

Preliminary study of participatory and nature-inclusive design approaches

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This paper aims to develop a working strategy for a larger research project to help urban designers shift their human-centred design practices to a more nature-inclusive approach. The interest in developing innovative design perspectives that incorporate nature stems from the need to address the challenges of biodiversity loss by adopting a perspective that prioritises non-human species and their needs. The methodology used presents an analysis of participatory and nature-inclusive design approaches and examines how they have been conceptualised and operationalised. A final discussion reflects on the importance of advancing the development of a nature-inclusive design discipline that focuses on the needs of non-human species and transferring participatory design concepts tailored to humans, such as agency, to non-human communities. Nature-inclusive design has the potential to encourage people to reconnect with nature and value non-human species as much as humans. Non-human actors need to be recognised as part of the community and given a chance to coexist in an urban context.

Keywords: *nature-inclusive design; participatory design; agency; non-human needs*

1 Introduction

With the Covid-19 pandemic, designers have recognised the potential of public spaces to manage major disasters (Dobson, 2021). This trend is evident in many European cities, but more needs to be done to address the consequences of climate change, such as biodiversity loss. Moreover, the trend toward rapid urbanisation further exacerbates climate change (While & Whitehead, 2013). "Rewilding," "ecosystem services," and "nature-based solutions" are ecological strategies that aim to create space for nature and can ultimately facilitate people to self-organize to transition to more sustainable and nature-inclusive societies (Davidova & Zímová, 2018). Given the ecological value of the issue, it is urgent to develop innovative design approaches to abandon an anthropocentric view and adopt a non-human perspective that considers how the needs of non-human inhabitants are intertwined with the interests of our community and the health of natural ecosystems (Houston et al., 2017; Maller, 2018).



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The design and implementation of innovative design approaches bring new opportunities, but also challenges, such as integrating green elements into the living environment and addressing the interests of non-human communities as well. This can create tensions and conflicts between the two groups (Rupprecht, 2017). For example, aphids may be perceived by people as damaging to home gardens, but they are an important food source for many species of arthropods, such as hoverflies and ladybugs (Boon et al., 2023). To overcome these difficulties, people need to engage in real-world settings and develop new behaviours and lifestyles, as well as new methods for people to organize themselves into broader systems (Davidova & Zimová, 2018). One project, that involved a research team member, suggests new methods to encourage different behaviours: the 'From Prevention to Resilience' project. Its goal is to create resilient neighbourhoods and it introduced the innovative 'Human/Non-Human Public Spaces' design perspective. This tool emphasizes the importance of public spaces in fostering resilience, considering both human and non-human communities such as plants, animals, and fungi. The project aims to address social and ecological concerns together (Boon et al., 2023).

This paper seeks to establish a working strategy for a broader research endeavour that aims to guide urban designers in transitioning from human-centred design practices to a more comprehensive and nature-inclusive approach. The primary focus will be on integrating non-human species as integral members of the community. The paper evaluates two participatory design approaches that incorporate nature and investigates their conceptualization and operationalization. A concluding discussion emphasises the significance of advocating the development of a nature-inclusive design discipline that caters to the needs of non-human species, utilising participatory design principles customised for non-human communities.

2 Concepts

In order to broaden the scope of participatory design to encompass non-human species, this section undertakes a comprehensive literature review of participatory design and nature-inclusive design, aiming to establish a connection between them through the notion of agency. These foundational concepts form the framework for the selection and analysis of the design approaches discussed in the subsequent chapter.

2.1 Participatory design

In the past, urban design was primarily driven by the designer, who was considered the sole expert in shaping the urban form. However, during the 1960s, a shift occurred as scholars in urban design began to recognize the importance of participation, leading to closer collaboration between urban designers, city planners, and local communities people (Giamarino et al., 2022). According to just city theorists, participation in decision-making processes is viewed as a means of exercising power (Fainstein, 2000). Luck (2018) highlights that the design process plays a central role in decision-making, encompassing considerations of who is involved, represented, and considered significant. Harvey (2003) further argues that participation should not be regarded solely as a means to an end, but as genuine and meaningful engagement (Bødker et al., 2010).

To effectively implement participatory design in urban development processes, a fundamental shift is required in the role attributed to users. They should be recognized not only as sources of information but as authentic participants in the design process (Bratteteig et al., 2013). Furthermore, the concept

of advocacy planning has advocated for the inclusion of diverse perspectives and the abandonment of top-down approaches in planning and design processes (Davidoff, 1965). As emphasized by Lake (2016), a transparent and inclusive design process is crucial to ensure equitable outcomes. Promoting a just process in urban design is vital to provide marginalized groups with opportunities to participate in decision-making processes that affect them and the public realm (Luck, 2018).

Therefore, the design process requires careful selection of participants and design tools to enable meaningful individual participation. Adopting a participant-centered perspective is crucial for developing appropriate participatory and responsive design tools that directly impact inclusivity, accurate representation, data utilization, and decision-making processes (Ataman & Tuncer, 2022). While the concept of agency holds significance in resilience, relating to a community's ability to withstand shocks or stressors (Borelli et al., 2020), it also plays a central role in implementing the participation of actors in design processes; as in design, agency encompasses a range of abilities that empower individuals to take action, express their opinions, and make decisions (Hernandez Ibinarriaga & Brian, 2021). However, agency has predominantly been applied in human-centric design processes. To overcome this limitation, there is a pressing need to expand its scope beyond an anthropocentric foundation, as suggested by Bruno Latour. Latour argues that agency should not be limited to humans but can also be attributed to non-human entities such as objects, technologies, institutions, and natural forces. By introducing the concept of "actants," Latour broadens the understanding of agency to include a diverse array of entities that can shape social action and behavior (Latour, 2011).

2.2 Nature-inclusive design

Nature-inclusive design is an evolving discipline that initially explored the application of ecosystem services, revegetation, landscape regeneration, and nature-based solutions. It can be defined as a technique that integrates into existing designs to create suitable habitats for local species whose natural habitats have been damaged or diminished (Sella et al., 2022). In the Netherlands, nature-inclusive design prioritizes the ecological well-being of native species, especially those in need of restoration, such as those on the OSPAR List of Endangered and/or Declining Species and Habitats or Dutch national Red Lists (Hermans et al., 2020).

In urban and product design, designers and researchers increasingly recognize the inadequacies of market products in addressing situational or species-specific needs, which can harm local ecosystems and populations (Van Stiphoud & Lehner, 2020). Nature-inclusive design expands the user perspective beyond humans to include biotic creatures. (Haraway, 2008); Harvey (2003) defines non-human actors as "significant otherness," encompassing humans, non-human animals, plants, forces, and living things. Wilson (2017) discusses agency from the perspective of the oppressed but acknowledges our limited knowledge of non-human beings. Haraway (2008), however, emphasizes the importance of engaging and understanding non-human beings to acknowledge our responsibilities. Indigenous literature provides insights into implementing agency in design, where agency is inherent in all aspects of reality, not solely a human trait. Indigenous perspectives view nature not as a concept but as an integral part of existence.

Developing ethical commitments to specific agents and species communities requires approaching connections with non-human agents without superiority (Watts, 2013). However, privileging relationships with certain non-human actors in a Western context can raise concerns about loss of autonomy. Deloria (1999) explains that people discover their identities as objects within a place,

rather than acting as individuals capable of controlling events. This challenges the Western notion of liberal individualism, potentially disrupting the humanistic subject in design processes, as non-human agency is embraced.

3 Methods

This paper aims to outline an initial working strategy for a larger research project. The methods section focuses on establishing and testing a preliminary approach for data collection and analysis. The process involves two primary phases: firstly, gathering and selecting design approaches from online sources, and secondly, analysing the chosen design approaches to gain insights into the conceptualization and operationalisation of participatory and nature-inclusive design.

3.1 Collecting and selecting design approaches

The researcher utilized online search engines, namely Google Scholar, along with specific keywords such as 'nature-inclusive design,' 'non-human participation,' and 'non-human community design.' This initial search yielded a list of fifteen relevant works. The researcher primarily focused on books, edited volumes, and scholarly articles authored by academics and practitioners specializing in participatory and nature-inclusive design. To organize the findings, all identified design approaches were compiled using Notion, a project management and note-taking software. This collection will serve as the basis for future analysis in subsequent phases of the research. The decision to select two specific design approaches was driven by the aim to examine approaches grounded in practical experience or reflective insights from real-world design projects. Furthermore, these chosen cases possess the capacity to incorporate the perspective of non-human actors. This selection allows for the exploration of design approaches developed within both real-world and academic contexts, encompassing a diverse range of geographical projects.

3.2 Analysing the selected examples

The analysis of the chosen design approaches entails conducting a content analysis of qualitative data using the software Atlas.ti, a tool specifically designed for qualitative data analysis. To facilitate the analysis process, the texts of the selected design approaches were conveniently uploaded into Atlas.ti and coded using a predefined set of group codes. These codes were established based on the author's background information and the fundamental principles and application of participatory design and nature-inclusive design. By conducting an in-depth analysis, taking meticulous notes on key points and concepts found in each publication, the two design approaches were effectively summarized. This exercise served to elucidate the connection between the two design approaches and their primary design domains, as well as to clarify the definition and practical implementation of the core concepts.

4 Results

The results section of this study introduces the chosen design approaches and examines various aspects, including the authors' backgrounds, the fundamental characteristics of the design approaches, and the definition and application of participatory and nature-inclusive design concepts. The main objective of this section is to present initial findings that serve as substantial evidence for the forthcoming stages of the research. Specifically, the following design approaches are presented: the 'First Guide to Nature Inclusive Design' authored by Maike van Stiphout and the 'Nonhuman Personas Framework' authored by Martin Tomitsch, Joel Fredericks, Dan Vo, Jessica Frawley, and Marcus Foth.

4.1 First Guide to Nature Inclusive Design

The First Guide to Nature Inclusive Design authored by Maïke van Stiphout encompasses a wealth of expertise derived from the field of landscape architecture. In the guide, Stiphout offers insights into the intricate dynamics between natural ecosystems and urban environments. By distilling her knowledge into coherent theoretical frameworks and actionable strategies, the guide serves as a valuable resource for professionals seeking to approach urban challenges through a nature-inclusive perspective. Stiphout emphasizes the importance of three pivotal steps to effectively transition projects towards a nature-inclusive paradigm, thereby fostering a harmonious integration of ecological and built elements.

1. Situate the project in the city as if it were a mountain landscape, taking the point of view of biodiversity. The designers needs to think of a project in 3D and pay attention to vertical and horizontal connections, where tall buildings become mountain peaks and roofs become plain surfaces connected to the surroundings.

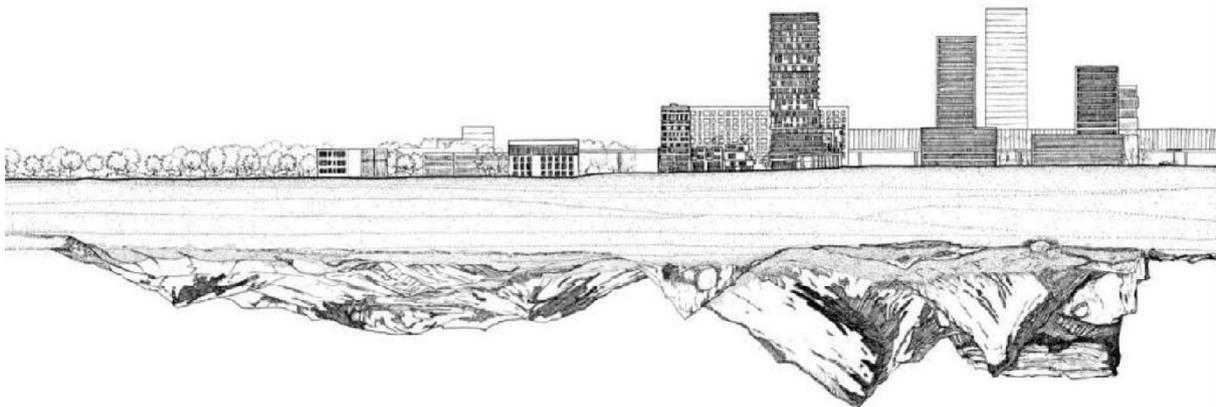


Figure 1. Representation of the mountain landscape view (Van Stiphoud & Lehner, 2020).

2. Define at least one urban biotope in your project, i.e., determine the ecological parameters that define the local habitat for a particular combination of animals, endemic and cultivated plant species, and natural and artificial spatial elements. Examples of biotopes depicted in the guide include the rock, the Bretten, the garden, and the covered hill biotope.
3. Variation in sizes and scales, Porosity and Diversity in use and maintenance are the three design tools to increase a project's receptivity to plants and animals. The first tool explains how the need for diversity in morphology exists at all scales of nature-inclusive design, from the regional to the building level. With greater variation in scale comes a greater number of microclimates. The second point states that the porosity of objects and building elements is one of the most important factors influencing the occurrence of plants and animals in the built environment. The third and final tool shows that variations in maintenance practices or the presence of people at different times also contribute to the increase in species diversity.



Figure 2. Representation of the four urban biotopes. From the top left to the bottom right: the Garden biotope, the Rock biotope, the Bretten biotope and the covered hill biotope, and their flora and fauna species. (Van Stiphoud & Lehner, 2020).



Figure 3. Example of the application of Porosity (Van Stiphoud & Lehner, 2020).



Figure 4. Example of partially unmown lawn that applies the concept of diversification in maintenance (Van Stiphoud & Lehner, 2020).

4.2 Non-human Personas Framework

The Non-human Personas Framework was developed by a research team from the University of Sydney and Queensland University of Technology to help designers develop non-human personas and apply them to a specific project, context, or case study. Non-human personas is a tool that can incorporate not only the voices of humans, but also the needs of non-human stakeholders into participatory design processes. Personas are useful for keeping the perspective of users and other key stakeholders at the forefront throughout the design process.

The researchers present the framework as a tool for developing and employing non-human personas, the steps of which are as follows (as in Figure 7):

1. Identifying non-human stakeholders, or recognising the living species, should be considered during the design process. Primary stakeholders, such as city residents and possums, are the primary end users of the design, while secondary stakeholders, such as birds, bees, and plants, are important representatives of the larger ecosystem.
2. Creating non-human personas, a group of aggregated stakeholders, like an aggregate possum persona, based on common behavioural characteristics such as type/species, age/lifespan, local population, needs/motivation, food/food sources, challenges/stressors, interacts with, and habitat. A fictitious name and a picture are given to make the persona look like a real living member of their species.
3. Forming coalitions via middle-out engagement to assess the extent to which the persona accurately reflects the identified non-human stakeholders, and address any gaps. The strategy combines the collective knowledge of stakeholders from the top, such as ecologists and policymakers driving environmental conservation policy, with those from the bottom, such as animal rights activists, wildlife caretakers from grassroots organizations, or indigenous peoples with a strong personal and cultural connection to the land.

Human Stakeholders



Emma the office worker



Adrian the proud homeowner

Non-Human Stakeholders



Beans the possum



Lorraine the lorikeet



Florence the native flora



Buzzy the bee

Figure 5. Example of human and non-human personas (Tomitsch et al., 2021).

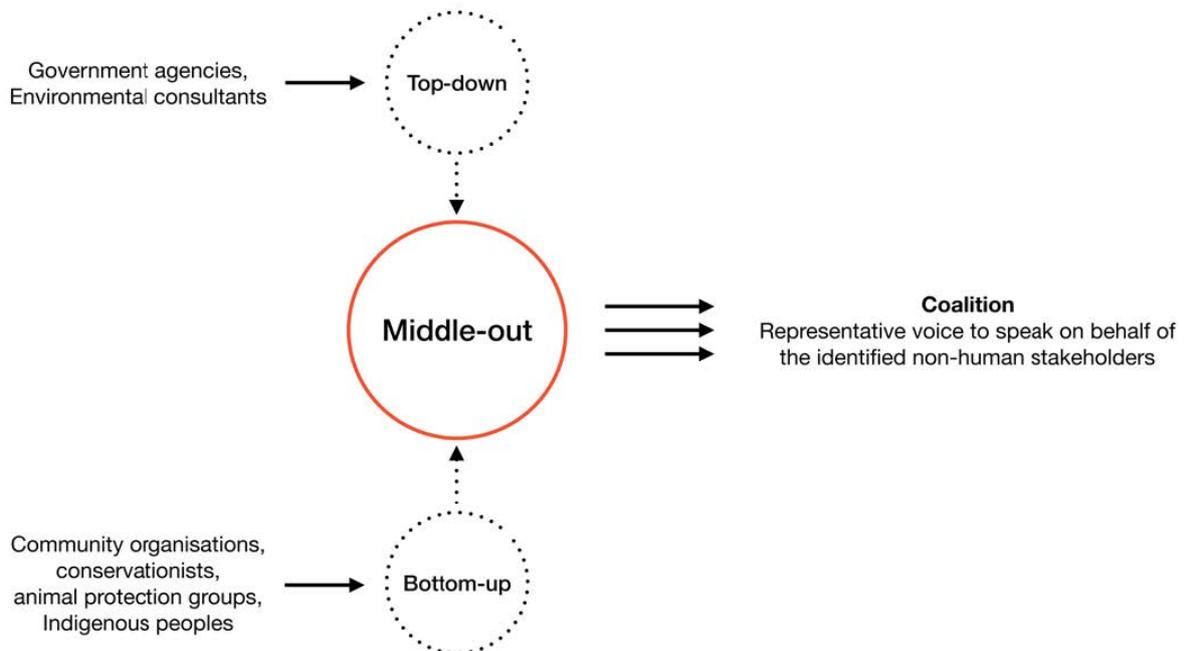


Figure 6. The middle-out engagement approach for forming a coalition that is able to speak on behalf of an identified non-human stakeholder (Tomitsch et al., 2021).

- Employing non-human personas and their coalitions in the design process is a reminder to consider the immediate and long-term environmental impacts of design decisions. Coalitions serve as an accessible tool to represent the voice of identified non-human stakeholders throughout the life of a design project and beyond.

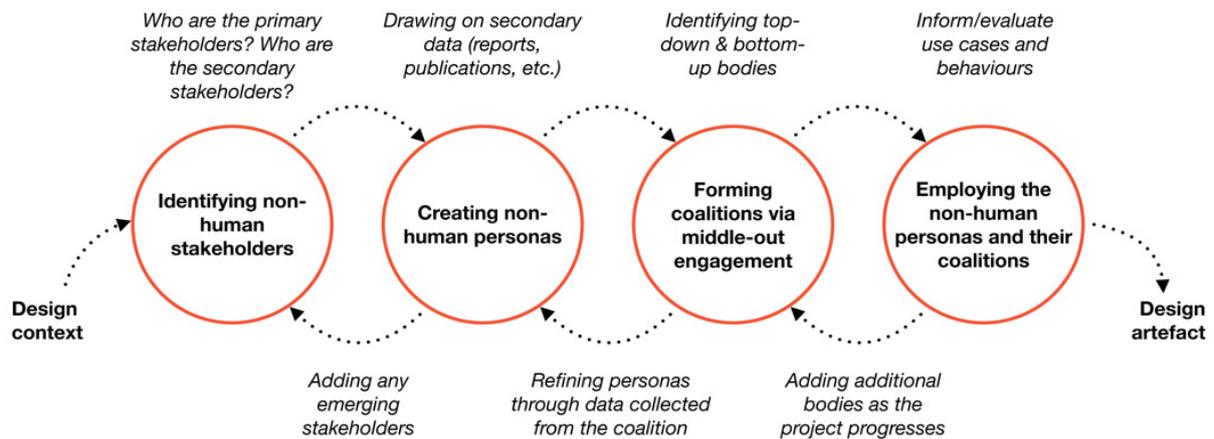


Figure 7. The non-human personas framework (Tomitsch et al., 2021).

5 Discussion

In this section, we aim to synthesize the findings of the literature review on participatory and nature-inclusive design with the analyzed design approaches, highlighting key considerations. The literature review and design approaches indicate that nature-inclusive design is still evolving and not yet recognized as a distinct discipline. For instance, Wageningen University defines nature-inclusive solutions as techniques integrated into existing designs to provide suitable habitat for local species affected by habitat degradation. Both design approaches suggest adopting a nature-inclusive perspective when evaluating implemented projects, seeking opportunities to enhance biodiversity or address non-human stakeholders' needs. However, they do not directly engage non-human actors in the design process, instead relying on tools like biodiversity lenses, porosity, or middle-out engagement to incorporate their voices and requirements. Hence, a crucial question arises from these design approaches: how can non-human actors be effectively foregrounded in participatory design processes? To address this, designers and researchers, first, require to consider the needs of both human and non-human species equitably and, second, explore the transfer and application of human-centered design methods to non-human species.

The first solution is addressed into both design approaches incorporating a nature-inclusive perspective to improve the well-being of all living beings, including humans, animals, and plants. Similarly, the "Human/Non-human Public Space" design perspective seeks to tackle both social and ecological challenges in urban areas. While acknowledging the value of non-human communities, it is essential to carefully consider the inclusion of human and non-human groups within the same design approach due to their distinct needs and behaviors. Prioritizing non-human communities as key stakeholders in participatory processes can foster greater design freedom and facilitate the development of new concepts, propelling the advancement of the nature-inclusive design discipline. Consequently, it may be worthwhile to explore the concept of nature-centered design instead of nature-inclusive design in future research phases.

To tackle the second solution, a concept borrowed from anthropocentric participatory design and applied to non-human actors is agency. The non-human personas framework enhances the agency of non-human actors by employing a middle-out design strategy that engages top-down and bottom-up organizations in community participation, thus representing the voices and needs of non-human

actors. The framework enables the accommodation of non-human stakeholders within specific spaces by considering their needs and behaviors; for instance, designing architectural elements that allow small birds to build nests by incorporating hollow structures on the east façade. These approaches align with existing scholarly definitions of agency and resonate with indigenous literature, which perceives agency as an inherent property in all aspects of reality rather than solely a human characteristic. Embracing this understanding of agency can facilitate the translation of an anthropocentric concept from Western society into one that is applicable to other species.

Therefore, the development of a nature-centered design discipline holds potential to encourage humans to reconnect with nature, value non-human species on par with humans, and approach non-human actors without a sense of superiority. This preliminary study demonstrates the feasibility of considering agency as a central concept in participatory design and recognizing non-humans as the primary users. Further research will explore these possibilities in greater depth.

6 Conclusions

The rapid pace of urbanization is contributing to climate change, biodiversity loss, and a decline in overall quality of life. In order to tackle these pressing challenges, it is imperative to adopt a nature-centered perspective that prioritizes the needs of non-human species and places them at the forefront of the design process. As we strive for an inclusive and sustainable society, it is crucial to develop and implement new behaviors and design methods that enable individuals to effectively coexist with nature.

Despite its growing importance, nature-inclusive design is still an evolving discipline and requires further development. Designers and researchers can drive this progress by shifting their focus towards the needs of non-human species and exploring the transfer and application of design concepts, originally designed for humans, to non-human communities. This can be achieved by redefining and revitalizing the notion of agency. By embracing a design discipline that incorporates nature, we can inspire individuals to reconnect with the natural world, foster equal regard for non-human species, and approach them without a sense of superiority. Recognizing the importance of non-human actors and providing them with opportunities to thrive in urban environments is crucial in our collective efforts to combat biodiversity loss.

In order to create a harmonious coexistence between humans and nature, it is essential to embrace a nature-centered approach in our design practices. By doing so, we can pave the way for a more sustainable and balanced future, where both human and non-human species thrive together.

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