How 'just' is hybrid governance of urban nature-based solutions?

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ABSTRACT

Hybrid (or multi-actor) governance has been identified as a key opportunity for upscaling urban nature-based solutions (referred to as urban NBS), representing a demand-driven and cost-effective realization of urban green infrastructure. However it is unclear how such hybrid governance affects the justice outcomes of urban NBS. Through six in-depth cases of urban NBS we show that hybrid governance can lead to both improvements and deterioration of distributional, procedural and recognition justice, depending on the hybrid governance choices. By exploring the tensions between these justice impacts we formulate three main policy implications for hybrid governance settings: the need for transparent decision-making on the distribution of costs and benefits; safeguarding public control over the urban NBS and the use of scientific expertise in combination with bottom-up consultation procedures to recognize both current and future voices.

1. Introduction

The uptake of urban nature-based solutions (NBS) is promoted as an innovative and cost effective strategy for cities to realize urban sustainability objectives, including climate change adaptation, in the face of increased urban densification (European Commission, 2015; Faivre, Fritz, Freitas, de Boissezon, & Vandewoestijne, 2017; Kabisch et al., 2016). NBS are defined as being solutions that 'are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience' (European Commission, 2015). Similarly, the IUCN define NBS as 'actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g. climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits' (IUCN, 2016). What stands out in these definitions is that NBS as a concept stresses the strategic, integrated use of natural ecosystems to support human wellbeing in a cost-effective way. It encompasses a slightly broader range of nature-based interventions than the concepts of Green Infrastructure (GI) and Ecosystem-based Adaptation (EBA), and is explicitly solution-oriented (Dorst, van der Jagt, Raven, &

Runhaar, 2019). As such, the NBS concept fits within a broader discourse on innovation and green growth as a response to environmental degradation and climate change related challenges (Fagerberg, Laestadius, & Martin, 2015) and helps provide a common language for diverse stakeholders (Dorst et al., 2019).

Hybrid governance to deliver urban NBS has been identified as a key opportunity in this debate, referring to a type of governance where policy makers collaborate with non-public actors such as businesses, citizens and NGOs. The term hybrid governance is applied in the urban context by Skelcher, Sullivan, and Jeffares (2013) and in the context of 'institutions of sustainability' for public good markets by Huylenbroeck, Vuylsteke, and Verbeke (2009). The concept of hybrid governance runs parallel to related concepts in the environmental/climate governance literature such as multi-level governance (Ehnert et al., 2018; Homsy & Warner, 2015; Liesbet & Gary, 2003; Piattoni, 2009), polycentric governance (Carlisle & Gruby, 2019; Dorsch & Flachsland, 2017; Ostrom, 2010) and mosaic governance (Buijs et al., 2016, 2019). It also shows similarities with the study of co-creation in urban NBS (Frantzeskaki, 2019; Frantzeskaki et al., 2016; van der Jagt et al., 2019) and of multi-actor processes in urban sustainability transformations (Hölscher, Frantzeskaki, McPhearson, & Loorbach, 2019). Hybrid governance -

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and co-governance as described in these related concepts - is expected to drive innovation and deliver co-benefits to multiple stakeholders, representing a demand-driven, cost effective realization of sustainable urban infrastructure. Hybrid governance includes citizen entrepreneurship/stewardship and network governance as effective, participatory ways of managing urban nature (Andersson et al., 2014; Skelcher et al., 2013). The explicit inclusion of for-profit actors, stakeholders and citizens as co-governing bodies, as well as application of the term to the urban sustainability context by others (Huylenbroeck et al., 2009; Skelcher et al., 2013) underpin our choice for this concept as a basis for our current analysis.

NBS delivered through hybrid governance have demonstrated their potential for strengthening justice elements, as in the case of Barcelona's community-driven and municipality-supported urban gardens placed in heavily dense and contaminated areas of the city (Kotsila et al., 2020), where citizens involvement and participatory governance was explicitly part of the NBS. Other ways in which NBS could enhance justice are related to their claimed potential of valorising and exploiting existing and diverse types of knowledge (Kabisch et al., 2016), although this is still lacking empirical grounding and is addressed in this special issue. But while such observed and expected advantages of hybrid governance of urban NBS (including social inclusion) are often stressed, the impact of urban NBS from a justice perspective is often neglected or ignored (Cole, Lamarca, Connolly, & Anguelovski, 2017; A. Haase, 2017; Kabisch et al., 2016; Kabisch & Haase, 2014; Rutt & Gulsrud, 2016). Literature on hybrid governance has focused largely on mechanistic aspects, examining their logistics and typology from a transaction cost perspective (Bello, Dant, & Lohtia, 1997; Garrette & Quelin, 1994; Ménard, 2018; Rutt & Gulsrud, 2016), often ignoring the power relations and the influence of socio-political environments within which partnerships are implemented, or the larger distributive implications of hybrid governance, with some exceptions (Armitage, de Loë, & Plummer, 2012; Linder, 1999; Miraftab, 2004; Skelcher et al., 2013). More recently, some authors stress the embeddedness of the concept of urban NBS within a market-driven, "growth-first", neoliberal paradigm, leading to unequal distribution of benefits between socio-economic urban groups (A. Haase, 2017; D. Haase et al., 2017). However, researchers have not yet empirically identified the justice effects of hybrid governance of urban NBS specifically.

While the implementation of urban NBS is expected to increase the quality of life for urban citizens, it is indeed unlikely that all segments of the population will benefit equally (Cole et al., 2017; D. Haase et al., 2017). One fear is that hybrid - in particular profit/market-driven - governance of NBS, will prioritize projects that serve high income groups, whilst superficial public oversight can diminish democratic accountability. For example, more vulnerable segments of populations may be displaced when urban greening leads to higher housing rents in the area, often the case when greening is carried out together with real estate upgrades (Curran & Hamilton, 2012; Dale & Newman, 2009; Immergluck, 2009; Millington, 2015; Pearsall, 2012). Also, NBS that are not inclusive in their processes of articulating and deciding on new urban landscapes might end up invisibilizing rather than addressing historical inequities in terms of distribution and recognition justice. For example, low income groups often are in greater need of public urban green areas for recreation than high income groups (Anguelovski, Connolly, Masip, & Pearsall, 2018; Boone, Buckley, Grove, & Sister, 2009), but might not be well represented in the processes involved in their creation. However, hybrid or multi-actor governance is not just seen as a threat, but also as a prerequisite for co-governed, inclusive representation of the needs of different citizen groups, increasing ownership and stewardship of local urban ecosystems (Andersson et al., 2014; D. Haase et al., 2017). Furthermore, the inclusion of non-public actors in NBS governance also offers a route to alternative funding sources for urban green public spaces, to overcome municipal/public financial resource constraints (European Commission, 2015; Homsy & Warner, 2015).

To meaningfully include justice as one of the urban sustainability goals

addressed through urban NBS implementation (Kabisch, Korn, Stadler, & Bonn, A. (Eds.)., 2017), policy makers and academics need to unpack the (positive and negative) justice implications of hybrid governance, in particular since hybrid/multi-actor/public-private NBS models are increasingly being developed. Second, an improved understanding is needed regarding the conditions under which justice-related outcomes can be enhanced in urban NBS in the context of hybrid governance.

This paper therefore sets out to fill a gap in the literature by analysing the overlap between these two calls for action: the integration of non-public actors into urban NBS governance (here referred to as hybrid governance) and the call for a socially just sustainability transition (Kabisch et al., 2016). To do this, we combine two streams of literature: one, on hybrid governance, in particular in the urban space (Garrette & Quelin, 1994; Koppenjan, 2005; McCarthy, 2007; Skelcher et al., 2013); and another from critical urban geography and political ecology, that takes a more socially concerned perspective on the outsourcing and "rolling back" of the state (Brand, 2007; McCarthy & Prudham, 2004; Wanner, 2015).

Our empirical base consists of six case studies, selected to represent a diversity of hybrid governance forms for urban NBS. We examine the justice implications for each case, focusing especially on how these urban NBS address or enhance justice-related vulnerabilities in the urban landscape. We employ a systematic qualitative research methodology to unpack the justice implications of hybrid governance, as well as the contextual conditions that seem to lead to more or less 'just' outcomes. These objectives lead to two key research questions:

1. How does the hybrid governance of urban NBS affect their justice outcomes?
2. What conditions may improve justice-related outcomes of hybrid governance for urban NBS?

Our paper contributes to the literature an empirical understanding of justice implications of hybrid urban NBS governance. We illustrate a tension between broadly shared benefits from private funding for urban NBS on the one hand and a loss of democratic control and lack of recognition of vulnerable groups, on the other. Conditions that we identify to enhance justice outcomes include transparent decision making within hybrid governance bodies, safeguarding public control over an urban NBS as well as combining use of scientific expertise in decision-making for urban NBS with bottom-up consultation procedures.

The remainder of this paper is structured as follows: Section 2 draws together diverging literatures on urban social and environmental justice and hybrid governance, building on a framework for examining the justice implications of NBS under hybrid governance. Section 3 sketches our qualitative cross-case analysis approach while section 4 reports on the findings regarding the distributional, procedural and recognition consequences of hybrid governance arrangements for NBS. Section 5 discusses our findings in the light of governance and NBS-related literatures. We conclude the paper in section 6.

2. Literature review: the justice implications of hybrid governance in urban NBS

Our literature review builds on two literature streams; hybrid governance and political ecology, both in the context of cities and (urban) green space. The literature was searched using key words linked to both topics, with a special focus on articles that combined both topics (or related concepts), which we discuss in 2.3.

2.1. Benefits of hybrid governance for urban NBS

Hybrid (or multi-actor) governance has been seen as crucial ingredient for the cost-effective mainstreaming realization of urban NBS, allowing policy makers to collaborate with non-public actors (businesses, citizens and NGOs) to create "resource and governance synergies" (Kabisch et al., 2016). The fact that urban NBS are expected to

provide multiple public and private benefits, each valued by different (public and/or private) stakeholders, strengthens the argument for setting up hybrid governance structures to unlock synergistic investments (European Commission, 2015; Kabisch et al., 2016; Toxopeus & Polzin, 2017). On top of this expected access to additional resources, hybrid governance is also seen as a crucial answer to complex socio-environmental problems that "pure" governance modes within established institutions (public, private, communal) cannot address by themselves (Lemos & Agrawal, 2006). In Europe, hybrid governance - particularly between state and market institutions - is expected to drive innovative investment tools and business models by delivering economic, social and environmental benefits to multiple urban stakeholders simultaneously (European Commission, 2015). This approach is perceived as a demand-driven, cost effective realization of sustainable urban NBS infrastructure: it allows for transfer of knowledge between different stakeholders and taps into private investment for urban NBS (Kabisch et al., 2016).

However, the collaborative, hybrid governance structures that are promoted in the urban NBS literature often remain superficially described, referring mostly to the different arrangements. We note a tension between (often criticized) neoliberal, market-driven public-private urban NBS governance (D. Haase et al., 2017) and (more applauded) forms of hybrid governance that offer space for co-creation and collaboration with citizen groups and NGOs to realize embedded urban NBS (Frantzeskaki et al., 2016; Kabisch et al., 2016; van der Jagt et al., 2019). Some interventions studied, like the High Line in New York, seem to include both hybrid governance logics simultaneously (Millington, 2015). Others describe hybrid urban environmental governance that include scientific experts (Bäckstrand, 2003). This diversity of hybrid governance forms requires us to provide more conceptual clarity in the urban NBS literature regarding the definition of (different forms of) hybrid governance.

Skelcher et al. (2013:3) refer to hybrids in the urban context as "the arenas for urban governance legitimated and mediated more or less by the state but influenced by other actors (business, civil society and not-for-profit organisations)." Several parallel academic debates discuss hybrid governance, from different perspectives. One focuses on hybrid governance as a way to lower transaction and governance costs (Bello et al., 1997; Huylenbroeck et al., 2009; Ménard, 2018). Here, hybrid governance takes place when actors, possessing autonomous property rights, have transferred part of these rights to a transaction partner because total benefits from cooperation outweigh total costs (Huylenbroeck et al., 2009). Partnerships between public and private actors are thereby promoted and preferred when 'there are high positive externalities involved' (Huylenbroeck et al., 2009:183). Possible forms that hybrid governance can take are contracts, trusts, user associations, cooperatives, and (private or public) agencies that act as intermediate structures to lower transaction and governance costs. The concept also encompasses more experimental approaches using pilot projects, learning alliances or living labs engaging different types of stakeholders (Bulkeley et al., 2016; van der Jagt et al., 2019).

Another debate on hybrid governance is explicitly focused on partnerships and collaborations involving civil society (NGOs, citizens groups), with a view to increase participation and democracy in urban nature and sustainability politics (Anguelovski, 2013; Bäckstrand, 2003; D. Haase et al., 2017). Hybrid governance can foster synergies through social innovation networks that bring grassroots demands "on the table" of negotiations. Moreover, different synergies in governance with civil society can help organize urban sustainability transitions at strategic, tactical, operational, and reflexive levels. Hybrid governance in this civil society context is referred to as "businesses and/or civil society actors that have the authority to formulate, determine and implement public policy within a specified policy and spatial domain" (Skelcher et al., 2013:1).

A few studies create an overview of the different forms of hybrid governance that have emerged in an urban and/or natural resource management context (see Lemos & Agrawal, 2006; Lockwood & Davidson, 2010; Skelcher et al., 2013). Lockwood and Davidson (2010), for example, define hybrid governance as "an assemblage of subjects, ethics, ends and techniques that constitute a hybrid regime of practices" directed by co-existing and competing mentalities. To disentangle different forms of hybrid governance and their potential for justice outcomes, we apply a typology from Skelcher et al. (2013:5) who define three overlapping discourses of hybrid governance in the context of cities:

- **Market-driven** hybrid governance strategies, where private actors are included in the governance structure, mostly for efficiency and funding arguments;
- **Networked, stakeholder** governance, where stakeholders are included in the governance structure to address complex social problems more effectively;
- **Responsive** (interactive) co-governance, where citizens are directly involved in the governance structure.

This triad allows for a shared and more fine-grained understanding of what is meant by hybrid governance, creating a spectrum of overlapping hybrid governance logics and discourses, where cases of urban NBS governance can be situated to assess their justice outcomes.

2.2. Justice concerns over urban NBS

Questions of justice related to urban greening and re-naturing are becoming increasingly relevant and complex, as cities are expanding their efforts to reach (global) goals around sustainability, liveability, resilience, attractiveness and climate adaptation (Connolly, 2019; Shi et al., 2016). At the same time, cities are presented with governance challenges concerning inter-related issues of growing urban populations, climate change, and social, economic and health inequalities (Heynen, Kaika, & Swyngedouw, 2006). In this context, NBS represent urban planning solutions that are designed to address multi-faceted problems (Kabisch et al., 2017), such as those concerning health (Annerstedt & Währborg, 2011; Hartig, Mitchell, de Vries, & Frumkin, 2014). While some impacts of urban NBS, such as those on air quality, and water absorption quality, may be quite straightforward to measure, articulating the justice outcomes of urban NBS requires an understanding of how their implementation and impacts are distributed, experienced, understood and negotiated (Anguelovski, Connolly, Masip, & Pearsall, 2018). Through a justice lens, urban greening and other nature-based interventions can work both for and against the health and well-being of local residents (Anguelovski, Connolly, & Brand, 2018; Boone et al., 2009; Cole et al., 2017; Pearsall & Pierce, 2010).

Environmental justice literature has traditionally exposed the unequal distribution of environmental harms and risks (e.g. exposure to toxicity, air pollution, disaster risk) and, similarly, of benefits and provisions (e.g. access to healthy recreation spaces, safe water and sanitation etc.) along lines of class, ethnicity, age, race or gender, among others (Anguelovski, Connolly, & Brand, 2018; Curran & Hamilton, 2012; Gould & Lewis, 2016; Martinez-Alier, Kallis, Veuthey, Walter, & Temper, 2010; Pulido, 2000). Certainly, increasing climate resilience and environmental quality, while also providing opportunities for relaxation, cultural enrichment and social cohesion, are all potential benefits of NBS. The more those adhere to principles of equity, inclusion, reparation and emancipation, the more likely they are to also enhance social and environmental justice in cities (Agyeman & Evans, 2016; Kotsila et al., 2020). Considering the links between urban sustainability and the NBS concept (Kabisch et al., 2017), "just NBS", inspired by "just sustainability", would require: "an emphasis on community-based decision making; on economic policies that account fiscally for social and environmental externalities; on reductions in all forms of pollution; on building clean, liveable communities for all people; and on an overall regard for the ecological integrity of the planet" (Agyeman, Bullard, & Evans, 2003:36–7). Indeed, when applying these principles, NBS interventions

provide great potential to benefit vulnerable, marginalized populations (Anguelovski, 2013). On the other hand, when such principles are not fully or consistently applied, nature-based interventions can act as sources of injustice by changing neighbourhood demographic composition and material outlook, towards gentrification and forced displacement (Anguelovski, Connolly, Masip, & Pearsall, 2018; Curran & Hamilton, 2012; Gould & Lewis, 2016).

The potential risk of urban NBS producing injustices is deeply connected to why and how such interventions come about, including the negotiation processes taking place prior and during implementation, and the relevant (conflicting) interests at play. In order to capture such (in)justice aspects in environmental / urban nature / climate change adaptation contexts, geographers and urban scholars have often used a conceptualisation of justice along three main, interrelated pillars (Fraser, 2005; Schlosberg, 2009).

Distributional justice addresses the question of how access to (green, nature-based) amenities is distributed in society (assessing availability, accessibility, attractiveness and other aspects), but also how the costs and benefits accruing from those amenities are distributed among the population. Research shows, for example, that there is a baseline inequity in who tends to benefit from such projects in cities, with high income and white neighbourhoods benefitting the most (Anguelovski, Connolly, Garcia-Lamarca, Cole, & Pearsall, 2019; Hastings, 2007; Heynen et al., 2006). The creation of NBS could generate new inequities by underpinning or creating new gentrification trends, either through displacement or from neighbourhood disparities in access to high-quality schools and healthy food (Checker, 2011; Gould & Lewis, 2016). Many long-term residents who are able to avoid displacement in neighbourhoods that experience gentrification led by nature-based regeneration, are still likely to suffer (Cole et al., 2017).

Procedural justice concerns the level and form of civil participation in decision-making around urban nature interventions. Interrogating procedural justice in NBS involves asking questions about the extent to which the planning, design, implementation and evaluation of urban NBS projects is open to input by citizens, who is represented (or not) in these participatory processes, and how much do these processes in fact influence decision-making. Greening initiatives in cities then need to ask the question: by whom and for whom this is being realized (Anguelovski, Connolly, Masip, & Pearsall, 2018)?. The role and impact of community participation relates to socio-cultural hierarchies and power structures, which can affect access to dynamics and outcomes of participation processes (Fainstein, 2014).

Recognition justice in urban nature governance refers to the recognition of different needs, values, and preferences that depend on people's (intersectional) identities and characteristics, such as gender, race, age, ethnicity (Curran & Hamilton, 2012; Kabisch & Haase, 2014; Pirro & Anguelovski, 2017). This is a crucial aspect of justice which needs to complement considerations of (re)distribution of access to and benefits that stem from urban nature (Fraser, 2005). Implementation of certain types of urban greening could, for example, be ignoring people's needs and demands related to issues of safety, religion, custom or different ways of valuing and relating to urban nature (Anguelovski, 2014; Byrne, 2012). The development of new green or blue areas, for example, can displace or disfavour existing, less green or less formalised, usages of those areas by local communities.

2.3. Hybrid governance of urban NBS under the lens of justice

Hybrid forms are generally deemed more flexible and dynamic, potentially allowing for more participatory and inclusive processes (Skelcher et al., 2013). At the same time, hybrids potentially constrain the capacities of elected politicians and public administrators to carry out their role as representative decision-makers, when private actors co-fund and decisions are made (partly) outside the official democratic process (Bassett, Griffiths, & Smith, 2002; Skelcher et al., 2013) or when responsibility for delivering certain services is placed on individuals and civil groups without adequate support from the state (Perkins, 2011; Rosol, 2012). This tension surrounds the (contradictory) potential justice outcomes of hybrid urban nature governance.

While hybrid governance arrangements can have positive justice impacts through e.g. the inclusion of different views and actors, they can also have negative justice outcomes by disrupting the distribution of responsibilities and rights, costs and benefits, or roles in decision-making. In their analysis of democratic consequences of hybrid governance in European cities, Skelcher et al. (2013) provide background to how some new governance designs allow for the creation of new dialogue spaces that can potentially improve the inclusion of more voices, including of marginalized groups. At the same time, they emphasize how emerging hybrid governance forms could impoverish democratic citizenship and lead to more autocracy, as political consent, legitimacy and accountability are embedded into these new governance structures to very different extents (Skelcher et al., 2013). In some cases, local governments manage to experiment with new and old governance arrangements while retaining governing capacities (Frantzeskaki et al., 2016).

Another justice concern resulting directly from hybrid governance in cities is that private investment into public infrastructure may lead to higher user costs for citizens (Koppenjan & Enserink, 2009). When private firms invest in public infrastructure, they typically aim to recoup their investment over time; in the case of a natural monopoly (toll roads, water supply) this can lead to excess costs over time, aggravating distributional justice. Furthermore, profit-driven private actors will often only be interested in investing in profitable urban infrastructure, such as real estate, leaving other activities (such as park maintenance or water management) as much as possible to the local government. Finally, rent-seeking by private actors engaged in hybrid governance structures is a key procedural justice concern, in particular when there is lack of transparency, a public-private salary gap, and unclear accountability structures (Koppenjan & Enserink, 2009).

Beyond how 'just' hybrid governance arrangements are in terms of NBS ownership, capital accumulation and democratic accountability, networked and responsive types of hybrid governance also carry the potential of responsibilities/costs and benefits stemming from NBS not being shared equitably (Checker, 2011). Importantly, when various stakeholders are involved in urban sustainability projects such as NBS, they are often only asked to contribute to decisions about technocratic issues that "could be delinked from the questions of social justice to which they were once attached" (Checker, 2011: p225). Relatedly, citizens being more directly involved in the governance structures of NBS can be seen as a form of neoliberal urban environmental governance and governmentality, whereby NBS expectations are become entrenched in citizens subjectivities (Brand, 2007).

While good arguments exist for promoting hybrid governance as a key route for upscaling and capturing the multiple benefits of urban NBS, there is a lack of understanding and accounting for the potential justice outcomes of such governance arrangements. While a hybrid governance approach may lead to faster upscaling of urban NBS and empowerment of disenfranchised stakeholders, a critical lens on this approach is warranted. Our literature overview shows that justice outcomes are likely to depend on the conditions that shape a specific type of hybrid governance arrangement. In our empirical approach, we therefore analyse both the contextual conditions that shape them and the outcomes that they bring concerning distributional, recognition and procedural justice.

3. Methods

We use a comparative case-study analysis and take a theory-refinement approach (i.e. grounded theory-lite). Given that urban NBS are a relatively new phenomenon with fuzzy boundaries and a diverse and complex set of stakeholders, in this way we rely on a structured data collection and analysis, while being open to identification of new patterns in our data (Pidgeon & Henwood, 1997).

This research is carried out as part of the NATURVATION project (see acknowledgements) that aims to understand and accelerate the mainstreaming of NBS in cities across Europe. These interventions form the basis for our analysis of the relationship between hybrid governance and socio-economic justice, further broken down into distributional, recognition and procedural justice. Our multiple-case study analysis consists of two main steps: the compilation of case study narratives based on a broader set of considerations around NBS in cities using a pre-set template (3.1) and the in-depth cross-case analysis (3.2) (Eisenhardt, 1989; Ozcan & Eisenhardt, 2009) focused on the socio-economic justice impacts of hybrid governance arrangements involving public and private actors.

3.1. Compilation of case study narratives

Six NBS interventions from three cities inside of Europe (Edinburgh, Scotland; Newcastle, UK; Athens, Greece) and three cities outside of Europe (Mexico City, Mexico; Tianjin, China; Winnipeg, Canada) were selected as case studies (see Table 1 for a short description of each case). These were drawn from a larger set of in-depth case studies carried out for the NATURVATION project. The six cases were selected because they represented a range of hybrid governance arrangements with different levels of private sector involvement in different countries and continents, as justice implications of hybrid governance are likely to vary across organisational, institutional and geographical contexts.

The qualitative data gathered for the case studies mainly consisted of primary documents and semi-structured interviews with key informants around the NBS interventions (Patton, 2002). The interviews conducted in each case study were audio-recorded and transcribed. In total, around 40 interviews were conducted (between 6 and 10 interviews per case study). Depending on the specific case, relevant informants were included from municipalities, NGOs, community groups, urban re-development, regeneration, planning and housing agencies, utilities (e.g. energy, water, waste), knowledge institutions, research groups,

academia, engineering, urban development, design, architecture and other relevant companies; as well as SMEs and representatives of multinational or national private corporations (Nesshöver et al., 2017). The case studies drew upon insights gained from observational site visits by individual researchers as well as participatory workshops and/or mobile labs (observational site visits by a research team) whenever relevant and appropriate (Wolfram, 2018). In order to elaborate a consistent and comparative narrative, a unified protocol for conducting the analysis was used. This included the exploration of the intervention history, governance and structural conditions of NBS, public participation in NBS, NBS impacts and implications, contradictions and contestation around NBS interventions as well as the innovation versus traditional approaches within and around NBS interventions.

3.2. In-depth cross-case analysis

The case narratives were analysed using a combination of top-down (along the three justice dimensions) and bottom-up coding (emerging patterns in more than two cases related to hybrid governance). This process was continued until no new major themes emerged. To ensure inter-coder reliability, each case was discussed in pairs of authors with at least one person not being involved in conducting the individual case study, taking on an outsider perspective (Suddaby, 2006).

To establish the link between hybrid governance and justice implications, we listed per case the following information. To answer research question 1 we described (a) public and private actors as well as their responsibilities with regard to the studied NBS intervention; (b) motivation and the value they expect to capture to co-deliver this NBS; (c) interaction between public and private actors (e.g. terms & conditions; contracts; sharing of responsibilities, risk & return) and (d) the specific conditions/circumstances that led to the involvement of non-governmental actors in the delivery of this NBS (Boase, 2000; Helm, 2010; Koppenjan & Enserink, 2009). To address research question 2, we analysed (a) social impacts (e.g. health, recreation, social cohesion,

Table 1
Description of cases and their hybrid governance structure.

NBS case	Short description of NBS and its hybrid governance structure
(1) Stavros Niarchos Foundation Cultural Centre (SNFCC) *Athens, Greece*	A 240,000 m^2 plot of land belonging to the Ministry of Finance was designated to host the SNFCC complex, a building with a green roof and a public park. The SNFCC is a donation of a private non-profit organisation (SNF) to the Greek State, but reserves the right to unilaterally withdraw this donation under certain conditions. Part of the (physical) space is marketed commercially to support an urban NBS in the context of austerity.
(2) The Forks *Winnipeg, Canada*	The Forks North Portage Partnership (FNPP), although publicly owned, acts as a private development corporation responsible for the downtown riverfront in Winnipeg, relying on commercial revenue streams from entrepreneurial activities on and around the winter ice. FNPP is owned by three levels of government (federal, provincial and municipal), but does not receive any public funding. There is a lot of space for citizens and entrepreneurs to develop activities on the winter ice, which leads to indirect income for the FNPP (parking, sales).
(3) Newcastle Park Trust *Newcastle upon Tyne, United Kingdom*	In reaction to a 90% public funding cut for city parks, Newcastle City Council developed a new business model for parks by setting up a charitable trust. This trust is envisioned to be 'a social enterprise with charitable status that subscribes to mutual values', to develop revenue streams within park premises to pay for maintenance of the parks.
(4) Water Fund (Por el Agua de la Ciudad de Mexico) *Mexico City, Mexico*	The City of Mexico Water Fund is a public-private financing mechanism set up to select and finance specific NBS projects that can address water challenges in the city. The Nature Conservancy brings together private actors, such as banks and multinational corporations, with public authorities for collaborative investment and decision-making for specific urban NBS interventions across the city Despite significant investment in water-related grey infrastructure, recurring water shortages and floods threaten the long term stability of the city's water system.
(5) Eco-Valley *Tianjin, China*	The Eco-Valley, a 11 km linear park, is a core element of China's most advanced Eco-City. Its hybrid governance arrangement consists of a government-to-government knowledge transfer in a public-private partnership. Its involves a local coordinating public body, several ministries, a venture company, investors and banks. Stakeholders like the Singaporean government bring in expertise on green infrastructure, water management (contributing to China's Sponge Cities approach) and the development of KPIs.
(6) Little France Park *Edinburgh, United Kingdom*	Little France Park is a parkland of about 65 ha, located between housing developments in the socio-economically deprived Craigmillar residential area. The City of Edinburgh Council commissioned an environmental NGO to draw together a partnership engaging public and private partners to develop a design plan for a new parkland. However, there are conflicting views on what this regeneration should entail; while the ELGT-led partnership pushes to develop an open and healthy outdoor space for residents, a housing developer (together with parts of the community and the City Council) proposed the provision of additional housing and public service amenities. They each run separate citizen consultation processes.

relaxation, safety, quality of life), (b) economic impacts (e.g. property value, employment opportunities, diversity of entrepreneurial activities, access to goods & services) and (c) cultural impacts (e.g. sense of heritage, identity, aesthetic beauty). When then re-interpreted the abovementioned impacts in terms of distributional, recognition and procedural justice.

The analytical process was conducted in an iterative way, constantly moving back and forth between the codes derived from the analytical framework and the data in order to refine these codes and identify patterns (Dougherty, 2017; Pidgeon & Henwood, 1997). When it was difficult to conclude whether certain outcomes where related to hybrid governance or justice outcomes, we excluded it or – in case of doubt – we mention this as part of our findings.

3.3. Description of case studies

The analysed urban NBS cases respond to different types of hybrid governance that are a result of a specific assemblage of actors, motivations and techniques (Lockwood & Davidson, 2010) as well as local cultures and particular historical, political and societal systems (Skelcher et al., 2013). Some cases in our selection have common drivers such as austerity policies, complexity or efficiency and market driven solutions. In Table 2 in the appendix we provide a detailed description and a classification of each case into hybrid governance types (market-, stakeholder- and/or citizen-driven). It shows that our evidence mostly reflects hybrid governance with private actors, both profit and not-for-profit. Our evidence is less a reflection of hybrid governance with citizens, which means that our outcomes may be less relevant for this type of hybrid governance. With these classifications in mind, we analyse each case in relation to distributional, procedural and recognition justice, including any interdependencies (in the findings section).

4. Findings

Using the empirical evidence from the analysis outlined in Section 3.2 we contend there are three key impacts per type of justice for the implementation of hybrid governance in the context of NBS. We discuss each justice type below and provide an overview of the key findings in Fig. 1 (below). Figs. 2, 3, and 4 (in the appendix) provide detailed insight into how we coded and clustered the evidence from our cases into the key impacts (subthemes) that we present below.

4.1. Distributional justice: impacts of hybrid urban NBS governance

4.1.1. A bigger, better pie: Higher quality and intensified use of urban NBS for all citizens (DJ1)

Firstly, hybrid governance is expected to lead to more, and a higher quality of urban NBS that would otherwise deteriorate or not be created in the first place. Involvement of private actors can unlock private funding to create, maintain and/or improve publicly accessible urban green-blue space. Case 1 (SNFCC) showcases how a private donation created a well maintained publicly accessible park enclosing two cultural buildings (National Library and Opera), on a public space that was abandoned and run-down due to historic neglect, crisis and austerity conditions in Greece. Hybrid governance allowed for an upgrade of the area, positively reshaping the neighbourhood's identity. Similarly, case 4 (Water Fund) shows how funds from private actors (banks, corporations) are pooled with public funds to improve the long-term water infrastructure of Mexico City, which is deteriorating under public management. The hybrid governance arrangement is set-up with the aim of providing funds, expertise and decision-making space in order to effectively secure the long-term water supply for citizens of Mexico City.

While in Athens and Mexico City hybrid governance is a response to lack of public funding and management of urban NBS, Winnipeg (The Forks) further illustrates how hybrid governance can drastically increase the use value of a public space (the river) without using public funding.

Innovative entrepreneurship has enabled the winter use of a frozen river, creating enough profits to maintain ice trails, thereby lowering commuting time for citizens who can now travel (skate) on the river providing as well a new recreational public space. Because the river connects distant neighbourhoods with the centre and citizen entrepreneurs fill this public space with enterprises and cultural initiatives, it is used by 700.000 citizens each winter. The trail contributes to the improvement in quality of life and health during Winnipeg's long winter (4–5 months), traditionally a very isolating period of the year. The Forks has also influenced the policy debate in Winnipeg: promoting public spaces that are accessible and functional during both the summer and winter is considered to be an important future direction for Winnipeg.

4.1.2. Slicing the bigger pie: unequal distribution of urban NBS benefits across citizens (DJ2)

While private actors can help create public benefits by co-developing and co-funding urban NBS, our empirical data confirms that this can also enhance the risk that NBS benefits are not distributed equally across citizens. This concern arises in particular when a hybrid governance model is set up in which commercial revenue generation needs to cover maintenance costs, like in cases 1 (SNFCC) and 3 (Newcastle Park Trust). In case 1 (SNFCC) two cafe-restaurants are established on the premises enclosed by the green space. While the rent paid by the restaurants helps cover maintenance costs of the whole complex, including the green areas, food and drink are offered at above average prices, appealing to high income groups. Moreover, some spaces are regularly rented out for private events – another income stream – making these spaces inaccessible during these periods both for the public and for the organisations hosted in the SNFCC (e.g. the National Library). Furthermore, the development of the SNFCC has led to a disproportionate increase in rental prices in its direct surroundings (average 30% rise between 2016 and 2018), raising concerns of (green) gentrification.

Similarly, in case 3 (Newcastle Park Trust) the numerous commercial services that are planned (woodland burials, high ropes, car parks, mini-golf courses) are expected to close off or congest park space. In consultation sessions, citizens voiced their concerns that they will increasingly feel like they need to pay money to use the park, effectively making parks more accessible and beneficial to affluent citizens, excluding those who cannot pay for these activities. There are also concerns that, due to the above dynamic, parks in Newcastle located in more affluent neighbourhoods will be more successful at realising revenue streams, leading to 'poor parks' that are less attended to because they cannot cover their maintenance costs.

Also in case 2 (The Forks), the wealthy, upper middle class riverside neighbourhoods are expected to benefit disproportionately because they have easier access to the river compared to indigenous inner city neighbourhoods: more than half of the riverbanks comprise private property in wealthy areas, whilst the rest of neighbourhoods can hardly access the riverbank due to terrain conditions. Whilst the ice trail does provide benefits to remote neighbourhoods as a commuting pathway to the city centre, accessibility (getting on) to the trail is an issue. Most of the riverbank lacks access points, due to lack of resources and fear of liability from involved parties, both public and private.

4.1.3. Rent-seeking: Public funding into urban NBS subsidizing private actors (DJ3)

In some cases, inequity is observed not between different groups of citizens but instead between citizens and private investors: concerns arise that public (tax) money subsidizes private for-profit actors. This was crucial in case 5 (Eco-Valley) in Tianjin, where the government funded the regeneration and preparation of the area of deserted salt farms and heavily polluted wasteland. Private investors in real estate benefited from this investment as well as from a large public investment into a large-scale green infrastructure development. While there was a committed percentage of 50% social housing in the total
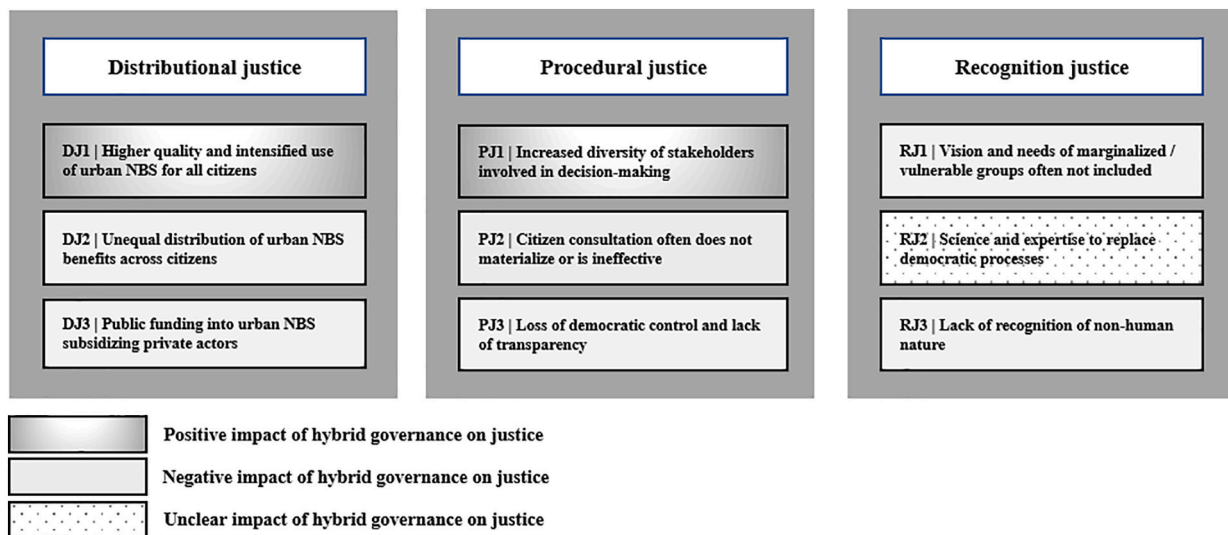
Fig. 1. Overview of key impacts of hybrid governance per justice type.

development to compensate for the large public investment into the Eco-City and Eco-Valley, the percentage of social housing was decreased to 20% due to higher-than-expected costs of the overall development. Therefore public money was disproportionately distributed to preparing and greening land to facilitate housing development for privileged residents (80%). Thus creating an urban NBS integrated into a new city that attracts high income groups in comparison to an average traditional Chinese city, or the rest of Tianjin.

Private actors can sometimes also capture excess brand value in exchange for their financial contribution, as is illustrated by the SNFCC (case 1) in Athens. The building hosting the national library and opera was constructed in a green space and branded with the name of the private foundation ('*Stavros Niarchos Foundation* Cultural Centre'). The contributing foundation captures cultural value that is now being associated with its brand, while the grey and green infrastructure is returned to the ownership of the Greek state and maintained using tax money. The private actor in this case obtained a type of 'rent' in the form of branding, connecting their name to a cultural flagship for the long-term, in exchange for a large one-off contribution.

4.2. Procedural justice: impacts of hybrid urban NBS governance

4.2.1. Increasing engagement: Increased diversity of stakeholders involved in shaping the urban NBS (PJ1)

Our cases indicate that hybrid governance choices, in particular if aimed at developing new income streams, seem to lead to an increased diversity and number of actors involved in the planning and design phase of an urban NBS as opposed to the traditional, public governance process. This is shown in case 2 (the Forks) where the government stepped back, allowing a publicly owned development corporation to manage the area without heavy regulatory procedures and without using any public funding. This created space for entrepreneurs and community actors to pursue their own bottom-up activities, simultaneously generating income to maintain the ice trail for public access. This case illustrates a 'demand-driven' approach that unleashed low-cost initiatives and experimentation among citizens.

In case 3 (Newcastle Park Trust), the planned shift towards a hybrid governance structure for parks triggered the involvement of a diversity of community actors in the planning and design process. This involvement aimed to deliver creative ideas on how to serve the public while generating income for park maintenance; it led to new perspectives on the public function of parks. For example, based on the public

health value of parks, the National Health Service (NHS) was attracted as a temporary funder and ideas were developed regarding how parks can better serve public health objectives. These included the addition of new amenities and incentives for people to visit and enjoy the public space. We note that the shift to a hybrid governance model thus can trigger an increased engagement of a diversity of stakeholders (that may or may not be historically marginalized).

4.2.2. The absent citizen? Citizen participation often does not materialize or is ineffective (PJ2)

Many of our cases confirm the importance of citizen consultation ahead of the decision to govern or implement an urban NBS in a hybrid way. They also showed that (participation levels in) such citizen consultations are a key concern for procedural justice, as well as the uptake of outcomes of these consultations for the implementation, design and maintenance of the NBS. We did not witness any case in which citizen consultations were run to deciding on the form and shape of the hybrid governance model. A good example of a citizen consultation process was found in case 2 (The Forks). While the ice trail was developed without any previous consultation, its success and wide uptake by citizens led to a consultation process about replicating the Forks model to other waterfronts in Winnipeg. The results were compiled into a vision document and officially adopted by the city council.

Other cases illustrate more problematic aspects of the way consultation was carried out. Consultations processes that are run *after* deciding on a hybrid governance model, like in case 3 (Newcastle Park Trust), the decision to change to a hybrid governance model – arguably the decision that impacts citizens most - was taken without consulting citizens. While different types of citizen consultation took place to give content to the shift to hybrid governance, in which many citizens participated, the interviews did document criticisms concerning the abovementioned process. Also, it was observed that there were uneven participation rates between affluent and deprived areas in Newcastle, in spite of attempts to reach vulnerable / marginalized groups, as well. We observe in case 6 (Little France Park) that citizen consultations can also be lobbying instruments for competing land uses. Two parallel consultations were organized by actors with opposing interests: one consultation demonstrated support for the development of a park; a similar consultation ran by a development company indicated community support for housing development.

In our other cases, no citizen consultation processes took place, in spite of decisions being made about publicly owned urban land and

infrastructure. In case 1 (SNFCC), the decision to temporarily hand over a public green space to a not-for-profit foundation was taken without citizen consultation. The agreement signed between the Greek government and the SNF foundation stated that the ownership would later be handed back to the Greek state. The lack of transparency in governance choices led to concerns that the expensive, high-maintenance SNFCC building would become a burden for taxpayers in the future. In case 4 (Water Fund), some interviewees suggested that citizen consultation may have been avoided due to fears of citizens rejecting what they might interpret as privatisation of the water supply. In case 5 (Eco-Valley), there were no existing residents to consult in the planning phase because the city was built from scratch; however approximately 1000 industrial workers had to be relocated from the area. After the first phase of implementation, feedback was gathered from the first residents through an online survey, but these are not expected to affect plans for further development, due to strong top-down project management.

4.2.3. Who's in charge? Loss of democratic control and lack of transparency (PJ3)

Our third - and arguably most structural - procedural justice impact of hybrid governance in urban NBS is the extent to which long-term democratic control over public land and infrastructure is at stake. In return for investment, private actors can increase their power over decisions regarding urban NBS at the expense of citizens and communities. Our case studies illustrate a variety of hybrid governance arrangements that lead to different shifts of decision-making power dynamics between private and public actors. They show how safeguarding the ultimate decision-making power of public authorities, as well as ensuring process transparency is crucial for long-term procedural justice outcomes of hybrid governance.

Procedural justice is affected in a structural way when public authorities 'loose' decision-making power over NBS due to hybrid governance choices. The shift of park management to a charitable trust in case 3 (Newcastle Park Trust), for example, places the parks outside of direct democratic accountability. While expectations are that this will lead to a more efficient (and thus less costly) decision-making process, it is unclear how citizens can voice their concerns regarding park management under this new governance mode. In case 1 (SNFCC) in Athens, the cultural centre and green space is officially managed by a public company (pertaining to the Ministry of Finance) but staffed by the private foundation, even after ownership of the SNFCC was passed back to the Greek state. Only one public official is represented on the SNFCC board, leading to minimal public decision-making power and accountability.

In case 4 (Water Fund), the chosen hybrid governance structure is a non-profit organisation that brings together private actors and utility managers with the government of Mexico City. In this set-up, the government remains powerful as a decision maker, funder and implementer. Nevertheless, this case illustrates the importance of transparency in hybrid governance schemes: while a scientific committee was convened to decide which projects to fund, the first pilot project chosen was not the option that the scientific committee proposed. Moreover, each private actor does not place their money into the Fund directly but chooses to co-invest per proposed intervention in order to maintain control over which projects they will support. This can promote rent-seeking behaviour: each private actor can choose to co-fund projects that benefit their own organisation most, thus also steering what public funds are being used for. This case illustrates how democratic accountability may be protected in the governance structure, but affected in practice.

Hybrid governance does not always lead to loss of democratic control; the hybrid governance choices can guard the ultimate public 'say' and retract influence of private actors, if needed. In case 2 (The Forks) the managing development corporation enjoys a large amount of independence and is managed without any public funding, but is still

publicly owned. Both conceptual and strategic decisions require the approval of a Board of Directors consisting of members from federal, provincial and municipal government. In this set-up, the city has kept hold of mechanisms of control and coercive power over river development, even though it is usually not exercised. This is also the case in case 6 (Little France Park) where decision-making is carried out by a consortium, spearheaded by an environmental NGO. The development of the park is on land that remains public and the work of the NGO is financed by the City of Edinburgh Council. Therefore the City Council continues to have considerable decision-making power regarding this urban NBS development.

4.3. Recognition justice: impacts of hybrid urban NBS governance

4.3.1. Recognized or not? Vision and needs of marginalized/vulnerable groups often not included (RJ1)

Including the visions or needs of marginalized or vulnerable communities is an explicit goal in NBS development in some of our cases, but their success at doing so varies. Case 6 (Little France Park) explicitly targets a socio-economically deprived neighbourhood: an urban park is developed, aimed at lowering health inequalities in the city and to foster economic regeneration of the area. However, there exists a competing plan to use the space to address housing shortages, create local jobs and build local amenities like schools rather than expand/protect urban nature spaces. Both the 'housing' and the 'greening' plan are aimed at the needs of vulnerable citizens, but they cater to different needs of this target group. The competing consultation processes by different lobby groups (as described in PJ2: 'the absent citizen') raise fears that other interests may drive the ultimate recognition of what these vulnerable groups 'need' most.

In two of our cases, the top-down hybrid governance approach seems to prevent recognition of vulnerable or marginalized groups. Case 4 (Water Fund) has a top-down vision that recognizes a primary need for all citizens in Mexico City, namely long-term water security. At the same time, it is unclear if the traditional cultural needs of local communities are recognized: the chosen pilot project imposed agricultural changes to local communities, carried out by external volunteers without preceding consultations. In case 5 (Eco-Valley) the top-down, large scale planning approach constrains the recognition and integration of individual voices. For example, 2000 people were relocated from the space to be developed into the Eco-City. Although it is claimed they were compensated and their land was unfit for agriculture anyway, it is not clear if their voice was recognized in the planning process.

In two cases we document efforts at including the needs of vulnerable groups. Case 2 (the Forks) exemplifies bottom-up 'demand driven' citizen involvement, but it is likely that assertive citizens (who are capable of organizing activities) were able to include their vision more than citizens with less (human and financial) resources. Nevertheless, the indigenous heritage of the Forks area is recognized and taken into account during the redevelopment of the river space by creating an indigenous, native area for this vulnerable community in Winnipeg. Since this was done without their direct involvement, it did create some concern that indigenous values were tokenized as a way of gaining support. In case 3 (Newcastle Park Trust) the renewed focus on public health due to the new governance model provides an opportunity to address vulnerable groups. This is illustrated by the proposal to situate a drug use rehabilitation centre in one of Newcastle's parks, where engaging with nature and maintaining the park would provide therapeutic benefits. At the same time, the commercial revenue streams envisioned by the Newcastle Park Trust are mostly not targeted at vulnerable citizens.

4.3.2. We know better: Science and expertise to replace democratic processes (RJ2)

A key finding in relation to recognition justice and hybrid

governance is that scientific expertise sometimes dominates decision-making in hybrid governance settings, replacing civic and citizen-driven democratic processes and voices. We note that scientific expertise – if sensitive to different values, needs and preferences – can improve recognition justice by recognizing not only the needs of current citizens but also of future citizens and non-human nature (voices that cannot vote in representative democracy). However, having scientific experts in charge of decision-making for urban NBS may lack sensitivity to local values (Corburn, 2005; Ravetz & Funtowicz, 1999; Whatmore, 2009).

This tension is well illustrated by two of our cases. The planning and development of the Tianjin Eco-Valley and Eco-City (case 5) is guided by a Key Performance Indicator system with 26 indicators on environmental, social and economic goals (such as greenspace per capita, use of native plants, accessibility, water and air quality). On the one hand, such scientifically grounded criteria allows for the inclusion of a broad set of values into the decision-making process, recognizing the needs of future citizens and non-human nature, as well as creating transparency and accountability on these values. At the same time, such a top-down approach may not reflect the values of current local stakeholders. In light of the Chinese eco-urbanism and ecological civilization political agenda, the vision of the Eco-City ("practicable, replicable, scalable") signals the intent of the government to use it as a scalable model for future cities, posing the risk of replicating one NBS design across different communities and cultures. Similarly, the Water Fund (case 4) has a scientific committee, composed of members selected for their relevant areas of expertise, which established a balanced formula for prioritising projects based on environmental and social factors like water retention capacity and community engagement. Project prioritization is decided by the Water Fund partners and this scientific committee; their decisions can therefore overrule those of local authorities and communities where projects are to take place. While scientific expertise can increase sensitivity to different values and visions, including future generations and non-human nature, the sensitivity for local cultural and community values can be a concern.

4.3.3. Standing up for the birds: Lack of recognition of non-human nature (RJ3)

In two of our cases, we find that along with hybrid governance came the increased importance of commercial interests, leading to concerns regarding the recognition of non-human nature, in particular nature conservation. In the development of the Eco-City and Eco-Valley (case 5) commercial interests were favoured over ongoing bird conservation efforts of a local NGO during the expansion of the Eco-City towards the seaside wetlands and salt marshes. In spite of the earlier mentioned KPI's - that include biodiversity measures - land use in a bird conservation area was renegotiated and large areas were commercialized into recreational theme and water parks. In case 3 (Park Trust) the development of commercial activities in Newcastle's park led to concerns regarding the recognition of nature conservation values within the parks. In Little France Park (case 6) development plans do recognize urban wildlife: the envisioned park aims to act as a key wildlife corridor, but it is not clear how this objective was affected by the hybrid governance of the park.

On a more positive note, inclusion of scientific expertise in decision-making (as discussed in RJ2) can potentially provide an entry point for recognition of non-human nature, as the cases of the Eco-Valley (case 5) and Water Fund (case 4) show. In both cases, objective, scientific criteria are set with the objective to safeguard the long-term sustainability of urban nature in support of urban resilience.

5. Discussion and conclusion

Our findings confirm the relevance of applying a justice-informed analytical framework in the analysis of urban NBS (Dahmann, Wolch, Joassart-Marcelli, Reynolds, & Jerrett, 2010; Heynen, Kaika, & Swyngedouw, 2006). The six cases we study reveals tensions in justice outcomes (distributional, procedural, recognition) due to hybrid governance of urban NBS, both positive and negative. A majority of the hybrid governance projects we study are initiated as a cost-effective solution to realising NBS under conditions which lack public sector funding and/or expertise. We find that these projects, while aimed at solving urban sustainability challenges and celebrated for their mainstreaming of NBS, in general do not explicitly integrate justice concerns into their approach (Pearsall & Pierce, 2010). We document both variations in justice outcomes between different types of justice within and between cases. To realize 'just' hybrid governance of urban NBS that answers to these tensions and variations, we formulate three main policy recommendations for local governments who implement, local organisations who advocate for, and multi-level stakeholders that are involved in NBS realization.

5.1. Slicing the bigger pie: hybrid governance requires transparent decision-making regarding the distribution of costs and benefits

An important positive impact is that investment of private actors in urban NBS can drastically increase 'the size of the pie' of public good delivery in the context of urban NBS, which can benefit all citizens in a city (DJ1). However, the consequent influence of private actors on the design, implementation, and vision of these urban NBS (e.g. to whom they are directed and if payment is involved for usage), is often based on a profit-driven 'raison d'etre'. This creates the concern that some actors and/or citizens benefit disproportionately from these NBS in terms of access, representation, and recognition (DJ2) or even engage in rent-seeking, taking more than they contribute (DJ3). In essence, while private actors can help realize 'a bigger pie' for all, they may also claim a relatively bigger slice of it for themselves and/or direct the urban NBS at citizens with purchasing power to realize profits. The contribution of private (for-profit) actors can be accompanied by rent-seeking behaviour and a lack of consideration of how socio-environmental costs and benefits that derive from NBS are distributed and experienced (Hastings, 2007; Heynen et al., 2006). While showing that NBS hybrid governance arrangements increase their upscaling potential, our findings also raise concerns relating to higher income citizens benefitting more than lower income ones when urban greening is coupled with high-end housing (Checker, 2011) and/or commercial activities (Curran & Hamilton, 2012).

This tension between upscaling (size of pie) and distribution (slicing the pie) of benefits is particularly salient in case 2 (The Forks) where a new, free, public 'winter trail' for ice-skating on the river was realized without public funding, based on private funding and entrepreneurship. The unused potential of the Forks river and the public vision of the development corporation together improved the quality of a public good (green-blue public space) without putting a claim on any public funding. At the same time, despite the public character of the amenity and widespread use of the ice trail, accessibility and entrepreneurial activities on the ice were disproportionately benefitting upper middle-class residents. Similarly, the SNFCC (case 1) provided public green space with widespread benefits using a private finance injection. However, the commercial activities that were developed triggered concerns around disparities in access along income groups as well as neighbourhood gentrification. In both cases, delivery of the NBS was realized without public funding through for-profit activities. So while freeing up municipal public budgets for other public causes, equal accessibility to the urban NBS –on public space - is sidestepped to be able to fund the NBS through entrepreneurial activities.

Overall, we find evidence supporting the strong potential of hybrid governance to improve distributional justice through providing public

amenities with associated benefits to health, well-being, biodiversity and climate resilience that would otherwise not have been realized. At the same time, unequal access to public NBS and their amenities is a key risk of integration of private funding streams for sustaining an NBS. We thus recommend urban NBS that are led through hybrid governance, to be purposively designed to serve a broad public. Such a hybrid governance set-up should always address justice questions from the start: in the process in which NBS are envisioned, designed and implemented, as well as with regard to the post-implementation impacts that we discuss in this paper. Our findings show that special attention should be paid to vulnerable, under-represented and marginalized groups (Anguelovski, 2013; Boone et al., 2009) that may not be targeted by commercial revenue streams if those sustain the NBS. This implies, for example, that visible (e.g. physical accessibility, proximity of entry points) or invisible barriers (e.g., high prices of park-related activities or available food and drinks) to urban NBS need to be controlled, avoided or adjusted for vulnerable groups. One should be especially vigilant regarding this point when market-driven private actors are involved, and decision-making moves (partly) outside of the democratic process and into a profit-driven logic.

To facilitate a fair 'slicing' of the pie, transparency and accountability during decision-making and implementation should be a key priority for the public/private actors that engage in hybrid governance of urban NBS (Hodge & Greve, 2007; Hood, Fraser, & McGarvey, 2006). This was especially apparent in case 4 (Water Fund) where lack of transparency translated into doubts about the fairness of its hybrid decision-making procedures. We argue that public scrutiny and input during the decision-making process (Siemiatycki, 2007) and public accountability afterwards can help to make such hybrid governance structures more 'just' (Hodge & Greve, 2007), as well as reduce concerns regarding conditions of fairness surrounding the upscaling of urban NBS through private resources.

5.2. Safeguarding democratic control: secure public influence over urban NBS in hybrid governance settings

In our second recommendation we address the tension between the positive impact of having a large diversity of stakeholders engaged in the design and implementation of NBS as a result of hybrid governance (PJ1), versus the concern that decision-making about public space are put at arm's length to representative government (PJ3) (Skelcher et al., 2013), creating inequality between citizens in their ability to exercise control (Beetham, 2004). On the one hand, stakeholder involvement in hybrid governance of urban NBS can bring about an improved ability for representation of "the membership basis of the participating groups and organisations" (Skelcher et al., 2013:127), providing democratic anchorage of hybrid governance. However this aspect of democratic control can be problematic if some voices are more vocal than others.

This tension is discussed in Skelcher et al. (2013): some argue that hybrid governance can create new spaces for dialogue, increase the responsiveness of government and engagement of citizens and communities (Barnes, Newman, Knops, & Sullivan, 2003), while others view a shift to hybridity as a reconfiguration of urban environments to escape public control and accountability, at the detriment of procedural justice. They outline the risk of a permanent move of decision-making regarding public space beyond the reach of the official democratic public system (Fainstein, 2014).

Our cases illustrate both sides of this tension, offering guidance for safeguarding democratic principles in a hybrid governance setting. Some of our evidence shows how public accountability is (partly) lost due to the design of the hybrid governance body (Park Trust, SNFCC), where the governance is essentially moved outside of the democratic representation process. Furthermore, the loss of public control over

public space through hybrid governance seems difficult to reverse, once democratic means have been lost. Other cases show that effective, meaningful communication and participation processes are lacking to safeguard public influence on decision-making (Water Fund, Eco-Valley).

On the other hand, hybrid governance also unleashed more intense interaction with citizens and communities in some cases. Instead of 'only' voting representatives to governing bodies who then take all decisions, hybrid NBS governance can facilitate potentially rich strategies of public influence through participation and communication (Skelcher et al., 2013). In Newcastle, for example, even though democratic control seems lost (PJ3), it is arguably due to the hybrid governance structure that organisations, citizens and communities were asked directly for their input on what activities to develop in Newcastle's parks under this new governance model (PJ1). In the case of Little France Park (Edinburgh), citizen consultations were part of the decision-making process under hybrid governance, even though issues did arise (PJ2).

Our evidence base therefore points at the safeguarding of democratic control as a key recommendation for realising 'just' hybrid governance for urban NBS. This can be done through two (parallel) channels. One, by keeping an important percentage of NBS management boards for elected representatives or government employees, or by maintaining leading positions of decision-making power and control in the hands of public authorities (as in The Forks). Second, by considering that "the template of representative democracy cannot easily be applied to these new arenas" (Skelcher et al., 2013:122). Therefore, hybrid governance constellations need to ensure that there are mechanisms in place to facilitate inclusive, meaningful, and long-term engagement of civil society and local residents in the realization of urban NBS. Our findings demonstrate that these aspects remain crucial when private actors are involved, whether in market-, stakeholder- or citizen-driven approaches of hybrid governance.

5.3. Context-sensitive science: recognize current, future and non-human voices by combining scientific expertise with thoughtful consultation procedures

A third tension explores the involvement of a diversity of stakeholders in the hybrid governance process with a focus on science and expertise (RJ2) versus the recognition of different, in particular marginalized voices (RJ1), including non-human nature (RJ3). Our findings expose a tension regarding the use of techno-scientific expertise and their ability to take into account cultural/traditional/street/local knowledge. Our evidence (and existing academic literature) provides two perspectives on this.

On the one hand, scientific criteria and quantifiable indicators to guide decision-making processes on NBS allow for the inclusion of long-term sustainability goals, which supports recognition of future generations and non-human nature, voices which are not automatically recognized in a representative democracy (Fishkin & Goodin, 2010; Lecce, 2009). From this perspective, science and expertise, as an additional deciding factor in hybrid urban NBS governance settings, can increase recognition of a variety of needs, values, preferences, identities and characteristics of (future) human and non-human nature, in particular those that are not able to vote within the current constitutional democracy. We witness this at the Water Fund (Mexico City), where a science-based approach is taken with the objective to secure a long-term sustainable water supply for all citizens. Similarly, in the Eco-Valley (Tianjin), a scientific system of KPI's is integrated into decision-making to reach long-term sustainability objectives.

While scientific methods may be geared towards importance societal goals such as long-term water retention capacity, they are at risk to

becoming too technical and failing to recognize current needs, such as cultural traditions associated with certain types of land use (a concern which was voiced in Mexico City) or displacement of/interference with current citizen groups. At the expense of reaching certain science-based indicators, certain voices may be excluded or the certain (westernized) views on indigenous, local communities may be imposed. This tension has long been observed in interventions that aim at the improvement or sustainability of socio-natural systems (Agrawal, 1995; Fish, Church, & Winter, 2016; Murdoch & Clark, 1994; Nygren, 1999) and urban re-naturing and greening (Anguelovski, 2014; Anguelovski et al., 2019; D. Haase et al., 2017).

We therefore recommend that hybrid governance structures that involve scientific experts to collaborate with local communities when deciding on the most suitable NBS interventions for a specific local context (Bäckstrand, 2003; Murdoch & Clark, 1994; Nygren, 1999; Wagle, 2000). By combining scientific expertise with thoughtful consultation procedures, current/local voices and cultural identities can be recognized alongside non-human nature and future generations (captured through science). Marginalized, local communities may sometimes be less visible and therefore more difficult to represent; we suggest that more resources and forms of dialogue are needed to integrate local values and cultures of especially these groups into science-based interventions.

5.4. Conclusion

Urban NBS interventions are often geared towards several sustainability goals but lack attention to their (un)intended justice outcomes. Through our empirical cases we explore the distributional, procedural and recognition justice impacts that may follow from hybrid governance, both positive and negative, with a balanced analysis of tensions between them. By formulating three policy recommendations (slicing a bigger pie, safeguarding democratic control and context-sensitive science) we address these tensions and show how to realize 'just' hybrid governance of urban NBS. Our results extend the environmental justice literature by empirically analysing the justice consequences of hybrid urban NBS governance. Through our policy recommendations, we offer guidance to realize the current wave of hybrid governance of urban NBS in a 'just' way. We recommend future research to add empirical insights that further flesh out these three recommendations, providing further empirical support and direction for operationalizing 'just' hybrid governance of urban NBS.

CRediT authorship contribution statement

Helen Toxopeus: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Visualization, Project administration. **Panagiota Kotsila:** Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Marta Conde:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Attila Katona:** Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Sander van der Jagt:** Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Friedemann Polzin:** Methodology, Writing - original draft, Writing - review & editing.

Declaration of competing interest

None.

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Appendix A

Table 2
Description of selected NBS interventions and their hybrid governance type(s).

Case nr.	NBS case	Type(s) of hybrid governance	Description and context conditions of NBS and its hybrid governance structure
1	Stavros Niarchos Foundation Cultural Center (SNFCC) *Athens, Greece*	Market-driven; Stakeholder-driven	A 240,000 m² plot of land belonging to the Ministry of Finance was designated to host the SNFCC complex, which includes a LEED-certified building with a green roof and a public park. Whereas the SNFCC is a donation of a private non-profit organisation (SNF) to the Greek State, the former reserves the right to unilaterally withdraw this donation under certain conditions. The SNFCC is located at a prime location near the coast in Athens, in a green space that now hosts the National Library and the National Opera. The financial sustainability of the SNFCC is achieved through renting out restaurants, and common spaces for private events, as well as parking fees. In the case of a budget deficit, the Greek government has to support it.
2	The Forks *Winnipeg, Canada*	Market-driven; Citizen-driven	The Forks North Portge Partnership (FNPP), although publicly owned, acts as a private development corporation responsible for the downtown riverfront in Winnipeg through relying on commercial revenue streams. Their investments brought an unprecedented change to the winter use of the river. The FNPP's main interest was to attract more customers by extending the range of public services provided, and creating ice trails on the river during the long Canadian winter season. The 10 km river ice stretch became a public space for skating, recreation, sports, cultural programs, and community events, as well as a transportation route called the Red River Mutual Trail. The FNPP is managed by three levels of government and involves entrepreneurs, social innovators and private consultancies in its everyday functioning. The Forks is also open to citizen involvement through civic and community-driven initiatives.

Table 2 (*continued*)

| Case nr.	NBS case	Type(s) of hybrid governance	Description and context conditions of NBS and its hybrid governance structure
3	Park Trust for Newcastle's parks *Newcastle upon Tyne, UK*	Market-driven; Stakeholder-driven	In reaction to a 90% public funding cut for city parks, Newcastle City Council developed a new business model for parks by setting up a charitable trust. This trust is envisioned to be 'a social enterprise with charitable status that subscribes to mutual values', to develop revenue streams within park premises to pay for maintenance of the parks. A network of actors is involved in setting up the new business model and governance structure of Newcastle parks, including the National Trust and the Lottery Fund that provide the funding with other expertise coming from innovation agency, university and private partners involvement.
4	Water Fund (Por el Agua de la Ciudad de Mexico) *Mexico City, Mexico*	Market-driven; Stakeholder-driven	Despite significant investment in water-related grey infrastructure, recurring water shortages and floods threaten the long term stability of the water system in Mexico City. The City of Mexico (CDMX) Water Fund is a financing mechanism set up to select and finance specific NBS projects that can address the water challenges in the city. The CDMX Water Fund was initiated in 2015 by an NGO, The Nature Conservancy (TNC), on behalf of the Latin American Water Funds Partnership and in partnership with other organisations including the Inter-American Development Bank (IDB), businesses and the CDMX government. The Water Fund aims to bring together government funding with funds of big private corporations and agencies for urban NBS projects, improving Mexico City's water system. TNC coordinates the process as an independent broker, bringing in expertise and independence and helping to bring together all of the actors in the water sector to invest in long-term development of the city's water infrastructure.
5	Eco-Valley *Tianjin, China*	Market-driven; Stakeholder-driven	The Eco-Valley is a core element of China's most advanced Eco-City, a 11 km long linear park that links residential districts, community spaces, commercial zones, and waterside areas, providing connectivity, transit, leisure, and recreation for 350.000 future residents. Its hybrid governance arrangement is the outcome of government-to-government knowledge transfer in a public-private partnership model. Its involves a local coordinating public body, several ministries, a venture company for the project and several investors and banks that expect financial return on their investments. The project needs to be commercially viable, depending on revenues from real estate sales.
6	Little France Park *Edinburgh, United Kingdom*	Stakeholder-driven	Little France Park is a parkland of about 65 ha, half of which has yet to be developed. The vision for the area, which is part of Edinburgh's green belt, is highly contested given several parties with conflicting perspectives on how to use the site. The original design, with a larger allocation of parkland, has been revised several times due to pressure from real estate development. The parkland is located between housing developments in the socio-economically deprived Craigmillar residential area. The City of Edinburgh Council commissioned an environmental NGO to draw together a partnership engaging public and private partners around developing a design plan for a new parkland and to prepare collaborative bids to fund its implementation.
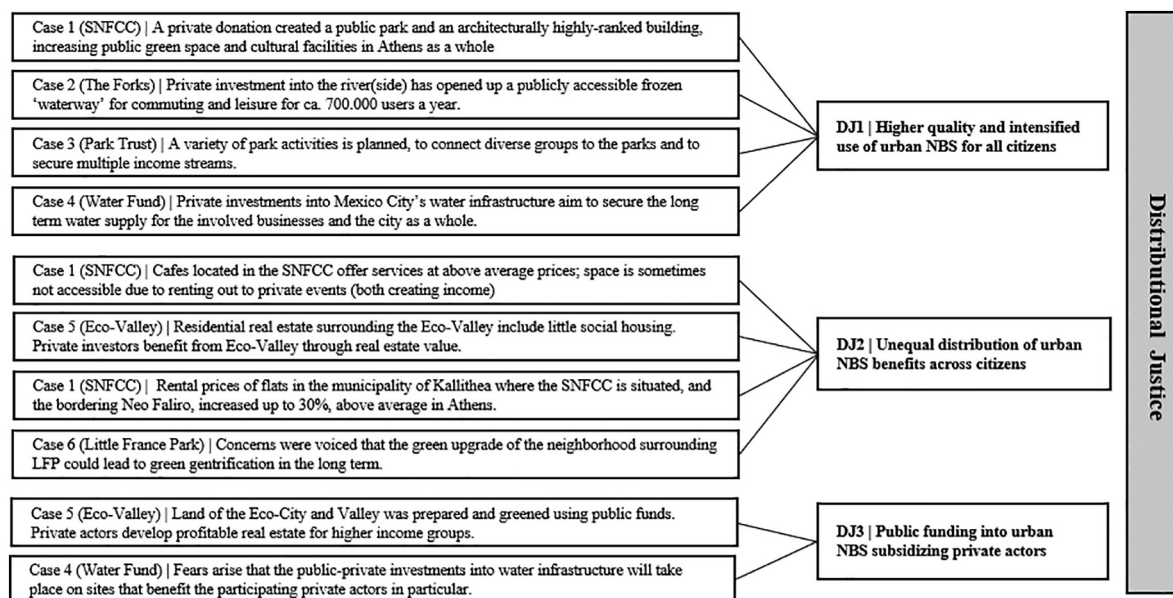
Fig. 2. Visualisation of cross-case analysis into aggregate distributional justice findings.
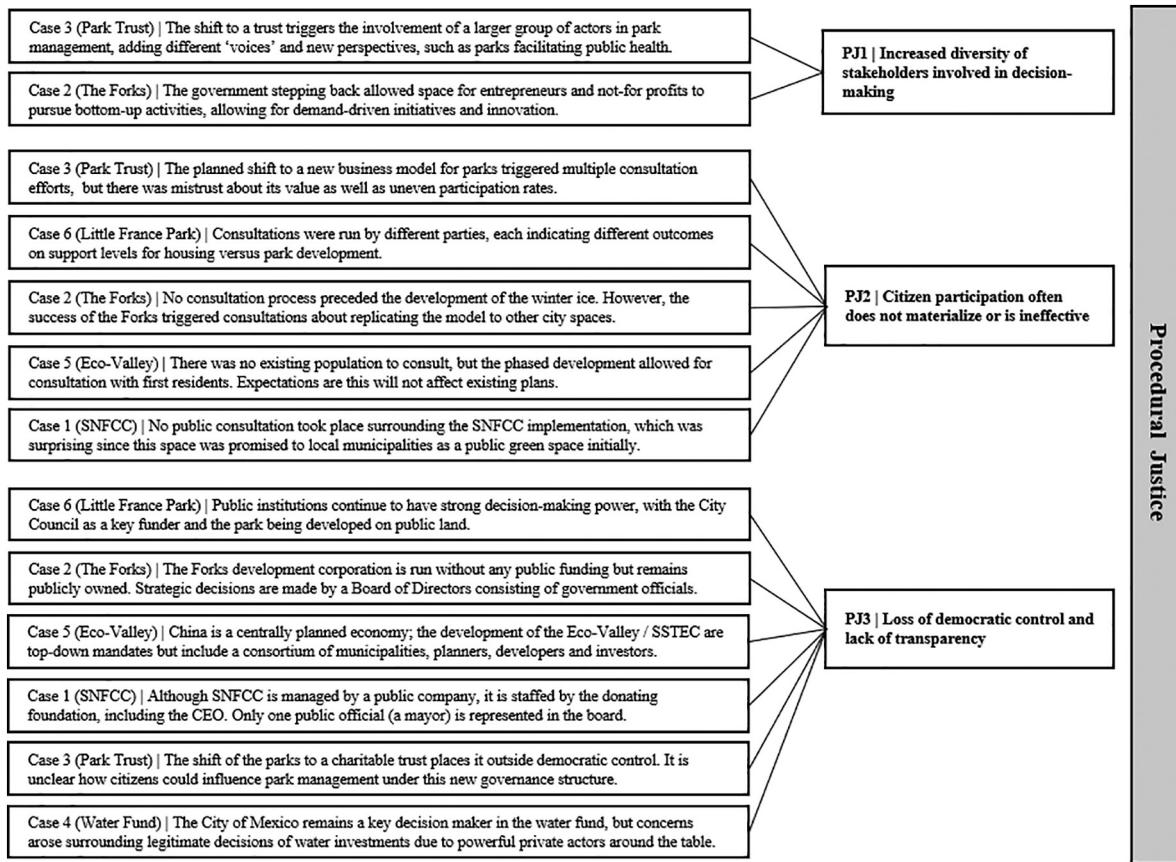
Fig. 3. Visualisation of cross-case analysis into aggregate procedural justice findings.
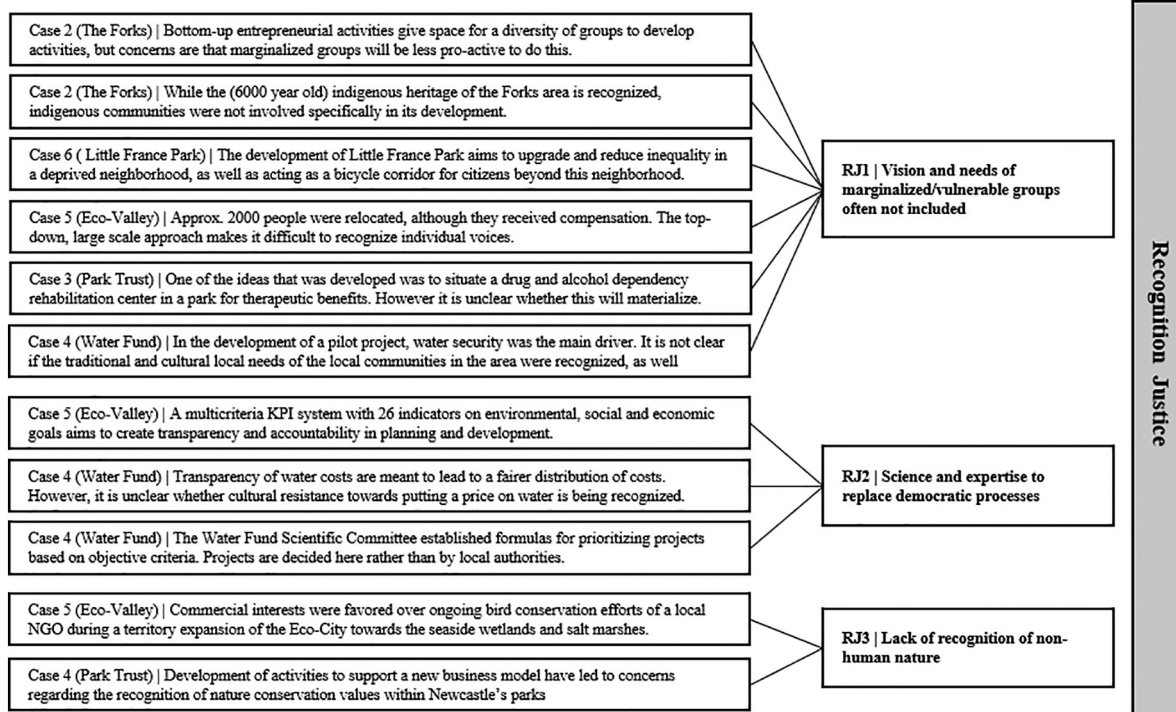

Fig. 4. Visualisation of cross-case analysis into aggregate recognition justice findings.

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