# SPOOL

## Landscape Metropolis #11

## Representing the More-than-Human

V12/#2

ISSN 2215-0897
E-ISSN 2215-0900

VOLUME 12 . ISSUE 2

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## Editorial



## Articles

**SPOOL** - Journal of Architecture and the Built Environment

SPOOL is a journal initiative in the field of 'architecture and the built environment'. It puts a strong emphasis on specific topics, so-called threads: Landscape Metropolis; Energy Innovation, Cyber-physical Architecture, Narratives, Evidence & Method, and Expo. These topics refer to existing and upcoming research programmes/interests in Europe and beyond, and ensure a steady stream of potential copy. Treating these topics as threads within one journal allows SPOOL to focus on the interrelationship between the fields, something that is often lost in specialised journals. SPOOL welcomes within this framework original papers and associated open data on research that deal with interventions in architecture and the built environment by means of design, engineering and/or planning.

**ISBN**
978-94-93439-05-4

**Cover images**
Front: Critical Zones | Highland Boundary Fault Graduation Show. The process of thinking through the making of these interdimensional and attentive representations instils in designers, here students, a critical awareness of complex, more-than-human landscapes. However, the challenge lies in moving beyond theoretical explorations to actionable propositions. By exhibiting these works, we aim to provoke critical reflections on Scottish landscapes and embed 'ecologically explicit' (Morton 2021) perspectives within the cultural consciousness of Landscape Architects and allied communities. Ultimately, these representations should serve as essential tools for interdisciplinary collaboration, enriching both professional practices and societal discourse on future landscapes. (Photograph by Rhodes, A. 2024).
Back: Nesting scales and cycles. Interdimensional representations of the environmental conditions that moss species need and create to thrive alongside their reproductive and life cycles demonstrate an appreciation for how vital these often-overlooked micro-species are to their macro worlds. (Drawing by Brand, B. 2023) .

**Publisher**
SOAP | Stichting OpenAccess platforms, Rotterdam, NL



**Contact**
Principal: Frank van der Hoeven (info@openaccess.ac)

**Design**
Sirene Ontwerpers, Rotterdam, NL

ISSN 2215-0897
E-ISSN 2215-0900

www.spool.ac

EDITORIAL

# Representing the More-than-Human

**Anna Neuhaus [1], Saskia de Wit [2] and Inge Bobbink [2]**

[1] *Technical University Berlin (Germany)*
[2] *Delft University of Technology (The Netherlands)*

In the thread *Landscape Metropolis*, SPOOL addresses the interrelation between urban, infrastructural, rural, and living formations as a dynamic, intertwined, and layered landscape structure. Triggered by the profound changes of the Anthropocene, the complexity of the metropolitan landscape asks for reorientation when addressing physical space as well as spatial investigation and theory, in terms of aesthetic appreciation, designerly concepts, guidelines for planning and governance, and design theoretical understandings. Spatial design responses to this growing complexity cover a broad spectrum of areas. They range from a focus on negotiation processes between human actors and demands—such as approaching the need for inclusivity, accessibility, and democracy in urban spaces (e.g., *Landscape Metropolis #5 – Park Politics*)—to a technical or ecological systems-oriented focus on managing landscapes, as in landscape ecology.

Further dimensions open when taking a post-humanist view, understanding spaces as animated worlds consisting of a multitude of actors like waters, soils, animals, microbes, plants, and technology, in which humans live entangled, in dependencies with other cohabitants (see, for example, Barad, 2007; Haraway, 2016; Latour & Porter, 2017; Tsing, 2012). How can designers and design disciplines reposition their roles toward this more-than-human, and how does it change the alignment of spatial interventions—the processes of designing in landscapes? In this SPOOL issue, *Representing the More-Than-Human*, we inquire about the role of visual representations in this reorientation: How can drawings—and the act of drawing—mappings—and the act of mapping—exhibitions and the act of exhibiting help to practice this approximation toward what we are part of: the more-than-human?

In doing so, we locate ourselves in a rapidly intensifying scientific and practical field. Spatial-oriented disciplines are increasingly in dialogue with approaches evolving in post-humanism and new materialism. Notions like multispecies 'making-with' (Haraway, 2016, p. 55)—highlighting that nothing exists in isolation and everything evolves in dependencies with other entities—or 'vibrant matter' (Bennett, 2010)—proclaiming material's agency—are translated to spatial inquiry (see, for example, Katsikis and Muñoz Sanz, 2024). The attention to mappings and their agency in this context is growing. Research and experiments are increasing on what is often called countermappings—as they provide alternative narratives of spaces by countering the ignorance about processes and entities—in this case, the more-than-human. This issue aims to contribute to this current debate by opening a polyphony that addresses multiple landscape-related dimensions—bringing a new focus on the strands that connect to spatial design. For, as discussed in the previous SPOOL issue on representation, the potential of visual representations that are in dialogue with rethinking space is 'to create awareness, understanding, (...), and, most of all, to move beyond documentation and to inform the process, the focus, and the intention of the spatial design itself' (Bobbink et al., 2022, p. 1).

The constant reorientation to the contested field of 'landscape' is a central concern in spatial theories and practice. In a way, more-than-human entities have been part of this process from the beginning. In spatial plans, entities such as water bodies, meadows, and forests have always been the subject of study and design. In reflecting on how landscapes are represented, however, it becomes clear that landscape-oriented

disciplines are—as are all other disciplines—mainly influenced by anthropocentric mechanisms. The landscape is predominantly understood and designed as the background for human action. More-than-human actors remain objects in drawings, mappings, and plans. Here the transformative potential of more-than-human thinking sets in. For the landscape-related disciplines, this means focusing on the dimension of the more-than-human in the central matter—the landscape—and critically examining where it is to be uncovered and reinvited, as it has been overlooked, simplified, neglected, or suppressed.

With all the potential of visual representations, it is crucial to be critical, as in any transformation process. This offers a spectrum of approaches for reflection, emphasizing that representations of the physical landscape imply making decisions, prioritizing, and directing the focus, constantly arising in power structures and from a way of thinking. Like all other humans, designers will never be 'innocent' (Haraway, 1988, p. 597) in the messy realities of our times.

Decisions are also to be made regarding the complexity and accessibility of the representations. There are limitations to what a reader of a drawing can comprehend; should it be understood by experts or a broader audience? The tension between oversimplifying complexities and comprehensibility is also a point of discussion in this issue. The question of decision-making and accessibility is directly related to the political dimension of representing the more-than-human. It is a constant process of negotiating, interpreting, and narrating the interests of humans and more-than-humans and their dependencies. This must be considered to avoid misinterpretation as an apolitical or supposedly neutral approach. The dangers are easy to imagine: 'The idea of entangled socio-ecological systems ruled by the laws of self-regulation and co-adaptation, with caring, protecting, and respecting as collective ethos, replaces contested interests and political struggle' (De Block & Vicenzotti, 2018, p. 154).

In this posture—bringing together excitement about the potential of representing the more-than-human and a critical attitude—this issue touches on a spectrum of areas where representations of more-than-human worlds affect spatial design processes, discussing their potentials and limits. The contributions reveal the agency of these representations in a range of areas, from conceptualizing space and landscapes anew to opening new perspectives for design interventions. All contributions can be read as approaches on how to, in this context, address the hyper-complex entanglements of actors, relationships, agencies, and dependencies through representations.

The issue opens with a discussion on Latour's concept of 'critical zones' (Latour & Weibel, 2020) and how this can be approached and developed through different ways of representation. The notion of critical zones, which is groundbreaking in spatializing more-than-human thinking, is discussed in many articles in this issue. It offers a new perspective on the 'critical' space that should be taken care of—the 'porous and permeable layer', a 'skin, a varnish, a biofilm', in which more-than-human actors are in correspondence, constituting it all the time (Arènes et al., 2018, p. 2). Irrgang, co-curator of the critical zone's exhibition at ZKM Centre for Art and Media in Karlsruhe, investigates the potential of 'thought exhibitions' and some of its most central approaches to get a grasp on the notion of critical zones and to imagine new relationships to the world we inhabit. These approaches can be interpreted as rethinking landscape and space through representing entangled, more-than-human processes.

Three more articles resonate with this theory and investigate how the concept of critical zones translates into representations related to spatial conception and design processes. Anna Rhodes' visual essay reflects on various experiments evolving from a design studio, exploring an area in Scotland through understanding it as a specific critical zone, coined by geological forces of deep time. The essay emphasizes the impact of representations in the design processes, which are also brought together in an exhibition format that enables a multifaceted narration. Also in the context of a design studio, Neuhaus and Orduz reflect on a method of matter and process-oriented mapping—rerepresentation—and investigate how it enables design

strategies and approaches as recursive and relational processes. Their investigation is located in critical zones focusing on wetness, opening up perspectives on what designing in more-than-human worlds can be. Bobbink and Soshnikova highlight, in correspondence with other mappings, the agency of 'Gaia-graphies' (Arènes et al., 2018)—not so much as a method of investigation or communication, but in the first place as a tool to inform innovative design processes. Here the act of drawing—'drawing' interdependent relationships as a verb—informs the process, content, and the design's aims. Moreover, the authors give centre stage to material processes, in this case peat subsidence and growth, and thus engage the soil in the analyzing and designing process.

The following articles engage in the debate from different perspectives that overlap with the previous articles in translating concepts of animated matter. Mussault understands water, soil, and rocks as lively processes. She investigates how mapping can help to recognize and interpret their dynamics and behaviours to enhance their agency to plan and strategize not against but with the forces (Clément, 2014). Likewise, Goldinger discusses the agency of material, here sea ice, by focusing on its melting and drifting character. She uses explorative scenario building and interdisciplinary, multimedia material experimentations to understand the ice as a formative design tool for marine spatial planning. The drawings map the ice on its path from the Siberian nurseries to the melt passage of the Fram Strait as an integral piece of landscape infrastructure. Bracke et al. combine different forms of representations into multispecies collages. With this approach they aim to mobilise various data sources to unravel the interdependent relationships on the site they investigate and include them in discussions about its future with multiple more-than-human actors. These collages aim to create awareness and approachability amongst various (human) stakeholders and, therefore, must be simple and easy to read.

The issue shows a wide range of directions and approaches of representation (e.g., hand-drawn mappings, multidimensional diagrammatic representations, filmic approaches). It discusses how different focuses and methods can bring new ideas and aspects to be involved in more-than-human worlds. Various topics are still open to discussion, such as further investigations into design processes and the spatial implementation of these attempts, e.g., through guidelines or governance approaches. All articles introduce aspects that reflect and enrich design processes, ranging from orienting these processes by giving ideas on how to rethink space through representations (Irrgang) to reflecting on how standard methods of spatial representation are insufficient in meeting these dimensions (e.g., Bobbink). Further, the relationship between tools, and their strengths and limits, is shown. Their different abilities in enabling approachability, complex narrations, or the depth of rethinking epistemologies show a large diversity (compare, e.g., Neuhaus et al.).

All contributions highlight that the authors of representations are and will be the medium through which materials and other actors like flora and fauna get a more dimensional voice and, hopefully, a louder one. The issue can be seen as a contribution at the beginning phase of an evolving discourse which integrates various disciplines and preludes a profound reorientation toward the more-than-human landscapes in spatial disciplines.

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https://doi.org/10.47982/spool.2025.2.00

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# Critical Zones and Thought Exhibitions

**Daniel Irrgang** [1]

[1] Leuphana University of Lüneburg, Institute of Culture and Aesthetics of Digital Media (Germany)

## Abstract

This paper discusses the notion of 'thought exhibition' proposed by the late Bruno Latour and Peter Weibel at ZKM | Center for Art and Media (Karlsruhe, Germany) and some of its most central approaches to imagining new relationships to the world we inhabit. The analysis particularly considers the last of the exhibitions developed by Weibel and Latour under this curatorial concept, *Critical Zones: Observatories for Earthly Politics* (2020–22), the conceptual preparation of which the author took part in.

*Critical Zones* utilized the spatio-aesthetic capacities of an exhibition to test, in the mode of an embodied thought experiment, a relational understanding of the world inhabited and shaped by interdependent lifeforms—a world that only artificially, through Western hegemonic thought and actions, can be separated into somewhat detached spheres of 'nature' and 'culture', where inhabitants of the latter demote the former to resources to be extracted.

This paper discusses the spatio-aesthetic experimentation enabled by the exhibition to challenge such dichotomous separations. It investigates the curatorial concept by focusing on two central works: *CZO Space* (2020) by Alexandra Arènes & Soheil Hajmirbaba and *Flash Point (Timekeeper)* (2018) by Sarah Sze. As 'cosmograms' (John Tresch, Bruno Latour), both works describe a relationship to a world that is not one of coherence and dominance but that respects its particularities and assemblages.

## Keywords

Critical zone, compositionism, cosmogram, cosmology, exhibition, museum, curation, thought exhibition, thought experiment, nature-culture dualism.

## DOI

https://doi.org/10.47982/spool.2025.2.01

# Introduction

'The globe is something viewed from the outside, from a Galilean point of view. The critical zone is a view from the inside. Our show is about this contrast.'[1] – With this triangulation, Bruno Latour located our endeavour on 22 January 2018, the first day of our first seminar week, followed by six further weeks over the course of two years. Dubbed by Latour as the 'Critical Zones Study Group', and co-organised by the author, the seminar took place at the Karlsruhe University of Arts and Design in Germany, the sister institution of the ZKM Centre for Art and Media. Our motivation was to conceptually prepare the exhibition *Critical Zones: Observatories for Earthly Politics* at ZKM (23 May 2020 – 9 January 2022), curated by Latour with Peter Weibel, Martin Guinard, and Bettina Korintenberg[2]. Together with students and researchers, we tried to triangulate a 'new place to land' (in Latour's words) – to imagine a new relationship to the world we inhabit – as the ground of global capitalism continues to disintegrate under the pressure of the Anthropocene. In an exhibition context, this means finding new forms of representation – visually, spatially, performatively, interactively, etc. – that conceive of this world as made up of entangled lifeforms and fragile processes sustaining life.

In this paper, I want to carve out some of the concepts that were, in my retrospective analysis, most useful for the study group and for some of the exhibition's participating artists in approaching such a triangulation: *cosmopolitics*, *compositionism*, and *cosmogram*. My aim is to, first, reconstruct the epistemological framework proposed by Latour, in which the questions discussed in the exhibition *Critical Zones* were raised. This framework suggests alternatives to conceiving of the world we inhabit as separated domains of nature and culture – an artificial dualism or demarcation established and powerfully fostered by the European Modernity tradition. This 'great bifurcation' (A. N. Whitehead) had enormous consequences for hegemonic Western epistemes and, thus, the planet we inhabit, as it established the myth of a 'nature' domain that can be exploited from a somewhat separable sphere of 'culture', where humans reside in a position of control, seemingly untouched by the effects of their interference. This cosmology of human exceptionalism lies, in part, at the root of the large-scale anthropogenic perturbations and disruptions of the Anthropocene, from which its name-giver can now no longer hide.

Based on these epistemological considerations, the further aim of this paper is to exemplify how such a framework was investigated in *Critical Zones* – an exhibition conceived as a thought experiment where such themes could be spatio-aesthetically examined – a 'thought exhibition', to use a term coined by Latour and Weibel, at the time director of ZKM. This investigation took on many forms within the complex exhibition setup, but I argue that two artworks were essential in investigating and providing representations for alternatives to the nature–culture dualism: *CZO Space* (2020–2022) by the landscape architects and design researchers Alexandra Arènes and Soheil Hajmirbaba, and *Flash Point (Timekeeper)*(2018) by the visual artist Sarah Sze. Both works are extensive installations made up of complex elements that create spaces through which the visitor can move to explore – from various spatial and conceptual perspectives – a notion of engagement with the entanglements making up the world they inhabit. I argue that, in this mode of spatio-aesthetic experimentation, separations fostered by the nature–culture dualism can be effectively

1 Bruno Latour, Critical Zones Study Group, Karlsruhe University of Arts and Design, January 22, 2018; noted by the author.

2 The exhibition eventually opened on May 22, 2020 (online first, under pandemic lockdown conditions) and continued, after some extensions, until January 9, 2022. It constituted the fourth iteration in a series of exhibitions realized by Latour and Peter Weibel, in cooperation with varying co-curators, at ZKM. It was preceded by 'Iconoclash: Beyond the Image Wars in Science, Religion and Art' (2002), 'Making Things Public: Atmospheres of Democracy' (2005), and 'Reset Modernity!' (2016). 'Critical Zones' should turn out to be the last exhibition by Latour and Weibel at the internationally renowned research museum in Karlsruhe. Bruno Latour passed away on October 9, 2022, Peter Weibel on March 23, 2023. This paper is dedicated to their memory.

questioned, while representations of alternative ways to structure the world – as complex interrelations of many lifeforms, human and non-human, and the critical processes they produce and depend on – can be explored.

## Inside the Critical Zone

But first, I would like to return to the opening quote, on the inside and outside point of view, and, with it, to some of the exhibition project's basic concepts: Latour put forward his notion of 'the globe' in two, albeit intertwined, ways – a cosmological (or epistemological) and a spatial (or proxemic) one. Galileo Galilei's and other early modern discoveries initiated a rupture in cosmology, catapulting the human from the centre of the cosmos into a spinning orbit around Earth's star, one of countless in the universe. Despite this displacement, anthropocentrism was re-incorporated into the modern cosmos by the juxtaposition of the world in spheres of nature and culture (Latour, 2018). It implies an outside position from which the so-called natural world can be observed from a distance. According to Latour, the image of the globe – i.e., the famous Blue Marble photograph by NASA – represents such a remote point of view: a view that is, at the same time, removed from involvement or responsibility[3].

An alternative is offered by the concept of the 'critical zone'. Taken from Earth System Science, it refers to the Earth's 'thin biofilm' – down into the soil until the bedrock and up into the canopy and lower atmosphere – where life subsists (Oncken et al., 2022). It is a dynamic field *sui generis*, where the effects of 'heterogeneous agencies mixed together in wildly different combinations' (Latour, 2014, p. 4) create their own living conditions – for example, plants' photosynthesis of carbon to oxygen as a condition for other lifeforms that, in turn, enable the existence of plants. Such interrelations cannot be organized as somewhat separated, monolithic blocks. As Latour (2014, p. 4) has pointed out, 'the notion of the critical zone is much less paralyzing for politics than that of the Anthropocene', as it avoids introducing yet another hegemonic universalism – be it the nature–culture distinction or the *Anthropos* prevalent within a somewhat new geological era. Instead, the *interdependencies* at play within the critical zone propose a conceptual space of relational political action for humans and non-humans to *compose* a common world.

Notions of interdependence and relationality are recurring *topoi* in discourses on posthumanism, new materialism, and the environmental humanities. They are already present in Gregory Bateson's 1972 work *Steps to an Ecology of Mind*. Criticizing Western dualisms as an epistemic condition for the exploitation of nature, Bateson emphasized the interconnectedness of all living beings. He also touched on the notion of an 'impossible outside' (to which I will return): 'We are not outside the ecology for which we plan – we are always and inevitably part of it' (Bateson, 1987, p. 510). Here it should be noted that, in contrast to Bateson's strong concept of interconnectedness, the critical zone is not to be conflated with holistic concepts of, as Latour (2014, p. 5) pointed out, a 'unified system [...] where everything is connected'. This would suggest yet another universalism. Rather, the relations remain always incomplete and fragile.

The notion of fragility is, in fact, paramount for characterizing the critical zone. Its interconnected compartments are highly reactive to changes in the biogeochemical processes and the interactions they generate and depend on. These systems usually react to such changes in an autopoietic sense of adaptation

3 Latour repeatedly made this point, from different angles, during the Critical Zones Study Group sessions as well as in his performance lecture format 'Inside' (Aït-Touati & Latour, 2022).

and self-maintenance. However, as those changes become more rigorous and turn into disruptions, the fragile and reactive critical zone is weakened and starts to spin out of balance. The fragility of the critical zone becomes more and more apparent with the accelerating anthropogenic perturbations since at least the 20th century[4]. Thus, when intervening in the critical zone – be it accidental through pollution or in an intentional manner to mitigate the effects of climate change – one should remind oneself, again with Bateson, that we are indeed not outside the ecology for which we plan. Every intervention in these fragile relations needs to be very careful, as the unintended effects of mitigating measures such as climate engineering (Buck, 2019) are difficult to foresee and control, but historically well documented (Kolbert, 2021).

To briefly return to the notion of 'system': while the notion of the critical zone in Earth System Science is closely related to the concept of 'Gaia' proposed by the geochemist James Lovelock and the microbiologist Lynn Margulis, Latour went to great lengths to avoid the universalist notion that comes from Gaia theory's roots in cybernetics and its Greek mythological eponym, associating a unified system comparable to a single entity (Latour, 2017; Clarke, 2020).

Universalisms like unified systems or the nature–culture dualism suggest, according to Latour, 'the hidden presence of an engineer at work who has devised the whole as a system of which we see only the parts' (Latour, 2014, p. 5). Similarly to Donna Haraway's (1988, p. 581) critique of 'the god trick of seeing everything from nowhere', Latour (2020, p. 14) framed this position of total overview as a controlling gaze, structuring Earth as 'unified, continuous, and homogeneous'. Such an 'external' position implies a relationship of maximum distance, both spatially and ethically: when there is a sphere to dwell in (culture) that can be separated from the catastrophes we inflict on our planet (nature) and human responsibility – then what is there to worry about? The notion of the critical zone, instead, 'breaks down the cartographical view of planet Earth. [...] Gone is the idea of a disinterested distant gaze' (Latour, 2020a, p. 14). If we do not live on the globe of modernity but *inside* the critical zone, which we generate together with others, every harm inflicted is self-inflicted.

## The Pluriverse of Cosmopolitics

Influential for Latour's adaptation of the critical zone has been, I believe, his appropriation of another concept: Isabelle Stengers's 'cosmopolitics'. It is best explained by differentiating it from the notion of 'cosmopolitanism' (in the sense of Kant). The cosmopolitan accepts different perspectives of human beings on a common world and assumes that these differences can be worked out (Papastergiadis, 2023). Problematic with this position, following Latour and Stengers, is the assumption that there is *one* common world – a cosmos – *already in place*, ready to be uncovered: a somewhat *a priori* existing world that is implicitly accepted and on which only the cultural perspectives differ. Such a 'transcendent world' becomes conflated with 'a reference for judgments or operations of disqualification or annexation' (Stengers, 2010, p. 24), a somewhat 'objective' world of Western epistemology. This sets up a Eurocentric cosmological hegemony to which all other worldviews must align themselves.

4 Depends on who you ask when looking for a starting date of when anthropogenic perturbations became a planetary rupturing phenomenon: 1450, with the rise of capitalism (Jason W. Moore); 1492, with the rise of near-global colonialism (Donna Haraway); 1610, with the colonialization of (and the genocides in) the Americas (Adele E. Clarke); or the contesting dates of the Anthropocene somewhere between the Industrial Revolution and the first Atomic Bomb fallouts (Clarke & Haraway, 2018).

The notion of *cosmopolitics*, in contrast, denies such universality. While the modernist globe assigns all its inhabitants to 'their rightful and predetermined places' (Latour, 2004b, p. 461), cosmopolitics presumes a pluriverse of different worlds, made up by a multiplicity of actors, 'including all the vast numbers of nonhuman entities making humans act' (Latour, 2004b, p. 454). Such a common world is not given; it is the *result* of an assembly of things that come together due to a specific matter of concern (Latour, 2004c). This coming together of divergent worlds, and the negotiations that occur, constitutes the 'politics' in 'cosmopolitics' – understood with Latour as 'the building of the cosmos in which everyone lives, the progressive composition of the common world' (Latour, 2004a, p. 53).

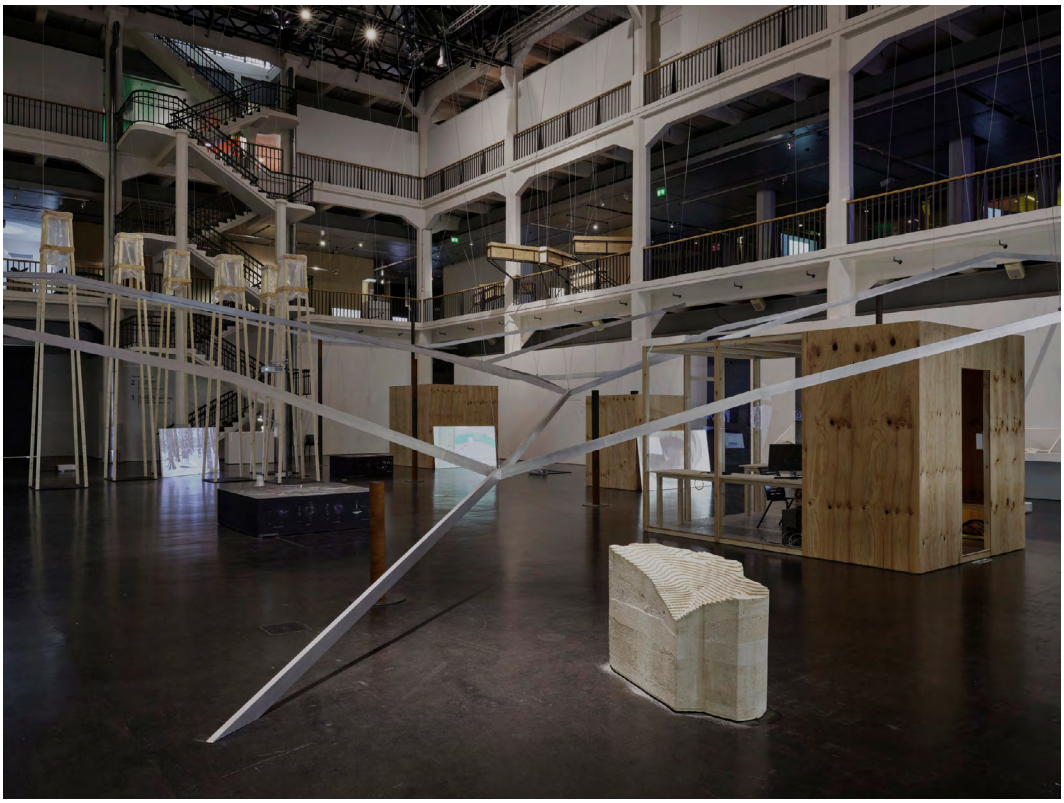

FIGURE 1 *Installation view of Alexandra Arènes' and Soheil Hajmirbaba's 'CZO Space (2020–22)* as seen from the entrance to the exhibition 'Critical Zones – Observatories for Earthly Politics', ZKM Karlsruhe, 2020–22. Photo ©: ZKM Karlsruhe, Photo: Tobias Wootton.

## Composing a Thought Exhibition

'(T)he progressive composition of the common world' – or 'compositionism' – is an important concept for Latour's curatorial approach[5]. It is connected to the notion of cosmopolitanism in its approach to moving beyond universalist epistemes of how the world ought to be constructed. Compositionism is a call 'to compose the common world from disjointed pieces instead of taking for granted that the unity, continuity, agreement is already there' (Latour, 2010, p. 485). A key text elaborating this concept is 'An Attempt at a

5 I am indebted to Martin Guinard for pointing me to this.

'Compositionist Manifesto'', which Latour dedicated to 'D.H.'. The nod to Haraway makes sense, as she, in her book *Staying with the Trouble*, developed the etymologies of 'compost' to describe the quasi-symbiotic generating of a common world: 'Critters – human and not – become-with each other, compose and decompose each other, in every scale and register of time and stuff in sympoietic tangling […].' (Haraway, 2016, p. 97) Compositionism becomes an essentially collaborative interspecies approach to composing the elements of the world as they appear and ever change, trying to avoid getting stuck in premade static categories and their anthropocentric hierarchies.

Taking compositionism as a starting point to grasp Latour's and his co-curators' curatorial approach makes it explicable why the exhibition *Critical Zones* appears as a heterogeneous assemblage of scientific instruments, participatory practices (like workshops and field trips), architectural models, diagrams, written visitor guide booklets aptly titled 'Critical Zones Fieldbook'[6], and, of course, artworks. The exhibition becomes an *experimental space* for how to approach 'wicked problems' such as climate change; it becomes a 'scale model to test ideas that are much too vast to be treated head on' (Latour, 2020a, p. 18). This is where the notion of 'thought exhibition' comes in: The thought *experiment* is a useful tool in science to test a hypothesis related to an object too complex, too remote, or too impractical to treat directly. As Latour and Weibel (2007, p. 94) have pointed out reflecting on two of their previous jointly curated exhibitions at ZKM, 'Iconoclash' (2002) and 'Making Things Public' (2005): 'In an exhibition, the usual constraints of time, space and realism are suspended. This means that it is an ideal medium for experimentation.' Of course, this is only partly valid, as museums are *dispositifs* of power and incorporate hegemonic histories. But although a thought exhibition remains limited to its space – an institution, in our case located in Central Europe – and time, the post-colonial 'here' of late capitalism, it can still function as 'a simulated space' (Latour & Weibel, 2007, p. 104) to test how new representations and practices can be developed, composed, and perceived by visitors and exhibition collaborators. And by doing so, new places to land can be explored.

Before approaching the last of the three concepts, 'cosmogram', I want to highlight one such representation that occupied a central position – spatially as well as conceptually – within the exhibition.

## Critical Zone Observatory Space

To turn the ZKM exhibition space into a site of experimentation – literally, in this case, representing a scientific experimental system – has been the motivation for 'CZO Space' (2020–22), an extensive design and architectural research installation developed by Arènes, Hajmirbaba, and many collaborators[7]. The installation occupied the first section of the exhibition space (the ground floor of one of the ZKM atrium halls) and was conceived as a spatial 'scale model […] to show a watershed inside a museum' (Arènes, 2020). It represented the watershed of the Strengbach valley in the French Vosges mountains through the

6 The booklet was available to the visitors in German and English language and provided extensive information on the conceptual and curatorial approach as well as to each exhibit and the layout of the exhibition. A PDF of the English version can be accessed here: https://zkm.de/media/file/en/cz_fieldbook_digital_en.pdf.

7 The installation is based on expansive research conducted by Arènes and Hajmirbaba in collaboration with the CZO scientists Paul Floury, Jérôme Gaillardet, Jacques Hinderer, Sylvain Pasquet, Marie-Claire Pierret, and other scientists from the French network of critical zone observatories (OZCAR). Besides the cooperation with the curators, the exhibition design facilitators (i.e., Matthias Gommel), and the technical staff at ZKM, the realization of the installation's multimedia elements involved Sonia Levy (film, animation), Frédérique Vivet (film), Juliette Hamon Damourette (animation), Patrick Franke (sound/field recordings), Grégoire Lorieux (sound/composition), Axelle Grégoire (maps), Renaud Hauray (handcraft models). For a complete list of credits see the project website http://s-o-c.fr/index.php/zkm_czos/.

scientific instruments of its local 'Critical Zone Observatory' (or: CZO), which is operated by the School and Observatory of Earth Sciences at the University of Strasbourg. CZOs collect data on the responsive processes constituting the critical zone: on the atmosphere, hydrosphere, biosphere, the soil, and the rocks. These 'field laboratories' employ multidisciplinary teams of scientists to track changes in the critical zone, usually not conceivable without scientific instruments, over longer periods of time. CZOs are located in specific landscapes that represent similar conditions all over the planet – in the case of the Strengbach observatory, a mid-altitude forest watershed – but which also differ and are specific to their given characteristics.

FIGURE 2 *Installation view of Alexandra Arènes' and Soheil Hajmirbaba's 'CZO Space (2020–22)* on the first floor of the exhibition 'Critical Zones – Observatories for Earthly Politics', ZKM Karlsruhe, 2020–22 (Photo by Tobias Wootton. ©: ZKM Karlsruhe).

The installation 'CZO Space' combined a scale model of the watershed with various instruments that were installed in the exhibition space in positions and on 'altitudes' that would, as a model, correspond with the valley's topography, some of which were linked with instruments and data collected in the field. The work included diagrammatic maps, video images, and sound installations. 'CZO Space' proposed to visitors a new gaze on a landscape: a representation not in a pictorial form, but composed of interrelating and responsive processes, perceived from a perspective *immersed in* the space. Its motivation was 'to develop a dialogue that fosters ways of becoming sensitive to the movements of the earth' (Arènes, 2022, p. 338).

In this paper, I cannot discuss all the sections of the complex installation, but I would like to highlight at least one, the 'Beech Trees Station': Subtitled as 'cosmic beings' and represented by wooden scaffoldings positioned in different spots in the exhibition space, this section signified parts of the Strengbach observatory's rainwater collection system. Tree canopies – demarcating the upper levels of the critical zone – absorb various molecules within the atmosphere, so that rain passing through the trees and shedding as excess water onto the ground carries, down from the canopies, biochemical elements by both rain and tree, with a composition quite different from rain falling on open fields. The water is collected in wooden

gutters set up under the trees by CZO scientists to extract samples to be analyzed in a laboratory. Since trees here serve as enriching and distributing devices and thus become part of the scientific infrastructure to detect, e.g., intensity levels of acid rain, Arènes (2022, p. 210) states: 'As the trees are monitored, the forest becomes a *sensitive infrastructure*.' Such an infrastructure goes beyond a technological – and human – experimental setup and includes plants, water, and landscape structures. Trees become part of the complex observation of the critical zone compartments and are, as such, conceptualized as critical agents within the observation infrastructure.

The sensitive infrastructures of the Strengbach valley CZO make visible, or observable, the landscape structures of this specific part of the critical zone. As a visitor to the exhibition, one could discover the abstract models of the tree sensors through the water-collecting devices and read about their function within the complex infrastructure of the CZO, while being immersed in the spatial model of a landscape as seen through the eyes and instruments of Earth System Science. In this *phenomenotechnical* (Gaston Bachelard) perspective on new ways of representing the world surrounding an observer – a perspective where human, non-human, biogeochemical, and technological agencies intertwine – 'the (notion of) Critical Zone extends the scope and the scale of what can be seen in landscapes' (Arènes, 2021, p. 146). To follow Arènes (2022, p. 223) further, it ultimately 'transforms the understanding of landscape, which is not a passive background, but which itself records, feels and provides the scientists with information on the variations in the atmosphere'. In such a perspective, the planet we, as humans, inhabit, along with many other lifeforms, is not pre-structured by any anthropocentric order, but generates its critical zone as manifold entanglements where heterogeneous elements are continuously composed and decomposed. This allows for many different – cosmopolitical – approaches on how a common world can be structured and made sense of.

FIGURE 3 *Installation view of Sarah Sze's 'Flash Point (Timekeeper)' (2018)* on the upper floor of the exhibition 'Critical Zones – Observatories for Earthly Politics', ZKM Karlsruhe, 2020–22 (Photo by Tobias Wootton. ©: ZKM Karlsruhe).

# Cosmograms beyond Illustrations

Such complex spatio-aesthetic representations of the critical zone, like 'CZO Space', where the visitor finds themselves surrounded by various visualizations and sonifications, by instruments and observatory processes, propose radically different alternatives to the distant Blue Marble seen from outer space. They are aesthetic means for questioning traditional concepts of the world by identifying their biases and, ultimately, proposing alternatives. As Latour (2020, p. 19) puts it: 'Changes in cosmology cannot be registered without changes in representation.' This is where the notion of 'cosmogram' comes in. The concept has been developed by the art and science historian John Tresch – and used by Latour in sometimes diverging ways (Latour, 2004a; 2004b)[8]. For Tresch, the concept describes representations – objects, architectural forms, practices – that bring an abstract cosmology into the aesthetically and operationally concrete. An example from Judeo-Christian mythology that Tresch mentions is the Tabernacle of Moses: It describes the godly regime as a spatial formation where all elements are put in significant interrelation. Despite this dogmatic example, cosmograms are not necessarily static. They may provide 'the basis for new interpretations and action: social relations, relations with other cultures, [...] with animals, plants.' And thus, enable a 'redescription, in [...] future tense: not the world as it is but the world as it could be' (Tresch, 2005, p. 69).

An important cosmogram for 'Critical Zones' has been Sarah Sze's installation 'Flash Point (Timekeeper)', a 2018 iteration of her 'Timekeeper' series. These works are built from found objects and images mounted on fragile scaffoldings and scattered on the floor, illuminated by projections mapped onto small screens or spinning along the walls beyond. It is difficult to say where 'beyond the installation' is, as the scattered and projected elements make its boundaries blurry. Sze's more recent 'Timekeeper' iterations are explicitly influenced by Latour's notion of the critical zone, as she has pointed out, comparing them to representations of 'the world as a very thin, very fragile membrane of life' (Sze, 2020, p. 200). During an artist talk on the occasion of her 2020 solo exhibition at the Fondation Cartier in Paris, Latour (2020c) pointed out the experience of being spatially de- and recentred by her installations: 'Visitors are asked to subvert his or her idea of what the Earth is like.' With *Timekeeper*, the notions of *cosmopolitics*, *compositionism*, and *cosmogram* merge: 'This is how viewers can escape the dichotomy between seeing inside-out or outside-in [...]. They become 'composers of space', in their own right.' (Latour, 2020b, p. 2). In fact, such uncertainty, from a visitor's perspective, of differentiating the inside from the outside contributes to the 'function' of 'Flash Point (Timekeeper)' as a cosmogram. Although I want to use the term 'function' carefully here. As Martin Guinard (2022) put it in his obituary on Latour: 'Criticisms understandably arise when philosophers curate exhibitions and use artworks merely to illustrate ideas. But in fact, we took a very different approach, which was to imagine an encounter between artists' works and his ideas, each of which followed different trajectories.' In an interview I conducted with Arènes and Hajmirbaba, they described their process of developing 'CZO Space' as a complex collaboration with scientists, artists, exhibition facilitators – and, of course, Latour. Hajmirbaba (2023) put it beautifully: 'If we were like a balloon, he was like a weight. Working with Bruno was like... how to say it... he nourished himself with what we did. [...] Like an anthropologist... And we were nourishing our proposal with what Bruno showed us. But not just Bruno. It was [...] also reading Anna Tsing, the patchiness, the connectivity...' We don't have the time to go into Tsing's (and Haraway's) notion of *patchiness*, which frames our view on the *planetary* Anthropocene as necessary, partial, situated, and always incomplete (Tsing et al., 2019). But the influence of this concept on their work is in fact something Arènes and Hajmirbaba share with Sarah Sze[9].

8 I am indebted to Isak Winkel Holm for pointing me to these discrepancies.

9 I am indebted to Bettina Korintenberg for pointing out to me its importance for 'Flash Point (Timekeeper)'.

# Conclusions: Composers of Space

The notion of thought exhibition is directly connected to an epistemic potential of artworks and artistic practices that goes beyond simple illustrations, beyond 'a boring demonstration of some a priori ideas' (Latour & Weibel, 2007, p. 105). In this sense, these works and practices become part of a spatio-aesthetic experimental system where not only new ideas can be tested, but where visitors may also develop their own questions and alternative cosmopolitical approaches. Of course, this does run the risk of the visitor being overwhelmed by both the complexity of the things presented and the difficulty of the issues raised. As in the case of other 'expanded' curatorial practices and theories in recent years (Rogoff & von Bismarck, 2012; Voorhies, 2022), such an epistemically rich conception of a 'research exhibition' assumes an active visitor with a developed curiosity and strong agency – which, despite all its merits in addressing the complexities of our world, runs the risk of somewhat 'losing' those visitors with a more contemplative or less intellectually involved approach.

The concept of the thought exhibition, however, still offers a valuable approach to investigating complex questions that relate to essentially spatial configurations, their perception, and representation – i.e., how a common world can be conceived and how positions of involvement, instead of analytical distance, can be occupied. The notions of *cosmopolitics*, *compositionism*, and *cosmogram* can here serve as a framework for artistic and design approaches to grasp the manifold perspectives on the world we inhabit, their continuous questioning and reworking, and the temporary representations they afford.

## Acknowledgements

This research has received funding from the European Union's Horizon 2020 program under the Marie Skłodowska-Curie Grant Agreement N° 101028379.

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# Interdimensional Representations

## A Critical and Collaborative Shift of Perspectives within the Highland Boundary Fault Zone

**Anna Rhodes** [1]

[1] The University of Edinburgh, Edinburgh School of Architecture and Landscape Architecture (ESALA) (United Kingdom)

### Abstract

This visual essay explores the translation of complex environments through representations with attributes that are summarized as 'interdimensional'. These attributes are not yet elaborated, but the term emphasizes that these representations integrate different dimensions of experiencing and understanding various spatial scales and temporal perspectives. The process of producing these representations requires the Landscape Architect to encounter, investigate, and communicate life, materiality, and processes in an approach that values attentiveness and creativity.

The representations discussed were developed in the context of a design studio at the University of Edinburgh, which was elaborated and led by the author and situated within the Highland Boundary Fault Zone in Scotland. A studio collective, composed of Master's students in landscape architecture over two years, was encouraged to traverse the fault zone, taking into account social, ecological, and geological fractures, as well as points of tension and upheaval.

Operating from within the 'critical zone', the late Bruno Latour's and his collaborators' provocation has been adopted: that working from this perspective is necessary to recognize that we humans are 'living among the living' (Société d'Objets Cartographiques [SOC], 2018). The author's, and the design studio's approach encourages experimental drawing and making to develop 'ecologically explicit' landscape architecture—landscape interpretations and design propositions—that foreground and support more-than-human worlds.

### Keywords

Astonishment, critical zones, interdimensional representations, landscape perception, shifting scales.

### DOI

https://doi.org/10.47982/spool.2025.2.02

# Introduction

The 'critical zone', as described by Bruno Latour, is the thin surface film of the Earth where water, soil, subsoil, and the living world interact; it is a 'tapestry' of traces left by animated beings and the activities of living forms (Société d'Objets Cartographiques [SOC], 2018). This essay reflects on the representations from a design studio at the University of Edinburgh called the Highland Boundary Fault Zone. In the studio, which I, the author of this essay, led, students were exploring complex environments from the perspective of being within the critical zone. Within the studio, throughout the design process—from interpreting landscapes through to developing propositional design—representations depicting multiple spatial scales, perspectives, and temporalities were encouraged through written exercises, lecture material, and discussion. The reference to 'interdimensional' representations emerged through the practice and pedagogy of thinking through making, reflecting, and composing this visual essay. While the attributes summarized under this term still need to be elaborated in different settings, it can be stated that these representations seek to convey relationships between different dimensions of experiencing and understanding complex environments, emphasizing the importance of creativity and sensitivity in the process of representing.

Continuously shifting between scales, from the macro to the micro and back, these representations seek to explore and communicate processes, species, and interdependencies that transcend scales. At the macro scale, the studio aims to understand and translate ancient geological processes and their influence on today's topography, watercourses, ecological networks, human habitation, and systems. At the micro scale, we observe and attempt to capture the motions, habits, and processes of microecologies in relation to their wider bioregions. To enable an open process of exploration and find new approaches to more-than-human worlds, we find creative ways to discover, be astonished by, and articulate the importance of worlds typically unseen. Spanning out from here, we consider encounters and interactions and recognize interdependencies between species to work out how we might forge and maintain relationships. Through this constant recalibration of scales and focus, we set out to understand the potential of landscapes to support life in the 'thick present' (Haraway, 2016).[1]

'It may not be possible to grasp fully the immensity of geologic time, but one can at least develop some feeling for its proportions.' (Marcia Bjornerud 2018, p. 91)

The studio looks back 450 million years to the formation of a geological fault now barely visible, which today separates two distinct regions: the Scottish Highlands and the Lowlands. The Highland Boundary Fault is a complex structure; it evidences deep geological time spans and is a physical record of environmental and climate change. Written in the rocks, landforms, and soils are stories of ancient collisions and eruptions, changing climates, how ecologies have evolved, and how water and ice have continuously sculpted landscapes to the present day. Journeying through time, we collectively investigated and appreciated how the geodiversity and geomorphic processes have influenced the critical zone of the fault, including all living entities and their interactions.

1 Haraway's use of 'thick present' refers to a multifaceted understanding of time that intertwines past, present, and future. It encourages being engaged in the current moment while recognising historical influences and future implications.

Landscapes facing social and environmental pressures located within the Highland Boundary Fault zone have informed bold design speculations on how landscapes can mitigate the challenges faced by both humans and more-than-humans within and beyond the contested epoch of the Anthropocene.The studio's ethos is to go beyond simple surfaces and to engage deeply with cultural and ecological communities. We make careful and thoughtful readings and work to represent a complex mesh of beings, animated materials, and associated processes. Working from this perspective is necessary to recognize that we are 'living among the living' (SOC, 2018). The drawings and making practices that follow recognize and celebrate other beings that exist together with 'us' humans and consider matter and processes that will transcend our lifetimes. Thinking through a practice of experimental drawing and making informs the students' ecological awareness and the development of 'ecologically explicit' (Morton, 2021) landscape architectural design.[2]

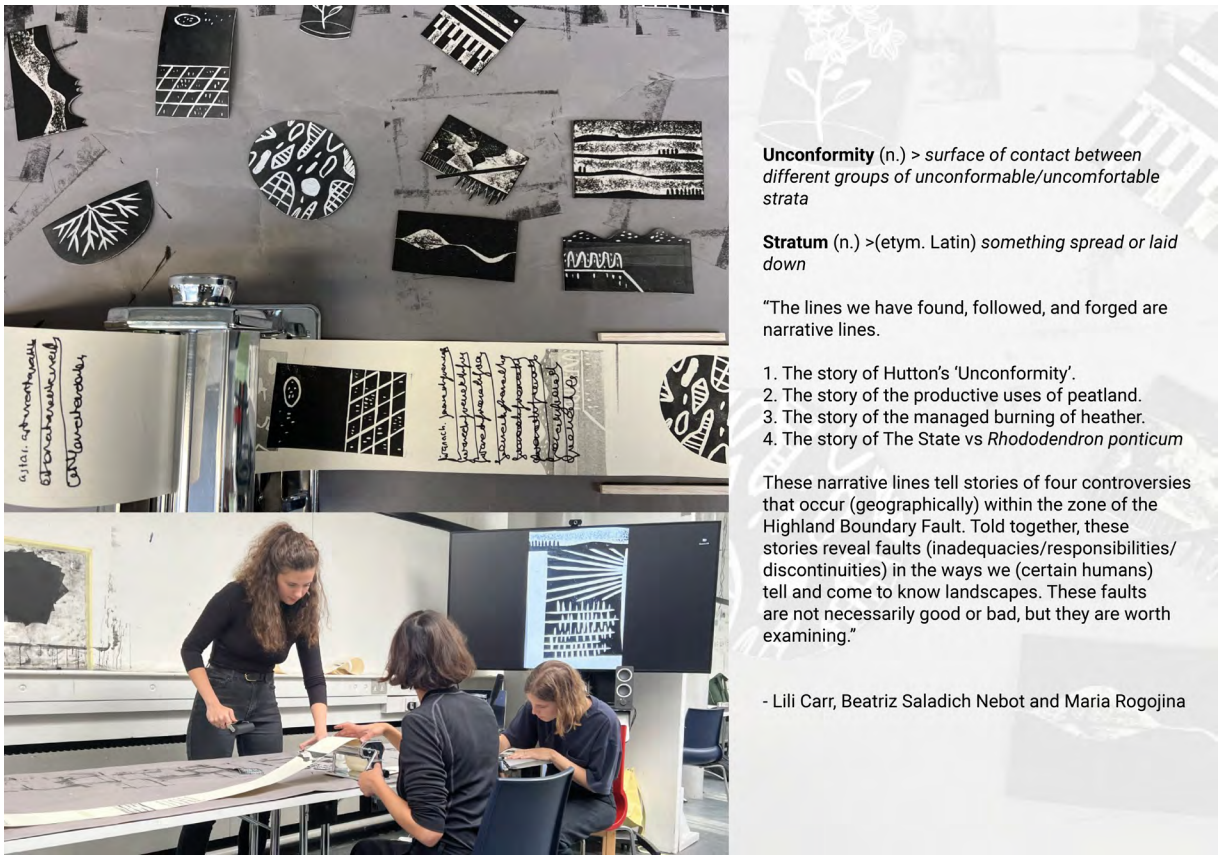


FIGURE 1

*Unconformities performance drawing.* (Performance by Carr, L., Rogojina, M., & Saladich Nebot, B. 2022. Photographs by Rhodes, A. 2022)

2 'Ecologically explicit' art, as coined by philosopher Timothy Morton, is simply art that brings this solidarity with the nonhuman to the foreground.

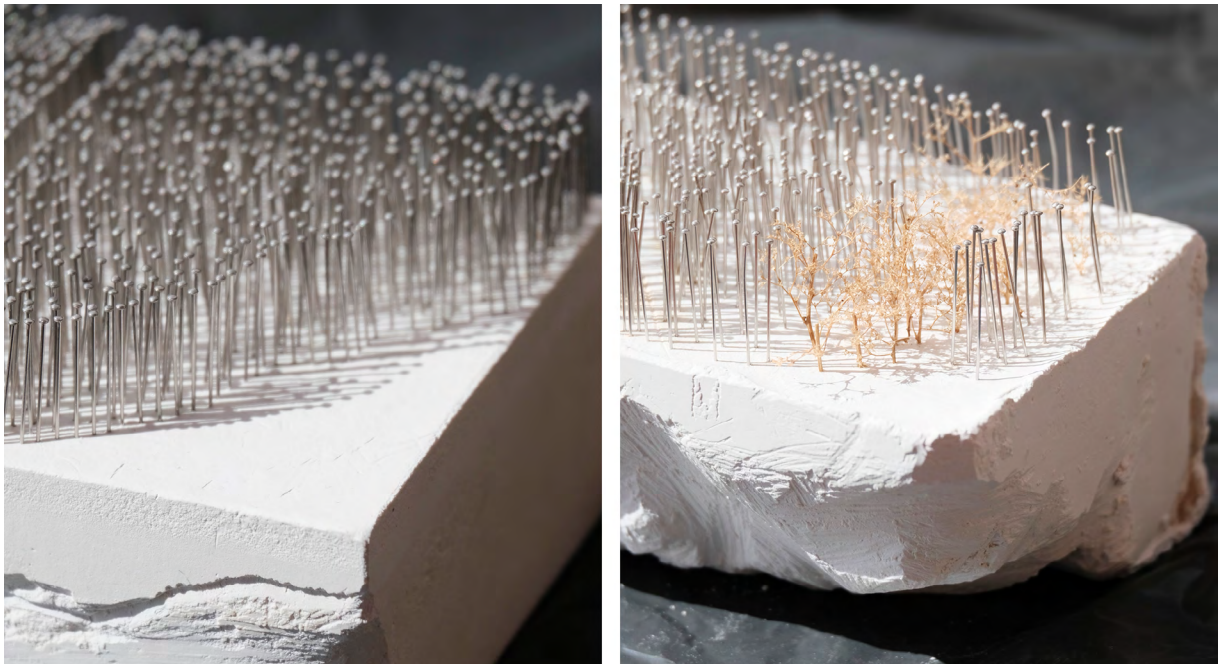

FIGURE 2

*Gentle gestures, carving woodland, allowing light in.* Layla Ho Kwan Ng's project, situated in the Tay Forest Park, Dunkeld, reimagines conifer forestry management practices through the medium of light. The project explores the relationship between light and shadow, the balance of which influences forest dynamics such as photosynthesis, growth, and, ultimately, the diversity of more-than-human species. Critical of clear fell techniques and short rotational cycles that create monotonous light and shadow contrasts, Layla Ho Kwan Ng views these as destructive practices with ecological and experiential repercussions. Instead, she proposes gentle gestures of thinning to encourage the gradual transformation of conifer plantations into a rich woodland ecosystem. (Drawing by Ng, L.H.K. 2024)

FIGURE 3

*Thinking through light.* Thinking of trees as sculptures at various scales and resolutions, Layla Ho Kwan Ng, observes how light affects individual trees, community formations, and, importantly, the in-between spaces for vegetative ecologies to thrive and for humans to experience. Her representational and design approach is to sculpt. The carving practices within her model making and drawing with light are akin to her proposals to gradually carve paths and clearings in dense plantations to allow light to activate a biodiverse future. Experimental making practices have been vital to deepen her ideas and connection to the materiality and light-triggered atmospheres of woodlands. (Drawing by Ng, L.H.K. 2024)

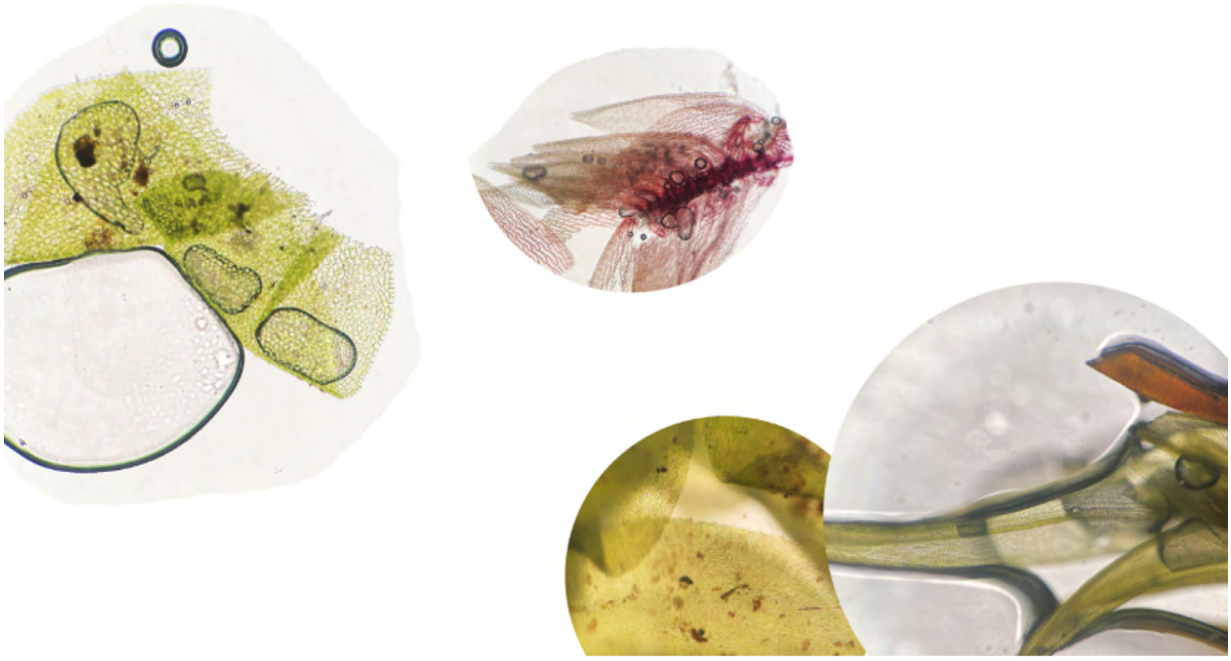

FIGURE 4

*Moss microscopy*. Initial research into freshwater cycles, flooding, and glaciation influenced Babs Brand's exploration of the Highland Boundary Fault zone. Settling on a study of high-risk flood zones along the River Tay her fieldwork focused on plant communities along the Tay's tributaries and small waterbodies, igniting a fascination with mosses. Through microscopy and a practice of developing illustrative prints, she delved into the beauty and importance of mosses, appreciating their capabilities for storing water and their influence within the wider context. (Drawing by Brand, B. 2023)

FIGURE 5

*The beauty of moss.* Playing with scale by enlarging the delicate and microscopic intricacy of mosses, curious and sensitive representations emerged from montaged images and paper embossing techniques. The iterative process of experimental making added to the conceptual narrative of the project, the absorbent paper morphing when wet, parallels with a developing appreciation of mosses' capabilities for storing water and their collective potential to relieve flood pressures. (Drawing by Brand, B. 2023)

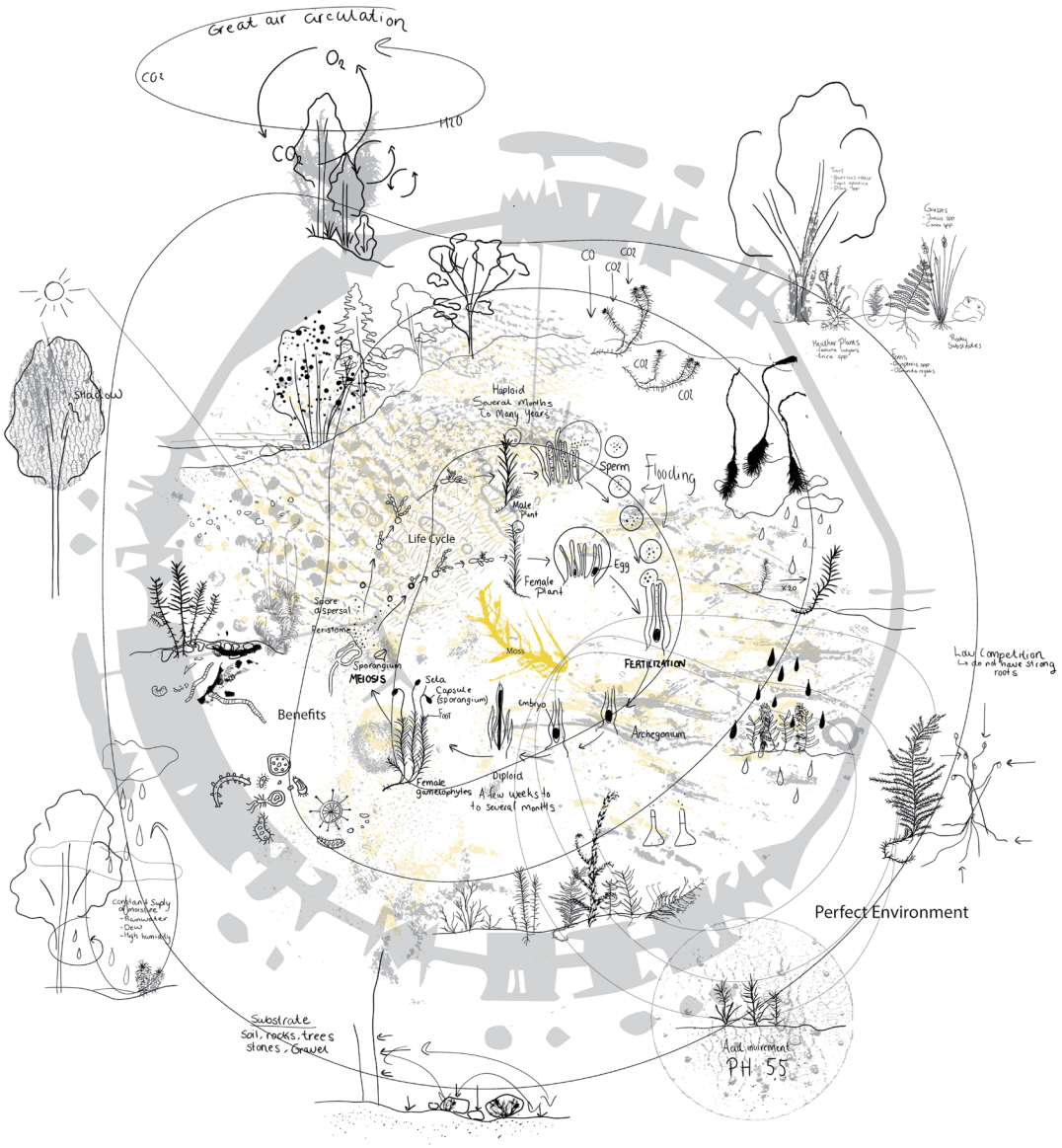


FIGURE 6

*Nesting scales and cycles.* Interdimensional representations of the environmental conditions that moss species need and create to thrive alongside their reproductive and life cycles demonstrate an appreciation for how vital these often-overlooked micro-species are to their macro worlds. (Drawing by Brand, B. 2023)

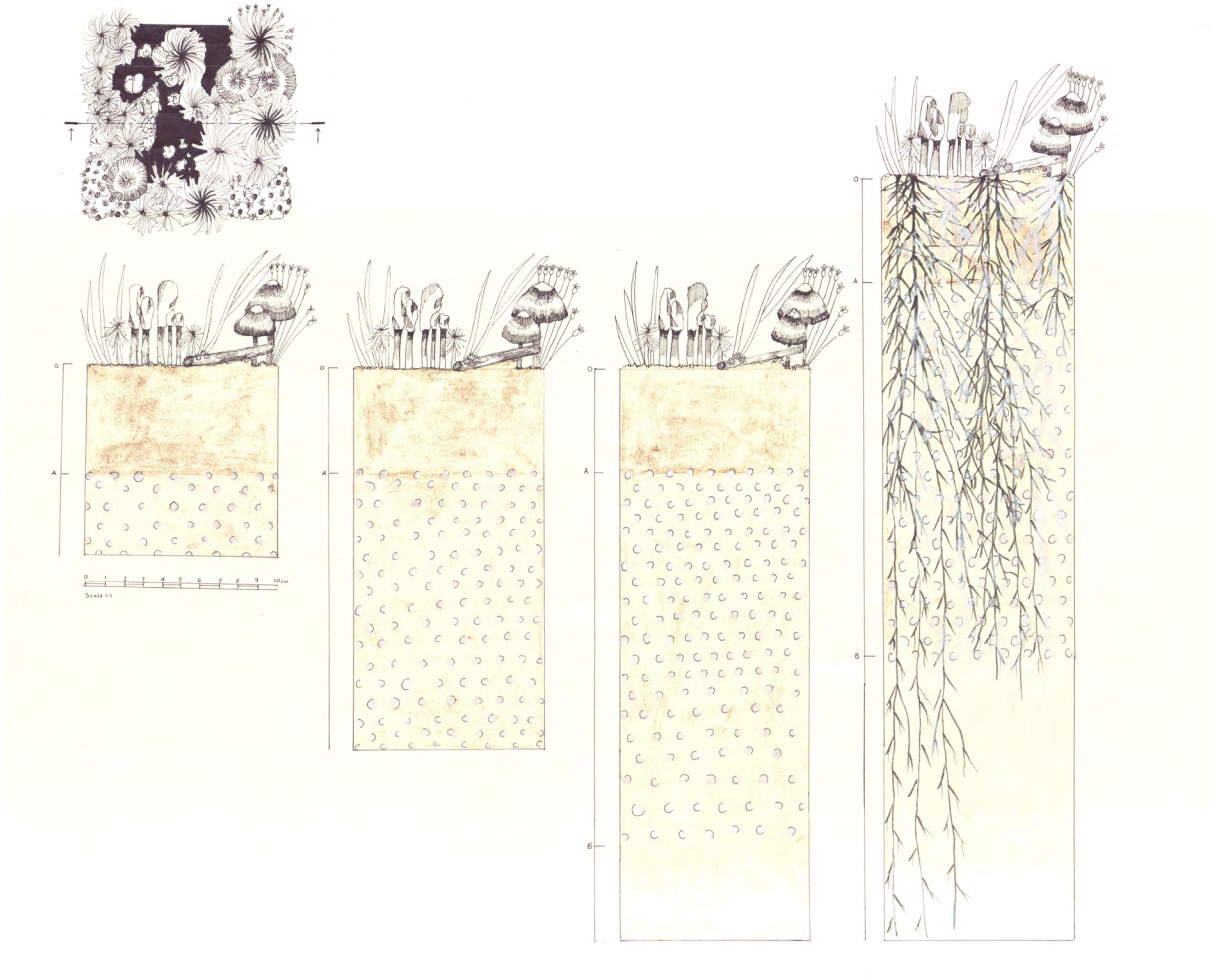

FIGURE 7

*Soil depth analysis, what occurs within 40cm of soil?* Alice Futter's project presents a counter proposal for The University of Edinburgh owned land at Drumbrae, near the city of Stirling. The current proposals set out a familiar ambition to offset carbon emissions and improve biodiversity by introducing woodland and improving open habitats (The University of Edinburgh, 2024). Alice Futter argues critical care and design consideration should instead be rooted in the soil as a living, connecting and life-giving medium. Fungi became a lens to inventory soil health across the Drumbrae estate, to deepen knowledge not only of individual species but of ecosystems and interdependencies between species. (Drawing by Futter, A. 2024)

FIGURE 8

*Strategic habitat plan of the Drumbrae estate and detail.* Working closely with soil samples and fungi species encountered during her fieldwork, Alice Futter developed soil inks and paints, cultured soil in a microscopy lab, and integrated spore prints into a strategic plan drawing to represent six different habitats, each with its own specific catalogue of fungi, plant, and animal species. Alice Futter's approach allowed material agencies to become apparent in the representational process. Within this work, she composed various scales relative to represent and gain the necessary proximity to understand each ecosystem in detail. Her material palette and curiosity led to complex imaginaries of the Drumbrae underworld. (Drawing by Futter, A. 2024)

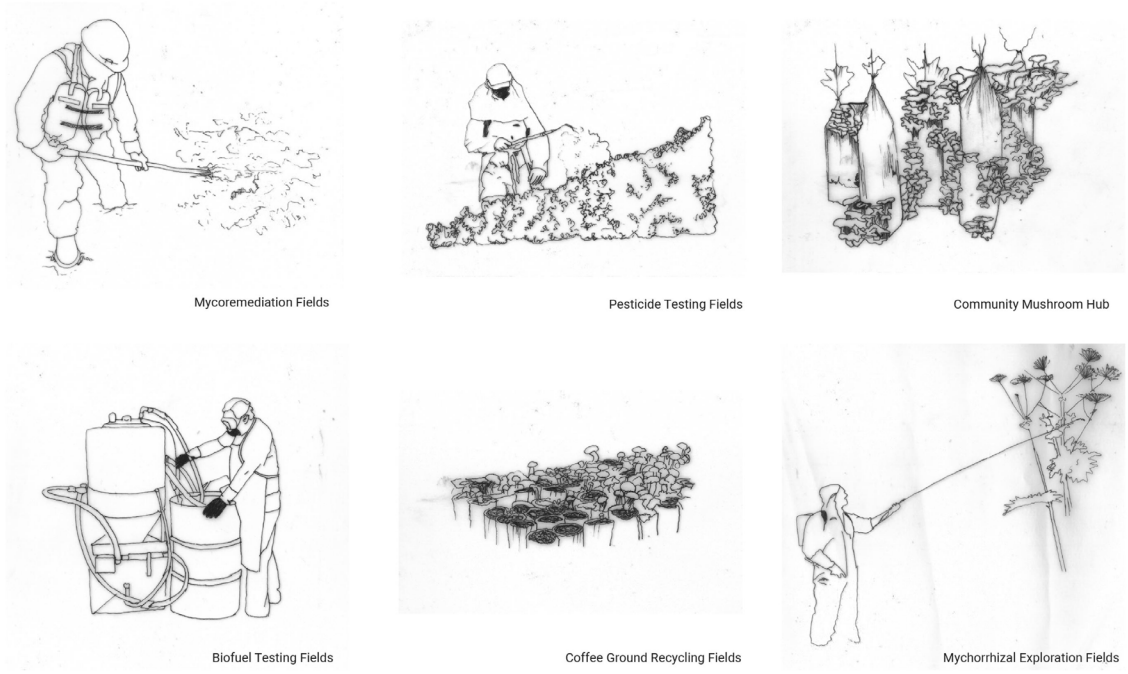


FIGURE 9

*A site for soil exploration;* Six interventions of disruption and innovation, devote attention to the underworld of the Drumbrae estate to deepen soil knowledge and exploration of land issues through critical care of soil, fungi and many other subsurface inhabitants. (Drawing by Futter, A. 2024)

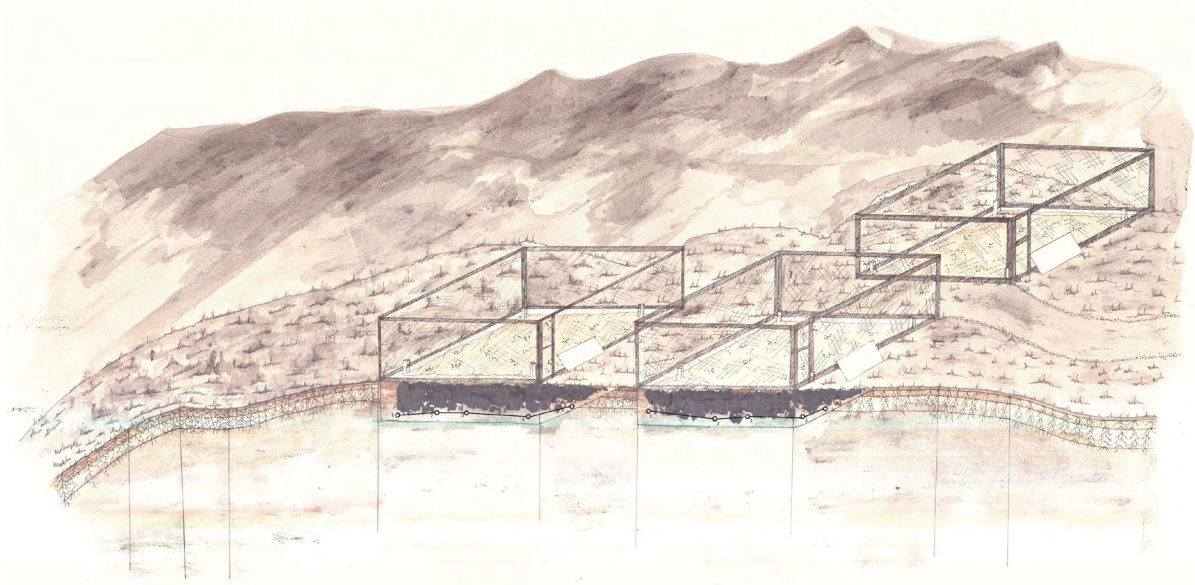

FIGURE 10

*Mycoremediation fields.* Through interventions such as mycoremediation testing fields, where staged oil spills would be remediated by particular species of fungus, such as the Oyster mushroom, the project advocates for radical shifts in focus: fungi and soils are brought to the foreground, ultimately instilling knowledge and awareness and, therefore, practices of care for those designing into and working with soils. (Drawing by Futter, A. 2024)

FIGURE 11

*Critical Zones | Highland Boundary Fault Graduation Show.* The process of thinking through the making of these interdimensional and attentive representations instils in designers, here students, a critical awareness of complex, more-than-human landscapes. However, the challenge lies in moving beyond theoretical explorations to actionable propositions. By exhibiting these works, we aim to provoke critical reflections on Scottish landscapes and embed 'ecologically explicit' (Morton, 2021) perspectives within the cultural consciousness of Landscape Architects and allied communities. Ultimately, these representations should serve as essential tools for interdisciplinary collaboration, enriching both professional practices and societal discourse on future landscapes. (Photograph by Rhodes, A. 2024)

## Acknowledgments

The Highland Boundary Fault design studio at The University of Edinburgh spanned two academic years. Composed of final-year Masters in Landscape Architecture students, it was led by Anna Rhodes (Lecturer in Landscape Architecture), and was supported by Anna Reid, Sophie Tombleson (Tutors and practising Landscape Architects) and John Darbyshire (Ecologist). This essay has emerged from rich and collaborative dialogue between students and staff. The insights, perspectives, and constructive exchanges have helped shape the development of ideas and refine the concepts presented here.

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# Re-Representations

## Design-Agents in More-Than-Human Landscapes

**Anna Neuhaus** [1] **and Alejandro Orduz** [1]

[1] Technical University Berlin, Chair of Designing Landscapes in the Anthropocene (Germany)

### Abstract

This article explores the agency of representations to open up perspectives in more-than-human landscape design processes. It follows and investigates the approach of re-representations—multimodal assemblages that narrate landscapes as zones constituted by specific socio-material processes. Methods of research through and on design are combined: students' experiments of designing with representations were set up in a landscape architecture design studio at the Technical University Berlin in the context of a deeply changing wetness regime in Lusatia, Germany. These design methods are investigated by synthesizing and comparing them with the aim of reflecting them in a post-humanist, new materialist discourse on the understanding of landscape and critical mapping. The findings concentrate on the most crucial agencies these re-representations have, to reorient design processes and reshape what is understood as landscape design in the shift to more-than-human worlds.

### Keywords

Re-representation, recursive design processes, more-than-human landscapes, mattering processes, transscalarity, patchiness, pluralism.

### DOI

https://doi.org/10.47982/spool.2025.2.03

# Bridging the Gap – Re-Representations in Design Processes

In the era of the so-called Anthropocene, spatial disciplines are currently reorienting their design approaches toward more-than-human worlds, with representations taking centre stage in this process. Latour and Weibel (2020) emphasize the potential of rethinking representational methods—and reorienting with them—to conceptually and spatially gain new understanding: they can reveal the Earth we inhabit as agential, more-than-human, relational, and determined by rapid and deep socio-material shifts. At the same time, resonating with discourses around critical mapping, they highlight that spatial representations are never objective and always just one way of narrating space. In landscape design processes, mappings are central methods and media—thus, Latour and Weibel's (ibid.) investigation is crucial in the shift toward more-than-human landscapes. Hegemonic maps are unable to contribute to this process—in this discourse on processual, more-than-human worlds—indeed, they are criticized for rendering landscapes as merely passive stages on which human action takes place (e.g., Aït-Touati et al., 2022).

As a response to this representational challenge in design, we follow the concept and new mapping category of 're-representing' (Neuhaus, 2025) and ask in this paper how this notion can help realign landscape design. The concept summarizes the crucial characteristics of emerging forms of representation that contribute to this change of perspective by rendering landscapes as consisting of 'mattering processes' (ibid., 2025). However, there are few examples so far that can be identified as re-representations. These examples—Gaiagraphy / Terraforma and the *Feral Atlas* (Aït-Touati et al., 2022; Tsing et al., 2021)—are directed at processes of spatial exploration and conceptualization. Their design potential has been largely unexplored (Neuhaus, 2025). This is where our research endeavors come in.

This article explores how re-representations enable more-than-human design approaches and how design processes—and the understanding of design—are reoriented when approached with this concept. We investigate this question by combining research *through* and *on* design methods. To do so, an academic design studio was established at the Technical University of Berlin, in which master's students experimented with their own re-representations oriented toward design. The outcomes of the design studio serve as the case studies for this article. Although we indirectly address pedagogical questions, we emphasize general aspects of how re-representations function in design processes, to derive findings that may also be relevant in non-academic settings. This article is informed by, and builds a bridge to, the growing discourse on post-humanist, new materialist reflections on space, landscapes, and more-than-human mappings.

The article begins by summarizing the key characteristics of re-representations that are potentially relevant to design processes. It then describes the studio's framework, based on the re-representations approach and situated within the context of drought in Lusatia, Germany. The third section outlines the methodological approach underlying this article, detailing the methods used to analyze the studio projects. Finally, it examines the design agencies of re-representations identified in this research through five perspectives, illustrated by the most distinctive projects developed in the studio.

# Investigating Re-Representations' Design Agencies

The following section will elaborate on how this article, and the methodology underlying it, is informed by the concept of *re-representing*.

## Re-Representations and Potential Design Agencies in Mattering Processes

The current article builds upon and is embedded in ongoing research by Anna Neuhaus (first author of this article) on re-representations as a new more-than-human mapping category. In a paper introducing this category, she highlights the importance of re-representations for landscape architecture and associated disciplines, as they have the agency to act within processes of more-than-human landscape exploration, design, and conceptualization (Neuhaus, 2025). Their characteristics relate to two main references: Gaiagraphy/Terraforma and the *Feral Atlas* (Aït-Touati et al., 2022; Tsing et al., 2021). Re-representations are characterized as multimodal assemblages that refer to 'situated landscapes as patchy zones of mattering processes' (Neuhaus, 2025). The approach elaborates that 'mattering processes', which emerge in and are discussed in re-representations, simultaneously act in material, discursive, and social spheres. Mattering processes comprise those socio-material processes that constitute landscapes in their constant becomings and that become particularly apparent in events like droughts, population migration, or species decline—and through that—create challenges across disciplines (ibid., 2025).

The concept of re-representing emphasizes that each re-representation creates a narrative that (1) tells a situated story about specific mattering processes and (2) indicates the ontological and epistemological constellation in which the mattering processes are discussed. Depending on the project's orientation in which the re-representation evolves (regarding goals, disciplines involved, and tasks of inquiry), the representations build from specific initial perspectives (ibid., 2025). The approach highlights that re-representations discuss mattering processes starting from a cultural-material or (geo)scientific perspective—and from there, they cross various disciplines (see also the references to Gaiagraphy/Terraforma and the *Feral Atlas*). Neuhaus indicates that they narrate more-than-human mattering processes as always situated in specific time-spatial constellations and theoretical alignments. This alignment, as well as where the processes are spatially acting, becomes approachable in the 'meta landscape representation' upon which each re-representing assemblage is based—in this mapping, the overarching narration develops (ibid., 2025). The concept elaborates that the meta landscape representations (Fig. 1) examine which mattering processes are considered and in which spatial locations—they hint at the ontological and epistemological angles from which the processes are interpreted. The meta representation is visually based: connections, dependencies, and spatial situatedness are brought together as transscalar, processual mappings (ibid., 2025). From the meta landscape representation, links between 'resonating elements' emerge (Fig. 1). These elements may consist of single elements or smaller assemblages of multimodal elements—they may be auditory, text-based, or visual and situate the narrative more deeply in the mattering processes (ibid., 2025).

Re-representations do not merely illustrate 'completed' knowledge about a space, but instead become primary agents in the processes of conceptualization and exploration of landscapes (ibid., 2025). Their agency to act in design processes has been an informed speculation in the concept of re-representing thus far, and will be investigated in this article using the following methodological framework.

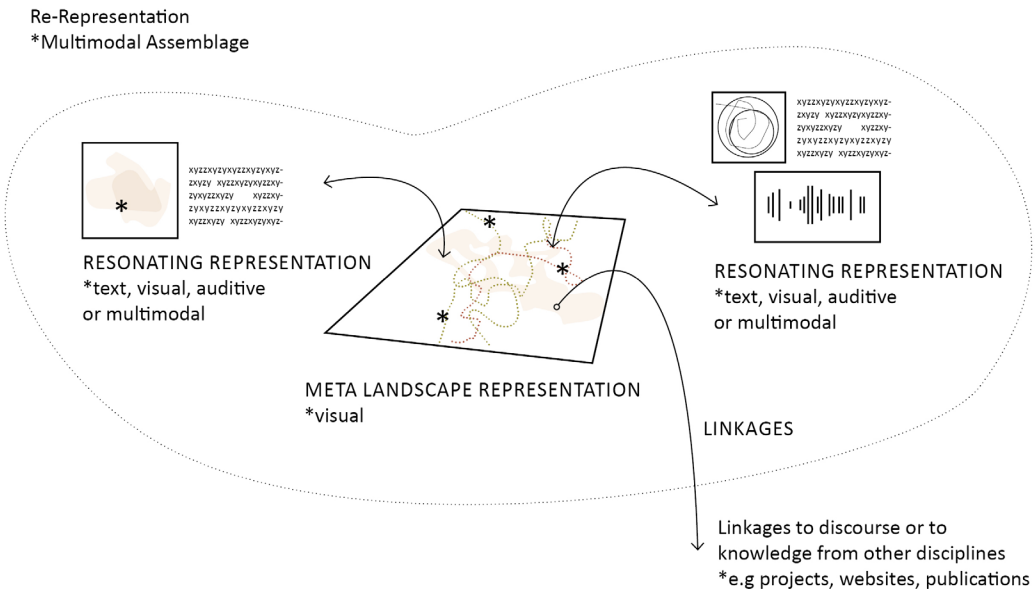


FIGURE 1 *Scheme of re-representations' multimodal assemblage.* The interplay of a meta landscape representation and resonating representations determines the formal characteristics of re-representations on the level of the assemblage. (Image by Neuhaus, 2025)

## Research through Design - Designing (with) Re-Representations

To situate the experiments within a mattering process that could challenge the design agencies of re-representations, the studio's re-representation experiments focused on the concept of 'wetness' and its mattering processes in Lusatia. The notion of wetness, according to Mathur and da Cunha (2020), opens up more-than-human perspectives on landscapes—countering the term and understanding of 'water' as a substance conceptualized, managed, and designed by humans. Lusatia—from the Sorbian 'swampy'—provides a fruitful testing ground for design agencies in precarious, contested, and relatively under-investigated situations of dryness. For more than a century, up to 75% of the waters of Berlin's iconic Spree River have originated from groundwater sources to enable coal mining in Lusatia (Umweltbundesamt Deutschland, 2023). The transition away from coal has triggered a continuous decrease in mine-water discharge, compounded by warmer and drier conditions due to climate change (ibid., 2023). The studio was established to examine how perspectives for more-than-human futures and interventions in the mattering processes of wetness might be developed through re-representations.

In any setting, interdisciplinary knowledge exchange is essential for investigating mattering processes and the multiple dimensions relevant to re-representations (Neuhaus, 2025). We therefore integrated diverse professional perspectives on representing wetness and its mattering processes in Lusatia, collected in a provisional studio archive.

The design studio format allows for free experimentation with re-representations. The studio encouraged students to navigate design challenges by composing their own re-representations, selecting and combining relevant strands. Core criteria (such as assemblage form) were established through assigned tasks.

Wetness—as an actor, matter of concern, and socio-material process—is too extensive to be exhaustively narrated or designed. It entangles more-than-human actors across air, soils, and material/immaterial spheres in transscalar ways (Mathur and da Cunha, 2020). Acknowledging this complexity, students approached wetness through re-representations focused on specific more-than-human actors and their regional entanglements, drawing on concepts of 'actors' (e.g., Latour, 2005) and 'kin-making' (Haraway, 2016). Mushrooms, pyrite, mosses, *Phytophthora*, and water pumps served as guiding actors for student groups. An additional group developed a condensed, overarching studio narrative in a single re-representation. These collaborative works were designed to culminate in a website (insidewetness.org).

## Research on Design: Investigating the Studio's Re-representations

There is currently no established methodology for analyzing re-representations within design processes. While some mapping elements build on conventional methods, their design dimensions extend far beyond these—fostering epistemological and ontological reorientations toward more-than-human design. To address this challenge, we developed an investigative framework based on re-representation characteristics, combining deductive (mapping analysis) and inductive (discourse analysis) methods (Neuhaus, 2025).

This research examines three interacting dimensions of re-representations: agency, form, and mattering processes (ibid., 2025). 'Agency' denotes the capacity to explore and design landscapes as zones of mattering processes; 'form' refers to the enabling formal characteristics; and 'mattering processes' examines which socio-material aspects are narrated. Our analysis focuses on five key agencies that emerged from the studio: (1) unfolding design narratives, (2) engaging pluralistic perspectives, (3) designing through condensations/shifts/gaps, (4) recursive design processes, and (5) interweaving situated narratives.

For each agency cluster, we analyze one to three exemplary studio projects. Using qualitative—comparative and synthesizing—mapping analysis, we examine the formal characteristics enabling these agencies. The interplay of mapping and discourse analysis reveals how mattering processes are discussed within landscape design contexts.

This analytical approach does not seek definitive conclusions about re-representations' agencies in more-than-human design, but rather offers initial insights into their potentials and limitations.

# Findings: The Designing Agency of Re-Representations in Mattering Processes

## Unfolding Design Narratives in Mattering Processes

This chapter elaborates how design narratives unfold in re-representations. The design narrative refers to the specific, explicitly and implicitly expressed story and method of storytelling: how the exploration and design are approached and what is valued as relevant in this particular setting. The studio groups used as references–'Mushrooms', 'Pyrite', and 'Unseen Connections'–will be introduced here to highlight the broad spectrum of possible design narratives, their diverse unfolding, and their commonalities. The project outlines will focus on their material and theoretical situatedness, and how these factors are enabled by the formal structure of the re-representations.

The re-representations of all three groups position their design narration ontologically and epistemologically within the meta landscape representations. Each practices landscape design through re-representing as a distinctive approach to discussing mattering processes. The design narrations of the 'Pyrite' and 'Unseen Connections' groups emerge by combining scientific approaches with bodily perception–'Pyrite' focusing on physically visible phenomena and 'Unseen Connections' on processes invisible to the human eye. Their respective meta landscape representations (Figs. 2, 3) unfold different design narratives identifying crucial socio-material processes–one proceeding from surface to depth ('Pyrite'), the other from subsurface to surface ('Unseen Connections'). The 'Mushrooms' group focuses on repetitive more-than-human 'intra-action' (interactions that determine and transform all involved actors; see Barad, 2007) through practices and rituals.

The 'Unseen Connections' project reveals crucial, typically invisible processes in Lusatia's wet-mattering processes that only become perceptible during singular events like droughts and subsequent tree infestations. Focusing on *Phytophthora*–a microscopic plant pathogen–this project questions human sensory capacities for exploring wet-mattering processes across scales. The design narration examines *Phytophthora*'s space-mattering relations in monoculture forests, traced spatially in the meta landscape representation as a processual section. Resonating representations deepen aspects of *Phytophthora*'s agencies and perceptibility through devices like looping, non-linear videos.

In the 'Pyrite' project's re-representation, this mineral (pyrite/iron ochre) anchors a design narration where scientific inquiry interacts with bodily perception. The central motif–why water bodies appear ochre–is particularly evident in the meta landscape representation, where visually perceptible pyrite effects (e.g., ochre coloration) are overlaid with scientific data on water-body critical loads.

Both approaches develop landscape design narrations that seek not to explain wetness comprehensively, but to examine specific mattering processes through specific constellations of perspectives. The re-representation evolves highly complex, location-specific design narrations–achievable only through the interaction between meta representations and resonating representations (overall narrative and deepened aspects).

Unlike other groups, the 'Mushrooms' project (Fig. 4) examines cultural practices and rituals of mushroom-picking in Berlin and Lusatia, revealing socio-material wetness-related landscape shifts. A circular meta landscape representation explores human-mushroom intra-actions—through gathering rituals—across seasonal and wetness-based cycles, particularly within what Bruno Latour (2018) terms the 'New Climatic Regime'. Here, mattering processes occupy spacetimes of soil, plant growth, and astrophysical constellations governing seasonal rhythms. Resonating representations further develop this knowledge through punctual spatial references, culminating in acupuncture-like designs manifesting through ritualized practices.

## Engaging in Pluralistic Perspectives: More-than-human Actors as Guides and Co-designers

As described, studio projects engaged non-human actors and their wetness entanglements. Each re-representation, as an exploratory/design tool, incorporated interdisciplinary empirical knowledge about these actors and their drought-mediated dependencies. Focusing on more-than-human actors enabled situated landscape design evolving from investigating specific mattering processes—not dissolving human perspectives but broadening them. The 'Pyrite' and 'Unseen Connections' projects exemplify how more-than-human perspectives co-guided the processes through the re-representations.

In the 'Pyrite' project, pyrite's socio-material agency determines the meta landscape representation's formal structure: a transscalar section (Fig. 3) in ochre hues. The group re-represents scales, sections, and perspectives of pyrite's agencies—and their (un)intended consequences—in Lusatia and Berlin. The meta representation reveals pyrite as a deep-time geological actor causing landscape ochreation. Surfacing through coal extraction, pyrite disperses through Lusatia's waterways, conflicting with fish and dragonflies, drastically reducing biodiversity. Three key sites condense pyrite's more-than-human intra-actions in resonating representations: Welzow opencast mine (iron oxidation source), Seese post-mining lakes (pyrite soaking), and Lehde (pyrite flow). These entangled landscapes reveal crucial more-than-human co-becomings in wetness.

Comparing 'Pyrite' and 'Unseen Connections' (Fig. 2) shows how mattering landscapes shift depending on central actors. 'Unseen Connections' is guided by *Phytophthora*, a waterborne oak pathogen in Lusatia's monoculture forests. Its transscalar sectional representation reveals wet-mattering processes operating across greater transscalar ranges than pyrite—from global wind dispersal to molecular soil interactions. Tracing *Phytophthora* highlights unseen material connections and transscalar agencies from atmospheric transport to soil processes.

Through re-representations, pyrite and *Phytophthora* became material guides for exploring plural imaginaries of Lusatia's transformation. Re-representations prove fruitful for illuminating wet-mattering dependencies by examining specific actors' entanglements. However, the studio's re-representations did not fully exploit interdisciplinary knowledge integration potential regarding more-than-human actors—an avenue for future research through, for example, cross-disciplinary source linkages.

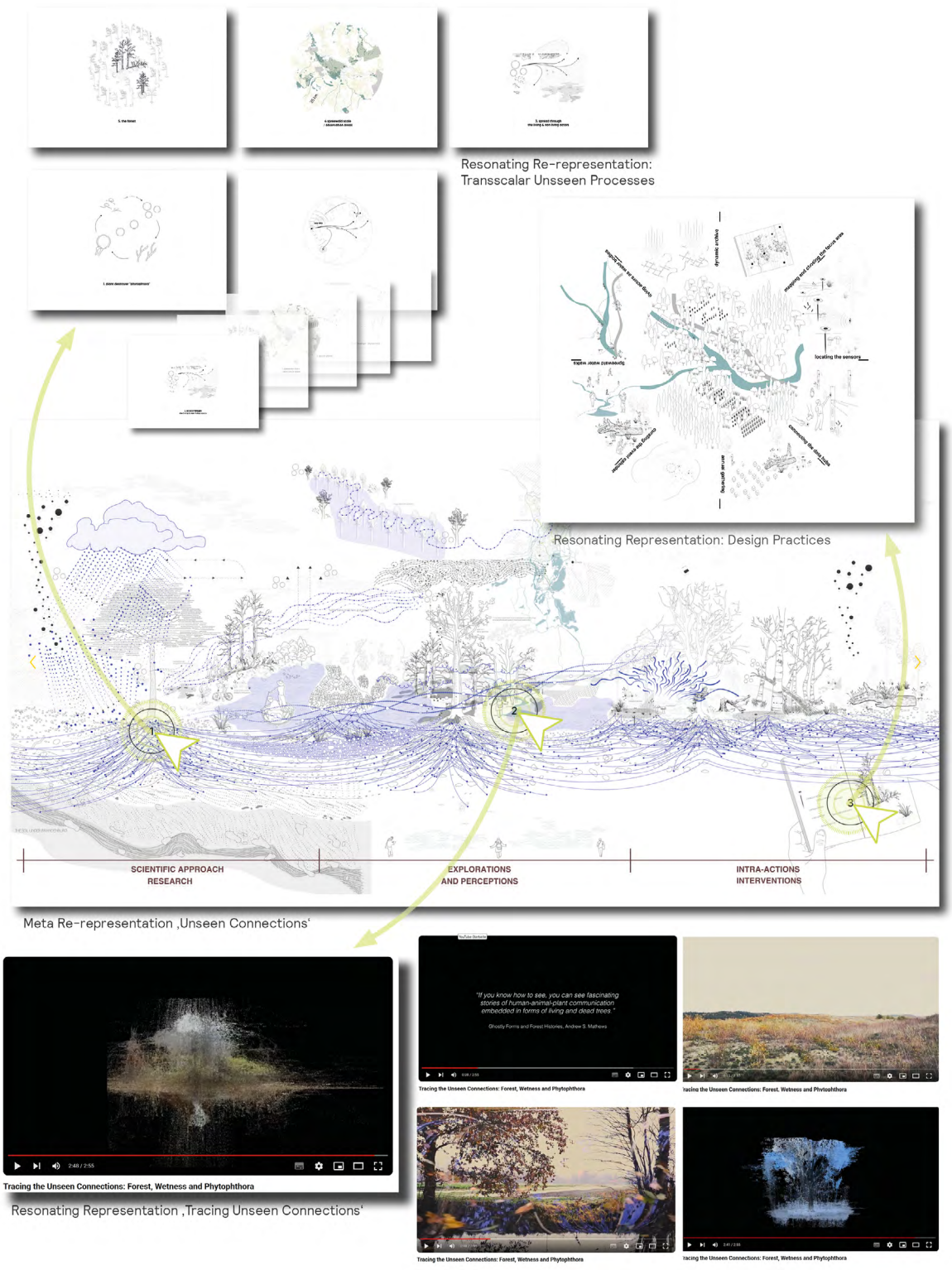


FIGURE 2 *Tracing unseen connections.* The Re-representation reveals phytophthora's transscalar mattering processes in Lusatia's wetnesses. It incorporates and connects exploring and designing processes. (Images by Öykü Dogru, Rodrigo Domingo Molina García & Ada Karadogan, 2024)

## Designing in Condensings, Shifts, and Gaps

Re-representations possess the agency to reveal crucial moments where mattering processes are determined by condensings, gaps, and shifts. These moments expose where relationships, dependencies, and connections between actors and processes converge or disintegrate (Neuhaus, 2025). The studio research demonstrated these are also the moments where design interventions can root themselves in mattering processes.

The 'Unseen Connections' project (Fig. 2) exemplifies all these departure points for design approaches. The re-representation simultaneously highlights gaps and breaks in knowledge, communication, and physicochemical processes like disease and infestation. Its meta landscape representation reveals how unnoticed wetness processes condense in material encounters between infected winds/water droplets and oak trees. The forest's health condition and wetness regime emerge through their deep dependencies—disease events are shown in relation to wetness regime shifts, such as drought-stressed trees. This initial condensing and shift informs ecological-level design interventions, like proposing greater tree diversity.

The meta landscape representation also portrays mattering processes as fragmented across knowledge and communication spheres. The sectional triptych (Fig. 2) is formally structured by different modes of knowing, sensing, and encountering unseen connections. The first section examines hydrological/hydrogeological measurement methods; the second explores phenomenological, bodily experiences of wet connections; the third addresses current perceptibility gaps through designs combining sensors and embodied experiences to create a dynamic archive and collective perception practices.

The 'Mushroom' project investigated cultural mushroom-picking rituals and their climatic/cultural shifts (Fig. 4). Its cyclic meta representation, developed with mycological expertise, tracked three focal species (*Fomes fomentarius*, *Armillaria gallica*, *Russula atropurpurea*) whose life cycles are shifting later annually, likely due to temperature-wetness changes. The representation highlights socio-material intensifications (e.g., picking) and knowledge gaps about fungal growth under shifting wetness, centering designs on rituals that heighten awareness of mushrooms as wetness indicators—intensifying future more-than-human wetness relationships.

This demonstrates re-representations' crucial agency in revealing connections, emerging patterns, fragmented understandings, and disrupted processes to identify potential intentional shifts in mattering processes.

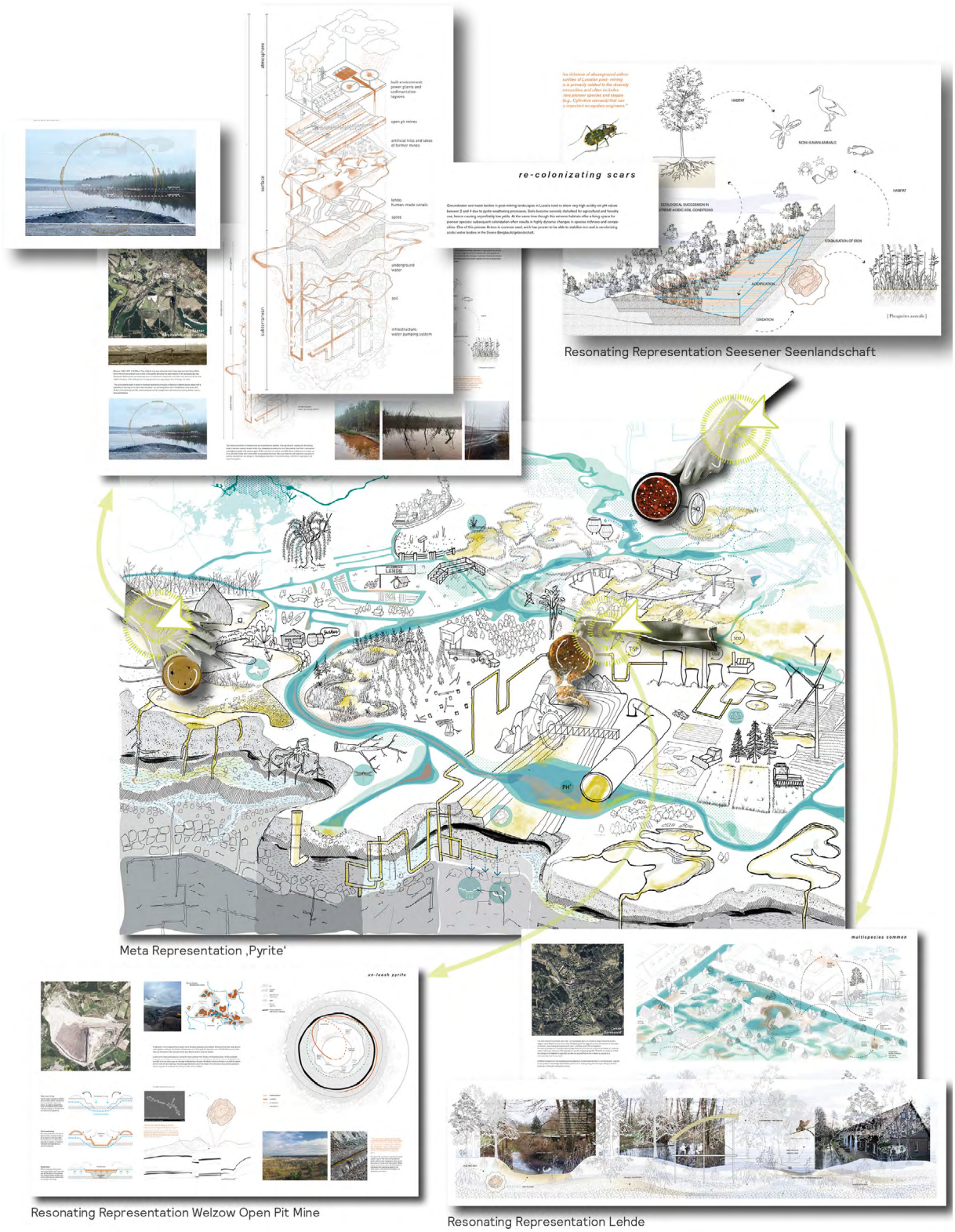


FIGURE 3 *Pyrite: a landscape of reciprocal capture.* Re-representation narrating pyrite-associated mattering processes, socio-materially situated in three landscapes: Welzow mine, Seesen open-pit lakes, and Lehde Spreewald canals. (Images by Erum Chauhan, Dilara Ucar & Jan van den Berge, 2024)

## Recursive Design Approaches—Letting Designs Act in Mattering Processes

In the studio, re-representations enabled recursive design proposals—iterative movements between exploration and intervention development. Having examined design origins, we now consider why interventions' (speculated) impacts must feed back into their originating representational elements.

The 'Pyrite' group's re-representation shows designs not only emerging from but reciprocally affecting mattering processes. Three sites—Lehde, Welzow, and Seese (Fig. 3)—are united in the meta representation exploring iron ochre's oxidation and 'feral' expansion as pyrite-wetness co-becomings. Resonating representations deepen each site's processes, interweaving explorations, interventions, and their effects.

In Lehde, a more-than-human practices compendium proposes to capture pyrite in collectives, speculating on mattering process changes. Seese's floating reed platforms dynamically interact with water levels, potentially capturing pyrite to improve aquatic ecosystems. Lehde's intervention integrates reed-based practices into waterways and community spaces, creating more-than-human infrastructures merging ecological and social functions—deliberately acting across mattering process spheres. These designs leverage re-representations' agency to recursively illuminate interventions and their speculated effects.

Integrating intervention impacts into re-representations facilitated ongoing interdisciplinary dialogue during—not after—the studio process. Documenting these exchanges could enrich re-representations. Future research should explore whether re-representations can accompany implemented designs, examining how processes might adapt to observed (measured/discussed) intervention impacts.


FIGURE 4 *Foraging fungi.* The re-representation is unveiling the circularity of wet-mattering processes of five mushroom species. It discusses how rituals of mushroom picking shape human-fungi-wetness relations and proposes interventions in space-time that intensify these interdependencies. (Images by Marianna Spindola Godoy & Gustavo Adrián Montemayor Magallanes, 2024)

## Interweaving Situated Narratives

The pluralistic approaches of the studio projects were synthesized in an overarching re-representation by the 'Studio Narration' group, titled *'A Landscape of Patches and Threads'* (Fig. 5). This project examined whether crucial moments in deep time would emerge as decisive events for multiple studio-investigated actors. The group integrated the studio's epistemological and scientific strands, facilitating dialogue among the pluralistic approaches to mushrooms, pyrite, *Phytophthora*, mosses, and pumps within one meta landscape representation. Connections were unfolded through a non-linear, non-Euclidean spacetime landscape—a spiral exploring deep time, where phases of varying temporal depth engage in 'dialogue'.

The group identified key moments of interconnectedness on the deep time spiral. The initiation and cessation of coal extraction, associated groundwater pumping, construction of canals and pumps, and acidification of soils/waters emerged as significant mattering processes across all actors' exploration and design narratives. While past events were thoroughly elaborated, the speculative exploration of future imaginaries—particularly design-influenced futures—remained underdeveloped, representing rich potential for further investigation.

Contemporary spatial locations were deliberately rendered vague, prioritizing associative blurriness to challenge linear, consecutive understandings of events. This approach developed a socio-material narrative of meaningful encounters among diverse more-than-human exploration and design narratives.

As the studio's central re-representation, this narrative served as the landing page for *insidewetness.org*, enabling cross-connections among groups' space-time dependencies. The re-representation thus acquired agency to interweave processes non-linearly.

By embedding linkages at crucial spacetime moments/processes, each group's re-representations could be activated—teasing out actor-specific narrative threads, patches, and strands. The website further connected to interdisciplinary narratives of Lusatia's wetness through external project links. This web-based structure curated knowledge relationally (contrasting traditional linear formats like publications), preserving discontinuities and gaps. Exploring additional formats (e.g., exhibitions) within the re-representation framework could prove valuable.

This overarching approach emphasized dynamic actor-narrative interplay, enabling deeper engagement with landscape process complexities. It highlighted the importance of recognizing and articulating plural relationships, dependencies, and methodological approaches that shape design processes.

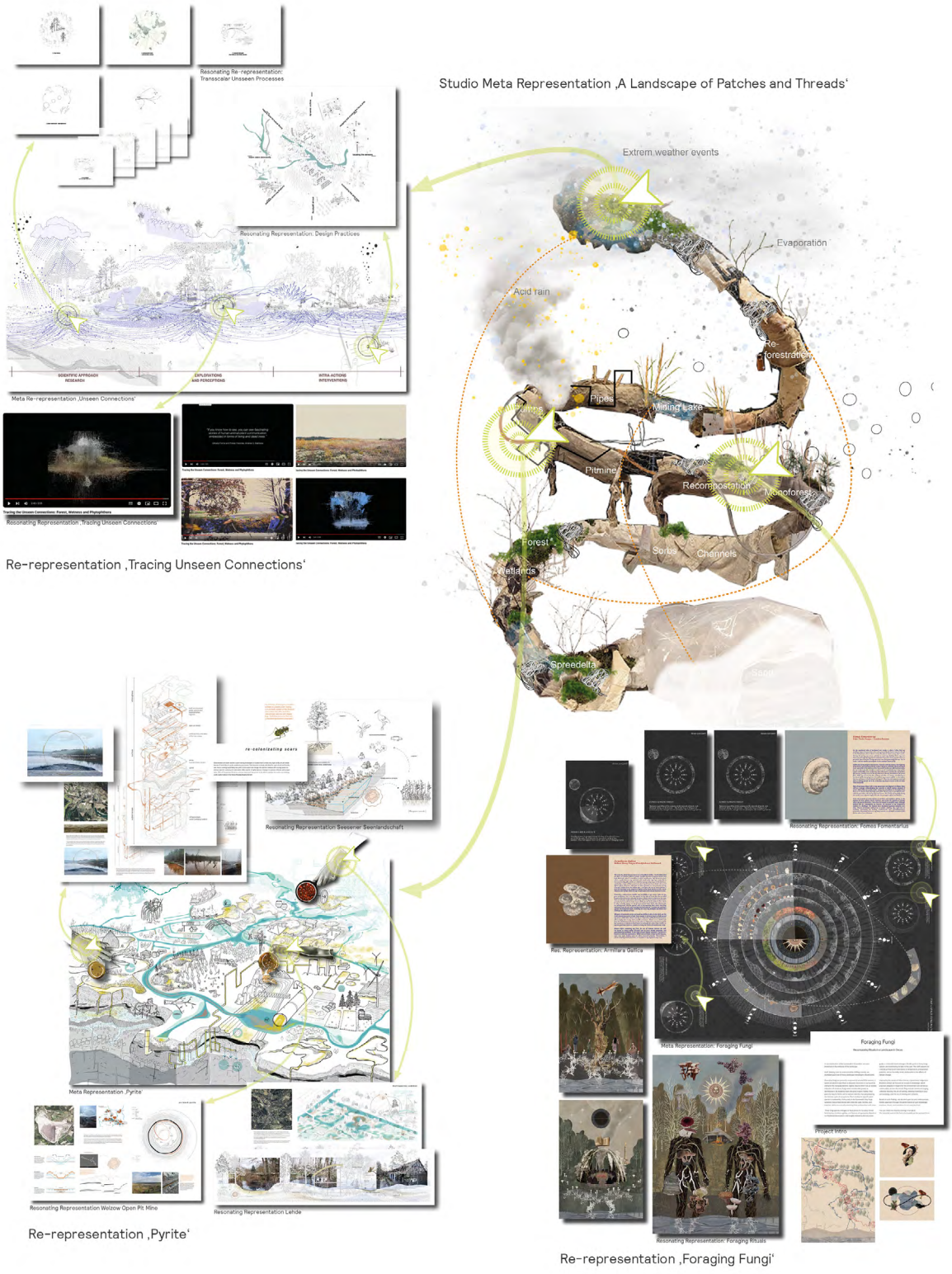


FIGURE 5 *A landscape of patches and threads.* Engendered as a space-time spiral, the studio re-representation cross-connects all projects. It reveals critical events in which many actors are affected, like the end of the ice age, the start of brown-coal mining, the fall of acid rain. Clickable buttons allow to explore the assemblages of the specific actors from here. (Images by Leoni Ina Layer & Johanna Schalm (spiral), Jan van den Berge, Erum Chauhan, Öykü Dogru, Rodrigo Domingo Molina García, Marianna Spindola Godoy, Ada Karadogan, Gustavo Adrián Montemayor Magallanes & Dilara Ucar, 2024)

# Reflection – Grounds for Further Design Experiments with Re-representations

The following remarks reflect upon the key findings regarding the agencies and characteristics of re-representations in design processes, to illustrate how this article contributes to bridging the gap between theory and design in relation to more-than-human landscapes. Reflecting on the studio's experiments shows that re-representations can act as co-designers: they enable recursive design processes and kin-making with actors in design, having the agency to build up a narrative that interweaves exploration and design in mattering processes. This research suggests that re-representations have the agency to allow more-than-human actors to be guides in exploration–design. The starting grounds of the designs are revealed in the re-representing assemblage—condensings, gaps, and shifts in the inseparable spheres of matter, knowledge, and cultural practices. In response to the socio-material processes that are mattering in re-representations, the design interventions do not aim to 'fix' material processes, but rather to create situated possibilities of more-than-human becomings in times of rapid transformation—as in the case of Lusatia and the challenges of dealing with increasing drought and drier conditions.

In the studio's re-representations, design interventions mean provoking shifts in mattering processes and enabling the perception of these shifts. This occurs through the introduction of a variety of elements that act on the specific mattering processes—for example, physical structures, sensing elements, the triggering of manifold more-than-human practices, or the provision of communicative forms of representation, such as field guides, aimed at facilitating kinship with more-than-human actors. For Lusatia's wetnesses, this means contributing pluralistic imaginaries and possibilities of more-than-human futures—ones that challenge, and indeed break open, anthropocentric perspectives in order to address a situation of increasing dryness. However, more work needs to be done to examine whether re-representations could also form part of the implementation of design strategies—for instance, as an interactive method to enable more-than-human engagement and communication.

Whether constructed, derived from cultural practices, or enabled by sensing and measurement tools, re-representations integrate the more-than-human mattering effects of the intervention as part of the represented processes. Design becomes a situated and traceable intervention. In the studio, the recursive loops that weave the design's effects back into the mattering processes are only speculative alterations—still allowing potential effects to be discussed interdisciplinarily. Thus, clearly, there lies potential in re-representations to serve as a parallel, adaptive, investigative institution alongside interventional processes. Here, implemented designs could become mirrored in their observed (intended and unintended) effects—via measurement, sensing, ethnography, and so on—enabling continuous reflection and debate. This should be elaborated in a variety of settings.

Re-representations allow design narratives and processes to be highly situated—in socio-material processes, interdisciplinary knowledge, and ontological and epistemological frameworks. This happens through the narrations that build up in the re-representational assemblage—incorporating and referencing interdisciplinary discourse and bodies of theory. These links become visible and do not disappear under a smooth, supposedly neutral representation; instead, they render interventional statements approachable as subjects of discussion. It remains open to whom exactly the discourse is made accessible through the use of re-representations. What does become evident, however, is that design with re-representations is not the end of a process, nor does it provide 'solutions'. On the contrary, it initiates and enables exchange, and it encourages further, deeper, and more diverse interdisciplinary—and potentially transdisciplinary—exploratory design movements in mattering landscape processes.

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# Peat, Actor and Design Tool

## Engaging Experimental Drawing Methods in the Design Process

**Anastasiia Soshnikova [1] and Inge Bobbink [2]**

[1] Technical University Berlin (Germany)
[2] Delft University of Technology (Netherlands)

### Abstract

This essay explores integrating experimental graphic methods into the design process to engage with more-than-human worlds. It is based on the graduation project *'RE-Peat: Different Futures for the Peat Polders, a Social-Ecological Landscape in the Netherlands,'* which aims to transform degraded peatlands. Through various representation techniques, such as hand-drawn perception drawings and Gaia-graphic representation, peat is positioned as an actor and a design tool. Such methods aim to foster environmental sensitivity and holistic design ideas, acknowledging the needs of both human and non-human actors.

### Keywords

Gaia-graphic representation, hand drawings, influence map, landscape architecture, more-than-humans, peat, social-ecological systems.

### DOI

https://doi.org/10.47982/spool.2025.2.04

This visual essay explores experimental drawing methods in the design process, seeking ways to include more-than-human actors in representation methods. We developed a narrative for a polder landscape by introducing 'peat' as the primary actor through various visual forms.

The essay is based on the graduation project '*RE-Peat: Different Futures for the Peat Polders, a Social-ecological Landscape in the Netherlands'*, which researches possibilities for recovering peatland degradation caused by human activities[1]. The project proposes design strategies and a framework to transform the Eilandspolder in North Holland into a social-ecological landscape based on peat soil growth. Inspired by social-ecological systems, it explores methods to represent interactions between natural and human processes, sharing flows of water, material, and energy. The term 'social-ecological system' underscores human-nature interconnectedness while highlighting the artificial distinction between social and ecological systems (Berkes, 2011). By focusing on human-natural system interactions, this approach considers non-human actors. Latour's Actor-Network Theory asserts that human and non-human elements actively participate in networks of material/immaterial objects and relationships (2007). Building on this, Latour suggests non-human actors possess agency influencing human behavior (Mahaswa, 2023, p. 2). The phrase 'humans and non-humans making each other' (Tsing et al., 2021) offers new insights into human-environment relationships, emphasizing non-human actors' roles.

Various experimental representation methods serve as analytical and design tools to approach the more-than-human world. The goal is to offer new perspectives highlighting non-human actors' agency, particularly peat—a delicate soil type formed by organic material accumulation under waterlogged, oxygen-deficient conditions. By positioning peat as both actor and design tool, representation methods become instruments for understanding and directing human-environment design solutions. Each drawing explores different dimensions of peat interactions, from sensory engagement and material exploration to depicting complex ecological processes and human impacts. Through hand drawings and visualization techniques, the project investigates peat's sensory and experiential qualities, using textures and materials to depict its complex nature.

The essay also examines human and non-human actor interactions, employing tools like the Gaia-graphic to map relationships and highlight ecological-social system interconnectedness. This visual tool builds on James Lovelock's 1970s 'Gaia' concept describing life-environment interconnections (Latour et al., 2020). Bruno Latour expands this, viewing Gaia as a complex network of humans, non-humans, and environments (Mahaswa, 2023, p. 6). The Gaia graphic visualizes this network's mutual influences. *Terra Forma: A Book of Speculative Maps* (Aït-Touati et al., 2022) proposes alternative cartography moving from anthropocentric perspectives (land as construction surface) to cosmopolitical perspectives focusing on Earth's internal dynamics (soil depth, natural cycles). This framework enables an 'inside' rather than external planetary view (Arènes et al., 2018, p. 4).

By transcending art-science boundaries, creative representations of peat's narrative invite stakeholders to reimagine landscape relationships. These experimental methods help navigate human-environment complexities, fostering holistic designs serving human and non-human actors' needs. However, potential misunderstandings may arise from unfamiliarity with these complex visualizations. Therefore, discussing them during creation is crucial to ensure they function as effective communication tools.

1 Graduation project (2022): RE-Peat: Different Futures for the Peat Polders as Social-ecological Landscape in the Netherlands. Tutored by Prof. Undine Giseke, Anna Neuhaus, both TU Berlin, Germany and Dr. Ir. Inge Bobbink, TU Delft, Netherlands.

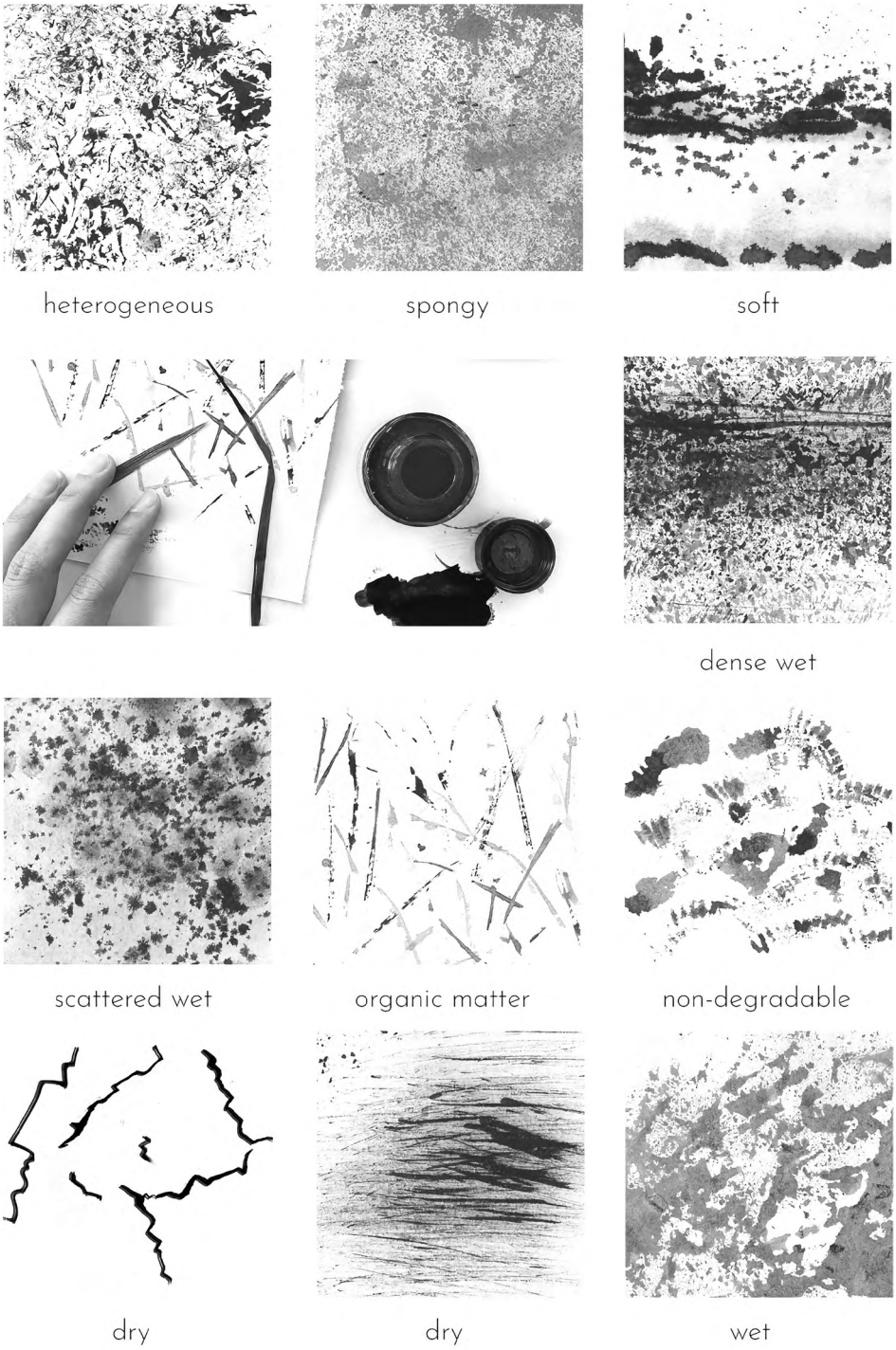



FIGURE 1

*The hand-drawn perception.* The visual representation of peat illustrates how humans perceive its qualities. Understanding peat as a primary actor involves studying its properties, composition, and processes. The perceptual quality of peat is employed to evoke specific emotions, fostering deeper connections with the peat soil. Peat becomes the design tool in these drawings, representing its sensory and experiential qualities for subjective and personal interpretation. Plants from the project site were used as a stamp to visualize the organic matter. The textures reveal multiple peat components and conditions through various techniques and materials. Wet and dry peat soil conditions are drawn, with water, essential for peat's survival. These texture drawings are a valuable tool in the design process because they offer sensory engagement, spatial contextualization, material exploration, and design iteration. This representation method promotes environmental sensitivity during the design phase by closely observing and representing the nuances of peat landscapes.

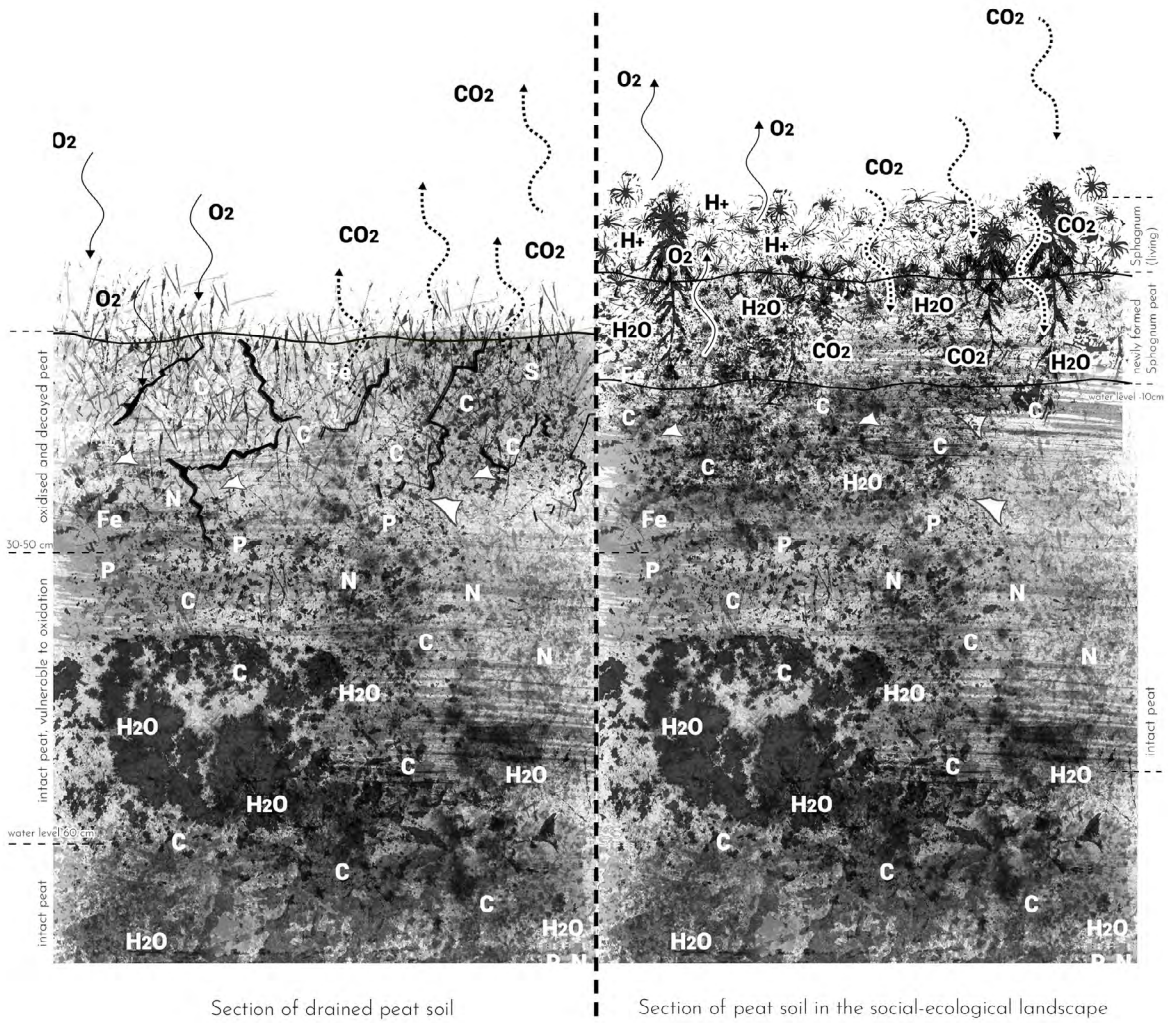
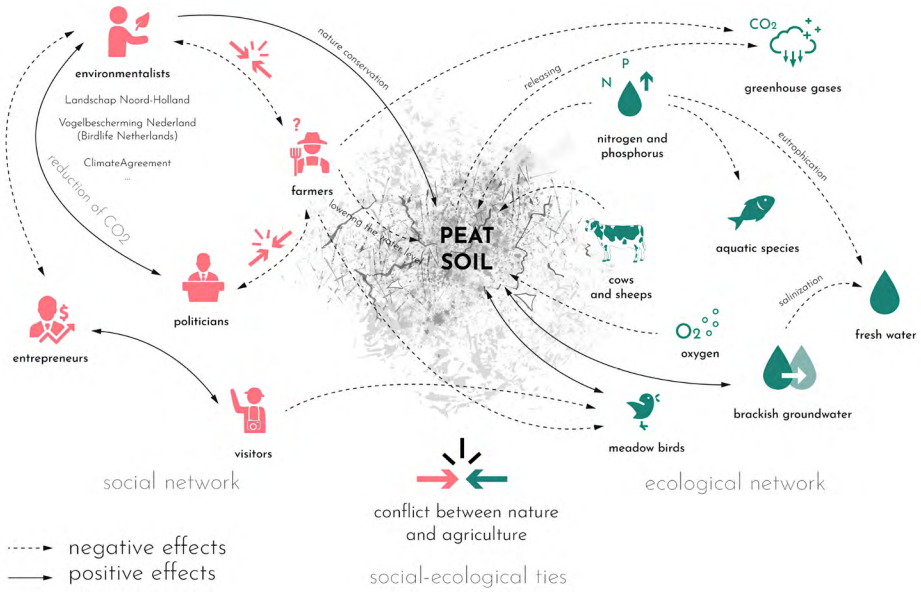



FIGURE 2

*Sections of peat soil with components and processes.* The drained and recovered peat soil sections are created using the textures illustrated in Figure 1. In contrast to the human perception depicted in Figure 1, this illustration delves into peat's intricate components and processes, highlighting how it functions and interacts within its environment. These sections help to appreciate the delicate balance between ecological processes and human interventions.

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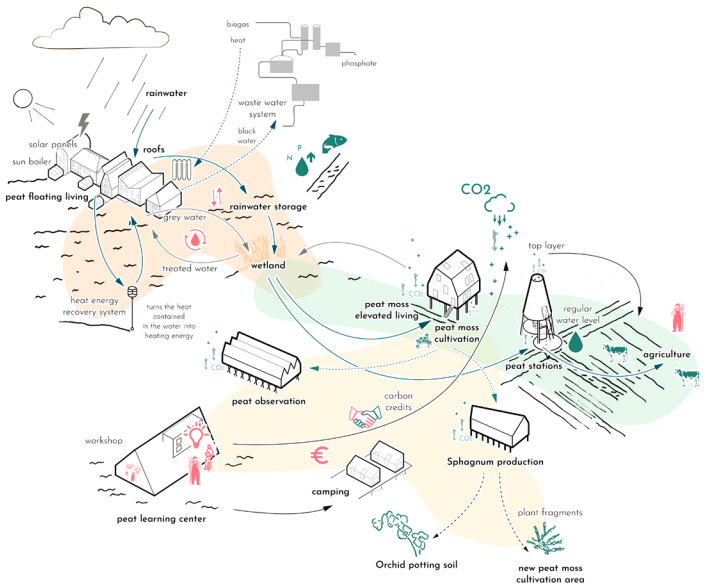



FIGURE 4

*Social-ecological interactions: sharing flows of water, material, energy, and species.* The social-ecological diagram depicts social and ecological systems' exchange processes and connections. Peat is an essential actor that interacts with other components in the system, influencing their behavior and functioning. Its distinct qualities make it a key player in maintaining the balance and resilience of the social-ecological system.

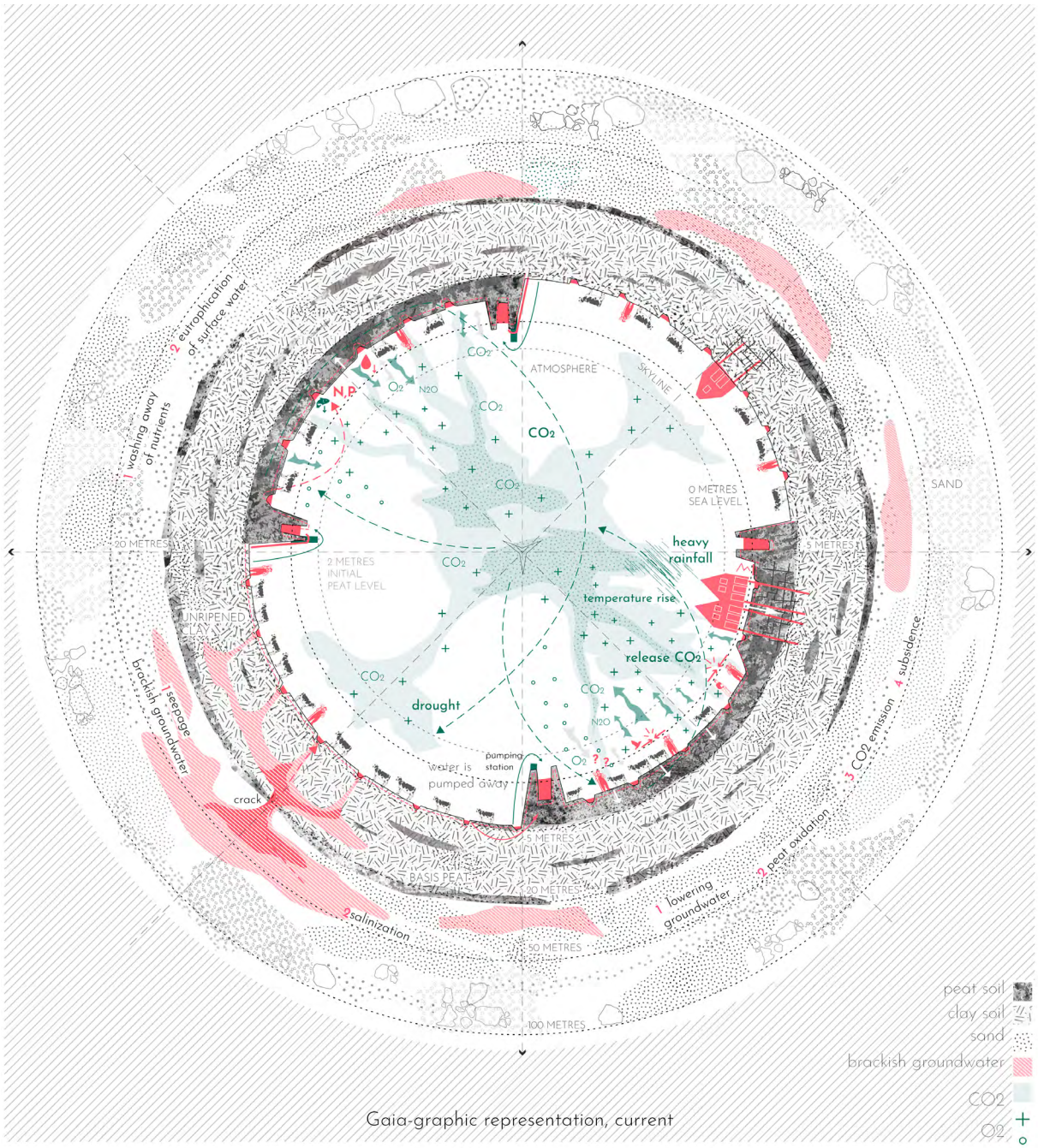
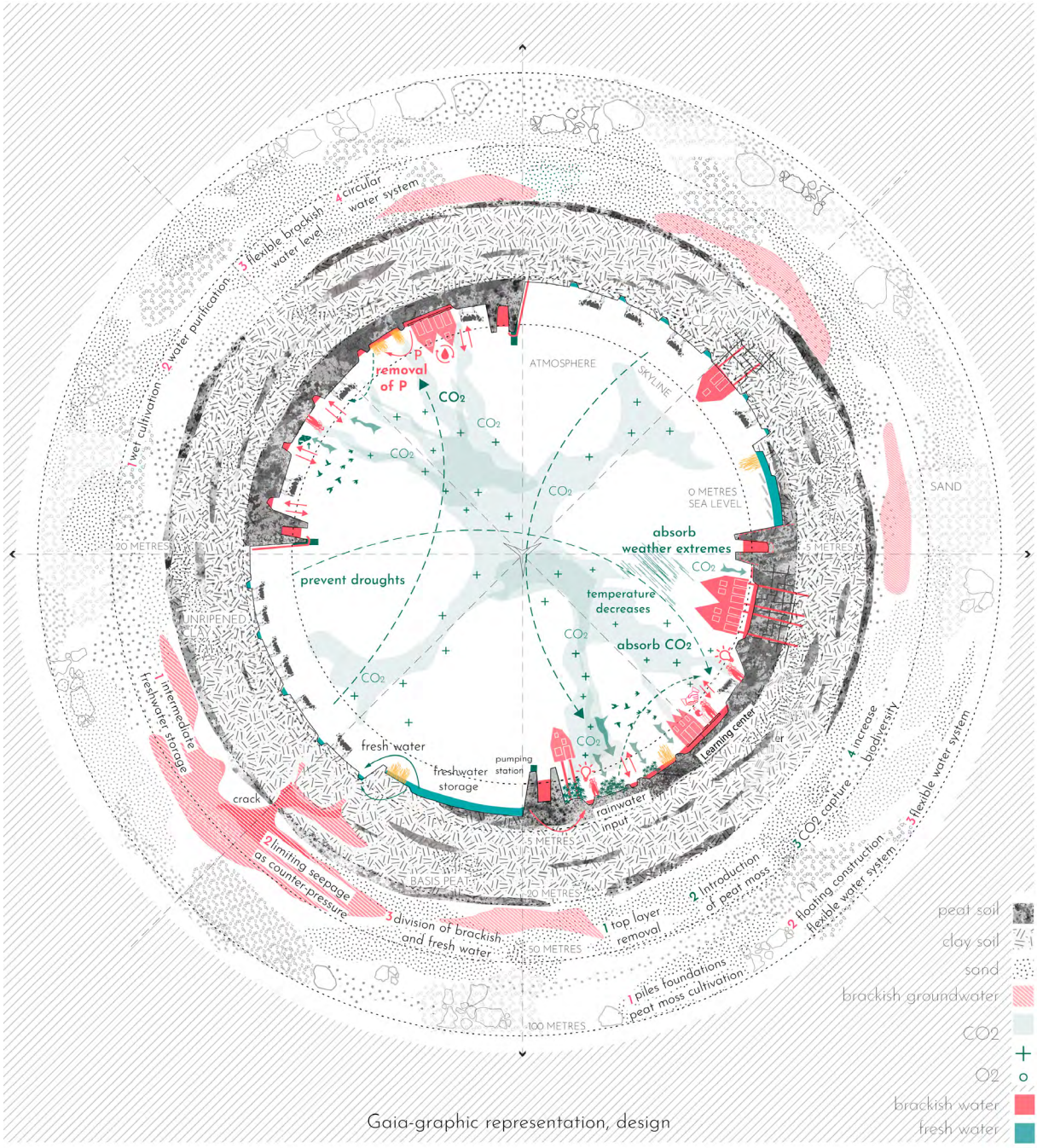



FIGURE 5

*Gaia-graphic representation, current social-ecological systems.* The outer ring reveals land use strata as a palimpsest, showing human impact horizontally and vertically. Placing the atmosphere at the centre illustrates how everything returns to us in a closed system (Aït-Touati et al., 2022). This representation highlights $CO_2$ release causing temperature rise, extended summer droughts, and increased heavy rainfall.




Gaia-graphic representation, design

FIGURE 6

*Gaia-graphic representation, design of a social-ecological landscape.* The circular shape of the mapping allows a continuous visualizing process at various scales and the interaction of human and non-human actors. Actors participate in the design process through their actions. Visualizing spatial relationships across scales is a crucial aspect of understanding complex systems. Beyond analysis, the Gaia graphic becomes an integrated element of the design process. It maps potential design interventions and evaluates impacts on human and non-human actors. This application of the Gaia-graphic as a design tool introduces a new dimension, evolving from a descriptive to a prescriptive role. It transitions from depicting systems to guiding design thinking. It promotes a system-thinking approach, allowing for the visualization of interconnected elements and the identification of intervention points.


FIGURE 7

*Human-peat interaction.* This drawing is an experimental graphic method showing the coexistence of human and non-human actors with peat soil. Significant actors are depicted in black and white, while peat soil is highlighted with solid contrast. This method provides stakeholders and designers with insights into the physical and material experiences of the peat landscape. This visual framework offers insights and solutions on involving the more-than-human through various experimental graphic methods, contributing to bridging the gap between scientific knowledge and spatial design practice. These methods aim to make the complexities of the more-than-human world tangible and visible and stimulate debate on our relationship with the planet.

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# What Slides, Crumbles, Drifts...

## Drawing Cartography into Movements and Flows

**Violaine Forsberg Mussault** [1]

[1] The Oslo School of Architecture and Design (AHO), Institute of Urbanism and Landscape (Norway)

### Abstract

In the urgent context of climate adaptation, enhancing representational and design tools within the landscape discipline is crucial for building a comprehensive understanding of the natural processes driving phenomena in hazardous landscapes. Moreover, the context of the more-than-human paradigm poses new challenges. If we view water, soil, and rocks as lively processes and nonhuman actants—agents with their own agencies and rights—how can mapping practices help us better understand, interpret, and recognize their processes, movements, and behaviors?

Based on an interpretative cartographic technique using LiDAR imagery, this paper introduces a series of cartographic experiments that depict water and rock as dynamic, lively processes. The resulting maps aim to enrich our representations of the forces driving natural hazards and provide a new "language" that enhances our understanding of their multiple agencies.

### Keywords

Landscape architecture, cartography, LiDAR, interpretation, large-scale landscapes, more-than-human, natural hazards, rock, water.

### DOI

https://doi.org/10.47982/spool.2025.2.05

# Introduction: Lively Forces in a Risky Landscape

The frequency and severity of climate risks—such as flooding, drought, and landslides—are increasing in Norway, as in many other parts of the world. These escalating risks pose new challenges for rural cultural landscapes experiencing disruptions due to accelerating climate change and its unpredictable effects. The Undredal Valley in western Norway exemplifies these challenges[1]. Here, risks affect the community's ability to adapt to changing geomorphological conditions and the site's inherent dynamics. The situation necessitates that landscape architects and planners simultaneously consider adaptation and mitigation strategies to address natural phenomena at the scale of the valley or watershed.

This paper forms part of a PhD project within a larger interdisciplinary research initiative focused on implementing adaptation and mitigation strategies through a landscape approach. The NATURACT research project aims to promote nature-based solutions[2] that encourage a process-based approach to adaptation at the scale of the entire valley[3].

Representational and design methods are closely intertwined, with maps and cartography playing a critical role in landscape architecture due to the range of design scales and stakeholders involved (Palmboom et al., 2020). Our practice-based research highlighted the need for tools that better analyze and understand natural phenomena. Enriching representational methods seemed essential to capture both the living dimension of natural processes and the fluid nature of this complex cultural landscape. As James Corner (2011) notes, maps can help to reveal invisible natural phenomena, fostering greater awareness and appreciation of their agencies. This study explores how cartographic representation can enhance our understanding of water, rain, and rocks as active elements, emphasizing their dynamic and vivid qualities. The paper presents initial cartographic experiments representing water and rock as dynamic processes. It centers on the question: *Can new mapping methods for natural processes of rock and water better express their agency—and possibly their subjectivity?*

1 The Undredal Valley is in the Aurland municipality on the western coast of Norway. The location can be seen on Kilden, the Norwegian public cartographic portal, and accessed here: https://kilden.nibio.no/.

2 See International Union for Conservation of Nature ‹Nature-based Solutions›: https://www.iucn.org/our-work/nature-based-solutions.

3 The NATURACT research project is an interdisciplinary research project that seeks to develop large-scale nature-based solutions in response to natural hazards. The research project (2022–2026) is led by five Norwegian research institutions in a broad interdisciplinary team and is funded by the Research Council of Norway. The research project aims to demonstrate the value of a landscape approach to natural hazards and build guiding strategies for adaptation and mitigation in large-scale nature-based solutions. It relies on three case studies, one of which is the Undredal Valley. For more information, see: https://www.ngi.no/en/projects/naturact---landscape-based-climate-mitigation/

# The Need for *Other* Maps

GIS mapping is integral to creating risk assessment and susceptibility maps at the Norwegian Water Resources and Energy Directorate (NVE)[4]. These constitute valuable tools for assessing and managing natural hazard risks in Norway. Risk assessment maps play a crucial role in planning by identifying areas vulnerable to natural hazards, thereby guiding land-use decisions, infrastructure development, and mitigation strategies. However, they have limitations when viewed from a holistic landscape perspective. Typically anthropocentric, they focus on human safety, interests, and infrastructure, assessing risk potentials primarily in relation to human structures (Fig. 1).

The research project's framework (around building landscape-based responses to natural hazards) calls for supplementing the technical and engineering approach to understanding natural phenomena with a more comprehensive cartographic method—one that provides new representations of natural hazards encompassing not only human safety but also landscape agencies and multispecies perspectives.

Geographic Information System (GIS) mapping has offered a method for considering a territory's geographical and cultural complexity. Its usefulness for landscape disciplines is not in question. However, its distanced view must be adapted to new practices in landscape architecture. Several scholars have noted that GIS mapping's presumed objectivity is problematic because it excludes living beings and ecosystem dynamics (Arènes, 2017; Bracke et al., 2022).

Landscape architecture historian Susan Herrington critiques Ian McHarg's map-overlay method, arguing that it conflicts with viewing nature as a dynamic phenomenon marked by gradual changes (2010). She observes that the method was grounded in the belief that science served as a "truth serum" for landscape architecture, providing both explanatory and prescriptive models for understanding nature (2010). By deconstructing this approach, Herrington demonstrates that—despite its scientific claims—it relied on inaccurate and inconsistent data, exposing flaws in McHarg's conception of the method as scientifically defensible.

GIS maps have been criticized for lacking critical engagement with the ground (Mattern, 2017), limiting their ability to capture the dynamism of earth, water, climatic events, and ecosystems—all crucial for developing effective climate adaptation strategies. By providing static snapshots and imposing boundaries that may not align with living processes, GIS mapping enforces a static view of natural entities and phenomena.

4 The Norwegian Water Resources and Energy Directorate (NVE) susceptibility maps identify areas prone to natural hazards based on geological and environmental conditions. They function according to layers concerning different types of hazards (landslides, snow avalanches, rockfalls, and floods). (See: https://kartkatalog.nve.no/#kart). NVE/NGI uses risk assessment maps as more operative tools that analyze and visualize the potential impacts of natural hazards on human infrastructure and safety. They assess the probability and consequences of natural events, helping to guide risk management and mitigation efforts.

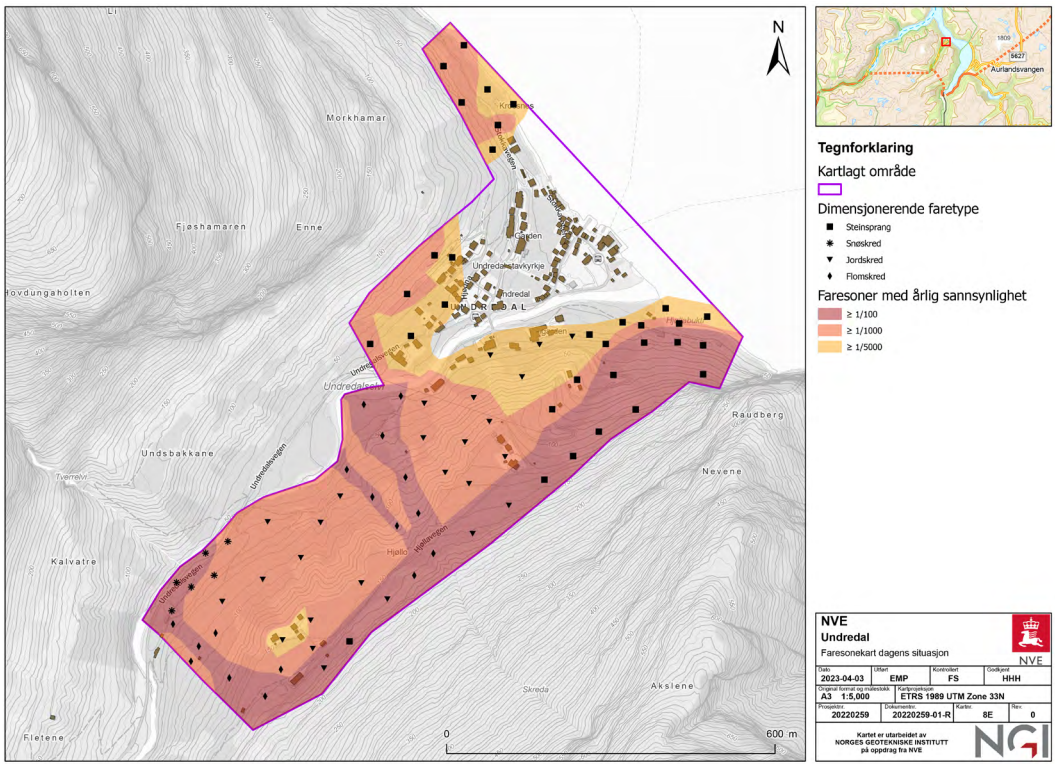


FIGURE 1 *Risk assessment map of the Undredal village (Norway).* The different colours refer to hazardous zones with annual probability and indicate varying levels of risk associated with natural hazards, represented by different dark symbols. Squares refer to the risk of rockfall; triangles refer to the risk of landslides, and rhombuses to mudslides. (Source: Norwegian Water Resources and Energy Directorate (NVE) and Norwegian Geotechnical Institute (NGI), 2023.)

Hence, the necessity for experimentation with mapping becomes particularly crucial within climate action, particularly in developing adaptation strategies. Within this context, a demand arises for innovative map types that nurture more prosperous approaches to natural phenomena, surpassing solely human-centric perspectives.

The more-than-human turn –a paradigm shift across fields that recognizes natural beings as living entities with rights and agencies (Descola, 2005; Morizot, 2020)– has influenced the landscape discipline (Elkin, 2017; Ezban, 2023; Prominski, 2014). It urges a view of landscapes not as passive backdrops but as dynamic sites and processes inhabited by a wide range of nonhuman agents (Tsing, 2015; Tsing et al., 2021). This shift calls for a deeper understanding of natural entities and processes, in line with Anna Tsing's call for critical description (Tsing, 2015). In addition, it prompts a reevaluation of our representational tools, sparking proposals for alternative cartographic methods.

As such, the need for alternative representations better suited to depicting natural entities and processes has grown in recent decades to align with the recognition of natural beings, emphasizing the need to integrate the interests and perspectives of these entities into design processes. Bruno Latour has urged us to overcome an external posture (from the outside) of a spectacular relationship to the landscape, challenging our tendency to see the landscape from above–where we are "outside of Nature." Instead, he advocates for an "approach from the inside," challenging us to recognize that "there is no outside anymore" (Latour, 2017, 3:33).

# A landscape as a Meshwork of *Actants*

The Undredal Valley is a 20 kilometre long, narrow and rugged valley that reaches the deep and narrow Aurlandsfjord. The region is enveloped by rugged mountain landscapes, with peaks rising sharply from the fjord and steep rock faces on the upper slopes. In this landscape, scree, deposits, rocks, and boulders in the riverbed, among other elements, reveal the activity of a mountain in motion. People have skillfully established settlements in this narrow valley, cultivating grazing livestock on parts of the slopes. The pastoral landscape shaped by goat herding in the summer season is an intricate tapestry woven with rocky mountains and forests in a delicate interplay (Fig. 2), shaped by human adaptation to rugged terrain.

Through time, breeders have accommodated natural hazards and have adeptly adjusted their practices and routes to navigate these constraints, acknowledging the inherent instability of their landscape as an integral aspect of their relationship with the land (Fig. 3). However, unpredictable hazards have raised concerns of increasingly extreme weather patterns threatening cultural practices. In recent years, there has been an increase in extreme weather events, mainly heavy rainfalls, leading to more landslides, mudslides, and debris falls (Fig. 4)[5]. More frequent floods erode sections of the valley floor during torrential overflow.

From a landscape perspective, the Undredal Valley represents a rapidly evolving terrain, shaped by complex and intricate dynamics that must be unraveled to provide meaningful adaptation efforts. The fluid, vernacular evolution of its cultural landscape further underscores the need for such guidance, as the increasing frequency of natural hazards poses growing challenges to the community's resilience.

Expanding on the need for nuanced ways to navigate change, adopting a more-than-human approach to the landscape illuminates Undredal's hazardous cultural landscape as a polyvocal or multi-actor landscape. Here, water, rocks, soils, goats, breeders, and forests all interact in multifaceted ways, resonating with Jane Wolff's view of the landscape as a myriad of forces—an interplay of human and nonhuman processes (Wolff, 2017).

> "Does life only make sense as one side of a life-matter binary, or is there such a thing as a mineral or metallic life, or a life of the it in 'it rains'? I think that there is, and that there are good ecological and biotechnical reasons for us to get better acquainted with it." (Bennett, 2010, p. 53)

Political theorist Jane Bennett, who wrote the quote above, is one of the many scholars who believe that the boundaries between the mineral and living worlds are more porous and interconnected than traditional Western epistemologies might suggest. She argues for an expanded understanding of agency and vitality, including human and nonhuman entities, for example, minerals and other material objects (2010). Bennett uses the concept of *actant* to refer to any entity within a network that can exert influence, act, and possess

5 The geotechnical report titled Faresoneutredning skred i bratt terreng – Aurland kommune (Hazard zone assessment of landslides in steep terrain – Aurland municipality) provides several descriptions of natural hazards (mainly landslides) that have occurred due to extreme weather events in the last two decades. The report includes descriptions of all previous natural hazards registered with NVE (the Norwegian Water Resources and Energy Directorate). As a stunning example, the description of the damages caused by landslides and debris flows after extreme weather in December 2011, following the Dagmar storm, vividly illustrates the rapid activation of the mountain's natural processes. See: https://publikasjoner.nve.no/eksternrapport/2023/eksternrapport2023_13.pdf.

vitality or liveliness[6]. Echoing Bennett, geologist Marcia Bjørnerud discusses the agencies of rocks and argues that rocks are not passive objects but active participants in Earth's ongoing processes. She highlights that they constantly record and communicate information about past events while influencing future developments. By viewing rocks as verbs, she emphasizes their agency and the interconnectedness of geological processes across different time scales. Her perspective encourages a deeper appreciation for the dynamic nature of landscapes and underscores the importance of understanding geological time (2018).

The concept of actant, as articulated by Bennett, helps us move beyond the dichotomy between nature and culture and recognize natural phenomena as active drivers in the making of the landscape. This perspective allows us to explore landscape processes from a multifaceted viewpoint that includes nonhuman influences, deepening our understanding of natural hazards as materials in motion and products of living processes, such as melting ice, the interaction of rock with water, and eroding rocky slopes.

From a landscape architectural perspective, the notion of actant enables us to engage with the vitality of natural entities like rocks, soils, water, and glaciers. It provides a framework for analyzing complex landscapes, helping us understand cultural and natural processes that intertwine in hazardous cultural landscapes such as the Undredal Valley.

Thus, with this understanding, natural hazards are no longer seen merely as disturbances (to a human-centric world) but rather as expressions of conflict or tension—arising when the actants' (natural entities') own interests—the overflow—become incompatible with the interests of the locals.

To acknowledge natural phenomena as actants, one can seek to understand the *personality* of the river, the water, and even the rock—their temperament, rhythms, movements, and amplitudes (de Toledo, 2021). These actants have their logic, characteristic behaviors, or ways of 'thinking' that, as landscape architects, we would benefit from understanding more deeply.

First, water is one of the significant actants in the crafting of the Undredal Valley landscape. It can both dig and erode and bring about more weighty events when entangled with other matters. Then, water can dislodge boulders and hasten the instability of stones. Heavy rains initiate various mountain processes and influence the stability of rocks and soil, resulting in multiple textures such as rockslides, mudslides, debris flows, and landslides.

The upper slopes of the valley are marked by steep rocky faces that have been shedding rocks since the last Ice Age, emphasizing rock as another significant actant alongside the water. This ongoing process has resulted in several meters of scree material accumulating on the lower slopes, further contributing to unstable soil layers.

During several fieldwork sessions, three additional landscape actants were identified: herds of goats, the forest, and the soil. Goat herds fulfill a dual role: as individual goats, they act as independent nonhuman agents, while as herds, they function as actants shaped by human interactions. Then, the forest, influenced by declining logging practices and rising temperatures, is advancing and asserting itself as a hybrid ecology, influenced by the grazing of goats in its undergrowth. Lastly, soil, an unstable and heterogeneous entity, is deeply interconnected with rock processes, water, and weathering.

This preliminary study and initial paper, therefore, focus specifically on two primary actants, water and rock, due to the methodological framework outlined below.

6 Bennett's concept of actant reflects her broader project of reimagining human/nonhuman relationships, described in the book *Vibrant Matter*.

FIGURE 2 *The mountain's rocky landforms witness centuries of rockfalls (scree materials).* The Undredal Valley is a landscape where pastoral practices are delicately interlaced with the forces of water and rock. Here, the Undrelaselvi River winds its way between the summer pastures of Melhus. The wood summer stables shelter farmers and herds of goats during summer grazing. One of these shelters (red in the background) is threatened by bank erosion. (Source: author, 2023)

FIGURE 3 *The Undredalselvi is the main torrent of the valley.* It behaves like an active mountain stream. The picture witnesses how it can sometimes accelerate and literally swallow up a piece of the bank. (Source: author, 2023)

FIGURE 4 *A partly damaged trail on the opposite bank.* This trail has a strong value for the community and is used by hikers and breeders. The Breskrida is one of the active side streams that run along the slopes before joining the main river on the valley floor. (Source: author, 2023)

# Method

## Building Site Knowledge

The cartographic work is grounded in a deep understanding of the site, developed over several months through extensive fieldwork. Conducting fieldwork across different seasons was crucial for capturing the varied behaviors of water (including the main river and numerous side streams) and the dynamics of rock slopes. This fieldwork combined various methods and included collaborative visits by co-walking with fellow researchers from the NATURACT research team, focusing on geological and hydrological insights. Additionally, site knowledge was supplemented through cartographic analysis of satellite imagery and document analysis, including archival materials and scientific and geotechnical studies. These resources were often shared and explained by research fellows. The scientific significance of the study relies on solid interdisciplinary collaboration and comprehensive geotechnical documentation. Such support was essential to ensure scientific knowledge could effectively validate and enhance the interpretative approach conducted through mapping.

## Capturing Flows and Movements through the LiDAR Cartographic Interpretation Method

The experiments presented in the following section are grounded in traditional orthographic map-making. Although planimetric cartography may not be the most valuable tool to capture dynamic features of natural processes, it was chosen for two main reasons. First, it is an essential tool in planning and landscape design, especially for adaptation and mitigation strategies (that rely heavily on GIS and satellite data). Second, this media fosters interdisciplinary collaboration—particularly with geologists and geo-engineers—by serving as a shared medium for facilitating dialogue between scientific fields and landscape disciplines. Hence, with respect to designing strategies, this study situates itself within a framework that seeks to complement GIS-layer maps. Another key methodological choice is adopting a replicable, straightforward, and partly analogue method. The work heavily relies on LiDAR images as a primary resource[7]. LiDAR, known for its precision, provides detailed, three-dimensional representations of terrain and vegetation. Functioning as a ground surface scanner, it offers a vivid depiction of landscapes, revealing not only traces of activities but also a palimpsest of different temporalities (Fig. 5). In addition to satellite imagery, it provides a new and rich dataset about the ground surface that articulates a geomorphological expression, revealing intricate details and nuances, such as crevices and other ground textures[8]. This resource is widely utilized in landscape analysis, archaeology, and geography.

7 Light Detection and Ranging (LiDAR) is a technology used to create high-resolution models of ground elevation with a vertical accuracy of 10 centimeters. The Norwegian public mapping portal Kilden provides free access to very fine-resolution LiDAR imagery.

8 In Norway, LiDAR imagery is available through the NIBIO/Kilden public cartographic platform (which also provides GIS layer maps). See: https://kilden.nibio.no/.


FIGURE 5 *LiDAR map of a section of the Undredal Valley, at Melhus.* The map is howcasing intricate details on rocky slopes and the riverbed at a high resolution. It is extracted at a scale 1/1000 from the Kilden online public cartographic platform. (Source: NIBIO, https://kilden.nibio.no/, 2023.)

However, its potential for interpretation in landscape architecture remains underexplored. Given the extensive data captured by LiDAR, selecting specific information for map conversion becomes crucial, adhering to standard cartographic interpretation practices within the discipline. As James Corner emphasizes, this process requires deliberate interpretation and data selection, acknowledging the inherent subjectivity in cartographic translation (2011). This paper's cartographic experiment interprets complex LiDAR data through a three-step process:

## Reading and Identifying

The first step in the drawing process involves analyzing the image's significant signs, lines, and features. The intricate textures revealed by the LiDAR data demand meticulous attention, requiring a careful, selective reading of crevices, reliefs, gullies, and micro-topographies. LiDAR allows us to identify details in a geomorphological field. By closely examining the topographical data, potential traces embedded in the image can be identified, revealing pathways, rock trajectories, waterways, and water flow patterns. The site knowledge gained through fieldwork is essential for interpreting these visual elements, creating a mental analogy between what is observed on the surface of the image and the landscape experienced in the field.

## Selecting Relevant Patterns and Signs

Identifying distinctive ground patterns crucial to understanding water or rock agency entails a blend of intuitive interpretation and scientific expertise. This process is dynamic and iterative, relying on continuous interaction between insights from LiDAR, site knowledge, and various documentary sources related to hydrology, geology, and geotechnical engineering[9]. The process also integrates cross-disciplinary dialogue with a more extensive scientific team[10]. The triangulation between subjective interpretation of LiDAR, site knowledge, and scientific inputs from earth sciences is essential to ensure that interpretation decisions are informed.

FIGURE 6 *Preliminary overlay experiments on a printed LiDAR map.* Several overlay experiments were performed to generate tracings and experiments with a graphical interpretation of the data. Hand drawing with pencil on transparent paper at scale 1/2500. (Source: author, 2023.)

9 The surveys also entail old and recent geological studies, risk assessment reports (from NGI and NVE), various cartographic resources, old photographs, and GIS maps from the Kilden cartographic database.

10 These are research partners from the NATURACT research project and include geologists, geotechnicians, and hydrologists. The Norwegian Geotechnical Institute (NGI) is one of the five Norwegian institutions involved in the research project and is the lead institution.

### Tracing Signs on a Map

The next step involves translating the identified patterns into graphical symbols or tracings via an overlay process. Drawing is done both by hand, using traditional tools like pencil and tracing paper, and digitally, with a graphics tablet in Photoshop. With both tools, the drawing hand responds subtly to the LiDAR image, enacting a drawing and translation process that is both interpretative and informed, allowing for a slow, deliberate engagement with the behavior of the actant—whether water or rock.

Here, drawing is to be understood as a *verb*, a process that gradually allows me to access a kind of subjectivity of the natural entity being drawn. Through each line, I attempt to capture the inherent logic of water or rock—the forces that drive its trajectories. The patterns created aim to uncover a more extensive behavior, an idea of displacement or movement. This tracing process involves various graphical choices common to all cartographic work, including decisions about simplification, emphasis, enhancement, or exaggeration of specific features. Through this process of cartographic interpretation, the drawing gradually gains intentionality.

In the following sections, I refer to this approach as the *LiDAR Interpretation Method*. It is an initial step, emerging as an intuitive engagement with the rich, layered material of the LiDAR. The maps presented are early results from an ongoing investigation, a first act of drawing and tracing that allowed me to sense its depths. Though the work is still in its early stages, some preliminary insights are offered to guide future research direction.

## Findings: Exploratory Cartographies

### Early-stage Experiments : The Watershed as a Living Organism / The Valley as a Rockscape - the Watershed as Rockshed

The first preliminary investigations represent water and rock distinctly through two hand-drawn thematic maps at the scale of the entire watershed—the scale that best aligns with natural phenomena. The first map brings the watershed and its hydrographic network to life, transforming the landscape into a water-filled scene [fig. 7], showing an intense and hairy network that evokes what looks like a vibrant organism.

The second map, which focuses on rock agency, emphasizes the role of the watershed in initiating rock processes. It introduces the idea of a 'rockshed'—an area where rock material is collected, channeled, or shed from higher elevations [fig. 8]. Thus, the rockscape/rockshed map helps provide a new understanding of the terrain, highlighting the active mountain faces in releasing stones. Both drawings offer insights into interpreting rock and water as distinct yet interconnected entities with distinct patterns. These initial sketches helped validate the effectiveness of LiDAR interpretation at a large scale (1/10,000), showing that this method not only enhances geomorphological expressiveness but also reveals potential to convey movement across the entire catchment area.


FIGURE 7 *Early-stage experiment: The watershed as a living organism.* Early-stage study cartographies to experiment with the potential of LiDAR interpretation at a large scale and about the understanding of the watershed. Hand-drawn with pencils on transparent paper at a scale of 1/10000 and reworked in Photoshop. Original drawing size: 110X160cm (Source: author, 2023).


FIGURE 8 *Early-stage experiment: The valley as a rockscape - the watershed as rockshed.* Early-stage study cartographies to experiment with the potential of LiDAR interpretation at a large scale and about the understanding of the watershed. Hand-drawn with pencils on transparent paper at a scale of 1/10000 and reworked in Photoshop. Original drawing size: 80X116 (Source: author, 2023).

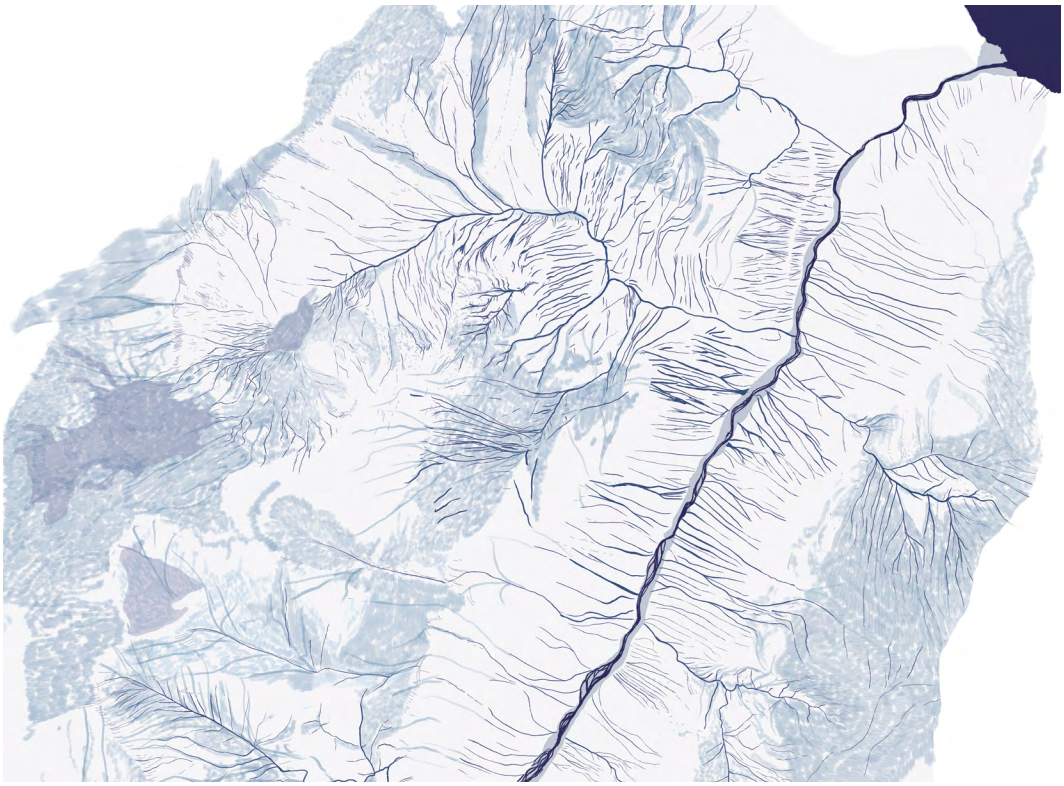

FIGURE 9 *Speculative map of heavy rainfall in the spring season.* Drawn at scale 1/5000 in Photoshop, using a drawing tablet. Original drawing size: 115 X 99 cm (Source: author, 2024).

## Speculative Map of Heavy Rainfall in the Spring Season

*Can the pathways that water traverses through the landscape be delineated and portrayed as etched into the soil?* This map explores this possibility, drawing upon topographic data and a selective interpretation of slope lines, which can be construed as rainwater pathways and routes. With extreme rain events projected to increase in frequency and intensity in this region (Rønningsbakk, 2018), understanding the impact of rainwater has become increasingly crucial in Undredal, as it governs all geohazards. The map proposes illustrating flows and trajectories of water during intense rainfall events in the new heavy rainfall regime. It speculatively enhances the watershed's agency, illustrating both past and potential future events. It portrays water as more abundant and dynamic than typically represented in standard cartographic databases. By emphasizing the physical characteristics of waterways shaped during heavy rainfall, the map aims to convey water's powerful movement and forces. Further experimentation could help refine this aspect, deepening the spatiotemporal dimension and offering a more comprehensive representation of movement's depth and velocity. The map highlights various water behaviors across distinct territories:

- The riverbed on the valley floor shows its evolutionary trajectory, including its primary bed, expanding zones, and inactive meanders;
- Blue surfaces, marked by relief, indicate areas where water accumulates in late spring as snow and ice on plateaus and summits, remaining static for extended periods (release areas);
- Light blue lines suggest speculative water trajectories, revealing sub-watershed logic;
- Darker blue lines show water rapidly descending the valley, carving through rocks and steep slopes.


FIGURE 10 *Tracing a mountain in motion.* Drawn at scale 1/5000 in Photoshop, using a drawing tablet. Original drawing size: 80 X 95 cm (Source: author, 2024).

## Tracing a Mountain in Motion

Leveraging LiDAR data unveils a rich tapestry of patterns etched onto mountain slopes, narrating the history of rock movements over time. This map seeks to capture rock's dynamic essence, integrating its natural processes into the landscape to evoke mountains' organic character. It graphically interprets these rock patterns, correlating them with watershed dynamics and geomorphological processes from peaks to valley floor. The darker surface represents release areas—higher-altitude sections prone to rock detachment, often characterized by fragile gneiss material. LiDAR interpretation subtly delineates these areas, offering critical insights into rockfall drivers. In contrast, the lighter surface with lines indicates discharge areas where rocks descend along slopes. These patterns evoke traces of past landslides, rockslide pathways, or gullies, illuminating connections between release areas and slope dynamics. The map conveys rock's vitality and fluidity, inviting deeper understanding of interconnected geological processes shaping the landscape.

FIGURE 11 *What crumbles, rolls, slides... Sketch drawing.* Drawn at scale 1/2500 in Photoshop, using a drawing tablet. Original drawing size: 42 X 53 cm (Source: author, 2024).

This preliminary sketch aims to capture a mountain slope's dynamics in simplest terms, using few swiftly executed strokes. It represents diverse past events inscribed on the ground surface and validates that various mountain processes can be read in LiDAR data. The graphical interpretation reveals traces of past scree, and ravines through which material accumulates and rolls down steep slopes.

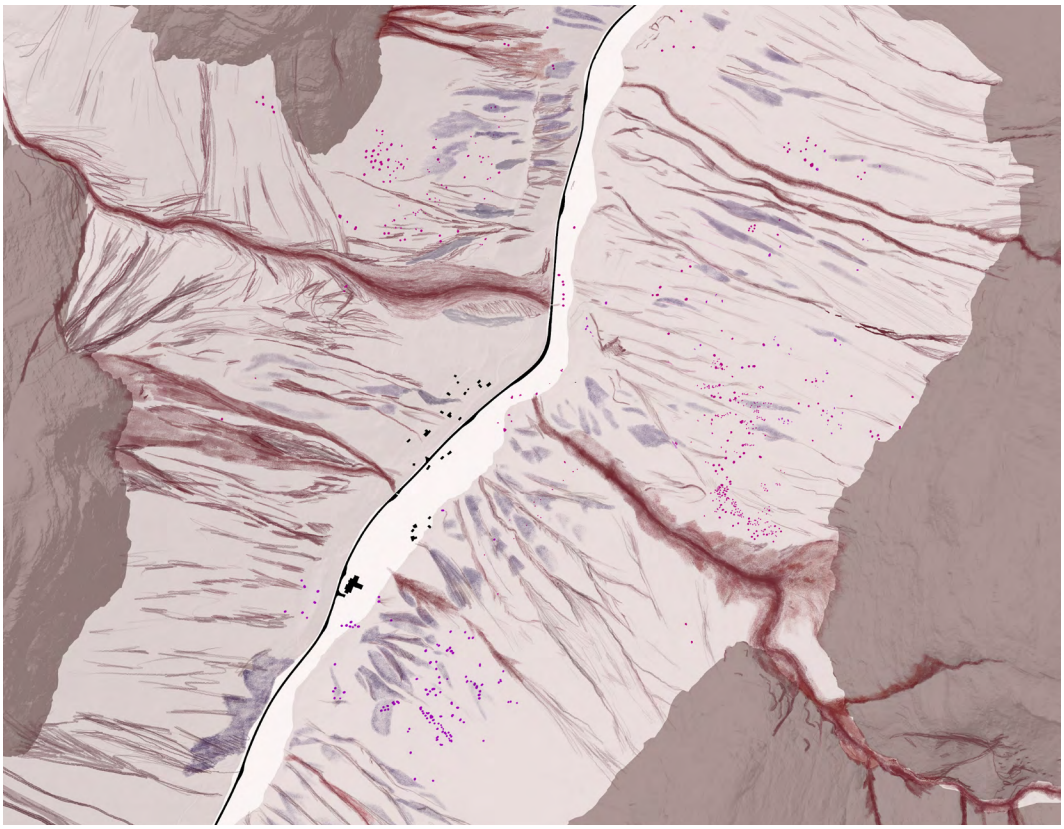

FIGURE 12 *What crumbles, rolls, slides: Interpretation of different mountain behaviors.* Drawn at scale 1/2500 in Photoshop, using a drawing tablet. Original drawing size: 77 X 72 cm (Source: author, 2024).

- Black tracings: human infrastructure (main road, mountain pastures)
- Pink dots: rock deposits (large blocks tumbling down slopes)
- Thick red corridors: debris flow-prone channels
- Purplish rown surfaces: past rockfalls and material accumulations
- Thin brown lines: smaller paths of less solid materials such as mud

## What Crumbles, Rolls, Slides: Interpretation of Different Mountain Behaviours

Combining diverse datasets (geotechnical surveys and maps) with LiDAR interpretation, this map graphically represents movements and processes shaping rocks and mountains, illustrating a range of rock behaviors. It translates terrain contours into tracings of movements—rockslides, debris flow channels, and stone deposits—revealing past events and their landscape imprints. Each graphic pattern conveys a unique geological process, gesturing toward a "language of the mountain" reflecting contemporary and historical geological timescales.

While not a formal scientific document, this representation could serve as an interpretive complement to technical maps, offering an alternative perspective emphasizing landscape vitality and processes. Bridging scientific rigor and interpretive exploration encourages reflection on how such approaches deepen understanding of geological phenomena's dynamics and interconnections between past occurrences and potential future events. However, integrating multiple temporalities, movement traces, and event types remains a developing approach, inviting further research.

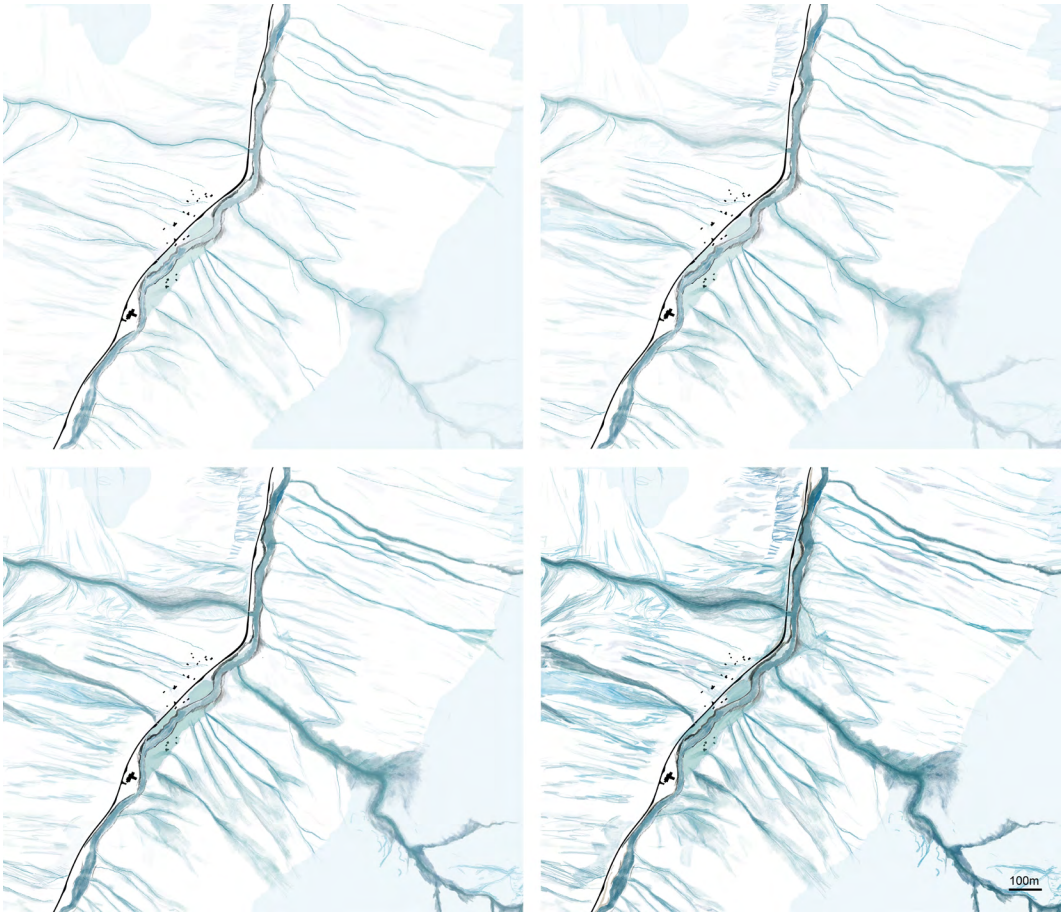


FIGURE 13 *Attempts to represent the impacts of intense rainfall.* Based on site observation from July 23, 2023. Drawn at scale 1/2500 in Photoshop, using a drawing tablet. (Source: author, 2024).

## Attempts to Represent the Impacts of Intense Rainfall, based on Site Observation from July 23, 2023

This series suggests a temporal interpretation of a rainfall event and a process-oriented approach to how water floods the landscape during an intense rainstorm. (Read from left to right, bottom to top.) The four maps convey a narrative, illustrating a heavy rainfall, like one observed in August 2023 when streams quickly filled and water carved new channels outside regular streambeds.

LiDAR data enables interpreting varying runoff intensities on slopes and within channels, highlighting stream forces. Variable thickness and patterns in watercourse traces illustrate gradual landscape filling with water. Each map represents a time interval of approximately one to two hours. This representation makes rainwater more comprehensible, revealing water as an actant with distinct temperament and behaviors, while highlighting terrain friction.

Though speculative, these maps retain accuracy value for climate adaptation strategies. Further experimentation—particularly regarding temporal aspects—is essential for fully realizing their potential.

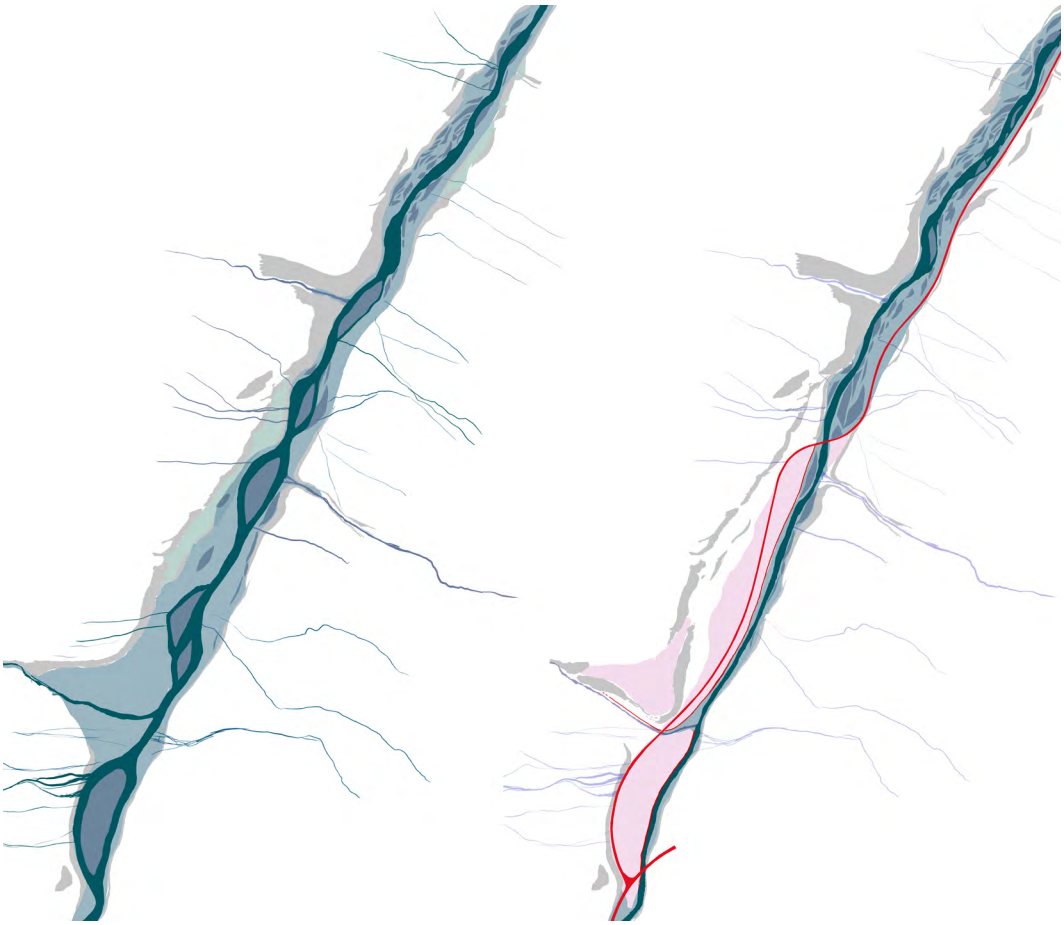

FIGURE 14 *What the river is enduring.* Red and pink features indicate road infrastructure and a large landfill area that now obstructs part of the riverbed, forcing it into a near-straight line and eliminating its previously dynamic, alternating channels. On both maps, grey areas represent embankments delineating the river's boundaries. Dark blue, curving shapes illustrate the river's natural meanders, which once shifted seasonally. Drawn at scale 1/2500 in Photoshop, using a drawing tablet. Original drawing size: 62 X 79 cm (Source: author, 2024).

## What the River is Enduring

Two maps depict a river's course within an upstream valley section that has undergone notable recent changes. LiDAR interpretation reveals the riverbed's evolution, showing natural hydro-morphological patterns and anthropogenic structures that have constrained its flow.

The left map shows the river's original pre-1970s path (shaded blue) before the road was built. The right map shows current conditions.

These visualizations emphasize the river's intrinsic need to move within a changing landscape, highlighting human infrastructure impacts. By juxtaposing these maps, the effects of the massive landfill become clear—most notably the river's confinement, leading to agitated flow, increased velocity, and various accelerations downstream. The maps portray the riverbed as a conflict zone, with the river being forced to lose its natural path, along with part of its territory and flow rights. Visualizing this conflict between human and natural forces fosters a critical perspective and empathy for the river's struggle. This approach resonates with Dirk Sijmons' call for renewed sensitivity and compassion toward both human and non-human elements of a site in the Anthropocene (2020).

# Discussion: Expressing Other-than-Human Subjectivities through Movement

The LiDAR interpretation method is preliminary and requires further testing across different cases, landscapes, natural phenomena, and scales. While relatively simple and low-tech—relying on an overlay drawing method and interpretation practices familiar to landscape architects—the technique is easily replicable. Despite being time-consuming when applied to large-scale landscapes or watersheds, it provides a valuable tool for engaging with detailed geomorphological understanding across scales, offering deeper insight into natural processes. This experimental cartographic technique effectively traces the genealogy of natural events, allowing us to map the underlying processes that generate them. Ultimately, it enables the creation of vivid, rich representations of natural processes, transforming invisible or silent dynamics into a compelling visual language that can inform planning and strategy development tools.

One particularly valuable aspect is the strong narrative potential of these cartographic representations. These maps can be interpreted as depictions of past processes and, more importantly, offer the possibility of creating speculative representations of future events. By providing a projected vision of potential behaviors of water and rock, they can generate speculative maps grounded in scientific data. This dimension remains in its early stages in these initial attempts and warrants further research. A more precise and attentive representation of temporal aspects would be necessary to deepen this hypothesis. While the maps here capture dynamic features, they primarily depict intermediary states rather than sustained movement. Further experimentation is needed to explore drawing techniques that could, for instance, incorporate different dates or situations within a single image or depict them as a continuum to visualize dynamics across time and space (Fig. 13). With development to better convey movement, adopting a spatiotemporal approach, these maps could become critical tools for climate adaptation strategies (van Dooren & Nielsen, 2018). Additionally, emphasizing movement could improve the maps' ability to represent a more-than-human perspective, allowing for a more nuanced portrayal of nonhuman actants and their distinct ways of being and behaving.

It is worth noting that other recent mapping practices increasingly focus on representing invisible movements to make nonhuman actants in landscapes more visible. Architect Alexandra Arènes, for example, captures the temporal and processual aspects of nonhuman beings in landscapes[11], emphasizing that living entities, primarily animals, need to be decoded, reinterpreted, and articulated through mapping (Arènes, 2017; Aït-Touati & Grégoire, 2021). Arènes argues that representing the *signature of movement* through cartographic drawing can shift our perception from a fixed view of the landscape to one that is dynamic and alive (2017). This idea is further explored in *Terra Forma: A Book of Speculative Maps* (Aït-Touati et al., 2022), which proposes innovative methods to depict earth processes, flows, and dynamics. Similarly, the *BeingAliveLanguage* project, led by Teresa Galí-Izard at ETH Zurich in collaboration with the Office of Living Things, compiles work visually representing the movements of living entities (such as roots and watersheds) through mapping[12]. In the realm of animal agency, related efforts have sought new approaches to understanding animal actions and behaviors by mapping the spatiotemporal patterns of nonhuman entities (Bracke et al., 2022). These diverse cartographic examples share a common focus on

11 For an overview of Alexandra Arènes› cartographic work and research, see: http://s-o-c.fr/.

12 For more information about the BeingAliveLanguage project and the researchers involved, see the project presentation here: https://gali-izard.arch.ethz.ch/language-description and here: https://gali-izard.arch.ethz.ch/beingalivelanguage-visualizing-soil-information-from-a-design-perspective-to-enhance-multidisciplinary-communication-zhao-ma-and, or works from the Office of Living Things: https://officeoflivingthings.com/sharing.

depicting the movement of nonhuman actants to access their perspectives or subjectivities, often relying on scientific collaborations and resources. They illustrate that representing movement can be central to a more-than-human approach, deepening our understanding of otherwise invisible or intangible natural processes and thereby contributing to their consideration as living processes. This alignment invites further exploration into post-anthropocentric cartographic drawing and supports the continuation of my research. Across current discourses, cartographic works, and research in the landscape discipline, the attention toward representing the movement of natural phenomena—and flowing and dynamic matter such as water, soil, rocks—emerges as a promising approach to more fully integrate their agencies and ways of behaving into our understanding of the landscape.

### Toward Navigational Maps

Further research is needed to examine how such maps can mediate human and nonhuman concerns in the context of accelerating climate risks and serve as navigational tools, as proposed by November, Camacho-Hübner, and Latour (2010). They argue that maps are not mere representations of reality but dynamic instruments shaping how we perceive and interact with the world, influencing our actions and decisions. Navigational maps enable users to navigate and orient themselves within complex networks, encompassing physical spaces and associated risks, providing a more comprehensive understanding of potential hazards and uncertainties, and enabling them to decide, plan, and strategize.

Building on this concept, I propose exploring the navigational potential of LiDAR interpretative maps. In climate adaptation discussions with local communities, such maps have the potential to help people navigate hazardous, shifting landscapes by visualizing changes in natural phenomena and relating them to climate events and watershed dynamics. I hypothesize that this approach could foster dialogue and offer practical guidance, warranting further investigation into how these maps can be co-produced and used collaboratively, in rural mountain landscapes.

## Conclusion

As the need for climate action intensifies, the LiDAR cartographic interpretation method meets the demand for landscape researchers and practitioners to engage with interdisciplinary approaches to deepen site reading practices and the way we understand natural phenomena and their multiple fluid processes. There is a need to strenghten strong collaborations with earth sciences and ecology to better understand complex hazardous landscapes.

The LiDAR cartographic interpretation method uncovers previously invisible past events inscribed on the ground, revealing signs that can help anticipate future landslides, rockslides, and mudslides in valley and mountain landscapes. It allows for a deeper understanding of the unstable nature of the landscape by exploring different temporalities simultaneously. By integrating rocks and water—entities often difficult to perceive as living—this method acknowledges their agency by making visible processes that are absent not only from our traditional maps but also from our common thought patterns. It offers the opportunity to

understand the language of rock and water as actants whose behaviors, needs, and demands become legible through interpretive practices.

The method has the potential to complement GIS maps by highlighting the processes driving natural phenomena, thereby enhancing our understanding of natural hazards. While community knowledge and perspectives are essential to climate adaptation, this type of cartographic work can help build a richer understanding of place in hazardous or rapidly changing mountainous environments, complementing embedded, experiential, and participatory forms of knowing. They can serve as tools to negotiate more-than-human perspectives, challenging the purely anthropocentric view often held of hazardous landscapes and encouraging planning and strategy that *work with*, rather than *against*, the 'forces at play' (Clément, 2014).

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# Drifting Space and Unruly Velocities

## More-than-Human Marine Spatial Planning in the Fram Strait

**Aniella Sophie Goldinger** [1, 2]

[1] The Oslo School of Architecture and Design (AHO) (Norway).
[2] The Arctic University of Norway (Norway).

### Abstract

This visual essay explores the translation of complex environments through representations with attributes that are summarized as 'interdimensional'. These attributes are not elaborated yet, but the term emphasizes that these representations integrate different dimensions of experiencing and understanding various spatial scales and temporal perspectives. The process of producing these representations requires the landscape architect to encounter, investigate, and communicate life, materiality, and processes in an approach that appreciates attentiveness and creativity.

The representations discussed were developed in the context of a design studio at the University of Edinburgh that was elaborated and led by the author and situated within the Highland Boundary Fault Zone in Scotland. A studio collective composed of Master's students in Landscape Architecture over two years has been encouraged to traverse the fault zone, taking into account social, ecological, and geological fractures, as well as points of tension and upheaval.

Operating from within the 'critical zone', the provocation of the late Bruno Latour and his collaborators has been adopted: that working from this perspective is necessary to recognize that we humans are 'living among the living' (Société d'Objets Cartographiques [SOC] 2018). The design studio's approach encourages experimental drawing and making to develop 'ecologically explicit' landscape architecture—landscape interpretations and design propositions—that foreground and support more-than-human worlds.

### Keywords

Arctic ocean, drifting, marine spatial planning, more-than-human, more-than-wet, oceanic urbanisation, sea ice.

### DOI

https://doi.org/10.47982/spool.2025.2.06

Neither land nor open water, sea ice defies common binaries of solid and fluid. As climate change models predict an ice-free Arctic Ocean as early as the summer of 2030 (Kim et al., 2023), with an expected increase in petro-capitalist and shipping activity (Bennett et al., 2020), this once-frozen territory is undergoing irrevocable changes with potentially catastrophic consequences for the fragile Arctic marine ecosystems and the Indigenous communities whose livelihoods depend thereon. This contested oceanscape critically calls for alternative ways of understanding territory, urban fluxes, and oceanic spatial practice; the speculative project depicted within this essay explores sea ice as a vibrant material actor—unruly, drifting, and surprisingly gritty.

'The sea—a material, spatial, ecological, and recreational resource—is undoubtedly the site of one of this century's greatest planning challenges.' (Couling, 2022, p. 278)

As an increasingly instrumentalized, inhabited, and extracted space, the ocean is becoming an urban issue. A growing field of oceanic spatial scholars is researching the myriad ways in which the ocean functions as a designed, operationalized space (Couling, 2022; Couling & Hein, 2020; Edwards, 2019; Kiss, 2022). Across disciplines, the oceanscape is emerging as a spatial medium of anticolonial resistance and more-than-human reciprocity (e.g., the sonic oceanic explorations of AM Kanngieser and the artistic research trajectories of TBA21-Academy), calling for fluid seascapes to be included within the transdisciplinary intersection of environmental humanities and spatial research. The urban, by now exceeding what is usually perceived as 'the city', thus needs to be understood as extensively outspread on a planetary scale of production, labour, and resource extraction (Brenner & Katsikis, 2020) across both terrestrial and oceanic hinterlands. While the majority of research has focused on centrally located oceans like the Northern and Barents Seas, known for their histories of fishing, oil, and gas extraction (Couling, 2022), the question emerges of how to approach the increasing operationalization of the polar oceans, historically difficult to map but holding immense complexities of colonialism, encroaching infrastructures, and geopolitical conflicts.

Although the young discipline of marine spatial planning (MSP) has been gaining traction within the last decade, it has been criticized for failing to depart from land-based rules and logics, often resulting in rigid boundary-making and flat understandings of the ocean space (Couling & Hein, 2020; Bode & Yarina, 2020). Within MSP, traffic separation schemes (TSS) are commonly used to regulate and manage shipping traffic in places of high traffic intensity but have yet to be implemented in an Arctic context, where, up until now, the sea ice has acted as a natural barrier for most resource and shipping activities. Although more-than-human actors such as whale migration routes and ecologically significant areas are considered within most TSS, these schemes' dominant approach prioritizes efficiency and economic factors. Current Arctic territorial planning efforts include the International Convention for the Prevention of Pollution from Ships (MARPOL) (International Maritime Organization, 2022) and the International Agreement to Prevent Unregulated Fishing in the High Seas of the Central Arctic Ocean (Directorate-General for Maritime Affairs and Fisheries, 2021). The latter set a precedent for an unusually farsighted effort of multilateral collaboration addressing a potentially serious environmental problem long before the problem occurs, making feasible a comparable approach toward the increasing marine traffic disrupting the fragile ecosystems of the Arctic Ocean.

Questioning the dominant perceptions of ocean space, the extensive work of Kimberley Peters and Philip Steinberg has been invaluable, as it explores the notion of a 'more-than-wet' ontology and the myriad ways in which the ocean space exceeds both its materiality and the bounded space through which it is often cartographically portrayed (Peters, 2015; Peters & Brown, 2017; Peters et al., 2018; Peters & Steinberg, 2019; Steinberg & Peters, 2015). Peters and Steinberg position the more-than-wet ocean space as an arena for

reconceptualizing understandings of space, time, and movement, offering new perspectives beyond 'the static simplicity of the landed place' (Peters & Steinberg, 2019, p. 305).

With the unruly drifting of sea ice creating further spatial complications (Bay-Larsen, 2021; Peters & Steinberg, 2019; Shake et al., 2018; Steinberg & Kristoffersen, 2017), a more-than-wet ontological approach appears crucial within the polar territories to fully understand their complex materiality and connectedness to global environmental, geopolitical, and capitalist infrastructures. The difficulties with mapping the ever-changing sea ice have resulted in what Bode and Yarina define as 'cartographic silencing' (2020). Critiquing the limitations of conventional ocean space representation, they propose the notion of 'thick representations', which—instead of rigid boundaries and land-based planning logics—delves into the depth, movement, and temporal aspects of fluid space essential for a softer, more adaptive approach to marine spatial planning (Bode & Yarina, 2020).

Acknowledging sea ice as a drifting landscape and a material actor within the Arctic oceanscape, the project considers 'drifting' as a specific type of mobility (Peters, 2015). The project was developed through an explorative and comparative methodology across speculative scenario-building and entangled drawing material; a wide array of interdisciplinary and multimedia explorations became necessary to identify, through design methods, these possible oceanic futures. The multiscalar and multitemporal need to address sea ice as a landscape architectural matter made it essential for multiple drawings, model explorations, and speculations to exist, grow with, and inform each other; the drawings became active tools for thought. During this process, differing ways of rendering the oceanic space became necessary to analyze, visualize, and contextualize the vast amount of data available. Proposing drifting and mapping as formative design tools, the project explores a recent emergence of more-than-human stakeholders in Arctic marine spatial planning scenarios, which is geared toward a more dynamic, fluid understanding of the agency of sea ice.


FIGURE 1 *Drifting territories.* Following the sea ice from the Siberian ice nurseries to the melt passage of the Fram Strait, the project explores the Transpolar Drift as an integral piece of landscape infrastructure within the Arctic Ocean. Although shipping routes, sea ice, and ocean currents, as shown here, are territorial elements of the more expansive Arctic Ocean (AMSR2, 2023; Berkman et al., 2020; Eumetsat, 2023; GEBCO, 2023; SAMBR, 2017), they all convene in the Fram Strait, where a planning intervention could have a widespread effect on the marine ecosystem health on a larger scale.

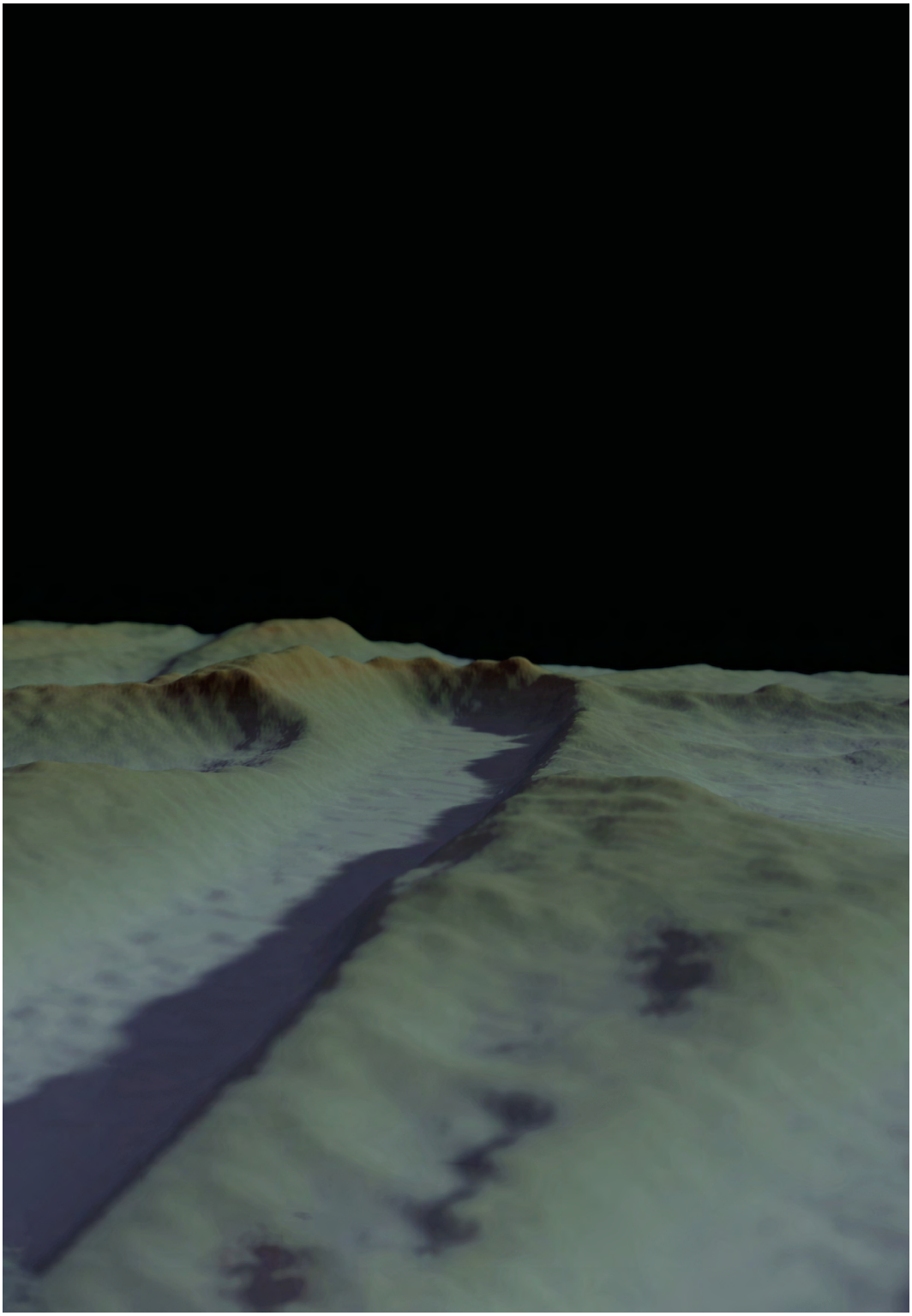

FIGURE 2 *Seafloor fieldwork.* Fieldwork was essential to relating to the ocean as a site, and I was fortunate to secure a spot on the Norwegian Institute for Marine Research's expedition into the Northern Barents Sea. Here, multibeam sonar scans conducted between Spitsbergen and Hopen Island (Norwegian Institute of Marine Research, 2023—rendered by the author) revealed an intricate landscape of iceberg scour markings and terrain modifications at 60 m depth, a testament to the lasting spatial imprint these drifting ice masses, however temporary they may seem, leave on the oceanscape through which they pass.

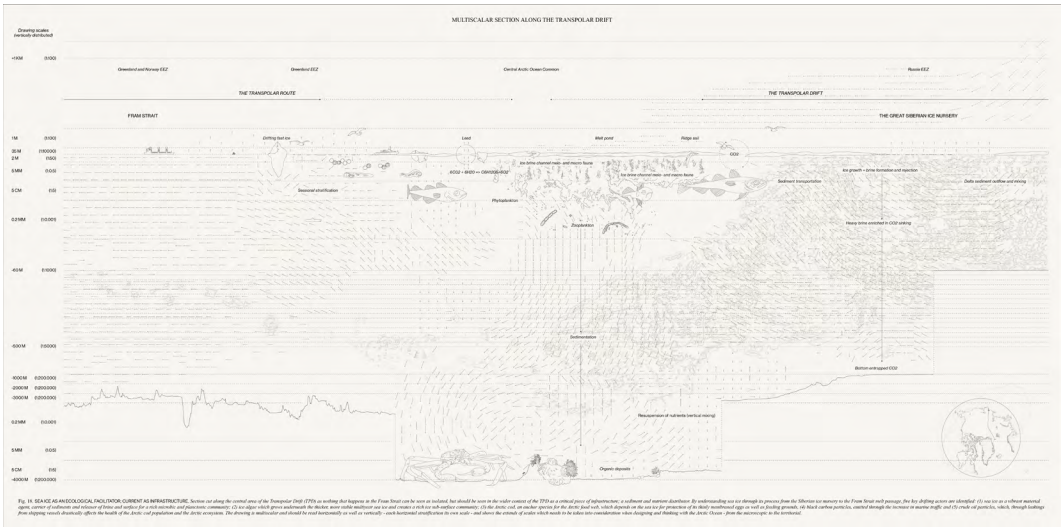


FIGURE 3 *Current as infrastructure: a multiscalar section along the Transpolar Drift.* Using the section as a critical tool to contextualize the scientific data, key drifting actors are identified: sea ice as a carrier of sediments, releaser of brine, and host for a rich microbial and planktonic community (Krumpen et al., 2019; Lannuzel et al., 2020); the Arctic cod, an anchor species for the Arctic food web (Huserbråten et al., 2019; Nahrgang et al., 2016); and marine traffic, with its noise pollution, black carbon, and crude oil particle emissions (Zhang, Q. et al., 2019).

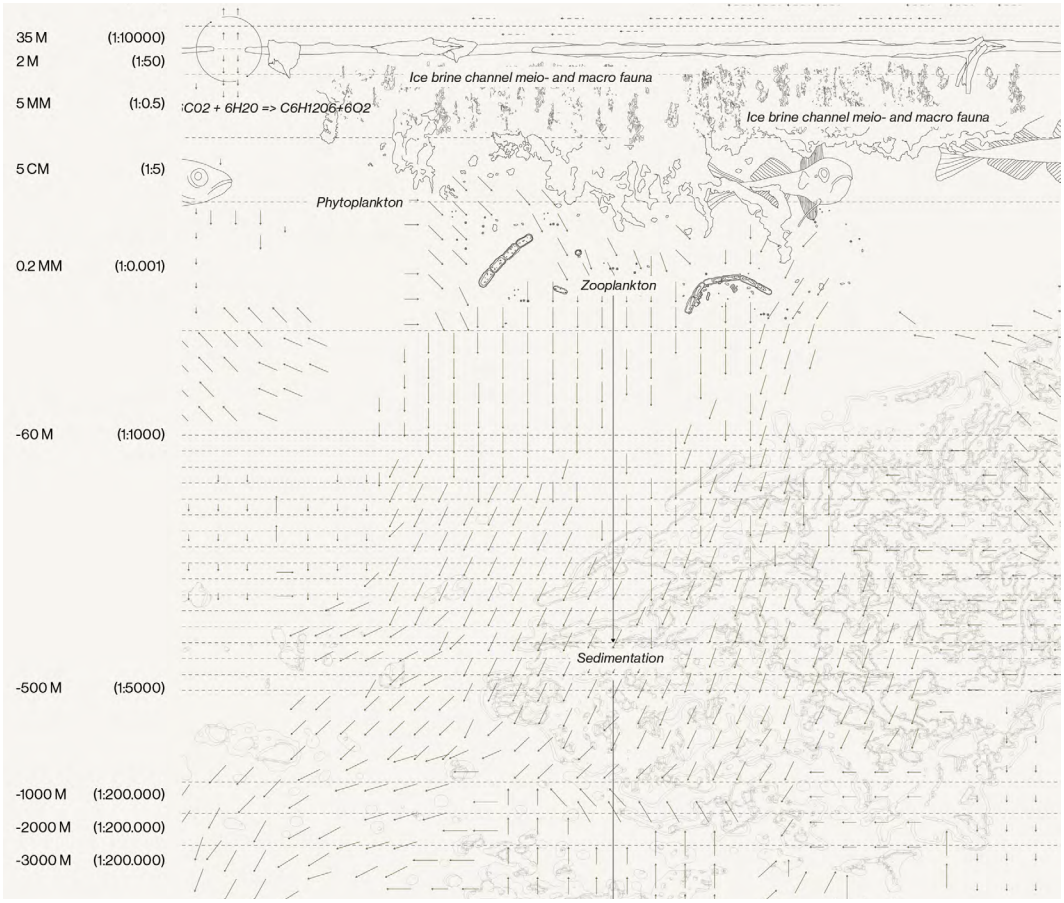


FIGURE 4 *Current as infrastructure: a multiscalar section along the Transpolar Drift (detail).* The section is multiscalar and is to be read horizontally and vertically. Each horizontal stratification is a scale of its own, stressing the variety of scales that need to be considered, from the microscopic to the territorial.


1 2

FIGURE 5 *Current and future conditions, a speculative scenario.* The two speculative spatial depictions were crucial to concretize and materialize the possible futures within the specific context of the Fram Strait. To the left (1): a current depiction of the spring sea ice conditions in 2023 with little annual marine traffic but a high export of drifting sea ice. To the right (2): a dystopian speculative perspective section anno 2100, in which the ocean is densely partitioned, compartmentalized, and drawn out in rigid fields of ownership and nationality, the transpolar route now a major new maritime shipping highway.

FIGURE 6 *Field of negotiations: speculating in future Arctic territorial conditions through material movements.* As a contrasting model exercise accompanying the rigid research into marine traffic separation schemes and maritime law, a hands-on and dynamic simulation became a way to engage with the many frictions inherent in the territory.

FIGURE 7 *Model experimentation (video stills).* The model, consisting of a light table, a map, and various environmental and anthropogenic simulators (i.e., sand, washing powder, oil, liquid soap, black food colouring, vinegar, baking soda, brush, stick, spray bottle), furthermore became a way of explaining and entering into discussion with people to whom the subject was unfamiliar—a strange sort of board game in which, suddenly, the threat of an oil spill came to take a very material form.

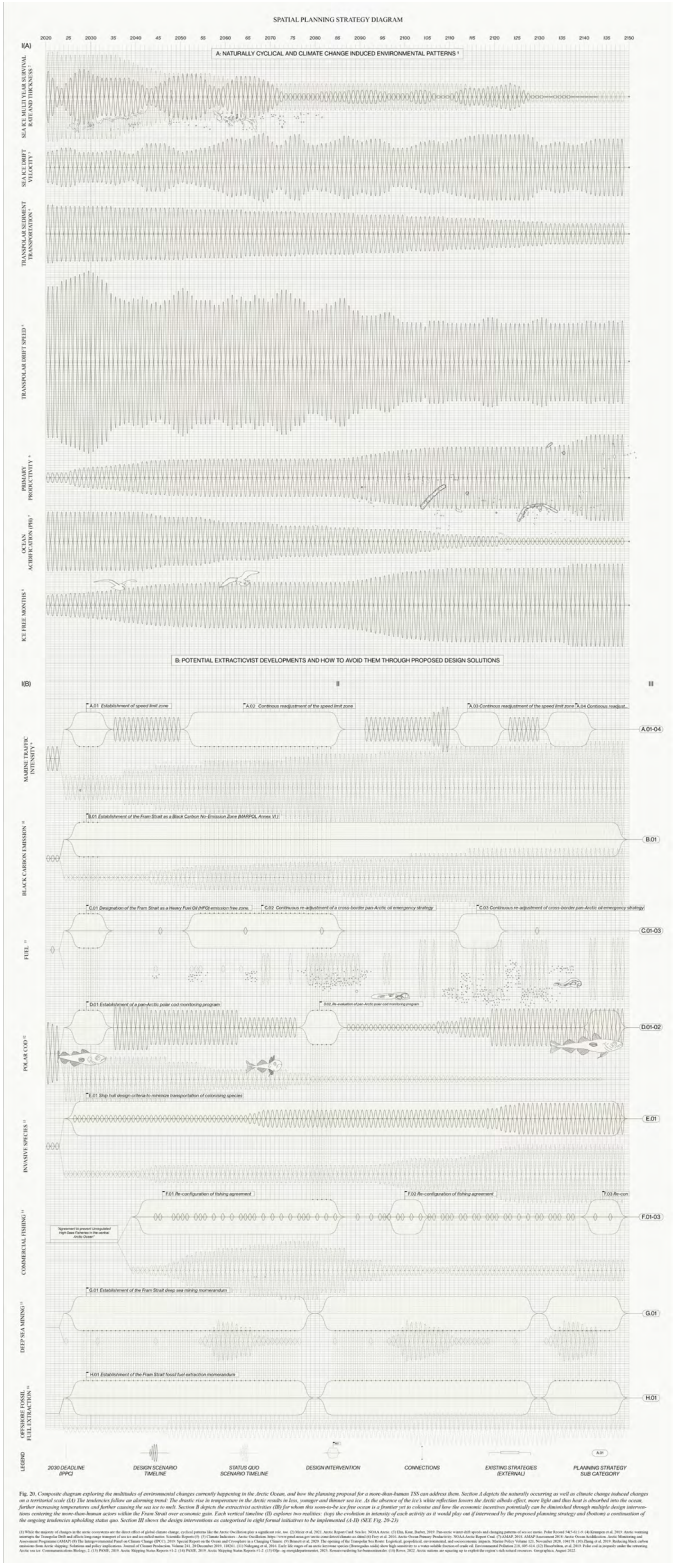


FIGURE 8 *Composite diagram.* Scientific data and modeled prognoses (2020–2150) were visually translated into a composite diagram exploring the multitudes of environmental changes in the Arctic Ocean. The diagram emerged as a crucial way of translating scientific data (AMAP, 2018; Bennett, 2020; Frey et al., 2016; Huserbråten et al., 2019; Kaur et al., 2019; Krumpen et al., 2019; Meier et al., 2021; Nahrgang et al., 2016; Climate Prediction Center, 2023; Oljedirektoratet, 2023; IPCC, 2019; PAME, 2019; Rowe, 2022; Zhang et al., 2019) into a differently readable visual language.

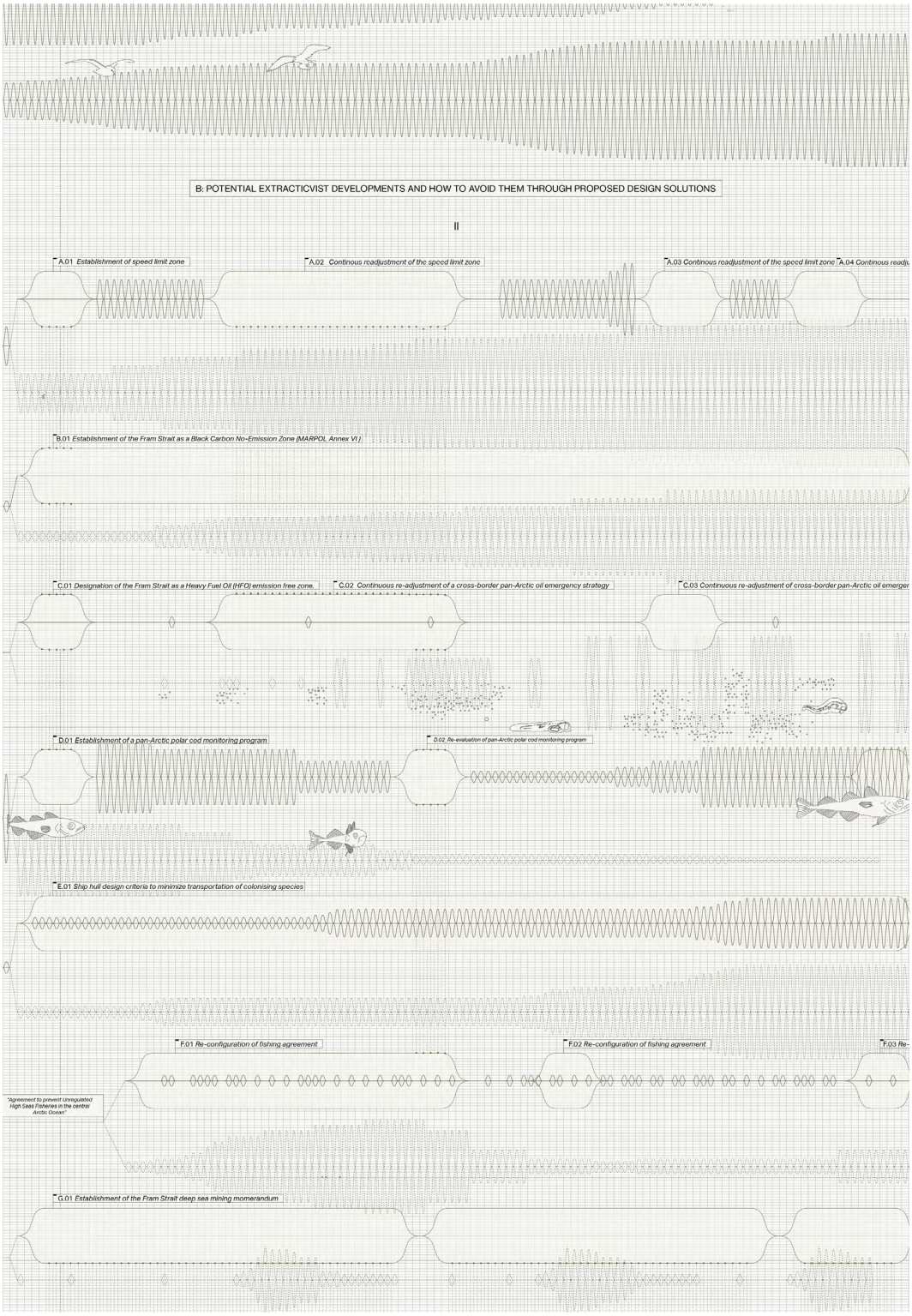


FIGURE 9 *Composite diagram (detail).* Mapping out multiple realities—one including the planning interferences and one maintaining a status quo—the drawing became instrumental in identifying potential key components and points of intervention for the planning proposal.

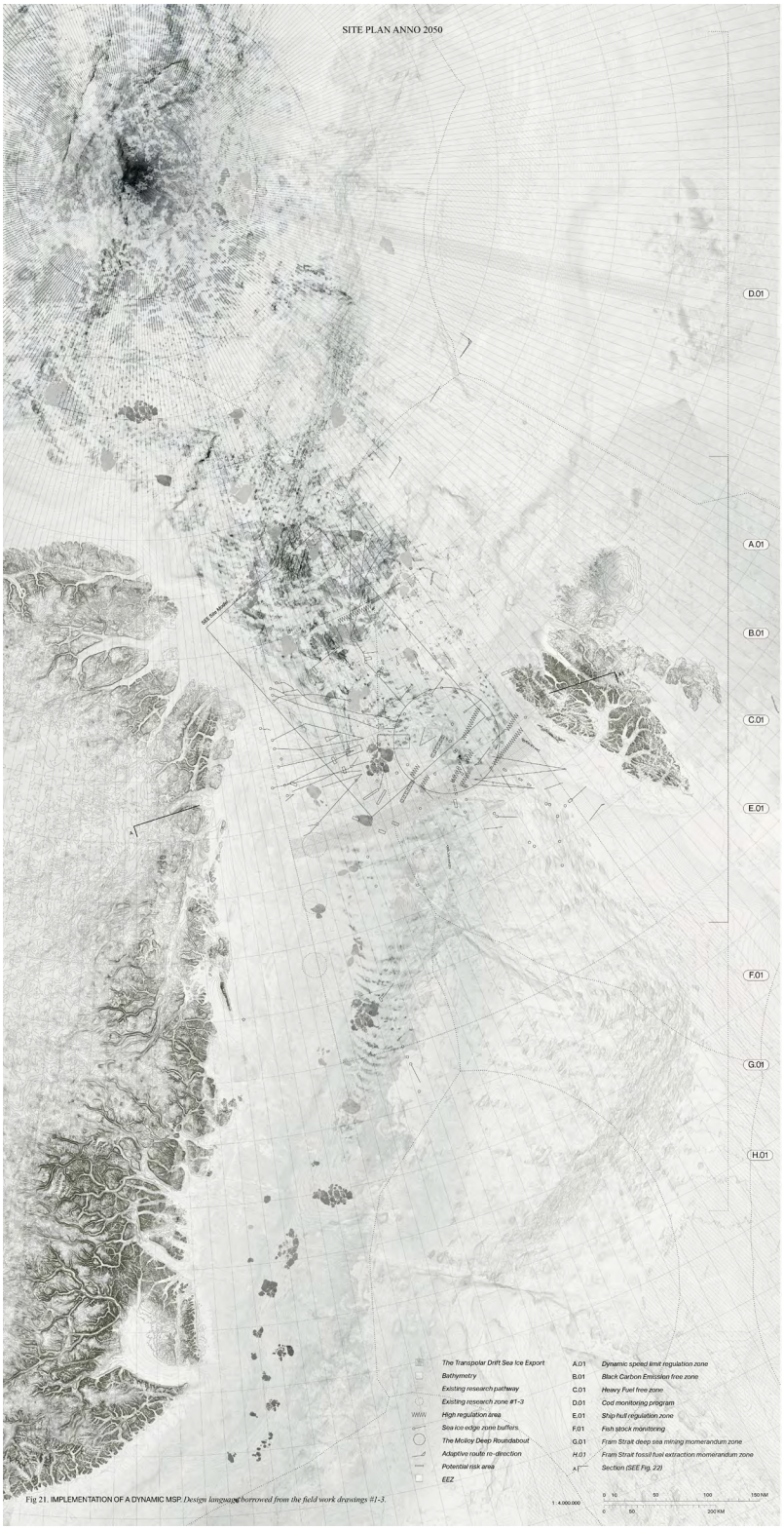


FIGURE 10 *A constantly shifting plan drawing.* Proposing a dynamically fluctuating marine spatial planning strategy for the Fram Strait, the project focused on creating a spatially responsive system between ice export levels, spawning periods, migration routes, fuel emission control, noise pollution, and ship hull criteria. Taking each passing actor, human or non-human, into account as 'drift passengers', the planning proposal aims to question the dominant anthropocentric hierarchy of marine spatial planning, proposing instead a design based on unruly viscosities.

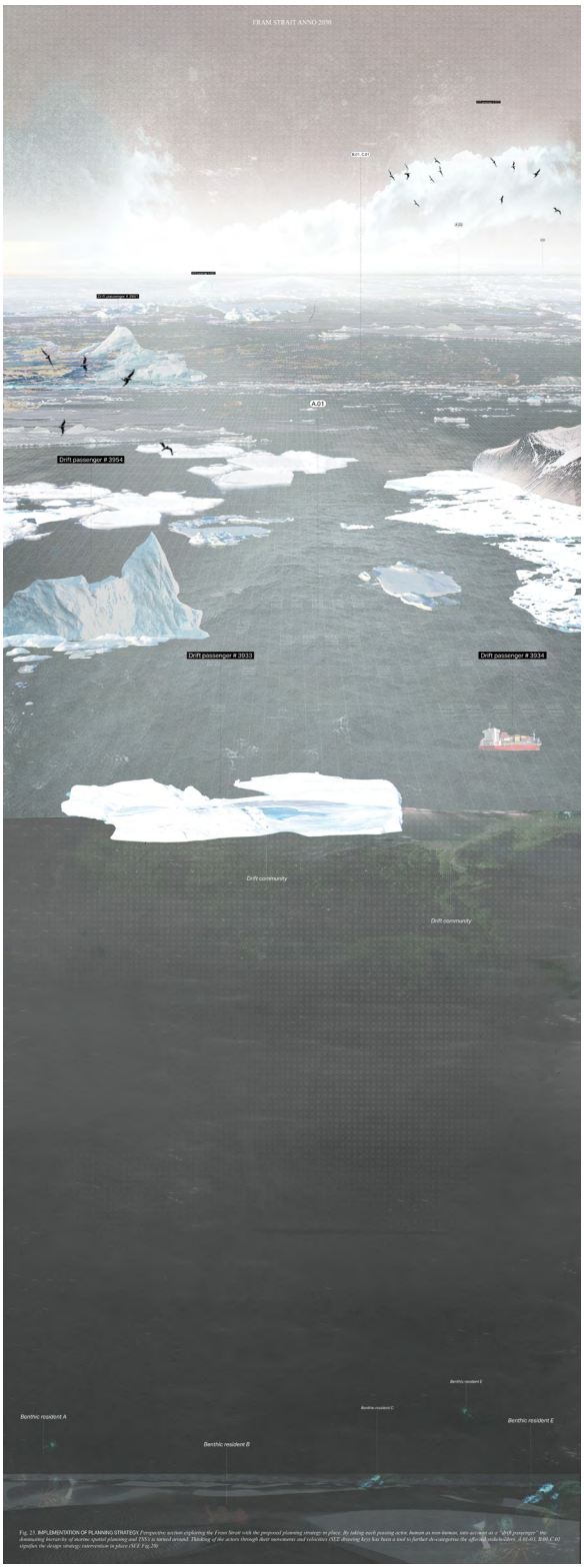


FIGURE 11 *Drifting stakeholders.* Finally, the perspective section explores the Fram Strait with the proposed planning strategy for 2050. Thinking with the actors through movement and viscosity became instrumental to further de-categorize the affected stakeholders: the notion of drifting thus became a crucial design tool for navigating the complexities of the Arctic environment, to plan with the unruliness of sea ice, and engage in less binary approaches to the frozen ocean space.

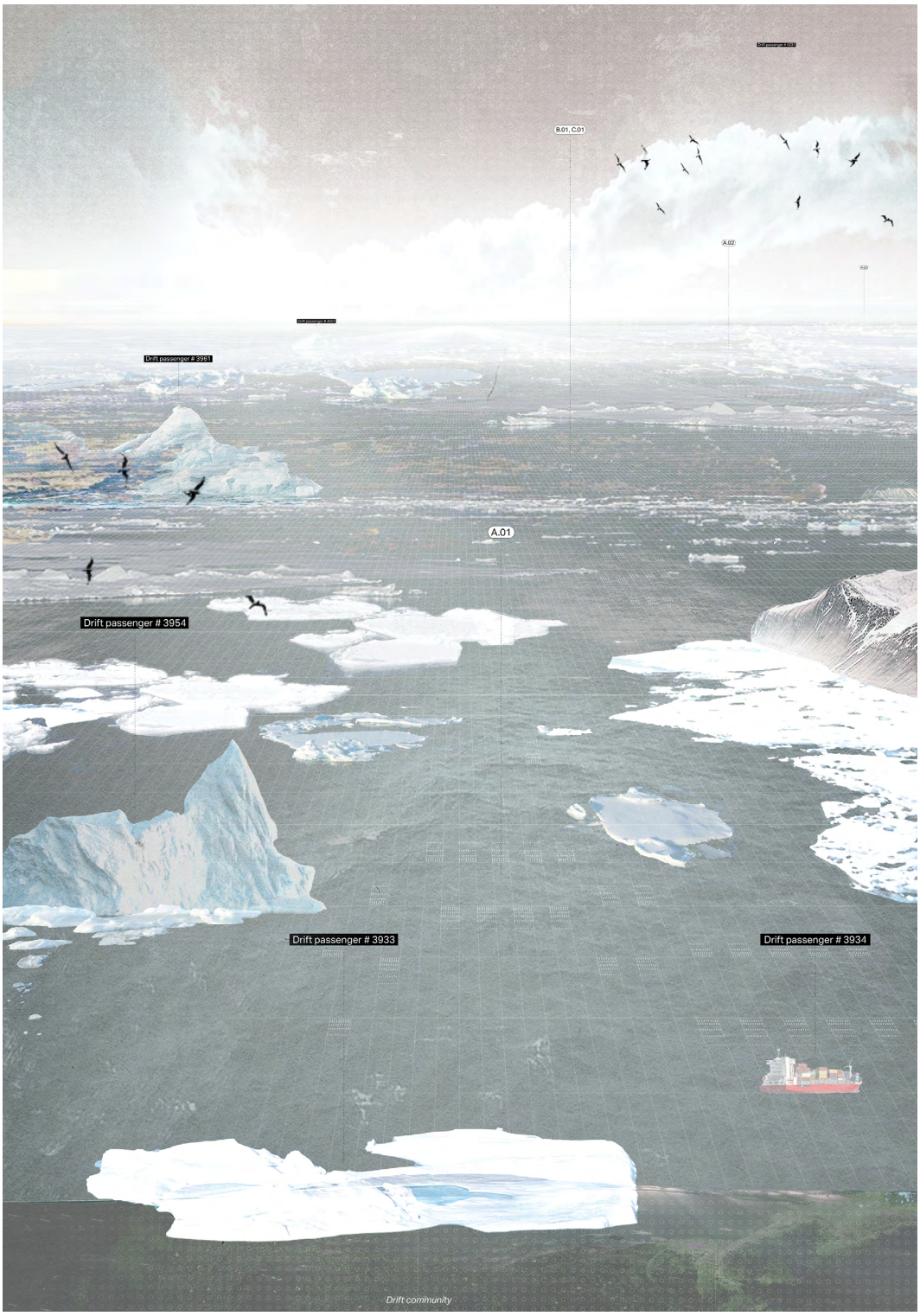


FIGURE 12 *Drifting stakeholders (detail).* While the role and agency of sea ice have been thoroughly researched throughout political and natural sciences, the project argues that a landscape architectural approach has the potential to unfold a more embodied understanding of the material agency of sea ice—here explored through an explorative marine spatial planning framework and interdisciplinary design methodology. The project frames the Transpolar Drift as an integral piece of landscape infrastructure and centres the agency of the drifting sea ice as a more-than-human stakeholder within the planning negotiations of a Fram Strait TSS.

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# Multispecies Collages for Marais Wiels

## Mapping More-than-Human Worlds in Brussels

**Björn Bracke [1], Koenraad Danneels [1], and Bruno Notteboom [1]**

[1] KU Leuven, Faculty of Architecture (Belgium).

### Abstract

This paper explores directions for a more-than-human conceptualization of urban space. We present five 'multispecies collages' for *Marais Wiels* (Wiels Marshes) in Brussels. This brownfield, inhabited by a wide range of animal species, has been the subject of various construction plans and debates over the past 20 years. In the article, we will first argue that the existing imaginaries for the site, as propelled by the designers and policymakers, fail to acknowledge its multispecies complexity. Such blindness can be linked to the analytical frameworks and representational methods used by urban design professionals. We will then explore an alternative methodology to read Marais Wiels as a space of (non)human cohabitation through a mapping and collage exercise. In doing so, we use alternative data sources and speculative drawing methods. We will show how these multispecies collages, built around five perspectives, reveal a more relational understanding of the site. We conclude by confronting existing spatial imaginaries with our re-reading of Marais Wiels and reflect on the collages as an attempt to bridge the gap between more-than-human theory and urban design practice.

### Keywords

More-than-human worlds, posthuman urbanism, multispecies mapping, human-nature constellations, ecological design.

### DOI

https://doi.org/10.47982/spool.2025.2.07

# Introduction

In this paper, we aim to conceptualize posthuman urbanism by exploring alternative imaginaries for an urban site, Marais Wiels (translation: Wiels Marshes) in Brussels. This former brewery, accidentally developed into an urban marshland, is part of a contested urban redevelopment program, which has been the subject of a polarized debate over the past 20 years. Citizens' groups and nature organizations oppose plans for new constructions such as housing, protecting the existing more-than-human activities on site. The discussion around Marais Wiels can be situated within broader academic debates that question the anthropocentric and dichotomous (nature versus culture) conceptualizations of planning the (urban) environment. This 'posthuman' or 'more-than-human' turn advocates understanding the world as 'emergent through co-becoming with multitudes of life forms and entities' (Ogden et al., 2013), emphasizing the importance of human and non-human interconnectedness.

This research agenda resonates in Brussels due to the growing debate on the safeguarding of urban animal populations in open-space wastelands, which are often threatened by real-estate development or infrastructure projects (Bergers et al., 2023). Still, spatial planning and design disciplines struggle to bridge posthuman or more-than-human approaches. Implementations tend to get stuck in a technocratic approach that aligns with the dominant 'neoliberal' processes of urban space production, as it often sidesteps underlying economic and political processes (de Block and Vicenzotti, 2018; Spencer, 2021). Moreover, the frameworks and conceptual processes in planning and design fail to engage with the imbricated nature of humans and non-humans (Houston et al., 2018). We argue that this is a problem of site perception and representation, as it remains seemingly impossible to read the situated interactions between multiple species, or as Timothy Morton puts it: 'Our perception is full of holes' (Morton 2010, p. 22).

Ideas promoted in posthuman discourse are difficult to connect to everyday design and planning practice. To bridge this implementation gap, we use a more accessible understanding of multispecies entanglements, limited to human-animal interactions, to develop a 'multispecies representation' of the project site Marais Wiels and mobilize it in a multi-stakeholder environment[1]. In this paper, we will first argue that the plans for Marais Wiels, developed over the years by the Brussels Capital Region and the site owner JCX Immo, fail to acknowledge the multispecies complexity of the site. Secondly, we will develop our own mapping of Marais Wiels as a space of (non)human cohabitation through a mapping and collage exercise. These multispecies collages, built around five perspectives, experiment with the use of alternative data sources and speculative drawing methods. We will show how these drawings reveal a more relational understanding of the site, which can constitute an analytical framework and representational method for future design processes. We will conclude the paper by confronting existing spatial imaginaries with our re-reading of Marais Wiels and reflect on the methodological framework to conceptualize urban space as a more-than-human constellation, bringing diverse bodies of knowledge into conversation (van Dooren et al., 2016).

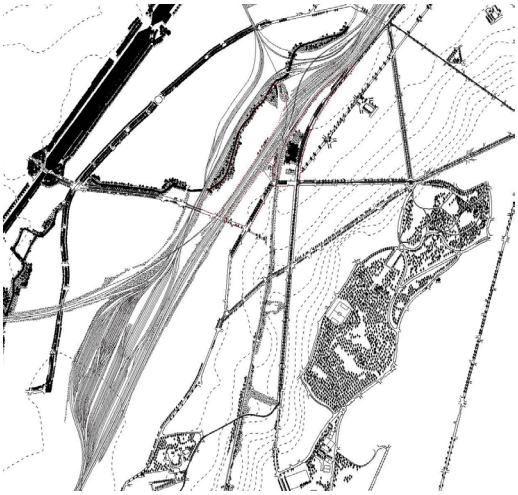
1 The method is developed in the framework of the project 'CO-HABITAT', funded by Innoviris, that investigates ways of representing and understanding the presence of animals in the Brussels Capital Region, in order to inform urban planning and design from a non-human perspective. Although animals are the primary focus of this study, their lifeworlds, consisting of other non-human factors (plants, soil, etc.), are also taken into account, since their presence is situated in specific urban habitats.

# Existing Imaginaries for Marais Wiels

Marais Wiels originated on a vacant industrial site of the former Wielemans-Ceuppens brewery. The brewery was built in 1879 on a swampy site in the Senne valley. Since its closure in 1988, the Brussels Capital Region (BCR), the municipality of Forest, and owners of the site had been discussing its future development. In 2005, a building permit was granted to the project developer JCX to build a contemporary art museum, 'Wiels', a cultural centre, 'Brass', and a new office district. During the construction works for the new business district in 2007, the foundations pierced an underground aquifer, causing the entire area to flood. This event, together with the 2008 financial crisis, halted the entire project, and JCX and the BCR agreed to repurpose the brownfield into a residential zone. In the meantime, the large body of water was increasingly populated and frequented by various plant and animal species, transforming the banks into diverse biotopes and habitats. When the developer submitted new building permits in 2013 and 2016, the projects were rejected due to significant protests by residents and action groups. As a result, the region decided to buy the site in 2020 and committed to preserving a significant part of the existing marshland as a public park, and reducing the built program to 80 housing units, a public park, and a new bicycle highway.

FIGURE 1 *Aerial and site photographs of the former Wielemans-Ceuppens brewery after the site was flooded (sources: Google Earth and author, 2024).*

Since 2015, the various municipal and regional authorities had taken the initiative to develop a balanced urban scheme and program for Marais Wiels. The framework for this development was elaborated in the 'Urban renewal contract CRU 4 Avenue de Roi' (Karbon, 2017), the 'Masterplan Forest-sur-Senne' (ORG Urbanism, 2020), and the design for the 'Parc infrastructurel de l'avant Senne' (VVV architecture urbanism, 2022). Despite efforts to preserve increasing portions of the marshland, local residents and organisations still resisted the plans produced by the municipality and region. In these plans, designers and policymakers represented Marais Wiels as a brownfield and wasteland, largely ignoring the animals present or deeming them unimportant. We argue in this paper that this imaginative process could be linked to the analytical phase of a design project, which formed the foundation for subsequent design proposals.



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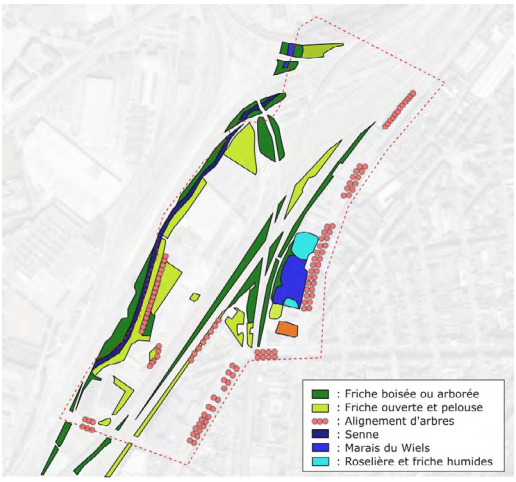


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FIGURE 2 *Analytical maps from the Masterplan Forest-sur-Senne.* The left drawing (1) shows a territorial reading of Marais Wiels and the larger landscape entities (railways, water, topography, and vegetation); the right drawing (2) shows the different ecological habitats of the area (authors: Bureau Bas Smets (left) and Aries (right); (ORG Urbanism, 2020).

The maps in Figure 2 show a territorial reading of Marais Wiels within the larger landscape structures (left) and a zoning plan of ecological habitats (right). These examples demonstrate the tradition in landscape and urban design of using aerial projections in spatial analysis. The first involves the combination of geomorphological information layers to reveal and conceptualize territorial urban figures. The second map represents positivist research methods (survey, GIS) typically used in environmental sciences. James Corner has problematized such Cartesian geometry, algebraic measurement, and purely technical projection drawings that are prevalent in contemporary representations of space and are not situated in place (Corner, 1992). Although this is only part of the extensive analytical work done by the design teams, the subsequent plans still seem to overlook the variety of animal and plant species present, the ways in which they inhabit Marais Wiels, and their interactions with human activities. This is exemplary of a wider, structural absence of more-than-human agencies in design processes in various places in Brussels, leading to similarly tense debates. To mobilize the complexity and human-animal interactions of Marais Wiels in planning and design arenas, we will explore an alternative conception of the site through multispecies collages.

## A Multispecies Atlas for Marais Wiels

The existing imaginaries and their underlying analytical drawings unveil a dualistic paradigm (Corner, 1997). On the one hand, there is a rational, analytical, and objective discourse driving contemporary planning and design efforts. On the other hand, there is an absence of the emotional, intuitive, and affective experiences as propelled by more-than-human theory. We therefore propose to use multispecies collages that aim to question current ethics of site inquiry by designers and attempt to cultivate new modes of attentiveness to situated practices (van Dooren et al., 2016). In doing so, we distance ourselves from prevalent analytical models or classification systems in the field of urban ecology (biological valuation, species inventory, ecosystem services, etc.) that risk reproducing human-nature binaries. We seek here to use concepts and related mapping techniques that evoke a more relational understanding of animals, humans, and site elements. In these collages, we aim to change the cultural narrative of Marais Wiels by representing non-human life not only as a backdrop for human histories (Tsing et al., 2020; Tsing, 2015), but as one of

the central activities in Marais Wiels. We have deliberately chosen to use animals (vertebrates and macro-invertebrates) as the entry point for our exercise, although posthuman theory broadly argues for the inclusion of all life forms, such as plants, fungi, and bacteria. By doing so, we leverage the available data and knowledge on urban wildlife to reveal insights into other other-than-human interactions.

One of the central challenges of the exercise is to translate more-than-human theories into valid scientific methods of inquiry that would be relevant for urban design practice. With these collages, we aim to bring qualitative and quantitative methodologies for situating multispecies knowledges together. More-than-human research is grounded in interpretive and critical social science, typically preferring qualitative design, narrative studies, fieldwork, and participatory action research (PAR) (Jacques du Toit, 2014). Many scholars have elaborated on alternative modes of inquiry, such as storytelling (Tsing, 2015), animal tracking (Morizot, 2018), collages (Tsing et al., 2020), or hand drawing (Corner, 1992). These methods contrast with typical analytical methods from planning and design practices today, as they lean heavily on quantitative methods, such as surveys, models, mappings, etc. In the multispecies collages, we explore how we can bridge these two traditions and can also link this to ongoing debates on mapping and representation in ecological urbanism. This results in a mixed-method mapping approach based on research, site visits, and interactions with human stakeholders over a period of about two years (February 2022–February 2024). Interim results of the atlas were discussed during interviews with human stakeholders or respondents, several of whom have good knowledge of local wildlife and thus represent these animals. We will return to some of these insights in the conclusions. Table 1 gives an overview of the different research methods and data sources used to construct the multispecies collages.

| Research design | Source of data | Description and overview respondents (R) |
|---|---|---|
| walk-along interviews with stakeholders (3) | notes | on site meetings with stakeholders Marais Wiels, Natagora, researchers |
| desktop research | notes and maps | screening of policy documents, geodata |
| (social) media analysis | notes and collages | screening of Instragram footage linked to Marais Wiels, screening facebook page, online articles, Archi Urban documentary |
| in-depth interviews (3) | interview transcriptions | structured interviews and discussions on intermediate results of the multispecies atlas:<br>municipality of Forest (R1 and R2), Brussels Environment (R3) and VVV architects (R4 and R5) |
| focus group | focus group transcription, notes, feedback on atlas | workshop with local site actors based on intermediate results on the multispecies atlas:<br>artists (R6 and R7), citizen group Marais Wiels Moeras (R8), researchers working on the site (R9, R10, R11) and nature organisation (R12). |
| site visits and field work (5) | site observations and notes | participation in local activities, site visits with expert and ecologist Guy Heutz (R13), individual site visits |
| observation data analysis | animal observations | observations collected on the citizen science platform waarnemingen.be |

TABLE 1 Overview of different research methods and sources of data.

The collages draw, among others, on the work of Kate Orff in Petrochemical America as an inspiring example of collaborative atlas-making as a form of activism to highlight environmental injustices and empower communities through visual representation and advocacy (Misrach and Orff, 2012). The book revives the atlas as a genre that ranges from representation to speculation, integrating photography, cartography, anatomical renderings, and visualizations that are both traditional (e.g., timelines, graphs) and inventive (palimpsests of maps, statistics, and logos) (Houser 2021). In a similar vein, the collages for Marais Wiels combine different forms of representation to mobilize a variety of data sources and to unravel the interdependent relationships that exist on the site, and include them in discussions about the future of the site with multiple stakeholders. We use the (deep) section as a recurring theme to show dynamics and relations between organisms and abiotic elements of the site (Carlisle and Pevzner, 2012; Reed and Lister, 2020).

This results in five collages, each with a different lens through which to look at human-animal cohabitation at Marais Wiels. The five themes include: resource, conflict, cultivation, care, and residence. The selection of the five themes was an iterative process of visualizing, grouping, and discussing site-specific knowledge with respondents and the research team, and rooting this work in existing theoretical frameworks in urban design and posthumanism. To categorize the themes, we sought methods to integrate various data layers and narratives using suitable representation techniques. While traditional thematic spatial readings are often based on form or scientific classifications, we claim that reading Marais Wiels through five more-than-human themes works better to explore the multispecies activities and realities on site.

## Resource

Using a 'deep section' as a basis, the first collage, resource, depicts the interdependencies and trophic levels of organisms in Marais Wiels. It explains how the project area serves as a granary for many animals and thus supports a food web that extends much wider than the project area. Central to the site's productivity is the topsoil layer, where primary producers and decomposers (indicated in yellow) play an essential role in the ecosystem. The drawings attempt to emulate these characteristics by building on 'metabolic' and 'food web' approaches within urban design. The incorporation of food webs in urban projects has been popularized in recent years by landscape architects and urban designers (Felson and Ellison 2021). Several design-based representations of idealized processes of ecological succession and metabolic dependencies have been developed by James Corner Field Operations for Freshkills Park, by Scape Studio for the 'Living Breakwaters' (Orff, 2016), and by Agence TER for the exhibition 'Sols Vivants' (Agence Ter, 2021).

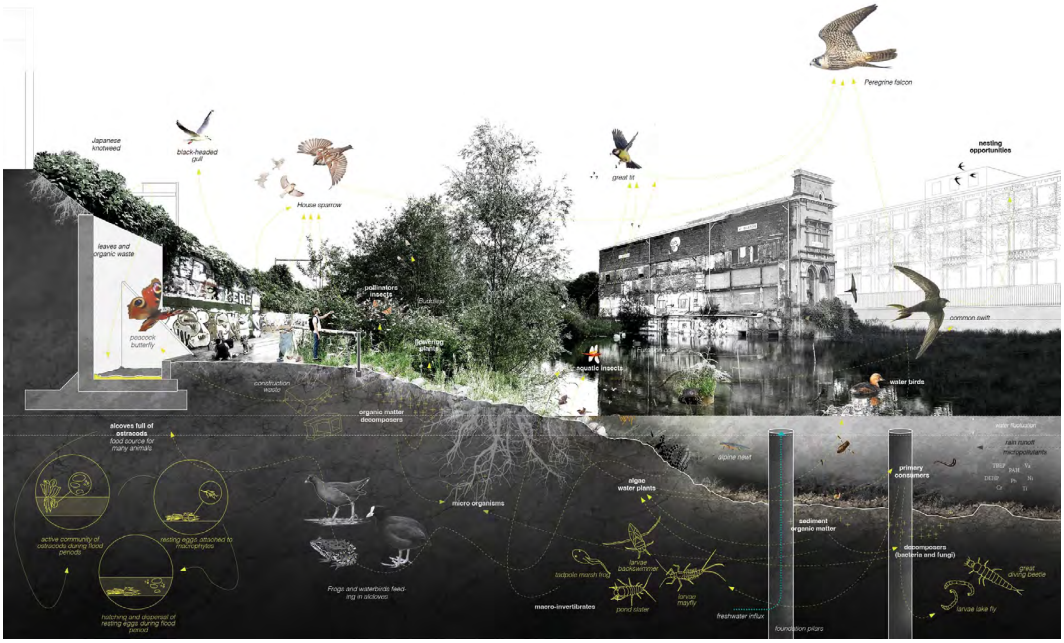


FIGURE 3 *Representation of Marais Wiels as a space of resource* (source: authors).

Unlike other places in the city, where the animal food chain is mainly linked to human waste or feeding behavior, Marais Wiels plays an essential role in activating more complex systems of biochemical decomposition and production. The impact on populations in the neighborhood is visible in animal observation data, which show a significant increase in house sparrow observations coinciding with the spontaneous vegetative development of Marais Wiels. This also applies to common swifts, numerous due to nesting opportunities in the many typical Belle Époque mansion houses in the municipalities of Sint-Gilles and Forest, who eagerly come to feed on the abundant aquatic insects. The presence of small resident birds, as well as pigeons and other species, makes Marais Wiels a popular hunting ground for peregrine falcons. All these animals rely on the abundance of insects and microorganisms. The artist collective active on-site (R6, R7) has documented macro-invertebrates and made numerous site observations. They discovered the important role of the 'alcoves'—old concrete crates against the railroad's retaining wall—where a unique life cycle of aquatic macrophytes has established, resulting in a substantial food reserve of ostracods, eagerly consumed by waterbirds and frogs (Rosa et al., 2023).

## Care

The notion of care and care ethics is closely related to 'posthumanist' or 'more-than-human' approaches, which 'draw their tradition from anti-essentialist takes on morality and ethics' (Jon, 2020). María Puig de la Bellacasa has extensively explored this topic in her book Matters of Care, based on an in-depth reading of Donna Haraway's work (Puig de la Bellacasa, 2017). She writes that 'insofar as we remain committed to ongoing curiosity with the specifics of "how" it could be done, care is a good trope to exhibit the singularity of a non-normative politics, and ethics, of knowledge' (Puig de la Bellacasa, 2017).

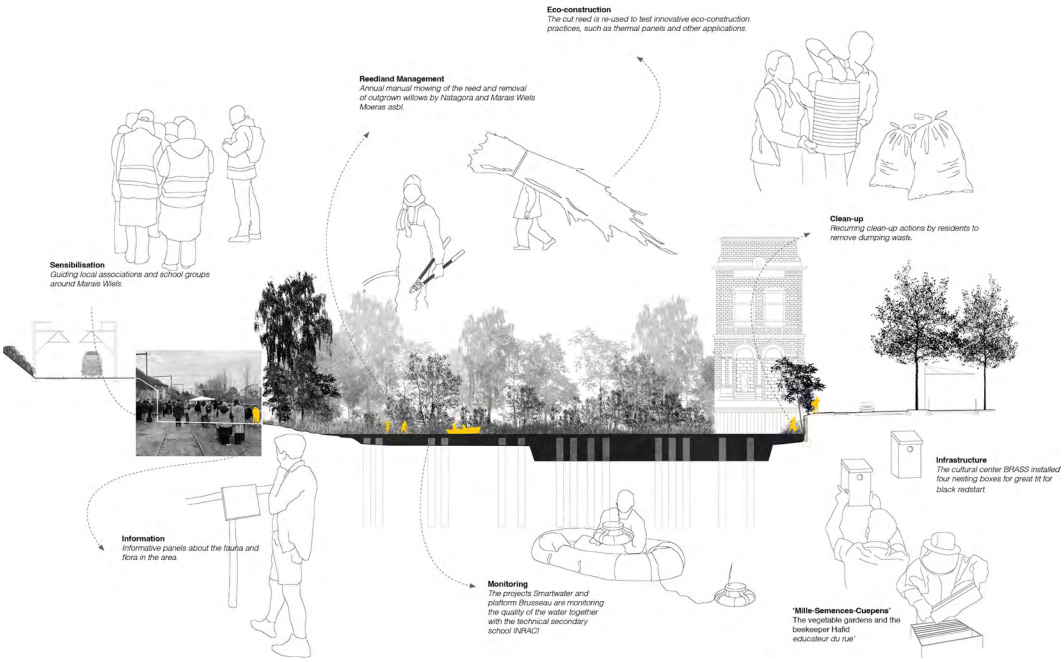


FIGURE 4 *Representation of Marais Wiels as a space of care* (source: authors).

We can read Marais Wiels as a place where caring relationships appropriate space, as revealed through our engagement with resident groups. Our collage illustrates a range of care-related practices, gathered from site visits, interviews, and (social) media analysis. The residents' group Marais Wiels Moeras asbl demonstrates strong commitment to caring for the marshes: clean-up actions, reed-cutting, informational panels, and guided tours reflect a desire to manage and care for the site, supporting existing animal behaviors while enabling human accessibility. Other involved actors include the communal youth center La Maison des Jeunes, the vegetable garden initiative Mille Semences-Ceuppens, and the beekeeper and 'street educator' Hafid, who uses fascination for nature and the site to connect with local youth and citizens (Lucie Tesnière, 2021).

Although gardening or beekeeping primarily benefits humans, it also fosters a perspective that links the well-being or successful growth of plants and animals to contextual elements (soil, climate) or other organisms (pollinators, parasites, etc.). Additionally, the collage includes research initiatives such as Smartwater, an experimental platform, and Brusseau, a citizen-science project on water, which establish important links between citizens and the research community. The technical secondary school INRACI developed a robot to support Smartwater's monitoring activities. Similarly, two local carpenters reuse cut reed for eco-construction projects and research.

The collage portrays care in various forms: protecting, managing, and documenting the place, while also installing nesting boxes, growing vegetables, keeping bees, and more. It also shows how care practices function as catalysts for other dynamics (food production, local economy, social cohesion, etc.).

## Conflict

The management of human-wildlife conflicts (HWC) in (peri-)urban areas is a growing focus of scholarly investigation in conservation biology and agricultural research (Basak et al., 2023; König et al., 2020). Posthuman theory offers a richer, ethically informed discourse on human-wildlife conflict that moves beyond simplistic notions of tolerance or intolerance. As this collage shows, these conflicts stem either from human-centered risk perceptions or unadapted human behavior. Research on conflict mitigation in urban contexts has emphasized education, human behavior, domestic animal management, and awareness of zoonotic pathogen transmission risks (Puri et al., 2024).

The conflict collage combines multiple layers of information. First, it addresses well-known urban conflicts between animals and humans. It includes migration patterns of amphibians (toads, frogs, salamanders), which have limited safe, forested hibernation areas around the pond. During migration periods (spring and autumn), conflicts with road traffic or dogs may occur. Observations indicate that some salamanders seek suitable sites farther from the water. Human activities also threaten waterbirds during breeding seasons, as uncontrolled proximity can trigger aggressive behavior. For example, several incidents involving Egyptian geese have been documented in Belgium (Jarit Taelman 2023). Social media photos from Marais Wiels similarly show defensive behavior by Egyptian geese in response to human approach.

In January 2024, a dead swan was found in Marais Wiels, presumably due to a fight with the resident male swan. Other conflicts involve species considered 'nuisances' by human residents. The municipality reports that rat presence is a pressing concern: 'Many residents complain about the rats—they are everywhere. The moment you touch something on-site, they emerge from the ground' (R1). Mosquitoes are also perceived as threats to comfort, hygiene, and health. In 2021, following resident complaints and advice from Bruxelles Environnement, fish were introduced to reduce mosquito populations (R4, R5).

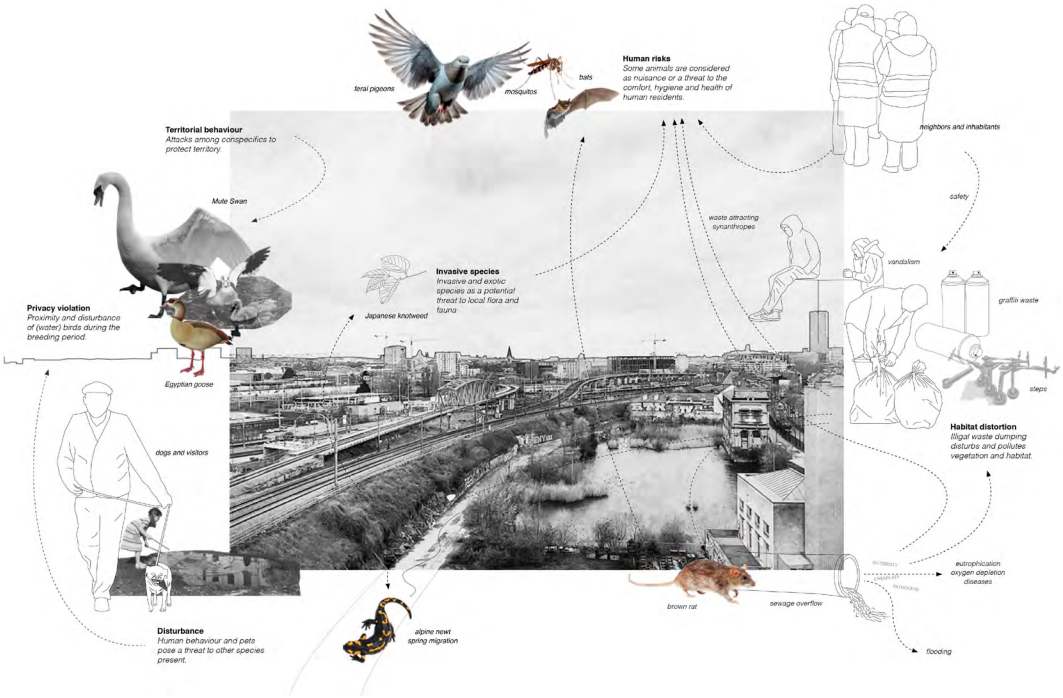


FIGURE 5 *Representation of Marais Wiels as a space of conflict* (source: authors).

However, experts (R13) note that Marais Wiels' ecosystem now hosts sufficient predators to prevent significant mosquito proliferation. Waste and pollution were also cited as major threats to habitat quality. Bruxelles Environnement, the agency managing the site, removes approximately ten cubic meters of waste monthly: 'This isn't small-scale fly-tipping but organized, structural dumping of industrial and construction waste' (R3). Additionally, Forest's undersized sewer system leads to frequent wastewater overflows into the marshes (Aries Consultants, 2020).

Finally, the municipality notes that vandals frequently discard e-scooters and bicycles into the water, disturbing vegetation and endangering animals. The site is perceived as unsafe by some; users of Brass and Wiels describe it as 'a place of tensions, with activities seen as problematic: the building's rear has become a no-go zone, occupied by individuals in precarious situations or engaging in deviant uses, creating insecurity (assaults, burglaries, vandalism, etc.)' (Carlier, 2020).

## Residence

The collage on residence delves into the diverse ways in which Marais Wiels serves as a place of shelter and safety for both humans and nonhumans. The term residence could, in this context, be understood as habitat, which in ecology refers to the area and resources utilized by specific species or an assemblage of animals and plants within their abiotic environment (European Environment Agency, 2023). Habitat has emerged as a pivotal term in ecology and the development of biodiversity policy since the 1980s, permeating fields such as landscape ecology, landscape architecture, and land-use planning (Dramstad et al., 1996). However, to move beyond a mere ecological discussion and transcend the confines of traditional ecological discourse, the term residence allowed for a different discussion with respondents. Marais Wiels hosts a remarkable diversity of life, including a unique array of dragonflies, insects, beetles, and moths yet to be fully discovered.

This collage illustrates how Marais Wiels accommodates safe spaces for various animals. The plan view situates the project area in the Senne Valley, while a cross-section elucidates the various habitat conditions between dry and wet areas. The collage unveils a rich tapestry of life cycles in Marais Wiels. For instance, the alpine newt finds refuge in the higher wooded verges during winter; the waterfowl and other waterbirds build their nests within the reed beds; pigeons inhabit the vacant building 'Metropole'; and the black-headed gulls spend their nights on the marsh in large groups. Its location in the Senne Valley makes Marais Wiels also very suited as a temporary residence for migratory birds—the common sandpiper is a welcome guest in spring and autumn.

Unexpected residents include semiaquatic turtles, such as the pond sliders—commercial pets abandoned by their human owners. Since they are omnivores, they can survive, but they cannot reproduce in the cold Belgian climate (Jooris, 2012). But humans also find shelter in Marais Wiels, as homeless people often seek rest and safety in this area. They regularly build temporary shelters, which, however, are systematically removed by the local government. The secluded and protected nature of Marais Wiels only temporarily provides opportunities to find a residence.

FIGURE 6 *Representation of Marais Wiels as a space of residence* (source: authors).

## Cultivation

The final collage, cultivation, reveals several practices that attempt to integrate multispecies phenomena into cultural events, expressions, rituals, language, artistic practices, local stories, etc. Matthew Gandy has emphasized the importance of 'symbolic resonances' of urban design discourse and the 'creation of site-specific fusion between art and nature' (Gandy, 2013). Philippe Descola has argued for the need for a new cosmological conception with a strong anthropological dimension, a cosmology 'open to all components of the world and also respectful of certain of their peculiarities' (Descola et al.,2013). In this collage, we

try to bridge ecology, creativity, and space and reveal patterns that could inform 'more meaningful and imaginative cultural practices than the merely ameliorative, compensatory, aesthetic, or commodity-oriented' (Corner, 1997).

The focus is on practices that could be understood as signs of a more welcoming regime that rejects discrimination between humans and animals through cultural activities. The collage captures the diverse array of initiatives and daily engagements of cultural and artistic organizations within Marais Wiels. The site has served as a fertile ground for numerous artistic productions and activities, ranging from theatre performances and festivals to workshops and exhibitions. Central to these initiatives is the natural richness and diverse animal species inhabiting the site. Notably, the little grebe, typically known for its shy character, has emerged as the symbolic mascot of the local action group. Macroinvertebrates such as dragonfly larvae, mosquito larvae, and diurnal flies are depicted on benches installed by the local artists' collective, while graffiti works frequently feature (water)birds, further intertwining art with nature. These creative endeavours and community-driven activities are fuelled by an ongoing resistance against proposed building and transformation plans, underscoring the persistent opposition to any changes that may disrupt the area's unique character.

Local narratives and imaginative conversations surrounding Marais Wiels play a significant role in shaping collective identities and fostering a sense of belonging. For instance, the community group responsible for site cleanup affectionately refers to themselves as 'les fées du marais' (the fairies of the marshland), or the installation of a pair of swans in 2022, an event that was understood as a poignant symbol of the community's commitment to preserving Marais Wiels. These examples highlight the profound connection between imagination, affective relationships, and the ongoing struggle to safeguard this urban oasis.

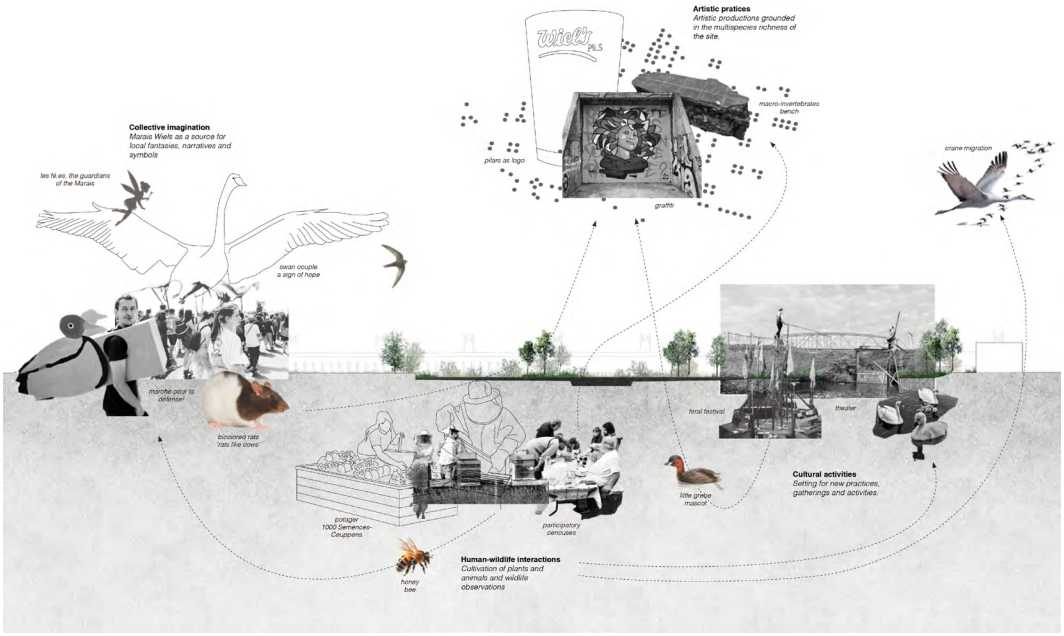


FIGURE 7 *Representation of Marais Wiels as a space of cultivation* (source: authors).

# Epilogue

These multispecies collages represent Marais Wiels in an alternative way, emancipating nonhumans on the site beyond their ecological value and revealing different perspectives on multispecies relations. Doing so, we seek to explore an analytical method for urban design, as an alternative to common projections that have led to human-centred visions of the future for Marais Wiels. We discuss three main conclusions from this exercise.

First, the mapping exercise presented here involves a double simplification vis-à-vis the dominant discourse in posthuman thought. We have limited ourselves to (visible) animals, leaving out many other actors, and the drawings often fall back on a human perspective when talking about multispecies relations (e.g., care, risk, or cultivation). This simplified approach was effective in reducing complexity and engaging with human stakeholders. Most stakeholders found the drawings 'very relevant' (R4, R5) and acknowledged that 'many of the elements represented are not really in the scope of the project today' (R1, R2, R3, R4, R5). However, it must also be mentioned that some of the stakeholders involved in this research are close to the lifeworlds of nonhumans, for example, the naturalists and activists working on the site on a regular basis. We can argue that, while the discussion only involves humans and uses human language (terms like 'conflict' are inherently human concepts), these collages can serve as an analytical tool bridging the gap between human-centred modes of site investigation prevalent in current practices, and the representations or 'gaia-graphy' (Arènes, 2022) of more-than-human discourse, which often seem detached from the everyday reality of designers and planners. In this sense, we present it as an intermediate step to integrate multispecies ontologies in an urban design context.

Secondly, the collages illustrate the complex epistemological terrain for multispecies representations that spans grassroots ecological survey work, scientific expertise, social media, and local tacit knowledge. This knowledge base, rather than being supported by policy agendas and knowledge production at the regional level, is rooted in local and non-institutional practices. The observation data for Marais Wiels, gathered by volunteers and managed by nature organization Natagora, are more pertinent and permeated in the local initiatives compared to the ecological studies accompanying the planning initiatives. This shift of scientific knowledge capacity from the government and its regulatory agencies to local citizen groups is part of a wider trend of a breakdown of knowledge capacities of the state (Gandy, 2019). However, this ecological knowledge generated on these sites and grounded in local communities creates opportunities for a more wildlife-inclusive development of the site. Collages for Marais Wiels challenge the imperative that only scientific or expert knowledge persists to support policy decisions, as the collages tap into local, transdisciplinary, and transformative knowledge production. The collages proved to be an excellent tool for situating and contextualising scientific data and linking it to local knowledge and practices.

Thirdly, the exercise demonstrates the complexity of providing a unified method for multispecies representations. In the collages, we mobilise representation methods from different fields, such as architecture, geography, biology, sociology, botany, ethnography, urban planning, and even the arts. Key recurring representation tools are section, plan, social media photos, photo collages, illustrations, and diagrams. Arrows prove to be a useful tool to show the connection between different phenomena or life forms. The combination of media allows one to connect abstract elements of the analysis, based on the interpretation of observation more schematically, in a more situated perspective of the site, represented by photographs. Furthermore, the use of the section allows us to further situate the analysis in the specificity of the site, as it shows the specific topography, soil conditions, etc. However, while the collages follow a certain compositional logic, this exercise has not led to a ready-made methodology or template for multispecies mapping, and should be made specific for each context. Here we can argue that it is not

so much the end result of the collage that is central—we could think of other themes or representations for Marais Wiels—but more importantly the interactive process of using the collages to connect different forms of enquiry and knowledge and feed conversations with human stakeholders. It is about recognising the nonhuman actors by representing their needs and behaviour and trying to interpret them as representatively as possible in human interpretations of the city.

The multispecies collages for Marais Wiels provide an example of how more-than-human thinking could be applied in site analysis in processes of urban design and planning. These are underpinned by data and field observations and might provide an entry to introducing nonhuman stakes in a (human) multistakeholder environment. The collages challenge the existing analytical conceptions for Marais Wiels that overlooked the multispecies entanglements. The exercise leaves us with interesting lessons to change methods of site inquiry, the mobilisation of data and local knowledge, and representation techniques. We see these multispecies collages as an example to develop a more relational and multidimensional diagnosis of a site, an alternative reading that can be seen as an intermediate step to fully engage with more-than-human worlds.

## Acknowledgements

We gratefully acknowledge the Brussels-Capital Region—Innoviris (Brussels Public Organisation for Research and Innovation) for financial support for the CO-HABITAT project under grant number 2021-PRB-7.

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# Moss


https://spool.ac
Haploid
Several Months
To Many Years
Sperm
Flooding
Male
Plant
Life Cycle
Egg
Female
Plant
Spore
dispersal
Peristome
Moss
FERTILIZATION
Sporangium
MEIOSIS
Seta
Capsule
(Sporangium)
Foot
Embryo
Archegonium
Benefits
Female
gametophytes
Diploid
A few weeks to
to several months
Heather Plants
Ferns
Perfect Environ
Substrate
soil, rocks, trees
stones, Gravel
Acid invironment
PH 5.5