Entry points for addressing justice and politics in urban flood adaptation decision making

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Adaptation decisions are necessarily about the distribution of risk and resources and thus are inherently political, with implications for equity and justice. These concerns are increasingly recognized to be pertinent in adaptation to urban flooding. Yet, the technical orientation of many flood adaptation interventions and decision-support may make these issues less visible in flood decision-processes. We draw from recent empirical case studies to identify thematic 'points of entry' that can facilitate attention to issues of justice and politics in urban flood decision-support. We map these entry points to four phases of the adaptation decision-process, highlighting lines of inquiry to enable researchers to make these concerns visible in collaboration with partnering organizations and stakeholders. We argue that researchers will need to work with stakeholders to make effective use of existing approaches and methods to explicitly make the political dimensions and issues of justice visible in decision-processes.

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Introduction

Adaptation planning is inherently political, entailing the negotiation of risk exposure, resource distribution, and implementation responsibilities in socially differentiated contexts where diverse actors have disparate authority, influence and capacities [1]. Adaptation decisions entail specific notions of how risk exposure and the cost and benefits of adaptation interventions should be allocated (equity) and what constitutes socially appropriate and fair processes for, and outcomes of, adaptation decision-making, in other words, justice [2].

While flooding is often addressed as a technological and engineering challenge, flood adaptation is a deeply social and political concern [3]. Flood adaptation builds on flood risk management practices and approaches with the aim of reducing associated vulnerabilities, with the recognition that the risk of flooding is changing as climate change influences hydro-meteorological regimes and leads to sea level rise. A substantive focus of flood risk management is on the distribution of flood waters and thus flood risk [4••]. Flood exposure is inherently uneven; interventions to address flood risk raise questions of whose (or what) vulnerability needs attention and what values and interests are being protected or exposed [5]. Flood management in urban areas is also significantly shaped by prior investments in the landscape, human settlements and the built environment – decisions characterized by their own historically and culturally situated politics and perspectives [6,7••]. New investments made in response to changing threats will have long legacy effects in future development patterns, raising questions of intergenerational equity and justice [6].

We synthesize promising points of entry into concerns of justice and the politics of adaptation from a selection of recent empirical literature (2018–2020) that either document real-world processes of decision-making for urban flood risk adaptation, or that describe decision-support interventions intended for use in flood risk adaptation. The surveyed literature offered cases from both the Global North and South. Much of this literature does not touch on issues of politics, justice or equity; here we focus on those studies that do, as well as those that present promising approaches for bringing these issues to the forefront in flood adaptation decision support. From this literature, we identify six points of entry for research that have the potential for making justice and politics more visible and tractable: a) knowledge co-production in adaptation planning, b) attention to framing, c) decisions on spatial scale and scope, d) considerations of heterogeneous social values, e) addressing social-political uncertainty, and f) evaluating participation and implementation capacity.

Six points of entry
Knowledge co-production in adaptation planning

Co-production of knowledge is increasingly promoted in flood management as a means of enhancing decision-making legitimacy and salience [8]. Research teams

supporting urban flood adaptation decision-making increasingly collaborate with technical experts in municipal agencies to define salient interventions, improve impact assessment and modeling parameters, and evaluate alternative interventions [9–11]; the differential agendas and power asymmetries among such technical actors is rarely addressed [but see Ref. 12•]. Engagement with urban residents or non-technical experts is less frequent [13], but increasing in light of European policy encouraging public participation in flood policy implementation [14]. Increased efforts to include diverse actors in planning highlights the importance of actor network coordination and inter-organizational communication. New pedagogical and participatory modeling tools have been developed to foster social learning, involve residents in evaluating infrastructure alternatives, and capture residents' priorities [13,15]. Approaches such as the Learning Action Alliance framework [16•] have the potential to enable scientists, technical experts and diverse subgroups of urban residents to debate risk drivers and thresholds together, identify already-existing adaptation strategies, visualize drivers and uneven outcomes, and potentially anticipate the distributional consequences of management interventions [17]. These efforts do not, however, guarantee that there will be appropriate attention to 'dissensus' [18] or concerns of justice. Process conveners need to create supportive spaces to raise procedural and distributive justice concerns, and to ensure all stakeholders are recognized and empowered. Achieving shared visions and objectives may be less critical than establishing norms and procedures for deliberation, debate and reconciliation across differing perspectives. Methodological innovation is needed to better incorporate the lay-knowledge of vulnerable residents early into decision processes to ensure mutual learning, rather than one-way consultation or education [19]. Both research teams and municipal decision-makers must be prepared to reassess intervention strategies as a result of such engagement [17].

Attention to problem framing in adaptation decision-making

The narrative framing of flooding, including what are understood as flood causes and impacts *a priori* define what adaptation strategies are considered and prioritized, and whose interests are represented [20,21•,22]. Relatively few studies undertake the work necessary to make the assumptions, beliefs, and values that define researchers' and stakeholders' frames explicit, despite the importance of this activity [23]. Analysis of distinct framings of flood causes, consequences and solutions by different urban actors reveals potential intersectional and intersectoral conflicts and persistent biases in judgement [21•,24], with implications for justice and legitimacy [12•,23]. Framing can be elicited through mental model interviews and analyses [24], through surveys [12•] and news media and historical documents [21•,6]. Actors' frames,

represented as criteria weights in decision analysis, can also be used to inform flood modeling and adaptation assessments [25]. Historical analyses of past flood management decision-processes, using historical document analysis and media coverage, for example, reveal the influence of specific problem framings on subsequent adaptation pathways, the politics entailed in those decisions, and the undesirable or unjust consequences that can result [6,26,27]. Importantly, decision processes that make actors' frames visible can enable problem *re-framing*, opening up novel alternatives to flood management [20].

Decisions on the spatial scale and scope of adaptation

Decisions concerning the spatial boundaries and scale of flood adaptation processes affect what risks, benefits or disbenefits are considered, and what actors are recognized as legitimate participants [28••]. Nevertheless, explicit discussion of choices of scale and scope in the literature on flood risk adaptation processes is uncommon. The biophysical and social drivers of flood risk, and the potential for negative spatial externalities, often demand regional-level analyses [29]. Yet, the increased interest in decentralized, micro-level green infrastructure interventions requires attention to impacts and outcomes at fine scales [30••]. Decisions over spatial scope inherently exclude some risks and actors' interests while prioritizing others; structural inequities in vulnerability can be thus reinforced, and the social drivers and local understanding of risk neglected [28••]. Liao *et al.* [4••] evaluates justice tradeoffs of flood interventions in Taipei, in which the interests of the urban core were prioritized over peri-urban communities in flood protection, while the latter had limited ability to participate in the decision process. Similar transfers of risk to ex-urban communities of Mexico City not only created spatial injustices, but also exacerbated future flood vulnerability for the urban core [6]. Pasquier *et al.* [31] advocate for initially consulting with stakeholders to define the appropriate scale for planning and thus the spatial parameters for risk modeling. Incorporating such approaches early into decision processes can be instrumental in recognition justice, and ensuring critical social and environmental tradeoffs are considered in planning.

The importance of considering heterogeneous social values

Who decides what benefits or disbenefits are assessed and how such benefits are valued in flood risk evaluation is also contingent on what justice principles are implicit or explicit [32,33] and how actors interpret acceptable risk [7••]. While damage and benefits to property, physical infrastructure and ecosystem services are often assessed [32,34], less progress has been made in accounting for more intangible and immaterial social and cultural values [35••]. Where social vulnerability is considered, human behavior, capacity and tolerance to risk is often presented as uniform across different sub-populations of affected

communities [36•]. Recognizing the value of roadways in access to health services, Dong *et al.* [36•] surveyed flood victims to create a 'disruption tolerance index' associated with such flooding to help guide adaptation investments. Lived-values approaches help urban residents define their thresholds of risk tolerance in social terms, and identify the social signposts that would determine a shift in strategy [37,38]. Multicriteria decision analysis (MCDA) can capture and quantify the evaluation criteria of experts in relation to specific interventions [32,34,39]; although it is less frequently used to capture less-tangible values and priorities across diverse urban residents. MCDA can also make visible implicit biases and preferences in decision-making, enabling stakeholders to confront them before prioritizing investments [20,40].

Addressing social-political uncertainty

The adoption of robust decision making or decision scaling approaches to flood intervention modeling allows researchers to accommodate deep uncertainty in climate and hydrological trends, flood behavior and the tradeoffs in performance and costs of combinations of specific interventions [9,41,42]. Increasing attention is being given to uncertainties stemming from technological and social trends, differences in problem framings, changing priorities of decision-makers and the distributional implications of choices for present and future generations [10,22,25,40]. Lack of clarity over what justice frames are used to inform decision-making — for example, Rawlsian versus utilitarian — exacerbates uncertainty in the interpretation of stakeholder preferences and values [4••,33]. Researchers are advancing the use of multi-objective optimization modeling to account for trade-offs in disparate problem framings and ranges of stakeholder risk aversion [22] and stakeholder preferences for specific interventions and performance metrics [41,43]. While such studies do not recognize the politics of negotiating uncertainties, they do recognize the uncertainties of decision processes involving multiple interests and values [10]. Agent-based models can simulate the possible influences of stakeholders' actions and preferences on flood risk [25]. Pathways research embraces uncertainty through orchestrating stakeholder deliberation about the future conditions that would trigger a change in adaptation [44,45]; the framework, however, has yet to fully grapple with the evolving politics of adaptation decision-making [46].

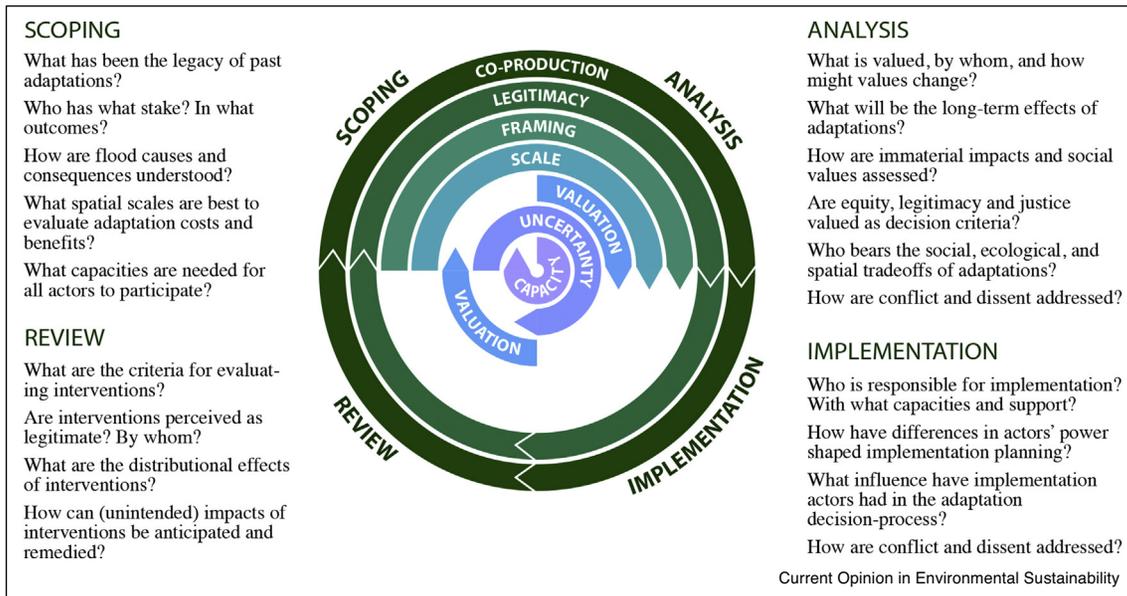### Evaluating participation and implementation capacity

In adaptation decision-making, actors must have the capacity to participate in the decision process (procedural justice) and have the resources and capacities to implement strategies they are responsible for (distributive justice) [33,35••,47••]. To attend to the disparate justice concerns in urban flood adaptation, there is a need for contributions from distinct sectoral agencies, civil society organizations and private entities; lack of effective coordination in implementation, attention to distinct capacities, and failure to build trust can undermine such efforts [47••]. In other words, urban adaptation requires consideration of how power and capacities are distributed across participating institutional and social networks. The participation of non-technical stakeholders in flood risk management can be discouraged by decision-processes that focus on the complex, highly-technical nature of infrastructure investments, and by the political interests tied to specific investment strategies [48]. Explicit attention to capacity building for effective participation in planning processes can improve diverse stakeholders' awareness and responsibility in flood risk management [13], potentially diminishing the risk of social conflict [14]. Capacity for implementation is increasingly contentious, as green- and blue-infrastructure investments made as part of evolving flood policy require direct participation from citizens who manage the spaces where implementation occurs [49], efforts in integrated flood risk management require intersectoral participation and coordination [47••], and corresponding funding is not always forthcoming [14]. Nguyen *et al.* [12•] explicitly evaluated the motivations and capacities of different actors in relation to flood management implementation, thus addressing the political acceptability of specific options. If unacknowledged, differences in stakeholder influence, mandates and responsibilities have been shown to create conflict and undermine adaptation effectiveness [33,47••,50].

Incorporating justice and political considerations into adaptation decision-making

The themes synthesized above can be mapped onto each of four phases of adaptation decision-making [51], responding to specific lines of inquiry that researchers can pursue as part of adaptation decision support to make concerns over justice and politics more explicit (Figure 1). Arguably, all six points of entry we identify in this piece may have application across all phases of the decision process, nevertheless, some entry points are particularly salient as decision processes are established, and other entry points may increase in salience in later phases. Given that the phases of scoping and analysis are instrumental in how a decision-process unfolds into implementation and ultimate impact, there are many opportunities in these phases for greater attention to justice. For example, attention to problem framing, and decisions on scope and scale are critical in the early stages of the decision process, setting the stage for what issues are considered, who is included and what is valued. Attention to issues of political legitimacy, knowledge co-production and uncertainty is likely to have differential but critical influence through the entire decision-process; whereas concerns over how impacts and outcomes are valued are particularly salient in relation to assessing vulnerabilities, deciding among adaptation alternatives, and finally in assessing outcomes. While these lines of inquiry are certainly not comprehensive, they can help ensure critical concerns are

Figure 1

SCOPING
What has been the legacy of past adaptations?
Who has what stake? In what outcomes?
How are flood causes and consequences understood?
What spatial scales are best to evaluate adaptation costs and benefits?
What capacities are needed for all actors to participate?

REVIEW
What are the criteria for evaluating interventions?
Are interventions perceived as legitimate? By whom?
What are the distributional effects of interventions?
How can (unintended) impacts of interventions be anticipated and remedied?

ANALYSIS
What is valued, by whom, and how might values change?
What will be the long-term effects of adaptations?
How are immaterial impacts and social values assessed?
Are equity, legitimacy and justice valued as decision criteria?
Who bears the social, ecological, and spatial tradeoffs of adaptations?
How are conflict and dissent addressed?

IMPLEMENTATION
Who is responsible for implementation? With what capacities and support?
How have differences in actors' power shaped implementation planning?
What influence have implementation actors had in the adaptation decision-process?
How are conflict and dissent addressed?

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The six points of entry, associated with the four phases of an adaptation decision process, with associated lines of inquiry to bring attention to issues of justice and politics.

brought forward in any research-supported decision process, including those in support of adaptation in other problem domains. They echo similar recent proposals by climate justice scholars [52••]. The pursuit of any of these lines of inquiry would necessarily entail interdisciplinary and transdisciplinary work, and the incorporation of novel methodologies and approaches, some of which have been outlined in the prior section.

Conclusion
There is a growing attention to concerns of justice, as well as the politics of adaptation planning and implementation in the urban flood literature. In part, this increased attention is associated with the significant shift in European flood management policy mandating public participation and whole-system approaches involving gray-infrastructure, green-infrastructure and blue-infrastructure investments. But this literature also demonstrates that policy mandates for inclusion and participation are not solutions in themselves [33,49], providing valuable lessons not only in flood adaptation, but also for efforts in adaptation in other sectors. Transparent decision-making processes, built on the shared narratives, constructive participation and influence of relevant stakeholders, increases the likelihood of fair, legitimate, effective and efficient practices [26,27]. The recent literature shows promise in methods and approaches that could be used to make visible justice concerns and the political dimensions of flood risk, with potential utility in other problem domains as well. Nevertheless, these approaches are not, for the most part, being explicitly used

for this purpose. While participation is often used instrumentally in decision analysis, there are fewer examples of participation redefining the problem of flooding itself, or influencing what is valued, whose interests are represented, or the social and political implications of recommended strategies. Social vulnerability assessments and analyses of risk perception are not uncommon, but these are less frequently integrated into the formal flood risk adaptation decision processes described in recent literature. The points of entry described above can help overcome perceived barriers in qualitative/quantitative knowledge integration and provide avenues for interdisciplinary scientific expertise to engage constructively with politicized, normative and dynamic decision-contexts. These approaches are only a sample of what is possible; the adoption of any of the approaches or methods described above is no guarantee that justice will be explicitly considered, or that the politics of adaptation decision-making will be acknowledged and accounted for. Further methodological innovation is certainly needed, in flood adaptation research as well as in relation to other adaptation challenges. Research and stakeholder teams must operate with explicit intention and resources, and dedicate time to these concerns in any decision process.

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