Advancing environmental justice in cities through the Mosaic Governance of nature-based solutions

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ABSTRACT

Nature-based solutions (NBS) are championed for providing co-benefits to cities and residents, yet their environmental justice impacts are increasingly debated. In this paper, we explore whether and how hybrid governance approaches, such as Mosaic Governance, may contribute to just transformations and sustainable cities through fostering long-term collaborations between local governments, local communities, and grassroots initiatives. Based on case studies in three major European cities, we propose and then exemplify six possible pathways to increase environmental justice: greening the neighborhood, diversifying values and practices, empowering people, bridging across communities, linking to institutions, and scaling of inclusive discourses and practices. Despite the diversity of environmental justice outcomes across cases, our results consistently show that Mosaic Governance particularly contributes to recognition justice through diversifying NBS practices in alignment with community values and aspirations. The results demonstrate the importance of a wider framing of justice in the development of NBS, sensitive to social, cultural, economic and political inequities as well understanding potential pathways to enhance not only environmental justice, but also social justice at large. Especially in marginalised communities, Mosaic Governance holds much potential to advance social justice by enabling empowering, bridging, and linking pathways across diverse communities and NBS practices.

1. Introduction

The potential of Nature-based solutions (NBS) for dealing with environmental and societal challenges, is increasingly being recognised in international science-policy agendas (Díaz et al., 2019; IPCC, 2022; Martin et al., 2020). Nature-based solutions are solutions that 'are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience' (Raymond et al., 2017). One of the hallmarks of NBS is their ability to simultaneously perform multiple functions and to provide multiple co-benefits to society (Commission and Innovation, 2021; Giordano et al., 2020; Raymond et al., 2017). For example, NBS not only can enhance biodiversity (Xie & Bulkeley, 2020), but also reduce stress and improve mood; increase the level of physical activity and reduce cardiovascular disorders, and promote social relations, access to food, and community resilience (Hartig et al., 2014; Raymond et al., 2019; van den Bosch et al., 2017).

At the same time, NBS have multiple justice trade-offs (Sekulova

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et al., 2021). NBS are often developed in high-income areas, with little attention for the needs of socially marginalised groups and issues of climate justice (Anguelovski et al., 2020; Cooke, 2020; Verheij & Nunes, 2021; Wolch et al., 2014). Numerous, often interrelated causes of environmental injustices have been demonstrated, including power-imbalances (van der Jagt et al., 2021; Woroniecki et al., 2020), narrow definitions of values of nature and knowledge claims (Pascual et al., 2021), low levels of linking and bridging social capital (Agger & Jensen, 2015), and lack of resources for implementing and upscaling community-initiated sustainability projects (Dorst et al., 2021; Mattijssen et al., 2018). Meanwhile, using NBS to green more marginalised areas has met criticism, due to fear of eco-gentrification or an unequal distribution of environmental benefits and burdens (Toxopeus et al., 2020; Vries et al., 2020).

Critical research on NBS has commonly sought to describe the quality or extent of injustices. For example, the unequal distributions of quantity and quality or urban green areas in many cities and countries (Haase et al., 2017), including the unfair allocation of ecosystem services (Kabisch & Haase, 2014); the historic inequalities embedded in ecosystem services production and consumption (Andersson et al., 2019; Langemeyer & Connolly, 2020); the differentiated social impacts of profound change and how to fairly include diverse actors in decision making on transformations (Bennett et al., 2019).

How to address these causes of injustice through just transformations approaches remains a critical challenge (e.g. Anguelovski et al., 2020; Chambers et al., 2022). These studies demonstrate the importance of both procedural and recognition justice of green space planning and management to overcome or restore unjust distribution of green spaces and their benefits. Procedural justice concerns how decisions are made, which groups participate in design, planning and management of public spaces, and on what terms (Low, 2013; Schlosberg, 2007). Recognition justice relates to the recognition of diversity of individual and group identities as well the diversity of values of nature, and practices of use and production of greenspaces (Calderón-Argelich et al., 2021; Langemeyer & Connolly, 2020; Schlosberg, 2007).

Quality and structure of NBS governance processes are crucial for just transformation processes (Bennett et al., 2019; Randrup et al., 2020). To enhance procedural justice, hybrid or multi-level governance processes have been suggested, aiming to balance top-down decision making with bottom-up perspectives (Buijs et al., 2016; van der Jagt et al., 2021), to foster cross-scale interactions between places and practices (Newig & Fritsch, 2009; Satterthwaite, 2013; Toxopeus et al., 2020), and use different modes of knowledge co-production to achieve outcome-oriented and process goals (Chambers et al., 2021; Horcea-Milcu et al., 2019; Raymond et al., 2022). While procedural, recognition and distributional justice concerns are discussed in scholarship on ecosystem stewardship and the co-creation of urban NBS (Frantzeskaki, 2019; Raymond et al., 2022; van der Jagt et al., 2021) and multi-level processes for urban sustainability transformations (Hölscher et al., 2019), the justice effects of network or hybrid governance are rarely analysed. A key exception being the study by Toxopeus et al. (2020) who identified issues associated with the transparent and equal distribution of benefits and costs of urban NBS and the safeguarding of democratic control.

The aim of this paper is to explore justice effects of hybrid governance approaches to NBS. We investigate whether and how aligning efforts by civil society, governments and housing agencies can contribute to environmental justice in cities, and more specifically in residential housing areas inhabited by marginalised groups. Conceptually, we focus on Mosaic Governance, a strategic approach that aims to stimulate the co-creation of urban green and NBS in concert by governments and civil society. Our focus on marginalised communities enables identification of opportunities for, and limits to, Mosaic Governance for contributing to equitable urban green spaces and inclusive decision-making processes. Operationalizing Mosaic Governance could be particularly challenging in marginalised communities because

green space and biodiversity might not have high priority when facing economic hardship (Raymond et al., 2021).

In the following sections, we first introduce Mosaic Governance and our three case studies. We then suggest six possible pathways through which Mosaic Governance may contribute to environmental justice in cities and exemplify these pathways through the analysis of the cases. In the concluding section, we discuss how different social, cultural and structural contexts interrelate with justice pathways and discuss a set of blind spots and limitations related to the capacity of Mosaic Governance to support justice in cities.

2. Mosaic Governance

Mosaic Governance is a rather recent branch of hybrid or networked governance approaches, with specific focus on urban sustainability governance (Buijs et al., 2016; Buijs et al., 2019; Gentin et al., 2022). Mosaic Governance is a normative governance design focused at stimulating the reflexive co-creation and management of urban green and NBS through the application of a set of interrelated policy instruments to develop and strengthen cross-scale networks and collaborations between governmental and non-government actors (Buijs et al., 2016; Buijs et al., 2019; Raymond et al., 2021). It links civil society networks, understood in their broadest definition consisting of active citizens, community groups, NGOs, social enterprises, with municipalities, housing agencies and other professional organisations responsible for urban green planning and management. Key to Mosaic Governance is the creation and strategic use of arenas for deliberation and agency within the complex urban governance context (Buijs et al., 2019).

Mosaic Governance offers new modes of collaboration across scales and mobilizes active citizen groups spanning different localities, cultures, age groups and educational levels. Such networks may extend to 'difficult-to-reach' socio-cultural groups, such as migrants and young people. To cater for the diversity -or mosaics- of actor groups, expertise, values, ambitions, and professionalisation in community engagements in urban sustainability practices, Mosaic Governance theoretically integrates metagovernance with multi-level and multi-actor governance (Buijs et al., 2016; Newig & Fritsch, 2009; Sørensen & Torfing, 2009).

Previous studies (Buijs et al., 2016; Buijs et al., 2019; Gentin et al., 2022; Gopalakrishnan & Chong, 2020; Mumaw & Raymond, 2021; Raymond et al., 2021; van der Jagt et al., 2021) suggest that Mosaic Governance in its ideal typical form consists of five key characteristics: i) an explicit focus on place-based initiatives by active citizens and social enterprises, who are ii) motivated by care for and engagement with local environmental and social issues. These initiatives are embedded in iii) a complex multi-level network with iv) diverse actors, ranging across civil society, governments, and businesses, all guided by multiple values and knowledges, with v) mutual steering through distributed power and agency. Practically, Mosaic Governance approaches aims to move beyond fragmented and ad-hoc collaboration through the development of a more coherent set of policy instruments. Examples of such instruments include: funding schemes for grassroots, facilitation of communities of practice, volunteer or professional scale-crossing brokers to facilitate collaborations, a front office for citizen initiatives, the use of knowledge brokers, the "right to challenge", etc.

Mosaic Governance may contribute to developing innovative environmental practices, to upscaling of place-based green innovations, and to improving environmental qualities (Buijs et al., 2019; Mumaw & Raymond, 2021). In addition, it may contribute to place-making and place-keeping (Buijs et al., 2016; Gopalakrishnan & Chong, 2020; Mattijssen et al., 2018), unlocking local resources, including knowledge and expertise (Buijs et al., 2019), and upscaling sustainability niches (Buijs et al., 2019; Mumaw & Raymond, 2021). It may also increase trust between actors (Buijs et al., 2016), increase public support for NBS (van der Jagt et al., 2021) and contribute to empowerment of local groups (Gentin et al., 2022; Gopalakrishnan & Chong, 2020). However, Mosaic Governance has never been applied to examine environmental justice in

residential areas containing high proportions of migrants and youth. In this paper we theoretically unpack pathways in which Mosaic Governance can contribute to environmental justice based on the analysis of Mosaic Governance processes seen in three international case studies.

3. Case study overview

We exemplify possible pathways to environmental justice with examples from case studies in three economically deprived and socio-culturally diverse neighborhoods in Copenhagen (Denmark) Utrecht (Netherlands) and Södertälje (Sweden). Our analysis is based on case studies and insights from two international projects, the FORMAS-funded VIVA-PLAN project, and the Horizon 2020-funded NATUR-VATION project. In total, the analysis is based on 95 interviews, an ethnographic study, document analysis, several focus groups and workshops with planners and other stakeholders as well as secondary analysis of case study working papers from the projects (Raymond et al., 2021 and www.viva-plan.eu).

3.1. Case 1: Urbanplanen, Copenhagen, Denmark

Urbanplanen is one of Copenhagen's largest social housing areas with 450 ha of mostly multi-layered apartments, 100 % not-for-profit social housing, with 6.000 residents and 50 ha of moderate-quality and well-used public urban green space (see Fig. 1). It is a socio-economically diverse neighborhood consisting of residents with diverse nationalities and cultural practices. In general, the socio-economic and educational status of residents is low and many struggle to enter the job market. Many residents have lived for 40+ years in the area and the sense of community is very strong.

Mosaic Governance in Urbanplanen is characterised by a well-established and nested governance approach with strong interrelated networks between the municipality, the social housing agency and over 70 active resident groups. The key bridging organization is "Partnership" ("*Parrtnerskabet*"), through which neighborhood social workers run the "Urbanplanen social master plan". The plan is well-funded, resulting in large investments in community facilities organised along traditional welfare state discourses and Agenda21. In spirit, the plan is driven by close partnerships between social workers and local grassroots initiatives, yet the success of the masterplan is evaluated on measures of safety, employment, and criminality informed by national policies. Institutional actors such as Partnership have great power to decide on overall management principles of the public spaces.

3.1.1. Examples of place-based initiatives

FRAK is a social economic entrepreneurship that connects local youth with green maintenance jobs to support stewardship of local commons and empower youth by developing job skills, individual sense of worth, and their CVs. Typical assignments include on-site gardening, planting trees, and a BioBlitz to determine which flowers are popular with residents. Involved youth contribute locally and in turn are enriched with a tight-knit community of co-workers and a stronger network outside their peer-groups.

The Fathers Group (Fædre på banen) is a community group dedicated to developing fellowship between fathers and their children through nature experiences and outdoor recreation. Simple outdoor activities link together fathers recently migrated to Denmark and bridge their common experiences and struggles in Denmark as new immigrants. Through linkages with Father Groups in other neighborhoods, it provides new social networks and stimulates exploration at the city scale.

3.2. Case 2: Overvecht, Utrecht, the Netherlands

Overvecht is characterised by mostly multi-layered apartments hosting high-rise flats with the largest share of social housing in Utrecht (67 %). The district includes three urban parks and has significant green space around buildings, often of low quality and moderately used (see Fig. 2). Overvecht has a population of 34.000 inhabitants, of which 50 % are immigrants from non-western backgrounds, and the lowest gross average income of any district in the city.

Motivated by participatory democracy considerations, Utrecht municipality developed city-wide Mosaic Governance approaches to support active citizen groups and co-management of greenspaces with residents. Key instruments are several funding mechanisms for local initiatives, such as the Neighborhood Green Plan (2011–2017), the Community Initiative Fund and the Right to Challenge (both ongoing). To ensure inclusiveness for all place-based initiatives, funding criteria are very open and flexible. In marginalised neighborhoods such as Overvecht, social workers support mobilisation and facilitation of new

Fig. 1. Urbanplanen and examples from NBS practices (Source: Authors & Copenhagen Municipality).

Fig. 2. Overvecht and examples from NBS practices (Source: Authors & Het Utrechts Archief).

Fig. 3. Ronna and NBS practices (Source: Authors and Södertälje Commun).

initiatives. Representational residents' boards – considered insufficiently inclusive – have been replaced by district networks consisting of active citizens and businesses from the local community. To stimulate exchange of knowledge and experiences among social enterprises and local initiatives, the municipality recently initiated the city-wide

NeighborhoodGreen platform.

3.2.1. Examples of place-based initiatives

Food Garden Overvecht is a set of organic community gardens acting as 'social care gardens'. Aiming for a 'radically inclusive' approach, they collaborate with multiple institutions, such as the municipality, social care agencies and the Salvation Army, to mobilize and empower a culturally diverse group of marginalised people through building community, learning new skills and offering work experience in various roles, including management positions.

The *Green Courtyards* initiative was developed in response to a suggestion by female migrants aiming to green the one-hectare courtyard of a ten-storey high-rise social housing complex. Heavily supported and eventually adopted by the municipality, the initiative engaged highly marginalised residents in the co-design and implementation of greener courtyards, offering improved access to nearby green and safe leisure and sports opportunities as well as improved biodiversity. One of the gardens included a social programme engaging difficult-to-reach residents from various backgrounds by means of home visits.

3.3. Case 3: Ronna, Södertälje, Sweden

Ronna is a residential area located in Södertälje, in the Stockholm Metropolitan region, characterised by high rise housing blocks with ample urban vegetation. It is home to a population of about 8.000 inhabitants, mainly first- or second-generation migrants from Syria and Iraq (see Fig. 3). In total, 78 % are rental apartments, owned by two housing companies, one commercially owned, and one owned by Södertälje municipality. Employment rates and average income are below the national average. The Ronna Forest, stretching at the outer

Table 1
Characteristics of Mosaic Governance in the case-studies.

Characteristics of Mosaic Governance	Urbanplanen, Copenhagen	Overvecht, Utrecht	Ronna, Södertälje
	Embedded Mosaic Governance	Community-centered Mosaic Governance	Mosaic Governance in the making
Focus on place-based initiatives	Numerous place-based initiatives often initiated and supported by Partnership.	Numerous place-based initiatives supported by targeted funding schemes.	Only few grassroots initiatives, mostly centred on sports with only indirect links to NBS.
Motivated by care and engagement	Care for nature and biodiversity by tending the local green commons.	Care for nature by co-developing urban green areas and meeting places.	Care for and engagement with green places is limited.
	Care for fellow citizens by using green commons for joined activities, including sustainable food and upcycling practices.	Care for fellow citizens by stimulating social exchange and providing social support.	Urban green spaces function as locale for care for fellow citizens through sports and cultural activities.
Well-established and complex multi-level networks	Partnership provides stable and extensive funding.	Champion citizens develop green initiatives based on local networks with diverse funding schemes	Civil society networks are small but developing.
	Partnership functions as bridging organization linking networks and stimulating collaborations among initiatives.	Horizontal networks initiated from municipality to strengthen collaborations.	
Highly diverse actors, values, and knowledges	Initiatives target a wide range of local values, cultures, and practices.	Socio-cultural diversity of the community is represented in many initiatives.	Socio-cultural diversity is only marginally included in green space planning and management.
	Staff from Partnership needs to navigate between state directives and community demands.	Local values and ambitions outweigh governmental priorities.	
Mutual steering through distributed power and agency	Focus is on the social welfare state with representational democracy.	Focus on democracy and power sharing, resulting in openness to community values and discourses.	Power and agency of local community to influence green space management is limited.
	Power leans towards institutionalised actors. Focus more on individual empowerment than on agency to influence decision making.	To increase inclusiveness, resident councils have been replaced by district networks linking active citizens to the municipality.	

layer of the area for about 14 ha is not very popular and generally perceived as unsafe, partly because of the presence of wild boar and ticks.

The municipality of Södertälje is currently developing collaborative approaches, including public consultation to coordinate on local needs. Although such gatherings are generally well attended, participation from disadvantaged communities is limited. Many renovation and maintenance programs have been launched but most are considered unsuccessful in keeping up with expectations of local residents (Mack, 2021). Södertälje municipality hosts over 250 registered community-based associations, but less than 5 % are found in Ronna and most of these are focused on sports and recreation.

3.3.1. Examples of place-based initiatives

Ronna currently does not host local initiatives focusing on greening of the district or improving access to nature. However, instances of mobilisation occur in other areas such as sports and improving the literacy of children and youth. Local sport associations and other volunteer organisations organize many youth-centred activities at a recently constructed multi-purpose sports facility near the Ronna elementary school.

Läsfrämjarinstitutet association is a bottom-up initiative, led by three mothers who aim to improve opportunities for children and youth via literacy and cultural activities. They also work to improve access to public meeting places, including green areas, where local inhabitants can gather and enjoy each other's company.

See Table 1 for a summary of the characteristics of Mosaic Governance in the case-studies.

4. Six pathways for environmental justice

The fundamental characteristics of Mosaic Governance and its general ethos suggest important linkages with distributional, procedural and recognition justice. As noted earlier, this paper attempts to elucidate these linkages. Based on existing literature on the relationships among civil society, stewardship, and environmental justice (Aydin et al., 2017; Buijs et al., 2016; Raymond et al., 2021; Rigolon & Gibson, 2021; Rutt & Gulsrud, 2016; van der Jagt et al., 2021), we posit six, interrelated pathways along which Mosaic Governance could contribute to advancing environmental justice: *greening* the neighborhood, *diversifying* values and practices, *empowering* people and communities, *bridging* across communities, *linking* to institutions, and *Scaling* inclusive values and approaches (see Fig. 4). Here, we briefly introduce each pathway theoretically and elucidate them through case examples.

4.1. Greening the neighborhood

The '*Greening*' pathway emanates from a core purpose of Mosaic Governance, namely collaborative place-making and place-keeping with local communities (Buijs et al., 2016). This pathway has potential to contribute to distributional justice by redressing unequal distribution of green spaces and associated benefits (Buijs et al., 2019; Langemeyer & Connolly, 2020; Łaszkiewicz et al., 2018). It creates scope for community-led decision-making, often with co-benefits such as social cohesion and community wellbeing (Buijs et al., 2016; Rutt & Gulsrud, 2016). Such place-based processes inclusive of community values and needs may also contribute to procedural and recognition justice (Fortnam et al., 2019; Paloniemi et al., 2018; Schlosberg, 2007).

The planning and maintenance of urban green spaces in all three cases are institutionalised within municipal programs including substantial budgets. In Urbanplanen and Overvecht, these government-driven approaches are complemented, and partly replaced, by a Mosaic Governance approach where professionals facilitate community initiatives and engage residents in local green place-making and place-keeping activities. In Urbanplanen, twenty years of engagement and funding from Partnership, including paid staff such as neighborhood

social workers, have contributed to the blooming, stability, and long-term engagement of active citizenship in this marginalised neighborhood. Initiatives such as FRAK include biodiversity enhancement programs involving local youth and a new greenhouse in a community garden to support local entrepreneurs in growing and selling produce.

In Overvecht, the approach is driven by a strong democratic discourse on decentralising governments, leading to the facilitation of active citizens through extensive short-term funding schemes. For example, the Neighborhood Green Plan Overvecht has funded 22 small- and medium-sized nature-based initiatives proposed by the local community, including social enterprises. This funding scheme offers extra support by social workers in marginalised communities. Typical contributions are greening road verges, planting street trees or creating flower beds, with budgets ranging from 5.000 to 40.000 Euro.

In Ronna, where citizens' connectedness to nature seems less well developed, care and engagement of active citizens is primarily directed at improving health and well-being. Urban greening then mainly functions to support social cohesion and empowerment through, for example, sport associations.

4.2. Diversifying values and practices

The '*Diversifying*' pathway refers to expanding the range of green space use and planning and management practices accepted on public land, and being inclusive to all social groups in the neighborhood (Buijs et al., 2016; Rutt & Gulsrud, 2016). It relates to enabling a wide array of experiences and being open to diverse values and ideas, discourses and knowledges, and visions and goals (see e.g. Assmuth et al., 2017; Paloniemi et al., 2018; Tozer et al., 2020). This pathway may especially contribute to recognition justice by facilitating an assortment of cultural practices, such as food-related social gatherings in parks (Tozer et al., 2020; van der Jagt et al., 2017).

The contribution of the diversifying pathway depends heavily on the type of Mosaic Governance that is in place and its ability to align green space practices to the plural values of nature in the community. The Mosaic Governance approach in Utrecht, with its open and flexible instruments, facilitates a wide range of bottom-up green space practices inspired by the diversity of cultures and identities in local communities. While dominant municipal discourses focus on biodiversity, health, and climate action, the community-led initiatives focus on more diverse aims, including co-benefits such as social cohesion, affordable and healthy food, and safe and accessible meeting places.

The Mosaic Governance approach in Urbanplanen is more strongly embedded in the dominant municipal and state discourse. Consequently, the contribution to diversifying practices is more limited because support for local initiatives is influenced by the degree their aims and ambitions align with dominant municipal discourses on e.g. biodiversity enhancement, crime prevention and economic empowerment. Partnership constantly negotiates between the needs of residents, grassroots demands for fellowship and democracy, and the normative demands of the state for increased employment and integration. *The Fathers Group* is a successful example of combining state aims of social integration of immigrants with community needs to strengthen family ties. The group uses public green spaces in Urbanplanen to gather fathers recently immigrated from war zones so they can spend more quality time with their children after work. The group is facilitated as an outdoor recreation activity by a national sports NGO with the support of Partnership, but the fathers and their children set the agenda. In Ronna, we do not see any contributions to diversifying due to a lack of local green iniitives. Consequently, the values and visions of the public authorities remain dominant in planning and management of green spaces.

The diversifying pathway also relates to diversifying the social groups using and enjoying urban green and its benefits. In all three cases, initiatives explicitly aim for diversification of the socio-cultural and socio-economic groups that use and maintain urban green spaces. For example, the Green Courtyard Initiative in Overvecht successfully
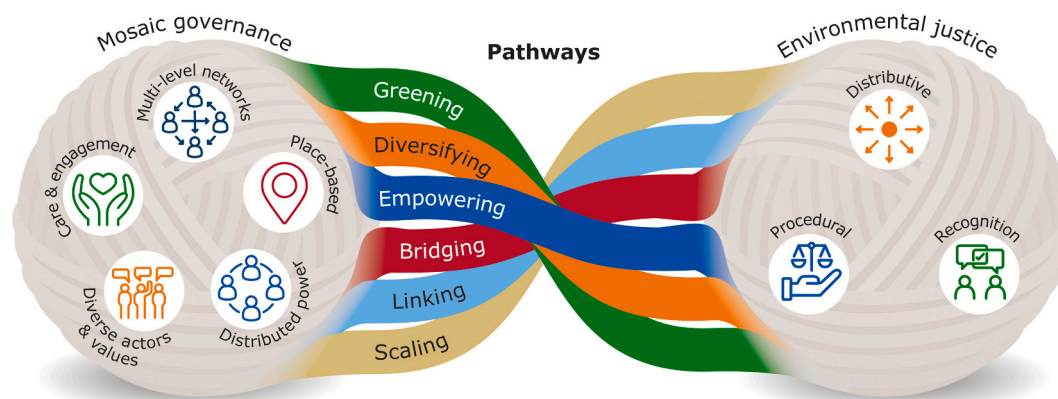
Fig. 4. Six pathways how Mosaic Governance can contribute to environmental justice.

co-developed new places for migrant families, including housebound women, to use and enjoy. Collaborations with housing agencies, social workers and other institutions were crucial for these initiatives.

Initiatives rooted in local communities do not only recognise, but also often explicitly aim to represent the diversity of values and needs of local communities, resulting in more diverse design, management and use of natural areas compared to top-down green space management (Madur-eira et al., 2018). In Urbanplanen and Overvecht, this has contributed to the recognition of these needs by institutional actors, such as using locally preferred flowers to beautify the neighborhood, the greening of unsafe and neglected areas and the uptake of social care gardens.

4.3. Empowering people and communities

The 'Empowering' pathway covers the enhancement of capacities, skills, and ultimately the agency of green space users, including decision-making power. The pathway includes, among other things, learning-by-doing in urban green stewardship, pursuing one's aims in concert with others, and developing skills that contribute to social and cultural capital, including improved access to the job market (Avelino, 2017; Frantzeskaki et al., 2016; Mumaw & Raymond, 2021). Empowerment is often considered the most effective means of addressing the root-cause of environmental injustice (Roberts, 1998), and it can provide a foundation for greening initiatives that are intersectional, relational and emancipatory for marginalised groups (Anguelovski et al., 2020).

Green spaces offer opportunities for empowerment of vulnerable and marginalised groups (Gentin et al., 2019; Peters et al., 2010; Rutt & Gulsrud, 2016). Many initiatives in Urbanplanen and Overvecht capitalize on these opportunities, individually or in concert with the municipality or housing agency. Local initiatives often represent gateways to marginalised communities, which motivate institutional actors, such as Partnership or housing agencies, to seek collaborations with these groups. Meanwhile, local initiatives benefit from the professional expertise and support of social workers.

Many initiatives, such as FRAK and Food Garden Overvecht, contribute to the empowerment of disadvantaged groups by providing easily accessible and enjoyable jobs and places for diverse groups, including youth, to meet in nature. They provide safe nearby places to practice gardening or enjoy urban nature, which enables the most marginalised to re-engage with society and to strengthen social and occupational skills, improve self-confidence and expand social networks. Economic empowerment is an explicit municipal aim in Urbanplanen, strongly supported by social welfare professionals in agreement with the state-dominated social welfare discourse. Having less hands-on support from authorities, initiatives in Overvecht depend more on local champions. Within Food Garden Overvecht, this has resulted in an approach to urban gardening labelled *radically inclusive,* where the most marginalised are offered opportunities to develop leadership skills. The Green

Courtyard Initiative also gave voice to some of the most marginalised groups. While empowerment through developing capacities and skills could be clearly observed, this was not the case for empowerment as leveraging political influence on city-wide green planning and policies.

4.4. Bridging across communities

The 'Bridging' pathway refers to strengthening social capital in communities through making new connections and building better relationships among different people, social groups and communities (Putnam, 2000). Bridging gives local actors first-hand knowledge of, or direct experience with, other local actors (enabling recognition justice), which could unveil shared interests along with opportunities for concerted action to advance those interests (advancing procedural justice). In addition, it could lead to more equitable sharing of environmental burdens and benefits, improving distributive justice.

By supporting local initiatives and offering volunteer positions, Mosaic Governance contributes to strengthening the social fabric in neighborhoods, bridging across different socio-economic and socio-cultural groups. All cases include examples of how local initiatives, with support from institutional actors, improve social cohesion spanning different communities through organising and facilitating informal social interactions in the use, development and maintenance of urban green. Sports in Ronna, urban agriculture in Overvecht and the Fathers group in Urbanplanen offer opportunities to engage in informal social interactions, and collaborate on different types of activities, ranging from managing local initiatives to volunteering in gardening. For example, Food Garden Overvecht aims to stimulate sense of community for all ethnic, socio-cultural and socio-economic groups in the neighborhood, including the most marginalised.

Compared to the other cities, Urbanplanen has a highly institutionalised approach. Here, neighborhood social workers from Partnership are the key bridge builders in the area. Collaborating with citizens and initiatives, they use place-making and place-keeping programs to strengthen the social and ecological development of the area. This support has enabled, for example, the Fathers Group to engage different communities, age groups and ethnic backgrounds, including immigrant fathers and their children, in typical Danish approaches to outdoor sports, green spaces and community building. Our analysis suggests that through long-term visions and paid staff, Partnership in Urbanplanen reaches more inhabitants for longer periods of time than most of Overvecht's grassroots initiatives, which depend more on temporary subsidies and the drive and energy of local volunteers and social entrepreneurs.

4.5. Linking to institutions

The 'Linking' pathway refers to strengthening connections between the local community and institutions, providing access to financial,

human, and political resources, contributing to agency and trust (Agger & Jensen, 2015; Andersson et al., 2017; Putnam, 2000). It may contribute to recognition justice because it creates opportunities for more powerful actors in a governance arrangement to see and respect differences in the various local groups and communities that are involved. Linking could also contribute to advancing procedural justice when local actors can informally voice their concerns, aspirations and understandings, directly, or through bridging actors or organisations (Ernstson et al., 2010).

By its very nature, Mosaic Governance is a linking activity. Indeed, for many initiatives, developing linkages with institutions that have access to financial, human, and political resources is crucial to fund activities, negotiate use-rights for publicly owned land or obtain permits and other formal rights. Linking can be supported by providing resources for local initiatives, developing and funding knowledge platforms, and initiating projects to link local groups with external partners and experts. In Ronna, newly arrived immigrants were linked up to local farmers who agreed to provide occasional support. For Partnership, in Urbanplanen, linking is an explicit aim in their collaborations with local initiatives, related to their ambitions for economic empowerment. They actively link residents to municipal or social housing resources, often with a green profile. In addition, they support active citizens in their search for funding from private foundations. Much of this interaction occurs at the local level, although youth involved with FRAK are also frequently involved in high-profile events at the city level. In Overvecht, likewise, some initiatives have developed strong links with institutional actors, such as environmental NGOs, the Salvation Army, local businesses and welfare associations.

While Partnership plays a major and stable role in Urbanplanen by linking marginalised groups with more powerful actors at higher scales, in Overvecht and Ronna initiatives are more dependent on the motivation, capabilities and social capital already present in the local community. Without a minimum of social capital and trust, contributions to linking and navigating vertical power-relations may prove difficult, as the Ronna case indicates.

4.6. Scaling inclusive values and approaches

The *'Scaling'* pathway involves upscaling or mainstreaming community-based values, norms and practices to other locales, or higher

Table 2
Examples for the six pathways to environmental justice from each city.

Pathways for environmental justice	Urbanplanen, Copenhagen	Overvecht, Utrecht	Ronna, Södertälje
Greening the neighborhood	Initiatives contribute to place-making, place-keeping and biodiversity through e.g. BioBlitz.	Initiatives for place-making and place-keeping have beautified previously neglected areas, such as courtyards.	Local initiatives contribute to greening only to a limited extend
Diversifying values and practices	Initiatives provide nature experiences for people previously lacking these. Partnership and local initiatives engage with marginalised groups through hands-on activities.	Initiatives provide nature experiences for people previously lacking these. Initiatives explicitly focus on social diversification in user-groups through "radical inclusiveness".	Municipality and housing agencies dominate green space planning and management discourse.
	Governmental discourses on socio-economic values and biodiversity influence local initiatives.	Broad and open municipal funding facilitates diversification in line with community values.	Institutions are not very active in diversification and stimulating urban green usage by marginalised groups.
Empowering people and communities	Strong contributions to empowerment, e.g. FRAK provides green jobs for youth.	Strong contributions to empowerment through support of vulnerable people to learn new skills and develop towards leadership positions.	Funding from municipality to develop local empowerment programs to strengthen social and cultural capital. Green spaces do not play a major role in these programs.
	Partnership supports social and economic empowerment and integration to Danish society.	The courtyards initiative gives voice to the most marginalised groups.	No empowerment as leveraging political influence
	Little empowerment as leveraging political influence	Some empowerment as leveraging political influence through restructuring local democracy	
Bridging across communities	Partnership is the key bridge builder, connecting diverse social groups and communities.	Initiatives explicitly aim for bridging across diverse socio-cultural groups through hands-on activities and informal encounters.	Initiatives support local youth and uses outdoor activities as a way to connect across socio-cultural groups to build community.
	Local initiatives contribute to bridging on all scales, working across different socio-cultural groups, and with other neighborhoods.	Local initiatives facilitate access to difficult to reach groups, including the most marginalised.	
Linking to institutions	Partnership actively links residents in need to municipal and or social housing resources - often with a green profile.	Courtyards initiative stimulates new links between social workers and the most marginalised, contributing to trust in institutions.	Local initiatives struggle to connect with the broader community of Södertälje and remain somehow at the margins.
	Partnership supports the search for funding from private foundations.	Food Garden Overvecht contributes to improved connections between community and institutions.	Local farmers were linked with newly moved residents, mostly refugees. However, the project was ultimately unsuccessful.
Scaling inclusive values and approaches	Impact on changing NBS planning and policies beyond the local scale is limited.	Very limited scaling-up of using NBS for co-benefits	Due to a lack of green initiatives, no scaling has been identified.
		Initiatives have been scaled out to other locations within the same district.	

levels of governance (Van Doren et al., 2018). Horizontal scaling – or scaling-out – refers to multiplying practices to other places, transferring values to other people, or providing inspiration for similar projects. In contrast, vertical scaling – or scaling-up – involves changes at the regime level, such as impacting the values, discourses, practices, or regulations of powerful actors, such as governments or businesses (Seyfang & Longhurst, 2013; Van Doren et al., 2018). The vertical scaling pathway creates opportunities for structural or institutional changes to develop governance instruments that recognise and respect hitherto poorly understood social-cultural contextual factors, marginalised values and norms, and innovative stewardship practices (Mumaw & Raymond, 2021). Such changes could advance recognition justice at a broad scale, reinforce the empowering pathway, and help realize general progress in procedural and distributional justice.

Few of the studied local initiatives have the ambition to scale out to other areas and other neighborhoods in the city. Although several cross-scale and cross-site networks were developed, such as "CommunityNature030" in Utrecht, actual contributions to urban transformation are limited, and predominantly relate to the development of innovative niches, such as the social care gardens in Overvecht, which have been copied at a few other places in the neighborhood. In Urbanplanen playground, children and staff planted and cultivated berry bushes and cuttings from this original stock have since been shared with children and staff at the 25 other staffed playgrounds across Copenhagen, developing a shared social-ecological knowledge between children across the city.

Vertical upscaling seems even more difficult to realize, although the success of the Community Initiative Fund and Neighborhood Green Plan have certainly contributed to mainstreaming at the municipal level of community-led urban greening initiatives in the city. Initiatives that aim for this, such as the Green Courtyards initiative in Utrecht, ultimately did not manage due to limited resources.

See Table 2 for a summary of examples of the six pathways to environmental justice in each city.

5. Discussion

This paper sought to unpack six pathways for addressing environmental justice concerns through the Mosaic Governance of NBS. Here we discuss how the pathways contribute new theoretical understandings about environmental justice and just transformations through NBS and how characteristics and impacts of these pathways depend on place-specific social, environmental and governance structures. We then outline some blind spots and how they may be addressed through future research on Mosaic Governance and environmental justice.

5.1. Pathways towards environmental justice

The Mosaic Governance approaches in two out of our three cases, Urbanplanen and Overvecht, have institutionalised the provision of critical resources to community groups and social enterprises, including funding, ecological knowledge, access to institutional networks and access to land. This has stimulated and facilitated local communities to contribute to *greening* their neighborhoods and *diversifying* green space practices to become more inclusive of community values, perspectives and aesthetic preferences. From an environmental justice perspective, these pathways especially contribute to recognition justice. Through these two cases, we illustrate many examples of how the diversifying pathway of Mosaic Governance contributes to recognition of the plural environmental values in the marginalised areas in our case-studies, and redirects institutional aims and discourses towards more place-based values and visions (Tozer et al., 2020). Many initiatives rooted in local communities do not only recognise, but explicitly aim to represent the diversity of values and needs of local communities, resulting in a wider variety of practices in design and use of natural areas (Madureira et al., 2018). Diversity is very much self-organised, instead of facilitated

externally through participatory planning (Fors et al., 2021; Gulsrud et al., 2018) or plural valuation techniques (Jacobs et al., 2016).

The focus on diversity and "radical inclusiveness" in the greening practices in Overvecht and Urbanplanen shed new light on the concept of relational greening. Relational greening calls for the challenging of silences, violence and racialization in ways that politicize and restore people-place relationships (Anguelovski et al., 2020). In Urbanplanen and Overvecht, professionals facilitate community initiatives and engage residents in green place-making. Collaborations between paid staff, local initiatives and local community support the elicitation and management of meaningful relationships beyond greening outcomes, including the possibilities for co-benefits from greening like social care, cheap and culturally specific foods, and improved safety and community cohesion. These examples suggest pathways how to plan NBS for other ways of being, feeling, living and knowing green spaces.

In our introduction, we argued that the *greening* and *upscaling* pathways may contribute to procedural and distributional justice. However, our cases show only limited examples of such contributions to environmental justice. While the greening pathway decentralises some of the decision-making power to the community level, this is often limited to very localised decisions. The improved fit between green areas and practices and community values and needs (Fortnam et al., 2019) did however contribute to more equitable distribution of locally important co-benefits of urban greening, such as improving social cohesion and providing inexpensive and healthy food (Mattijssen et al., 2018; Raymond et al., 2017). However, because the municipalities and some of the housing agencies - being located in social welfare states in North-Western Europe – already significantly invest in green spaces and take responsibility for larger green structures such as urban parks (Pauleit et al., 2019), actual contributions of Mosaic Governance to distributive justice of NBS and its benefits are likely more limited than in other, less affluent, societies (Tozer et al., 2020). Here, the most relevant contribution may lie in preventing ecological gentrification effects of urban greening and suggesting alternative development strategies with a focus on co-benefits, community-based place-making and place-keeping and strengthening place-based community identities as suggested in "just-green-enough" approaches (Curran & Hamilton, 2018).

5.2. The importance of a wider framing of justice

Current literature on just transitions and NBS focuses on the need for equality or equity in the distributive, procedural and recognition dimensions of environmental justice (Frantzeskaki, Kabisch, et al., 2016; Patterson et al., 2017). However, our results suggest that the relationship between NBS and justice is more complex than is often considered from an environmental justice lens. Our cases reveal options to capitalize on the potential of NBS to advance social justice, not only through NBS contributing to socially relevant outputs, such as social cohesion or integration (Gentin et al., 2019; Peters et al., 2010), but also to strengthen social and cultural capital of the volunteers as an explicit aim and/or outcome of community-based place-making and place-keeping (Smith & Stirling, 2018). Especially the empowering, bridging, and linking pathways create opportunities with respect to a wider array of social, cultural, economic, and political co-benefits (Table 2). For example, the empowering pathway resulted in improved job skills and employment opportunities for youth in Urbanplanen, and enhanced leadership skills and social and cultural capital for vulnerable people in Overvecht and Ronna respectively. Bridging contributed to cross-cultural learning and social cohesion in Urbanplanen, strengthened social networks among marginalised groups in Overvecht, and new cross-cultural relationships in Ronna. Finally, linking provided access to municipal and housing resources for residents in need in Urbanplanen. It also created connections between social workers and highly marginalised residents in Overvecht, as well as employment opportunities for newcomers to Ronna, albeit these were somewhat limited.

Adopting a wider, or more comprehensive, framing of justice in the

design and implementation of NBS matches well with the practical re- alities and ambitions of the marginalised groups or communities that would be affected by urban greening initiatives. As seen in our case studies, such as the "radical inclusiveness" of Food Garden Overvecht, and consistent with many broad national and transnational social movements concerned with aspects of environmental justice (Mattijssen et al., 2017; Temper et al., 2018), such groups are often dealing with multiple issues and find inspiration in coupled environmental and social values and goals.

These broader social justice implications suggest that Mosaic Governance of NBS in marginalised communities may hold potential to advance social and environmental justice in equal measure. The results also demonstrate the importance of a wider framing of justice in the design of NBS as well as in debates about ecological gentrification. Questions around equality and equity must extend beyond environ- mental benefits and risks to encompass the full suite of potential social, cultural, economic and political benefits and disbenefits found in any given urban environment. Such a comprehensive view on justice is needed to account for linkages between environmental and social justice and aid in avoiding transitions that are disempowering or reinforcing exploitative institutions, social structures, and economic relations (Anguelovski et al., 2020; Avelino, 2017).

5.3. Pathways are dependent on long-term engagement, adaptivity and reflexivity

The contribution of the empowering, linking and bridging pathways of Mosaic Governance to environmental and social justice is contingent on institutional commitment to long-term engagement, adaptivity in NBS planning and design, and reflexivity among planners and local stakeholders. Recent papers call for the strengthening of relational and reflexive capacities of public institutions, enabling multiple arenas of discussion (Kiss et al., 2022; van der Jagt et al., 2021) and the impor- tance of building long-term institutions for brokering power and addressing sustainability challenges (Chambers et al., 2021). The Urbanplanen case demonstrates the possibilities for strengthening these capacities not only across public institutions, but also across non- governmental organisations such as Partnership and The Fathers Group, as well as architects and other designers commissioned to sup- port the design of NBS. Combining the diversifying and linking pathways helps institutions to become more reflexive and understand alternative worlds, while empowering enables alternative visions to be developed internally and articulated externally. Reflexively responding to local community disenfranchisement from formal decision making, recent community engagement strategies in Urbanplanen have been better tailored to the needs of specific groups, including fathers, migrant families, and housebound women. Such partnerships are crucial to procedural justice and softening tensions between diverse groups (Raymond et al., 2022). They help to redistribute power by embedding marginalised voices in technocratic narratives and policies (Chambers et al., 2021; Randrup et al., 2020), in this case held by the residents association, architects and the City of Copenhagen.

In contrast, investment in knowledge brokers and other non- government intermediaries to facilitate long-term engagement in NBS design and management was lacking in Ronna. Here, it is not clear if and how multiple actors have learnt from their experiences around com- munity engagement. Local housing associations have been the main drivers and these engagements have often been viewed as fragmented and tokenistic, and in-turn contributed to loss of trust in urban planners (Mack, 2021). Ronna in this way shows some of the negative conse- quences of a rigid approach to engagement where Mosaic Governance principles of adaptivity and reflexivity have been insufficiently consid- ered in NBS planning.

5.4. Mosaic Governance context impacts justice outcomes

The contribution of Mosaic Governance to institutional reflexivity and social and environmental justice depends on its actual manifestation in the different cities, and the place-based reconfiguration of elements from self-governance, network governance, and hierarchical governance (Toxopeus et al., 2020). In Urbanplanen, Mosaic Governance is highly institutionalised with semi-governmental institutions such as "Partner- ship" acting as key *bridging organisation* (Connolly, 2018) between community, municipality and the state. Strong and long-term collabo- rations exist, and substantial resources are available. However, collab- oration is based on the exchanges of "bundles" of resources, values, and knowledge, in which the amount and direction of available resources are guided by governmental values and policies. We label this approach *embedded Mosaic Governance.* This approach contributes significantly to socio-economic empowerment. It provides long-term engagement and stability in structures and resources, also facilitating governmental reflexivity. However, diversification of values and practices, and thus actual contribution to recognition justice, is more limited due to its focus on governmental aims.

In contrast, policy instruments in Overvecht are based on a narrative stimulating local initiatives as manifestation of community-based participatory democracy. In this *community-centred Mosaic Governance* approach, community ambitions take centre stage. The provision of funding and access to land is largely uncoupled from governmental values and discourses, and the power to decide on aims and objectives of green initiatives lies with the community. This provides a favourable context for the diversification of practices. However, because of limited, fragmented and short-term resources, actual justice outcomes strongly depend on the motivation, capabilities and social capital already present in the local community. Without a minimum of social capital and trust, contributions to empowering, linking and navigating vertical power- relations may prove difficult, as the Ronna case indicates. In addition, governmental reflexivity may be limited by the lack of structural support and long-term engagements. Finally, the Ronna case can best be typified as *Mosaic Governance in the making.* While the municipality and housing associations are interested in developing strategic networks with the residents in Ronna to strengthen active citizenship, this is in an early stage and significantly hindered by previous experiences and lack of trust (Mack, 2021).

5.5. Blind spots

Successful collaborative governance depends on the wider gover- nance context. While the examples of scale-crossing collaborations and institutions provided in our cases may be inspirational to many cities and countries, the Mosaic Governance approaches described in this article might not be easily translatable to different contexts, for example to cities or countries with a lower level of trust in governments or lower levels of social and cultural capital in communities. The Ronna case il- lustrates the challenges of establishing Mosaic Governance if there is a tradition of top-down steering in urban green space management with local initiatives having little interest and efficacy or formal decision- making power to change the rules of the game. This suggests that sim- ply providing a budget for local initiatives is not enough, there needs to be a concerted effort to build social capital and trust to achieve more inclusive NBS governance. The significance of the challenge becomes even more profound when zooming out to other global regions or na- tions that might have less of an interactive governance tradition than northwest Europe (Pauleit et al., 2021), or where the planning system is underfunded and therefore inadequate (Shackleton, 2021).

In addition, there are indications that not all our cases represent optimal examples of Mosaic Governance. First, we observed limited policy learning from successful initiatives. For example, the successful Greening Courtyard initiative in Overvecht was considered a fixed-term project rather than a long-term service. Consequently, the project could

not be replicated in other social housing complexes in the neighborhood. Second, some socio-cultural groups were difficult to reach or keep engaged, which was due to social norms, e.g. prohibiting 'unnecessary' mingling of males and females in green space activities, or limited resources. Third, power sharing was achieved to varying extents, with Urbanplanen and Ronna being more entrenched by the political agenda and hegemonic discourses than Overvecht. Whereas independence from municipal discourses is often conducive to recognition justice, it could also lead to undermining municipalities' capabilities to govern democratically based on priorities, such as biodiversity or climate action, transcending individual neighborhoods (Toxopeus et al., 2020). Finally, at least in one of the cases (Overvecht), we also encountered examples of local urban greening initiatives, not discussed in this paper, that were not clearly conducive to environmental justice, but prioritised other goals (e.g., biodiversity). This suggests the need for more in-depth research into sensitivities of local NBS initiatives to internal power imbalances and their inclination to take justice issues into consideration.

6. Conclusions

It is now generally accepted that in developing and implementing nature-based solutions, environmental justice issues, including possible ecological gentrification or other negative social impacts need to be considered. In this paper, we have identified six possible pathways through which Mosaic Governance can contribute to just transitions towards sustainable cities: Greening, Diversifying, Empowering, Bridging, Linking and Scaling. We conclude that from an environmental justice perspective, Mosaic Governance especially contributes to recognition justice, through diversifying NBS practices in alignment with community values, needs and aspirations. This diversity is very much self-organised and initiated from local communities, instead of facilitated through participatory planning or plural valuation techniques.

However, we also conclude that the environmental justice discourse needs to be aligned with the wider social justice discourse, highlighting the need for a wider framing of justice in the development of NBS as well as in debates about ecological gentrification. We show how the empowering, bridging, and linking pathways successfully capitalize on the potential of NBS to advance social justice in cities. Especially in marginalised communities, co-development of NBS may advance social justice and environmental justice in equal measure and strengthen social cohesion or empower marginalised groups towards increased participation in society and economy. Actual contributions to justice very much depend on how Mosaic Governance approaches are enacted, including the power relations involved. Trade-offs may exist between a community-centred approach to Mosaic Governance, contributing especially to diversifying practices and bridging across communities, and an approach where Mosaic Governance instruments are embedded in hegemonic governmental discourses, contributing especially to individual and community empowerment.

CRediT authorship contribution statement

Arjen E. Buijs: Conceptualization, Investigation, Methodology, Writing – original draft. **Natalie M. Gulsrud:** Formal analysis, Investigation, Writing – original draft. **Romina Rodela:** Formal analysis, Investigation, Writing – original draft. **Alan P. Diduck:** Writing – original draft. **Alexander P.N. van der Jagt:** Investigation, Writing – review & editing. **Christopher M. Raymond:** Conceptualization, Funding acquisition, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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