords: Socioeconomics; Urban ecology; Urban biodiversity; Environmental justice

2. Type of submission: Abstract

[T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services](#)

Understanding behaviors and (a)symmetries in power relation and ecosystem services flows among multiple stakeholders in a North-Western Mediterranean River Basin.

Presenting author: Enrica Garau

Other author(s): Josep Pueyo-Ros, Josep Vila-Subiròs

Affiliation: University of Girona, University of Almeria

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Freshwater ecosystems and the services they provide to people are among the most threatened ecosystems due to human activity. This historical trend is placing them at the center of the debate on how to address water scarcity and associated social conflict.

With predicted environmental changes, increase uncertainty and, at the same time, reinforce the need for new spaces of dialogue among stakeholders with the aim to open new scenarios of cooperation in the face of classic competition.

Power relations, access and control, (in)equity, and (in)justice are key modulators of conflicts arising from the use and benefit of ecosystem services by multiple stakeholders.

A greater knowledge of stakeholder value systems and behaviors is thus crucial for understanding socioecological dynamics. We propose an analytical framework that combines political ecology and game theory to analyze freshwater ecosystem services. This integrated framework was used to reinterpret concepts such as common goods, (a)symmetric flows, and (un)fair trade-offs in the context of ecosystem services. Ultimately, this approach served to gain new understanding of behaviors and (a)symmetries in power relations.

We studied the case of a north-western Mediterranean river basin using data obtained from interviews with stakeholder and newspaper articles. Our findings identified different types of stakeholder relationships, ranging from mutual support and cooperation to conflict. We also found that power relations in the basin are closely linked to concepts of control, access, equity, and justice. Each strategy is rooted in a value system that drives decisions on the use of natural resources and these decisions, in turn, have the power to generate trade-offs and situations of environmental (in)justice that lie at the root of these WES conflicts.

The proposed analytical framework shows how social mechanisms can affect ecosystem services flows, potentially facilitating or hindering the development of more equitable management models for natural resources.

Keywords: Socioecological systems, Water ecosystem services, Stakeholder power relationships, Political ecology, Game theory

3. Type of submission: Abstract

[T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services](#)

Environmental Justice and Ecosystem Services: where we come from, where we are, and where we are going.

Presenting author: Miriam Montero Hidalgo

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The ecosystem services (ES) framework recognises and quantifies the dependency of humans on ecosystems as well as the dependency of the ecosystem's health from the relationship between humans with its environment. The ES flux from nature to humans and viceversa could be ordered in a fair way by some moral considerations, such as those established by environmental justice.

Although the framework is gaining momentum as a conceptual basis for diverse strategies that operationalise ecosystem benefits, including green infrastructure, ecosystem-based adaptation and nature-based solutions, its implementation needs to consider equity and justice to avoid (re)producing social and environmental inequalities. Hence, improving the framework through an environmental justice (EJ) lens could result in a more holistic and inclusive approach to legitimise existing ES implementation approaches.

Environmental justice emerged as a grassroots movement of African American communities against the siting of toxic waste facilities near their homes. From this initial framing, significant progress has been made on the concept's growth, deepening and development in other fundamental research areas such as climate change, spatial planning and biodiversity conservation. Moreover, new forms of discrimination are being represented, including those rooted in gender, age and disability prejudice. In this light, this presentation summarises where we are, where we are going and where we come from regarding the relationship between EJ and ES.

This contribution first discusses the evolution and expansion of the environmental justice concept, starting from Schlosberg's (2013) definition and exploring the different justice dimensions from the scientific literature. Furthermore, we analyse current concerns

regarding who should be the subject of justice (humankind and/or nature) and describe how the ES and EJ frameworks could enrich each other through an analysis of knowledge gaps and previously detected missing links. We conclude with punctual proposals on how to overcome the identified gaps that could aid in laying the groundwork for a theory that brings together ES and EJ in a novel way.

Keywords: environmental justice, ecosystem services, equity, human well-being, conceptual framework

4. Type of submission: Abstract

[T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services](#)

Environmental injustices in the city of Rome: Assessing the accessibility to cultural ecosystem services based on geotagged social media data

Presenting author: Giulia Benati

Other author(s): Fulvia Calcagni, Federico Martellozzo

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Urban green spaces (UGS) provide multiple benefits and enhance people's mental and physical health through the delivery of cultural ecosystem services (CES). Yet, the benefitting from CES is determined by the accessibility to UGS, which is often reduced for the most fragile population groups, such as those with limited mobility or socio-economic disadvantages. While accessibility to UGS is fundamental, it is not a sufficient condition for access to benefits, as the quality of UGS, and consequently the CES they deliver can strongly differ. However, as qualitative approaches to assess UGS quality are resource- and time-consuming, most research at municipal level has assessed distributional justice exclusively focusing on the accessibility to UGS. This study will expand on previous research by assessing distributional justice considering both the distribution of UGS and their quality in terms of CES, by examining georeferenced social media data. Using the city of Rome as a study area, we: (1) assess the population who has access to UGS at different walking distances through a geographic information system (GIS) network analysis; and (2) assess the CES flow of these UGS through a semantic analysis using geo-tagged social media data from Twitter. Our findings show that equal accessibility to UGS is a necessary factor for an environmental just city, but it is not sufficient: despite some inhabitants seem to have good accessibility levels, they dispose of a poor CES variety and therefore of a low UGS quality, especially in the most disadvantaged areas, not receiving the benefits that UGS deliver elsewhere. The thereby informs urban decision-makers on the one hand where the population needs higher access to UGS and on the other hand where it lacks access to specific CES.

Keywords: Environmental justice, Urban green spaces, Cultural ecosystem services, Geo-tagged social media data, GIS network analysis

5. Type of submission: Abstract

[T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services](#)

Applying a Source-to-Impact Flood Risk Assessment to identify Priority Areas for Green Infrastructure Interventions in a Sewershed in Syracuse, NY.

Presenting author: Pablo Herreros Cantis

Other author(s): Timon Mcphearson

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Applying a Source-to-Impact Flood Risk Assessment to identify Priority Areas for Green Infrastructure Interventions in a Sewershed in Syracuse, NY.

Green infrastructure (GI) is rapidly becoming a mainstream nature-based solution for urban stormwater management. In the city of Syracuse NY, hundreds of GI interventions have been implemented through the Save The Rain Program (STR) during the last decade. Like many other US-based programs, STR focused on the deployment of GI to reach the city's water quality compliance goals. The distribution of other stormwater-related benefits, such as reducing flood risk, however, was overlooked and assessed only through proxy indicators such as imperviousness. In a city where socially vulnerable populations and minorities are disproportionately impacted by urban flooding, it is essential to explicitly analyze how different intervention scenarios not only generate varying flood risk reduction outcomes, but also different distributions of this benefit through local communities.

In this study, we build upon a recently published framework that evaluates the impact of different precipitation capture scenarios on buildings and infrastructure. In order to enrich this framework with social and environmental justice dimensions, we propose the addition of socio-demographic indicators to evaluate the vulnerability of the populations benefited under each scenario, in order to inform their impact on communities that would otherwise remain overlooked and disproportionately affected by flooding. Results from a case study in a sewershed in Syracuse illustrate how the distribution of priority areas varies depending on the criteria used to identify them, and that the current distribution of GI interventions within the sewershed does not necessarily overlap with areas with high potential for mitigating flood risk in high vulnerability communities.

Keywords: Green infrastructure, Flooding, Modelling, Social Vulnerability

6. Type of submission: Abstract

T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services

Methods to assess distributional inequality from the supply perspective

Presenting author: Felipe Benra

Other author(s): Laura Nahuelhual, Maria Felipe Lucia

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Assessing distributional inequality is one of the key challenges to understand the linkages between ecosystem services and equity issues, and the bottom line to understand other types of ES inequality, such as procedural and recognitional. However, the evaluation of distributional inequality does not come without challenges as distributional inequality can be evaluated from the supply side (i.e., people or landowners responsible for the biophysical supply of ES) or from the demand side (i.e., people benefiting from the supplied ES), thus from different perspectives. Whereas both types of analyses are of great importance for understating ES–inequality linkages, the literature has focused mostly on the demand side. We present here an empirical evaluation of distributional inequality from a supply side perspective, by developing a “rural property” analysis for ~400,000 properties in southern Chile. We calculated the amount of seven ecosystem services supplied by each individual rural property, namely water supply, water regulation, sediment retention, carbon sequestration, carbon storage, recreation opportunities. We then computed two inequality indicators for total and mean ES values, the Gini coefficient and the Atkinson index to look at overall distributional inequalities and differences among ES. We found varying levels of inequality for the different ES, with carbon related ES presenting the highest inequalities, and an overall higher inequality for total compared to mean values. We discuss limitations and methodological shortcomings in the investigation of distributional inequalities from the supply side and provide some examples for improvement of this key step in the overall evaluation of ecosystem services inequalities.

Keywords: inequality, distribution, rural areas, Chile, inequality indicators



7. *Type of submission: Abstract*

T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services

Who is benefiting downstream? Experimental evidence on the relevance of upstream–downstream geographic distance for water provision

Presenting author: Adriana Bernal–Escobar

Other author(s): Stefanie Engel, Estelle Midler

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One of the greatest challenges of water management in watersheds arises from the asymmetry in water appropriation: people upstream always have first access to water supplies and their decisions affect downstream users. Payments for watershed services (PWS) aim to incentivize water provision upstream by directly paying upstream land users for the water services they provide for downstream water users. Nevertheless, since people often exhibit parochial behavior, the question of who benefits from the ecosystem services provided could be relevant to PWS effectiveness. We implemented a modified dictator game in the field to study the effect of varying the geographical identity of downstream beneficiaries on 1) baseline water provision in the absence of PWS, 2) PWS effectiveness, and 3) provision decisions after the payments end (i.e., “motivational crowding”). Our experiments involved 60 rural farmers from the Colombian municipality of Junín, whose water provision decisions affected passive downstream beneficiaries in either the same municipality or the capital city of Bogotá. Our findings suggest that while sharing a closer place identity with downstream beneficiaries is relevant to determining baseline water provision, it does not affect PWS effectiveness or the emergence of motivational crowding effects.

Keywords: Watershed management, PES, Social identity, Motivational crowding

8. *Type of submission: Abstract*

T. Thematic Working Group sessions: T20a – Disentangling equity in ecosystem services



Addressing the ecosystem services inequality produced by large-scale avocado growing in northern Caldas, Colombia

Presenting author: Andres Suarez

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Avocado (Persea Americana Mill) cultivation has gained momentum in the world market; however, the social and environmental implications of large-scale production (e.g., land grabbing, land-use change, deforestation) have been highlighted. Therefore, the claim of this research is that large-scale avocado cultivation produces socioecological disruptions because monocultures affect the ecological structure of the land (natural capital) and its capacity to provide Ecosystem Services. In addition, large-scale production generates ecological distributive conflicts, and therefore inequality. In this sense, this research – following a critical realist philosophy–, seeks to approach this statement through a deep ontological understanding of reality, so it is expected to identify the causal mechanisms that create unexpected results in a particular study area. To analyze this, the research strategy will be a case study, and methodologically a multilevel mixed methods design will be followed. With this research, the most important expected result is the identification of the causal mechanism that generates inequality due to large-scale avocado growing in northern Caldas, Colombia. Along with this, it is expected to provide a solid theoretical and methodological framework for future research in the field of ecosystem services, agriculture, and equity. As a more general result, it would be ideal if the results provided could participate in the decision-making process in a real context.

Keywords: ecosystem services, inequality, monoculture, critical realism, mixed-methods