
This is the **accepted version** of the article:

Baró Porras, Francesc; Langemeyer, Johannes; Łaszkiewicz, Edyta; [et al.].
«Editorial to the special issue "Advancing urban ecosystem service implemen-
tation and assessment considering different dimensions of environmental jus-
tice"». Environmental Science & Policy, Vol. 115 (Jan. 2021), p. 43-46. DOI
10.1016/j.envsci.2020.10.008

This version is available at <https://ddd.uab.cat/record/235414>

under the terms of the  license

Editorial to the special issue "Advancing urban ecosystem service implementation and assessment considering different dimensions of environmental justice"

Authors:

Francesc Baró^{a,b}, Johannes Langemeyer^{a,b}, Edyta Łaszkiewicz^c, Nadja Kabisch^{d,e}

^aInstitute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona (UAB), Edifici Z (ICTA-ICP), Carrer de les Columnes s/n, Campus de la UAB, 08193 Cerdanyola del Vallès, Spain

^bHospital del Mar Medical Research Institute (IMIM), Carrer Doctor Aiguader 88, 08003 Barcelona, Spain

^cSocial-Ecological Systems Analysis Lab, Department of Regional Economics and Environment, Faculty of Economics and Sociology, University of Lodz, POW 3/5, 90-255 Lodz, Poland

^dHumboldt-Universität zu Berlin, Department of Geography, Unter den Linden 6, 10099 Berlin, Germany

^eHelmholtz Centre for Environmental Research – UFZ, Department of Urban and Environmental Sociology, Permoserstraße 15, 04318, Leipzig, Germany

Email addresses: francesc.baró@uab.cat (F. Baró); johannes.langemeyer@uab.cat (J. Langemeyer); nadja.kabisch@geo.hu-berlin.de (N. Kabisch); edyta.laszkiewicz@uni.lodz.pl (E. Łaszkiewicz)

1. Introduction

The ecosystem service (ES) concept is mainstreaming and increasingly taken up by urban policymakers striving for safe, resilient and sustainable cities as stated under UN Sustainable Development Goal 11¹. In particular, the ES framework is gaining momentum as a conceptual basis for the operationalization of benefits of urban green infrastructure strategies (Demuzere et al. 2014) and, more recently, nature-based solutions (Raymond et al., 2017). Yet, the ES concept has been criticized for its insufficient consideration of fairness and justice, hence ES-based assessments, policies and the implementations of greening projects bare the risk of (re-)producing social inequalities in cities, for example through 'green gentrification' (e.g. Ernstson, 2013; Haase et al. 2017, Marshall and Gonzalez-Meler, 2016; Anguelovski et al., 2020). Urban ES research is increasingly taking up this criticism, highlighting the need to strengthen the inclusion of equity issues, especially with regard to the distribution of ES in terms of trade-offs, availability, and accessibility of benefits (Daly and Farley, 2011; Kabisch and Haase, 2014, Rigolon et al. 2019). Also, many cities, such as Berlin and Barcelona, are putting increasing emphasis on justice in their new urban green space planning strategies (e.g. Berlin, 2020; Barcelona City Council, 2018).

¹ See: <https://sustainabledevelopment.un.org/sdg11>

This Special Issue (SI) aims to be an additional cornerstone in firmly anchoring considerations of equity and justice in urban ES research and praxis, and intends to advance ES justice in cities conceptually, methodologically and empirically. In this SI we build on conceptual legacies from social and environmental justice (Fraser, 1995; Kabisch and Haase, 2014) in order to address the implementation and assessment of 'urban ES justice' (Langemeyer and Connolly, 2020), which includes aspects of distributive justice, i.e., fair allocation/access of ES for all social groups; procedural/participatory justice, i.e., fair integration of all affected groups into ES-related decision-making processes; and interactional/recognition justice, i.e., recognizing the needs, values, and preferences of all urban residents in relation to ES in a safe, fair, well-coming and non-discriminatory environment, across different spatial and temporal scales.

We asked authors to advance new conceptual and theoretical approaches, empirical case studies, and methodological and analytical developments critical for providing new models, tools and approaches for the integration of these three dimensions of justice in urban ES implementation and assessments, and also to come up with particular recommendations for urban environmental planning and policies. Thereby, the SI addresses the need for a comprehensive approach to urban ES that recognizes justice in its multiple dimensions, including potential historic inequalities in ES distributions, diverging values and demands by different population groups, such as children, elderly or historically marginalized groups (cf. Anguelovski et al., 2020), and that allows for the effective inclusion of their interests in the governance and planning of urban green spaces.

2. Core themes and contributions

The SI comprises eleven manuscripts, which we have clustered with regard to their different ways to address the overarching aims of the SI. First, we highlight the conceptualization of justice in urban ES research, mainly through the paper by Langemeyer and Connolly (2020). Second, we synthesize those papers including an integrated, interdisciplinary or transdisciplinary approach to urban ES assessments as a way to navigate towards generating, improving or maintaining environmental justice in cities, considering recognition, procedural and distributive dimensions. Third, we focus on contributions that include quantification, mapping and assessment of urban ES through innovative methodological and analytical

approaches to understand the (mainly distributive) justice implications for vulnerable groups, including low-income residents, migrants, children or older people. Finally, two papers specifically address the phenomenon of green gentrification through the lens of ES. Though the SI only addresses European case studies, there is a good balance across European regions (Southern, Central, Northern and Eastern). In the following, we provide a brief summary of the eleven papers structured around the three aims of the SI.

2.1. Conceptualization of justice in urban ecosystem service research

As ES are becoming more and more important to the daily experience of urban residents, and thus to urban planning, **Langemeyer and Connolly (2020)** highlight the urgent need to weave notions of justice into urban ES research and practice. By developing an ES justice model from an urban perspective, the authors provide theoretical entry points and practical examples to address this aspect in urban ES service research. The study highlights the argument that to build an urban ES justice model, some core limitations embedded in the ecological and economic legacy of the ES concept need to be overcome (Norgaard, 2010; Lele, 2013; Pascual et al., 2014). First, this includes moving beyond the classical (rural) framing of stocks of natural capital that deliver benefits to people, which oversimplifies the deeply interconnected character of social-ecological systems in the co-production of benefits for human wellbeing (Andersson et al., 2007; Peterson et al., 2018). Secondly, the predominance of economic understandings of values guiding ES assessments generates an overemphasis on Pareto-optimal solutions, which by definition do not account for inequitable distributive effects of ES (Chaudhary et al., 2018; Saarikoski et al., 2016). The authors highlight critical entry points to overcome these limitations building on the urban environmental justice literature, which – taken together with recent advancements in research on ES services – allows for the development of a new model for urban ES justice. The model presented by Langemeyer and Connolly (2020) considers three relevant filters, namely *infrastructure, institutions and people's perceptions* (cf. Andersson et al., 2019), that can either facilitate or hamper the flow of ES benefits. It combines a conceptual model of how these filters impact ES in urban environments with the classical environmental justice triad of recognition, procedural and distributive justice (Fraser, 1995). The paper then contextualizes this combined conceptual framework within larger theoretical arguments about spatial and temporal justice. Spatial justice includes accounting for the benefits and burdens from ES

planning outcomes at the micro scale through inter-scalar teleconnections affecting people globally (cf. Swyngedouw and Heynen, 2003). Temporal justice embeds historical perspectives of injustice (cf. Anguelovski et al., 2020), as well as mid and long-term temporal dimensions of ES justice that are related to urban resilience and long-term sustainability (Elmqvist et al., 2019).

2.2. Integrated urban ecosystem service justice assessments

From the conceptualization of environmental justice by Langemeyer and Conolly (2020), particular case studies addressing ES and justice in specific urban green spaces are presented. Park user behavior of different age groups is explored by **Kabisch and Kraemer (2020)**¹. Using two differently designed parks in the German city of Leipzig, authors identify a trend wherein particular park facilities, i.e., infrastructural and vegetation characteristics of parks, determine park use by age group under summer heat conditions in a way that e.g. sports fields invite young generations (teenagers) to be active in groups, to play and to socialize while older people are nearly exclusively observed on benches. From a socio-environmental justice perspective, authors conclude that inviting all age groups to visit urban parks requires an equal provision and maintenance of age-appropriate park design elements, which particularly contributes to a qualitatively improved distributive justice dimension that addresses the needs of younger and older generations.

Enssle and Kabisch (2020) explore the patterns of older people's health and visitation of urban parks and green spaces in the city of Berlin. Authors find that beyond the distributive dimension of urban green spaces, social inclusion into the neighborhood via a social network such as closer relationships and friends is positively associated with park use. From there, Enssle and Kabisch (2020) propose a framework of the three dimensions of socio-environmental justice in regard to ES provision which should help urban planning to consider both the physical and the social environment to be designed in a way that invites older people to visit and use urban green spaces for recreational and social activities, but also to foster the integration of older people in planning processes and the establishment of local community programs.

The particular integration of local stakeholders in urban development and regeneration processes and their interactions in relation to ES provision is assessed by **Olsson et al. (2020)**.

Using the district of Sofielund in Malmö, Sweden as a study case, authors interviewed local stakeholders, including property owners, managers, businesses and local representatives from the Swedish Union of Tenants. In terms of environmental justice, findings show that a distributive injustice of ES provision influences the local perception of what is just. This has, in turn, consequences for the willingness to participate in planning processes. Authors highlight that a comprehensive involvement of local stakeholders and acknowledgement of their perspectives in planning processes is key to a perception of just urban ES governance. Recommendations for improvements include the establishment of more structured participatory processes, better communication between property owners and the municipality and the recognition of power structures.

2.3. Methodological and analytical applications

Spatial approaches to assess inequities in the distribution of urban ES represent a substantial contribution to the SI with five papers. **Baró et al. (2019)** explicitly focus on regulating ES while the others address cultural ES. Baró et al. (2019) analyze the distributive justice implications of the amount of air purification, runoff mitigation and temperature regulation provided by almost 200,000 street trees in the city of Barcelona. The authors find that, unlike previous evidence on urban tree distribution and equity, the provision of regulation ES by street trees is positively associated with the distribution of certain vulnerable groups, such as older people. In light of these results, authors argue that street tree planting strategies can play a relevant redistributive role in terms of local ES provision, especially in compact cities.

As part of the assessments of cultural ES, **Suárez et al. (2020)** use an environmental justice lens to analyze outdoor recreation opportunities provided by urban and peri-urban green spaces in the Oslo metropolitan area. Their findings show that population preferences for daily outdoor recreation areas differ depending on age and place of residence and that migrants and low-income households have relatively less access to these amenities. The authors underscore the point that in order to properly address urban environmental justice, cultural ES assessments should go beyond the analysis of uneven or unequal access and also account for people's (diverse) preferences.

Liotta et al. (2020) develop a methodological framework to assess inequities in access to the cultural benefits of urban green spaces based on a multidimensional definition of well-being, which integrates aspects related to health, education, insecurity and social relations. In line

with Suárez et al. (2020), the application of this approach in the Paris metropolitan region highlights the importance of considering different indicators of social inequity for the prioritization of green infrastructure interventions rather than assessments merely based on green space inequality.

Finally, two papers analyze the equity implications of cultural ES distribution in Eastern European cities. **Łaszkiewicz and Sikorska (2020)** evaluate welfare disparities among children living in Lodz in relation to the nature-based aesthetic appreciation benefits provided by the greenery surrounding home-school routes. They highlight the point that the distributive environmental injustice is not only understood in terms of the inhabitants' place of living but also regarding inhabitants' spatial movement (spatially dynamic environmental justice). **Sikorska et al. (2020)** focused on the role of informal green spaces to reduce distributive inequity in the access to recreational ES for children and elderly residents of Lodz and Warsaw. Both studies found distributive environmental injustices affecting those age groups and highlight the potential role of unmanaged street greenery (i.e., beyond formal green spaces such as parks) in providing ecosystem services in a way that may limit disparities in the access to cultural ES.

2.4. Urban ecosystem services and green gentrification

Green (ecological, environmental) gentrification is the process where the implementation of new urban green spaces increases neighborhood attractiveness, and consequentially real estate values, potentially foster social displacement or segregation (Anguelovski et al., 2018); thereby increasingly limiting access to ES for vulnerable urban populations over time (Amorim-Maia et al., 2020). Two papers published in this SI address green gentrification as the consequence of new greening initiatives and discuss it in the context of ES (Maia et al., 2020) and real estate market valuation (Bockarjova et al., 2020).

Amorim-Maia et al. (2020) demonstrate that factors determining green gentrification are not limited to the social and historical conditions of urban green spaces. With the use of geo-located social media data, they show that cultural ES provided by urban parks play a significant role in determining whether these parks are associated (or not) with green gentrification processes or produce environmental injustices in Barcelona. The findings obtained by Amorim-Maia et al. (2020) have relevant policy implications. In particular, they find green gentrification to be primarily attributed to the built infrastructure (such as

architectural and artistic features) present in or surrounding the parks enhancing aesthetic and recreational ES, while the actual level of 'greenness' does not play a significant role in explaining gentrification processes.

Finally, **Bockarjova et al. (2020)** focused on how the valuation of urban green spaces and ES by real estate buyers relates to green gentrification. In particular, they highlighted the process by which green interventions have an impact on housing markets. With the use of a meta-analysis based on hedonic pricing models, the authors demonstrate that the impact of green interventions on the property market differs by the type of greening and the related ES provision. In particular, real estate buyers value the presence of a park or blue space in the vicinity of their property more than the presence of other types of urban nature.

3. Concluding remarks

Previous urban ES assessments have provided useful information for planning urban green infrastructure and the implementation of nature-based solutions, but some have also lacked context in terms of how different residential groups benefit, especially when considering diverse needs. In this Special Issue we presented case studies, new concepts, and advanced methodologies that provide some of this context by integrating the ES concept with considerations of environmental justice. The studies embedded in this Special Issue highlight the point that, in order to make environmental justice considerations explicit, urban ES assessments need to address the societal distribution of ES, people's multiple values, perceptions and needs, fairness of ES-based decision-making processes, and aspects related to spatial, temporal and interactional justice.

For instance, the studies show that certain ES provided by urban green spaces might favor green gentrification processes, and that the complex role of the 'green' in these processes needs to be carefully scrutinized. Particularly in recent debates over fostering nature-based solutions, more in-depth research is needed to create a sound understanding of how it can be ensured that these interventions (and the related ES provision) benefit all potential user groups. Furthermore, several papers also highlight a need to more strongly consider informal, unmanaged or street green infrastructure and the critical role they can play in reducing distributive injustices in the access to ES, potentially compensating for the patchy and

generally uneven distribution of more formal green spaces such as urban parks.

In short, urban green spaces are an important part of the urban socio-ecological system which provides numerous benefits to residents that are of particular importance in the context of challenges coming with climate change, urbanization and even with the current Covid-19 pandemic. We, as researchers, can help urban planning to identify and even quantify these benefits and – most importantly – try to assess to whom these benefits are available or not to provide most informed recommendations. Continuously highlighting the importance of environmental and social justice aspects in these assessments raises awareness in urban green space planning and implementation campaigns and may help urban planners and decision makers in creating and applying instruments that contribute to developing more sustainable and just cities. However, creating just planning processes that foster participation and inclusion without sacrificing efforts to ensure future justice, resilience and sustainability remains a challenging task.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest.

Acknowledgements

We are thankful to all authors for their contributions, to the reviewers for their insightful comments and expertise. We particularly thank the editor in chief Prof. Martin Beniston and the Editorial team of Elsevier / Environmental Science and Policy for their highly valuable comments and commitment to this special issue. We are also grateful to all participants of the session "*Advancing urban ecosystem service assessments for more inclusive and just cities*" organized in the ESP 10 World Conference (Hannover, Germany, 2019). The work of the guest editors for this special issue was partly funded by the Spanish Ministry of Science, Innovation and University and the National Science Centre (Poland) (grant no. 2016/22/Z/NZ8/00003) through the 2015-2016 BiodivERsA COFUND (project ENABLE, code PCIN-2016-002), the European Research Council (project GREENLULUs; grant agreement ID: 678034 and URBAG grant agreement ID 818002); the EU's Horizon 2020

framework program for research and innovation (project NATURVATION, grant agreement ID: 730243), and the research project 'Environmental-health Interactions in Cities (GreenEquityHEALTH) – Challenges for Human Well-being under Global Changes' (2017–2022) funded by the German Federal Ministry of Education and Research (BMBF), funding code: 01LN1705A,

Note: ¹Please, note that Kabisch and Kraemer (2020) is referred to by Kabisch et al. (2020).

References

1. Amorim-Maia, A.T., Calcagni, F., Connolly, J.J.T., Anguelovski, I., Langemeyer, J., 2020. Hidden drivers of social injustice: uncovering unequal cultural ecosystem services behind green gentrification. Environ. Sci. Policy 112, 254–263. doi:<https://doi.org/10.1016/j.envsci.2020.05.021>
2. Andersson, E., Barthel, S., Ahrné, K., 2007. Measuring social–ecological dynamics behind the generation of ecosystem services. Ecol. Appl. 17 (5), 1267–1278.
3. Andersson, E., Langemeyer, J., Borgström, S., McPhearson, T., Haase, D., Barton, D., Davis, M., Kronenberg, J., Naumann, S., Röschel, L., Stange, E., Baró, F., 2019. Enabling green and blue infrastructure to improve contributions to human well-being and equity in urban systems. BioScience 58. <https://doi.org/10.1093/biosci/biz058>. Anguelovski I., Brand A.L., Connolly J.J.T., Corbera E., Kotsila P., Steil J., Garcia-Lamarca M., Triguero-Mas M., Cole H., Baró F., Langemeyer J., Pérez del Pulgar, C., Shokry G., Sekulova F., Arguelles L. 2020. Expanding the Boundaries of Justice in Urban Greening Scholarship: Toward an Emancipatory, Antisubordination, Intersectional, and Relational Approach. Annals of the American Association of Geographers, 1–27. DOI: 10.1080/24694452.2020.1740579
4. Anguelovski, I., Connolly, J.J.T., Masip, L., Pearsall, H., 2018. Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. Urban Geogr. 39, 458–491. doi:10.1080/02723638.2017.1349987
5. Barcelona City Council, 2018. Barcelona Climate Plan 2018-2030. Retrieved from: <http://hdl.handle.net/11703/109218>.
6. Baró, F., Calderón-Argelich, A., Langemeyer, J., Connolly, J.J.T., 2019. Under one canopy? Assessing the distributional environmental justice implications of street tree benefits in Barcelona. Environ. Sci. Policy 102, 54–64. doi:10.1016/J.ENVSCI.2019.08.016
7. Berlin [Senatsverwaltung für Stadtentwicklung und Wohnen], 2020. Environmental Justice in Berlin. https://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/d901_01.htm, accessed: 01.09.2020
8. Bockarjova, M., Botzen, W.J.W., van Schie, M.H., Koetse, M.J., 2020. Property price effects of green interventions in cities: A meta-analysis and implications for gentrification. Environ. Sci. Policy 112, 293–304. doi:<https://doi.org/10.1016/j.envsci.2020.06.024>
9. Chaudhary, S., McGregor, A., 2018. A critical analysis of global ecosystem services (Paristhitiki sewa) discourse in Nepal. Land Use Policy 75, 364–374.
10. Daly HE and Farley J (2011) Ecological Economics, Second Edition: Principles and Applications. Island Press.
11. Demuzere, M., Orru, K., Heidrich, O., Olazabal, E., Geneletti, D., Orru, H., Bhawe, A.G., Mittal, N., Feliu,

- E., Faehnle, M., 2014. Mitigating and adapting to climate change: Multi-functional and multi-scale assessment of green urban infrastructure. *J. Environ. Manage.* 146, 107–115.
12. Elmqvist, T., Andersson, E., Frantzeskaki, N., McPhearson, T., Olsson, P., Gaffney, O., Takeuchi, K., Folke, C., 2019. Sustainability and resilience for transformation in the urban century. *Nat. Sustain.* 2 (4), 267.
13. Enssle, F., Kabisch, N., 2020. Urban green spaces for the social interaction, health and well-being of older people— An integrated view of urban ecosystem services and socio-environmental justice. *Environ. Sci. Policy* 109, 36–44. doi:[10.1016/J.ENVSCI.2020.04.008](https://doi.org/10.1016/J.ENVSCI.2020.04.008)
14. Ernstson, H., 2013. The social production of ecosystem services: A framework for studying environmental justice and ecological complexity in urbanized landscapes. *Landsc. Urban Plan.* 109, 7–17.
15. Fraser, N. (1995). From redistribution to recognition? Dilemmas of justice in a post-socialist age. *New left review*, (212), 68.
16. Gómez-Baggethun, E., Barton, D.N., 2013. Classifying and valuing ecosystem services for urban planning. *Ecol. Econ.* 86, 235–245.
17. Haase, D., Kabisch, S., Haase, A., Andersson, E., Banzhaf, E., Baró, F., Brenck, M., Fischer, L., Frantzeskaki, N., Kabisch, N. et al. (2017) Greening cities – to be socially inclusive? About the alleged paradox of society and ecology in cities. *Habitat International*. 64, 41–48. DOI: [10.1016/j.habitatint.2017.04.005](https://doi.org/10.1016/j.habitatint.2017.04.005)
18. Kabisch, N., & Haase, D. (2014). Just green or justice of green? Provision of urban green spaces in Berlin, Germany. *Landscape and Urban Planning*, 122, 129–139.
19. Kabisch, N., Kraemer, R., 2020. Physical activity patterns in two differently characterised urban parks under conditions of summer heat. *Environ. Sci. Policy* 107, 56–65. doi:[10.1016/J.ENVSCI.2020.02.008](https://doi.org/10.1016/J.ENVSCI.2020.02.008)
20. Kabisch, N., Kraemer, R., Brenck, M. Corrigendum to “Physical activity patterns in two differently characterised urban parks under conditions of summer heat” [*Environ. Sci. Policy* 107 May (2020) 56–65]. <https://doi.org/10.1016/j.envsci.2020.08.004>
21. Langemeyer, J., Connolly, J.J.T., 2020. Weaving notions of justice into urban ecosystem services research and practice. *Environ. Sci. Policy* 109, 1–14. doi:[10.1016/J.ENVSCI.2020.03.021](https://doi.org/10.1016/J.ENVSCI.2020.03.021)
22. Łaszkiwicz, E., Sikorska, D., 2020. Children's green walk to school: An evaluation of welfare-related disparities in the visibility of greenery among children. *Environ. Sci. Policy* 110, 1–13. doi:<https://doi.org/10.1016/j.envsci.2020.05.009>
23. Lele, S., 2013. Environmentalisms, justices and the limits of ecosystem services frameworks. *The Justices and Injustices of Ecosystem Services*. Earthscan, London, pp. 119–139.
24. Liotta, C., Kervinio, Y., Levrel, H., Tardieu, L., 2020. Planning for environmental justice - reducing well-being inequalities through urban greening. *Environ. Sci. Policy* 112, 47–60. doi:<https://doi.org/10.1016/j.envsci.2020.03.017>
25. Low, S. (2013). Public space and diversity: Distributive, procedural and interactional justice for parks. In G. Young, & D. Stevenson (Eds.), *The Ashgate research companion to planning and culture* (pp. 295–310). Surrey: Ashgate Publishing.
26. Marshall, K.A., Gonzalez-Meler, M.A., 2016. Can ecosystem services be part of the solution to environmental justice? *Ecosyst. Serv.* 22, 202–203.
27. McAfee, K., 2012. Nature in the market-world: ecosystem services and inequality. *Development* 55 (1), 25–33.
28. Norgaard, R.B., 2010. Ecosystem services: from eye-opening metaphor to complexity blinder. *Ecol. Econ.* 69 (6), 1219–1227.
29. Olsson, J.A., Brunner, J., Nordin, A., Hanson, H.I., 2020. A just urban ecosystem service governance at the neighbourhood level- perspectives from Sofielund, Malmö, Sweden. *Environ. Sci. Policy* 112, 305–313. doi:<https://doi.org/10.1016/j.envsci.2020.06.025>
30. Pascual, U., Phelps, J., Garmendia, E., Brown, K., Corbera, E., Martin, A., Gomez-Baggethun, E., Muradian, R., 2014. Social equity matters in payments for ecosystem services. *BioScience* 64 (11), 1027–1036. <https://doi.org/10.1093/biosci/biu146>.
31. Peterson, G.D., Harmáčková, Z.V., Meacham, M., Queiroz, C., Jiménez-Aceituno, A., Kuiper, J.J., Malmberg, K., Sitas, N.E., Bennett, E.M., 2018. Connecting people's contributions to nature to nature's

- contributions to people. Response to: Diaz et al. (2018). *Science* 359 (6373), 270–272.
32. Raymond, C.M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M.R., Geneletti, D., Calfapietra, C., 2017. A framework for assessing and implementing the co-benefits of nature- based solutions in urban areas. *Environ. Sci. Policy* 77, 15–24.
33. Saarikoski, H., Mustajoki, J., Barton, D., Geneletti, D., Langemeyer, J., Gómez-Baggethun, E., Marttunen, M., Antunes, P., Keune, H., Santos, R., 2016. Multi-criteria decision analysis and cost-benefit analysis: comparing alternative frameworks for integrated valuation of ecosystem services. *Ecosyst. Serv.* 22, 238–249.
34. Scott, D., Oelofse, C., 2005. Social and environmental justice in South African cities: including 'invisible stakeholders' in environmental assessment procedures. *J. Environ. Plan. Manag.* 48 (3), 445–467.
35. Sikorska, D., Łaskiewicz, E., Krauze, K., Sikorski, P., 2020. The role of informal green spaces in reducing inequalities in urban green space availability to children and seniors. *Environ. Sci. Policy* 108, 144–154. doi:<https://doi.org/10.1016/j.envsci.2020.03.007>
36. Suárez, M., Barton, D.N., Cimburova, Z., Rusch, G.M., Gómez-Baggethun, E., Onaindia, M., 2020. Environmental justice and outdoor recreation opportunities: A spatially explicit assessment in Oslo metropolitan area, Norway. *Environ. Sci. Policy* 108, 133–143. doi:[10.1016/j.envsci.2020.03.014](https://doi.org/10.1016/j.envsci.2020.03.014)
37. Swyngedouw, E., Heynen, N.C., 2003. Urban political ecology, justice and the politics of scale. *Antipode* 35 (5), 898–918.