

Masters in Business and Social Impact



Master Thesis U.S.E.

Enablers of justice in the nature-based real estate sector in The Netherlands

30 June 2023

Chayanika Perera

d.c.d.perera@students.uu.nl

Supervisor: Dr. Helen Toxopeus

Second reader: Dr. Katrin Merfeld

Abstract

Nature-based-solutions (NBS) have been proposed as a promising pathway to building resilient, sustainable, and climate-adaptive cities. However, the recent academic scholarship is increasingly becoming aware that the impacts of NBS are not uniformly positive. This is because NBS tends to be costly, require high maintenance, more importantly can result in green gentrification and extend to a wider justice discussion spanning a diverse range of justices, including distributional, procedural, recognition and ecological justice. Therefore, there is a growing need to gain a deeper understanding of the wider justice interaction within the NBS paradigm, and re-orient the NBS implementation to include these justice aspects going forward.

Motivated by the recent emergence of real estate projects that successfully contribute to creating justice and remedying past inequalities, this research pioneers exploration into the intersection of real estate justice in NBS implementation. Through 11 semi-structured interviews from a carefully curated, diverse range of NBS practitioners and field notes from Urban NBS Day 2023 event organized by Utrecht University and Eindhoven University of Technology, this research aims to answer what enables justice in the nature-based real estate sector in The Netherlands.

The results show that receiving government support, harnessing knowledge, robust engagement, conducive organizational management, and partnerships help enable justice in the real estate sector in The Netherlands. This study offers three main contributions to the current academic discussion. First, it provides an overview of the debate on negative impacts of NBS in real estate. Second, it explores the wider justice implications of NBS in the real estate sector. Third, it unveils the factors that enable justice in the nature-based real estate projects. Through evidence, it shows that specific enablers can mitigate or rectify injustices arising from the conventional implementation of NBS in real estate.

Table of Contents

1. Introduction	4
2. Literature Review	7
2.1. Green gentrification.....	7
2.2. Wider justice issues	8
2.3. Justice typology.....	9
2.4. NBS reorientation for justice.....	11
3. Methodology.....	13
3.1. Research design.....	13
3.2. Sampling technique	13
3.3. Data collection.....	13
3.4. Data analysis	14
3.5. Reliability, validity, and ethical considerations.....	14
4. Results and interpretation	16
5. Discussion and conclusion.....	32
References.....	36
Appendix A.....	43
Appendix B	49
Appendix C	50
Appendix D.....	54

1. Introduction

The share of the world's population dwelling in cities is expected to rise from 55% in 2022 to 80% by 2050 (World Economic Forum, 2022) and as this residential shift accelerates, many countries will be tested on their ability to address daunting challenges such as housing, energy systems, transportation and other infrastructure (United Nations, 2018). At the same time, rapid urbanization gives rise to severe environmental degradation, causing air pollution, water pollution, noise pollution and waste disposal concerns, as evident in the case of China (Han et. al., 2014) and India (Uttara et. al., 2012). This is why sufficient attention and productive local practices should come into play ahead of heavy pollution (Zhang et. al., 2022).

The situation in The Netherlands, where loss of nature and biodiversity in city areas due to land use and fragmentation (CLO, 2016), is no different to most other countries, and in fact is exacerbated by a long-drawn housing shortage. Economisch Instituut voor de Bouw (2020) warns of escalation of tension in the housing market in the coming years as the number of households are expected to rise by 335,000 between 2020-2023 while only a net 230,000 houses are expected to be built. The ongoing nitrogen crisis, with The Netherlands reporting the highest nitrogen emissions per square kilometer within the EU (Rabo Bank, 2020) adds on to the conundrum.

The current housing crisis in The Netherlands extends beyond insufficient supply of overall housing. Social housing, which is a subsidized form of housing meant to protect low-income earners with rent capped at the current limit of €808.06 per month (Ministry of the Interior and Kingdom Relations, n.d.) continues to steadily decline since 2012 and is expected to be only 25.7% of all homes by 2030 (NL Times, 2023b). This social housing crunch not only places vulnerable communities further at the bottom of the pyramid, but also drives social inequality higher among middle-income groups whose income is too high to qualify for social housing but too low to qualify for homeowner mortgages (Boelhouwer, 2020). People are taking to the streets to protest as years of unproductive government policy has skyrocketed housing prices, causing prices to surge by 63% whereas average household income growth expanded only at a rate of 25% in the 2015-2021 period (Boztas, 2023).

Furthermore, the existing Dutch nature policy lacks a comprehensive and coordinated national strategy for raising the quality of urban and infrastructure-adjacent nature (Council for the

Environment and Infrastructure, 2022). Only a limited number of municipalities are actively working towards improving the quality of nature in and around their cities. As a result, nature areas are becoming more difficult to reach; 6 out of 10 Dutch nationals have never, or almost never visit a nature reserve but would like to do so. Especially communities in more disadvantaged neighborhoods have less access to local green spaces (De Vries et al., 2020).

Many of these issues are interconnected. Rapid urbanization causes biodiversity loss and this loss in turn prevents new houses from being built in order to mitigate the ensuing damage, which then leads to a housing shortage (Crum, 2021). As a solution that bridges all these challenges and promote synergies between the Sustainable Development Goals, NBS have been proposed (Seddon et. al., 2020). NBS are actions inspired by, supported by and copied from nature, and they provide environmental, social and economic benefits simultaneously by blending nature into cities, landscapes and seascapes (Council for the Environment and Infrastructure, 2022). When applied in the real estate sector, they have the capacity to help biodiversity recover, or even further improve, when they are truly and widely incorporated into the "urban fabric" i.e. construction projects and different urban infrastructures (Thomson & Newman, 2020). Seddon et. al. (2021) acknowledges NBS as a popular, integrated approach to climate change and biodiversity loss, and provides four guiding principles to increase its effectiveness.

The discussion among existing literature on the effects of NBS when incorporated into many aspects in life, including real estate, is diverse. For example, Bockarjova et. al. (2022) explored 85 NBS projects implemented across Europe and found that a bulk of them generated attractive social returns on investment. Kolokotsa et. al. (2020) looked at 55 NBS case studies and attributed psychological benefits such as lower stress, quicker recovery from psychological events, improvement in self-esteem and physiological benefits such as reduction in cardiovascular diseases and reduction of respiratory problems, to living in close proximity to natural environments.

However, the effects of NBS are not all positive. Nature-inclusive buildings represent a natural process that is replaced by a technical system, hence they can also trigger higher costs and higher maintenance (Wohlleben, 2018; Timmermans, 2021; Jacobs, 2021; as cited in Koppes, 2022). There are also concerns over cost-effectiveness and credibility compared to engineering innovations as well as over their climate change resilience (Seddon et. al., 2020). Furthermore,

a city becoming more attractive due to NBS can drive up property values and thereby violate social justice (Martín et. al., 2020).

Bauer (2022) explains that as an effective means of addressing societal, economic and ecological challenges, this triple win posit of NBS tends to conceal the possible resultant injustices that arise from them. Therefore it is important to first make a close link between environmental justice and NBS. Urban green interventions can result in the formation of exclusive elite green enclaves and green gentrification, while depriving lower-income and minority groups of access to these environmental privileges (Anguelovski et al., 2019). Green gentrification arising from urban greening efforts can also lead to the marginalization, exclusion, or displacement of vulnerable community members (Pearsall, 2018). Furthermore, if they are implemented without regard to local histories and contexts, it can worsen existing injustices by demolishing complex self-organizing ecological systems, seizing indigenous knowledge, and prioritizing technical approaches to converting nature into infrastructure (Grabowski et al., 2022).

While the growing expanse of literature that are beginning to highlight the concerns regarding NBS is commendable, the topic of justice as part of NBS is still nascent, as much as the topic of NBS itself is still a relatively new phenomenon. While it is well-established that NBS is a useful tool for resolving diverse socio-ecological obstacles, the dialog around the emergence of justice-related vulnerabilities that stem from these NBS interventions is still implicit (Wijsman & Berbés-Blázquez, 2022). As a result, there is not yet much empirical foray into how these vulnerabilities are at play, specifically in the real estate sector. Snep et al. (2023) state that there is an increasing demand to enhance the understanding of NBS knowledge within the social housing sector, particularly among housing corporations, local authorities and landscaping firms. Kabisch et al. (2016) confirms this growing need for future science and policy agendas to include the socio-environmental justice and social cohesion considerations when disbursing NBS in society, by taking into account the integrative governance approaches and encouraging the participation of transdisciplinary, diverse actors. Given the existing housing crisis in The Netherlands and the climate crisis concerns, it is pivotal that we explore ways in which we can maximize the utility of NBS as a tool to bring about spatial and ecological harmony within the real estate sector of the country, and this appears to be an untapped territory in the existing

literature. This research therefore intends to fill the aforementioned research gap by answering the specific research question “what are the enablers of justice in the nature-based real estate sector in The Netherlands?”

The inductive nature of this research question calls for a qualitative study, and I have sought to locate answers to this question by examining a range of data sources to enhance credibility, including interviews, surveys, other documents and field notes from the Urban NBS Day 2023 event (Appendix C). This research contributes to the growing pool of literature that is written on justice within the NBS paradigm. My findings will shed light on a range of projects that successfully balanced between justice and co-benefits of NBS, and reveal what enabled this great balance for them. Future researchers can use this study as a launch pad to develop foolproof frameworks for NBS real estate arrangements, while policy makers can use these results to nurture the conditions that facilitate successful implementation of more equitable nature-based real estate projects in the future.

2. Literature Review

NBS are championed as a medium through which serious challenges to our planet such as climate change and loss of biodiversity can be addressed (Bockarjova et. al., 2020). Ecosystem-related approaches with the NBS family can be used to combat many specific societal challenges such as water security, food security, human health, disaster reduction and climate change (Cohen-Shacham et. al., 2016). NBS offer promising potential for advanced urban planning to accommodate complex urban challenges, and enable resilience building at the same time (Frantzeskaki et. al., 2019).

However, the recent literature opens the dialog on some of the limitations of NBS, signaling that it cannot serve as a panacea, while drawing the attention to some of the negative impacts resulting from NBS interventions.

2.1. Green gentrification

Green gentrification, a process which displaces the poor due to the influx of affluent people who are attracted to the area as property prices surge after urban green urban renewal, is one of the most common negative impacts that result from green interventions; this deprives poorer residents of the opportunity to be a part of the green real estate (Bockarjova et. al., 2020). In

their paper, titled *Property Price Effects of Green Interventions in Cities*, the authors demonstrate how some of the green interventions increased local property value by maximum 20% compared to properties that did not undergo green interventions.

The early supply-side catalyst for such gentrification emerged from rent-gap theory where landlords attempted to minimize re-investment in infrastructure in order to maximize profits, resulting in a rent gap that attracted investors who bought and redeveloped the land to sell it to buyers with high income; the demand-side response that evolved as a result attracted customers with high net worth to develop a preference for such properties, as a consequence of growth in white-collar work and displeasure with regard to life in suburbia (Quinton et al., 2022).

Gentrification spirals into a wider societal issue because this results in the displacement of vulnerable, low-income communities at the expense of individuals who have adequate income but are confronted with tight housing possibilities (Marcuse, 2015). This unequal distribution of environmental benefits and drawbacks leads to the creation of environmentally rich and poor communities and in return, results in a feedback loop where the rich living in ecologically abundant areas grow ignorant of the unintended negative consequences of NBS, while the ecologically poor communities continue to suffer from environmental degradation, diminishing health and reduced livelihood capabilities (Gould & Lewis, 2016). This not only leads to a situation of environmental inertia, but also deprive society of the opportunity to improve their environment, which ultimately deepens existing inequalities. Especially, the residents that are marginalized over prolonged periods suffer the worst impacts on their health and wellbeing due to green gentrification, as they feel alienated from green spaces and tend to use it less compared to the newcomers (Jelks et al., 2021).

Therefore, a public policy response is needed to address these challenges and a deep understanding of the social injustices that occur at various levels such as social justice level, individual ethics level and professional ethics level (Marcuse, 2015).

2.2. Wider justice issues

The negative impacts of NBS are not limited to gentrification. In order to develop a comprehensive insight of NBS in an equity lens, it is imperative to first develop a deeper

understanding of the many aspects of how justice is violated in the green space, beyond gentrification and income levels.

NBS's capacity to achieve sweeping transformational changes towards sustainability and justice in cities remain doubtful as NBS in urban areas have to confront the complexities of social exclusion, neoliberal governance and growth philosophies (Sekulova et al., 2021). Recent studies show that municipalities often utilize NBS to rejuvenate deteriorated areas and entice new real estate investment through green branding, but leaves more complex issues involving land use and unrestrained urban development, unattended. And despite the assertions about the resultant public benefits, these interventions occur at the expense of the most socially and racially vulnerable urban groups, through creating green gaps in the property market (Anguelovski et al., 2018). For example, large parks located near crime zones amplify sense of insecurity, while for some residents of color, green spaces often symbolize traumatic histories of disinvestment, racial violence and exclusion (Tozer et al., 2020).

Furthermore, green spaces are not equitably distributed within cities and access to these spaces is often characterized by significant stratification based on factors such as income, ethnicity, race, age, gender, disability, and other dimensions of diversity (Wolch et al., 2014). This has widespread consequences on a range of issues such as public health. Environmental practitioners should therefore prioritize strategies that explicitly focus on the social justice and environmental goals defined by the very groups that suffer the consequences of environmental burdens, a strategy that is known as 'just green enough' (Curran & Hamilton, 2012). This demands further inquiry into how NBS particularly affects a broader spectrum of specific communities including immigrants, elderly people, linguistically and economically isolated populations and disabled individuals (Kato-Huerta & Geneletti, 2022).

2.3. Justice typology

Justice is broadly conceptualized along three salient categories when it comes to urban NBS literature: distributional justice – how access, costs and benefits of green and nature-based amenities are distributed in society; procedural justice – the extent of civil participation in decision-making; recognition justice – the acknowledgement of different needs, values, and preferences that vary based on individual identities and characteristics such as age, gender, race, and ethnicity (Toxopeus et. al., 2020).

Bauer (2022) provides us an extended understanding of these three primary categories of justice. Distributional justice, stemming largely from John Rawl's Theory of Justice in 1971, is the predominantly visible justice type in academic and practical contexts, and is violated when unequal access marginalizes a societal group. Availability, attractiveness and accessibility should be considered where distributional justice is concerned, and these three are not mutually exclusive either. For example, parks or green spaces are not available for marginalized communities most of the time. And even when they are available, the use of this space also depends on how accessible and how attractive it is. Procedural and recognition justice go hand-in-hand most of the time, because participation can enhance recognition, while recognition is essential to participate. However, Bauer claims that both procedural and recognition justice are currently significantly underrepresented in academic literature.

While implementing NBS in historically marginalized communities marks a commendable starting point to addressing distributional justice, the integration of NBS takes place at the intersection of far more diverse social practices and structures that are defined by characteristics including race, nationality, gender, sexuality, class and ability (Wijsman & Berbés-Blázquez, 2022). Therefore, the need to look beyond distributional justice and include other spheres of justice such as procedural justice and recognition justice is now rising to prominence.

This paves way to discuss the recent emergence of even more nuanced types of justices in the environmental justice scholarship, such as restorative justice and ecological justice. Restorative justice or reparative justice, looks at how NBS policy and planning can be utilized to remedy the existing injustices (Juhola, 2022). Environmental degradation results in depletion of natural capital, and exacerbates poverty among marginalized societies that depend on those natural resources for their livelihood; the restoration of these resources through reparatory NBS activities help uplift these communities out of poverty and forge economic equality (Nickayin et al., 2023). In essence, this means that the implementation of restorative justice would lead to the eventual achievement of distributive justice as well.

Ecological justice deals with the human interactions with non-human entities, and characterizes the human moral obligations towards other species (Jason Antony Byrne, 2010). It recognizes the interconnectedness and interdependency of all species and broadens the moral considerations beyond humans to include animals, plants, and even non-living entities such as

rocks, rivers, and oceans. The current justice scholarship adopts a more human-centric approach to NBS and therefore there is a growing need to recognize and incorporate the capabilities and needs of non-human entities into future NBS, by utilizing the ecological input of transdisciplinary teams in the design and decision-making process of NBS (Pineda-Pinto et al., 2021).

2.4. NBS reorientation for justice

While NBS is not a panacea for climate-related socio-spatial issues, the aforementioned drawbacks do not necessarily make it redundant either. Cousins (2021) affirms the importance of NBS as a means of achieving sustainability and resilience for cities and communities, in order to address climate change and explore novel approaches to governing, building infrastructure, and developing plans and designs. To achieve this, he calls for re-orientation of NBS into just NBS, which he defines as harnessing nature to transform socio-spatial inequalities into opportunities to build progressive, cohesive, and sustainable communities.

Anguelovski and Corbera (2022) confirm this view and look at principles and conditions under which NBS as a policy tool can deliver justice benefits to rural and urban areas, so that nature-enabled dispossession can be avoided. The authors highlight eight promising principles and approaches, including no land speculation & associated green gentrification, long-term green inequalities tackled, no greenwashing & privatization of nature for profit, in order to facilitate justice-inspired governance of NBS. Particularly regarding the real estate aspect, as many research display that private firms, investors and developers grab nature and use it as a means of raising land value and profits, the authors argue that NBS projects must be decoupled from profit-driven and speculative dynamics.

This paves way for a complex discussion as creating mass-scale representations of inclusive, diverse, and fairly distributed forms of nature, could in fact lead to more economic costs than gains (Sekulova et al., 2021). Simply put, large-scale investment in urban greening cannot generate a return within financial markets if it is not linked to some category of real estate or the commercial retail industry, and this is paradoxical. This leads to the question; how can then private companies together with public and other agents effectively be a part of the solution for justice in the NBS real estate sector?

In the Dutch context, especially with rising housing protests (NL Times, 2023a; Van De Klippe, 2021), the analysis of Pearsall and Anguelovski (2016) is useful in understanding how attempts to criticize, contest, and resist environmental gentrification has an overlap with proven environmental justice strategies. The authors call for deeper understanding of how and why activists contest technocratic and political delivery of sustainability, so that governments and various other actors can work towards more equitable outcomes for urban greening efforts.

Currently the debates about the role of green interventions and other NBS as a driver of green gentrification is very limited, while there is also a large research gap for counter measures to respond to green gentrification (Cucca et. al., 2023). Interestingly, the existence of some urban real estate projects that managed to successfully address some of these socio-spatial inequalities effectively motivate further research into NBS with a justice lens. This query is not fully explored yet.

Implementing NBS in social housing significantly contributes to distributional justice, while addressing procedural and recognition justice is also important in order to make the green spaces meaningful for their residents (Snep et al., 2023). Through observation of three living labs, their research looked at how the effective implementation of NBS in Dutch social housing can result in distributional justice, particularly given the current physical, social and financial limitations. The authors illustrate that NBS has the capacity to raise the liveability of an urban environment for individuals with low socio-economic status, by providing a diverse ecosystem. The authors emphasize that drawing on NBS knowledge is therefore crucial, but the existing knowledge on this is insufficient.

It would then justify an explorative inquiry into what factors that enabled some of the successful archetypes to effectively balance the NBS aspect with the justice aspect. In order to materialize the full potential of NBS and ensure all dimensions of sustainability is achieved, solutions must be co-developed together with all relevant stakeholders, by harnessing their experiences (Nesshöver et. al., 2017). This is why this research will focus on closely working with various stakeholders involved in the nature-based real estate projects, in order to extract information on what enabled them to become successful urban NBS real estate models that delivered well on the justice front.

3. Methodology

3.1. Research design

In line with the explorative nature of the research question, a mixed-method approach was followed to gather qualitative data, using a combination of semi-structured expert interviews, open-ended surveys, and the author's field notes from the Urban NBS Day 2023 (Appendix C) hosted by the Utrecht University and TU Eindhoven.

3.2. Sampling technique

For the interviews, a purposive or judgment sampling technique was employed, where specific individuals were deliberately selected to obtain specific information that cannot be provided by other choices (Taherdoost, 2016). The participants were selected given their extensive knowledge and experience with regard to nature-based real estate projects that address 4 primary categories of environmental justice: distributive, procedural, recognition and ecological. In order to ensure comprehensive coverage of various domains of NBS real estate, the sample for this study comprised of participants who performed a wide spectrum of roles in nature-based real estate, encompassing construction, strategic management, academic research, real estate investment, and municipality officials. See Table 1 in Appendix A for the detailed description of each participant and why they were selected.

The field notes were collected at the 2nd Annual Urban NBS Day 2023, organized by the Utrecht University and TU Eindhoven and held on 31st May 2023. The event was a meeting place for practitioners of many facets in the NBS field, including municipalities, NGOs, architects, real estate planners, as well as for researchers and students. This year's theme was socially- and nature-inclusive real estate, and the goal of the event was to enable the knowledge exchange, to collaboratively generate innovative ideas and to drive future partnerships to implement NBS in the real estate sector (Utrecht University, n.d.). The expert panel discussion allowed the author to gain a deeper understanding of the various justice aspects in the NBS real estate sector, and the author was also able to receive feedback from various NBS real estate practitioners upon presenting a brief summary of this research.

3.3. Data collection

Altogether 11 responses were collected; out of these, 2 were interviews conducted by the author, 3 were open-ended surveys conducted by the author, another 3 were from a YouTube telecasted webinar (De Warren, 2020), and 3 were interviews conducted by Utrecht University's EWUU Alliance research team that is researching on financing socially inclusive urban nature-based solutions in the architecture/real-estate industry.

The semi-structured interviews conducted by the author were conducted based on an interview guide (Appendix B) that was drafted ahead of the interviews, while the open-ended surveys were based on the same set of questions as the interview guide which were emailed to the recipients. The semi-structured nature of these questions allowed the author to cover specific ground and ask targeted questions, but at the same time allowing a considerable amount of freedom for the respondent on how to reply (Bryman, 2010).

All the interviews were audio recorded, then transcribed using Assembly AI platform. Where the original interview was conducted in Dutch, the transcriptions were translated to English using DeepL platform and Say Hi app.

The interview guide starts with requiring a brief introduction of the role of the respondent, and then spanning to the major challenges they faced about the project and how they addressed those, and what worked well for their project in order to be nature-and socially-inclusive. Then the respondent is asked what they would improve next time, and ending with asking what support they wished they had when the project was undertaken.

3.4. Data analysis

The 11 responses were coded using NVivo 14, a statistical and qualitative data analysis software. In vivo coding was used as basis for the initial coding process, where attention was given to the participants' own words and phrases for the lower-level code categories, which is a type of inductive coding technique that allows codes to emerge from the data itself instead of using a predetermined set of codes (Thomas, 2006). 16 such codes were developed at the initial stage of in vivo coding. These codes were then categorized into 5 broader themes using thematic analysis (Alhojailan, 2012).

3.5. Reliability, validity, and ethical considerations

To add credibility and depth to the data collection, the response gathering was done in conjunction with desk research and was also the notes gathered from the field notes at the Urban NBS Day 2023. This diverse array of sources was utilized in order to achieve triangulation and to maintain the qualitative rigor of the research (internal validity) by adding depth to the data collected (Fusch et al., 2018). Also, by ensuring coherence between theory and observation wherever necessary, internal validity was further cemented.

As this research is context-driven, for example its geographic reach being limited to The Netherlands, and because of its relatively limited sample size due to the novelty of the topic, it may be difficult for this research to be replicated and to be generalized (external validity) but maybe transferable in similar contexts. This difficulty of replicability and often difficult transferability even within the same context but at different times, tend to be a common drawback in qualitative research, and therefore this research has attempted to compensate for this by providing thick descriptions of narratives where possible, as recommended by Clifford Geertz (Bryman, 2010).

With regard to ethical concerns, the names of the interview participants were kept confidential throughout the report by anonymizing them.

4. Results and interpretation

This chapter explains the results of the conducted study. 16 initial codes were identified as factors the participants perceived that enabled justice in the NBS real estate sector. They are: receiving financial support from government, relaxing strict laws by government, government performing the role of intermediary, government maintaining its integrity, gathering experience, availability of knowledge pools, leveraging on knowledge institutes, coherent communication, high degree of community involvement, high degree of social cohesion, employment of mixed business models, employing a wide range of funding sources, fostering diverse teams, ensuring good green management, ensuring good governance, and forming partnerships. They were then categorized into five broader themes. See Appendix D for visual representation of the codes. Each of these 16 factors are examined in detail below, classified under their respective umbrella theme.

4.1. Receiving government support

Receiving government support was one of the most highly regarded enablers of NBS real estate justice, as every participant cited this in their responses in multiple ways. All of the participants had interacted with the government as a major stakeholder, in the layer of municipalities, and had received support from these municipalities in multiple manners in their endeavor to address NBS justice, which are explained below.

4.1.1. Receiving financial support from government

Receiving financial support from municipal governments for NBS projects was perceived as one the most facilitating factors. This code displayed the highest number of code references. Respondent 2 highlighted that the biggest challenge to their nature-and socially-inclusive project was making it financially feasible. In this sense, financial support from state goes a long way in releasing part of the high-cost burden of NBS to make it available to low-income groups and other underserved communities, and thereby facilitating distributional justice. From an academic researcher's point of view, Respondent 8 stated that many NBS real estate actors wish for "some slack in the financial regime", especially when it comes to social housing.

Government financial support can be provided in multiple ways. Respondent 5 stated that it was government support that enabled them to acquire affordable land as Netherland's first

housing cooperative. The municipality facilitated this by exercising its discretion to make the necessary calculations to make the plot affordable for medium-rent housing. This is important because land is mostly owned by various private actors such as housing corporations, which are driven by profit motives and hence does not tend to pursue projects that cater to vulnerable communities. By making the land more affordable for community-led and more sustainable-driven movements such as cooperatives, which are financially-less-capable to begin with, the municipalities facilitate distributional justice.

Government financial support can also be offered via special loans offered to fuel more private sector participation in the underserved justice areas in real estate; both Respondent 3 and Respondent 5 explained that the kick-starter loan offered by the government enabled them to start their projects before the bank funding set in. Where the government does not have enough funds, it is also in a position to make arrangements for new forms of collective finance channeled by other parties to enable just NBS projects; Respondent 5 mentions the initiative underway by the City of Amsterdam to set up a housing cooperative fund to which all housing associations can contribute. Respondent 1 mentions that subsidies are another way governments can provide financial relief to private actors who want to operate in social housing, and thereby channel more distributional justice.

4.1.2. Relaxing strict laws by government

Relaxing existing laws stimulate fresh developments, making them accessible to parties which were not able to access them before. This enables both distributional justice as well as recognition justice. Respondent 5 stated that the Municipality of Amsterdam opened up the existing laws and allowed a housing cooperative to compete for a plot of land for the first time in 2018, which is what enabled them to form a new organizational structure to realize their nature-based real estate project. This enabled an entity that is not a commercial developer to acquire land and commence an NBS real estate project for the first time, where the absence of profit motive enabled distributional justice.

Some of the existing strict laws can act as a hindrance to promote new innovations that would accelerate justice in the NBS paradigm. 2 respondents cited that having to adhere to strict laws limited them from experimenting with innovations that would bring down the cost of the projects, and thereby prevented the achievement of distributional justice. Respondent 3

mentioned that law often prevented them from cutting down some of the invasive trees, which often delayed the project and the company had to spend resources on fighting action groups in court. This depleted their funds that were meant to keep the cost of the project low, to increase distributional justice. Respondent 5 stated that having to adhere to the stringent requirements by the Municipality of Amsterdam was one of their biggest challenges, and that the municipality is now in the process of re-evaluating the need to demand such strict requirements. The same municipality is also re-evaluating how to speed up the communication of the tender-winning announcement to the losing parties so that their resources would not be wasted waiting for the news for too long. These initiatives are intended to encourage more private actor participation in just NBS activity in the real estate sector, by making the processes less bureaucratic.

4.1.3. Performing the role of intermediary

Respondent 5 states that the government, particularly the municipalities, “playing the role of an intermediary that steers, guides and even a director”, is beneficial for NBS entities because of the level of authority it can channel in acting as the center pillar that brings together a diverse set of other NBS actors. Respondent 8 confirms this by highlighting the role of the government in “creating an upward spiral in NBS projects, so that more care, more contact and more effort can be disbursed” to address justice challenges.

The municipalities can utilize this discretion as an authoritative intermediary to prevent green gentrification resulting from NBS real estate as well. Respondent 5 highlighted that the municipality has special requirements in place in order to ensure that their property, which was specifically made affordable for the housing cooperative following special calculations by the municipality, remains perpetually affordable for future citizens. The municipality does this by requiring the housing cooperative do not sell their property, and even when a transfer takes place, the housing cooperative is obliged to prove that it will be for an entity with the same type of purpose. In essence, ensuring distributional justice through tenant homogeneity and by eliminating land price speculation that could result in gentrification. Tenant homogeneity appears a recurring theme to ensure no land price speculation for profit motives, and is retouched from a private-actor perspective in 4.4.1.

The municipalities, as an intermediary that has authority over large jurisdictions, also offers support by maintaining the overall biodiversity of the city as well. This is because individual

actors can only look after ecological justice of their own property, but in order to address larger ecological challenges such as biodiversity of an entire city, a larger and more authoritative figure is needed. Also, Respondent 11 elaborates how the private actors may sometimes overdo the nature component of NBS in order to make them more attractive and thereby violate ecological justice, and therefore it is the municipality's responsibility to maintain the overall biodiversity of the city, with activities such as maintaining ecologically sound soil in the city, retain rain water and prevent droughts, etc.

4.1.4. Government maintaining integrity

Maintaining government's integrity through trust building with stakeholders is important to build healthy relationship between the two parties. Respondent 8 states that particularly, poor neighborhoods currently have little trust in the government and among themselves, and this makes it difficult to take care of public green spaces together. Earning this trust from the residents by maintaining its integrity, the government can encourage more citizen participation, and thereby enable procedural and recognition justice within the NBS real estate sector. Respondent 3 confirms this view, by stating that it is important for residents to see that the government and the other parties involved kept their promises. He stated that during their re-greening project, they were able to successfully gain the support and participation of a diverse resident base, thereby enabling procedural justice, because the municipality and the housing association fulfilled all the promises made to the residents regarding their demands.

4.2. Harnessing knowledge

Acquisition of some form of knowledge in NBS was the second-highest cited factor that enabled the participants to differentiate their NBS projects towards justice. Drawing from their extensive research experience, Respondent 8 highlighted how gaining some form of NBS knowledge would help to address the existing challenges in the field. According to them, this knowledge can be acquired in many forms, including following a course, setting up an intervision team or a community of practice with other real estate organizations. Other respondents' comments too paved way for recurring themes of gathering knowledge and they are classified as follows:

4.2.1. Gathering experience

3 of the respondents highlighted that having some level of prior experience helped them handle some of the justice challenges that their projects faced. This prior experience can manifest in several forms.

A more frequently mentioned form of gathering experience was by conducting pilots; 2 of the respondents mentioned that conducting pilots on various aspects helped them address specific justice aspects they wanted to experiment with. Respondent 3 explained that using pilots to experiment with new bio-based materials helped them bring down cost of the projects to make them more affordable for public housing and consequently address distributional justice. The pilots, by displaying promising results, also helped the team win public approval towards these relatively-unknown materials from the residents and other stakeholders who were initially anxious about them as they are not certified yet. Respondent 5 mentioned how their property was enabled as a pilot back in 2018. De Warren marks the first ever tender that was specifically issued by a municipality in The Netherlands as a pilot for a housing cooperative (Hodde, 2020). This paves the path for other underserved communities to explore this structure for the same purpose of achieving a more socially-inclusive NBS property, because now they can use this pilot as a guideline. Respondent 5 also added how conducting energy pilots enabled their property to become an energy-positive building. De Warren generates its own heat and cold using energy poles (Pieters Bouwtechniek, 2021) and Respondent 5 elaborated how this helps bring down energy costs for the low-income groups thereby promoting distributional justice.

Similar to pilots, another means with which participants gathered knowledge was by experimenting with new methods. 3 respondents highlighted the importance of experimenting with new methods. Respondent 3 explained how the experiments with new bio materials led to lower construction costs, thereby achieving distributional justice, while Respondent 10 explained that experimenting with the dunes concept in a coastal area enabled them to fund an NBS real estate project where the beach was made more accessible to a greater number of residents instead of only the front row residents, promoting more recognition justice. Respondent 5 mentioned about experimenting more with wood instead of concrete as a base material for social housing, which will ensure ecological justice as well as more distributional justice by reducing costs.

Experience can also be gathered by being involved in similar projects with similar values. Both Respondent 5 and Respondent 7 mentioned their prior experience in handling various sustainability projects together such as the creation of Café de Ceuvel which is a café run using both environmentally and socially sustainable technologies (Café De Ceuvel, n.d.), and being part of the community-led Konijn Movement which organized many nature-and cultural events including the re-greening of a Portuguese castle ground which had been destroyed from forest fires 2 years ago, prepared them better to address the procedural justice challenges when De Warren property was being constructed. Respondent 1 describes that using motivation letters to select tenants for Trudo Toren was a method they had employed in their previous real estate projects. This approach helped them avoid long waiting lists and enabled the creation of a more targeted, holistic, and purpose-driven community in NBS housing, thereby addressing recognition justice.

Another method with which experience can be gathered as well as be transferred to other parties is living labs. Respondent 5 explains how their property De Warren acts as a living lab for individuals and communities who want to learn from it.

4.2.2. Availability of knowledge pools

Both Respondent 5 and Respondent 7 who worked together towards the same NBS property mentioned the importance of creating a knowledge pool that future NBS actors can draw in expertise from. They are currently working on documenting all of their experiences, processes and learnings in detail and making them available to the public through a website, so that the NBS actors who want to undertake similar activities in the future “do not have to re-invent the wheel”. Respondent 7 also highlighted the importance of spreading knowledge about various organization structures, particularly to financial institutions, explaining that the lack of understanding in Dutch financial institutions of new structures such as housing cooperatives led to the delay in acquiring funding required for the project, ultimately them having to reach out to a German bank instead.

Knowledge pools also manifested in the form of toolkits. 2 respondents mentioned the availability of established toolkits as a factor that facilitates future NBS activity that is more geared towards environmental and social justice. They deliver a structured process that facilitate the implementation of various systems. Respondent 9 highlights the development of

a nature-inclusivity toolkit by the Municipality of Rotterdam for the management, design and development of the city, and how real estate companies can and should use this toolkit when designing their NBS properties. The toolkit divides the city into core biotopes and ecological structures, and the real estate developers can utilize it to obtain information about biodiversity at any scale within the city, so that the property can be customized and designed to suit the existing biodiversity in the area. The respondent elaborates that this enables the real estate developer to gain a deeper understanding of the neighborhood, what kind of species are there, and tailor-make property design to protect not only endangered species but also the more common ones there, ensuring ecological justice. Respondent 11 confirms this need for real estate developers to deeply understand distinct biodiversity of the area they are developing to ensure ecological justice, particularly from the point of view of the flora and fauna. He elaborated this with the example of the tendency of some NBS developers to place nest boxes on housing walls instead of on trees, in order to generate a generous green image for their property, but this may not align well with the bird's natural behavior and may result in deviating them from their natural habitat.

Toolkits can also be developed in other areas, to encourage overall public participation in NBS and thereby increase procedural justice. Respondent 5 highlights a government toolkit being developed in the form of a report that educates the public about details including the pre-conditions for land allocation, financing streams, and the contours of the €50 million-fund for housing cooperatives in general. This can serve as a toolkit for future housing cooperatives who want to pursue NBS activities in order to secure land for underserved communities.

4.2.3. Leveraging on knowledge institutes

3 respondents spoke of the advantage of including knowledge institutions in the NBS process, because they already possess deeper understanding of nature and social justice through extensive research. Respondent 5 mentioned that involving knowledge institutions and other initiatives helped them significantly in gathering knowledge, especially as they were the first to establish a housing cooperative in The Netherlands and also because they did not have some of the inherent NBS and other expertise required. Respondent 8 highlights that an additional benefit of involving knowledge institutions and local schools (green education) is the addition of fresh human capital. Respondent 11 highlighted the importance of municipalities involving

researchers and universities to brainstorm at early stages in the process such as the tender-calling stage.

4.3. Robust engagement

9 of the respondents found that the strong engagement between stakeholders of a NBS real estate project to be beneficial to maintain its social-inclusivity, and thereby foster procedural and recognition justice. The engagement manifests in a number of ways and is observed as follows:

4.3.1. Coherent communication

The participants engaged various stakeholders through clear, comprehensive communication. These stakeholders encompass a broad spectrum of individuals, ranging from architects to residents. Respondent 5 stated that deep conversations with 3 different architects was beneficial for their property, an NBS housing cooperative, as these architects had extensive experience working with sustainability as well as working with a large group of people. This helped maintain procedural justice within the project. There were also comprehensive discussions with the residents, roughly 50 individuals, about their sustainability preferences and the tradeoffs they were willing to make to achieve those sustainability preferences. Good communication enhanced residents' participation in the decision-making process in the project, fostering procedural justice. For the same property, Respondent 6 explained how surveys were sent to the future residents in order to obtain their preferences about design choices, as well as about their social activity preferences. The use of a range of digital communication tools helped them stay closely in touch even during the pandemic period where physical distancing was inevitable. Respondent 4 expressed that their neighborhood association promptly opens dialogs between the inhabitants and other stakeholders in order to “increase understanding and to influence decision making”, when a concern comes up. The duty of the neighborhood association is to ensure that the residents' interests and needs are represented in communication with other stakeholders, thereby securing procedural justice for the residents.

4.3.2. High degree of community involvement

Increasing community involvement through active participation was beneficial to maintain engagement, thereby fostering procedural justice. Respondent 5 elaborates how all of their

housing cooperative's 50 future residents were involved in designing, developing and furnishing the building. He also emphasizes on the importance of community involvement in creating sense of ownership; if the residents do not own the houses they live in, it has a tendency to diminish the incentive for them to invest in sustainability. This is confirmed by Respondent 8 from a research perspective, where the observations show that if the residents do not have influence over the green spaces, they will not perceive it as their space and use it, even if another party undertakes the management of it. Respondent 8 stated that therefore taking the time to involve the residents in the process not only ensures procedural justice is met, but also ensures that other NBS aspects of the real estate project is maintained.

Respondent 10 highlights that community involvement can be done by involving the residents in green management. He points out that most NBS real estate companies are mostly focused on the physical aspects and tend to ignore about the management phase. Involving the residents in green management ensures socially-inclusive and nature-inclusive buildings in the city, where humans can also meet around the vegetable garden, about maintaining greenery on and around the buildings. This also helps in reducing service costs by eliminating the need to hire a green-space manager. This is interconnected with 4.4.4 where community involvement in good green management is touched upon yet again from a management perspective.

4.3.3. High degree of social cohesion

Fostering social cohesion is vital to keep a community engaged. Respondent 4 stated that one of the main duties of their neighborhood association is to organize activities to increase social cohesion. Due to this bond and the good representation of residents' interests, the association is able to mobilize relatively large number of people to achieve their NBS goals.

Respondent 10 elaborates that encouraging social cohesion is particularly important in the urban context as they observe trends of increasing loneliness and more psychological problems among the tenants in high-rise buildings in the city. His company tries to be more active in large building complexes, where there is more room to do community management. He adds that social cohesion can also be enhanced through the physical design of the buildings, for example by increasing the common/social and green meeting spaces in the building, and by combining it with NBS features such as communal vegetable gardens to foster social connections and thereby positively affect mental health. This caters to both procedural and recognition justice.

This loneliness sentiment is affirmed by Respondent 5 in a separate interview series conducted as a part of the ‘knowledge bank’ of De Warren website (Hodde, 2022), where he highlights that social cohesion is important particularly in the urban context, because there is a tendency for total individualization with “everyone living in their own concrete box”. He adds that the concept of living in isolated apartments “significantly detracts our essence as humans, our social nature, and our interconnectedness as beings within a network”.

Achieving social cohesion through physical design is yet again evident in Kerckebosch, the NBS property where Respondent 3 and Respondent 4 are involved in. The BNA brief of Royal Dutch Architects (BNA, 2019) states that the property promotes social cohesion and more nature involvement by replacing the uniform high-rise design with a varied supply of homes so that all residents can experience more social cohesion and more nature. This promotes distributional justice. The brief adds that Kerckebosch also fosters great social cohesion through physical design features such as a shared vegetable garden, a freerun course and a social meeting placed labelled Binnenbos. Through these features, the property encourages various types of residents to come together, and thereby promoting not only procedural justice, but also recognition justice as well.

In a city landscape where wider privatization of the common area takes place, where the street becomes a meeting place, it is important to harness the social fabric (Hodde, 2022). It is important that children have similar-aged companionship in the neighborhood without them having to depend on adults’ attention most of the time. This is in line with the comments of Respondent 11, who also highlighted the importance of “figuring out together where the children can play”. This kind of physical design and community planning is aimed at recognition justice.

Respondent 6 describes a process where their housing cooperative employed a survey to obtain the social preferences of their future residents when they join the cooperative. This survey contains questions such as how often do you want to have dinner together with your living group or and what type of housing are you looking for? She highlights that it is important to get these elements right, so that there is better understanding between the interested parties, and every resident gets to exercise their social preferences this way, which amounts to procedural justice.

4.4. Conducive organizational management

Having a conducive organizational structure and management facilitated justice in multiple ways:

4.4.1. Employment of mixed business models

As funding was considered the biggest barrier to realize distributional justice in implementing NBS in the social housing sector, the social housing NBS projects linked to the participants that were interviewed followed a mixed business model that enabled them to fund the social housing element with more expensive free sector housing. Respondent 1 described that his company's business model is an evolving-fund model, where the social houses get sold after some time, and the revenue received from selling these houses is re-invested in building more social houses again. This way, the company was able to become a leader in building social housing among all social housing associations. Furthermore, in order to prevent any land price speculation activity and green gentrification from occurring, the company ensures that when a social house is sold, it will be sold to a prospective tenant with a similar income profile/social background, in other words, tenant homogeneity. This not only prevents green gentrification, but also ensure recognition justice by continuing to serve the underserved communities in the housing market. With their mixed structure, the company ensures that they are able to fund and reserve at least 20 apartments specifically for people with special needs who are severely underserved by the market, such as disabled people, former-addicts and homeless people. Further, the company has introduced a concept called Slimmer Kopen (smart buying), where some of the existing and new homes are sold at a significant discount on the market value, to facilitate low-income families to buy houses and to keep land prices under control in order to prevent green gentrification.

Respondent 3 confirmed that a similar mixed business model helps his neighborhood developing company, where the free sector houses sell at an attractive price due to the NBS appeal, and this revenue goes to fund more social housing and to uplift the neighborhood for all types of residents. From a research observation point of view, Respondent 8 suggested that this model should be more nurtured, where social housing organizations are allowed to rent middle-income houses so that they are "less tight in budget and have to deal with less human

trouble. This will also give them the funds to innovate and improve, without offering just the bare minimum in social housing”.

Respondent 10 elaborates on a similar arrangement for an NBS housing project in a coastal area, although not in a social housing setting. In order to ensure that the natural beach view was available to all the residents and not just the front-row tenants, thereby implementing recognition justice, the project had to be made less dense. This meant that the low-rise buildings had to be made quite expensive, about 25-30% above that of existing, in order to fund the ocean view for the residents of the high-rise buildings at the back.

4.4.2. Employing a wide range of funding sources

Funding remains one of the biggest hindrances to implement distributional justice in NBS real estate sector. Entities that focus on distributional justice often find it difficult to show profitability prospects attractive enough to secure mainstream bank funding. The interviewees addressed this challenge by acquiring peripheral methods of funding to increase their possibilities. Respondent 7 explains that their project used a cocktail of funding including a loan from Participatiefonds Duurzame Economie Noord-Holland, and crowdfunding in the form of bonds issued. This diversification of funds enables an entity to lower its borrowing costs (interest rate) as well, further contributing to distributional justice. The idea is also to financially enable a larger volume of NBS real estate projects that carry justice intentions.

Additionally, some projects use co-investment as a method of funding as well. Again, Respondent 7 confirmed that they utilize this in certain ways. For example, a loan from future residents into the facility, which gets paid back once the resident is leaving the cooperative. The project also uses a savings model, where once the housing cooperative becomes financially independent after paying off its loans, the residents who has lived there throughout the period will get a lesser rent. Respondents mentioned that co-investment also works to increase sense of ownership and participation, thereby fostering procedural justice somewhat.

4.4.3. Fostering diverse teams

Nearly half the respondents perceived that having a capable and a diverse team facilitated them to conquer justice challenges better. This is because the diverse talent and experience brought into the team helps them address the multifaceted aspects of justice in a unified manner.

Respondent 5 states that “So we also have a really great team of sustainable builders, sustainable installation consultants who have all the knowledge about the latest techniques, a contractor who is so interested to do this.” This is in addition to the highly capable core team of the housing cooperative board, which was formed by some of the residents including himself. “I think we've had the most support from the expertise and the experience of the nature fight, because we are really a group of people who go deeper, who look beyond the standard and have a lot of heart for developing a beautiful sustainable property.”

Respondent 3 mentioned having a strong team as a great strength to tackle recognition justice challenges. His neighborhood development company involved a team of innovators, who experimented on many aspects of NBS. If the experiment fails, it is important to move on. This diverse team brought together their versatile talent and experience to experiment with unique methods that were not in use before, and thereby enable justice where necessary.

Respondent 7 explained that for a future housing cooperation, the dream team should consist of a diverse mix including an economist, advocate, project managers, negotiators, and above all, a passionate set of individuals. Respondent 9 confirms the importance of attracting a team of passionate individuals about the cause of nature-and socially-inclusive real estate, quoting that the case of SAWA building was made possible by a passionate architect who was determined to achieve it, and that an urban ecologist was involved from the early stages itself.

4.4.4. Ensuring good green management

When NBS leads to the creation of green spaces, or when natural green spaces exist in an area, the proper management of these spaces becomes crucial to ensure justice prevails. The field notes suggest that this is because most vulnerable communities are unable to participate in green maintenance, largely because they are underprivileged, come from diverse cultural backgrounds, have various other problems and do not have a good relationship among themselves. Consequently, while there are a lot of green space available, they are not maintained properly. Similar scenario was confirmed by Respondent 3; the neighborhood his organization re-greened already had many trees and a forest prior to the intervention, but it was not maintained well. Field notes suggest that using specific green spaces and their management, for example shared activity in a vegetable garden, could act as a means of building this missing relationship among the community, rather than as an obligation to manage the spaces. It also

helps to alleviate feelings of temporariness, which was identified as one of the significant barriers to harnessing social inclusiveness. Involving the vulnerable residents in green management will not only ensure distributional justice but also procedural and recognition justice by encouraging participation and fostering social connections.

Respondent 10 confirms this view of involving the residents in green management. It is easier for a private real estate company to outsource green management to employees who specifically perform those roles, such as a janitor or a gardener. However, that is expensive and hence affects distributional justice negatively. Also, it then fails to achieve the objective of bringing the community together, particularly in a green space. Therefore, having a sound plan to involve the inhabitants, and clearly deciding who is in charge of what, will be beneficial to maintain socially-inclusive NBS real estate properties.

As Respondent 9 pointed out, it is important to have the management perspective laid out at an early stage of property development itself. Questions such as is there only one property manager? Does he also do the green management there? Or is that in the hands of city management? need to be found answers for. Because for private real estate companies, it maybe easier to lay claim for just one part of the green, but not the other. Then where does public space begin? Where does a building start? And who is responsible for what? This view is confirmed in the field notes, where the expert researcher stated that some of the vulnerable communities do not participate in green management, because they tend to lack sense of ownership as it is difficult to perceive where the public space and the private space of the corporation start and end. Therefore, Respondent 9 calls for real estate companies and other actors to come to one table of a vision, and discuss who is in charge of what, and where can management of green contribute to the new system that is being created.

Respondent 9 furthermore suggests that from a managerial perspective, it is ideal that a manager gets involved at the beginning of the process itself. She emphasizes that setting up a place is just once, but the management of it should be life-long – a sentiment that is confirmed by the expert views in the field notes: “it is important to balance initial building costs with total life cycle costs i.e. total costs of ownership. Here, Respondent 9 again suggest that it would be just if the property owner can too contribute to the green management financially, as the whole area

receives a boost after the NBS intervention and it might be possible to sell the property at a higher value later on.

4.4.5. Ensuring good governance

As an NBS real estate entity that is dealing with social-inclusiveness as well, interviewees explain that it is important to maintain good governance. This is because it is highly likely that these real estate projects deal with already marginalized communities, and involve individuals that come from different social backgrounds that carry inherent problems. Also, ensuring transparency in procedures helps foster procedural justice as well, especially as socially-inclusive NBS properties depend on the trust-building between a diverse range of individual actors involved. Respondent 5 stated that having a good system of checks and balances, and being able to demonstrate that they work well and transparently, helped them tremendously.

Respondent 6 advocates to use a democratic decision-making process to enable procedural justice, where decisions are taken as a collective, for example, using survey responses and requesting votes. This was confirmed by Respondent 4, whose neighborhood association follows a similar process, where a certain issue is taken up for debate only if multiple inhabitants support it and vote for it. She perceives that a factor that worked best towards ensuring justice prevails within the property and within the organization, is this democratic and open process where stakeholders are brought to roundtable discussions when interests of different groups of inhabitants or stakeholders are not aligned. This ensured procedural justice for them.

4.5. Partnerships

Various forms of partnerships between numerous parties was cited as a factor that enabled more just NBS ventures to emerge in the real estate sector. These helped bring a variety of resources, expertise and networks together. The diversity of the actors operating in unison enabled the activation of multiple forms of justice in most vulnerable and therefore essential spheres, that one party alone could not have addressed due to lack of resources, lack of expertise or lack of knowledge.

Respondent 2 mentioned that the specific partnership between the 2 architect firms, and the contractor was what made the rare combination of a social housing project in a vertical forest

possible for the first time, thereby ensuring distributional justice – “together, the 3 parties understood the goal of making the tower realizable”. He affirmed that all parties provided utmost support from their respective ends and that was what worked well for the project to be most just. Respondent 5 stated that it is crucial to ensure that you find partners that match in profile, ideas and standards.

One type of partnership that enables justice in social housing sector is public-private or public-community type partnership. Respondent 3 states that the neighborhood development company of which he is the director, is a public-community partnership, and greening decision in a social housing setting arose because the municipality made the initiative.

Respondent 11 suggests that it is important to form partnerships on an even a higher level, such as planning entire cities to be more nature-inclusive and socially-inclusive; for example multiple parties including real estate companies should come together and engage in collective discussions to explore potential collaborative decisions such as “where the children can play, where older people don’t have to walk 15 minutes because there’s a park nearby”.

5. Discussion and conclusion

5.1. Reflections and implications

The purpose of this study was to identify the factors that enable justice within the nature-based real estate sector in The Netherlands. The growing awareness regarding the adverse effects of NBS calls for a deeper understanding of the social impact of these negative implications such as green gentrification and violations of other types of justices such as distributional, procedural and recognition justice (Bockarjova et. al., 2020; Toxopeus et. al., 2020). While the recent environmental justice scholarship is increasingly exploring this topic, its explicit links to NBS are yet to be explored (Bauer, 2022). Coupled with the societal implications in the current discourse of the real estate sector in The Netherlands, which is signified by a rapid decline in social housing, exacerbation of existing social inequalities and loss of biodiversity (NL Times, 2023b; CLO, 2016), exploring this topic is of great significance and merits extensive academic inquiry.

Therefore, this study represents a pioneering effort in integrating the concepts of NBS justice in the real estate paradigm. The 11 responses and field notes evaluated involves a combination of distributional, procedural, recognition and ecological justice. The results reveal that receiving government support, harnessing knowledge, robust engagement, conducive organizational management, and partnerships enabled the aforementioned four types of justice in the NBS real estate sector in The Netherlands.

The study reveals that while it is difficult to integrate justice with NBS within the real estate sector, especially in a social housing context, it is not impossible if the right mix of catalysts come into play. This finding supports the existing literature as it suggests that NBS still champions as a means of achieving sustainability and resilience for cities and communities, provided it is re-oriented to include the justice lens (Cousins, 2021). It also supports the existing evidence that NBS can achieve much superior, equitable and sustainable results if the distributional, procedural, recognition and ecological justice aspects are integrated into its discourse (Snep et al., 2023; Kabisch et al., 2016)

This study fills a research gap by addressing calls for strategies that can remedy the NBS-related injustices in real estate, such as green gentrification (Cucca et. al., 2023) and broader societal repercussions on how NBS impacts diverse communities, including immigrants, elderly individuals, linguistically and economically isolated populations, and disabled individuals (Kato-Huerta & Geneletti, 2022). It then extends the current theoretical insights by offering compelling evidence of the existence of specific enablers within the real estate sector that can effectively mitigate such injustices. For instance, ensuring tenant homogeneity when property ownership is passed on helps keeping property prices out of speculation, thereby preventing green gentrification. This is in line with the decoupling of NBS with land speculation principles recommended by Anguelovski and Corbera (2022). Another enabler, ensuring good green management, especially through high degree of resident involvement, not only enables procedural justice by fostering equal opportunities to participate, but also enables recognition justice at the same time by bringing together diverse, possibly-marginalized and historically mistreated/neglected communities of individuals who are unable to organize by themselves.

However, it is notable that all the private sector actors who participated, mentioned that it is nearly impossible to replicate their past justice success in the current economic environment due to lack of financial feasibility. In this context, this study also helps provide a more prudent way forward for justice establishment within NBS real estate, given the current economic constraints. It introduces a launchpad to experiment with innovations in the organizational structure of future projects i.e. such as promoting more housing cooperatives. It also goes on to show that pursuing green projects that harness human capital more could add more value to the NBS paradigm, because it is relatively easily available and has the added advantage of stimulating both procedural and recognition justice, while invigorating nature at the same time. Also, recommendations from the field notes suggest that there is a greater demand for future projects to take shape more in the form of re-greening existing property, because while research shows that there is already existing green space in terms of physical square meters, the issue lies in the inadequate maintenance and upkeep of these areas. Many environment and NBS practitioners prefer this over undertaking expensive and complex new projects – which could exacerbate the existing injustices.

5.2. Contribution

This research scientifically contributes to the growing pool of literature that is written on NBS at the intersection of justice. However, in essence, it is unique as it discusses justice typology particularly pertaining to the real estate sector, and it explores what makes NBS projects that addresses environmental and social injustices different to the ordinary NBS projects. While agreeing with the existing NBS justice scholarship on the prevailing injustices, it then augments this by exploring strategies to remedy those injustices and how to enable more just NBS real estate properties in the future.

To the practical paradigm, this research beckons a pragmatic way forward to achieve NBS real estate justice in the future, given the current difficult economic and social context. It signals to the individuals, communities, and various other entities of the best formula to possess when pursuing just real estate projects that also incorporate nature into them. For the policy sphere, it gestures effective approaches in which governments and local municipalities can summon greater social justice while addressing the housing shortage and building a nature-inclusive Netherlands.

5.3. Limitations

Due to its context-bound nature, this research tends to be limited to the relevant circumstances, and can lack in generalizability. Also, NBS in the real estate sector is a novel phenomenon and the intersection with justice is further novel. This narrowed down the sample size available to examine. Furthermore, for three of the interviews (Appendix A) the author was not present as it was sourced from a similar project but with a different research question, only because certain parts of the interview guides were identical. There could be information that went missing here since it was not exactly tailor-made. These three interviews were also covered in Dutch and translated to English using digital platforms, therefore the accuracy of the translation could be subject to translation bias.

5.4. Future research

This research investigates the justice scenario in the context of several different types of NBS real estate projects, such as public-private partnerships, housing cooperatives, and purely

private ventures. Future research can build on these findings and pursue a deeper exploration into justice contexts in each specific type of arrangement.

Also being contextual-driven, the methodology affects the generalizability of the results. Future researchers could investigate the transferability of the results across diverse contexts in order to obtain a deeper insight into various implications.

Author's field notes on discussions with NBS real estate research experts suggest that there is potential to explore achieving greater justice through re-greening and better-maintaining existing green space. Future research can explore this context with linkages to utilizing community involvement to achieve justice purposes.

References

- Alhojailan, M. I. (2012). Thematic Analysis: A Critical Review of Its Process And Evaluation. *West East Journal of Social Sciences*, 1(1), 39–47.
<http://www.westeastinstitute.com/journals/wp-content/uploads/2013/02/4-Mohammed-Ibrahim-Alhojailan-Full-Paper-Thematic-Analysis-A-Critical-Review-Of-Its-Process-And-Evaluation.pdf>
- Amvest. (n.d.). *Corporate social responsibility – Amvest*. amvest.nl.
<https://www.amvest.nl/en/about-amvest/corporate-social-responsibility/>
- Anguelovski, I., Connolly, J. L., & Brand, A. L. (2018). From landscapes of utopia to the margins of the green urban life. *City*, 22(3), 417–436.
<https://doi.org/10.1080/13604813.2018.1473126>
- Anguelovski, I., Connolly, J. L., García-Lamarca, M., Cole, H., & Pearsall, H. (2019). New scholarly pathways on green gentrification: What does the urban ‘green turn’ mean and where is it going? *Progress in Human Geography*, 43(6), 1064–1086.
<https://doi.org/10.1177/0309132518803799>
- Anguelovski, I., & Corbera, E. (2022). Integrating justice in Nature-Based Solutions to avoid nature-enabled dispossession. *AMBIO: A Journal of the Human Environment*, 52(1), 45–53. <https://doi.org/10.1007/s13280-022-01771-7>
- ArchDaily. (2023, June 5). *Housing Coöperation de Warren / Natruified Architecture*.
<https://www.archdaily.com/1001864/housing-cooperation-de-warren-natruified-architecture>
- Bauer, W. (2022). Reframing Urban Nature-Based Solutions Through Perspectives of Environmental Justice and Privilege. *Urban Planning*, 8(1).
<https://doi.org/10.17645/up.v8i1.6018>
- BNA. (2019, November 5). *Kerckebosch, Zeist*. BNA Royal Institute of Dutch Architects.
<https://www.dutcharchitects.org/projects/kerckebosch-zeist-1>
- Bockarjova, M., Botzen, W. J. W., Bulkeley, H. A., & Toxopeus, H. (2022). Estimating the social value of nature-based solutions in European cities. *Scientific Reports*, 12(1).
<https://doi.org/10.1038/s41598-022-23983-3>
- Bockarjova, M., Botzen, W. J. W., Van Schie, M., & Koetse, M. J. (2020). Property price effects of green interventions in cities: A meta-analysis and implications for gentrification. *Environmental Science & Policy*, 112, 293–304.
<https://doi.org/10.1016/j.envsci.2020.06.024>
- Boelhouwer, P. (2020). The housing market in The Netherlands as a driver for social inequalities: proposals for reform. *International Journal of Housing Policy*, 20(3), 447–456.
<https://doi.org/10.1080/19491247.2019.1663056>

- Boztas, S. (2023, March 16). 'How will I buy?': housing crisis grips the Netherlands as Dutch go to polls. *The Guardian*. <https://www.theguardian.com/world/2023/mar/15/netherlands-housing-crisis-dutch-elections>
- Bryman, A. (2010). Social Research Methods. In *Taylor & Francis eBooks* (pp. 157–184). https://doi.org/10.4324/9780203381175_chapter_9
- Café De Ceuvel. (n.d.). *About Café de Ceuvel*. <https://deceuvel.nl/nl/cafe/about-us/>
- CLO. (2016, June 10). *Verlies natuurlijkheid in Nederland, Europa en de wereld*. www.clo.nl. <https://www.clo.nl/indicatoren/nl1440-ontwikkeling-biodiversiteit-msa?ond=20877>
- Cohen-Shacham, E., Walters, G., Janzen, C., & Maginnis, S. (Eds.). (2016). *Nature-based Solutions to address global societal challenges* (No. 978-2-8317-1812-5). IUCN, Gland, Switzerland. <http://dx.doi.org/10.2305/IUCN.CH.2016.13.en>
- Council for the Environment and Infrastructure. (2022). Nature-inclusive Netherlands: Nature everywhere and for everyone. In www.rli.nl. https://www.rli.nl/sites/default/files/advisory_report_nature_inclusive_netherlands.pdf
- Cousins, J. J. (2021). Justice in nature-based solutions: Research and pathways. *Ecological Economics*, 180, 106874. <https://doi.org/10.1016/j.ecolecon.2020.106874>
- Crum, S. (2021). *Transition to nature inclusive neighbourhoods in the Netherlands* [Masters Thesis]. Radboud University.
- Cucca, R., Friesenecker, M., & Thaler, T. (2023). Green Gentrification, Social Justice, and Climate Change in the Literature: Conceptual Origins and Future Directions. *Urban Planning*, 8(1). <https://doi.org/10.17645/up.v8i1.6129>
- Curran, W., & Hamilton, T. (2012). Just green enough: contesting environmental gentrification in Greenpoint, Brooklyn. *Local Environment*, 17(9), 1027–1042. <https://doi.org/10.1080/13549839.2012.729569>
- De Vries, S., Buijs, A., & Snep, R. P. H. (2020). Environmental Justice in The Netherlands: Presence and Quality of Greenspace Differ by Socioeconomic Status of Neighbourhoods. *Sustainability*, 12(15), 5889. <https://doi.org/10.3390/su12155889>
- De Warren. (2020, June 6). *Warren Webinar “Hoe doen jullie dat nou, zo’n wooncoöperatie?”* [Video]. YouTube. https://www.youtube.com/watch?v=6rvO_YHAWW4
- Economisch Instituut voor de Bouw. (2020). Woningbouw 2020-2023; Vooruitzichten op basis van maatregelen rond stikstof. In www.eib.nl. https://www.eib.nl/pdf/Woningbouw%202020-2023_web.pdf

- Frantzeskaki, N., McPhearson, T., Collier, M. J., Kendal, D., Bulkeley, H., Dumitru, A., Walsh, C., Noble, K., Van Wyk, E., Ordóñez, C., Oke, C., & Pintér, L. (2019). Nature-Based Solutions for Urban Climate Change Adaptation: Linking Science, Policy, and Practice Communities for Evidence-Based Decision-Making. *BioScience*, 69(6), 455–466. <https://doi.org/10.1093/biosci/biz042>
- Fusch, P. I., PhD, Fusch, G. E., & Ness, L. R. (2018). Denzin’s Paradigm Shift: Revisiting Triangulation in Qualitative Research. *Journal of Social Change*, 10(1). <https://doi.org/10.5590/josc.2018.10.1.02>
- Gould, K. A., & Lewis, T. L. (2016). *Green Gentrification: Urban Sustainability and the Struggle for Environmental Justice*. <https://www.amazon.com/Green-Gentrification-sustainability-environmental-Sustainable/dp/1138309133>
- Grabowski, Z. R., Wijsman, K., Tomateo, C., & McPhearson, T. (2022). How deep does justice go? Addressing ecological, indigenous, and infrastructural justice through nature-based solutions in New York City. *Environmental Science & Policy*, 138, 171–181. <https://doi.org/10.1016/j.envsci.2022.09.022>
- Han, L., Zhou, W., Li, W., & Li, L. (2014). Impact of urbanization level on urban air quality: A case of fine particles (PM 2.5) in Chinese cities. *Environmental Pollution*, 194, 163–170. <https://doi.org/10.1016/j.envpol.2014.07.022>
- Hodde, J. (2020). [Persbericht] We gaan bouwen! — De Warren. *De Warren*. <https://dewarren.co/archief/2020/12/20/persbericht-we-gaan-bouwen>
- Hodde, J. (2022). Waarom collectief? Een interview met warrenpionier Chandar van der Zande — De Warren. *De Warren*. <https://dewarren.co/kennisbank/interviewchandar-inspiraties>
- inbo.com. (2022, October 26). *Vision - INBO*. INBO. <https://inbo.com/en/vision/>
- Jason Antony Byrne. (2010). Ecological justice. *Sage - Encyclopedia of Geography*. https://www.researchgate.net/publication/48380927_Ecological_Justice
- Jelks, N. O., Jennings, V., & Gobster, P. H. (2021). Green Gentrification and Health: A Scoping Review. *International Journal of Environmental Research and Public Health*, 18(3), 907. <https://doi.org/10.3390/ijerph18030907>
- Juhola, S., Heikkinen, M., Pietilä, T., Groundstroem, F., & Käyhkö, J. (2022). Connecting climate justice and adaptation planning: An adaptation justice index. *Environmental Science and Policy*, 136, 609–619. <https://doi.org/10.1016/j.envsci.2022.07.024>
- Kabisch, N., Frantzeskaki, N., Pauleit, S., Naumann, S., Davis, M., Artmann, M., Haase, D., Knapp, S., Korn, H., Stadler, J., Zaunberger, K., & Bonn, A. (2016). Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on

- indicators, knowledge gaps, barriers, and opportunities for action. *Ecology and Society*, 21(2). <https://doi.org/10.5751/es-08373-210239>
- Kato-Huerta, J., & Geneletti, D. (2022). Environmental justice implications of nature-based solutions in urban areas: A systematic review of approaches, indicators, and outcomes. *Environmental Science and Policy*, 138, 122–133. <https://doi.org/10.1016/j.envsci.2022.07.034>
- Kerckebosch. (2023a, January 31). *Een wijk voor iedereen - Kerckebosch*. <https://kerckeboschzeist.nl/een-wijk-voor-iedereen/>
- Kerckebosch. (2023b, February 16). *Help je mee? - Kerckebosch*. <https://kerckeboschzeist.nl/help-je-mee/>
- Kerckebosch. (2023c, February 20). *Wie zijn wij - Kerckebosch*. <https://kerckeboschzeist.nl/wie-zijn-wij/>
- Kolokotsa, D., Lilli, A. A., Lilli, M. A., & Nikolaidis, N. P. (2020). On the impact of nature-based solutions on citizens' health & well being. *Energy and Buildings*, 229, 110527. <https://doi.org/10.1016/j.enbuild.2020.110527>
- Koppes, R. (2022). *The integration of forest ecologies into the urban environment* [Master Thesis]. Delft University of Technology.
- Last, J. (2021, November 18). *This vertical forest tower makes elite green design affordable. But is it actually green?* CBC. <https://www.cbc.ca/news/world/green-housing-bosco-milan-trudo-netherlands-1.6228709>
- Marcuse, P. (2015). Gentrification, Social Justice and Personal Ethics. *International Journal of Urban and Regional Research*, 39(6), 1263–1269. <https://doi.org/10.1111/1468-2427.12319>
- Martín, E. G., Giordano, R., Pagano, A., Van Der Keur, P., & Costa, M. (2020). Using a system thinking approach to assess the contribution of nature based solutions to sustainable development goals. *Science of the Total Environment*, 738, 139693. <https://doi.org/10.1016/j.scitotenv.2020.139693>
- Ministry of the Interior and Kingdom Relations. (n.d.). *Rented Housing*. www.government.nl. <https://www.government.nl/topics/housing/rented-housing>
- Nazaruk, Z. (2023, February 20). *Can Rotterdam avoid green gentrification and become a climate-adaptive city for all?* Equal Times. <https://www.equaltimes.org/can-rotterdam-avoid-green?lang=en>
- Nesshöver, C., Assmuth, T., Irvine, K. N., Rusch, G. M., Waylen, K. A., Delbaere, B., Haase, D., Jones-Walters, L., Keune, H., Kovács, E. K., Krauze, K., Külvik, M., Rey, F., Van Dijk, J.

- J., Vistad, O. I., Wilkinson, M. E., & Wittmer, H. (2017). The science, policy and practice of nature-based solutions: An interdisciplinary perspective. *Science of the Total Environment*, 579, 1215–1227. <https://doi.org/10.1016/j.scitotenv.2016.11.106>
- Nickayin, S. S., Jahelka, A., Ye, S., Perrone, F., & Salvati, L. (2023). Planning for Just Cities with Nature-Based Solutions: Sustainability and Socio-Environmental Inequalities in San José de Chamanga, Ecuador. *Land*, 12(3), 604. <https://doi.org/10.3390/land12030604>
- NL Times. (2023a, February 25). *Amsterdam housing scarcity protest set for Sunday; March down shopping street scrapped*. <https://nltimes.nl/2023/02/25/amsterdam-housing-scarcity-protest-set-sunday-march-shopping-street-scrapped>
- NL Times. (2023b, March 20). *Share of social housing rentals keeps falling despite gov't plans*. <https://nltimes.nl/2023/03/20/share-social-housing-rentals-keeps-falling-despite-govt-plans>
- Pearsall, H. (2018). New directions in urban environmental/green gentrification research. *Edward Elgar Publishing eBooks*. <https://doi.org/10.4337/9781785361746.00031>
- Pearsall, H., & Anguelovski, I. (2016). Contesting and Resisting Environmental Gentrification: Responses to New Paradoxes and Challenges for Urban Environmental Justice. *Sociological Research Online*, 21(3), 121–127. <https://doi.org/10.5153/sro.3979>
- Pieters Bouwtechniek. (2019, November 19). *The first self-built housing cooperative in the Netherlands may start building - Pieters Bouwtechniek*. www.pietersbouwtechniek.nl. <https://www.pietersbouwtechniek.nl/actueel/blog/first-self-built-housing-cooperative-netherlands-may-start-building>
- Pieters Bouwtechniek. (2021, May 10). *Celebrating start of construction of De Warren housing cooperative - Pieters Bouwtechniek*. <https://www.pietersbouwtechniek.nl/en/news/viering-start-bouw-van-wooncooperatie-de-warren-met-wethouder-laurens-ivens-en-gedeputeerde-zita-pels>
- Pineda-Pinto, M., Frantzeskaki, N., & Nygaard, C. (2021). The potential of nature-based solutions to deliver ecologically just cities: Lessons for research and urban planning from a systematic literature review. *AMBIO: A Journal of the Human Environment*, 51(1), 167–182. <https://doi.org/10.1007/s13280-021-01553-7>
- Quinton, J. M., Nesbitt, L., & Sax, D. S. (2022). How well do we know green gentrification? A systematic review of the methods. *Progress in Human Geography*, 46(4), 960–987. <https://doi.org/10.1177/03091325221104478>
- Rabo Bank. (2020, January 21). *Growing housing shortage: A Q&A on the Dutch nitrogen crisis*. RaboResearch - Economic Research. <https://economics.rabobank.com/publications/2020/january/growing-housing-shortage/>

- Rotterdam Partners. (n.d.). *City Projects make Rotterdam more resilient, greener and healthier - Rotterdam Partners*. <https://en.rotterdampartners.nl/articles/city-projects-make-rotterdam-more-resilient-greener-and-healthier/>
- Seddon, N., Chausson, A., Santos, R., Girardin, C. a. J., Turkelboom, F., & Turner, B. (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B*, 375(1794), 20190120. <https://doi.org/10.1098/rstb.2019.0120>
- Seddon, N., Turkelboom, F., Smith, P., Key, I., Chausson, A., Girardin, C. a. J., House, J. I., Srivastava, S., & Turner, B. (2021). Getting the message right on nature-based solutions to climate change. *Global Change Biology*, 27(8), 1518–1546. <https://doi.org/10.1111/gcb.15513>
- Sekulova, F., Anguelovski, I., Kiss, B., Kotsila, P., Santos, R., Palgan, Y. V., & Connolly, J. L. (2021). The governance of nature-based solutions in the city at the intersection of justice and equity. *Cities*, 112, 103136. <https://doi.org/10.1016/j.cities.2021.103136>
- Snep, R. P. H., Klostermann, J., Lehner, M., & Weppelman, I. (2023). Social housing as focus area for Nature-based Solutions to strengthen urban resilience and justice: Lessons from practice in the Netherlands. *Environmental Science & Policy*, 145, 164–174. <https://doi.org/10.1016/j.envsci.2023.02.022>
- Stefano Boeri Architetti. (2023, March 9). *Trudo Vertical Forest | Stefano Boeri Architetti*. <https://www.stefanoboeriarchitetti.net/en/project/trudo-vertical-forest/>
- Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *Social Science Research Network*. <https://doi.org/10.2139/ssrn.3205035>
- Thomas, D. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation*, 27(2), 237–246. <https://doi.org/10.1177/1098214005283748>
- Thomson, G., & Newman, P. (2020). Cities and the Anthropocene: Urban governance for the new era of regenerative cities. *Urban Studies*, 57(7), 1502–1519. <https://doi.org/10.1177/0042098018779769>
- Toxopeus, H., Kotsila, P., Conde, M., Katona, A., Van Der Jagt, A. P., & Polzin, F. (2020). How ‘just’ is hybrid governance of urban nature-based solutions? *Cities*, 105, 102839. <https://doi.org/10.1016/j.cities.2020.102839>
- Tozer, L., Horschelmann, K., Anguelovski, I., Bulkeley, H., & Lazova, Y. (2020). Whose city? Whose nature? Towards inclusive nature-based solution governance. *Cities*, 107, 102892. <https://doi.org/10.1016/j.cities.2020.102892>

trudo.nl. (n.d.-a). *About Trudo*. Sint Trudo. <https://www.trudo.nl/over-sint-trudo>

trudo.nl. (n.d.-b). *About Trudo Toren*. <https://www.trudo.nl/trudo-toren>

United Nations. (2018, May 16). *68% of the world population projected to live in urban areas by 2050, says UN | UN DESA | United Nations Department of Economic and Social Affairs*. [www.un.org. https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html](https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html)

Utrecht University. (n.d.). *Urban Nature Based Solutions Day 2023: Real Estate*. <https://www.uu.nl/en/events/urban-nature-based-solutions-day-2023-real-estate>

Uttara, S., Bhuvandas, N., & Aggarwal, V. (2012). IMPACTS OF URBANIZATION ON ENVIRONMENT. *IJREAS*, 2(2).

Van De Klippe, W. (2021, September 13). *Thousands march in Amsterdam for an end to the housing crisis - DutchNews.nl*. [www.dutchnews.nl. https://www.dutchnews.nl/news/2021/09/thousands-march-in-amsterdam-for-an-end-to-the-housing-crisis/](https://www.dutchnews.nl/news/2021/09/thousands-march-in-amsterdam-for-an-end-to-the-housing-crisis/)

Weessies, R. (n.d.). *Portret + video: Martin Aarts*. Architectenweb. <https://architectenweb.nl/nieuws/artikel.aspx?ID=42268>

Wijsman, K., & Berbés-Blázquez, M. (2022). What do we mean by justice in sustainability pathways? Commitments, dilemmas, and translations from theory to practice in nature-based solutions. *Environmental Science & Policy*, 136, 377–386. <https://doi.org/10.1016/j.envsci.2022.06.018>

Wolch, J., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities ‘just green enough.’ *Landscape and Urban Planning*, 125, 234–244. <https://doi.org/10.1016/j.landurbplan.2014.01.017>

World Economic Forum. (2022, November 8). *This chart shows the impact rising urbanization will have on the world*. <https://www.weforum.org/agenda/2022/04/global-urbanization-material-consumption/>

Zhang, X., Han, L., Wei, H., Tan, X., Zhou, W., Li, W., & Qian, Y. (2022). Linking urbanization and air quality together: A review and a perspective on the future sustainable urban development. *Journal of Cleaner Production*, 346, 130988. <https://doi.org/10.1016/j.jclepro.2022.130988>

Appendix A

Table 1

Interview and webinar response profiles

#	Type	Role	Entity	Profile	Author present
1	Interview	Manager: Strategy at Sint Trudo	Trudo Toren – Eindhoven	Trudo Tower is a vertical forest, with over 10,500 plants placed in its balconies to absorb roughly 50,000kg of CO ₂ annually. It was developed with the purpose of re-greening the former industrial area of Strijp-S (Stefano Boeri Architetti, 2023). It attempted to address distributional justice through unique design choices reducing its construction costs, so that it can be made affordable enough for social housing (trudo.nl, n.d.-b). It addressed recognition justice by avoiding long waiting lists for housing and instead selecting its tenants based on motivation letters, which also helped in creating a purpose-driven, holistic, self-starting community (Last, 2021). Recognition justice was achieved furthermore, as the building ensured a number of apartments were reserved for people with specific needs, such as disabled people, former-addicts and homeless people (Response 1). Sint Trudo focuses on a real estate portfolio that is centered around people (and greening) and has given birth to a concept called Slimme Kopen which allows people with low incomes to buy their own house from Trudo at a significant discount to market price (trudo.nl, n.d.-a). The respondent was selected in order to obtain information from a strategic decision-making perspective in a socially-inclusive NBS real estate company.	Yes
2	Open-ended Survey	Agency Manager and	Trudo Toren – Eindhoven	Inbo is the architecture firm that designed Trudo Toren, together with Italian architect Stefano Boeri from	Yes

		Project Leader at Inbo		Stefano Boeri Architetti and landscape consultant Laura Gatti. While Trudo Toren itself addresses several aspects of distributional and recognition justice in NBS, Inbo in general pursues a portfolio of real estate projects that are centered around people and greenery as well. The company’s aim is to “make neighbourhoods more social and healthier” and they “design places where people, city and nature meet” (inbo.com, 2022). The company was also involved in developing another nature- and people-centric project titled Little C, a waterfront project in Rotterdam, that connects the property to nearby parks and the city. This project gets quoted several times in Response 7 as an NBS and possibly socially-inclusive project as well. This respondent was selected in order to obtain information from an architectural perspective in a socially-inclusive NBS real estate company.	
3	Interview	Director: Wijkontwikkelingsmaatschappij Kerckebosch (Neighborhood Development Corporation)	Kerckebosche – Zeist	Kerckebosche is a social housing neighborhood in Zeist, re-greened, its biodiversity enhanced and re-developed into 1000 homes with a mix of social homes (distributional justice) and free rental sector, from its 1960s original state (Kerckebosch, 2023a). The green renewal was undertaken through the collaboration between the Municipality of Zeist and housing corporation Woongood Zeist through the establishment of Wijkontwikkelingsmaatschappij Kerckebosch in 2006. The re-development was undertaken to improve the deteriorating conditions of the neighborhood at the time, and to increase the social safety of the residents (Response 3). The neighborhood also promotes social cohesion among its diverse residents of	Yes

				various ages, education levels and background through working groups to focus on volunteer work and neighborhood development (recognition and procedural justice) (Kerckebosch, 2023b). This respondent was particularly selected in order to obtain information from a managerial perspective on regreening and how to enhance justice in a legacy NBS property with a diverse resident base.	
4	Open-ended survey	Chairman of Wijkvereniging (neighborhood association) Kerckebosche	Kerckebosche – Zeist	The Wijkvereniging is the neighborhood association of Kerckebosche, and it is made up of the residents themselves, with the aim of “preserving the ideas of the neighborhood and representing the interests of residents” (Kerckebosch, 2023c). The board consists of a chair, treasurer, communication representative, nature conservation and management representative as well as an energy transition and sustainability representative. The board’s duty is to ensure procedural and recognition justice is maintained for the residents during their interactions with various stakeholders such as the local government, WOM, Utrechts Landschap, welzijnswerk (Meander Omnium), Woningcorporatei, as well as to organize events of social cohesion (Response 4). This respondent is also a resident in the property, and was selected because of their dual role as a resident of an NBS property who is also involved in bringing procedural and recognition justice to the other residents through representation and collective action.	Yes
5	Webinar	Chairman of De Warren Housing	De Warren – Amsterdam	De Warren is The Netherlands’ first housing cooperative, with a group of 50 people collectively designing, developing and managing their own	No

		Cooperative		premises (Pieters Bouwtechniek, 2019). It consists of 36 apartments with a mix of social and medium-term rental housing (distributional justice), is energy-positive, and uses recycled wood as its base material. They attempt to achieve recognition justice by opening their property to a wide range of people ranging from starters to families with children (ArchDaily, 2023). The cooperative ensures distributional justice is maintained by not letting the property be used for speculative purposes when transferring ownership, thereby maintaining property prices at affordable range; they also promote procedural justice by involving the residents in the decision-making processes through surveys and regular communication (Response 5). This participant was chosen in order to obtain information from a strategic capacity of a just NBS arrangement that is the first of its kind in The Netherlands.	
6	Webinar	Board Member of De Warren Housing Cooperative; Communication & association affairs	De Warren – Amsterdam	De Warren is not only The Netherlands' first housing cooperative, but it is also unique in its proposition for maintaining social cohesion within its accommodation. The property is designed to carry 30% of shared spaces that promote wellbeing, such as yoga room, communal garden, communal kitchens, music studio and co-working spaces, and it also promote sharing economy by arranging for sharing equipment, sharing mobility and collective food production in their greenhouse (Pieters Bouwtechniek, 2021). These initiatives not only achieve distributional justice but also procedural justice at the same time. This participant was selected in order to obtain information from a social cohesion perspective, given their	No

				involvement in managing community engagement aspects of the project.	
7	Webinar	Board Member of De Warren Housing Cooperative; Legal & finance	De Warren – Amsterdam	De Warren differentiated their project by following the unique legal structure of a housing cooperative, and by obtaining funding from multiple sources, which supported them to maintain the above-discussed justice features (Response 7). This respondent was chosen in order to obtain information from the perspective of legal and finance operations of the property.	No
8	Open-ended survey	Senior researcher – Policy Processes : Climate Resilience	Wageningen University & Research	This participant was selected due to their extensive experience in publishing research on social housing and climate adaptation, combined with her exposure to the public sector as an environmental policy advisor. Particularly, her research paper titled “Social housing as focus area for Nature-based Solutions to strengthen urban resilience and justice: Lessons from practice in the Netherlands” which was conducted together with a team of researchers, looks at the application of NBS in the social housing sector to achieve environmental justice, significantly aligning several of its elements with my research question.	Yes
9	Interview	Project Leader: City Management	Municipality of Rotterdam	This participant was selected due to their extensive involvement in the government sector, particularly from the city management perspective, their background and involvement in environment and sustainability. The Municipality of Rotterdam is exemplary in the NBS paradigm, and has not only housed several successful NBS real estate projects such as Sawa, Little C in the recent times, it also undertakes NBS at an urban planning	No

				level as a city (Rotterdam Partners, n.d.). The municipality is also conscious of negative impacts of greening, such as gentrification and is in the process of administering policy tools to combat these (Nazaruk, 2023).	
10	Interview	Director of Projects	Amvest	This participant was chosen due to the specific role they play in their company, which is an investment manager and developer of homes and residential areas in the Netherlands. They were selected particularly in order to obtain information from the perspective of private investment in the NBS real estate sector. The company takes a special interest in investing in sustainable areas that are “readily managed from a financial viewpoint” and is significantly involved in social justice aspect by undertaking projects such as energy-efficient care homes, and unregulated rental properties in the medium-priced sector (Amvest, n.d.).	No
11	Interview	Former Director and academic tutor of architecture	Municipality of Rotterdam, Rotterdam Academy of Architecture, Academy of Architecture Amsterdam	This participant was selected due to their role in spatial planning, architecture and capacity as a government servant due to involvement with the municipality. His extensive career spanning over 30 years, particularly focusing on the subject of mixed, complex urban environment and the residential living in the city center also would provide us with an insightful view over how the interaction between real estate, NBS and justice has panned out over time (Weessies, n.d.). Also, his extensive experience as an academic tutor in the architectural field provides us with interdisciplinary view on how academic research can contribute to the research question.	No

Appendix B

Interview guide

Introduction

1. I am a Business and Social Impact Master student at the Utrecht University and am currently conducting my thesis on what factors enable justice within nature-based projects in the real estate sector of The Netherlands. For this purpose, I would like to interview you regarding the [project].
2. I hope to conduct the interview for roughly 30-45mins and will be asking you a set of open-ended questions regarding the [project]. I will be recording this interview and transcribing it for analysis purposes.
3. All information shared during the interview will be kept confidential and anonymous.
4. Please note that participation in this study is voluntary, you can withdraw any time you wish.
5. Would you have any questions before we proceed?
6. Could you please verbally confirm your consent to this interview in that case? Thank you.

Background

1. Can you describe your current role and responsibilities in the real estate sector and the [project]?

Enablers and barriers

1. What are some of the major challenges you faced before, during and after the project?
2. How did you address those difficulties?
3. What did you feel that worked well for the project?

Prospects

1. What do you feel that can improve within the process in the future?
2. What kind of support would you have wished was available?
3. What would you have done differently if you were to do this again?

Thank you very much for your time and participation in this study.

Appendix C

Field notes

Field notes from Urban NBS Day 2023

Date: 31 May 2023

Location: Social Impact Factory, Utrecht

Organized by: Utrecht University School of Economics and TU Eindhoven

1. Opening keynote presentation by Dr. Juliette Bekkering:

[Full Professor at Eindhoven University of Technology and founder of Juliette Bekkering Architecten. Ongoing research interests include: sustainability in architectural design, biophilic design, smart concepts for architecture in healthcare and public buildings]

Recommendations for future realizations:

- Integrate NBS from beginning of architectural design
- Balance initial building costs with total life cycle costs (Total costs of ownership – TCO)
- Value green and sustainability as part of the real estate value
- Laws and legislation should be implemented to enforce more sustainable and nature based solutions

2. Expert panel discussion:

Dr. Tatiana Acevedo Guerrero [Assistant Professor of Sustainable Urban Governance in the Global South – Utrecht University], Dr. Judith EM Klostermann [Researcher policy processes – Wageningen University & Research], and Tom McDevitt [Project Leader for UULabs - Utrecht University Living Labs for Sustainable Development]

Reparatory justice is important – When it comes to historically marginalized communities and NBS, getting them to economic efficiency is important but the first step is to repair. Then build emancipatory spaces at the intersection of land, resources and nature. Emancipatory spaces for people who has been historically marginalized. You use NBS solutions to repair historically marginalized people. Eg: mangroves restoration in Columbia. The people took over the mangroves and decided to implement NBS their way, for example promoting mangroves for tourism in indigenous culture, on very small scale. It's tourism but it's their way.

Another example should be botanical gardens. For example Utrecht Botanical Garden ticket costs €8 for a non-Dutch visitor. The botanical garden itself is a colonial structure where a lot

of the plants were brought from the colonies. So it would make sense to implement reparatory justice there, by opening the garden – especially to communities from backgrounds that would never have visited the garden, such as schools from complicated neighborhoods, new migrants, food insecure families, food insecure students.

3. Dr. Tatiana Acevedo Guerrero answer to Q&A

NBS should be customized to each place so that it takes into account the native setting. It is now a common occurrence in NBS that cities, especially ones in the Global South, import ideas around green walls. Especially shopping malls. They are huge, have air conditioning and are guarded with security staff with guns. Mall is a gated space. NBS should not be secluded and enclosed.

In the case of Malaysia, there are articles about how residents got infected with Dengu, due to attracting too many mosquitos due to the nature walls. Therefore for NBS it is important to look carefully at where nature thrives in the cities. It could be small places, and not-so-nice places. Even if its weeds, and it may not bring huge economic value like European gardens; it does not have to promote the image of utopia or paradise.

4. Poster discussion – thesis presentation by Chayanika Perera [presenting the thesis research question and findings on Enablers of justice in the NBS real estate sector]

Questions raised by author and answered by a diverse group of researchers from fields including sustainable business development, architecture and spatial planning

Q: What do you think the role of community-driven initiatives like housing cooperatives would be going forward? I began to notice that it could be a good solution to the lack of private investment in just NBS real estate.

A1: Yes, it could be a good method to explore and see. Because it seems like some of them have the resources and the expertise needed for this kind of venture already. Therefore they have the room to fail and experiment – so that future communities have a model to go by and do not have to take such big risks.

A2: Actually it also depends on what your definition of what a nature based solution is. So when is something a nature based solution? And some of the buildings with balconies and greening, it's very expensive. If it's an adaptation of a building or an extension of a building, it is going to be expensive. But around the building, there are so many much cheaper nature-based solutions and which can be quite affordable in social housing. That's something we're looking at these days.

Also promoting local garden or a vegetable garden within the housing corporation, it might already be existing. Then it becomes not so much of a new and big NBS intervention, but extension and better management of an already existing NBS.

5. Poster discussion – thesis presentation by Chayanika Perera [presenting the thesis research question and findings on Enablers of justice in the NBS real estate sector]

Discussion with Dr. Judith Klostermann [senior researcher and author of research paper Social housing as focus area for Nature-based Solutions to strengthen urban resilience and justice] and Dr. Helen Toxopeaus [Assistant Professor at Utrecht School of Economics in the field of Business and Sustainability, and researcher at the Sustainable Finance Lab]

Judith: In the Netherlands there has been different periods of different housing. In the 19th century if people had a house, it was already a lot. Then they had this idea of green villages. The idea was that people needed vegetable gardens to be healthy. And then after the World War, there was this idea of garden cities. With big apartments and flats with lot of green spaces around it. After that was the cauliflower neighborhood concept. Then they wanted to take the cars out of the streets because people got run over. So there are different periods in architecture, and these periods they offer lot of insights for NBS. Especially garden cities, because they have a lot of green spaces. But they have low value right now, because of low investment, it's mostly grass and cheap stuff.

Author: Do you think space is a problem in the Netherlands? Like finding empty spaces for new houses?

Judith: Space is certainly a problem, but space is also well-regulated. So if you want to have the space, you can get it. But the government has to take the initiative there.

Author: I guess my question is, are there any empty plots of land that has not been utilized for anything?

Judith: No. If you want space, you always have to take it from somebody else.

It's just that the lack of maintenance, actually what makes the green space less valuable right now. If you can use ideas from the past to revitalize it, there are lot of opportunities. Especially, you have to know the history of a neighborhood, and then you can adapt the green space to that idea again. Because there's research done in this, there was actually an idea sometime back, of connected green spaces and where children could play and people could hang out. But these ideas are often forgotten and pieces of land was taken away from this idea to build something and to densify it. If you can go back to the original idea, you can make it more valuable.

Helen: Yeah, so that's not about making a lot of new buildings that are nature-inclusive, but lot of the cases here are actually new buildings. But what you're saying is there are actually existing neighborhoods where there is already a lot of greenery that is under-developed. So by investing more on these areas where there are a lot of vulnerable people live, for social housing, it would actually maybe also lead to more just real estate.

Judith: But then the problem is also that the people in those areas, like the Overvecht, they don't feel like they own that space. So if you go in as a municipality and say we are going to redevelop

it according to our own ideas, then still it may not have any function. So you have to make sure that the people feel again that it's their own space. And I think this is working a lot better in some Rotterdam neighborhoods. I don't know, they are entrepreneurial or something. So they team up and they say to the municipality, hey, this park is now ours, we are going to do something here and you pay for it.

Author: Yes, I can relate to that. I live in the Overvecht, and I see that problem there. I may be wrong, but I think there's a lot of migrant people there. And a lot of international students. So I guess they are in a transitory state. Maybe they don't feel like they belong there sort of.

Judith: Yeah, but it's very much a social thing. So people also have to spend their time. I think that we did the same thing in The Hague so the corporation said to us yeah, we organized this evening and there was only one person there and they too came from another neighborhood. What are we going to do? I kept saying it's a growth model. So you have to start with one and then you have six and then you have twelve and you have to allow it to spread and to grow.

It also depends on the corporation because sometimes they have really terrible relations with their residents, so the trust is really below zero. But there are also corporations who are already investing in better relations. That requires a lot of work and my estimate is actually that maintaining the garden is only 50% of the work. The other 50% is maintaining relations with the people.

Author: Yeah, especially considering that people with lower incomes, well, they don't always have the money to also live in greenery.

Judith: If you look at square meters it's already there. Only it's all shared space. Almost all of it is shared space. They do not have private, private space. That's the problem. If they think that it's not theirs at all then they won't use it. They have to feel like it's theirs. Take care of it also so they don't throw rubbish in it because the most maintenance costs in those gardens is getting out the rubbish week after week. But if they don't feel like it's my garden then they won't do it. And sometimes they don't feel safe. But it's also even in some of the corporation gardens are public, so people even can't really see where the public space and the private space of the corporation start and end. And sometimes they have a fence. Around it and a gate with a key. And even those people with the keys don't feel that it's theirs. They don't use it. It's mostly underprivileged people, they have problems, they are from many different cultures and if they don't have relations among each other, then that but you can start it in the garden, you have to start organizing things. It's also this feeling of temporariness. It's certainly a barrier.

Appendix D

Coding scheme

