BOOK OF ABSTRACTS

This Book of Abstracts provides a comprehensive overview of the session content and is structured into three main sections:

I. Session Description – an introduction to each session, including its objectives and expected outputs
II. Session Program – a detailed schedule for each session, including speakers and timing
III. List of Abstracts – a complete compilation of all accepted abstracts

I. SESSION DESCRIPTION

ID: T20a

Justice in Nature-based Solutions: tackling the gaps for equitable Ecosystem Service outcomes

Hosts:

	Name	Organisation	E-mail
Host (s):	David Camacho-Caballero	ICTA-UAB	davidalejandro.camacho@uab.cat
Co-host(s):	Johannes Langemeyer	ICTA-UAB	johannes.langemeyer@uab.cat

Abstract:
Nature-based Solutions (NBS) are widely promoted for their capacity to deliver multiple ecosystem services (ES). At the same time, justice considerations are recognized as a central issue in the design, implementation and scaling of NBS, providing an entry point for broadening ES justice discussions in practice. However, the NBS literature, similar to the ES literature, shows uneven attention to different justice dimensions: while distributive and procedural aspects are mostly addressed, others, such as ecological and restorative justice, remain underexplored.

The session will combine short presentations with interactive group work. We invite presentations addressing ecosystem service justice in the realm of NBS. Participants will engage in facilitated discussions to reflect on which justice dimensions are most neglected in their own field and to identify strategies for addressing these gaps. The aim is to foster a justice-centered research agenda that can ultimately guide policymakers and practitioners in designing more just NBS and ES strategies.

This proposal explicitly connects to the work of ESP's Thematic Working Group 20, Equity in Ecosystem Services Research, by advancing methodological and conceptual debates on distributive, procedural, and recognition justice, while also broadening the discussion to include less-developed justice dimensions. The session will contribute to TWG20's objective of building clearer guidelines for assessing inequity in ES.

Tentative presentations

- David Camacho-Caballero: Justice, yes, but which, when and how? A cross-examination of the implementation of justice principles in NBS practices

- Johannes Langemeyer: Vulnerability Mitigation as a Paradigm for Planning Just, Sustainable, and Resilient Nature-based Solutions: A Comparative Synthesis" We invite contributions that present innovations in participatory tools and methods (e.g. open-source mapping, biodiversity apps, low-cost sensors, structured monitoring schemes) that advance citizen science and biodiversity monitoring in rural and mountain areas. Submissions may also critically examine how equity and inclusivity can be strengthened in biodiversity stewardship, explore participatory governance and policy interfaces that enable meaningful community involvement, or highlight the role of local knowledge and co-created solutions for ecosystem services. By

fostering dialogue across disciplines and sectors, this session aims to foreground biodiversity as a priority that cuts across all levels of project design and implementation, offering both theoretical and practical insights into participatory ecosystem services in Europe's green transition.

Goals and objectives of the session:

- Present findings from systematic literature reviews on how justice dimensions are conceptualized and operationalized in Nature-based Solutions.
- Create a clearer understanding of the implications of NBS injustice for ES provision.
- Facilitate dialogue among participants to share experiences of justice challenges in their own work.
- Co-produce strategies for integrating overlooked justice dimensions into NBS assessment frameworks and NBS planning/implementation practices.

Planned output / Deliverables:

A potential collaborative research paper capturing the key outcomes of the session.
Networking outcome: reinforcement of the ESP working group interested in advancing justice in NBS/ES research, linked to TWG20.

Related to ESP Working Group:

TWG 20 - Equity in ES research

II. SESSION PROGRAM

Room: B1
Date of session: Friday 22, May 2026
Time of session: 11:00 – 12:30

Timetable speakers:

Time	First name	Surname	Organization	Title of presentation
11:05	Alberto	González-García	Institut des Geosciences et l'Environment	A global assessment of procedural and distribution justice in Nature-based solutions
11:10	Connie	Lopez	Universidad Nacional de Colombia	Justice beyond checklists in nature-based projects: territorial rights, FPIC, and ecosystem services in Colombia's Pacific region
11:15	David	Camacho	Universitat Autònoma de Barcelona	Justice in Nature-Based Solutions: An Evaluation Framework for Participatory Planning and Implementation
11:20	Lisa	Lejemtel	Centre international de recherche sur l'environnement et le développement	Perceptions of Urban Nature and Justice in Paris
11:25	Jose Manuel	Urrutia	Gottfried Wilhelm Leibniz Universität Hannover	Back to the basics: setting a baseline understanding of perceived importance of justice and risk for ecosystem services planning
11:30	Jinzhou	Wu	Vrije Universiteit Brussel	Mapping Demand-Supply Mismatches for urban heat mitigation: a socio-environmental analysis of the Brussels-Capital Region
11:35	Celina	Aznarez	Aarhus University	Urban heat inequities around schools: how gaps in cooling ecosystem services amplify exposure in Tshwane, South Africa
11:40	Silvia	Ronchi	DAStU Politecnico di Milano	Shaping Environmental Justice: The Role of Urban Planning in Contemporary Cities

III. LIST OF ABSTRACTS

The first author is the presenting author unless indicated otherwise

1. Urban heat inequities around schools: how gaps in cooling ecosystem services amplify exposure in Tshwane, South Africa

First author: Celina Aznarez
***Other author(s)*:** Zander Venter, Sudeshna Kumar, Maya Pasgaard,
Affiliation: Section for Ecoinformatics and Biodiversity, Department of Biology, Aarhus University, Denmark
***Contact*:** caznarez@bio.au.dk

Urban heat disproportionately impacts vulnerable populations, impairing health, learning, and well-being. School communities are especially sensitive, as elevated temperatures can directly affect cognitive performance and daily comfort. These risks are compounded by inequities in access to urban green infrastructure (UGI) and its associated cooling ecosystem services (ES), which are shaped by both socio-economic factors and historical legacies. In South African cities, the spatial distribution of green infrastructure continues to reflect the persistent socio-environmental inequalities created under apartheid, with previously advantaged racial groups often enjoying greater access to greener environments. This study investigates the distributive justice of UGI and cooling ES in the immediate surroundings of 766 primary and secondary schools in the city of Tshwane, using 300 m buffers to capture local environmental conditions. Multiple indicators of UGI were examined, including NDVI, percentage canopy cover, a cooling ES index, and land-use-derived green infrastructure, alongside land surface temperature (LST), racial composition, and school socio-economic quintile data.
Preliminary results suggest that schools serving higher-quintile, predominantly White communities generally experience lower LST and greater access to cooling services than schools serving predominantly Black-African communities. Notably, middle- and upper-middle-quintile schools appear to benefit less from UGI and experience higher heat expo-sure than both the lowest (Q1) and highest (Q5) quintiles, revealing a non-linear socio-economic pattern in access to cooling. Among UGI indicators, percentage canopy cover shows the largest inequities and is likely the most critical contributor to cooling. Interaction effects indicate that ecosystem services mitigate heat, but benefits are unevenly distributed across socio-economic and racial contexts, reflecting enduring environmental injustices. These findings underscore the urgent need for urban planning interventions that prioritize canopy cover around schools in historically disadvantaged neighborhoods. By systematically assessing how cooling ES are distributed across socio-economic and racial lines, this research pinpoints critical distributive justice gaps in nature-based solutions and provides an evidence base to guide more equitable urban adaptation strategies, ensuring that school communities in vulnerable areas are not left behind in the face of increasing urban heat risks.

***Keywords*:** School environments, Urban Green Infrastructure, Urban heat, Distributive justice, Socio-economic inequities, Racial inequities

2. A global assessment of procedural and distribution justice in Nature-based solutions

First author: Alberto González-García
***Other author(s)*:** Ignacio Palomo,
Affiliation: Institut de Recherche et Development, Grenoble, France
***Contact*:** alberto.gonzalez-garcia@univ-grenoble-alpes.fr

Nature-based Solutions (NbS) are being implemented globally to address climate and biodiversity challenges. However, research on environmental justice within these initiatives often relies on a few case studies, leaving a gap in our understanding of justice patterns across large datasets. This research aims to assess whether broad sets of interventions align with justice principles by analyzing a database of over 1,600 restoration projects globally. Our methodology follows a structured approach to analyze distributive and procedural justice. To assess distributive justice, we conduct a spatial analysis of the full project database overlaying project locations with biodiversity and social vulnerability indicators. We perform this analysis at both global and regional scales to identify potential trade-offs, distinguishing between global priority areas and locations that are critical within their specific regional context. Second, we address

procedural justice through a two-step process focusing on a subset of approximately 200 projects that contain sufficient qualitative information. We use detailed field knowledge from a small number of deeply analyzed pilot cases to define specific search criteria and indicators of participation, which are then applied to the larger subset. Our preliminary work suggests that, regarding distributive justice, while projects may align with regional biodiversity or vulnerability needs, they might not necessarily coincide with global priority hotspots. For procedural justice, we expect that current planning processes may engage a narrower set of actors than the actual both direct and indirectly affected actors by these restoration projects. In the context of expanding implementation of NbS, we expect that our framework provides some guidance on the current state of benefits and challenges from a justice perspective of NbS.

***Keywords*:** ecosystem services, landscape planning, environmental justice, co-benefits, landscape restoration

3. Mapping Demand-Supply Mismatches for urban heat mitigation: a socio-environmental analysis of the Brussels-Capital Region

First author: Jinzhou Wu
***Other author(s)*:** Markus Münzinger, Francesc Baró, Frank Canters,
Affiliation: Cartography and GIS Research Group, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium
***Contact*:** jinzhou.wu@vub.be

Recent studies adopting an ecosystem service (ES) demand-supply framework have shown that, in many cities, a significant spatial mismatch occurs between the need for heat mitigation measures and the cooling capacity of urban green infrastructure. Often, the mismatch between demand and supply reveals socio-environmental inequities, with less affluent and vulnerable populations being more exposed to heat risk. Nature-based approaches for mitigating urban heat should therefore prioritize areas where the need is highest and alleviate disproportionate negative impacts on socially vulnerable populations.
This study proposes an ES demand-supply mismatch framework for identifying priority areas for urban heat mitigation in the Brussels-Capital Region. The framework expands upon existing indicators by incorporating novel metrics that more accurately reflect the societal need for urban heat mitigation and the cooling benefits provided by urban trees.
Demand is assessed by combining indicators for heat exposure, population distribution, and population vulnerability. To quantify vulnerability, a multi-indicator approach is adopted, integrating socio-demographic data on age, health conditions and medication usage, housing conditions, and adaptive capacity.
To quantify supply-related indicators, we utilize high-resolution 3D information derived from LiDAR point cloud data to move beyond 2D canopy cover and characterize the structural and biophysical attributes of individual trees. To better capture cooling-related benefits for residents, we not only assess the cooling capacity of urban trees through volumetric proxies for evapotranspiration but also consider the provision of street-level shade derived from crown geometry and the accessibility of public green spaces.
Our analysis reveals a strong mismatch between ES demand and supply across the Brussels region. The mismatch pattern strongly correlates with social deprivation. Consequently, the proposed analysis framework provides valuable input for the development of inclusive urban green planning strategies for the Brussels region, highlighting priority areas for implementing heat mitigation measures.

***Keywords*:** Urban heat; Supply-demand mismatch; Vulnerability; LiDAR; Urban trees.

4. Shaping Environmental Justice: The Role of Urban Planning in Contemporary Cities

First author: Silvia Ronchi
***Other author(s)*:** Marta Dell'Ovo, Andrea De Toni, Daniel Edward Chamberlain, Enrico Caprio, Riccardo Alba, Irene Regaiolo
Affiliation: DAStU Politecnico di Milano
***Contact*:** silvia.ronchi@polimi.it

Rapid urbanisation is reshaping ecological conditions in cities, exacerbating socio-environmental inequalities and deepening disparities in the distribution of ecosystem services (ES). A substantial body of literature shows how socio-economic status influences access to green spaces, microclimatic benefits,

and urban biodiversity, revealing persistent patterns of environmental injustice. The so-called "luxury effect," whereby affluent neighbourhoods exhibit higher species richness and ES provision, highlights how urban form, planning choices, and socio-economic dynamics jointly shape ecological opportunities across the urban fabric.
Dense and compact morphologies are typically characterised by sealed surfaces, limited vegetation, and reduced habitat availability, thereby constraining biodiversity potential. Despite their weak ecological performance, these areas frequently coincide with high real-estate values and socio-economic advantage. Conversely, more open or low-density urban configurations, usually located in peripheral or marginal contexts, may support greater ecological functionality due to the presence of natural and semi-natural spaces, yet often host vulnerable populations due to limited access to services and urban opportunities.
Urban planning therefore plays a central role in addressing environmental justice by reorienting policies toward a fairer distribution of ES and enhanced biodiversity. Integrating socio-economic indicators into spatial analyses further supports the recognition of structural inequities in access to environmental benefits.
Within this framework, the research examines two Italian case studies (Milan and Turin) to explore how socio-economic conditions, biodiversity (with a focus on bird species richness), ES provision, and urban morphology interact. Using a multi-methodological approach, the study identifies areas where ecological and social vulnerabilities overlap, as well as districts where high ecological performance coincides with socio-economic advantage, confirming persistent spatial stratification. The analysis also highlights specific morphological components that most strongly influence biodiversity and ES distribution. These insights support the development of planning standards and targeted interventions, including desealing, tree canopy expansion, blue–green infrastructure, and the regeneration of marginal green spaces, contributing to more inclusive, resilient, and ecologically functional urban environments.

***Keywords*:** Environmental justice; Performance-based planning; Luxury effect; Ecosystem Services; Biodiversity; Socio-economic value

5. Justice beyond checklists in nature-based projects: territorial rights, FPIC, and ecosystem services in Colombia's Pacific region

First author: Connie P. López Gómez
Affiliation: Universidad Nacional de Colombia, Medellín, Colombia
***Contact*:** cplopezg@unal.edu.co

Nature-based Solutions (NbS) are often promoted as a means of delivering multiple ecosystem services while supporting climate and biodiversity goals. Yet in practice, NbS can also reproduce injustice when they are implemented on Indigenous and Afro-descendant territories without strong protection of territorial rights. In many projects, Free, Prior and Informed Consent (FPIC) is treated as a one-time administrative step rather than a process that allows communities to negotiate conditions, refuse, or seek repair when harm occurs.
This paper develops a Rights–Territory–Ecosystem Services (RT-ES) framework to assess justice in NbS initiatives, with a focus on nature-finance projects (e.g., carbon credits projects and the emerging/potential natural hydrogen sector, which represents a promising alternative energy). We combine analysis of the project´s safeguard documents and FPIC records with comparative qualitative case studies from Colombia's Pacific region, including interviews with key actors.
Across cases, communities do not simply ask for "more benefits." They use local consultation protocols to demand recognition (who they are and how they relate to the territory), and restorative justice (how to address harms, past and present). RT-ES supports this analysis through four practical lenses: (i) territorial legitimacy and shared decision-making, (ii) recognition of diverse nature values (including cultural and relational values), (iii) transparent benefit sharing and risk distribution, and (iv) FPIC quality, grievance, and repair pathways. We discuss how RT-ES can help researchers and practitioners design and evaluate NbS that are not only effective for ecosystem services, but also fair and reparative for communities.

***Keywords*:** Nature-based Solutions; FPIC; justice; territorial rights; ecosystem services

6. Perceptions of Urban Nature and Justice in Paris

First author: Lisa Lejemtel
***Other author(s)*:** Améline Vallet, Ellora Miguel, Harold Levrel, François Chiron, Sandra Lavorel
Affiliation: CIRED, AgroParisTech, Cirad, CNRS, EHESS, Ecole des Ponts ParisTech, Nogent-sur-Marne, France

***Contact*:** lisa.lejemtel@universite-paris-saclay.fr

Urban nature policies, like other environmental policies, can have unexpected social consequences when they focus solely on ecological objectives. For instance, they may exacerbate inequalities in access to green spaces or operate with only minimal public involvement in decision-making processes. These regressive side effects are at the core of the environmental justice literature, which aims at highlighting inequalities related to environmental issues, encompassing distributive imbalances as well as participation and recognition deficits within environmental decision-making. Despite the increasing number of studies focusing on environmental inequities, public perceptions of environmental justice related to urban greenspaces is still understudied. This study examines how inhabitants of Paris perceive urban nature as well as different justice dimensions (distribution, participation, recognition), drawing on data from an online questionnaire (790 respondents). We investigate which types of injustices residents report, how they evaluate the current situation in their district, and which justice principles they believe should guide greening strategies. We also analyze how these perceptions vary across sociodemographic groups and explore respondents' relationships with and attitudes toward urban nature. Using quantitative and statistical methods, including clustering, we identify distinct profiles of respondents in relation with environmental justice. These profiles align with respondents' personal experiences of injustices and correspond to different ways of relating to urban nature. Participation and recognition dimensions of justice are prevailing concerns in participants' responses (both based on personal experiences of injustices and perceptions of urban nature in Paris). Our results also show a strong preference for equality principle regarding distribution, with less support to approaches targeting vulnerable neighborhoods. Overall, this study underscores the importance of integrating residents' perceptions into urban nature policies and strengthening justice dimensions within environmental planning. Understanding how different groups experience and evaluate environmental justice can inform more inclusive and equitable approaches to the design and management of urban greenspaces.

***Keywords*:** fairness, equity, greenspaces, urban planning

7. Back to the basics: setting a baseline understanding of perceived importance of justice and risk for ecosystem services planning

First author: J. Manuel Urrutia, II
***Other author(s)*:** Carl C. Anderson, Phoebe King, Christian Albert
Affiliation: Gottfried Wilhelm Leibniz Universität Hannover
***Contact*:** urrutia@umwelt.uni-hannover.de

Urban heat islands (UHI), which can be exacerbated by extreme heat events, pose a growing risk to metropolitan regions worldwide. Nature-based Solutions (NbS) offer promising strategies to address UHI. However, the equitable distribution of ecosystem services (ES) provided by NbS can be obstructed due to a lack of meaningful participatory planning with stakeholders. This weakens the ability of NbS to deliver ES to those most vulnerable to heat and leads to the possible creation or entrenchment of existing environmental and socio-economic disparities. In the case of addressing UHI in metropolitan regions, previous scholarship at the NbS, climate justice (CJ), and risk nexus has neglected to examine how the perceived importance of CJ and risk shape the planning of NbS for urban heat. We conduct a survey using the public participation geographic information system (PPGIS) platform MaptionnaireTM to explore the relative importance of CJ dimensions and aspects of disaster risk in relation to other factors, including sustainability, biodiversity, and various socio-economic considerations for planning successful outcomes. We find that 1) dimensions of CJ are overall considered to be less important than aspects of risk, 2) vulnerability is perceived to be less important than hazard or exposure; and 3) biodiversity is viewed as highly important. Our findings provide a baseline understanding of how stakeholders view CJ and risk for NbS planning and highlight the need to raise awareness amongst stakeholders of the links between explicating integrating CJ for positive outcomes, including improved risk management. Additionally, the findings point to the importance of communicating with and drawing upon stakeholder priorities while ensuring that vulnerability and CJ concerns remain central to ES planning.

***Keywords*:** Climate justice, urban heat island, nature-based solutions, ecosystem services, risk perception

8. Justice in Nature-Based Solutions: An Evaluation Framework for Participatory Planning and Implementation

First author: Arianna Feliciani
***Other author(s)*:** Johannes Langemeyer

Presenting author: David Camacho-Caballero
Affiliation: Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona (UAB), Spain
***Contact*:** davidalejandro.camacho@uab.cat

Nature-Based Solutions (NBS) are increasingly employed to address urban socio-ecological challenges through the provision of ecosystem services; however, the integration of justice within their implementation remains a concern, particularly within participatory processes. This study addresses this challenge by developing and validating an evaluation framework designed to equip planners and practitioners to diagnose justice-related shortcomings and guide the participatory planning and implementation of more equitable NBS.

The framework builds on a comprehensive literature review and organizes justice considerations into four categories: (a) Inclusiveness and Equity, (b) Quality of the Process, (c) Governance and Power, and (d) Institutionalization and Impact. These criteria are operationalized through a stage-based model aligned with five phases of NBS planning: decision framing, co-creation, planning, design and monitoring. To test its applicability, the framework was implemented through semi-structured interviews with practitioners in six European cities (Barcelona Metropolitan Area, Warsaw, Sarajevo, Mannheim, Vejle, and Thessaloniki), revealing systemic shortcomings such as limited stakeholder coverage, weak transparency, and absence of long-term monitoring.

Findings highlight that justice gaps often emerge early in decision framing and cascade through subsequent stages, undermining equitable outcomes. By providing actionable criteria and participatory guidelines, the framework supports planners and policymakers in diagnosing procedural shortcomings and institutionalizing reflexive practices. This approach advances inclusive NBS governance for the equitable provision of ecosystem services, fostering urban transformations that are ecologically sound and socially just.

***Keywords*:** Nature-based Solutions, justice, participatory, equity