Exploring justice and urban biodiversity

A scoping review protocol and planning tool

March 2021

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Acknowledgements

I (the author, Jo Fitzgibbons) am an uninvited guest, grateful to be living and working on the traditional, ancestral, unceded and occupied territory of the Musqueam, Squamish and Tsleil-Waututh nations.

Any discussion about planning for land and life must critically engage with the ongoing history of colonialism and systemic oppression of First Nations, who have been the traditional stewards of these systems for thousands of years in the land known now as Canada.

I would like to personally thank my mentor Jennifer Pierce, who has taken on this project with great enthusiasm, embraced its ever-evolving scope, and been fully engaged despite juggling several other important commitments. Thanks also to the fellow researchers in this space at UBC and beyond, with whom we have had enriching conversations about justice and biodiversity, and whose perspectives have helped to inform this work. Last but not least, thanks sincerely to the UBC librarians who worked with me to understand and meet the standards of methodological rigour expected of scoping reviews.

It has been a great pleasure to work for the Urban Biodiversity Hub as a Sustainability Scholar and I look forward to maintaining a lasting connection with this organization.

Disclaimer

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organisations in support of providing graduate students with opportunities to do applied research on projects that advance sustainability across the region.

This project was conducted under the mentorship of Urban Biodiversity Hub (www.ubhub.org). The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of Urban Biodiversity Hub or the University of British Columbia.

Executive Summary

City governments globally are recognizing the benefits of living with nature, and launching efforts to protect and regrow urban biodiversity. However, these efforts can reinforce existing inequities - for example, through “green gentrification” or ecosystem disservices. How might we build cities that are biophilic, just, and equitable? This Scholars project offers a framework for understanding urban social-ecological justice and offers a practical planning tool based on a scoping review.

THE UNIVERSITY OF BRITISH COLUMBIA

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1. Background

In 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released a Global Assessment of biodiversity loss which explained that roughly one million plant and animal species – roughly a quarter of all species studied – are threatened with extinction (IPBES, 2019). These losses have profound implications, not only for the world's ecosystems but also for people: it has often been said that ecosystems are our "life support", providing essential services to life such as cleaning the air and providing us with food. Apart from these losses, it is also true that accessing natural areas is essential to human wellbeing. Spending time in nature improves cognitive and learning development in children (McCormick, 2017; Strife & Downey, 2009), helps people recover faster from invasive procedures (Ulrich, 1984), and supports stress attenuation and overall emotional wellbeing (Kaplan & Kaplan, 1989; van den Berg, Hartig & Staats, 2007).

Planners and policymakers are increasingly recognizing both the risks of losing nature in cities, and the benefits of having it. At the same time, however, creating and restoring nature in human-dominated areas is risky, for both people and nature. For people, "greening" efforts can trigger gentrification and price low-income residents out of their homes. For nature, well-intentioned efforts to support biodiversity can leave plants and animals more vulnerable to disease transmission, predation by household pets, vehicle strikes, and other threats. These potential justice implications - for both people and nature - must be attended to if we hope to achieve our vision of more just and sustainable cities.

2. Objectives

The objective of this Scholars position was to create a toolkit that can be used to combat unjust biodiversity planning and ensure that vulnerable people are able to reap the benefits of biophilic city planning. The partner organization for this project is the Urban Biodiversity Hub (UBHub). UBHub is an international volunteer organization that supports cities in their efforts to develop, measure and assess urban biodiversity strategies and planning. UBHub maintains a database of thousands of biodiversity efforts taken by cities around the world. While these efforts are crucial to address the global ecological crisis, actions to create and conserve habitats and species can also reinforce existing inequities and contribute to oppression. Accordingly, UBHub applied to mentor a Sustainability Scholar to research issues of justice in biodiversity planning, and to create a toolkit that would support their client cities to plan for justice within their biodiversity promotion efforts. We decided to conduct a scoping review of academic and grey literature discussing justice in the context of urban biodiversity, and to translate the findings from that scoping review into a toolkit. This toolkit, which we call the "Urban Social-Ecological Justice Screening Tool", can be used to conduct a gap analysis of existing biodiversity efforts (making it a useful tool for academics as well as planners), as well as to inform the creation of new plans.

Our goals with this research project were two-fold: 1. We sought to characterize the current research and practice on promoting justice in urban biodiversity planning, and 2. We sought to contribute to this body of research and practice by proposing a framework that can be used for planning and plan analysis to help both academics and practicing planners conceptualize, promote and otherwise grapple with justice in urban biodiversity planning.

3. Methods and Protocol

3.1 Scoping reviews and our research goals

A scoping review is a structured literature review with well-established procedures that can be used by researchers to evaluate what is known about a particular topic, with replicable findings. It is very similar to a systematic review in terms of procedure, with some important differences. Notably, systematic reviews scrutinize the quality and methods of included studies. This is useful for understanding the quality and generalizability of findings, and to understand why differences in findings might occur. However, this is more relevant for experimental and medical research than it is for social science because qualitative research usually aims for internal, rather than external, generalizability.

A scoping review instead takes a broader lens to assess and report on "the state of the literature" – it can be used to understand the extent of what is known about a particular topic, and to identify trends and research gaps. Scoping reviews can be particularly useful for interdisciplinary topics, where relevant literature may emerge from a number of different fields with different disciplinary norms surrounding methods, reporting, and priorities. Since "justice and urban biodiversity" is a highly interdisciplinary topic, and since we were most interested in pulling themes and best practices from the literature, we opted to conduct a scoping review for this project.

We designed our methodology in close consultation with a UBC reference librarian. This included attending three workshops on systematic and scoping reviews, as well as individual meetings with a reference librarian to review our objectives, query, syntax, inclusion and exclusion criteria, and database selection. Working with a librarian is recommended for systematic and scoping reviews to promote methodological rigour, validity, and consistency across reviews of this nature. Table 1 provides a complete overview of our timeline and steps taken throughout the process.

Notably, because we sought to broadly characterize the state of the literature, we expanded somewhat on standard scoping review protocol by including a high-level data extraction alongside our full-text screening process. This allowed us to more effectively and accurately identify gaps and focal points in research that may identify with similar terminology but that did not meet our full inclusion criteria. For example, many descriptive or spatial articles that did not take a justice-oriented interpretive framework (Creswell, 2013) were scanned and thematic data was extracted, but not included in our final step, which more thoroughly analyzed and synthesized highly relevant, transformative or anti-oppressive literature. In some special exceptions, we included articles that did not self-identify as justice-oriented research but where crucial and unique implications for justice could be inferred. Given that the intention of a scoping review is to catalogue "what is known" about a particular subject, we believe the inclusion of these exceptions is an important step in synthesizing scholarships that have so-far not been in conversation with one another and hence may not be using the same terminology.

In other words, after completing the initial abstract scan, our data extraction phase was broken into two parts. First, we extracted high-level data (e.g. subject matter, discipline) from a full-text but high-level screening of included articles. We used this high-level data to isolate a smaller subset of articles that we believed would be especially relevant in relation to our conceptual framework (described in Section 1.2 of this report) and that could contribute to improvements in research and/or practice on this topic.

Table 1: Steps and Timeline

Step 1: Query development	Both authors collaborated to decide on appropriate keywords, databases, inclusion criteria, research intentions, and example records. Fitzgibbons tested the query and worked with a librarian to refine the query and methods. (October – November 2020)
Step 2: Database search and mass record collection	Fitzgibbons runs the query and controlled vocabulary search on the selected databases and uploads all retrieved records into the Covidence systematic review tool. (November 2020)
Step 3: Title and abstract screening	Both authors independently screen the titles and abstracts against the inclusion and exclusion criteria to decide which records are relevant enough proceed to Step 4. Any disagreements (called "conflicts") on the relevance of individual records are identified and resolved through discussion. The inclusion/exclusion criteria is updated accordingly to reflect conclusions and minimize future conflicts. (November 2020 – March 2021)
Step 4: Full text high-level data extraction	Fitzgibbons completes a high-level data extraction on a large subset of records to collect basic information about subject matter and nature of the records. Through this process, a subset of the most relevant records are identified, which proceed to Step 5. (February 2021 – April 2021)
Step 5: In-depth reading and extraction	Both authors read, analyze, take notes, and discuss the most relevant articles as identified in Step 4. (April 2021 – June 2021)
Step 6: Citation chaining and snowball records	The authors screen the bibliographies of Step 5 records to identify and retrieve new potentially-relevant records. The authors also add any additional records retrieved from their personal libraries or through other means. Steps 3-6 are repeated on all new records. (June 2021)
Step 7: Grey literature search	The authors retrieve grey literature records through a combination of structured searches and snowballing. Steps 3-6 are repeated. Fitzgibbons leads the structured search while Pierce leads the snowball record retrieval. (December 2020; July 2021)
Step 8: Synthesis and writing	The authors collaborate to synthesize, understand, and report back on the data. The authors also collaborate to construct the Urban Social-Ecological Justice Screening Tool, with Fitzgibbons leading the development of this tool. (February 2021 tool is drafted based on early insights; August 2021 tool revision and writing commences)

3.1.1 Scholarly search

We ran our query on 6 academic databases containing journals relevant for our disciplinary scope: Web of Science, AESD and ProQuest Theses and Dissertations (ProQuest), GeoBase and GeoRef (Engineering Village), and CAB Direct. We tested our assumptions about disciplinary scope by running a "reverse search" on 12 sample articles that exemplified a range of the type of research we were looking for. All 12 samples were indexed on Web of Science and several were additionally indexed on CAB or GeoBase. We added GeoRef, AESD and ProQuest Theses and Dissertations as a buffer, and also to capture relevant unpublished academic research (e.g. theses) and other grey literature.

We divided our query into three distinct thematic clusters: "justice", "biodiversity" and "urban" (Table 2), using the Boolean operator "AND" between them to emphasize results containing all three themes. We sought to identify keywords that were broadly representative of the interdisciplinary nature of urban biodiversity research; for example, using "landscape restoration" to access design and

architectural research, “urban forest” to access urban forestry disciplines, and “biological diversity” to access ecologically focused research.

In addition to the keywords indicated in Table 2, we tested more than 20 additional keywords using a “NOT” search to isolate their effects on the results yielded. We found that some relevant keywords “contaminated” the results with irrelevant records – for example, they keyword “equity” often yielded responses related to “spatial evenness” without reference to justice. However, results that used “equity” to discuss justice issues generally also used other keywords such as “inequality” or “oppression” and were hence not excluded by omitting the keyword “equity”. A full list of tested and omitted keywords is available in Appendix A.

Some databases we searched had an option to search using controlled vocabulary. Where available, we used this option to run a second search using a version of the query that was translated to the controlled vocabulary for that database. The controlled vocabulary searches for CAB Direct, GeoBase and GeoRef are available in Appendix B.

Table 2: Query keyword clusters[1]

	Keywords
Justice cluster	(justice OR racism OR inequality OR marginali* OR gentrification OR poverty OR "indigenous people*" OR aborigin* OR racial* OR oppress*)
Biodiversity cluster	(biodivers* OR "biological diversity" OR "ecosystem servic*" OR wildlife OR "urban greening" OR "green space" OR "landscape restoration" OR "green infrastructure" OR "access to nature" OR canopy OR "daylighting" OR "urban forest*" OR "nature-based solution*" OR riparian)
Urban cluster	(urban OR city OR cities OR metropol*)

3.1.2 Grey literature search and other sources

Once we have completed extraction on the most relevant articles yielded from the database search, we will screen their bibliographies to find new potentially relevant sources - a process called “citation chaining” - and run those records through the same screening protocol we deployed for articles yielded from the search. Some articles were also collected through word-of-mouth or found through references from blog posts and other grey literature. Such “snowball” records are still being collected.

In addition to scholarly literature, we ran targeted searches on Google and browsed select relevant websites in order to find grey literature at the intersection of justice and urban biodiversity. We screened the Urban Biodiversity Hub’s database of urban biodiversity actions and plans, searching all documents for keywords in the “justice” cluster while also adding some previously excluded keywords such as “equity”. For the Google searches, we ran several simplified variations of the academic database query; for example, “justice” AND “urban” AND “biodiversity”. We also ran searches that reflected the type of records we might expect to find this content in - for example, “access to nature plan” or “urban biodiversity strategy” AND justice OR equity.

For the most part, relevant records simply referred to academic research on the topic. We avoided grey literature records that duplicated scholarly research included in our scholarly search. To accommodate the low number of non-academic records, we relaxed our inclusion criteria. For example, for grey

[1] When an asterisk (*) is used in a query, it means that any combination of letters to finish the word will be returned. For example, “marginali*” would return results featuring the words “marginality, marginalized, marginalization”, and other such variations of the word.

literature sources such as urban strategies or policies, we did not expect a social justice interpretive framework. More broadly we included any records that planned for parks, green space or other nature-related content with more-than-cursory reference to justice-related themes, such as distributive inequities (e.g. access to green space, mitigating green gentrification) or procedurally just park planning processes (e.g. intensive co-planning of green spaces with racialized residents).

Even with relaxed criteria, however, the total number of relevant grey literature records is so-far modest. For example, of 77 records retrieved so far, 46 (more than half) are blog posts or opinion pieces and 14 were plans, reports, strategies or otherwise government documents. The remainder were a combination of websites, compilations, webinars or project pages. Of the government documents, only 6 discussed justice or equity considerations in any detail and all of these were parks and recreation plans that dealt only minimally with biodiversity or nonhuman life. The grey literature search is still a work in progress and hence these numbers should not be used to draw conclusions; however, if the trend continues, it may suggest that justice and equity considerations are not well-integrated in current biodiversity, conservation or greenspace planning and policymaking.

3.2 Limitations

It may be true that there are strong examples of place-based, grassroots initiatives at the intersection of justice and urban biodiversity. In the final publication associated with this project, we will provide some examples of such initiatives that we are aware of. These examples will come from our own knowledge and awareness of efforts through our lives and work; in other words, their retrieval is not replicable to the standard expected of a scoping review. However, we feel that it is important to provide these examples because place-based and community-based efforts may not primarily be communicated or operationalized through writing or online media, making any literature review an ineffective tool for exploring them, but they nevertheless exist.

We present this scoping review with the caveat that, perhaps paradoxically, we limited our scoping to examples from traditional hegemonic institutions in academia and government, whereas (as described above) many of the most relevant examples and case studies may be hyper-local and not readily available to analyze online or through hegemonic academic sources. Qualitative, ethnographic and case study approaches can be used by researchers to broadcast these community-based efforts in academic media; we designed our query to unearth such research, and we hope to provide examples of these once the research has been completed.

It is also worth noting that both “biodiversity” and “justice” are subjective, malleable terms. We have done our best to be transparent about our conceptual framework (how we interpret these terms), working definitions, and intentions with this research - however, the findings may not be replicable to the extent that may be possible with more discrete or quantitative subject matter. In particular, during the final phase of inclusion, we selected articles based partly around our intention to A. Synthesize disparate areas of justice literature, and B. Construct a tool that would be useful for planning and plan evaluation to promote justice in biodiversity planning practice. The findings of this review are hence our assessment of the current state of the literature, but the content we have chosen to emphasize also reflect our positionality and motivations as researchers in this field.

3.3 Conceptual framework and inclusion criteria

Table 3 contains a summary of our inclusion and exclusion criteria. Typically, researchers conducting systematic or scoping reviews will use a standardized reporting tool to communicate inclusion and exclusion criteria, in order to support replicability and transparency. These tools highlight key criteria that researchers might use to determine which records are relevant, and which are not. A screening and standardized reporting tool using the elements outlined in Table 3 has been used to communicate our inclusion and exclusion criteria. This is based on the SPIDER[2] (which stands for Sample, Phenomenon of Interest, Design, Evaluation, Research Type), tool adapted from Cooke, Smith, & Booth (2012). Other standardized reporting tools such as PICO (Participants, Intervention, Comparator, Outcome) are common in health sciences and experimental research, while SPIDER has been adapted for qualitative research contexts, and is more suitable for our purposes.

Table 3: SPIDER standardized reporting table for inclusion and exclusion criteria, adapted from Cooke, Smith, & Booth (2012).

	Inclusion criteria	**Exclusion criteria**
Sample / Scope	Urban, suburban or metropolitan areas and residents, including large urban parks or conservation areas.	Rural or ex-urban areas, non-urban marine or agricultural areas, urban-rural linkages.
Phenomenon of Interest	Distribution, creation, maintenance or degradation of urban green and blue space or biodiversity. *Examples: Green infrastructure, species management, urban greening, stream daylighting*	Not centrally concerned with green space, vegetation, biodiversity or nonhuman life. *Examples: parks and recreation built infrastructure, transportation networks*
Design	A social justice interpretive framework (Creswell, 2013) can be inferred or is stated.	Descriptive research without a social justice interpretive framework.
Evaluation	Implications for justice (see table 4)	Not focused on justice outcomes.
Research type	Qualitative, quantitative, mixed methods.	N/A
Other	Published in English, must contain sufficient original content for analysis	Not published in English, too short or unsubstantial for analysis.

All of our keyword clusters – justice, biodiversity, and urban – are subjective and malleable terms that can be understood and used differently depending on the context, speaker, and audience. Because of this, when deciding on our inclusion and exclusion criteria, we had to reflect on what these terms meant for our purposes in order to exclude articles. The following section explains how we understand these terms, and how we applied those definitions to include and exclude articles.

3.3.1 What is urban?

Because our goal was to create a tool that can be useful for both academics and biodiversity planners, and because biodiversity planning can happen at multiple scales, we took a broad and inclusive interpretation of what it means to be "urban". For our purposes, if an article self-identified its scope as urban or metropolitan, or pertained to a case study in a city or large town, it met the inclusion criteria for the "urban" dimension. In some cases, this included large protected marine or terrestrial areas adjacent to or within cities. We included research about large urban conservation areas and parks. We excluded research with a rural or exurban scope, or that discussed sustainability issues across rural-urban gradients in step 3.

[2] For our purposes we have adapted "Sample" to "Scope".

3.3.2 What is biodiversity?

To define "biodiversity" we relied on experience and research gained by mentor Jennifer Pierce through her scholarly research and professional work with UBHub and as a planner. Notably, Pierce led authorship on a book chapter which sought to operationalize the term "biodiversity" for urban environmental planning purposes (Pierce et al., forthcoming 2021). In this chapter, the authors acknowledge that there are both scientific and operational uses and definitions of the word "biodiversity" which are contested and varied in their applicability to urban contexts. This chapter understands the scientific definition of biodiversity as "*the variety and richness of organisms and the structures and functions of their ecosystems as they relate to one another under the unique influences of human settlements*". It proposes an operational, value-driven and human-focused definition for use in cities, which is "*prioritized urban biodiversity comprises the organisms and their supporting ecosystem features that enrich and sustain cities and their associated landscapes*". For the purposes of our review, we have been inclusive of the full range of perspectives on biodiversity. Any article that aligned with either or both of these definitions was considered to meet the criteria, which was assessed in step 4.

More practically, and as per Table 3, when screening results, we found it useful to simplify this thinking into a yes-or-no question of whether the article discussed nonhuman life or ecosystem function. For example, several articles discussed "access to parks" or "health benefits from parks" without discussing trees, canopy, or wildlife and instead emphasized built amenities, infrastructure or design. Such articles were included in the first level of screening (step 3), but excluded in step 4. On the other hand, articles that discussed how particular wildlife (e.g. birds) or the quality of green spaces (e.g. forested areas) were unjustly distributed were considered to meet the "biodiversity" criteria.

3.3.3 What is justice?

To define justice, we developed a framework that combines ideas of ethics, inequality and oppression from various disciplinary traditions. Notably, a common trifecta of "procedural", "recognitional" and "distributive" justice is used in social and environmental justice research, while ideas of animal welfare, "deep ecology", intrinsic values and the "rights of nature" emerge from more ecologically focused research. More recently, we find compelling arguments for a social-ecological framing of justice underpinned by a relational ontology, which for our purposes, we will call "relational justice". Table 4 conveys our interpretive framework for understanding justice.

However, "justice" is perceived and communicated in many ways across diverse disciplines and cultures and therefore its interpretation had to consider the cultural context of the research. For instance, in some countries, the dialogue around justice issues may not use the term "justice" even though the content is interested in similar concepts that would use this word in other countries. On the other hand, the term could be used more freely than our definition: for example, we found many instances of articles that used the word "justice" to refer to spatial analytical methods associated with "environmental justice" research that examine unequal distribution of natural amenities or pollution. While some of these articles contained nuanced discussions of justice, it was clear that others were using the term as descriptive language for their choice in methods without critically analyzing or discussing the structural causes of those inequalities or taking an anti-oppressive stance. Similarly, terms such as "inequality" and "equity" sometimes referred to un*even* spatial distribution of environmental amenities without discussing how these intersected with gender, race or class.

There is a robust, well-studied scholarship on the uneven distribution of environmental amenities and its implications for human health. While this research is instrumental, our contribution was not to

review and report on this enormous and robust body of research, but rather, we sought to identify opportunities for change *toward* justice that could be useful for planners and policymakers.

Note that, in Table 4, the resources listed under "reference material" for each category are not homogenous, but rather, represent a spectrum of relevant discussions and debates that can be representative of its philosophical perspective. For example, under Distributive, Recognitional and Procedural justice, much of the reference material discusses at least two of the three domains, and responds to previous work. Because of this, we have listed those reference materials together, in chronological order. Under "ecological justice", Naess, 1972 is widely considered to have founded the "deep ecology" movement which rejects the idea of human supremacy and represents a somewhat fundamentalist approach to ecological justice. On the other hand, contemporary understandings of intrinsic values for nature (e.g. Connor & Kenter, 2019) are more sympathetic to popular anthropocentric approaches such as ecosystem services, and situate intrinsic values as being on equal footing in a mosaic of other valid perspectives on nature's worth.

Table 4: Conceptual framework for justice

	Main focus	**Related terms**	**Reference material**
Distributive justice	Oppression through unequal distribution of materials	-	Cooke & Kothari, 2001; Fraser, 1995, 1997; Healey, 1998; Honneth, 2004; Langemeyer & Connolly, 2020; Miller, 1999; Rawls, 1971; Schlosberg, 1995, 2007; Young, 1990, 2001
Recognitional justice	Oppression through misrecognition and portrayal of social difference	-	
Procedural justice	Oppression through exclusionary, unfair or corrupt planning and negotiations	Participatory justice	
Ecological justice	Exploitation, domination and undervaluing of nonhuman life	Deep ecology, animal welfare, rights of nature, intrinsic values, compassionate conservation	Baxter, 2004; Connor & Kenter, 2019; Naess, 1972; Okansen, 1997; Pritchard & Robison, 1981; Wallach, Bekoff, Batavia, Nelson, & Ramp, 2018
Relational justice	Misrecognition and/or severance of human-nature or human-landscape relationships	Social-ecological justice, relational ontology, relational values	Anguelovski et al., 2020; Bird-David, 1999; Chan et al., 2016; Yaka, 2018
Other reference material	Anguelovski et al., 2020; Creswell, 2013; Langemeyer & Connolly, 2020		

Our conceptual framework and the Urban Social-Ecological Justice Screening Tool (submitted as a separate document alongside this report) are based on literature that is well-established and burgeoning in the realms of social, ecological, and environmental justice. Notably, we draw on social justice concepts of distributive, recognitional and procedural justice established by Fraser (1995, 1997),

Honneth (2004), Young (1990, 2001), Schlosberg (1995, 2007), Rawls (1971) and recently extrapolated for urban ecosystem services by Langemeyer and Connolly (2020).

These concepts are often expressed as an essential trifecta of justice, but we add a fourth dimension, ecological justice, to reflect the need for just and fair treatment of nonhuman life. Some dimensions of the "trifecta" of justice can be seen as applying to plants and animals. We also find compelling arguments for ecological justice in theories or fields that do not overlap neatly with the distributive, recognitional and procedural paradigm, hence the inclusion of a new, fourth dimension. For example, deep ecology focuses on the intrinsic worth of all life irrespective of its utility for humans (Naess, 1972), and compassionate conservation promotes a "do no harm" approach, redirecting attention toward the wellbeing of individual animals, rather than conventional conversation which may, in many cases, consider killing animals or populations defensible if it leads to desirable conservation outcomes (Wallach et al., 2018). Notably, these scholarships rarely deploy the language of "justice", which may speak to the scholarly division between people and nature surrounding issues of justice and moral consideration. Simply put, these discussions are about justice, but they do not use that word.

Lastly, building on newly-developing areas of research, we have added qualities or considerations that may intersect with any and all of these four domains of justice. Because these words represent considerations that are relevant to any and all forms of justice, but do not usually reflect distinct forms of injustice in their own right, we have represented them outside of the main Venn diagram, encircling all forms of justice to demonstrate that they are always present. Notably, Anguelovski et al. (2020) call for a re-framing of environmental justice research to take a more actively anti-oppressive approach and actually seek to rectify (rather than simply document) environmental injustices. Langemeyer and Connolly (2020) draw attention to temporal and spatial domains of injustice.

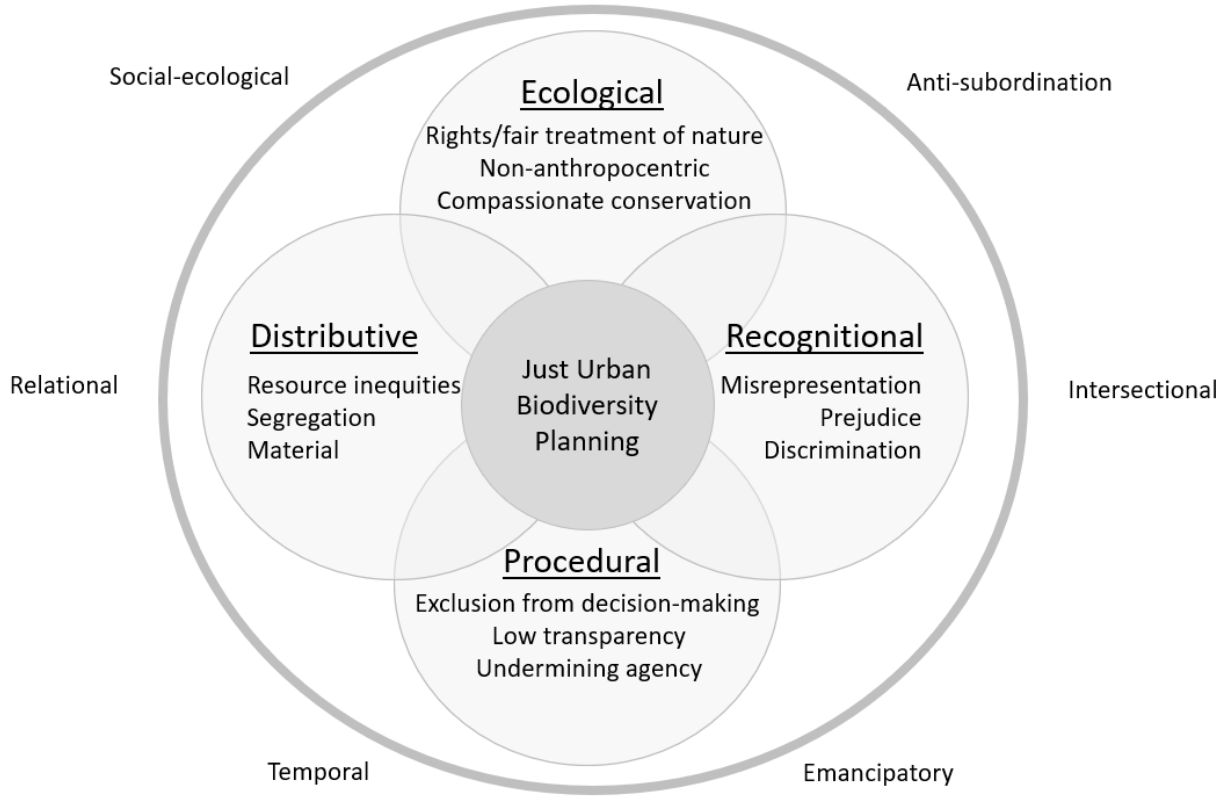

Figure 1: Visual representation of conceptual framework

We have added “Anti-subordination”, “Intersectional”, “Emancipatory” and “Temporal” to reflect their arguments. Anti-subordination means that efforts should focus on avoiding harm. Intersectionality draws attention to how multiple concurring layers of identity can cumulate into complex experiences of oppression. Emancipatory means that efforts to promote justice should focus on liberating oppressed communities rather than simply treating the symptoms of their oppression (Anguelovski et al., 2020). Lastly, temporal means being attentive to how oppressive forces and their impacts evolve and change shape with time (Langemeyer & Connolly, 2020). Our review has unearthed some useful cases to demonstrate how these dynamics manifest and overlap. Some papers, for example, drew attention to historical practices of redlining (Schell et al., 2020) or apartheid (Anderson et al., 2020), where acts of oppression advanced against a particular social group (Black Americans and Africans) have resulted in contemporary environmental injustices that look different from the original racist acts that generated them. These papers demonstrate how segregation and financial oppression of Blacks and other minorities have led to the “luxury effect”, whereby more affluent and white neighbourhoods often have higher levels of biodiversity and greater access to ecosystem services. The original act of oppression created new types of inequality over time.

We have also added “Relational” and “Social-ecological” to our ‘circulating’ considerations in order to capture recent developments surrounding the importance of a new “social-ecological justice” that captures relational values for nature, and challenges the fallible division between human and nonhuman as subjects of justice (Chan, Gould, & Pascual, 2018; Jax et al., 2018; Langemeyer & Connolly, 2020; Levine, Muthukrishna, Chan, & Satterfield, 2017; Yaka, 2018). Both of these terms (relational and social-ecological) refer to not only human relationships to the natural world, but also, how the natural world shapes and mediates our relationships with one another. In other words, social-ecological justice rejects the dualistic framing of humans and nature as separate, which distinguishes it from both environmental justice (which usually focuses on impacts to humans) and environmental ethics or ecological justice (which usually focus on impacts to nature). To exemplify this, Yaka (2018) draws on case studies of community resistance to hydropower plants in Turkey, where residents see their existence, identity and way of life as inextricable from the threatened local river.

4. Preliminary findings

At the time of submission of this Sustainability Scholars project report, I and my mentor Jennifer Pierce are still in the process of screening and analyzing the results of this scoping review. I have screened the abstracts of 1,249 records and Jennifer Pierce has screened 757. The abstract screening phase (Step 3, refer to Table 1 for steps) is hence approximately 80% complete. I have also completed high-level extraction (Step 4) on 124 studies. Steps 5, 6 and 8 have not been started. Step 7, the grey literature search, has commenced and will conclude once new records can no longer be retrieved through snowballing or query searches.

The following section hence represents draft and high-level findings illuminated through the review process. More in-depth analysis of the final included papers in this review will eventually be published in a peer-reviewed academic journal alongside the Urban Social-Ecological Justice Screening Tool. Once the review is completed, I will produce a blog post on this topic for the UBHub website.

Overall, we find that the body of research dealing meaningfully with justice for people *and* justice for nature is small. The most common places we found such content were the journals *Landscape and Urban Planning, Urban Forestry and Urban Greening, International Journal of Urban and Regional*

Research, Progress in Human Geography, and *Sustainability*[3]. However, essential theoretical content to inform the conceptual framework (Table 4) were also often found in the form of self-authored books, as our framework was informed by scholarship beyond the scope of our query. The majority of such research was theoretical rather than empirical.

We find few[4] articles in our final stage of review that synthetically discuss ethical dimensions of urban biodiversity without compartmentalizing into anthropocentric or biocentric views. The vast majority of related research approaches this topic from an anthropocentric perspective. This may, in part, be a result of nomenclature differences across biocentric and anthropocentric perspectives. For example, biocentric justice research may use alternative language to discuss justice in a latent sense, such as "deep ecology" or "animal welfare", and we did not include these terms in our query.

Many[4] records retrieved from our search query dealt with distributive environmental justice issues and often relied on a combination of spatial and demographic data. For example, of the 124 articles that have been through high-level extraction so far, 41 were spatial analyses. Many of these articles deal with issues such as access to nature, green gentrification, or ecosystem services from green space without discussing ecological welfare considerations such as the biodiversity crisis, ecological resilience, ecosystem novelty, or other factors. Relatedly, a majority of records on this topic focused on distributive justice rather than procedural or recognitional social justice. For example, many[4] articles focused on the social stratification of green amenities and dis-amenities across urban space.

New research on this topic could contribute to addressing this gap through qualitative and experimental research that explores experiential and relational dimensions of people in urban nature - for example, exploring how lived experiences with racism might influence a person's comfort in urban parks. One grey literature source that deals with such content is Oregon Metro's "Connect With Nature" project (Oregon Metro, 2019), a community engagement effort that sought to co-create park design guidelines with communities of colour to better reflect their perceptions, uses, and needs for green space.

Lastly, we find a serious underrepresentation of ecological or nonhuman-focused conceptions of justice. We also find few articles that consider relational values for nature in tandem with justice (but see Anguelovski et al., 2020, Langemeyer & Connolly, 2020 and Yaka, 2018 for exceptions, and section 2.3.3 for a description of these records). We suspect that this is because much of the literature on nonhuman ethics does not use the language of "justice" and hence was not detected by our query, which may have been biased toward human-focused terminology for justice. Future scoping reviews could include terminology that captures scholarships which discuss ecological or nonhuman justice in latent terms, such as those literatures identified under "Ecological justice" in our conceptual framework (Table 4).

5. Urban Social-Ecological Justice Screening Tool

Based on the findings from this scoping review, we have developed a simple tool to support justice in urban biodiversity planning. The tool is structured as a series of worksheets and prompts to support planners or public servants that are constructing biodiversity plans, or related plans. It serves as a framework to guide thinking about different ways that justice can be promoted in a biodiversity plan. When used by civil society, consultants or other parties, the tool can be used to promote transparency

[3] Statements of "few", "many", "most" and related terms signify our preliminary impressions and findings based on incomplete data analyses. These will be quantified and stated more explicitly upon completion of this review. The journals listed on this page will also be updated if the completed analysis demonstrates different trends.

and accountability. For example, if a City government has made commitments related to decolonization, gentrification or other justice-related goals, this tool could be used by advocates to assess whether or not the City's biodiversity plan reflects those commitments.

The tool is available as a separate document alongside this submission.

6. Conclusion and Next Steps

This Scholars report is representative of 250 hours of work that took place between October 2020 and March 2021. Notably, when faced with insufficient case study data from biodiversity plans and grey literature, we re-scoped this project and have opted to create a publication-quality scoping review and a toolkit suitable for publication on UBHub.. Scoping reviews are methodologically rigorous, time-intensive processes that require consistent inputs from at least two authors. As a result, this research will continue beyond the 250 hour scope of the Sustainability Scholars project. This report details our scoping review protocol, preliminary findings, and a draft version of a tool that can be used to support justice in biodiversity planning and planning analysis.

In the months following completion of this report, I (Joanne Fitzgibbons) and my mentor Jennifer Rae Pierce will collaborate to produce and publish a co-authored scoping review based on the work started here. Notably, the next phases of work could include:

- A written blog post or newsletter article about this review and the toolkit
- Completion of high-level data extraction from academic database query
- Citation chaining using the bibliographies of the most relevant articles
- Collection of relevant grey literature
- Uploading, screening, and extraction of additional records retrieved through these steps
- Thorough reading, analysis, and reporting based on the most relevant grey and scholarly records after high-level extraction of all records is complete
- Submission to a peer-reviewed academic journal and subsequent revisions
- Adapting the Urban Social-Ecological Justice Screening Tool for content analysis of urban biodiversity plans, and testing it in further research

7. Appendices

Appendix A: Tested keywords

The following table identifies a number of keywords that were tested using the "not" function on the Web of Science database to determine their impact on the query's yield. We decided which keywords to include in our query based on the results of this test.

Original term	Kept	Results and notes
Aquatic	No	39 unique results, none met all 3 inclusion criteria. One notable exception dealt with env. justice re: aquatic environments, and was downloaded.
Biological diversity	Yes	4 unique results, one was relevant
Conservation	No	Omitted; this yielded hundreds of results related to urban heritage property / historical preservation. Any relevant results had overlaps with other terms in this cluster.
Disadvantage	No	Vague - yielded results relating to quantitative methodologies, ie. "the addition of variable A disadvantaged the result"/
Equity, equitable, equit*	Kept "equity"	Equit* yielded results that discussed "equitable distribution of..." but did not meaningfully engage with questions of justice, fairness etc.
Forest	Substituted "urban forest*"	"Forest" yielded thousands of irrelevant results, often pertaining to rural community forestry projects without clearly transferable findings for urban areas.
Gender	No	More than 500,000 results yielded - scanning these suggested that gender is used as a descriptor for methods and not as a justice consideration
Greening	Substituted "urban greening" and "green space"	Original term yielded several irrelevant results related to basically anything green or greenwashed - for example, "green transportation" which actually referred to cycling and transit (but not, for example,

		greenways). The revised term offers more accuracy.
Indigenous	Substituted "Indigenous people"	“Indigenous species” results came up.
Marine	No	45 unique results, none would have proceeded to full-text screening - keywords from "urban" and/or "justice" clusters tended to be superficial or buzzwords
Natur*, nature, natural	No	Yielded 2,353 results. Sorted by most relevant, the first 3 pages did not meet inclusion criteria. The term is too broad and yields articles focused on urban justice but not nature, biodiversity, greenspace (cluster 2)
Nature-based solution vs. nature based solution	Kept hyphen	Made no difference to search yield / redundant
Pollution	No	Vast majority of results are technical studies mostly focused on quantifying particulate matter in the air, and they do not deal at all with questions of biodiversity, ecosystems etc.
Rewild*	No	Yielded 0 results
Riparian	Yes	8 unique results, one was relevant and another was questionable
Social equity	No	Results pertained to spatial equity AND somehow restricted us from seeing other, more relevant results in WoS
Urban indigenous, urban aboriginal	No	Yielded 0 relevant results
Urban* vs. urban	Urban	Urban* yielded results about urbanisation encroaching on habitat - conservation or environmental degradation was the focal concern, rather than justice
Water	No	Librarian suggested that this term would be too vague but substituted with "marine" and "aquatic" which pertain more explicitly to environment/ecosystems.

Appendix B: Controlled vocabulary

Note that Web of Science and ProQuest do not use controlled vocabulary, so controlled vocabulary searches were only conducted for CABDirect, GeoBase and GeoRef databases.

	CABDirect	GeoBase & GeoRef
Justice cluster	None available	{environmental justice} OR {social justice} OR {human rights} OR {indigenous knowledge} OR {indigenous population} OR {ethnicity} OR {equity} OR {socioeconomic status} OR {race} OR {ethnic minority} OR {minority group} OR {ethnic group} OR {racial disparity} OR {racial identity} OR {black population}
Biodiversity cluster	"biodiversity" OR "nature conservation" OR "nature reserves" OR "nature conservation and reserves" OR "ecosystem management" OR "ecosystem services" OR "ecosystems" OR "wildlife" OR "wildlife conservation" OR "wildlife management" OR "wildlife corridors" OR "urban parks" OR "greenspace" OR "riparian areas" OR "riparian buffers" OR "riparian ecosystems" OR "riparian vegetation" OR "environmental services" OR "environmental management"	{biodiversity} OR {aquatic ecosystem} OR {artificial ecosystem} OR {ecosystem} OR {ecosystem approach} OR {ecosystem dynamics} OR {ecosystem function} OR {ecosystem health} OR {ecosystem engineering} OR {ecosystem management} OR {ecosystem resilience} OR {ecosystem service} OR {nature conservation} OR {nature reserve} OR {nature-society relations} OR {riparian forest} OR {riparian vegetation} OR {riparian zone} OR {river bank} OR {greenspace} OR {greenbelt} OR {open space} OR {landscape ecology} OR {landscape planning} OR {urban forestry}
Cities cluster	"cities" OR "urban areas" OR "urban development" OR "urban environment" OR "urban forestry" OR "urban parks" OR "urban planning" OR "urban sites" OR "urban society"	{urban area} OR {urban design} OR {urban development} OR {urban ecosystem} OR {urban population} OR {urban region} OR {urban renewal} OR {urban service} OR {urban politics} OR {urban policy} OR {urban planning} OR {urban site} OR {urban system} OR {metropolitan area}
Subject heading is called…	Subject term	Controlled term
Notes	Searching using “Descriptor” rather than “Subject term” yielded identical results. Searching using “Broad term” yielded zero results.	"Urban Forestry" and "Nature-based solutions" were omitted from the standard query and captured in the controlled vocabulary search because they are identified as controlled terms.

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