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The Ladder of More-than-Human Participation: A Framework for Inclusive Design

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Abstract: The accelerating environmental crises necessitate a shift in design and management, prompting a move beyond anthropocentric frameworks that prioritize human needs and expertise. This article explores more-than-human participation in design, arguing for an approach that recognizes expertise, innovation, and the rights of nonhuman beings. By integrating nonhuman contributions, design collectives can overcome limitations of human-centric governance and foster more just, resilient, and sustainable ways to live. Starting with Sherry Arnstein's (1969) influential Ladder of Citizen Participation, this article proposes a structured way to understand degrees of more-than-human participation and discusses the implications. Through this approach, design becomes a more-than-human endeavour with a better chance of responding to the needs of all stakeholders within a living Gaian system.

Introduction

This article explores forms of more-than-human participation in design and emphasizes the practical benefits of adopting an inclusive approach. Inclusivity is crucial because human responses to environmental crises often position design and management practices as mere tools for pessimistic mitigation. In this context, efforts to design solutions that benefit all life can seem unrealistic, overly nostalgic, or excessively critical. However, inclusive design recognizes the interdependence of human and non-human systems, fostering more sustainable and adaptive solutions. By involving non-human

perspectives, such an approach can generate innovative strategies that address ecological challenges more equitably and holistically.

Opportunities for Inclusive Participation

Here, the term 'design' refers to the collective process of creating conditions that support life in response to novel circumstances. (Roudavski 2021; Parker et al. 2022). Such design does not need to involve or be led by humans. Existing frameworks for conservation tend to rely on human expertise, scientific, Indigenous, or otherwise, and overestimate human capacity to guide equitable action (Washington et al. 2021). They miss out on the contributions of more-than-human collectives and risk engaging with some forms of nonhuman life more than with others. A growing body of evidence shows that nonhuman beings, such as plants and animals, possess their own expertise, can innovate and lead design efforts (Holland and Roudavski 2024; Parker, Soanes, and Roudavski 2022; Rutten, Holland, and Roudavski 2024). The exclusion of such nonhuman contributions undermines prospects for equitable governance across spatial, temporal, and organizational scales (Holland and Roudavski 2024). Resisting such restrictions, positions that see the world as a living Gaian system (Margulis and Sagan 2010) and can engage with nonhuman capabilities, expertise, cultures, and innovations deserve further investigation.

Interconnected sources of design solutions reveal the potential of more-than-human approaches. Abiotic phenomena, such as Earth's orbit, solar radiation, and weather patterns, define habitable zones, constrain local climates, and provide structures that life can exploit (Lenton and Watson 2011). Seasonal migrations of birds or shedding of leaves in deciduous forests are examples of life fitting such patterns. These processes are inseparable from living systems and typically remain beyond human control. Biotic agents create and maintain life on Earth, engage in complex relationships, interpret, and respond to their environments, transmitting information through genes, behaviours, and other exchanges. Humans contribute through governance, information accumulation, and planning. However, their efforts often produce harm along with benefits. Machines add further capabilities by collecting, storing and sharing information, discovering complex patterns, automating tasks, supporting numerical analysis, and making predictions. Machines are particularly interesting as they interlink other agencies and can operate outside the constraints of living systems. Engaging with these agencies involves soliciting contributions from both human and nonhuman entities through design (Roudavski 2018, 2020, 2021).

The Need for Systematic Interventions

Addressing biases in biological and ecological sciences, governance, as well as in resulting designs requires systematic interventions that minimize anthropocentric distortions. Human institutions naturally prioritize processes and phenomena that are easily accessible or appear significant to human societies. In biology and ecology, this often results in taxonomic and geographic biases, such as the prioritization of charismatic species, larger body sizes, or evolutionary relatives of humans (e.g., see Berti et al. 2020).

Systematic frameworks, such as the ladder discussed in this article, help address these imbalances. By organizing participation along a structured ethical and methodological framework, such approaches ensure more equitable attention across species, geographies, and disciplines. Systematic conservation planning can be an important way to avoid the allocation of resources based on human preferences or visibility (Margules and Pressey 2000). However, debates on the nature of

organising principles are ongoing and seem unlikely to conclude with consensus (Saltz and Cohen 2023). In these circumstances, continuing experimentation with systematic approaches can spark discussions on the ethical need for fairness in disciplines often marked by significant injustice and harm.

The response to this need is difficult because human individuals and institutions prioritise process and phenomena that are more easily accessible and appear significant to human societies. The difference is much greater in the disciplines and practices that have no inbuilt focus on nonhuman life, including governance and design. Such biases can be difficult to resist, especially when their impacts are invisible or hard to interpret. In response, this article proposes one systematic structure.

Structure of More than Human Participation

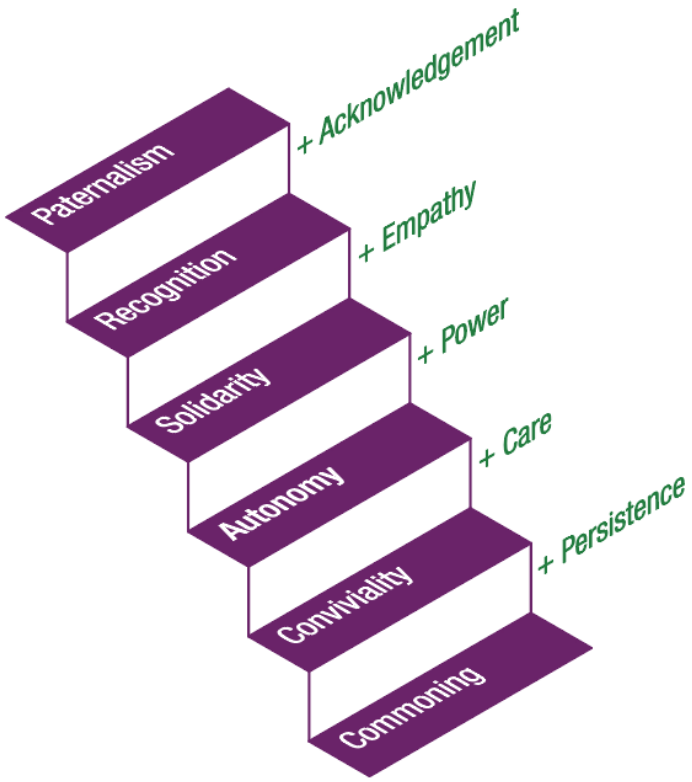

Figure 1. Ladder of more-than-human participation

This structure is a framework that rethinks Sherry Arnstein's (1969) Ladder of Citizen Participation (see also Roudavski and Holland 2023). Arnstein's ladder delineates participatory involvement into degrees ranging from Nonparticipation (Manipulation, Therapy) and Tokenism (Informing, Consultation, Placation) to Degrees of Citizen Power (Partnership, Delegated Power, Citizen Control). As more than 30,000 citations on Google Scholar demonstrate, this ladder has been widely influential across various disciplines. Some literature has begun to engage with the ladder in application to nonhuman stakeholders (Voinov and Bousquet 2010; Giraud and Hollin 2017; Hernandez-Santin et al. 2023), but the field still lacks a systematic reconsideration of its implication beyond human collectives.

Recent research into sensory ecologies and animal behaviour, combined with ecocentric analyses of environmental and ecological justice (Donaldson 2020; Schlosberg 2013), provides a foundation for this inclusive framework. This reconceptualised ladder allows us to link events, agents, and proposals from disparate fields into one system. It employs the language of participatory design to assess power relations, with the aim of identifying the steps necessary to support more inclusive design. The ladder structures collaboration to include nonhuman entities, promoting power sharing between taxa.

Paternalism

Powerful humans often adopt a paternalistic attitude toward weaker human minorities and toward nonhumans, deciding what is best and acting accordingly. Paternalism can sometimes serve a purpose, such as when adults guide children who lack the necessary skills (Conly 2013). In ecological contexts, Kareiva (2011) specifically argues that conservation succeeds when it aligns with human interests. This approach prioritizes human benefits, seeing nonhuman communities as challenges for human governance.

However, paternalism in more-than-human contexts often leads to negative consequences. By placing narrow human interests above the concerns of other lifeforms, humans contribute to ongoing failures in addressing critical issues such as climate change and biodiversity losses (Díaz et al. 2015). Conservation strategies that prioritize species based on their appeal to humans—such as pandas—often neglect less visible but ecologically vital species like insects, viruses, or grasslands (Lorimer 2007).

Additionally, humans often struggle with the long-term dynamics of ecosystems. As landscapes degrade gradually, human societies lose living memories of healthier ecosystems, and even specialists fail to notice the decline (Dayton et al. 1998). This phenomenon, known as the "sliding baseline," illustrates the dangers of paternalism in ecological management, where humans impose short-term fixes without addressing deeper systemic issues.

Examples from conservation further reveal the harms of paternalism. Species relocation, though well-intentioned, often disrupts natural processes, reflecting human assumptions about where and how species should exist (Camacho 2010). Similarly, the displacement of Indigenous people from protected areas under the assumption that conservationists know best reveals how paternalism can overlook traditional ecological knowledge and its ways of transmitting nonhuman expertise (Brockington, Duffy, and Igoe 2010).

Recognition = Paternalism + Acknowledgement

The first step in more-than-human design requires a willingness to acknowledge the capabilities of others (Parker, Soanes, and Roudavski 2022). All communities involve both human and nonhuman entities, but human societies often fail to recognize nonhuman beings—such as organisms, genes, and ecosystems—as integral parts of their cultures. Instead, humans often treat ecosystems as mere resources.

Even when humans attempt to fairly distribute benefits and risks, nonhuman entities continue to face exclusion due to persistent biases. A more inclusive perspective, one that views ecological and social processes as interconnected, offers a potential path forward. Feminist and decolonial scholars have long pointed out how some human practices, such as the work of peasants or land management by Indigenous peoples, remain undervalued or invisible (De La Cadena 2010). The same invisibility applies to nonhumans, whose contributions to living communities often go unrecognized.

A stance based on acknowledgement moves away from principles of charity towards principles of justice (e.g., see Baxter 2005). Such ecological justice calls for the recognition of nonhuman rights, including the right to political consideration. This shift broadens the framework beyond the redistribution of resources and calls for political structures that recognize the role and contributions of nonhuman beings.

Thus, recognition becomes the essential first step in building a more-than-human community. Existing participatory approaches show that disadvantaged human groups benefit when more powerful actors acknowledge their existence and needs. Similarly, nonhuman stakeholders will gain from greater recognition. For instance, birds can innovate by finding novel ways to use trees for habitation. Although human designers cannot fully interpret the complex advantages that trees offer birds, technical systems can help humans understand some aspects of these relationships. By broadening the scope of human knowledge to include nonhuman needs and contributions, design teams can increase the visibility of underrepresented stakeholders and expand the range of possible solutions (Holland and Roudavski 2024).

Solidarity = Recognition + Empathy

The next step in building more-than-human communities is from recognition to solidarity. In this context, solidarity involves fostering empathy toward nonhuman beings, who may have divergent lifestyles, needs, and preferences, by highlighting commonalities and shared life patterns. Empathy allows humans to better understand nonhuman beings, leading to more inclusive decision-making processes.

For example, our work on multispecies cohabitation (Holland and Roudavski 2024) recognises trees and birds as active participants in the design process rather than passive objects to be managed by humans. Birds, as discerning clients, continuously assess their habitats and demonstrate their preferences, while trees, as designers, create complex structures that birds use for shelter and nesting. Here, human beings can demonstrate empathy in response to rapid uptake of artificial habitat structures by wildlife who lack perches and nests in degraded landscapes.

Empathy is especially important because when recognition processes broaden the range of stakeholders to include nonhuman entities, tensions inevitably arise. Living with nonhuman lifeforms in urban and modified settings can produce both beneficial and harmful outcomes for all parties. For example, while providing habitat structures for birds can support avian populations, these interventions can also disrupt existing ecological balances or create ecological traps. In some cases, consensus is not achievable, as different stakeholders have incompatible needs. This divergence is especially acute where human activities degrade natural environments, leading to unpredictable disruptions (Frank and Glikman 2019).

Cohabitation in these settings requires ongoing negotiation of needs and wants between stakeholder groups, including humans, animals, and plants. Our work illustrates this challenge in examples where both human and nonhuman communities must find ways to coexist in damaged landscapes. For example, large old trees are vital for bird populations, yet human development threatens their existence.

Such disunity is normal, especially in more-than-human communities. Under the framework of agonistic democracy (Mouffe 2005), the goal is not to achieve consensus but to discover commonalities amidst persistent challenges to dominant hegemonies. This perspective allows for the coexistence of multiple, sometimes conflicting, interests, emphasizing the importance of negotiation rather than elimination of differences. Solidarity, in this expanded sense, is about recognizing the

value of diverse lives and working toward just outcomes for all, even when full agreement is not possible.

Autonomy = Solidarity + Power

Human empathy is important given the overbearing impact of human societies on the planet. However, it is not sufficient. 'Nothing about us without us' is a well-known slogan of many minorities (Ahmed, Windle, and Lynch 2021). It emphasises that no policies or actions should occur without full and direct participation of affected stakeholders, even when the practices of the minorities can cause harm or friction. What is true for disempowerment based on ethnicity, sex, or disability (Charlton 1998) within human communities also applies to more-than-human collectives. We argue that human and nonhuman agents should have the power to pursue their own interests in design situations and even lead design in relevant projects. Here, our example is the ability of digital data to support trees as leaders in design projects (Rutten, Holland, and Roudavski 2024). The resulting information can support ongoing efforts to understand their capabilities and defend their rights to movement, communication, and procreation, among others.

Conviviality = Autonomy + Care

The term autonomy often suggests the idea of competition and survival of the fittest, as encapsulated in Tennyson's famous phrase, "nature red in tooth and claw." This view, which emphasizes individual competition, has dominated scientific and public discourse. While competition plays a crucial role in natural selection, it is not the sole or even dominant mechanism in many biological systems. Modern ecological and evolutionary research emphasizes the importance of cooperation and interdependence among species. For example, Kaplan (2015, 12) highlights how cooperative behaviours, such as parental and group care, are common in birds and could even surpass competitive interactions in certain contexts.

Evidential support for this cooperative view of nature stretches back to Kropotkin's ([1902] 2012) discussions of mutual aid as a driving force in evolution and human societies. A growing body of work on symbiosis expands on this, showing that interrelationships have been fundamental to the development of life on Earth, with species depending on one another for survival and flourishing (Margulis and Sagan 2010). This emphasis on relationships challenges the anthropocentric idea of autonomy as individualistic competition and redefines it in terms of conviviality, which blends self-supporting actions with care and mutual support.

In urban and other anthropogenically modified environments, conviviality, understood as the interplay between autonomy and care, becomes a way to foster multispecies cohabitation. By supporting both human and nonhuman autonomy, cities can create spaces that meet the needs of all species. As Rigby (2018) and others argue, cities should serve as sites of multispecies hospitality, where different forms of life can coexist autonomously, yet interdependently. This vision promotes a bio-inclusive approach to urban planning, moving beyond human-centric models to accommodate the needs of nonhuman residents like birds, insects, and other wildlife.

In another example that relates to birds, we discuss this in the exploration of interspecies cultures, where the design of urban habitats must support the autonomy of nonhuman species, like the powerful owl, while ensuring their well-being (Parker, Soanes, and Roudavski 2022). This research into urban habitat structures demonstrates how design can integrate the needs of multiple species, balancing human control with the autonomy of nonhuman inhabitants.

Commoning = Conviviality + Persistence

Caring relationships within communities become impactful when they persist over time and involve many stakeholders. In the context of multispecies cohabitation, commoning involves creating systems that enable sustainable, ongoing care for both human and nonhuman participants. Human cultures typically operate on shorter time scales, but more-than-human governance requires accommodating both faster changes, like microorganism evolution, and much slower processes, such as forest formation (Holland and Roudavski 2024). Thus, effective commoning must consider time scales beyond human experiences to create long-lasting and inclusive solutions.

The concept of 'commons', originally developed as a framework for managing shared resources outside the logic of neoliberal economies (Ostrom, 1990), has evolved into 'commoning', a process of sustained collective action (Bresnihan 2016; Dawney, Kirwan, and Birgstocke 2016). Rather than focusing only on resisting market exploitation, commoning emphasizes persistent and ongoing activities necessary to maintain shared spaces for all beings. This rethinking of the commons accounts for the ecological functions of environments altered by humans, recognizing that these spaces also support multiple taxa, including microbes, plants, and animals (Cooke and Lane 2018).

We provide a preliminary example of such commoning in the work that designs artificial perches for birds in degraded landscapes. This research explores how manufactured structures can serve as temporary solutions in the absence of large, old trees, which take centuries to grow and provide essential habitat features such as perching and nesting sites for birds. By integrating computational models and ecological data, we simulate the long-term impacts of artificial perches and tree regeneration over hundreds of years (Holland et al. 2023). This approach exemplifies commoning because it combines convivial design, creating habitat structures that support human and nonhuman autonomy, with the persistence needed to ensure that these structures remain viable over extended periods. The persistence of such efforts is crucial, as many species depend on habitat features that take decades or centuries to form.

Such approaches reframe urban environments as shared commons, where both human and nonhuman beings participate in design processes. Commoning, therefore, blends conviviality with persistence, ensuring that multispecies cohabitation continues across ecological time scales.

Benefits and Costs of Inclusion

We explore the objectives of design through the lens of more-than-human participation, conceptualizing this approach as a ladder with various steps. This perspective emphasizes the potential for collaborative design between humans and nonhuman beings, acknowledging the significant challenges involved. However, given the often-detrimental impact of current anthropocentric methods, even modest improvements in this direction could yield substantial benefits. Anthropocentric biases tend to dominate attention towards spatial, temporal, and organizational scales that align with human experiences, often neglecting other forms of life (Holland and Roudavski 2024). Shifting to more-than-human design offers numerous advantages: it promotes justice by giving nonhuman beings a better chance to survive and thrive, leverages the hidden potential of behavioural and phenotypic plasticity, fosters a deeper understanding of communal life across different taxa—echoing practices seen in traditional and Indigenous societies—and nurtures an optimistic outlook that, while acknowledging the mounting losses, focuses on novel, locally successful, and morally sound alternatives to human-centric, extractive economies. However, this approach faces scepticism, particularly from those who view it as naïve or impractical due to the perceived intrinsic selfishness of humans. Furthermore, the profound lack of knowledge about

nonhuman systems, many of which remain undescribed or are difficult to observe, complicates the unpredictability of complex systems, posing significant challenges for understanding and planning. These difficulties extend to demonstrating the benefits and causality within complex systems, often undermining support for research and practical implementation, especially when the advantages fall outside of human perceptual scales. Additionally, engaging in more-than-human design introduces greater complexity to projects, including team composition, communication, and goal setting, while also increasing the likelihood of disagreements and conflicts of interest between diverse life forms in complex ecosystems. This approach may also require counterintuitive curtailment of human interests, particularly when viewed through a short-sighted lens. Despite these challenges, more-than-human approaches offer greater potential than traditional harm-mitigation strategies. Therefore, they are worth pursuing.

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