

everything flows



everything grows

Perception and
Design of Ecological Processes in
Landscape Architecture

Katarina Bajc

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Empirical Part of the Dissertation
(Research-by-Design Test Case in Hamburg,
Germany)
HafenCity University Hamburg (HCU)
Landscape Architecture and Planning
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Abstract

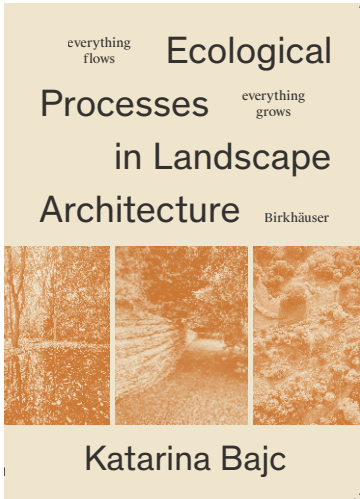
In contemporary landscape architecture, a tension emerged between the demand to produce a final and stable aesthetic image and a wish to adhere to the contemporary sustainable development agenda by supporting desirable ecological developments and their dynamic quality. In Western landscape architecture, historically, the aesthetic manifestations of ecological processes and related changes in the landscape were often intentionally suppressed because they did not conform to the cultural aspirations of the time. This led to the landscape design tradition that shapes organic landscape material as a static architectural item or emphasizes focal composition based on the Cartesian perspective to impress through photography. Due to the pressing environmental challenges in the Anthropocene, contemporary landscape architecture is increasingly confronted with the design task of facilitating meaningful aesthetic experiences of the ecological quality and dynamic processes, including those that occur in spatial or temporal scales outside our directly perceptible realm. Therefore, designers need to explore and consider a new range of possibilities in which bodily and cognitive experiences of vital ecological dynamics aesthetically impact people. The present study seeks to contribute to addressing this design challenge. It aims to expand the understanding of how the aesthetic quality of the ecological context is perceived and how can it can be revealed and strengthened by designing ecological processes in urban landscapes.

Preface

The findings of the dissertation have been published in two publications:

→ **1. THEORETICAL CONCEPTS AND THEIR APPLICATION IN LANDSCAPE ARCHITECTURE EXAMPLES**

Publication: Bajc, K. (2026). Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. Birkhäuser Basel.



Chapter 1 examines the status quo of ecological processes in landscape architecture design.

Chapter 2, “*Design of Ecological Processes in Landscape Architecture*” provides an overview of current strategies for designing ecological processes in landscape architecture based on the model for describing ecological processes within two categories:

- slow ecological processes and landscape armatures
- fast ecological processes and landscape patterns.

A structured overview of current strategies for designing ecological processes in landscape architecture was made to examine which design approaches are already applied in landscape architecture and to understand the related critical success factors or shortcomings in the praxis. This overview has shown that a wide range of design

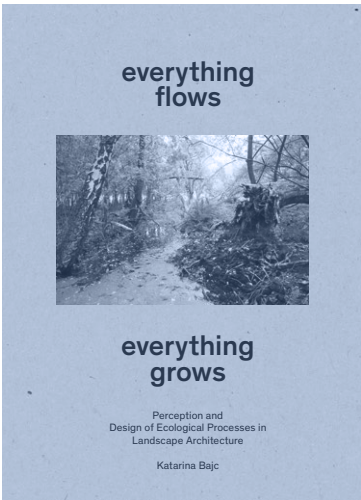
approaches that attempt to reveal, interpret, or strengthen the aesthetic aspects of ecological dynamics are already being applied in urban landscapes. However, projects that employ these design strategies are still relatively rare due to the requirements and routines of formalized planning processes, which, in most cases, do not allow for experimentation, change, or unforeseen development over time.

Chapter 3 “*Perception and Design of Ecological Processes Beyond Form*” examines contemporary theoretical models of perception of the environment that extend formal approaches and material aspects of design in relation to their relevance for landscape architecture. The possibilities for communicating ecological value by designing landscapes that motivate humans to act and establish long-term affective relation with a site were discussed in this chapter. Currently, a design vocabulary of landscape architecture is bound to the relatively fixed formal parameters expressed in maps, renderings, and similar design representations that cannot fully convey temporal and aesthetic quality of ecological dynamics beyond the material aspects. As a counterpoint, the study examined how concepts such as atmospheres, affordances, and other embodied sensory experiences can be applied in landscape architectural design. Findings are structured in concise descriptions of design approaches, reflected through the lens of theoretical concepts of environmental perception, and illustrated with landscape architecture works by different landscape architects.

Chapter 4, “*Ecological Processes as a Shared Basis*” outlines key aspects in which future work across academia and practice could open new pathways for designing ecological dynamics in landscape architecture. When adequately articulated through design-based methods, the phenomenological nuances of ecological processes could be translated into fruitful impulses for sustainable landscape design. Their direct experience as shared tool for interdisciplinary communication could facilitate the integration of stakeholders from diverse epistemological backgrounds into a shared discourse, thereby fostering mutual understanding and supporting a long-term, process-oriented landscape design approach. Redefining the role and scope of landscape architecture to support these goals is a necessary first step and should be implemented in the institutionalized planning processes and procedures to succeed on a larger scale.

→ **2. RESEARCH-BY-DESIGN TEST CASE IN HAMBURG**

Publication: Bajc, K. (2026). Everything Flows, Everything Grows. The Perception and Design of Ecological Processes in Landscape Architecture. HafenCity Universität Hamburg.



The research-by-design methodology was applied in the dissertation to test the individual modes of experiencing ecological processes in real-life settings. This part of the research is presented the publication at hand. The large-scale municipal nature conservation project ‘Natürlich Hamburg!’ and the three selected landscapes within it served as case sites and ongoing planning processes to investigate the landscape perception and design related to ecological processes. The research-by-design methodology was applied for testing perceptions of ecological processes in people of different professional backgrounds and observing its potential for interdisciplinary communication among experts. This stage of the study informed understanding of limiting factors to designing with ecological processes, such as the lack of commonly recognized methodology to record perception of the aesthetic aspects of ecological dynamics and the lack of official planning procedures and instruments that could accommodate such creative process over time. The current sectoral organization of institutionalized top-down planning poses a challenge when designing ecological contexts that expand jurisdiction boundaries. Complex and elusive aesthetic outcomes of ecological transformation processes, or performative activity that shapes the landscape over time, continue to present a potential for expanding landscape architecture research and practice.

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1.

INTRODUCTION

1.1 Research Framework

Based on the framework for research by Creswell and Creswell (2018), I will first explain the philosophical worldview or basic set of beliefs that underlie my research design. My work is informed by two worldview frameworks, as defined by Creswell and Creswell (2018): the pragmatic worldview and the constructivist worldview. My study pertains an open research problem therefore I intentionally formulated an open research question rather than framing a hypothesis to be tested. This is reflected in my research design and the choice of methodology, that allow me to approach the research topic from various perspectives.

→ PRAGMATIC WORLDVIEW

In accordance with the pragmatic worldview, I am guided by the belief that “an external world is independent of the mind as well as lodged in the mind” (Creswell & Creswell, 2018, p. 11).

Therefore, in the first part of the study, I developed a model for describing ecological processes in landscape architecture. This is a relatively objective model that can also be accepted as valid within the natural sciences, as it is based on analytical and representational tools drawn from fields such as ecology and geology. It reflects the notion of a “world independent of the mind,” (Creswell & Creswell, 2018, p. 11).

This first part of the study was published in the in the book “Ecological Processes in Landscape Architecture. Everything flows, everything grows.” by Birkhäuser Basel in 2026. The model for describing ecological processes in landscape architecture divides the dynamics in the environment broadly into two categories (see Figure 1):

- slow ecological processes and landscape armatures
- fast ecological processes and landscape patterns (Bajc, 2026).

Beyond an objectifiable model, the subjective experience of landscapes, or the “world lodged in the mind” (Creswell & Creswell, 2018, p. 11), was recorded in the study by collecting testimonies of individual experiences in urban landscapes, evaluating works of landscape architecture, and discussing related theoretical concepts concerning the perception of ecological processes in the environment.

Evaluated were contemporary landscape architecture approaches that specifically aim their design strategies at the categories of ecological processes described in the model. I structured these works according to how they derive aesthetic expression from temporal phenomena, and discuss their approaches to designing with ecological processes in the first part of the study (Bajc, 2026).

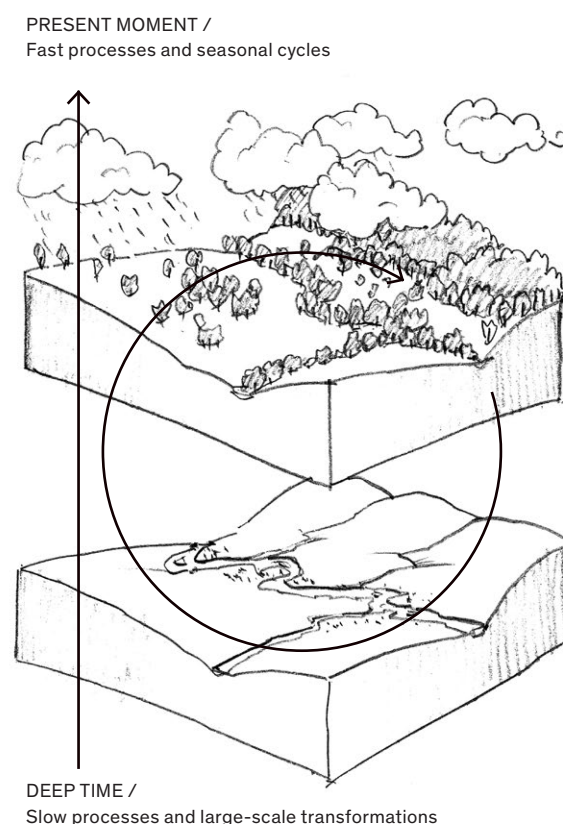


Fig. 1: Model for describing environmental dynamics. The diagram shows two elementary components of environmental dynamics, broadly based on the pace of change and spatial scale. Slow ecological processes and landscape armatures are depicted as geological structures and local or regional climate. Fast ecological processes and landscape patterns are shown as vegetation and other local structures and patterns on the soil profile.

The developed model for describing ecological processes in landscape architecture can be applied to analyze environmental dynamics in any landscape site. To illustrate this, I use the model in three chosen case sites in Hamburg to describe their ecological and experiential context (see Chapter 2 of the present publication: Ecological Processes as a Shared Basis for Landscape Design). The source literature used for this analysis stems from the natural sciences (including maps of topography, geology, soil composition, and vegetation communities) as well, as from workshops and interviews with design and maintenance experts. Some of the study participants have previously worked with ecological processes at these specific sites; therefore their testimonies merged the direct experiential knowledge with the general professional expertise of their discipline.

These data were gathered in analytical drawings and texts that give insight into the ecological processes of each site, their natural development, and related landscape maintenance, management, and care practices. The effects of cultivation and design processes, including their physical evidence in the landscapes, are considered integral to the ecological dynamics of the site, just as natural processes are. Therefore, this study draws equally on data from the natural sciences and on the subjective and artistic expressions of the individual study participants in order to bridge the epistemological divide in the conceptualization of ecological processes.

→ CONSTRUCTIVIST WORLDVIEW

The constructivist worldview assumes that individuals develop subjective meanings of their experience in the world. These meanings can be varied and multiple. A researcher must thus look for a broad complexity of views rather than artificially narrowing meaning (Creswell & Creswell, 2018). The manner in which the natural sciences translate, explain, and describe ecological processes is not how individual laypeople or design experts experience those same processes on site. Independent of the cognitive or scientific knowledge one might have about ecological processes, the way these processes reveal themselves to our immediate perceptual realm in the landscape itself is fundamentally unique to each person.

Humans have a limited capacity to directly perceive processes that unfold on vast scales, such as geological or climate change, and require sustained attention to perceive and conceptualize changes that unfold over several seasons or decades. The ecological processes that led to the genesis and morphology of each particular landscape site are thus not accessible to our perception directly or in their totality. To explain what we do perceive, I use the metaphor of a window of perception that can reveal a fraction of a site’s past and present ecological processes their traces and effects.

In the second part of the study (see Chapter 2 of the present publication - Ecological Processes as a Shared Basis for Landscape Design), I therefore examine windows of perception, or subjective impressions and interpretations that ecological processes evoke in individuals when they directly experience them in the landscape. This was done to gather cues about how different characteristics of typical ecological processes in the landscape might affect aesthetic perception in the chosen sites, and to complement and test the discussed theories and models of landscape perception in situ.

Several existing philosophical models attempt to explain how humans perceive the environment. Some are emphasizing sensory and others cognitive properties of perception. In my study, I use the concepts of philosopher Maurice Merleau-Ponty (1945/ 1962), perceptual psychologist James J. Gibson (1979/2015), and philosopher Alva Noë (2006) to discuss possible windows of perception that help humans connect to ecological dynamics on different temporal and spatial scales through landscape design (Bajc, 2026). The theoretical models of Maurice Merleau-Ponty (1962/45), James J. Gibson (1979/2015), and Alva Noë (2006) are useful to relate the experience of ecological processes with:

- movement, exploration, and temporal experience - the concepts of “invariants” and “perceptual flow”
- the relational, intentional, and active nature of perception - the concepts of “affordances” and “action in perception”.

This part of the dissertation was published in the in the book “Ecological Processes in Landscape Architecture. Everything flows, everything grows.” by Birkhäuser Basel in 2026 (see Figures 2, 3 and 4). The selected theoretical models indicate various under-explored possibilities for landscape architects to create an interface between human perception and ecological processes that can facilitate a meaningful experience of ecological context in a landscape site. I align these theoretical models with works of contemporary landscape architecture that reveal, interpret, and strengthen the aesthetic aspects of ecological dynamics in urban landscapes through design (see Bajc, 2026).

The present publication focuses on research by design at three landscape sites in Hamburg that exemplify three distinct ecological contexts, in order to investigate how the subjective perception of different landscape dynamics is shaped. Some of the individuals involved in the study projected historical, cultural, and scientific meanings on the landscapes and ecological processes that they observed. Other reports were based primarily on direct sensory experiences. Both approaches offered insights into which characteristics of ecological processes are perceived aesthetically. These findings are only partially generalizable, as they are embedded in the specific socio-cultural contexts of the sites, landscape types, and time frames examined.

However, to a large extent, the recorded subjective impressions aligned with the principles developed from theoretical models of perception and complemented the previously analyzed design approaches from overview of the selected landscape architecture works.

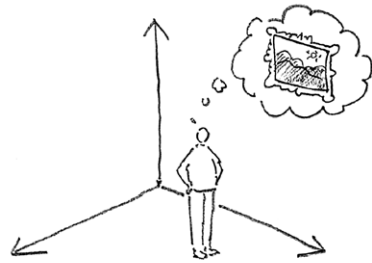


Fig. 2: The Cartesian perspective established a spectatorial epistemology in which an external reality is observed and represented from a detached subject position (Wylie, 2007). These notions about our perception and experience of the landscape were challenged most notably by the philosopher Maurice Merleau-Ponty, and later by the perceptual psychologist James J. Gibson, as well as most recently, by philosopher Alva Noë.



Fig. 3: Ecological processes cannot be grasped in a static landscape scene due to their complexity, inconstancy and their elusive temporal and spatial scales. Moreover, the very act of perceiving entails a strong temporal dimension and is relational and active in character (Noë, 2006).



Fig. 4: Humans and other animals live in a continuous stream of perception from birth to death that is more or less intensive and detailed at different times, but never ceases completely (Mace, 2005). As we move through a landscape, perception continuously responds to stimuli and, over repeated visits, merges with memory into a unified experience of past and present.

1.2 Research for, about and by Design

The selected research framework informs both the research design and the selection of methods. To approach the research subject from different points of view, I apply a combination of methods of “Research for, about and by Design” as defined by Prominski (2019a) and Lenzholzer et al. (2013) based on earlier design theory writings:

- Research for design seeks to enhance the quality of the designed artifact by transferring research-based knowledge into the design process. This research is usually carried out from a distance and does not interfere with the designed object directly. The researcher takes the role of supplier of knowledge but does not design the artifact. The designer applies knowledge developed through research to the design process.
- Research on design or research about design is carried out on a finished product or design process. This research looks at the object without changing it through history, theory, or critical practice. A typical method of this research is the case study.
- Research by design or research through design employs the design activity as an essential component of the research, and design is employed as a research method.

In theory, this offers a very clear division between different design research approaches. In my study, however, I had to involve aspects of all three approaches to cover the complexity of the research questions adequately. As a result, theoretical models and the analysis of representative international landscape architecture projects were complemented by methods such as expert co-design workshops and graduate student design studios.

→ RESEARCH FOR DESIGN

The aim of my work is to contribute knowledge that can inspire and support designers and public administrators in addressing the challenge of integrating dynamic ecological processes with aesthetic demands in urban landscapes. These commissions have increased steadily over several decades as our societies are confronted with extreme weather events, biodiversity loss, and other environmental challenges.

In most Western cities, there are no commonly accepted approaches to integrating ecological quality with leisure uses, largely because nature conservation areas and urban green spaces for recreation remain administratively separated. Cities employ ecologists to develop and manage nature conservation areas and landscape architects to design and maintain urban leisure areas. The need for interdisciplinary instruments and approaches for designing dynamic ecological processes in nature conservation areas and urban leisure green spaces constitutes both a research gap and a practical application that this dissertation seeks to address. The landscape design strategies and theoretical models developed in this study aim to bridge academic theory and design practice by suggesting tools and methods for interdisciplinary collaboration between ecology and landscape architecture.

→ RESEARCH ABOUT DESIGN

Before conducting the co-design workshops and studios in Hamburg, I analyzed selected implemented landscape architecture works as cases where designers clearly attempted to make dynamic ecological processes apparent to human perception. By reflecting on these works, I could recognize and systematize several consistent design approaches and constraints. Contemporary landscape architecture projects that attempt to reveal and respond to ecological dynamics provide instructive examples of how to address the challenge of not being able to promise or foresee a precise visual outcome. What kind of aesthetic experience they ensured instead, and how they delivered it, were crucial questions in this part of the research (see Bajc, 2026).

Identifying and interpreting those landscape architecture approaches helped to create a framework for the later phases of my research. To this end, I additionally studied preliminary design proposals by landscape planners and architects that were commissioned for the project “Natürlich Hamburg!” by the Hamburg’s public authority for the environment, climate, energy, and agriculture [Behörde für Umwelt, Klima, Energie und Agrarwirtschaft -BUKEA] (hamburg.de, n.d.-a).

→ **RESEARCH-BY-DESIGN WITHIN THE “NATÜRLICH HAMBURG!” NATURE CONSERVATION PROJECT**

To date, there is no clear consensus within the scientific community on which exact methods constitute research by design. I orient my research toward the approaches proposed by Prominski (2019a) and Lenzholzer et al. (2013). Lenzholzer et al. (2013) suggest that the selection of a specific research framework - such as, in my case, the constructivist and pragmatic worldviews - already guides the researcher toward certain methodological approaches, without limiting them to these approaches. Research methods can be combined, as long as there is transparency in regard to their choice, and, most importantly, if they support the research question.

The research-by-design study for this dissertation was conducted within the large-scale municipal urban nature conservation project “Natürlich Hamburg!” in Hamburg, Germany. With this project, the public agency BUKEA in Hamburg is attempting to set a precedent for fostering biodiversity in urban areas. The project is part of Germany’s national program for establishing and securing conservationally important natural sites and landscapes. The projects within this program are known as *Naturschutzgroßprojekte*, large-scale conservation projects (Bundesamt für Naturschutz, n.d.-a), and are supported by the German Federal Agency for Nature Conservation [Bundesamt für Naturschutz - BfN].

“Natürlich Hamburg!” is the first such large-scale conservation project funded in the urban context. Others aim at protecting landscapes that are mostly intact and already ecologically significant. Conversely, the “Natürlich Hamburg!” project specifically aims to strengthen and develop the ecological potential of the urban environment and to

increase biodiversity in the city. The project’s second goal, formulated by the initiators of the project as being of equal importance, is to design and offer nature experiences for people in their immediate residential environment through the “sophisticated and aesthetic design of green spaces.” (Behörde für Umwelt und Energie, 2017, p. 4). A diverse and near-natural composition of flora and fauna is intended to enhance opportunities for experiencing nature in the city.

Within the framework of my PhD research, I was able to follow the development of this project from its inception in 2018. I recognized its potential to deepen the understanding of designing ecological processes in cities and advance the research questions addressed in this dissertation. Although the “Natürlich Hamburg!” project does not explicitly focus on the perception and design of ecological processes, which is the subject of my research, these questions are nevertheless central to its underlying approach. The project aims to foster biodiversity and other ecological goals in urban areas and simultaneously increase the general public’s awareness and acceptance of these goals.

To this end, the “Natürlich Hamburg!” project facilitated expert discussions and generated design proposals concerning the long-term maintenance and development of diverse habitats, such as grasslands, water bodies, heathlands, and forests. These habitats are situated within the urban context, where perception and care of their ecological processes is paramount to the success of their development and protection. The team of the “Natürlich Hamburg!” project is well aware that urban nature conservation depends on attractive design and effective public communication, and actively works toward this goal (hamburg.de, n.d.-a).

The “Natürlich Hamburg!” project covers 54 km² and comprises 19 parks and 14 nature conservation areas evenly allocated across Hamburg. For the research-by-design study, I chose three sites, all of which are part of the “Natürlich Hamburg!” project area.

- Altonaer Volkspark can be understood as an urban forest, while formally belonging to the category of recreational urban green spaces. It is managed by the Department for Landscape Planning and Urban Green, Hamburg [Abteilung für Landschaftsplanung und Stadtgrün, BUKEA], while the direct

implementation of the measures lay within the responsibility of the local District Office Altona [Bezirksamt Altona].

- The other two sites are designated nature conservation areas or *Naturschutzgebiete* (NSGs) - NSG Wittmoor and NSG Wittenbergener Heide. They are managed by the Department for Nature Protection Hamburg [Abteilung für Naturschutz - BUKEA], while the direct implementation of the measures is the responsibility of the district authorities Wandsbek in NSG Wittmoor [Bezirksamt Wandsbek] and Altona in NSG Wittenbergener Heide [Bezirksamt Altona].

All three sites are publicly accessible areas; owned by the Free and Hanseatic City of Hamburg, one of Germany’s federal states. Some parts of the NSG Wittmoor are private and belong to non-profit nature

conservation associations, such as the Nature and Biodiversity Conservation Union [Naturschutzbund Deutschland e.V - NABU] (NABU Hamburg, n.d.), and Loki Schmidt Foundation (Loki Schmidt Stiftung, n.d.). These stakeholders make individual decisions about the development of ecological processes and the design of leisure amenities for visitors in compliance with the German Federal Nature Conservation Act [Bundesnaturschutzgesetz, BNatSchG], the federal law governing nature conservation in Germany.

In this regard, these are not typical private areas, as their management and maintenance are carried out in cooperation with state and district planning authorities and are specifically aimed at fostering protected species and habitats. In NSG Wittmoor, some areas, mostly pastureland, are also owned and used by local farmers. In these cases, recreational and agricultural uses partially conflict with ecological management objectives and nature conservation interests (Tesch, 2017).

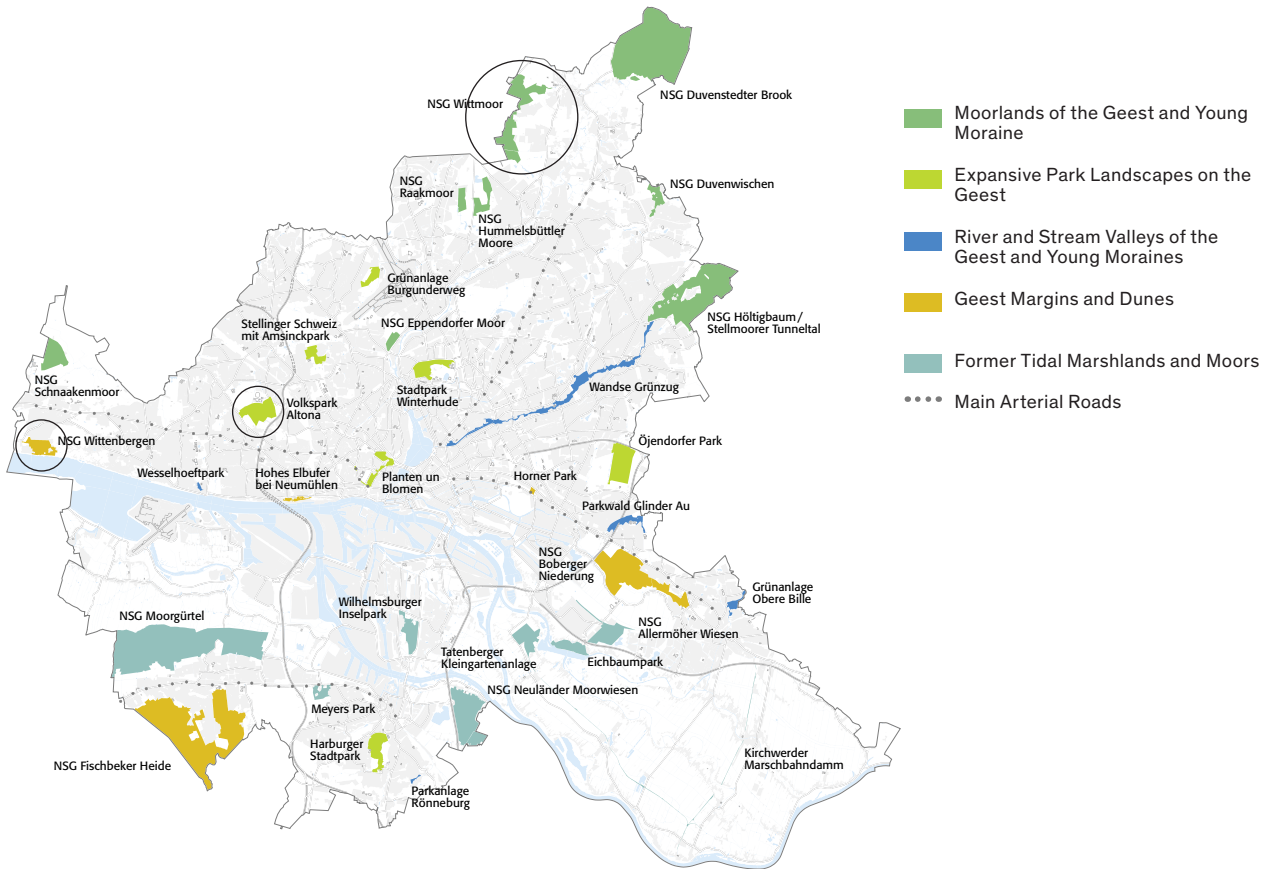


Fig. 5: The “Natürlich Hamburg!” project covers 54 km² and comprises 19 parks and 14 nature conservation areas evenly allocated across Hamburg. Within the framework of my PhD, research by design was carried out at the three marked sites: Altonaer Volkspark, NSG Wittmoor, and NSG Wittenbergener Heide.

The areas included in the “Natürlich Hamburg!” project will be enhanced over the next decade according to their specific contexts. In urban and actively used green areas, such as parks, the aim is to foster biodiversity and ecological function by increasing wilderness areas and running differentiated maintenance regimes to support and develop habitats. In nature conservation areas with limited access, the aims are to design and enhance the nature experience and the landscape image. In both cases, aesthetic impact and ecological quality are to be strengthened with approaches tailored to the areas’ current uses and ecological functions.

The project is accompanied by an interdisciplinary advisory board consisting of expert organizations such as NABU, the largest nature conservation association in Germany, and the German Association for Garden Art and Landscape Architecture [Deutsche Gesellschaft für Gartenkunst und Landschaftskultur - DGGL]. Private and public stakeholders contributed to the development of design ideas, while a study was commissioned to evaluate the project’s social and economic impacts.

Research-by-Design Study within the “Natürlich Hamburg!” nature conservation project applied following methods:

- Two co-design workshops were conducted in May and September 2018, with around 30 experts each.
- Two courses with around 30 masters students of architecture and urban planning each followed in 2018 and 2020, with a similar structure to the co-design workshops.

All these formats applied the “appreciative inquiry” technique, according to Lenzholzer et al. (2013): “Research participants are asked to value the best there is, envision what might be, dialogue about what should be, and innovate on what will be” (p. 11). This focus on positive attributes diverges from a problem-oriented discourse toward one where the participants focus on a common vision and discuss steps that need to be taken to achieve it.

1.3 Research by Design Process: Case Hamburg

The research-by-design methodology in this dissertation provided an additional research approach beyond the knowledge generated through the literature review and the review of landscape architecture projects. The large-scale municipal nature conservation project ‘Natürlich Hamburg!’ and the three selected sites within it served as research-by-design real-life settings and ongoing planning processes to investigate the landscape perception and design related to ecological dynamics.

Research-by-design methods were applied in the co-design workshops on site with experts and university design studios with students. The methods were developed based on preliminary findings from the overview of theories of perception and design strategies that emerged from the review of process-focused international landscape architecture works. Co-design workshops were intended to explore the knowledge gaps that emerged about modes of perception of slow and fast ecological processes and were conducted directly at the selected landscape sites. The co-design workshops with experts and university design studios with students took place in the three case sites in Hamburg:

- Altonaer Volkspark, an urban public park
- Wittmoor, designated nature conservation area protected under the German Federal Nature Conservation Act
- Wittenbergener Heide, designated nature conservation area protected under the German Federal Nature Conservation Act

As researcher, I facilitated the collaborative research by setting the agenda but did not interfere with the design process that took place during the co-design workshops with the planning professionals. The data collected from the “Natürlich Hamburg!” expert workshops includes audio recordings of the participants’ discussions during the design process, which were later transcribed, and all the notes and drawings produced by the participants during the design process.

The second source of data from the research-by-design process were a design studio and a seminar conducted in 2018 and 2020 at HafenCity University Hamburg. I directed students to reflect on ecological processes in the landscape sites and develop design solutions to the problem of aligning functioning ecological systems with their aesthetic impact in urban landscapes. I was involved in this process more actively. I mentored the students throughout their design process, whereas my role in the expert co-design workshops was limited to observing the design process.

The formats developed for the co-design workshops and university design studios helped identify aesthetic aspects of ecological dynamics that form common ground between the natural sciences and arts or design oriented disciplines. The aim was to create a format that could involve participants with varying levels of expertise, from laypeople and students to experienced professionals. These formats facilitated and stimulated discussions that generated speculative design ideas. As abstract design principles these can be added to the existing repertoire of landscape design approaches that strengthen the aesthetic perception of ecological quality and dynamics.

The research-by-design methods were to set a stage for communication about individual and shared experiences of ecological dynamics at a specific site and facilitate project-oriented interdisciplinary dialogue between the participants with various professional backgrounds and values. The co-design research formats were, therefore, tailored to test the role that a direct experience of ecological processes in real-life settings might play in creativity and design decision-making among different landscape professionals.

The collected data encompass artistic interpretations and scientific analyses of the dynamic processes at the selected sites, together with related design proposals developed by students and expert workshop participants. I also recorded the verbal interactions among the study participants, which provided background information about the design process and complemented the participants’ individual notes and drawings.

→ INDIVIDUAL AND SHARED EXPERIENCES OF ECOLOGICAL PROCESSES

Human perception of ecological processes surpasses mere intellectual knowledge of these processes that might be based on the sources from the natural sciences. To a certain degree, people’s experience of the environment is personal and individual, embedded in local cultural contexts and metaphors, early memories, bodily experiences, as well as current interests and activities. Using a research-by-design methodology, I attempted to record participants’ direct and individual experiences of each landscape site’s ecological interrelations and dynamic processes. The aim was to examine how the impact that the design, management and maintenance of ecological processes is perceived by individuals in different landscape settings. I also sought to better understand how inspiration for the design process can be drawn from a direct on-site experience of ecological processes.

The research-by-design study in this dissertation is based on the assumption that human conceptual systems, including landscape design strategies, stem from embodied as well as imaginative layers of thought (Lakoff, 1987, p. 14). Consequently, I developed a research-by-design format that allows the participants to acquire embodied experiences of a chosen landscape type in addition to their cognitive and conceptual knowledge about ecology and planning. Their existing expert knowledge contributed an imaginative dimension, which allows for employing metaphor, metonymy, and mental imagery, taking the mind beyond what can be directly seen and felt. The choice of research-by-design methods applied in this study was guided by the premise that both embodied and imaginative layers of thought must be present in design strategies that aim to aesthetically reveal, interpret, or strengthen dynamic ecological processes as well as support healthy ecosystems.

Individual values, knowledge and expectations about society affect how we experience a landscape and how we judge its aesthetic and other qualities (Carlson, 2002). Environmental experts might perceive landscapes differently to everyday landscape users, due to their professional bias. I took into account that participants’ judgments would differ according to their profession, level of knowledge about the environment, and epistemological understanding of ecology within a landscape setting.

Landscape design and ecology professionals usually think about ecological systems in an abstract manner during their work assignments. They acquire knowledge about the function of different environmental processes predominantly from the natural sciences. However, they also experience natural dynamics bodily and aesthetically on a daily basis, as laypeople do, even if they do not consciously reflect on this perceptual process. For example, a landscape architect might enjoy a cool, salty breeze at the sea shore when they visit a site before designing a beach promenade. A nature conservation expert may walk around a dry grassland to inspect and count insect populations as part of their job and simultaneously be pleased by the smell, texture, and color of the freshly cut meadow. This shifts the focus from studying and thinking about isolated ecosystems to experiencing their overall spatial and aesthetic impact.

I deliberately limited the study to participants who already possessed professional knowledge and expertise in the environmental sciences, planning, design, or fine arts, and who either understood the relevant ecological processes and mechanisms in similar landscape types or knew the landscape sites in question very well. I invited local experts who are familiar with the researched landscape sites through direct experience, for example through their work in the management or maintenance of these landscapes or through conducting biological inventories there. Additionally, selected environmental experts and planners from other German and European cities were also involved to foster diverse perspectives on the topic.

I purposefully assembled a broadly representative interdisciplinary group of participants from the fields of landscape planning, nature conservation, biology, botany, architecture, urban planning, landscape architecture, and fine arts. A landscape-related professional education of the participants was essential for this study, so that they were able to discuss and develop new design approaches and strategies, as this was one of the proposed outcomes of this research.

Design and planning experts, such as landscape architects, consider the world as a project of design. Their stance may be characterized as projective, with a succession of “projective moments” as identified by Prominski (2019a, p 38) and the corresponding process of “designerly ways of thinking and knowing” as described by Cross, that can “form a fundamental,

common ground of intellectual endeavour and communication across the arts, sciences and technology.” (2007, p. 46) The skills related to such designerly or projective thinking enable the research-by-design approach within this study. Professionals in environmental fields are trained to deal with problems in a projective way, so I assumed they would use their cognitive, tacit design knowledge and apply it to develop design solutions during the workshops. This cannot be expected of laypeople to the same degree. Therefore, I chose not to conduct the study workshops with everyday landscape users or the general public.

For the purpose of the study, it was key to lead an informed discussion about ecological processes and reflect on how humans alter them when they design landscapes or make management and maintenance decisions. Therefore, participants had to possess basic knowledge of common landscape maintenance and landscape management practices and their ecological context to be able to contribute adequately to the conversation.

At the same time, the research-by-design format in real-life settings prompted the participants to share their personal opinions and their subjective, intuitive and embodied experiences. Together, the two perspectives provided a more holistic understanding of how maintenance regimes shape not only ecological composition but also the aesthetic character and image of particular landscapes.

To prevent participants from automatically reverting to their professional routines and familiar methodological approaches, the workshops and design studios were designed to foster direct embodied experience and design experimentation. This was done through expeditions and collaborative activity that the participants undertook directly on site. The collected data and results thus reflect individual as well as shared experiences of ecological process among the participants.

The projective, designedly focus of the data produced during the workshops and design studios allowed me to synthesize possible new future design approaches. Additionally, I was able to record participants’ perceptions of the current condition and synthesize the phenomena most frequently noticed and noted by the majority of the study participants. Various modes of perception of ecological processes could be deduced and interpreted in this process. The data reflects a site- and context-specific approach with design suggestions on how to foster and

intensify experiences of ecological process in each of the three case landscapes. When abstracted from their specific site contexts, the design suggestions may also be applicable to similar urban settings and landscape types. This publication presents both the identified modes of perception and the resulting design strategies.

→ RESEARCH-BY-DESIGN EXPERT WORKSHOPS AND UNIVERSITY STUDIOS

I conducted two expert co-design workshops within the large-scale municipal nature conservation project “Natürlich Hamburg!” as a research-by-design part of this study. In addition, I followed the working process within the “Natürlich Hamburg!”, joined site visits, and made semi-structured interviews with the management and staff of the project. The data gathered from these activities present an empirical basis for the study. Expert co-design workshops took place in Altonaer Volkspark in May 2018 and in Wittmoor in September 2018. Each workshop lasted 8 hours and involved around 36 experts from the fields of landscape architecture and planning, nature

conservation, biology, botany, city planning, and fine arts. The invited experts represented BfN [German Federal Agency for Nature Conservation], BUKEA [Public Agency for the Environment, Climate, Energy, and Agriculture Hamburg], Hamburg University, HafenCity University, several private landscape architecture offices, non-governmental nature conservation associations, and associations for preserving garden heritage.

The teaching process, results, and exchange of ideas at HafenCity University, Hamburg, also contributed data and knowledge production for this research. The HafenCity University design studio was held in Wittenbergener Heide in 2018 with around 30 students from the Master of Architecture and Master of Urban Planning programs. The project team and management of the ‘Natürlich Hamburg!’ were actively involved in the studio, offering excursions, lectures, and feedback sessions. In the summer semester 2020, a seminar with the title “Landscape Architect as a Curator” was held at all three study sites. The seminar was similar to the studio in its task definition and involved Urban Planning, Urban Design and Master of Architecture students at the HafenCity University in Hamburg.

Engaging interdisciplinary groups of professionals and students as co-producers of knowledge in the research-by-design process.

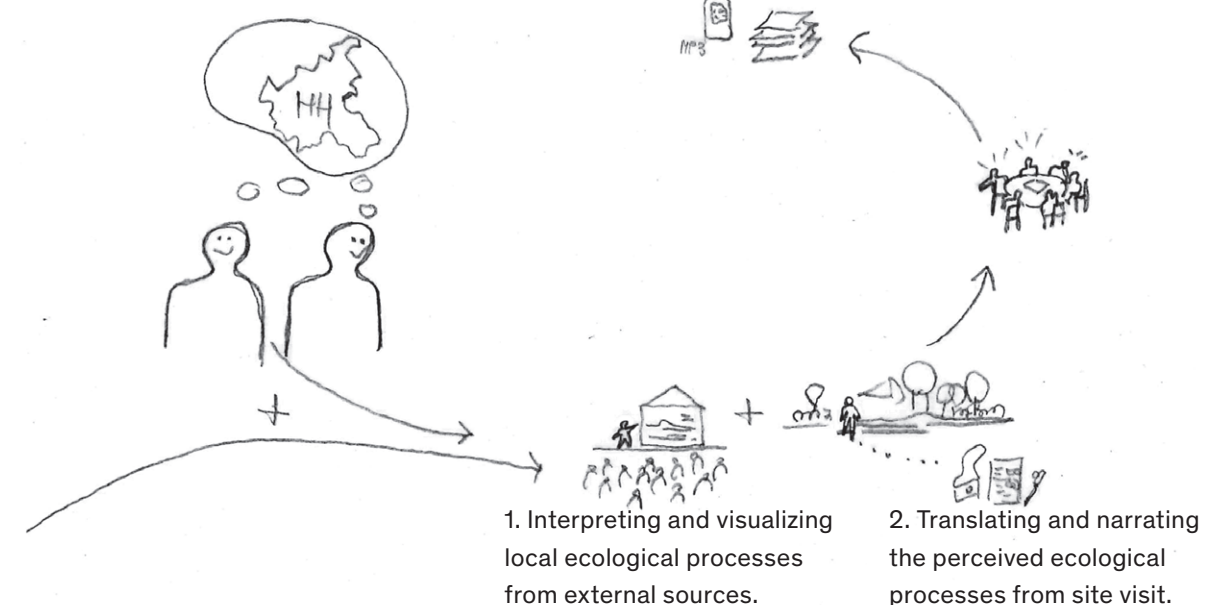


Fig. 6: Research-By-Design process within interdisciplinary co-design expert workshops and design studios.

The co-design workshops with experts and the design studios with students included theoretical input from invited experts in landscape design, nature protection, and fine arts to encourage interdisciplinary understanding and dialogue. The co-design workshop participants and students undertook individual expeditions on-site over several hours before engaging in joint design process during the workshops. They initially shared and reflected on their individual perception of ecological context on site, and its aesthetic aspects. Subsequently, the participants and students created alternative design and management ideas for each study site, aiming to integrate its ecological development with aesthetic experience and recreational uses (see Figure 6).

The participant groups discussed various perspectives on how ecological and aesthetic aspects could be perceived and integrated as a unified whole within a landscape, rather than perpetuating fragmentation and professional divides among planning disciplines. Conflicting aspects as well as synergies between the involved disciplines were addressed to foster knowledge transfer and understanding between them. The study involved a spectrum of experts from art, landscape design, and nature conservation in order to draw on different forms of pre-existing knowledge and understanding of ecological dynamics. However, the study also actively included the embodied and sensory experiences of the specific case landscape sites to bridge the professional biases of the participants.

The research-by-design process in the expert workshops and design studios, were structured in three parallel activities:

- interpreting and visualizing local ecological processes from external sources
- translating and narrating the perceived ecological processes on site
- developing design approaches to strengthen the function and perception of ecological processes on site

These phases enabled a transparent research-by-design process within expert workshops and university studios, and helped to structure the interpretation of the findings. The research results are divided into these three categories and are presented in the respective chapters of this publication.

→ **INTERPRETING AND VISUALIZING LOCAL ECOLOGICAL PROCESSES FROM EXTERNAL SOURCES (SEE CHAPTER 2)**

In this phase, students and workshop participants collected and interpreted sources that are commonly used in landscape architecture and environmental planning, such as geological maps, land-cover maps, faunistic and floristic datasets, maps of habitats and current landscape maintenance and development plans with descriptions of measures to be undertaken. This information mainly stems from the natural sciences or engineering disciplines, and is describing the ecological quality and intended management goals for each site. However, this data does not show how periodic maintenance regimes, such as mowing or pruning, or radical one-time habitat management interventions, such as forest clear-cutting or controlled burning, may affect the aesthetic character of a landscape. Nor can it convey the spatial and aesthetic impacts of natural, spontaneous dynamics.

Ecological data is commonly represented in maps and written inventories that capture only a single moment in the ongoing development of a landscape. To support the understanding of the temporal dimensions of ecological processes, the study participants created diagrams and interpretative illustrations depicting the spatial effects of ecological dynamics on landscapes over time. Through these process-oriented illustrations, it became clear that the pace and spatial scale of different ecological changes greatly influence the perception of landscapes and subsequent design decisions. Therefore, these interpretative illustrations inspired me to develop a simplified model for describing ecological processes in the landscape, with armatures as perceptible structures of slow ecological processes and landscape patterns as perceptible aspects of fast ecological processes (see Bajc, 2026). This model was used to examine and structure the overview of design strategies for ecological processes in international landscape architecture works (see Bajc, 2026).

Furthermore, the model was applied to analyse ecological dynamics and their spatial manifestations in the study site, the city-state Hamburg. The territory of Hamburg was depicted as a landscape armature shaped by underlying slow processes, in order to adequately represent the ecological and

aesthetic context of the three local sites chosen for the research-by-design study:

- Forest landscape: urban forest (Altonaer Volkspark)
- Moor landscape: wet grasslands and peat bogs (Wittmoor)
- Arid landscape: heathland with dunes (Wittenbergener Heide).

In this first analytical phase, central fast ecological processes and related landscape patterns at each site were researched and depicted, in addition to the armatures in which they are all embedded. This showed how the three sites selected for investigation within the Hamburg's armature exhibit fundamentally different geological origins, that resulted in their distinct ecological trajectories (see Chapter 2). The analytical illustrations of the fast ecological processes combine naturally occurring processes, such as vegetation succession patterns, as well as human made maintenance and management regimes.

From the interpretative analysis of these external data sources, the following assumption emerged: ecological processes that influence a landscape over an extended period of time are strongly related to its individual, local character, and are often perceived as prominent spatial and experiential features in landscapes. This conclusion led to the premise that ecological processes cannot be separated from the ways in which landscape is perceived. Each landscape site is deeply entangled in local slow and fast ecological processes, which generate its particular aesthetic expression. Therefore, direct and in-depth understanding of perception of ecological processes may carry untapped potential as a basis for landscape architecture design. To test this assumption, site visits were organized as part of the expert workshops and design studios.

→ **TRANSLATING AND NARRATING THE PERCEIVED ECOLOGICAL PROCESSES ON SITE (SEE CHAPTER 3)**

Participants carried out site visits or expeditions in the landscapes alone or in pairs. Each visit lasted at least two hours. Participants were instructed to focus on personal, subjective landscape perception and

record or translate the experience through different artistic media. After individual site expeditions, all participants presented and discussed their impressions in small groups and reflected on the characteristics and particularities of experiencing the ecological character of the area.

The reports and narratives shared by the participants about how they experienced particular landscape sites helped me to identify possible general windows of perception through which people within western cultural background may perceive ecological processes. Not all ecological processes identified in external sources from the natural sciences are directly perceptible on site. I was interested in finding out which aesthetic aspects of local ecological processes most prominently and clearly caught the attention of the workshop participants and students during the site visits.

The three case landscapes were intentionally chosen for this research-by-design process due to their discrete and particular ecological character: the moor landscape in Wittmoor, the heathland with dunes in Wittenbergener Heide, and the urban forest in Altonaer Volkspark. Each site revealed its constituent ecological dynamics to the study participants in a distinct manner. Therefore, the perceptible realm specific to the local ecological context of each site was further examined.

The data analysed during this part of the research included audio recordings of the participants' narratives of their experiences during the expedition. Oral accounts were later transcribed, and all the notes and drawings produced by the participants to represent their perception of the ecological context in each landscape site were collected. The second source of data within the research-by-design method were a design studio in the summer semester of 2018 and a seminar in the summer semester of 2020 at the HafenCity University Hamburg. The data collected here encompassed students' artistic interpretations of the dynamic processes as experienced on the three sites.

This qualitative data set was initially fragmented and unstructured. Applying qualitative coding as a data analysis process allowed me to systematically structure this material to identify categories and patterns within it, and to interpret the findings. The material was first sorted into thematic groups in which participants' statements and observations overlapped, repeated, and clustered around particular

perceptible phenomena. These were identified by the participants as characteristic landscape-bound situations in which a particular window of perception allowed them to experience the underlying ecological context of the site.

The individual reports of perceiving ecological processes are presented in this publication as site portraits in the Chapter 3, as they were narrated and depicted by the participants of the study. The following categories that frame and synthesize the reported perception and experience of ecological processes on each of the sites:

- topography
- light, shadow, and microclimates
- vegetation communities and composition
- animal encounters
- decay
- walking

→ **DESIGN APPROACHES TO STRENGTHEN THE PERCEPTION OF ECOLOGICAL PROCESSES (SEE CHAPTER 4).**

Participants in the study identified and discussed windows of perception of ecological context by reflecting on the testimonies of their own experiences in the landscape sites. In the co-design workshops this reflection led seamlessly to a discourse on how landscape architecture can or should be managed to support such modes of perception of ecological development and related landscape content. The discussions on the design solutions started spontaneously among the participants, presumably because of the majority’s background in landscape planning and management, and the naturally projective stance in their professional practice.

Inspired by sharing their experiences in the landscapes, the participants developed visions and ideas for landscape design, management, and maintenance regimes in this phase of the research-by-design process. These solutions mostly aimed at fulfilling a commonly agreed ecological goals, but simultaneously attempted to enhance the landscape’s aesthetic character, or to afford possibilities for experiencing its ecological quality.

The workshops and design studios initially had similar problem formulations modified according to their setting:

- Urban public park: Aim to increase the biodiversity and ecological function by designing wilderness areas, implementing differentiated maintenance regimes, and altering the species compositions in actively used green areas.
- Nature conservation area: Aim to design and stage the experience of ecological processes, including in areas with limited access.

Co design workshops and the students’ design proposals offered several innovative approaches to revealing, interpreting, and strengthening the aesthetic experience of ecological processes in urban landscapes and nature conservation areas. In the Chapter 4 several of these design proposals and ideas are presented synthesized into design strategies applicable to other comparable landscapes:

- communicating armatures
- designing paths as a medium of agency and perception
- enabling curatorial praxis and care
- harvesting, foraging, collecting, recycling, playing
- creating habitats to be experienced

Individual design suggestions are clustered according to the applied design approaches in this chapter, independently of their initial site. This abstraction process allowed for synthesizing and concisely demonstrating the collected findings.

During the research process I compared the clusters of data from the participant’s reports of the perceptions from the expedition with the categories of perception of ecological processes that were theory-based and those generated from the overview of design strategies in international landscape architecture works. These can be found in the book Bajc, K. (2026). Ecological Processes In Landscape Architecture - Everything Flows, Everything Grows. Birkhäuser Basel:

- cues to care
- tension in transformation
- distilled type
- participatory care and co-design
- play and discovery
- dissonance and friction
- atmospheres
- biophilia

1.4 Creating Knowledge

The dissertation combines an analysis of landscape architecture works with theories of perception of the environment. Additional data collection and inquiry follows the research-by-design methodology and offers a third component out of which the experiential and site-specific knowledge about the perception and design of ecological processes in this study is derived. The data analysis was developed in accordance with a qualitative research approach, as proposed by Janice M. Morse (1994).Morse identifies four cognitive processes integral to qualitative data analysis:

- comprehending
- synthesizing
- theorizing
- recontextualizing (Morse, 1994, p. 25).

I adopt these phases (see Figure 5) and modify them for my research questions, which are design-oriented rather than within a classical field of humanities:

- How are ecological processes and their aesthetic manifestations in landscape architecture currently addressed by design?
- How can landscape design enable and support the perception of dynamic ecological processes also in ways that reach beyond material and formal parameters?
- How can landscape architecture strengthen the individual perception and the shared experience of ecological processes of particular landscape types?

To sort the data collected during the research-by-design, I used a coding process as a qualitative data analysis method, in which I assigned descriptive labels to distinct aspects of the data. In this first phase of comprehending, the coding allowed me to identify related content across the fragmented collected material and uncover underlying meanings.

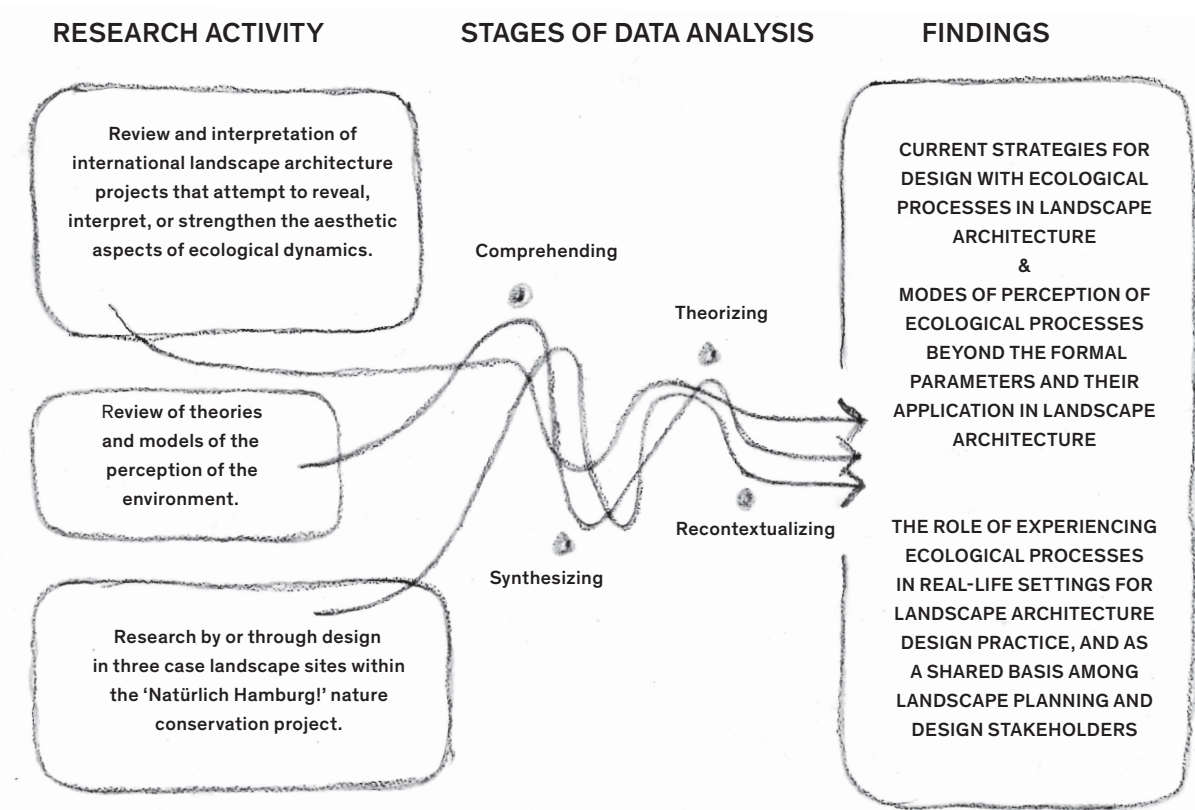


Fig. 6: A Diagram of the Research Process.

The aggregation and analysis of similar data sets revealed where knowledge gaps existed and where supplementary inquiry was needed. In such cases, additional interviews were conducted, and further case landscape architecture works were analyzed in the comprehending phase. Existing theories of the perception of the environment were also reviewed in this phase.

In the synthesizing phase, I developed the general from the particular, as data were gradually removed from specific instances and abstracted into more generalized descriptions. Overviews of existing theories of the perception of the environment were superimposed with reviews of international landscape architecture works and the research-by-design data.

The coding of the research-by-design data was an open process of labeling and organizing the qualitative data to identify core themes. The coding was not intended to be derived from the theory overview. However, the researched theoretical models and concepts were largely confirmed by the landscape perception phenomena reported in the research-by-design workshops and interviews very early in the process. The design strategies identified in the review of international landscape architecture projects partly supported the theoretical concepts developed in this research, while also revealing that certain aspects of landscape experience remain insufficiently addressed in mainstream landscape architecture practice. In the synthesizing phase, I started to interpret and link research-by-design data categories with each other and with the theoretical concepts through analytical drawings and design comments.

To describe the theorizing phase, Morse (1994) states: “in qualitative investigation, the theory is developed from comprehending and synthesizing data, not as a structure or frame within which to sort data. [...] Theory gives qualitative findings application” (p. 32). I hold that this is also true in design-related research, such as research by design. Therefore, in this phase, I attempted to solidify the recognized design approaches and consider their application. I combined the collected data with existing theories from the ecological sciences, landscape architecture practice and theories about perception of the environment to underpin and develop categories of design approaches that reveal, interpret, and strengthen the aesthetic aspects of

ecological dynamics.

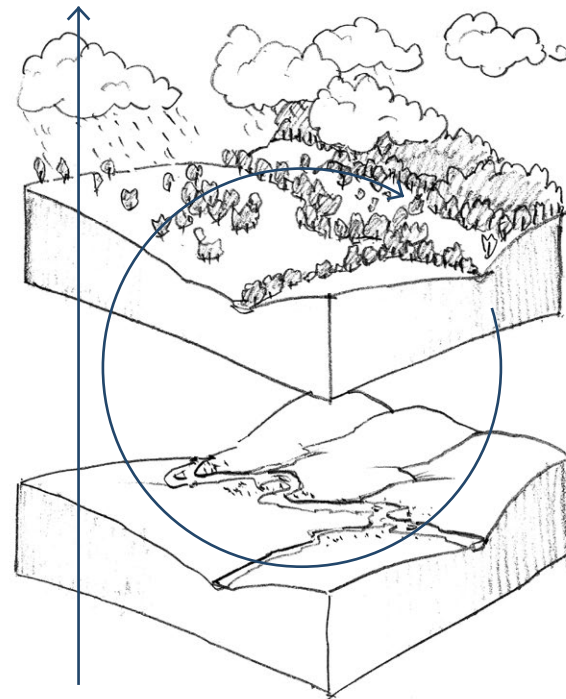
The recontextualizing phase finally allowed me to position the emerging theory so that it is applicable in other contexts. This provided a mechanism to demonstrate the transfer, usefulness and implications of the findings (Morse, 1994, p. 34). The design approaches that emerged from building the theory are situated in a landscape design context and demonstrate advances in the field through their application. Further research gaps and shortcomings in landscape architecture and landscape governance processes were also indicated here.

2.

**INTERPRETING AND VISUALIZING
LOCAL ECOLOGICAL PROCESSES FROM
EXTERNAL SOURCES**

Design thinking and methods are strongly influenced by the format of sources that a designer uses. Reading and interpreting the sources through the lens of ecological dynamics, as presented in this chapter, aims to support and inspire a process-oriented landscape design practice. Through the interpretation and illustration of external sources from the ecology, hydrology, soil science, and climatology ecological processes, the city of Hamburg and the three case study sites became legible as temporal phenomena shaped by both slow and fast ecological dynamics. This offers a new perspective on the mappings and other representations of ecological processes from the natural sciences that are usually used as a basis for landscape planning and architecture.

PRESENT MOMENT /
Fast processes and seasonal cycles



DEEP TIME /
Slow processes and large-scale
transformations

Fig. 1: Model for describing environmental dynamics. The diagram shows two elementary components of environmental dynamics, broadly based on the pace of change and spatial scale. Slow ecological processes and landscape armatures are depicted as geological structures and local or regional climate. Fast ecological processes and landscape patterns are shown as vegetation and other local structures and patterns on the soil profile.

2.1 Hamburg as a Landscape Armature

Hamburg, like any other place on earth, can be defined as a landscape armature on several scales, from the point of view of geology, topography, hydrology, weather, and climate to major vegetation structures. The most prominent landscape armatures in Hamburg are the topography and geology of the old drift moraine with sand depositions, known as geest landscape, and the valley of the Elbe River (see Figure 7). These features were formed by the glacial melt-water during the last glacial period (Weichselian glaciation) in northern Europe about 14,500 years ago. The stark topographical elevation on the edge of the geest landscape was further coined by the Elbe River throughout subsequent centuries and today divides the city of Hamburg into three distinct parts: old drift moraine in the north, old drift moraine in the south, and the glacial valley of the Elbe River between them. The two geest elevations are characterized by sandy,

gravelly soils, with fragments of dunes and heathland still intact, juxtaposing the flat marshland of the Elbe valley with silt and fertile soils.

For many Hamburg residents, the 30–50-meter-high steep geest slope is no abstract geological phenomenon, but a distinctive feature in their mental map of the city. Like many of the oldest settlements in



Fig. 8: Edge of the Geest with the “Altonaer Balkon” or the Balcony of Altona in Hamburg, Germany.

The Altonaer Balkon is a popular site in Hamburg, where one can grasp the vast landscape armature of Hamburg within a single view.

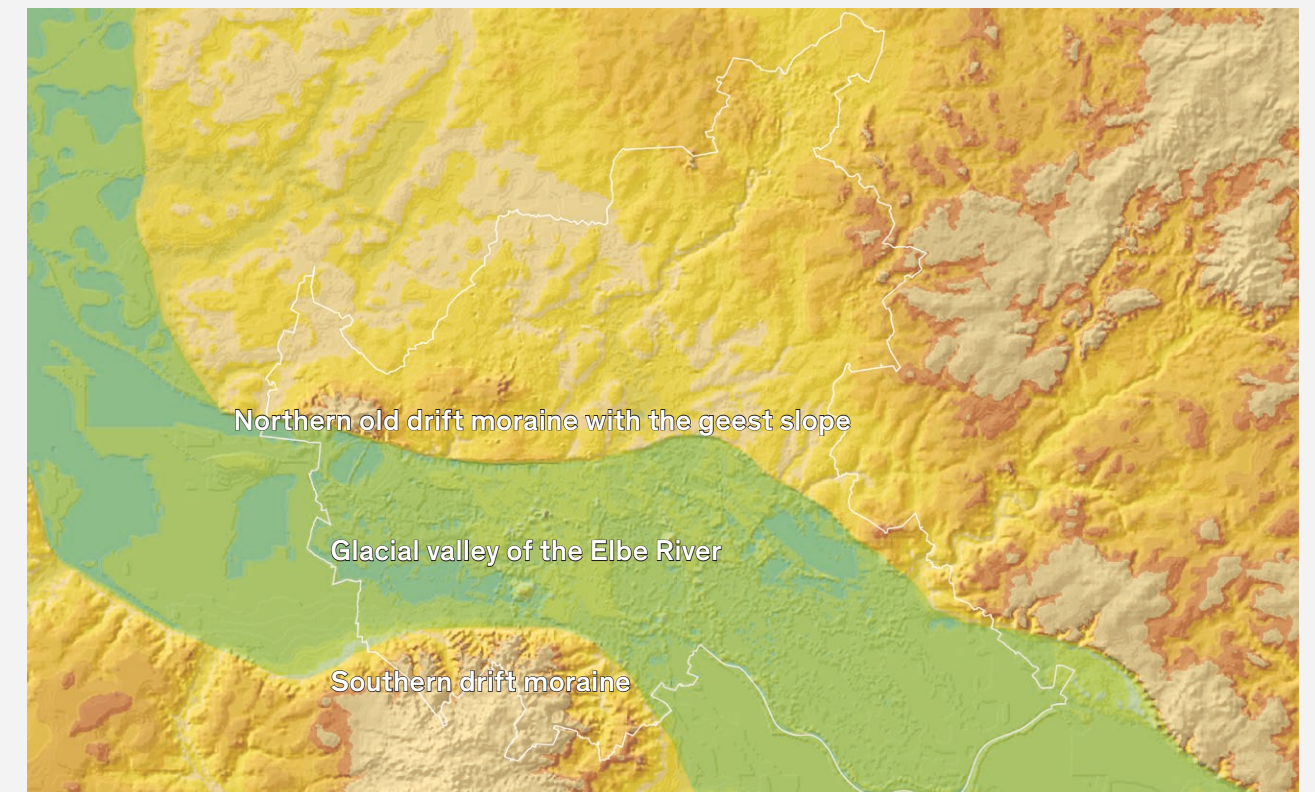


Fig. 7: Glacial Valley of the Elbe River in Hamburg.

Hamburg's recognizable landscape armature was created by the slow ecological processes of the ice age, the Weichselian glaciation, when glacial melt-water formed the valley of the Elbe River between two drift moraines.



Fig. 9: "Blick auf den Köhlbrand" or View of Köhlbrand, Painting by Lovis Corinth, 1911.

The landscape armature of the geest and the Elbe valley has structured the development of Hamburg over centuries and has maintained its aesthetic impact on the city, as conveyed in numerous artworks.

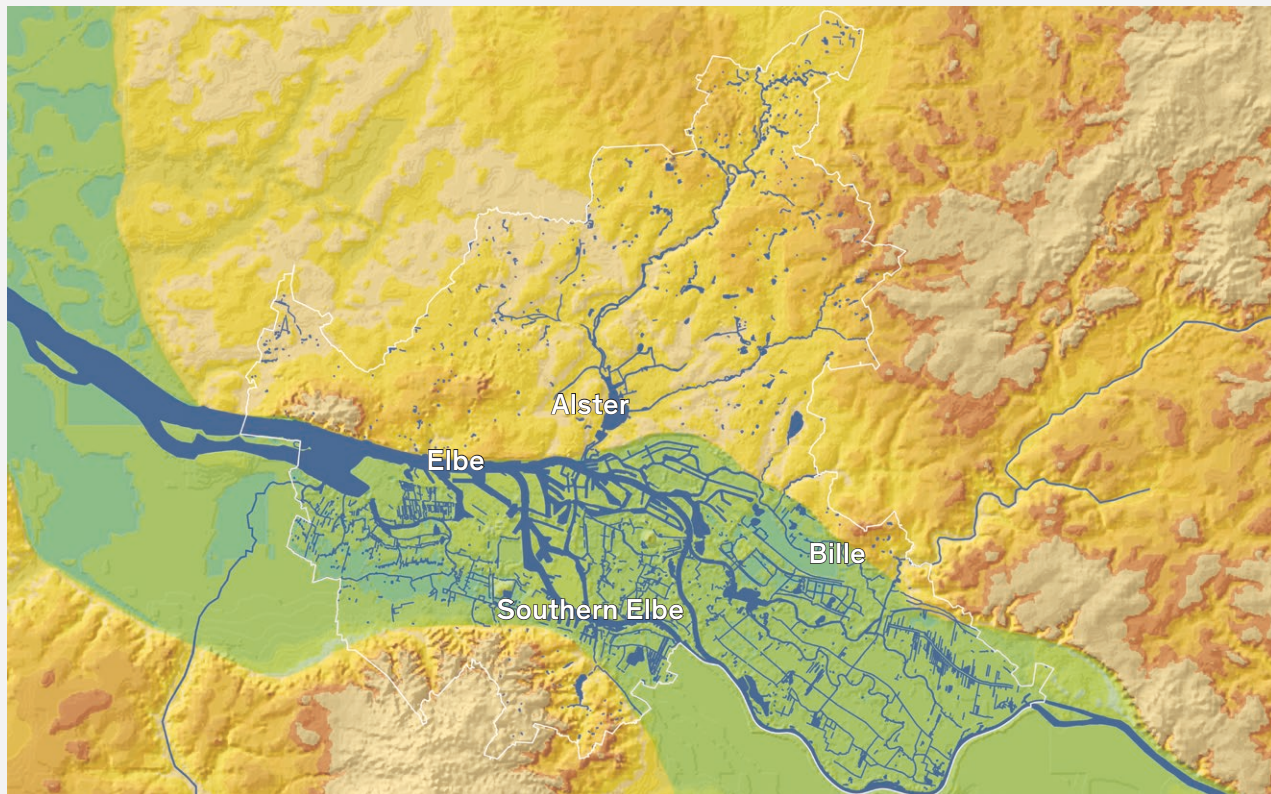


Fig. 10: The Network of Hamburg's Rivers Complements the Geological Armature of the City.

The Rivers Elbe, Alster, Bille and several other smaller watercourses were significantly altered, channelized and dammed to their present form. Their capacity to transform the natural landscape armature overtime was therefore limited. The water bodies occupy significantly less space than their natural riverbeds within the natural armature would allow.

Northern Germany and Denmark, Hamburg emerged on the boundary between the geest of a glacial moraine and a glacial valley (see Figure 9). The settlement developed in the safety of the northern geest moraine, protected from storm floods, but close to the fertile soils in the marshlands of the Elbe valley below.

The abrupt elevation of the northern geest edge today serves as a balcony in the center of the city, from which one can admire the magnificent views of the Elbe River and the harbor (see Figure 8). The northern geest edge stretches from idyllic heathland and pine forests in the west all the way to the east of the city, which is still characterized by the agricultural tradition and fragments of dunes. The vast expanse of the Elbe River and the marshy flatlands within its valley, with vegetable cultivation and fruit tree plantations, contrast with the steep geest and its dry soils. These armatures are a vital part of the identity of the city. They frame the atmosphere of everyday life and offer prominent features that allow inhabitants to orient themselves within the city.

The northern geest moraine is divided into eastern and western sections by the valley carved out by the Alster River and its tributaries (see Figure 10). At the confluence of the Elbe and Alster, where the steep slope of the geest edge is interrupted, the city of Hamburg was founded. These bodies of water have therefore been foundational armatures for the city of Hamburg since hundreds of years. They influenced the city's morphology and were later gradually reshaped by humans. The riverbed of the Elbe was significantly altered, channelized, and deepened to its present form, with two main streams, the Northern and Southern Elbe, and a dense network of smaller canals for port use and agriculture irrigation. Like the Elbe, the Alster River's course was also significantly changed. From 1235, the Alster was successively dammed in order to operate mills at Jungfernstieg, just before the confluence with the Elbe. The resulting stream developed into a lake in the following decades and centuries. This vast water body now lies at the heart of the city and is a landscape armature strongly identified with the city of Hamburg, along with the geest slope and the Elbe River.

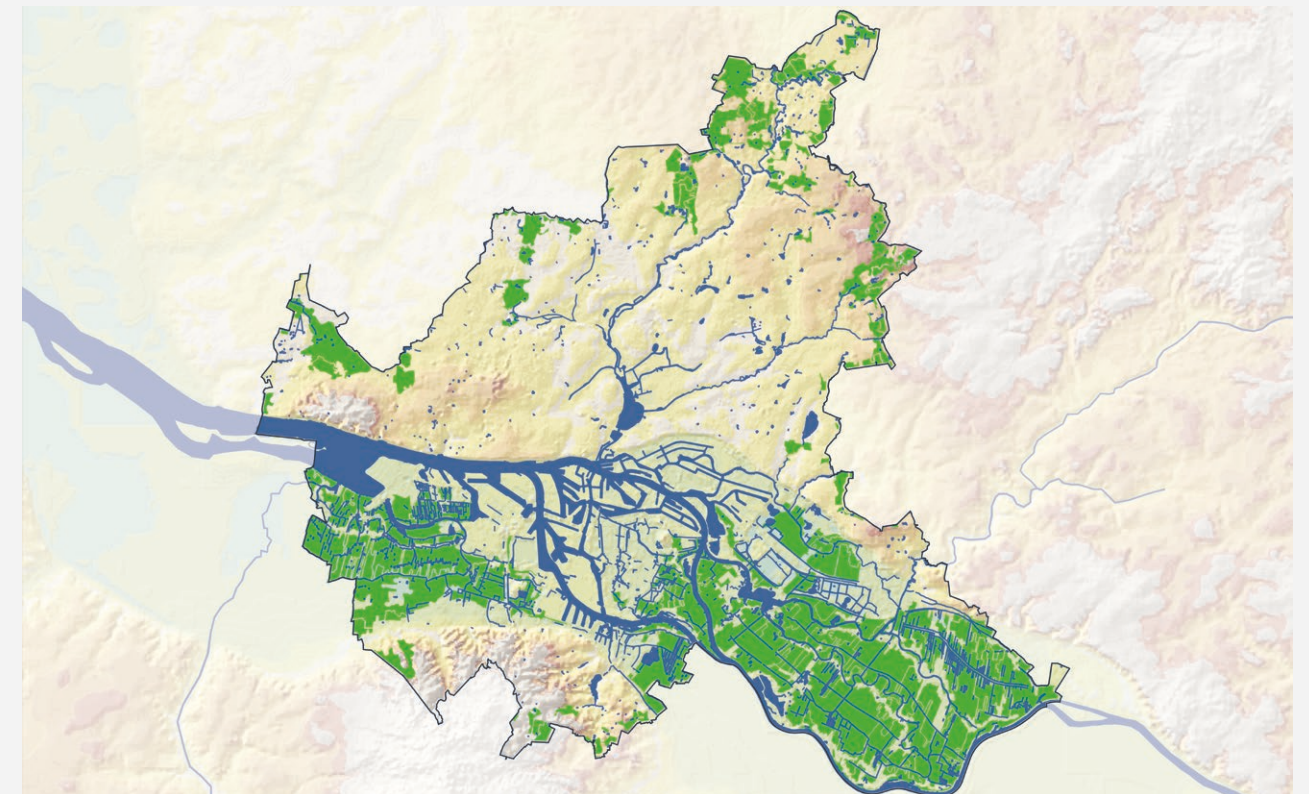


Fig. 11: Distribution Pattern of Agriculture Areas in Hamburg.

Agriculture areas with pasture, fruit, vegetable and grain crops are still mostly situated in the Elbe valley, where the slow fluvial and geomorphological processes deposited fertile land over millennia.

This gradual historical coalescence of the city of Hamburg with its armature context is, to some extent, consciously reinforced today. The city and local district-level planning authorities attempt to strengthen the unique character of the city's landscape with their strategic planning decisions. At the city level, the public administration for environmental planning BUKEA is developing the Green Network, a connected network of uninterrupted green spaces, two green rings, and landscape corridors running in all directions from the city center into the surrounding landscapes (BUKEA, n.d.-a). The landscape framework "Grün Vernetzen" or Connecting Green, largely follows the existing armatures of the city of Hamburg, such as valleys and corridors of the Alster, Bille, and Elbe Rivers, and smaller streams, such as the Wandse and Osterbek. The geest slope supports landscape corridors, such as Horner Geest (BUKEA, n.d.-c) and Harburger Geestachse. Extensive and uninterrupted ancient forests form other landscape corridors, such as Eimsbüttler Achse, and the Elbe River banks constitute Elbufer Achse. These green corridors and networks

of green areas are to create a superordinate green armature of the city of Hamburg. They are intended for leisure, as well as to facilitate species migration between habitats (BUKEA, n.d.-b), uninterrupted water flow, the flow of fresh air, and microclimate regulation. At the same time, they should strengthen the unique local aesthetic character of these landscapes and regulate the development of the urban fabric.

Despite of this long-term strategy to develop the existing green armatures in an interconnected network, the current patches of vegetation in the city are still relatively fragmented. This is common in urban environments, where the growing city fabric has historically encroached and displaced the landscape types that prevailed before. In Hamburg, by far the biggest green areas are dedicated to agricultural cultivation, such as pasture, fruit, vegetable, and grain crops in the fertile Elbe valley (see Figure 11). This corresponds to Hamburg's two major landscape armatures: the geest and the marshland. The green areas on the drift moraines are composed of fragmented patches of nature conservation areas and

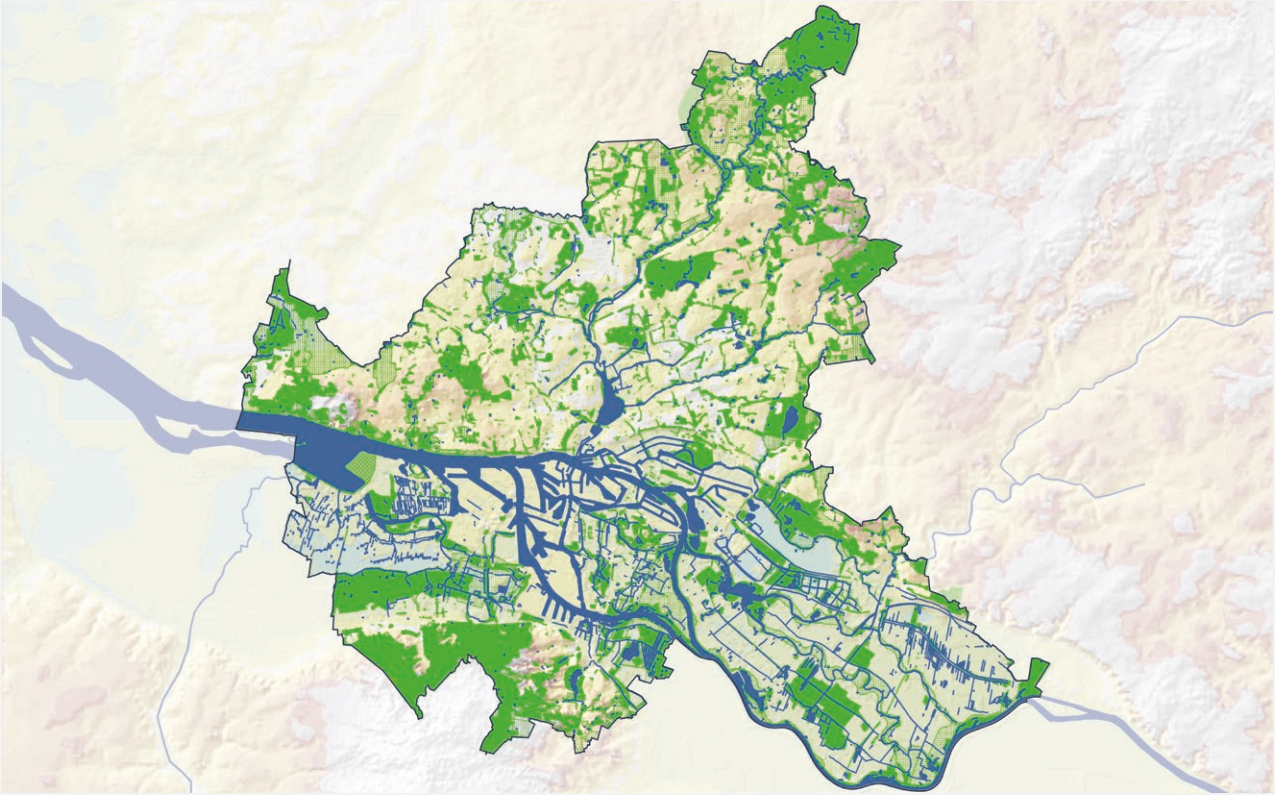


Fig. 12: Distribution Pattern of Public Open Green Areas in Hamburg. Current patches of public open green areas and corridors, such as forests, nature and landscape conservation areas, public parks, sports parks and playgrounds in the city of Hamburg are relatively fragmented and dispersed.

isolated relics of older forests, as well as parks and other leisure areas of all sizes (see Figure 12).

Hamburg's Green Network strives to link them with the model of two rings, inner and outer, and a radial system of landscape corridors leading to the surrounding countryside (see Figure 13). This radial model is a result of land-use planning and policy. To some extent, it is an artificial structure superimposed on Hamburg's natural landscape armature. Therefore, it does not entirely succeed as an intuitive carrier of identity on its own. The public administration for environmental planning, BUKEA, is developing a comprehensive public relations campaign (Hamburger Senat, 2018), with illustrated maps, interactive tools, guidance systems, signage, outdoor events, and symposia to consolidate the perception of Hamburg's Green Network as an armature of the city.

In areas where Hamburg's Green Network does not correspond with natural armatures and flows, such as major uninterrupted vegetation corridors, water bodies or the edge of the geest, it is challenging to communicate the idea of a green network. For a figure represented on a map to become meaningful to the population, it must be supported by landscape experience in real-life settings.



Fig. 13: Hamburg's Green Network as a Planned Future Landscape Armature for the City. Hamburg's Green Network strengthens the existing pattern of public open green spaces by creating new landscape connections and supporting the development and perception of a city-encompassing landscape armature.

2.2 Research-by-design Study Sites in Hamburg

The direct impact of landscape armatures and their environmental dynamics is apparent on many different scales. These range from the tidal dynamics, erosive force, and sedimentation processes of the Elbe River the paludification of moorlands, to forest growth and succession processes. Hamburg's main landscape armatures, the low-lying marshland in the glacial valley and the elevated geest moraines accompanying

it to the north and south, were formed by the slow ecological process of glacial erosion and deposition of material. Most local fast ecological processes are based on these geological landscape armatures and manifest in recognizable landscape patterns and vegetation communities. The complexity of these intertwined factors is enormous and cannot be listed here for the whole city of Hamburg. I therefore selected three distinct landscape sites to demonstrate the characteristic ecological processes that have shaped its development and continue to influence Hamburg's landscapes today (see Figure 14).

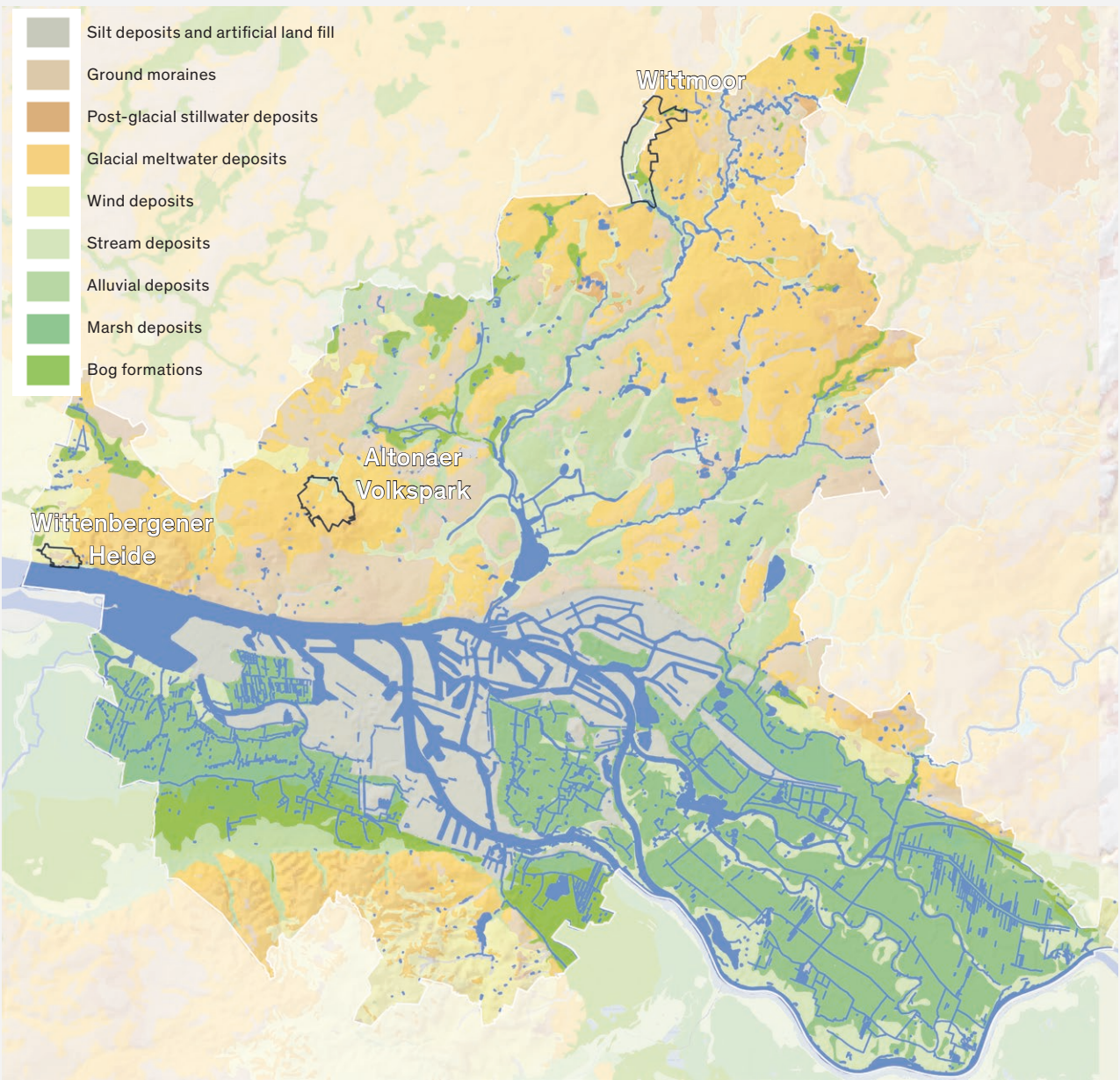


Fig. 14: Geological Map of Hamburg with the Three Study Sites. The three sites were selected because of their representative character for Hamburg in terms of ecology and aesthetic quality. They are set in different landscape types, which are rooted in respective geological context and the particular slow processes that influenced their geneses.

These represent three fundamentally different landscape types - a wet grassland and peat bog; a heathland with dunes; and an urban forest - that can all be found on the northern geest moraine in Hamburg. They were chosen because of their representative character regarding the ecology and aesthetic identity of Hamburg. The selected local landscape types were studied in three sample sites: Wittmoor (wet grassland and peat bog), Wittenbergener Heide (heathland with dunes), and Altonaer Volkspark (urban forest). The following section therefore narrows the focus to the vital fast ecological processes that affect the three selected study sites and the landscape patterns in which they are embedded.

External sources from the natural sciences, including ecology, hydrology, and soil science, provided the basis for interpreting and visualizing local fast ecological processes. These visualizations were developed within the design studios with students and in consultation with expert participants. In later steps of the research-by-design process these visualizations of local ecological processes were related to the participants' direct on-site accounts of experiencing their aesthetic impact (see Chapter 3).

2.3 Ecological Processes in Peat Boglands

The geest moraine in the north of Hamburg is built of glacial material deposits with soft undulating topography. Wet meadows and peat bogs developed in depressions and flatlands with poor drainage, as well as along some glacial river and creek valleys. The slow ecological processes responsible for peat formation and accumulation are dependent on the water inflow. Bogs that are supplied with water entirely from precipitation have low pH and low nutritional value, as they form closed systems, cut off from the influx of minerals. These wet landscapes are covered with mosses (Sphagnum), sedges, cotton grass, rushes (Juncus), and sundews (Drosera), and do not permit higher or woody vegetation due to the constant moisture. In nutrient-rich bogs that are supplied with ground or surface water, reeds and sedges dominate, with some wooded vegetation, such as birches, alders, and willows (BfN, n.d.-b). In Hamburg, the majority of bogs are nutrient-rich. The presence of standing water prevents the usual processes of forest succession in these areas, as tree cover cannot establish

permanently or dies back after flooding. Water-dominated processes of peat formation have been interrupted in many bog areas by human activities, such as draining the land and peat cutting. This has, in part, enabled forest succession processes and allowed for pasture and agriculture uses (Däumling et al., 2017). Besides the biodiversity loss, the bogland's function as a carbon sink is a critical concern for managing ecological processes by rewetting it again (see Figures 15 and 16).

→ CASE AREA: WITTMOOR (213 HECTARES)

Wittmoor is a bog landscape in the north of Hamburg on a watershed between the Mellingbek stream and Wittmoorgraben. The area lies in a tributary valley of the Alster that was eroded by the glacier tongue in the Weichselian ice age, the most recent period to shape Northern Europe by glacial processes (Tesch, 2017). Wittmoor is the last remaining raised bog in the north of Hamburg. Its slightly undulating topography, combined with mostly low vegetation, grassland, and heathland, offers wide views over big stretches of the landscape and the gentle transitions between the diverse landscape types of Wittmoor. These include bogland, carr and bog woodland, wet grassland with pastures and wetlands, several small water bodies and streams, birch and willow forests, and dry sandy habitats, such as heathlands and dry grasslands.

The glacial topography, dams, bog-related water regimes, and the contours of peat cutting and drainage infrastructure are the most obvious landscape armatures in this area (see Figure 17). The linear flows are clearly recognizable as physical structures in the landscape. These are formed by water streams and trenches, and the distinct linear ecotone zones between the diverse landscape types, such as forest and heathland, forest and grassland, and along the shores of the moorland water bodies that gently merge with birch forests. A historical landscape armature element typical in north German cultural landscapes are Knicks, hedgerows and trees that grow on low protective elevation walls built of soil, stones, or peat. These stretch for kilometers, often alongside paths.

The bog substance was heavily degraded by hundreds of years of peat cutting and drainage, with as much as two-thirds of the peat material removed. Today, horse pasture and grassland still represent an

active cultural landscape in some of these areas. The transitional raised peat bog, degraded by peat cutting, drainage, and lowering of the groundwater table, was partially restored by nature conservation management in recent decades with measures that rewet the peat substance. A water regime keeping the water level close to the surface throughout the year has been re-established in the bog area by building new dams and gradually abandoning the trench drainage system, which resulted in two scenic bog lakes in the heart of Wittmoor (see Figures 18 and 19).

As in many nature conservation areas, most of the habitats and landscape types here were created

or heavily influenced by cultivation in the past. The trees, mostly oaks, were cut for building and heating material and to create boardwalks over bog landscapes in prehistoric times. Due to the diversity of landscape types from arid to wet, many different ecological processes govern the area. The nature conservation status as a raised bog prescribes particular maintenance and management measures across the year that develop ecological processes in a desired direction. These strengthen its superordinate waterflow related moorland landscape armature and the distinct ecological identity of each landscape type within it (see Figures 17 and 20).



Fig. 15: A Peat Bog in Wittmoor with diminishing water regulation capacity creates a characteristic pattern of small dry elevations. Sedges and rushes cover these. If the growth is dense, they keep the pioneer succession processes at bay for an extended period.

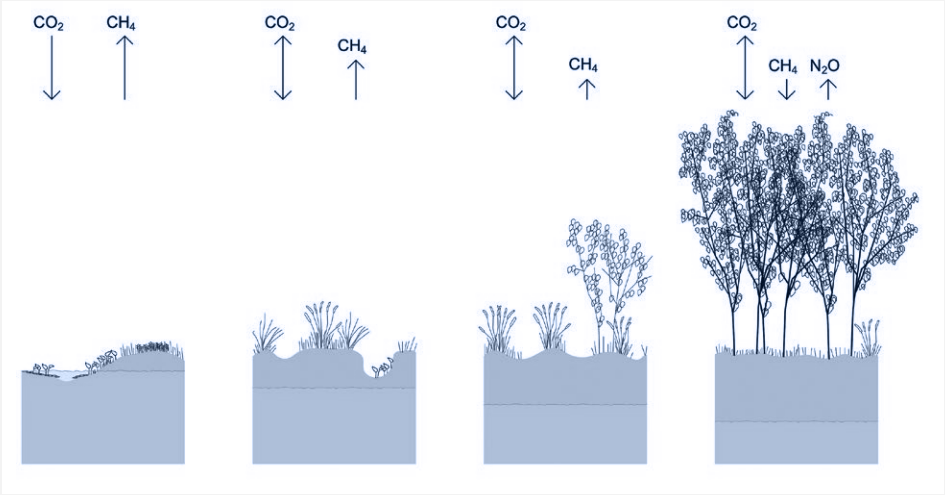


Fig. 16: Drying peat bogs shift from carbon sinks to carbon sources, with significant consequences for climate change (Pia Brockmann and Katrina Westphal, University design Studio, HCU). Besides the biodiversity loss, this is a critical concern for managing ecological processes by rewetting, including in the peat bog area at Wittmoor.

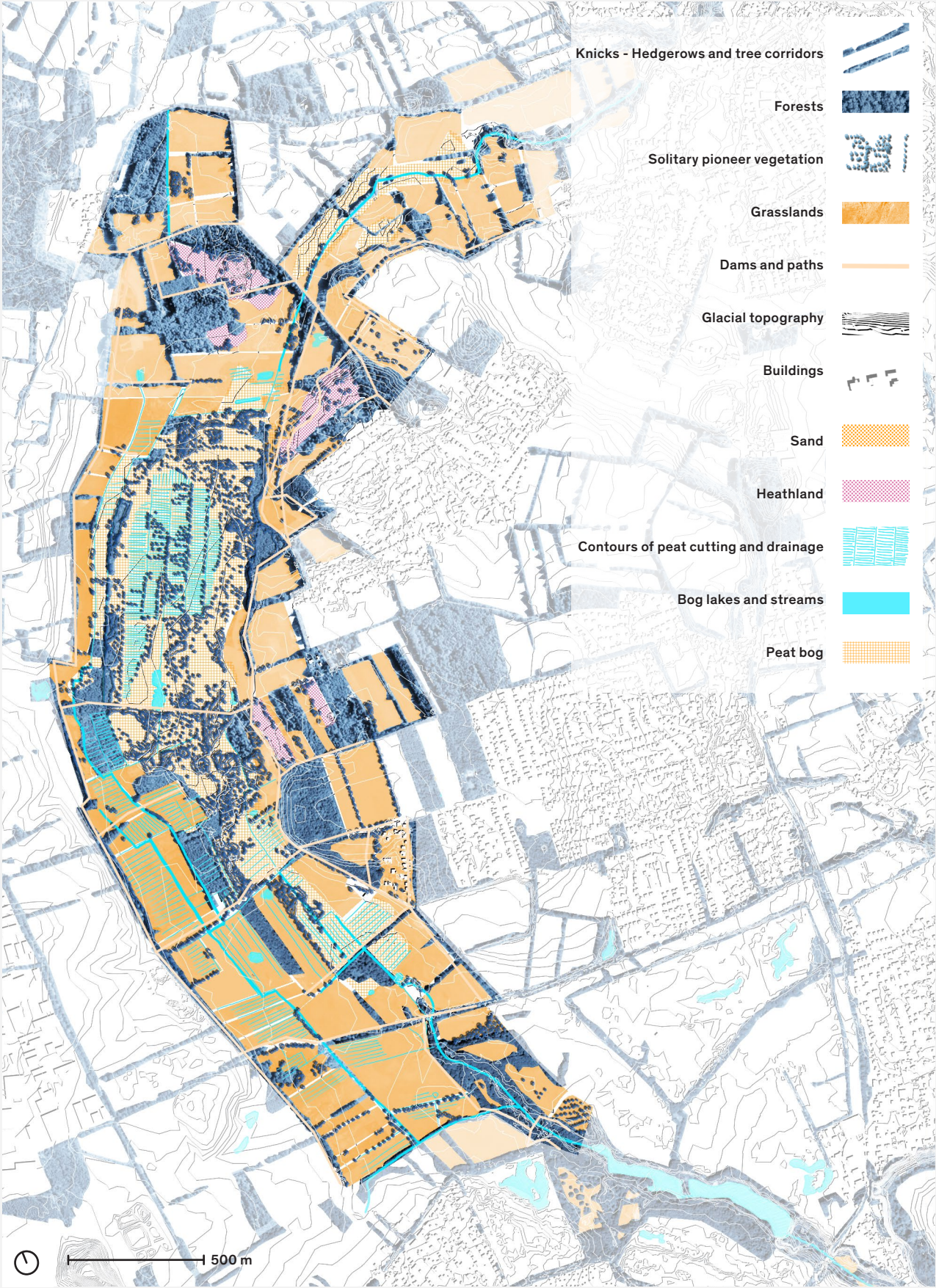


Fig. 17: Nature Conservation Area Wittmoor: Landscape Armatures and Landscape Patterns. The glacial topography, dams, bog-related water regimes, contours of peat cutting and drainage are the most obvious landscape armatures in this area. Hedgerows and tree corridors that grow on low protective elevation walls, add another layer to the legible landscape armature.

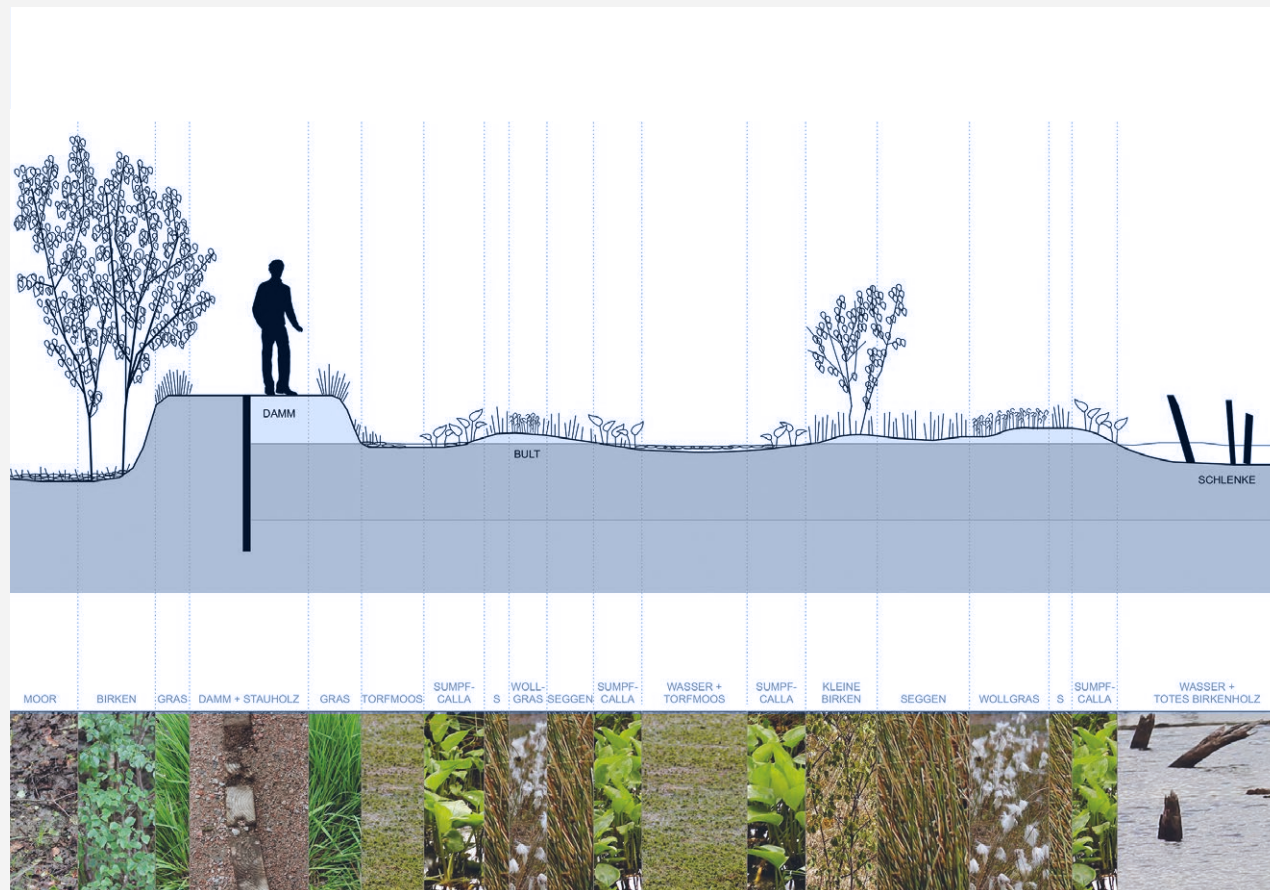


Fig. 18: Depending on the water regime and soil moisture content, various grasses, sedges, and pioneer species colonize the small patches of land (Pia Brockmann and Katrina Westphal, University design Studio, HCU).
Peat moss floats on the surface in the lake's shallow areas, while marsh calla grows along the damp shore of the bog lake, from which submerged birch deadwood protrudes.



Fig. 19: Scenic Bog Lake in the Heart of Wittmoor.
The dam through the Wittmoor boglands retains water in the lake and should, in the future, support the development of a bog-like water balance and ecological processes that are less dependent on human intervention, such as maintenance or the removal of pioneer vegetation.

In Wittmoor, most forest areas are left to develop according to their own dynamic processes of succession. Birch forests are slowly dying out in the bog area where the water has inundated them. This landscape image of decay has become a signature characteristic of the area and its most popular motif (see Figure 19). The juxtaposition of dainty, light birch forests and moorland grasses against the dry, rough heathlands with oaks contributes to the dismal and mysterious character of the moorlands.

In bog areas, however, trees and shrubs may also be removed through management interventions to prevent them from absorbing water from the peat layer and drying it out, or from overgrowing protected rare habitats. Selected plots of monoculture spruce forest

plantations have also been cut down and transformed into mixed deciduous forests.

Such management measures are as well prescribed for the heathland, where the sandy, nutrition-poor ground is subject to gradual eutrophication and attracts lower woody vegetation and trees, mostly pioneer species, such as birches. This colonization process is delayed by maintenance regimes, including manual or mechanical removal of saplings, as well as grazing by sheep, to protect the heathland vegetation (see Figure 22). Heathland as a cultural landscape was developed in this area as early as the Middle Ages and persisted due to grazing. The heathland as a cultural landscape is kept today for its ecological and cultural value.

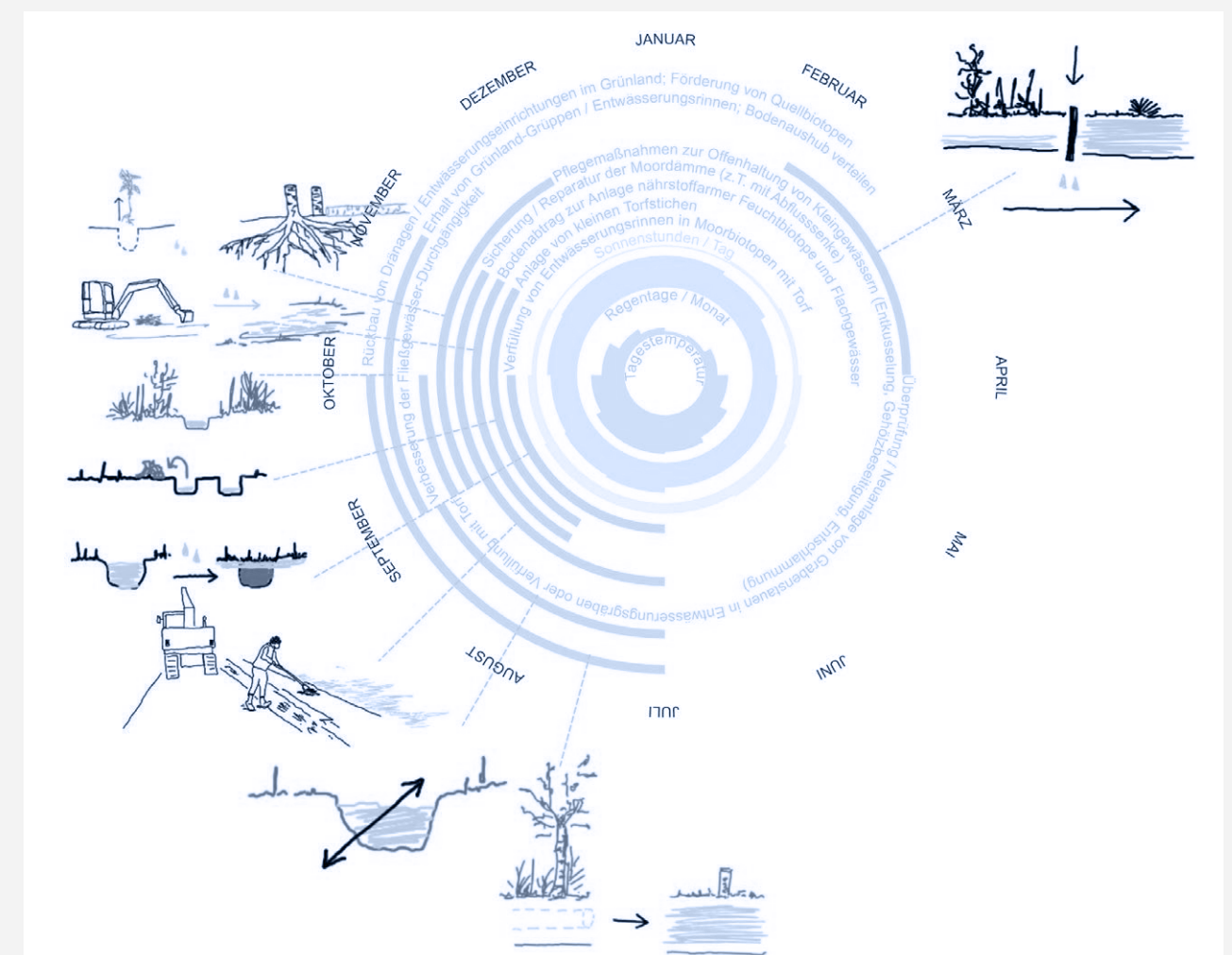


Fig. 20: The diagram illustrates typical seasonal maintenance practices and their effects on the ecological processes of the peat bog (Lina-Marie Bienmüller, Lea Gotthardt and Dimitrios Traianos, University design Studio, HCU).
Typical practices include soil removal to create nutrient-poor wetlands, the removal of birch trees and other pioneer vegetation from the peat layer, the dismantling of drainage infrastructure to create open water bodies, and the backfilling of drainage channels with peat or other suitable material.

2.4 Ecological Processes in Heathlands and Dunes

Like bogs, dunes and heathlands are often isolated historical landscape relics within the cities that reveal its formative slow ecological processes and underlying landscape armatures. The sand dunes in Hamburg are the legacy of the glacial meltwater and wind that deposited the glacial sand material on the edge of the Elbe valley (see Figure 21). They covered the majority of the landscape on the slopes of the geest before urban development and other land uses dominated the area. Heathlands were created after the Neolithic period by overgrazing and the collection of firewood from the forests that initially grew in the poor, sandy soil of the geest. Therefore, the origins of

this rare and protected habitat are anthropogenic, and heathland can be considered a cultural landscape. The succession processes of forest development are taking their course in all heathland areas where grazing and other removal of the vegetation has been abandoned (see Figure 24).

→ **CASE AREA: WITTENBERGENER HEIDE
(67 HECTARES)**

Wittenbergener Heide is a nature conservation area in the west of Hamburg. It lies in on the edge of the old drift moraine, the geest, and includes its steep, 30-meter-high slope and the lower-lying wet meadows in the valley of the Elbe River (see Figure 23). On the moraine, the landscape is characterized by sand

dunes and dry heathlands, which form the core focus of conservation efforts in this area. The dry, sandy character of the area results from regular winds that have carried sand sediments onto the northern bank of the glacial Elbe River valley since its formation, where they accumulated into dunes (see Figure 26). Due to the advanced forest succession processes, the dunes and the heath vegetation are now only preserved in isolated fragments. On the geest, three-quarters of the nature conservation area is covered by young acidophytic oak and mixed oak forests, with small areas of pine forest typical of north German sandy landscapes (Ringenberg & Haase, 2019). These forests are thick with impermeable understory due to the uninterrupted succession processes. However, centuries ago, they were managed by the practice of coppicing, which gave them an open, light-flooded character. A couple

of characteristic oak trees from this time - Kratteichen - are still present in the area (see Figure 25). With their sculptural habitus resulting from decades of coppicing, they are considered cultural as well as natural monuments. Coppicing as a wood harvesting practice has been applied in Europe since prehistory (Hibbert, 1978). In this area, it has probably been in use since the Middle Ages for tanbark harvesting (Ellenberg, 1996). Coppicing was applied on species of trees that produce new shoots from their stump or roots if cut down. Young tree stems were repeatedly harvested near ground level, resulting in a stool with new growth characteristically curved at the base (Ellenberg, 1996). In Wittenbergen, these were typically oaks, which are still existing today as remnants of the old cultivation practice and reminders of this area's historical extensive agriculture use (Poppendieck et

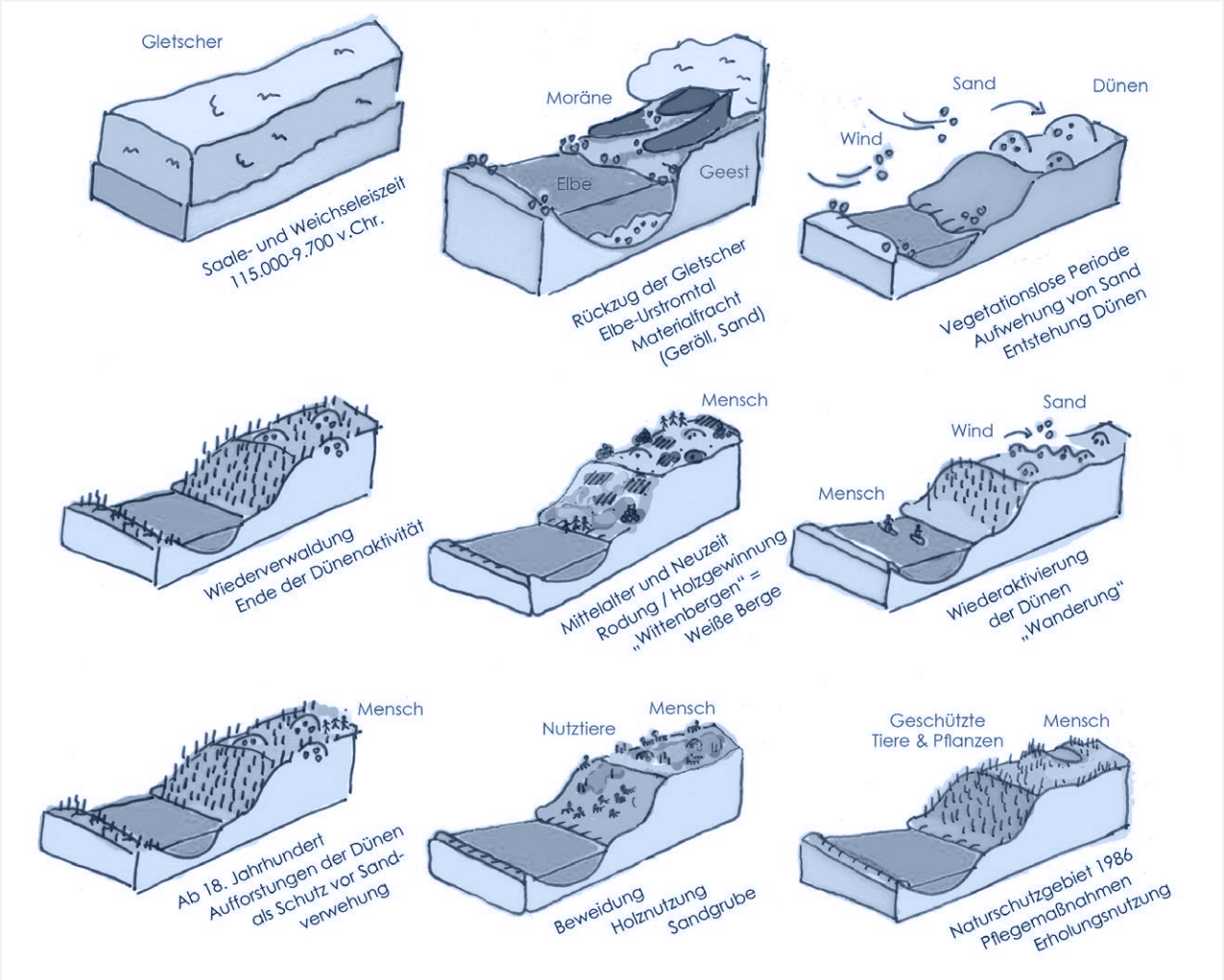


Fig. 21: Formation and Development of the Geest Landscape in Hamburg (Jörg Koffler, Marvin Brinkmann and Pascal Brade, University design Studio, HCU). The diagram shows the slow and fast ecological processes that created the characteristic dunes and heathland landscape type in Hamburg.



Fig. 22: In heathlands, the colonization process of pioneer vegetation can be delayed through labor-intensive maintenance regimes. (Lina-Marie Bienmüller, Lea Gotthardt and Dimitrios Traianos, University design Studio, HCU). These include manual or mechanical removal of saplings and heath rejuvenation, as well as grazing by sheep to foster the heathland flora.

al., 2010). The thin trees shoot up in competition for light in the dense younger forest cover that grows in the surrounding area today. In contrast, the old oaks have a spacious habitus. Having stood for centuries as solitary trees within a low heathland landscape, they still occupy space generously today (see Figure 25).

The combination of coppicing and heath pasture historically caused extensive deforestation in Wittenbergener Heide and many other landscapes on the geest. Cutting and grazing continued until the forest's regenerative ability was exceeded, and the area was entirely overtaken by heath (*Calluna vulgaris*). Sheep grazing drew nutrients, mostly nitrogen, out of this landscape which was then distributed elsewhere on the agricultural fields as fertilizer in the form of livestock manure. The heath was also used as livestock bedding, for which the upper layer of soil was removed by hoe and spade.

For centuries, the horizon of this landscape was defined by a low carpet of heathland plant communities and a few solitary coppiced oaks, which maintained

its open expanse. The continuous disruption of the vegetation cover through grazing and harvesting contributed to further loss of nutrients and lower pH, but it also continuously rejuvenated the heath vegetation (Ellenberg, 1996, p. 51). These ecological processes have largely ceased since the invention of artificial fertilizers at the end of the nineteenth century. The extensive heathlands became obsolete as a source of manure to enhance the productivity of farmland. As a consequence of this development, heathland and dune patches in Hamburg and Wittenbergen are increasingly confined to small areas and colonized by tree cover (see Figure 23).

The pioneer species of birches (*Betula pendula*) and pine trees (*Pinus sylvestris*) usually conquer the heath areas first, followed by mixed oak forests, which might further develop into European beech forests as a climax of the vegetation succession process. These ecological succession processes are typical of most comparable natural sites in northern Europe. In addition, invasive species such as wild black cherry

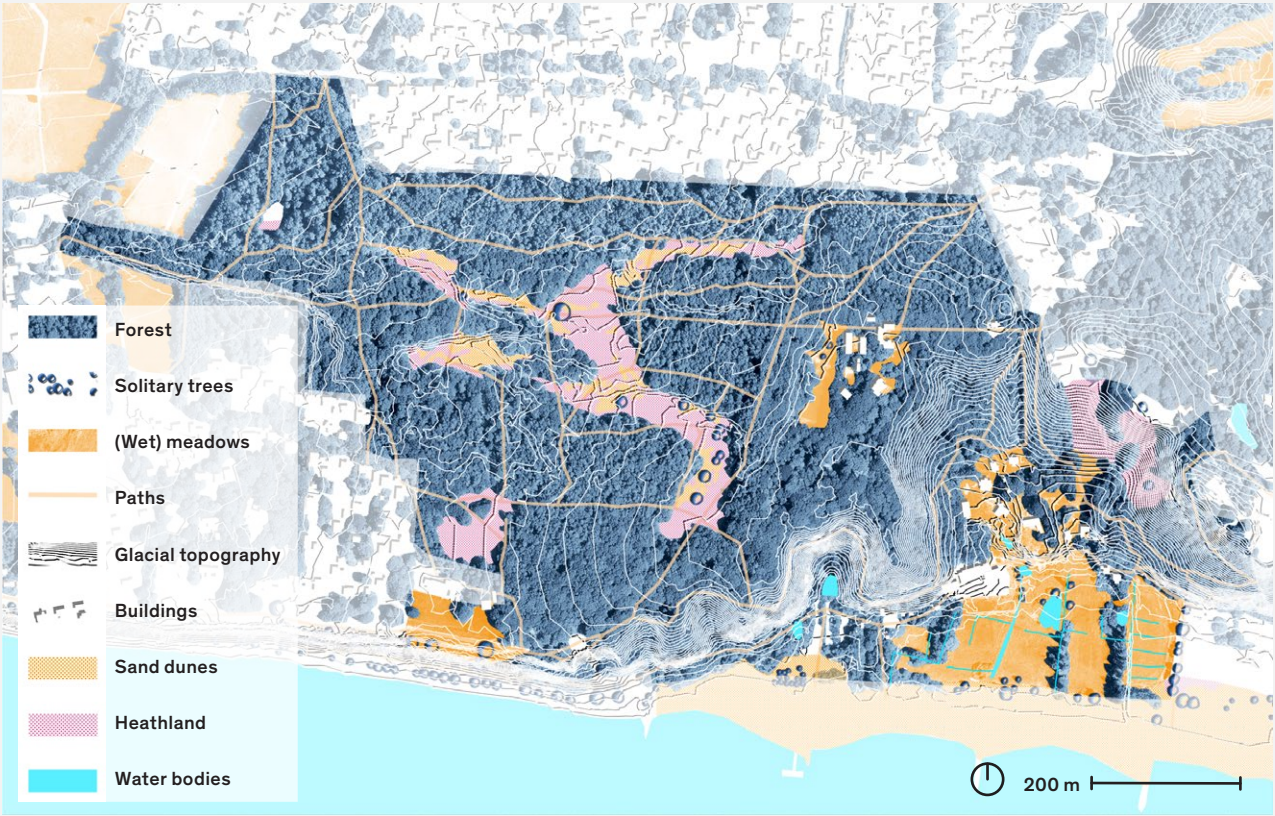


Fig. 23: Nature Conservation Area Wittenbergener Heide: Landscape Armatures and Landscape Patterns. Additionally to the glacial topography with the steep edge of the geest the landscape armature of Wittenbergener Heide is formed by the contrast between dense volume of the forest and the open area with heathland in the center.

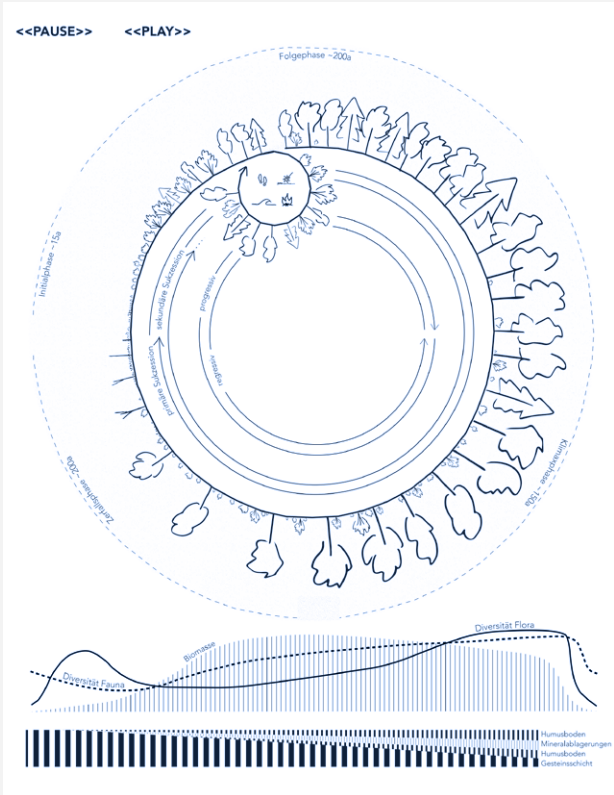


Fig. 24: Maintenance regimes in heathland and forest periodically remove large amounts of biomass from the area (Paul Allard, Anna Holzinger, and Philipp Rosenow, University design Studio, HCU). These practices interrupt forest succession processes and shape the vegetation composition and species diversity.



Fig. 25: Ancient Coppiced Oaks Known as Kratteichen. The historical practice of coppicing for wood shaped the sculptural habitus of these solitary oaks. Coppiced trees are now valued culturally and aesthetically and are supported with maintenance processes that imitate this harvesting technique.

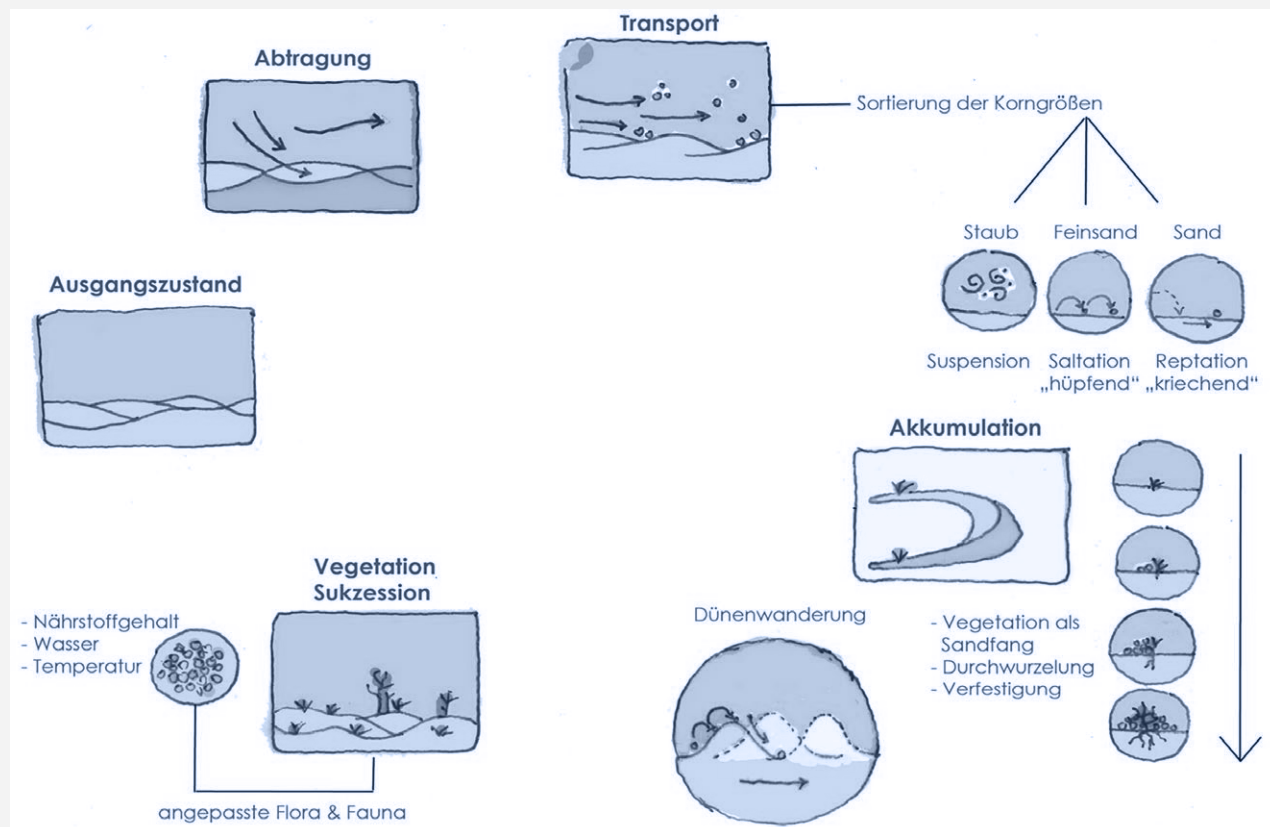


Fig. 26: The Processes of Dunes Formation (Jörg Koffler, Marvin Brinkmann and Pascal Brade, University design Studio, HCU). The dunes at Wittenbergener Heide were formed by regular winds that carried sand sediments onto the northern bank of the glacial Elbe River valley. Today, increasing nutrient levels in the sand allow grasses to gradually colonize the dunes and initiate vegetation succession processes.



Fig. 27: Dunes at Nature Conservation Area Wittenbergener Heide. Ecological processes of dunes and heath rejuvenation are ensured artificially by the management processes and keep the core of the nature conservation area open with sand and low vegetation.

preventing these erosive processes, so the slopes, like the dunes and heathlands, are gradually conquered by woodland (Ringenberg & Haase, 2019). The few small dunes in the area are an impressive site for visitors, as such landscapes are rarely found in urban areas (see Figure 27). Under natural conditions, the dunes would be reshaped by wind erosion and gradually migrate over time (see Figure 26). Yet, as urban development and vegetation increasingly encroach upon them, they are now artificially maintained to prevent overgrowth (see Figure 22).

Beyond the steep descent of the geest edge, the tidal dynamics of the Elbe River dominate the ecological processes along the narrow strip of river shore. The freshwater tide creates a rare natural environment typical of the estuary of the Elbe. The water rises approximately two meters and floods the silt banks twice a day, creating good conditions for the development of alluvial forest, which is present on the site in a rudimentary form (see Figure 28).

The tidal dynamic processes are also crucial for the wet meadows adjacent to the riverbank. The meadows are a sensitive habitat that depends partly on the amount of water the trench drainage system allows in the area and partly on the mowing frequency. If the meadow is too wet, reeds develop, which is already occurring to some extent. Historically, the balanced system of grazing and flooding created wet meadows that provided more valuable grazing land than heathland, as they were regularly enriched by nutrient-rich alluvial deposits from the Elbe. Today, they present another cultural landscape that is no longer economically relevant. Flooding and periodic mowing are still maintained as key ecological processes because they support the area's biological diversity and its protected wet meadow species, including the endangered chess flower (*Fritillaria meleagris*).

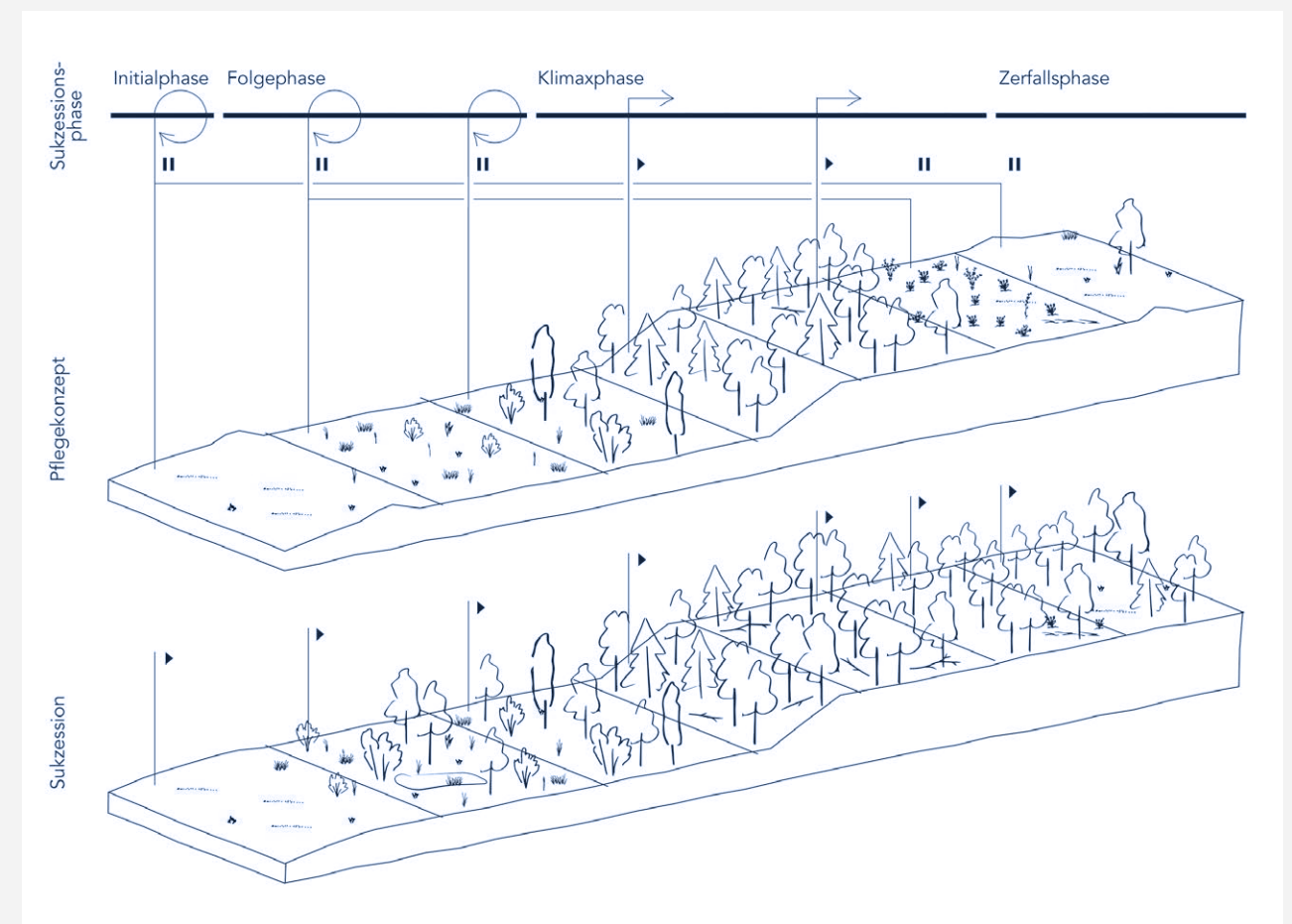


Fig. 28: Two scenarios of vegetation growth in wet and dry habitats on the geest slope of the Wittenbergener Heide (Paul Allard, Anna Holzinger, and Philipp Rosenow, University design Studio, HCU). The upper scenario shows the geest slope under intensive maintenance regimes, while the lower scenario depicts the vegetation structure that would emerge if unconfined succession processes would prevail.

2.5 Ecological Processes in Urban Forests

In contrast to ancient landscape types, such as bogs and heathlands, forests in the city are very heterogeneous in terms of their evolution. They exist in relatively isolated patches encircled by the urban fabric. Some are relics of the old woodlands that belonged to every village in the area since the Middle Ages as a source of raw materials and pasture. These contained mostly oak trees; an understory depleted from overgrazing. Since the pasture was abandoned, many of those old forests recovered, however the composition of their herbaceous layer differs from that of younger forests. Many younger forest patches in the city developed on the heathlands, moorlands and grasslands that were gradually afforested from the start of the industrial revolution (Poppendieck et al., 2010).

Therefore, urban forests are less strongly conditioned by the geological armatures than moorlands and heathlands are. The genesis of forests in the city is also associated with the private gardens of the nobility and, later, the establishment of public parks. Garden design styles and forestry management techniques that dominated different time periods strongly shaped the ecological processes within them. Rejuvenation practices, forest restructuring, and the choice of native and non-native species merge with natural succession patterns and shape visual, sensory, and atmospheric characteristics of these different forest types. Nutrient cycles, water tables, air quality, and invasive species also affect the fast ecological processes and, consequently, the aesthetic character of urban forests.

→ **CASE AREA: ALTONAER VOLKSPARK
(121 HECTARES)**

Altonaer Volkspark is a public park in the northwestern part of Hamburg, the Altona district (see Figure 30). When the park was founded in 1914, Altona was a town independent of Hamburg that had grown to be one of the densest urban areas in the German Empire in the 19th century. In 1890, Altona acquired a plot of land at Bahrenfelder Tannen to create a big public park for all social strata according to the newly developed concept of a “Volkspark” - a people’s park

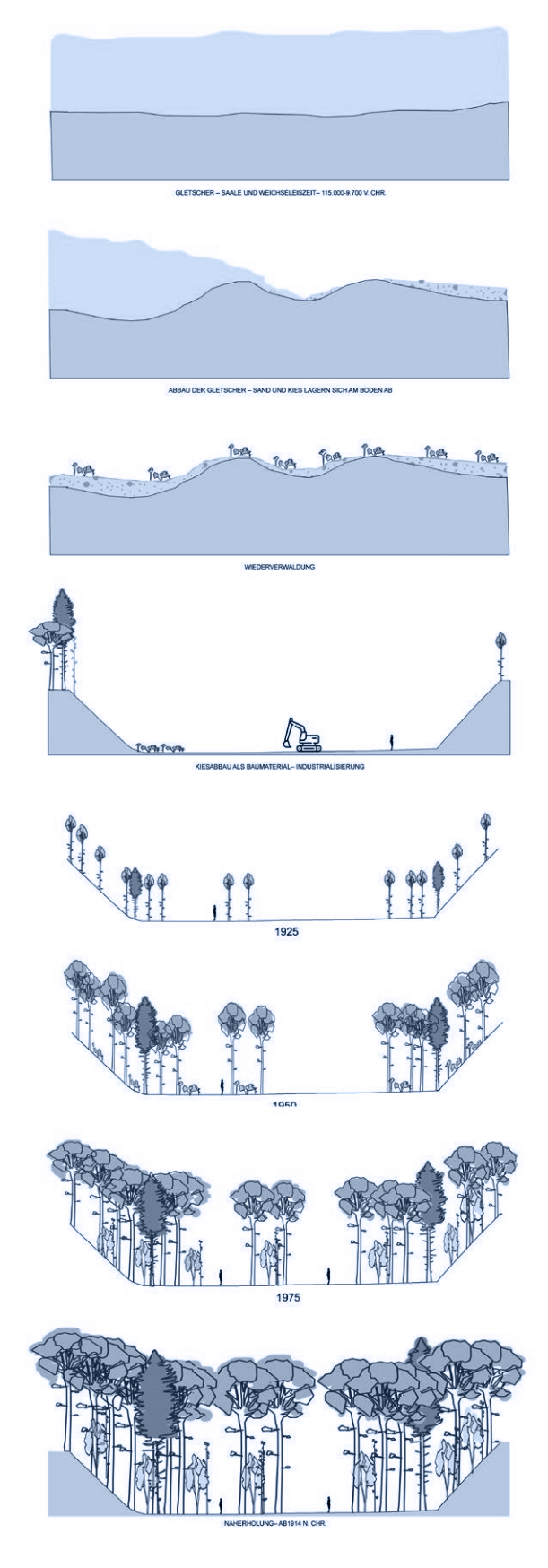


Fig. 29: Processes Contributing to the Landscape Armature, Spatial Patterns, and Present-Day Aesthetic Character of Altonaer Volkspark (Anna Krah, Amelie Radwe and Selina Sophia Neckelsen, University design Studio, HCU).
The glacial geology, sand extraction, and forest succession initially shaped the landscape armature of the area. Building on this foundation, Ferdinand Tutenberg developed Altonaer Volkspark.

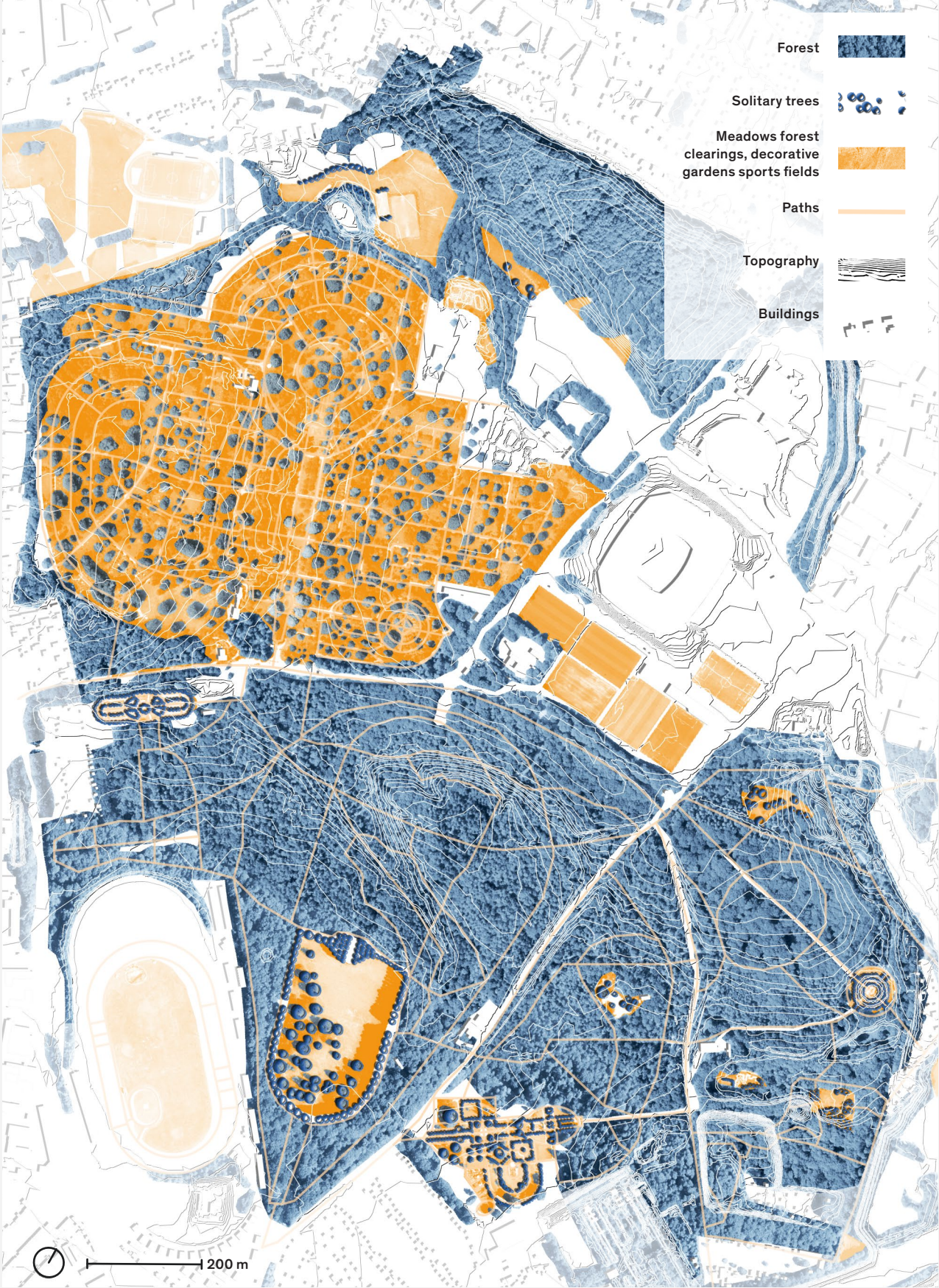


Fig. 30: Altonaer Volkspark: Landscape Armatures and Landscape Patterns.
The forest cover is shaped by partially unconfined processes of growth, decay, and succession, while remnants of the and geometric clearings and other historical garden structures of the Volkspark tradition form distinct islands within the forest matrix.

(Schnitter, 2014). The area was barren land at the time, with sandy heathland, low bushes, scrub, and an uneven terrain partially caused by sand quarries (BUKEA, n.d.-d).

The underlying armature layer presents the park's extreme topography, reminiscent of the sand harvesting activity and the geological glacial history of the area (see Figure 92). This topography is still recognizable as a landscape armature in the present day. The steep paths, the views from the ridges, the moist microclimate of its depressions, and forest cover underpin the experience of the park. The forest vegetation cover offers a relatively undisturbed habitat within the otherwise dense urban fabric of Hamburg Altona. Forest development is guided by an interplay of partially unconfined ecological processes of growth, decay, and succession, alongside active maintenance and management practices. The third characteristic of the park is its numerous fragments of historical garden structures that are stylistically related to the Volkspark movement: formal rose and dahlia gardens, flowerbeds rimmed by Buxus hedges, pavilions, promenades, view axes, amphitheatres, and other elements. These are protected by the Denkmalschutzgesetz, cultural heritage conservation act (Landesrecht Hamburg, 2013).

The *Reformbewegung*, a social reform movement, emerged in the mid-nineteenth century in the German

Empire and later spread to other parts of Europe and the United States. A Volkspark as a new type of public green space that arose during the reform was to offer more differentiated leisure opportunities than were commonly available at the time. The strictly representative character of parks in the 19th century, with decorative lawns, flowerbeds, and paths for strolling, was gradually loosened.

Immediately after the purchase, the area was planted with young fir tree and oak saplings. However, Ferdinand Tutenberg, the head landscape architect of Altona, officially started implementing the park plan only two decades later. By then, the area boasted dense vegetation cover that developed from the saplings. Building on this underlying condition, Tutenberg began to realize his vision of a *Schönheitswald* - a "beauty forest." (see Figure 31). By adjusting the species composition of the existing tree cover, he attempted to develop a mixed forest and increase the benefits of the park in terms of atmosphere and aesthetic experience (Grunert, 2001, p. 356). He first ordered the conifers growing in dense groups on dry sandy soil to be thinned down. This helped the birches and oaks thrive where they were before competing with other trees for resources. He additionally planted native birch, maple, hornbeam, beech, and oak trees to develop the light and bright character of a deciduous forest, which the existing dense fir conifers, with their dark shadows,

could not offer. *Schönheitswald* was a design concept coined by Tutenberg to develop a forest park through management and maintenance practices that were both technical and artistic (Grunert, 2001, p. 356).

The goal of his design concept was for the diversity of all the succession stages of the vegetation to be apparent in the forest, from saplings to mighty, mature trees and deadwood, as well as different layers of understory, bushes, and trees. Tutenberg understood his role as a designer by enhancing the existing "beauty" of the area and intervening where "disharmonies and imperfections" presented themselves (Grunert, 2001, p. 356). The ideal model for this aesthetic decision was a healthy mixed forest with its natural charm, color, texture, light, giant sculptural trees, and rich stratification. A couple of exotic species, such as northern red oak, bird cherry, North American Douglas fir, blue spruce, and Oriental spruce, were added (Wette & Küneke, 2019), as was fashionable at the time (Grunert, 2001).

During Tutenberg's lifetime the ecology was not evolved as a normative science to prescribe the development of diverse strata and succession stages in a forest or stress their importance for biodiversity, as is common today. However, Tutenberg seemed to prefer diverse strata intuitively, most likely inspired by the aestheticization and glorification of intact natural landscape types in the Romantic era. This aesthetic vision was combined with active support for wildlife. Tutenberg recognized that a healthy forest provides valuable habitat for birds. He arranged nesting places, drinking and bathing spots, and winter feeding stations, and also planned to provide good conditions for insect populations (Grunert, 2001).

A Volkspark was to include sports and other activities on the lawns; use and appropriation of the areas were welcome. Tutenberg found the natural character of a forest suitable for such activities, combined with lawns, paths, and smaller vegetable and decorative gardens where visitors and school children could garden on their own and learn about plants. The generous lawns and forest were to offer people of all social strata, especially those who lived in dense urban and industrial districts, access to fresh air, contact with the natural environment, and the opportunity to enjoy activities outside. Altonaer Volkspark therefore emerged as a subtle combination of forest and park, reflecting a deliberate design decision from the outset. Tutenberg understood the concept of the *Waldpark* or a "forest park" as a viable response to calls for park

reform during the ongoing social reform movement.

At the beginning of the twentieth century, debates about how to formally arrange the new programmatic content of a Volkspark favored architectonic compositions, geometric layouts, and clearly divided green spaces. Many new Volksparks at the time adopted this style, such as Stadtpark in Hamburg and several works by the influential landscape architect Leberecht Migge (Grunert, 2001). Tutenberg did not strictly follow this model, but applied some of its aspects, which are



Fig. 31: The Processes of Restructuring the Forest Communities in Altonaer Volkspark (Gesche Delfs and Sarah Schmidt, University design Studio, HCU). The fast ecological processes in urban forests are steered and curated by maintenance and management regimes. In Altonaer Volkspark, these processes started with the vision to develop a *Schönheitswald* - a beauty forest. This entailed transforming a dense monocultural conifer forest into a mixed light-permeable deciduous forest.

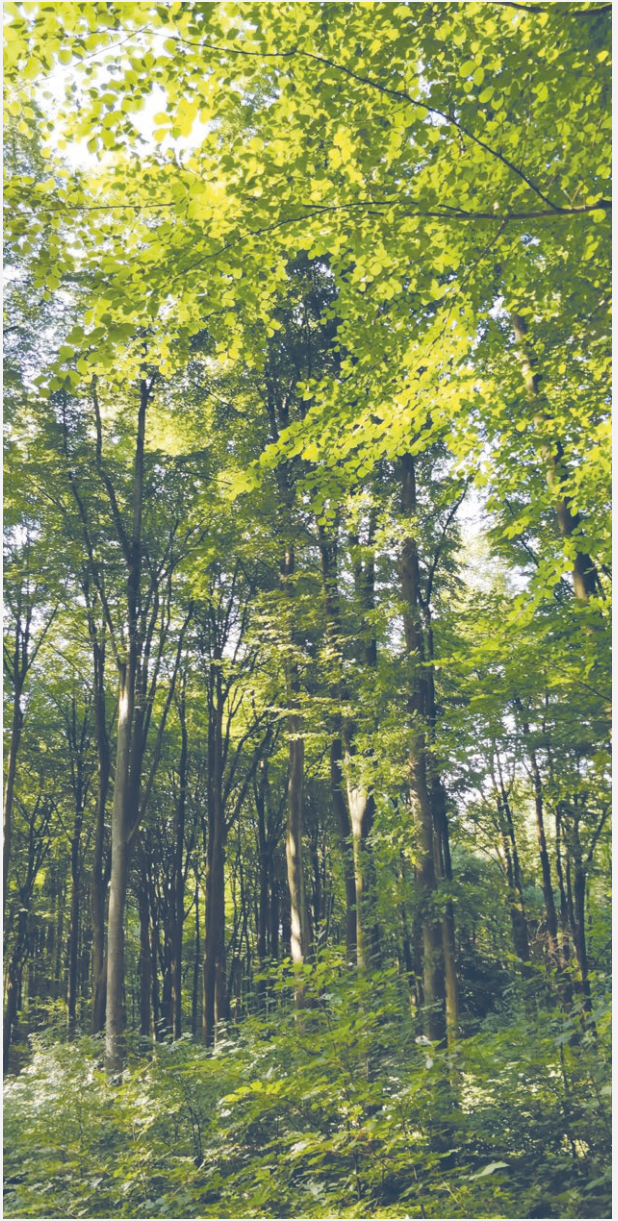


Fig. 32: The Forest at Altonaer Volkspark. Today, the park is characterized by forest vegetation with coniferous and mixed deciduous forest patches, predominantly of beech, with few oak and fir tree stands. Forest succession processes are complemented by forestry practices for forest rejuvenation and support of desired species composition.

still evident in the horseshoe shape of the large central lawn framed by rows of oak trees, the geometrically arranged paths and decorative gardens, and the long, prominent axes. However, rather than adopting the design canon of the reform movement too literally, Tutenberg responded with sensitivity to the site's existing landscape character, ecological processes, and underlying landscape armature. The existing forest vegetation and the topography, which was largely the result of sand extraction in the area, both blend seamlessly into the park fabric. Most geometrical elements and long view axes through the park and forest are now at least partially overgrown. Tutenbergs initial design concept of tightly knitting the natural and social developments in one forest park is still a sound basis for the cohabitation of flora, fauna, and human activity in Altonaer Volkspark in the present day.

Currently, the park is characterized by forest vegetation with coniferous and mixed deciduous forest patches, predominantly of beech, with few oak and fir trees. From 1933 on, the forestry management in the park was restructured, and more conifers were planted again. After 1945, intensive forest maintenance decreased, and only a few thinning or planting works were implemented (Wette & Küneke, 2019). As a result, much of the current tree cover is an even-aged forest, more vulnerable to catastrophic events, such as storms and pest outbreaks, than a forest with more differentiated strata and succession stages. In Altonaer Volkspark, beech tree stems of the same height, almost without an understory layer, stretch several tens of meters to the sky, competing for the sunlight. Rays gently pour through the leaf curtain, creating a characteristic nearly sacral atmosphere that Tutenberg himself (Grunert, 2001, p. 356) and some contemporary landscape architects (e.g., Winogrand, Landezine, 2020) described as a *Walddom* - a forest cathedral (see Figure 32).

2.6 Conclusion

Interpreting and visualizing local ecological processes from external sources helped to establish a mental connection between the descriptions of ecological dynamics and their spatial manifestations over time. It demonstrated how armatures and spatial patterns in the landscapes are caused by geological processes, the growth of plants, the succession of vegetation communities, and other ecological dynamics. Interpreting and visualizing local ecological processes also made the spatial and aesthetic impact of maintenance and cultivation practices over time obvious, including gardening and landscape design decisions. The close relationship between these ecological processes and the particular character, and atmosphere of each unique site also became apparent.

The ecology of peat bogland is shaped by the complex logic of its water regimes. The dams and drainage channels that control water flows therefore also govern the spatial and aesthetic impact of most other ecological processes on site. The slow decline of birch forests, inundated dead wood, and the flora, fauna, and microclimates specific to moist environments create an uncanny character in this landscape.

The spatial character of generous open expanses, the continuous horizon of low, coarse, dry heathland vegetation, and the sandy dunes are under constant threat from nutrient influx and succession processes encroaching from the surrounding forest matrix. Taller vegetation growth is changing both the ecological and aesthetic identity of this landscape.

In an urban forest, succession processes continuously shift glades and openings within the forest matrix, alter species composition and stratification layers, and create changing patterns of light beams and shadows. Meanwhile, forest management regimes push against these spontaneous dynamics and attempt to steer them, prevent overgrowth and expansion of invasive species.

By consciously examining and the relationship between ecological dynamics and their impact on the spatial character of landscapes, a site's unique aesthetic content can be revealed and used as a shared basis for creative processes in landscape design. Interpreting and spatially visualizing local ecological processes from external sources can serve as a valuable tool in the design process.

3.

**TRANSLATING AND NARRATING THE
PERCEIVED ECOLOGICAL PROCESSES
ON SITE**

This step of the research-by-design process aimed to record and translate the participants' individual aesthetic experience of ecological processes as well as to establish a common ground for discussions among the study participants. An empathic, shared basis for discourse about management, maintenance, and design was set by exchanging personal perceptions during site visits. Being in the landscape and focusing simultaneously on the bodily experience and the aesthetic landscape qualities was intended to ground the participants emotionally. When participants returned from the site visit to the venue where the co-design workshops took place, the discussion began with their individual reports of their experience in the landscape. The discussion groups were small, with up to eight participants each, including moderators. This instituted a confidential and familiar environment that encouraged participants to reveal their personal candid perceptions of the landscape sites and connect them to past observations of the landscapes in professional or private contexts. The workshop's research-by-design format stimulated them to share their direct lived experiences of the site with as little professional bias as possible.

The varied landscape types visited by the study participants opened different windows of perception through which ecological processes became apparent. In this chapter the selected reports of the experienced spatial or aesthetic phenomena related to ecological dynamics, as reported by the study participants are presented. Several participants related to similar fundamental experiences and

aesthetic aspects in their reports, even in different landscape types. This helped me to categorize their observations and narratives under the following headings, independently of landscape type where they were reported:

- topography
- light, shadow, and microclimates
- vegetation communities and composition
- wildlife encounters
- decay
- walking

These situations reported by the participants largely corresponded with the aesthetic categories I deduced from the literature about environmental perception models and review of landscape architecture works. I present these in the book *Ecological Processes In Landscape Architecture - Everything Flows, Everything Grows. 2026. Birkhäuser Basel*. Typically, a single situation reported by the participants involved several identified categories of perception and design of ecological processes:

- cues to care
- tension in transformation
- distilled type
- participatory care and collaborative design
- play and discovery
- dissonance and friction
- atmospheres
- biophilia
- landscape choreography



Fig. 4: Humans and other animals live in a continuous stream of perception from birth to death that is more or less intensive and detailed at different times, but never ceases completely (Mace, 2005). As we move through a landscape, perception continuously responds to stimuli and, over repeated visits, merges with memory into a unified experience of past and present.



Fig. 3: Ecological processes cannot be grasped in a static landscape scene due to their complexity, inconstancy and their elusive temporal and spatial scales. Moreover, the very act of perceiving entails a strong temporal dimension and is relational and active in character (Noë, 2006).

For example, the slow processes made an impact on the participants when they were confronted with a stark topography of an geological armature, such as the cliff of a geest edge. They experienced the armatures kinesthetically through the “*Landscape choreography*” of the ridges and valleys that led their way and guided their views across the landscape. The perception of the armatures was intensified by the colder microclimate and distinct earthy scents on the bottom of a former sand quarry in the urban forest.

They were able to perceive the “*Tension in transformation*” in the patterns of intense erosion that is dissolving the slopes. They were puzzled by the “*Dissonance and friction*” in counterintuitive movement of capillary water caused by peat-cutting remnants or by unexpected water regimes in the bog landscapes. They identified different “*Atmospheres*” from the interplay between light and shadows created by topography and vegetation in the forest.

In this chapter, I describe a number of these situations, where ecological processes were revealed to the participants in meaningful way, so they reported on them explicitly. In each case, I categorize the experience under a title: Topography; Light, Shadow and Microclimates; Vegetation Communities and Composition; Animal Encounters; Decay; or Walking; and locate it in one of the landscape case sites Altonaer Volkspark, Wittmoor or Wittenbergener Heide. Additionally, I note which slow or fast processes were predominantly perceived and which categories of perception were mostly involved in the act of perceiving. The personal experience is usually recorded in an oral account from the participant (presented in italics) and, if available, illustrated by their own drawings or diagrams. In several cases, participants also immediately reflected on the possibility of designing or intentionally enhancing this experience by maintenance regimes or landscape management. These design suggestions conclude the research-by-design findings. They are presented in terms of their potential for design strategies in the chapter “4. Design Approaches to Strengthen the Perception of Ecological Processes”.

The gathered data show that portraits of aesthetic experiences of ecological dynamics can only be made of a particular site and are difficult to generalize. This points to the fact that ecological processes are closely related to each landscape's local aesthetic context and unique character. The distinctiveness of a landscape, or

Eigenart, as referenced in the German Federal Nature Conservation Act (BNatSchG), can therefore be understood as a phenomenon shaped by local ecological conditions as well as by aesthetic and experiential qualities. The three case landscapes revealed their constituent ecological dynamics to the participants in the study in very distinct ways. Because of these differences, they were intentionally selected for the research-by-design process, as each site possesses a very particular ecological character.

However, the categories of perceiving the ecological process through distinct topography; light, shadow, and microclimates; vegetation communities and composition; animal encounters; decay; and walking could be deduced from the collected reports independently of the individual site. These categories appear to be the most prominent windows of perception through which participants translated and narrated the ecological processes perceived on site. They are presented in the Chapter 3.

3.1 Topography

Landscape armatures related to geological processes are prominent features in all three case sites. Perceived as striking landmarks on the horizon or through kinaesthetic experience of intense physical activity within the landscape, they were mostly observed and referred to in terms of topography.

The workshop participants' reported individual experiences of ecological processes correspond, to some degree, with the theoretical concepts of aesthetic perception identified in the first part of the dissertation (see Katarina Bajc, Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. 2026. Birkhäuser Basel). Topography-related on-site aesthetic experiences and perception encompassed the following categories:

- landscape choreography,
- tension in transformation,
- dissonance and friction,
- atmospheres.

→ LOCATION:
ALTONAER VOLKSPARK

Perceived slow ecological processes: geological processes such as weathering and erosion of sand quarry, inhibited vegetation succession
Perceived fast ecological processes: forest management practices



Fig. 33: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

A large part of the bodily and kinaesthetic experience in Altonaer Volkspark is shaped by the dynamic topography of the steep forest terrain within the former sand quarry. It invites visitors to climb slopes several metres high, often motivating them to leave their path out of curiosity about the view beyond the ridge. Although, as one participant commented: *“There was not necessarily anything of interest on the other side to see.”*

The desire paths traverse the topography up and down without taking notice of its curves, making the walk intense and varied. *“The bare tree roots gave me support while climbing; the sand filled my shoes. I took them off and continued barefoot.”* Traces of erosion

are omnipresent, creating tension in the ongoing transformation of the topography. The diversity of views is disorienting, from ridges to valleys, from depressions up and around corners. Without an overview, the landscape becomes a place in which one can lose oneself.

In Altonaer Volkspark, the perception of the geological armature is intensified by the homogeneous forest stand, such as beech or spruce, free of understory, trees all of the same age. The dynamic terrain offers diverse ecological niches and microclimates. Participants repeatedly described the dark ravines and depressions filled with ferns as enchanting (see Figures 34-37) . In one such moist depression, the botanists



Fig. 34: Marc Sommer
Fig. 35: Gesche Delfs
Fig. 36: Leon Dünkel
Fig. 37: Anna Krah, Amelie Radwe, Selina Sophia Neckelsen
HCU University Design Studio

participating in the workshop unexpectedly discovered greater chickweed (*Stellaria neglecta*), a protected plant species, much to their excitement. Higher-lying slopes mostly lack understory here, which reveals the topographical contours and reinforces the experience of contrasting atmospheres of the various forest types in the area. Ridges attract human movement because they reduce the need for repeated ascent while offering broader orientation and views across the landscape. Ridges and ravines thus take on the role of armatures, channeling the movement of humans as well as animals, water, and air, which was observed also in Altonaer Volkspark (see Figure 33).

→ LOCATION:
WITTMOOR, NATURE CONSERVATION AREA

Perceived slow ecological processes: geological processes and peat-cutting heritage, changing water regimes, primary succession processes
Perceived fast ecological processes: bog maintenance practices such as scrub clearing

The armature of water management infrastructure in Wittmoor underpins the experience of the site with its utilitarian grid. The drainage trenches and water dams follow an orthogonal pattern and guide the movement of humans and animals along their structures in a straight line (see Figures 38,39). The traditional reclamation of grassland and peatland through drainage, however, has increasingly been restricted by nature conservation management in recent decades, which aims to gradually rewet and revitalize the bog ecosystem.

Many study participants observed traces of the tension between these competing processes in the landscape and addressed them in conversations. The delicate beauty of the swampy overgrown grassland areas seamed with rushes (*Juncus*) and sedges (*Cyperaceae*) where the drainage trenches were sealed was the preferred aesthetic image in the area and sparked discussions about appropriate land use.

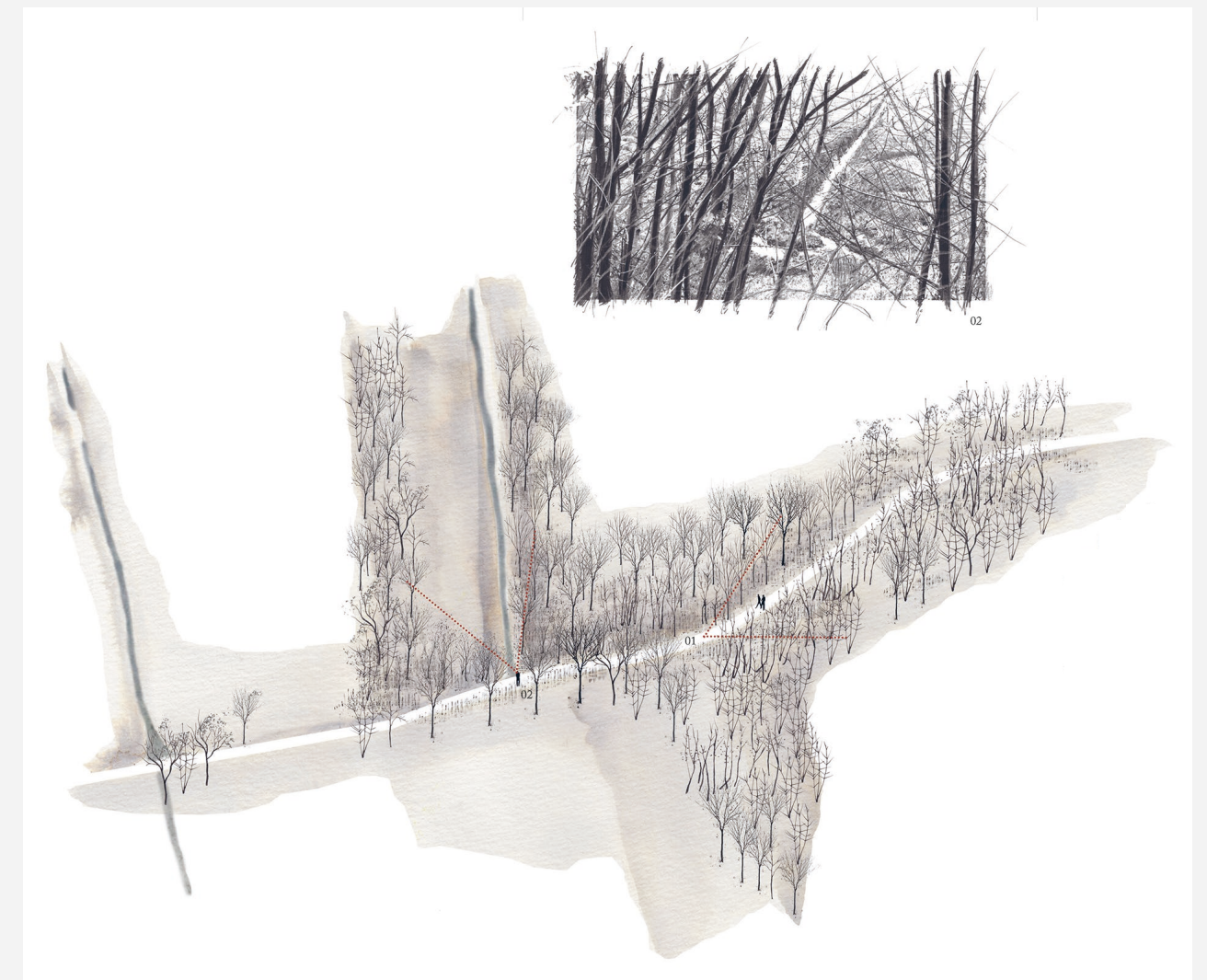


Fig. 38: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

The pastureland was described as dull and without diversity, even though seeing horses and other grazing animals was praised as adding aesthetic value to the landscape. Consensus was established, that the peat bog should be revitalized and further grasslands artificially flooded. The constant negotiation, even rivalry, between these two landscape management goals, grassland and bogland and their related ecological processes is clearly evident in the landscape. It creates points of dissonance and friction that stand out because they defy the logic of what is expected of the related natural landscape type.

"There is one place that I personally find really exciting. ... [T]here is suddenly a one-and-a-half-meter high ledge that you have to climb; a plateau, hundred meters across. It's like a round slice of cake. And the interesting thing is, even though its one-and-a-half-meters above the ground level, it is wet on top. And you can experience the capillary action of the peat there so beautifully. At the edge it's dry, of course, but in the middle, it's wet. I was really surprised when I saw that for the first time. It's totally crazy, I'm meters higher than the surrounding area, and it's wet at the top!" (see Figure 40).

Standing on the elevated ridge, one can easily grasp the armature of this landscape with one gaze.

The wet valley with moor landscape, lush birches, dark green rushes (Juncus), sedges (Carex) and moor grass (Molinia), are set against sandy slopes of the geest with its dry and rugged heath vegetation. The paths leading through the knee-high heath bushes on the softly undulating hills offer spectacular views of the moor landscape lying in the valley beneath "There is a bench, where you have a beautiful view down to the lowlands. From here, you can understand the moor, so to speak, and understand the different layers of historical peat cutting. There is the heathland edge, then [under it] the peat edge, and down there [in the valley] the moor lake. And you have a very long view into this moor landscape, from a protected situation, with large oaks behind you. And for me, the view was most attractive in spots where it opened up so far that it encompassed all these different areas. Across the grassland, the reeds, then behind the hill with the birches and the heath. I found it really beautiful." (see Figures 41, 42).

Traces of peat-cutting history still coin the topography in the area as a subtle topographic armature. The edge where the peat cutting ends forms a continuous horizontal line in the topography. Its dissonance with natural bog topography and the expected water regimes only becomes consciously apparent after several visits (see Figures 40, 41).



Fig. 39, 40: Lea Gotthardt, HCU University Design Studio

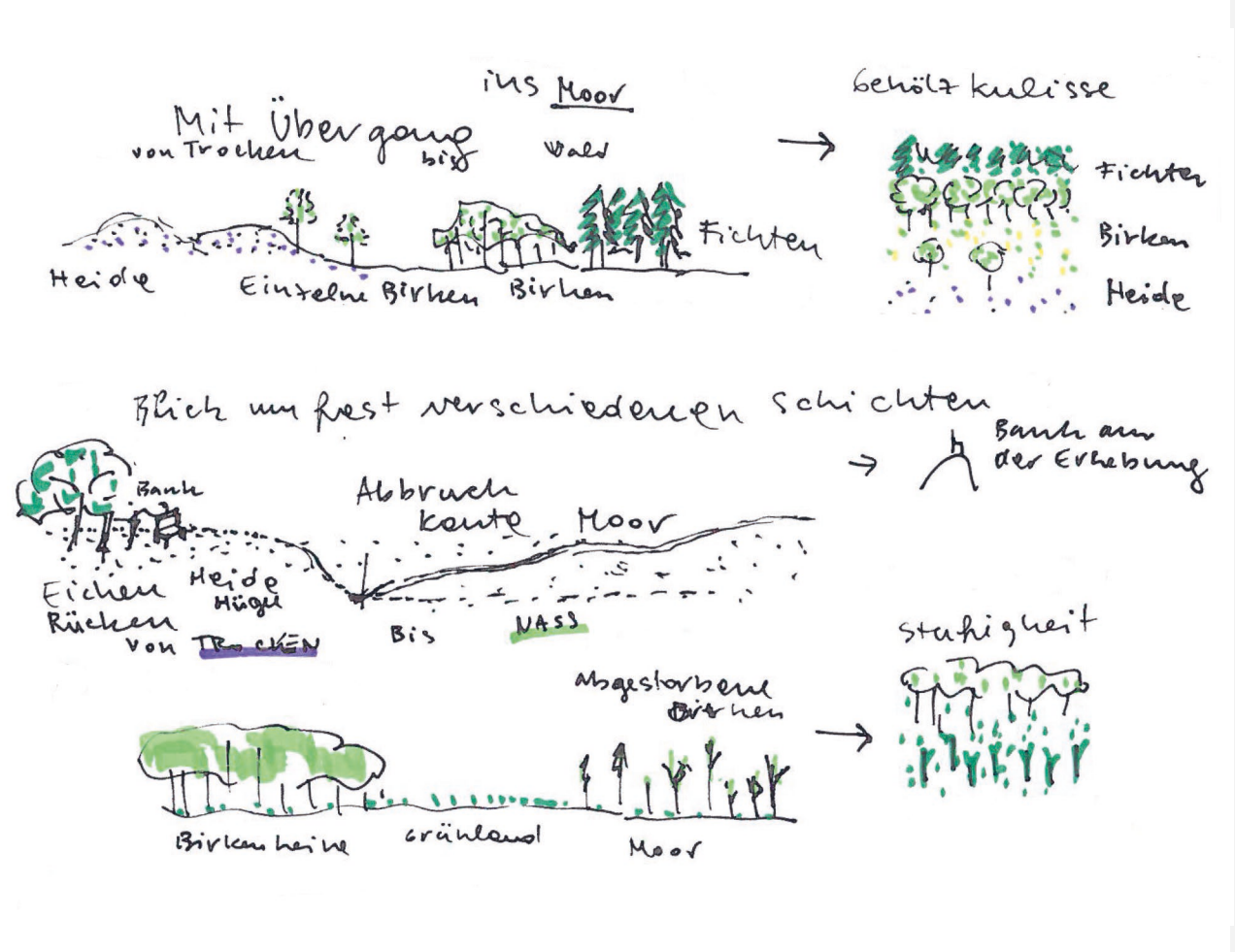


Fig. 41: Graphic Notes Katarina Bajc, Wittmoor Co-design Workshop



Fig. 42: Gabriele Pütz, Wittmoor Co-design Workshop

3.2 Light, Shadow, and Microclimates

Light, shadow, and microclimates featured prominently in participants' accounts of experiencing ecological processes in forests and vegetation corridors. The fast ecological processes of growth, maintenance regimes, decay, and succession within plant communities were perceived through various atmospheres, each shaped by distinct, fleeting combinations of sound, smell, light, texture, and microclimatic conditions related to different vegetation compositions and the process of evapotranspiration.

The workshop participants' reported individual experiences of ecological processes correspond, to some degree, with the theoretical concepts of aesthetic perception identified in the first part of the dissertation (see Katarina Bajc, Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. 2026. Birkhäuser Basel). Participants' on-site aesthetic experiences and perception related to light, shadow, and microclimates encompassed the following categories:

- participatory care and co-design,
- distilled type,
- cues to care
- biophilia,
- atmospheres.

→ LOCATION:
ALTONAER VOLKSPARK

Perceived slow ecological processes: regional and local climate, changing water regimes, forest succession processes and rejuvenation
Perceived fast ecological processes: vegetation growth and decay, seasonal vegetation patterns, seasonal forest maintenance practices

The urban forest at Altonaer Volkspark can be interpreted as a series of negotiation processes between vegetation succession and forest management interventions; spontaneous forest rejuvenation and artificial plantings; regional forest communities, and exotic species. Invasive species, pests, diseases, and damage or nutrients introduced by the park visitors add to the complexity of this field of tension between different ecological processes. Traces of this can be noticed in particular spatial patterns and atmospheres in the forest. During the expeditions at Altonaer Volkspark in May 2018, the ecological context was predominantly revealed to the workshop participants through the interplay between light and shadows.

Visitors were drawn to the *chiaroscuro* effect beneath the trees and to the shifting spatial qualities particular to forests, intensified by sunlight seeping through the leaves (see Figures 44-48). Rather than highlighting single forest communities, tree species, or even scenic views, the participants mostly shared their observations of different atmospheres conveyed through forest dynamics over seasons and during the day.

"In a mature beech forest, one feels exalted under the majestic 30-meter tall trees! The scale is so impressive. It's not an experience you get in everyday life. I tell myself that's where the gods live! So high up there in the canopy, where the sun glitters around the leaves. It's like a cathedral."



Fig. 43: Graphic Notes from Altonaer Volkspark Co-design Workshop
Katarina Bajc

In other parts of the forest, in contrast, a combination of various tree species and strata forms a sequence of diverse smaller enclosed spaces or “forest rooms” (see Figure 43). Here one is immersed in the vegetation and feels protected and hidden. *“There is a loose sense of enclosed space, but you can see through the curtain of leaves and the light beams invite you into the next forest chamber. This one might be bigger or smaller, feel like a vast hall or a safe nest. The space is mediated by the texture and intensity of the light.”* The light gives direction, motivates, and draws visitors to

explore further. It continuously offers new experiences of ingress and immersion into different forest atmospheres.

Several participants reported that the balance between the tree trunks as invariant elements and the rather ambivalent transitory variants, such as light and sound, created a sense of life and vivid, elevated atmosphere in the forest (see Figure 44). *“I liked how natural it felt with these rich alternating sequences of space and light.”* This effect was stronger in areas with clearly readable vegetation strata, including a ground

layer, herb layer, shrub layer, saplings, and different canopy layers and was further reinforced by occasional clearings dispersed throughout the forest cover. *“The light structures the space and offers a sensation of a comfortable room, like a living room in a forest. The large tree trunks are still and calm. They convey a clear sense of space. That’s what the forest is to me: the firmness of the trunks, the way the leaves move in the wind, the play of light under the leaf canopy. It’s what gives it life. I find it fascinating.”*



Fig. 44 - 47: Nur-UI Hoda Dag, HCU University Design Studio



Fig. 48: Hülya Lasch, HCU University Design Studio



One participant described the feeling of being drawn in a landscape as a “poetic moment.” He was standing in the dark, cool shadow of a forest, looking out at the lush green brightness of a clearing, anticipating its warmth. “I felt invited to step out of the forest and open to receiving whatever I would find there.” The contrasting forest rooms and their atmospheres of ingress and immersion created the effect of being drawn in and led through space. This provided several participants with different affordances that guided their experience and movement through the forest park (see Figures 49 and 50).

Fig. 49: Graphic Notes from Altonaer Volkspark Co-design Workshop
Katarina Bajc



Fig. 50: Nil Lachkareff, Altonaer Volkspark Co-design Workshop

→ LOCATION:
WITTMOOR, NATURE CONSERVATION AREA

Perceived slow ecological processes: geological processes, water regimes of the bog and creeks, water management regimes by a system of drainage channels and ditches, developing ecotones
Perceived fast ecological processes: bog and heathland management practices and seasonal cycles, pioneer forest growth

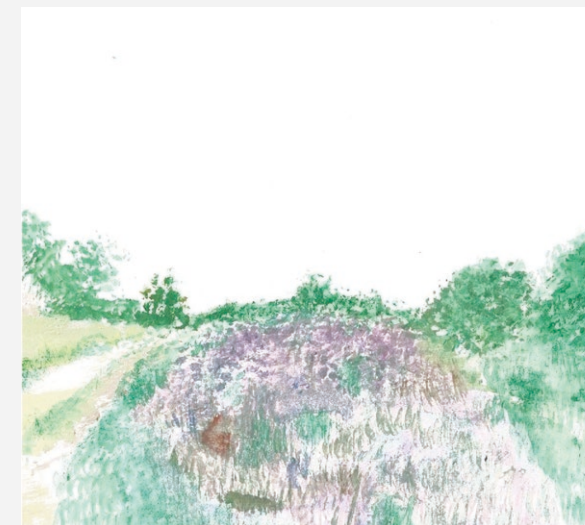


Fig. 51: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, University design Studio, HCU

The undulating topography and armature of the glacially formed valley in Wittmoor interchanges between dry, sandy heathland on the geest slope (see Figure 51) and wet, dark, murky bog, carr and marshland at the bottom of the valley (see Figure 52). This creates distinct alternating atmospheres and immersive microclimates. “It facilitates landscape experiences in different seasons. In summer, when I stand on the hot open heathland, I can take a few more steps and go into the shady, wet woodland. But when it rains, I go into the forest for protection.”

Similar comments were made about the intricate armature of embankment hedges or *Knicks*, and rows of oak and poplar trees. These were reported to provide seasonal protection from the frequent winds typical of northern European landscapes.



Fig. 52: Lina Maria Bienmüller, HCU University Design Studio

3.3 Vegetation Communities and Composition

Participants' reports identified ecological processes in the landscape's various patterns and vegetation compositions shaped by past management decisions, such as single-species plantations of same-aged trees. They also recognized ecological processes in the visible traces of current maintenance and care regimes, for instance in the dense undergrowth of forest stands set aside for rejuvenation. Aesthetic character of local ecological processes reflected in distinct and legible vegetation types of iconic, regional landscapes, as well, as in the wilder, impenetrable character of pioneer succession stages.

The workshop participants' reported individual experiences of ecological processes correspond, to some degree, with the theoretical concepts of aesthetic perception identified in the first part of the dissertation (see Katarina Bajc, Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. 2026. Birkhäuser Basel). Participants' on-site aesthetic experiences and perception of vegetation communities and composition encompassed the following categories:

- participatory care and co-design,
- distilled type,
- cues to care
- biophilia,
- atmospheres.

→ LOCATION:
ALTONAER VOLKSPARK

Perceived slow ecological processes: Local and regional climate patterns, decaying heritage armatures, developing ecotones and succession processes of the forest vegetation communities
Perceived fast ecological processes: vegetation growth, forest and park maintenance practices

Altonaer Volkspark occupies an ambiguous position between forest and park. The sequences of atmospheres in the forest, the spatial expressions of “chambers” or “rooms”, with their different understory structures, strata, and clearings, are a result of park design, as well, as forest maintenance and management regimes. These respond to the existing forest types, steer their development and influence the landscape experience at any given moment. *“I’ve always found nature exciting when it’s been designed, so to speak, to some extent, and you could see that someone had been at work here. Those areas were particularly attractive. For example, an area within a dense forest with no undergrowth, where the trees suddenly stood free. Spatially, these sudden changes were interesting.”*

Even-aged beech forest stands are prevalent in Altonaer Volkspark. Participants admired them for their immersive atmosphere and their open structure with no understory, which allows views to penetrate

deep into the forest (see Figures 53 and 54). However, participants with an ecology background also criticized them for their uniform shadow cover, which prevents young trees from developing, so the existing beech forest stands do not rejuvenate.

Maintenance practices in the forest park attempt to mimic ecological processes of rejuvenation that would naturally occur in the woodland after lengthily process of aging and decaying. In areas with a dense understory layer of impenetrable shrubbery, young beech trees are planted additionally to accelerate the rejuvenation processes in the forest, whereas maple trees emerge on their own as a pioneer species faster. Occasionally, older trees are removed to create more space for emerging saplings and to establish clearings within the forest matrix. The aesthetic aspects of this sustainable approach to forest regeneration in an urban park were remarked upon somewhat unfavourable: *“The young maple saplings blur and obscure the clear image of the park.”*



Fig. 53,54: Nil Lachkareff, Altonaer Volkspark Co-design Workshop

The clearings and glades in the forest were referred to positively as “islands of sun” and “moments of surprise” (see Figures 55 and 56). They seemed to have a strong experiential impact and sensory quality due to the change in light, temperature, humidity, and fauna. Participants also often reported a characteristic and intense scent in the glades. These small spaces punctuate the forest matrix, creating landmarks in the homogenous vegetation cover. They support the landscape choreography, with participants reporting that they walked or drifted from one such magnet to another, each time with a sensation of having discovered something special.

However, as in many other urban settings, the clearings in Altonaer Volkspark are often quickly overgrown by a thick layer of invasive blackberry bushes before young tree saplings can establish themselves. This succession stage, typical of anthropogenic landscapes, was only admired by the biologists among the workshop participants, who could appreciate its quality as a refuge and food source for birds. To others, it appeared untidy and out of place in both a healthy forest or an attractive park.

For the most part, Altonaer Volkspark offers near-natural sites that are the result of ecological processes similar to those found in an undisturbed woodlands. “The forest succession dynamics in Altona are valuable; they’re rare in Hamburg.” Yet, several participants also remarked that these sites, which they referred to as “wild” or “wilderness,” caused them to “lose orientation.” A workshop participant described an overgrown part of the forest where the tree cover consisted of several strata, different age classes, and a variety of pioneer tree species: “I didn’t really feel

drawn in. I had to consciously cross a threshold to explore it.” Participants’ perceptions of the areas with pioneer growth in the forest were ambivalent in terms of their aesthetic as well as ecological development: “For me, wilderness is open in terms of time and result. It is something pure. This is happening here on a small scale, partly because people don’t trespass or enter these areas, and there’s less maintenance. But in general, this forest is no wilderness. It’s more of a near-natural forest developing slowly on its own.”

Overall, the aesthetic aspect of early pioneer stages of vegetation was evaluated rather unfavourably, despite recognising its ecological value. In many cases, participants only appreciated these patches of wilderness in juxtaposition to invariants created by maintenance, design or other human intervention. Cues to care and other legible structures attracted attention and prompted reflection, for instance through symmetry in the vegetation structure or accents such as a window cut into the vegetation that offered a view through the dense growth. “There’s a collision between geometrical [and near-natural] spaces. Sometimes I had the feeling: I am the beholder; someone wants to communicate something to me; I see a spiral, or a circle or an oval; I am passive in this situation, and I walk along the shape that is being presented to me. Other places in the forest are uncoded; where suddenly I’m forced to be more active in my perception. I found that sometimes the two situations collide here in the Volkspark, and these were the most interesting moments.” (see figure 55).

Pioneer stages of forest succession appeared to be difficult to grasp as a distinct forest type, because they convey a rather ambivalent, transitory character.



Fig. 55: Robin Winogrand, Altonaer Volkspark Co-design Workshop

Most study participants found them aesthetically irritating and in terms of visual appeal, they were seldom praised. However the participants reports appreciated them in an abstract and metaphorical sense as an expression of nature’s “freedom” or unconfined development. Pioneer vegetation stands were cherished as the few islands in the city not determined and excessively regulated by humans. For some participants, the tension of the transformation between the natural forest succession process and the urban context was aesthetically exciting. It was mentioned to generate a sense of secrecy and discovery (see Figure 57).

As a park, Altonaer Volkspark is a cultural monument that includes both near-natural forest character and designed forest-management regimes. It also features historic promenades lined with rows of trees, geometrically structured hedges, and prominent axes that traverse the forest in four directions, all originating from the elevated Tutenberg monument mound. However, the vegetation growth, succession, and decay processes are gradually dissolving this clear framework of the park - the four view axes, leading to the mound and other geometrical structures. Several



Fig. 56: Anna Krahl, Amelie Radwe, Selina Sophia Neckelsen, HCU University Design Studio

workshop participants noticed and discussed the tension between the park’s historical heritage and the ongoing development of the organic material that constitutes its structures. The tension in this transformation processes between “coded and uncoded” or “wild and orderly” was often mentioned in the co-design workshop discussions and influenced the conscious perception of the common ecological processes in the park, different vegetation communities and the succession processes of the forest. “...Nutrients from pets’ urine have an impact on the understory layer in the park. For example, they foster nettles. So, this herb flora, provides a bit of information about, [...] the ecological reality of the place, in this almost overgrown forest. And so different timescales express themselves in it. The Tutenberg structures, which are cut in and orthogonal, represent the timelessness of the whole park. These formally designed places, manifested in their stable state, have a timeless character, because you can read the dynamics all around them. And I think that’s also a quality of this park; this contrast between the monuments - as they were designed once and are produced again and again - and the fluidity of nature.”

The historical invariant strictures, understood as relatively stable and recognizable elements within the landscape, appear to support visitors in identifying and articulating underlying dynamic processes. This became evident when workshop participants observed patterns in the canopy cover from the top of the Tutenberg monument (See figure 58).



Fig. 57: Lea Gotthardt, HCU University Design Studio

In this regard, the sun-exposed slopes of the artificial, geometrically shaped Tutenberg mound attracted considerable positive attention among the workshop participants. This was unexpected because the artificial topography of its armature presents a fundamentally foreign element - almost a misfit - in the homogenous near-natural matrix of the forest. The elevation, with its geometrical slopes forming the shape of an octagon, appears within the dense forest canopy like a historical fragment fallen out of time. The monument generated particular interest among the biologists in the group because of its dry

meadow habitats, which are unusual in this setting, surrounded as they are by dense forest cover. The slopes are exposed in all cardinal directions, exhibiting slightly different dry meadow communities on each side, including white campion, hawkweed, blueweed, *Hypericum*, and *Senecio* herb species (see Figure 59). The dissonance between an artificial element and its significance for biodiversity in the park intrigued many participants and was discussed in every of the five workshop groups. Most participants identified it as a design feature with considerable potential to be further developed artistically in order to stimulate reflection

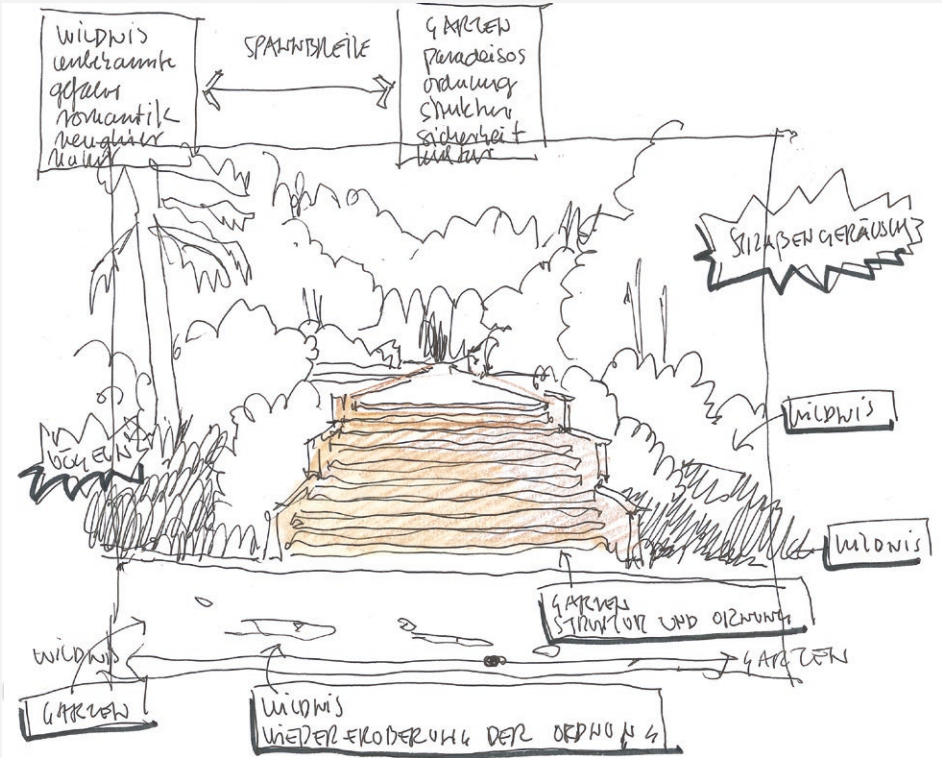


Fig. 58: Gašper Habjanič, Altonaer Volkspark Co-design Workshop



Fig. 59: Graphic Notes from Altonaer Volkspark Co-design Workshop
Katarina Bajc

on the contemporary relationship between nature and culture. Remarkably, also numerous other workshop reports of observing ecological processes and wildlife were set in the geometrical structures of the park. These features appeared to heighten participants' perception and awareness of urban cohabitation between humans and non-human life: "There was an amphitheater in the forest, abandoned, only serving the plants, overgrown, but structured and manmade. In it was starling [*Sturnus vulgaris*] looking for food. I thought it was a nice idea, to build an amphitheater for nature and not for humans, as has actually been done in the past."

"I found the cut woodland hedges at the border of the forest somehow striking. The stocks are cut so you can recognize the sharp edge. I found that quite beautiful [...] Just as the clearings that were mown into the forest. [...] It is the gardeners' intervention that prevents natural reforestation in the park. They trim the openings and glades, and, along with the planted coniferous trees, this presents the ingredient that makes this park unique."

Without human intervention, a beech forest would likely come to dominate the area over time. In Altonaer Volkspark, however, the forest exhibits a variety of forest types, age structures, and regeneration stages as a result of its differentiated maintenance and use as a park. The patches of forest that display clearly readable distinct forest types are often monocultures of the same age. These were appreciated and described by the participants with affinity and labeled as "beautiful" more often than mixed or pioneer forests. For example, a few relatively small pine-tree (*Pinus sylvestris*) stands in the area generated strong resonance in terms of an immersive atmosphere. They were described as

picturesque and had a powerful sensory impact due to the intense perfume-like odor of the forest ground. For several participants, these visceral responses evoked memories of childhood and summer vacations on the North Sea coast, thereby establishing an intuitive and affective connection to the ecology of north-eastern German lowland pine forests as a regional landscape type (see Figures 60 and 61).

The ravine with even-aged spruce trees in the park (*Picea abies*) evoked similar sensations. Participants referred to the smell of the resin, the wind rustling high in the crowns of the trees, the dark green of the needles, the heavy shadow on the forest ground, and the moist, cool microclimate (see Figure 64).

The experience of immersion in an atmosphere of recognisable forest type was a repeated motif in the participants' reports. Consonance between the ecological processes of a familiar and a distinct vegetation community and its expected atmosphere generated a positive emotional response. Clearly recognisable, homogeneous forest types dominated the descriptions of the experiences in the Altonaer Volkspark by the participants, although such aesthetically distilled situations cover comparatively small areas of the park. The opportunity for ingress and immersion in different recognizable forest communities and their varied atmospheres in a sequence was reported as a quality of this park as opposed to undisturbed natural mixed woodland that extend over larger areas.

Atmospheres of dissonance within the urban forest manifested in various situations throughout the park, where conditions differed from those expected in their near-natural counterparts. Participants noted



Fig. 60: Graphic Notes from Altonaer Volkspark Co-design Workshop
Katarina Bajc



Fig. 61: Collected field samples, Altonaer Volkspark Co-design Workshop

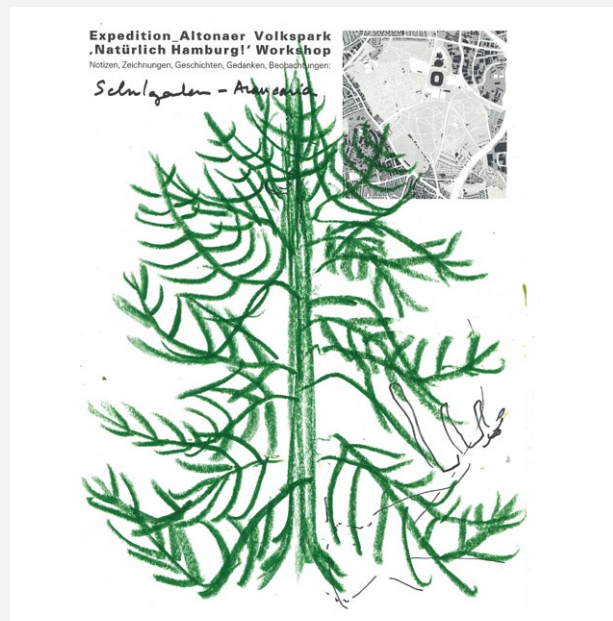


Fig. 62: Nil Lachkareff, Altonaer Volkspark Co-design Workshop



Fig. 63: Graphic Notes from Altonaer Volkspark Co-design Workshop Katarina Bajc

the lack of typical woodland smell in deciduous areas compared with natural woodlands. They speculated whether this sensory perception might have been influenced by the surrounding urban fabric, drought conditions, and the lack of undergrowth within the forest park. It was noted that areas with dense herb layer are unusually rare in the park. Occasionally, they appeared in the stands of common hornbeam (*Carpinus betulus*), with plants such as ground elder (*Aegopodium podagraria*) and local geophyte plants.

Maple and beech saplings encroach on the small oak tree stands in the park. New oaks cannot germinate in these circumstances and will likely be displaced over time. The forest managers redirect this natural process by removing the competitors and introducing species, including mountain ash (*Sorbus aucuparia*) and hornbeam (*Carpinus betulus*), to foster the oak understory. These particular ecological processes were noticed by a few botanists in the workshop group. The prevalent perception among these participants was that forest development had been degraded by its urban setting, which influences the entire landscape armature with its local climate, water balance and soil health. This makes it difficult to initiate the fast ecological processes of forest growth and rejuvenation on a small scale.

Single exotic trees or other prominent plants found in the matrix of native vegetation communities in the park create moments of surprise and function as

cultural signifiers. A solitary yew tree (*Taxus baccata*) in the forest park attracted attention with its sombre, dark-green volume standing out within a sea of light-green spring beech leaves. As an evergreen invariant, it remains a stable landmark within the forest, while the surrounding vegetation changes with the seasons. "The presence of conifers hints that this is not a wilderness." Larches and other deciduous trees that boast their prominent habitus, such as the red variety of beech trees and single oaks, evoked a similar effect. When maintenance regimes release these trees from competitors in their immediate vicinity, their crowns are able to develop and thrive, attracting attention through their contrasting shape, texture, colour, or age. Surrounded by dense forest, they resemble "wolf trees", and are aesthetically cherished not only for their distinctive form but also, and perhaps primarily, for their individual ecological development and cultural biography (see Figures 62 and 63).

In this context, the exotic species typical of warmer climates, such as Araucaria, were also noticed and reflected upon as signifiers of climate change (see Figure 62). Several species that are uncommon for Hamburg's climate were found to be thriving in the park. They sparked discussions about the current climate condition and the impact of its slow ecological processes on the future development of the forests and local native flora.

The workshop participants in several workshop groups touched upon the importance of physical activities and play connected to vegetation and forests. They observed that most old, mature trees in the park had no branches under a height of two meters. Pruning and maintenance regimes intentionally prevent the activity of climbing and swinging due to safety concerns. Many found this unfortunate while reflecting on their own experiences of playing in the forest as children and the significance this had for their respect and love of nature later in life. "I saw a large maple tree outside the playground that is wonderfully suited for hanging a swing. It seemed like a symbol to me that nature can also be used as a playground." (see Figure 65).

Several participants recognized trunks and dead wood as affordances for sitting, playing, and exercise (see Figure 66). "I took a small test of courage. I balanced along a tree trunk that lay diagonally across an embankment." In general, the function of a forest park in a city was understood in terms of environmental education and play as much as in terms of ecology. In several statements, the park was identified as a unique opportunity for children and young adults to experience ecological processes unfolding in a woodland, which is impossible in other more uniform urban green spaces. The lack of intentional affordances to support these experiences and perceptual learning was criticized in some groups and was attributed to too intensive maintenance regimes.

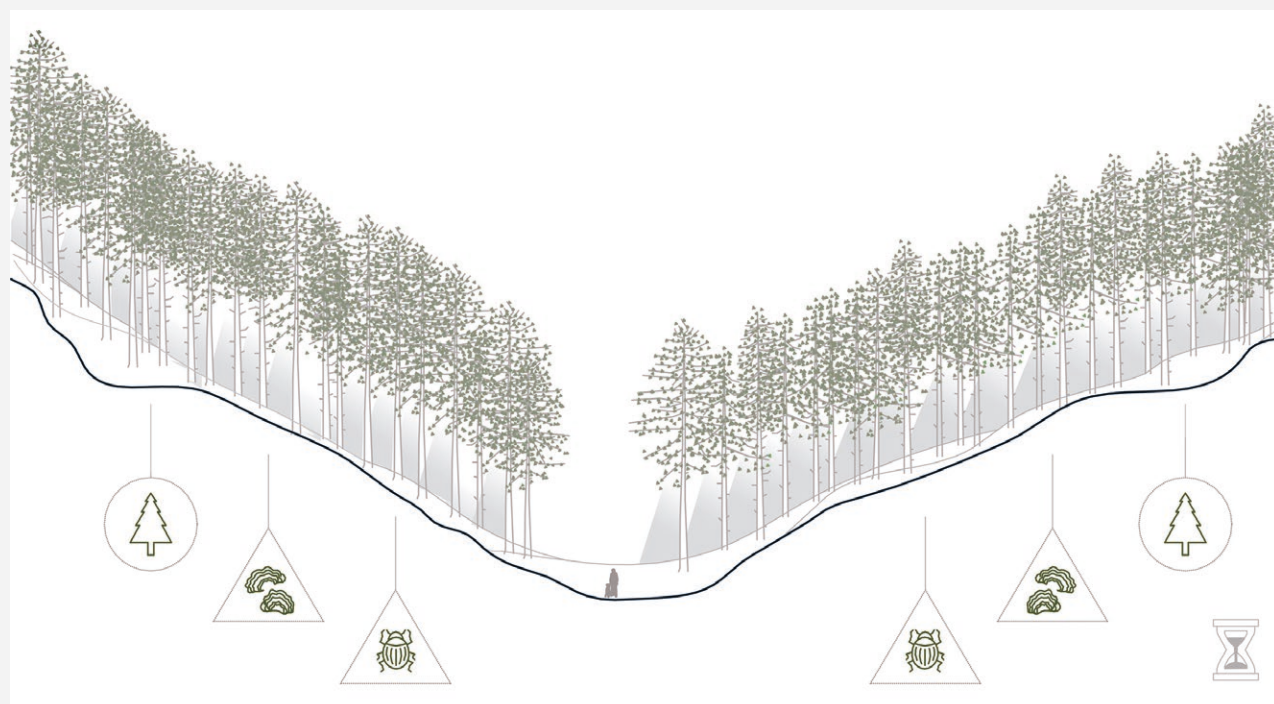


Fig. 64: Gesche Delfs and Sarah Schmidt, HCU University Design Studio

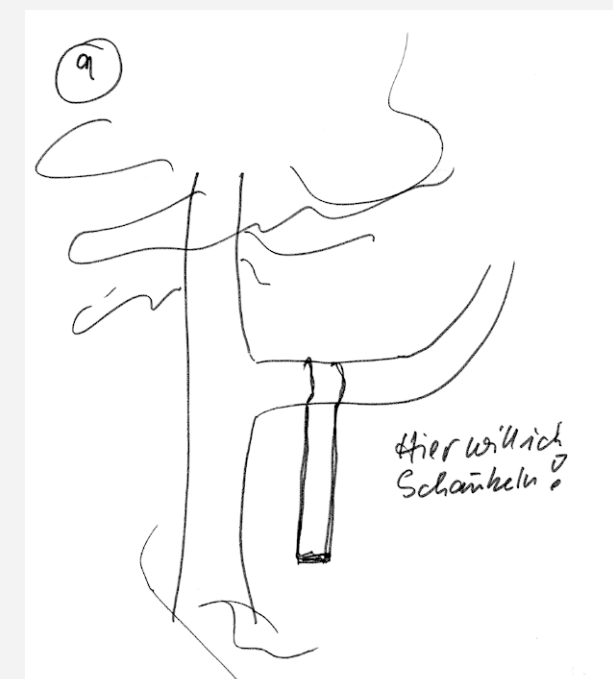


Fig. 65: Unknown Participant, Altonaer Volkspark Co-design Workshop



Fig. 66: Ando Yoo, Altonaer Volkspark Co-design Workshop

→ **LOCATION:**
WITTMOOR, NATURE CONSERVATION AREA

The rare protected bog habitat in Wittmoor prompted spirited discussions among the workshop participants. Intimate, subjective aesthetic preferences and observations became intertwined with more sober debates about the appropriate ecological management of the peat layer and the constraints imposed by conservation goals. The general label “wilderness,” used so often for different pioneer vegetation in the Altonaer Volkspark co-design workshop, was rare in these discussions. The term was replaced with remarkably precise descriptions of single succession stages in terms of their experiential impact as well as their ecological function within the habitat.

Birch forests sprouting spontaneously from the peat ground of the bog in Wittmoor threaten to dehydrate the moor landscape by evapotranspiration. In the co-design workshop, these pioneer forest stands

Perceived slow ecological processes: geological processes and water regimes in a peat bog, forest succession processes

Perceived fast ecological processes: bog, wet meadow, and forest management practices

inspired very nuanced conversations with regard to their age, composition, density, capacity to colonize and degrade the peat layer, and, finally, their contribution to the aesthetic experience particular of the moorland. *“The unconfined, natural process of forestation of the bog would absolutely undermine the nature experience of the moor landscape. This area thrives on its open, wide character. The last thing we want here is dense birch forests mixed with other tree species. But lighter, younger stands with sparse birch stock, or the*



Fig. 68: Gabriele Pütz, Wittmoor Co-design Workshop



Fig. 69: Klaus Hoppe, Wittmoor Co-design Workshop



Fig. 67: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

occasional oblique solitary old birch growing on the bog - they are attractive. I would have nothing against these processes. So, I think it is relatively easy to bring together the goals of nature experience and habitat maintenance or care here.”

The fine, delicate atmosphere of light, young, lush green birch tree groves with a sedge understory was widely admired (see Figures 67 to 69). *“Bent birch tree stumps of two or three meters, different grass structures swaying a bit in the wind. It has such a special atmosphere. I just find a moor landscape fascinating. A mighty, rigid oak in the background. This interplay between filigree, delicate and quite craggy aspects in the same landscape; an interplay between the robust and the ephemeral.”*

“I was so magically attracted by the look of this place. It has me very much under a spell. The path was quite narrow and protected on one side by the old oaks. I found it very charming, because I had a feeling of being secluded but near to the moor, [...] that was my favorite place in the area.”

“I have such a fondness for birch groves. At this time of year, with fresh green, in this forest of sticks with a green carpet of moss [...] and the grasses, too, which are like a cushion underneath, with the white and black stems of birches in between.

Nature conservation professionals in the workshop groups, stressed that birches contribute to the degradation of the peat layer. There was consensus that from a particular age and density of this pioneer vegetation, the succession process had

to be interrupted by flooding or removing the trees. When a distilled, recognizable vegetation community of young birch grove with a lush sedum carpet underneath starts dissolving and a forest with more diverse strata develops, it appears to also lose its powerful aesthetic appeal. From that point on, it is no longer linked to the archetype of the moor landscape, either ecologically nor with regard to its recognizable visual character. The bog, its water regimes, and the young birch tree cover are part of the same ecological system in this area and seem to reinforce one another aesthetically, as well. *“We probably all agree it should not become an area-wide forest. But thin woodland structures with a few trees, very sparse birch stands, do help one to experience the typical landscape character of the moor.”* (see Figure 70).

Study participants contemplated on the scenic quality of different forest succession processes, maintenance regimes, and the spatial impact of the vegetation mosaics. *“The chambering, where large open areas were interspersed with small saplings and coppices - these stands were heavily nipped by wild animals, and I asked myself: how does a landscape like this actually develop? I couldn’t explain which animal did it, but I thought it was really beautiful. The forest community became varied here due to succession processes with alternating biotopes.”*

“I noticed the juxtaposition of the two: dense monocultural forests with trees of the same age with trunks like poles, quite strange, so that you got the feeling there was something wrong. That it didn’t grow



Fig. 70: Gabriele Pütz, Wittmoor Co-design Workshop

naturally. And on the other hand, there was a forest with different layers: tall trees and undergrowth." Changes in vegetation composition attracted attention most consciously when evidence of human intervention, such as chopped tree trunks, or more pleasant traces, such as the characteristic scent of freshly cut grass were present in the landscape. These initially bodily and sensory experiences further prompted cognitive reflection on how ecological processes should be guided by landscape management. For example, the removal of grass cuttings after mowing to maintain nutrient-poor soil conditions and the corresponding vegetation community: "It smelled very strongly of woodruff. But it wasn't woodruff, it was sweet vernal grass, that's what it's called, *Anthoxanthum odoratum*. *Odoratum* because it smells. It's got coumarin in it, and it smelled really intense. These are the low-nutrient grounds. I really love the smell, but you shouldn't sleep in the hay, because it's poisonous. It was freshly mowed, this meadow. That's why you could smell it."

The aesthetic experience of vegetation composition was manifold, all-encompassing and

participants perceived it on many spatial scales simultaneously, with all their senses. "I shrank my scale all the way down to a few square meters so I could notice all the small details. That only works when you pause for a while. [...] What a composition: very small pennies of birch leaves on the ground and the rustling sound. I found it extremely impressive. Above, a meter-long filigree of moor grasses. Once you squat down and disappear in it you get a whole new perspective. And then if you look a little further away again, there is just this typical color arrangement with ochre yellow, the dull green of the moor grass and the white stripes of the birches. For me, this is the archetype of a moorland walk."

In addition to smells, sounds are also strong carriers of the aesthetic appeal of the moor landscape. "One could hear the rustling of the wind and the leaves, and the birds. I felt the need to enter the grove and lie down, and forget the everyday stress. I lost a sense of time and felt really good there." (Figure 71). The day of the expedition in Wittmoor was stormy, and several participants reported that the sound of poplar trees

added a dramatic experiential layer. "I love the wind in Hamburg and I think it's good that you can hear it intensely. [...] it was really like a musical score. First you had the poplars, then came the birches. Everything has distinct sounds. The oaks rustle differently, the beeches rustle differently. And the big forest stands; they make a loud noise. And then it was quite quiet. Suddenly on the meadow, there was no sound at all; it was rather too silent."

The experiences of dissonance in the landscape atmosphere were as well captured in its sound: "I wanted to say that I actually didn't like the soundscape that much. The rustling of leaves, I usually find it beautiful, these trembling poplars [...]. But I was expecting to tune in a moor today. And in a bog landscape, I imagine silence. The air is still. That's the image I had in mind. There was a contradiction in perception for me. Because I was actually attuned to moor, but I heard the sound of pioneer forest. The sounds were ambivalent."

Only rarely did participants speak about a single plant; more often, they referred to the atmospheres and aesthetic impact of entire landscapes, vegetation

communities, and their composition. Two exceptions stood out. In Wittmoor, the protected bog areas are inaccessible, especially where they are flooded, which limits the possibility of observing typical rare bog plants up close. Participants remarked upon this as a problem: "How can I protect a sundew [*Drosera*] if I have never seen one? I don't even know why I should. It's actually true for all of Hamburg's bog nature reserves. You can't experience this type of vegetation up close."

Oaks were another exception, where individual plants were singled out and discussed. Participants spoke particularly often of ancient coppiced oaks with admiration, describing them as unique, even mythical living beings. They were mentioned in Altonaer Volkspark workshop, and even more frequently in the conversations that took place in the Wittmoor nature conservation area. In addition to ancient trees' ecological importance as habitats for many species of fauna, participants also spoke passionately of their aesthetic impact. "There was an oak, with a beautiful crown. It embraces visitors with its branches almost all the way to the meadow." (see Figure 72).



Fig. 71: Lina Maria Bienmüller, HCU University Design Studio



Fig. 72: Gabriele Pütz, Wittmoor Co-design Workshop

3.4 Wildlife Encounters

Emotional responses, and reports of affective experiences, were strongest in relation to individual living beings, especially animals. Participants appreciated routes and sites where one could see or hear wildlife most. Their narratives therefore established a strong correlation between habitats for specific fauna, related ecological processes and maintenance regimes, and participants' preference for particular sites within the park or conservation areas, especially where they had encountered, or expected to encounter, charismatic wildlife.

The workshop participants' reported individual experiences of ecological processes correspond, to some degree, with the theoretical concepts of aesthetic perception identified in the first part of the dissertation (see Katarina Bajc, Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. 2026. Birkhäuser Basel). Participants' on-site aesthetic experiences and perception of wildlife encompassed the following categories:

- biophilia
- distilled type
- play and discovery.

→ LOCATION:
ALTONAER VOLKSPARK

In most workshop expedition reports, participants emphasized places and situations of entanglement, where humans can relate to non-humans living beings. *"I collected these feathers. I guess maybe it was buzzard. This other one - I'd like it to be from a black woodpecker. I think or I imagine I heard him. But it was probably just a crow. Black crow."* (see Figure 73). Encounters with birds, for example, manifested through the omnipresent bird song. *"I found it striking that you could hear the bird calls everywhere. There is a lot of life. Just everywhere, in all strata layers, in all possible hiding places. But you very rarely see them."*

The relationship between the forest structure and vegetation communities was often discussed in connection with sightings of particular wild fauna. Interestingly, study participants thereby also uncovered urban character of the forest park by interpreting the constructed ecological conditions underlying what at first appears to be a natural setting: *"In various corners of the park, I encountered the song of the wood warbler. You might confuse it with a wren. But a wood warbler only calls one note at a time and then sings it faster and faster, like a buzzing, and always with this quite distinctive twit-twit-twit. The wood warbler typically lives in deciduous woods, as the name says. It was striking to hear this bird as I walked around. For me, it represents the genuine native beech woodland character here in the park. What's even more interesting, I could see it*



Fig. 73: Collected field samples, Altonaer Volkspark Co-design Workshop

Perceived slow ecological processes: movement and flows of fauna along armatures, edges and ecotones, mature forest succession processes
Perceived fast ecological processes: vegetation growth and decay, seasonal forest maintenance practices

liked the exotic conifers like spruces and Douglas fir in the park much more than native trees, because it could sit on the lower branches. These exotic trees don't really belong in the native beech woods, but they do seem to fulfill a particular habitat function that is missing here in the park. The beech trees are all very high, even-aged, and don't offer low branches. So, these birds coexist here with species that prefer fir trees, like coal tit and goldcrest. This is increasing the species diversity in a way that is particular to a park-like setting."

In addition to the Tutenberg monument mound, other more natural-looking glades in Altonaer Volkspark also lure visitors by offering sunbeams and warmth within the forest (see Figure 74). The wildlife supported by these glades was just as much of a draw for the workshop participants as their pleasant microclimate.



Fig. 74: Nil Lachkareff, Altonaer Volkspark Co-design Workshop

These open forest spaces were observed to host relatively rare species for the urban environment, such as a family of northern ravens or the endangered plant greater chickweed, found alongside a picnic party in a sunny clearing. Also encounters with insects, such as dragonflies and butterflies, and the buzzing of other pollinators generated excitement among participants in these setting. Ilex hairstreak and purple hairstreak butterflies that feed on oaks were observed in wind-protected glades that were big enough to let the sunlight in the forest matrix.

However, the glades in the forest park also attract many invasive plants, such as stinging nettles and Himalayan balsam plants (*Impatiens glandulifera*). This was discussed critically, yet also acknowledged that these plants host many charismatic insects, such as the well liked cabbage butterfly (see Figure 75). Participants' accounts reflected a dissonance between

judging the environment as non-native and, to some extent, ecologically inappropriate, while simultaneously appreciating its capacity to provide habitat for living beings regardless.

Like in forest glades, participants reported numerous encounters with fauna along the paths and other linear ecotone zones (see Figures 76 and 77). To some extent, this is a logical consequence of the path's function as a linear armature: it channels human movement while intensifying the perception of the spaces through which it passes. However, paths also function as a connected networks of open corridors within the vegetation matrix, so some fauna uses also them for migration and as a habitat (Forman, 1990; Seiler, 2001).

In Altonaer Volkspark, participants observed that the transitional zones between the forest vegetation matrix and the paths or meadows vary in form, although

in most cases the forest ends rather abruptly (see Figure 77). In the few areas with blossoming perennial borders, the encounters with butterflies, such as large tortoiseshell cabbage white, and other invertebrates were more frequent. The abundance of charismatic insects contributed to the positive aesthetic response in these more differentiated ecotone zones. "These perennials smell nice, too. Compared to closed, homogenous forest cover, this made an impression on a completely different sensory level for me." The shrub layer on the forest edge also had a positive impact on the aesthetic perception of the area due to numerous sightings of avifauna that take cover in it. Regarding landscape composition, participants also noted that these ecotone zones played an essential role for the aesthetic experience of the park as coulisse and a buffer zone between the forest and the path and were gently guiding the views.

The presence as well as the absence of certain animals impacted the participants' perception of the forest park. Remarkably, the perception of the urban character of the forest was shaped in part by the eerie absence of grasshoppers, locusts, and crickets, which would normally contribute to its summer soundscape. This was noted by several workshop participants and related to the relative scarcity of forest ecotone edges and long grass meadows in the area. The threshold zones between the forest and paths compensate in part for the lack of these ecotones, ecologically as habitats and aesthetically, as places of contact with fauna.

Distinct natural landscape types, such as mixed natural woodlands, appear to be perceived as complex but coherent wholes, where interrelated ecological processes contribute to what species and atmospheres one expects to encounter. This was revealed on different scales, such as through the absence of certain insects



Fig. 75: Ando Yoo, Altonaer Volkspark Co-design Workshop

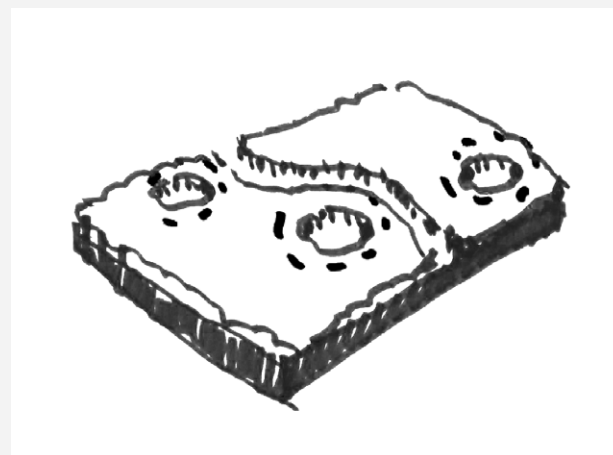


Fig. 76: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

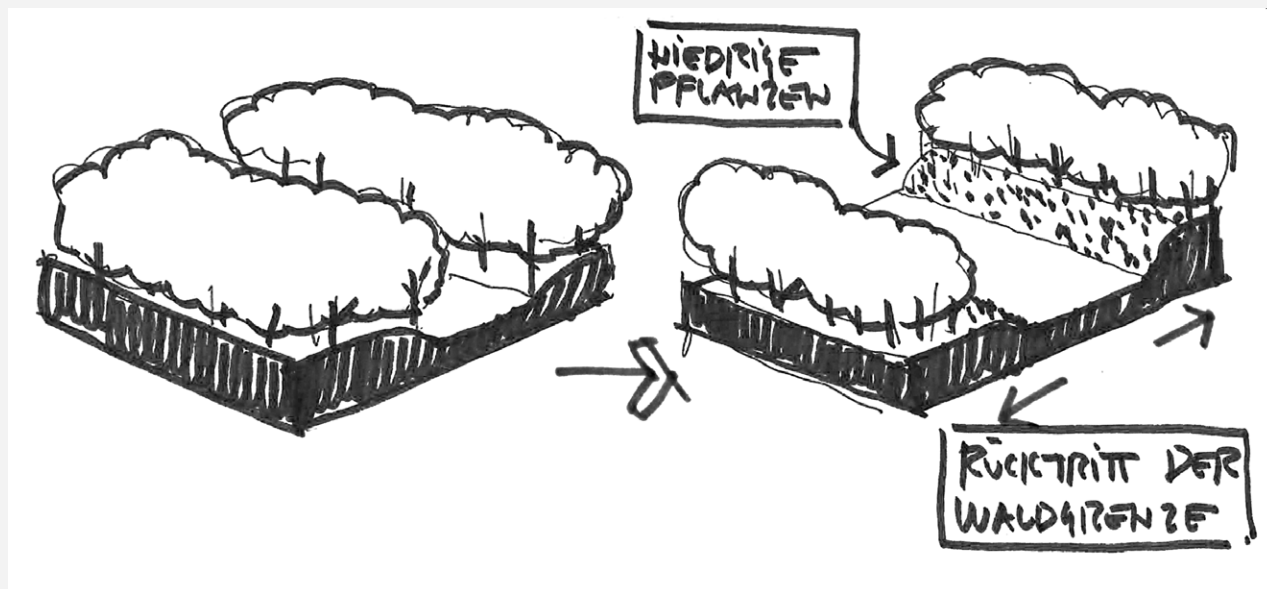


Fig. 77: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

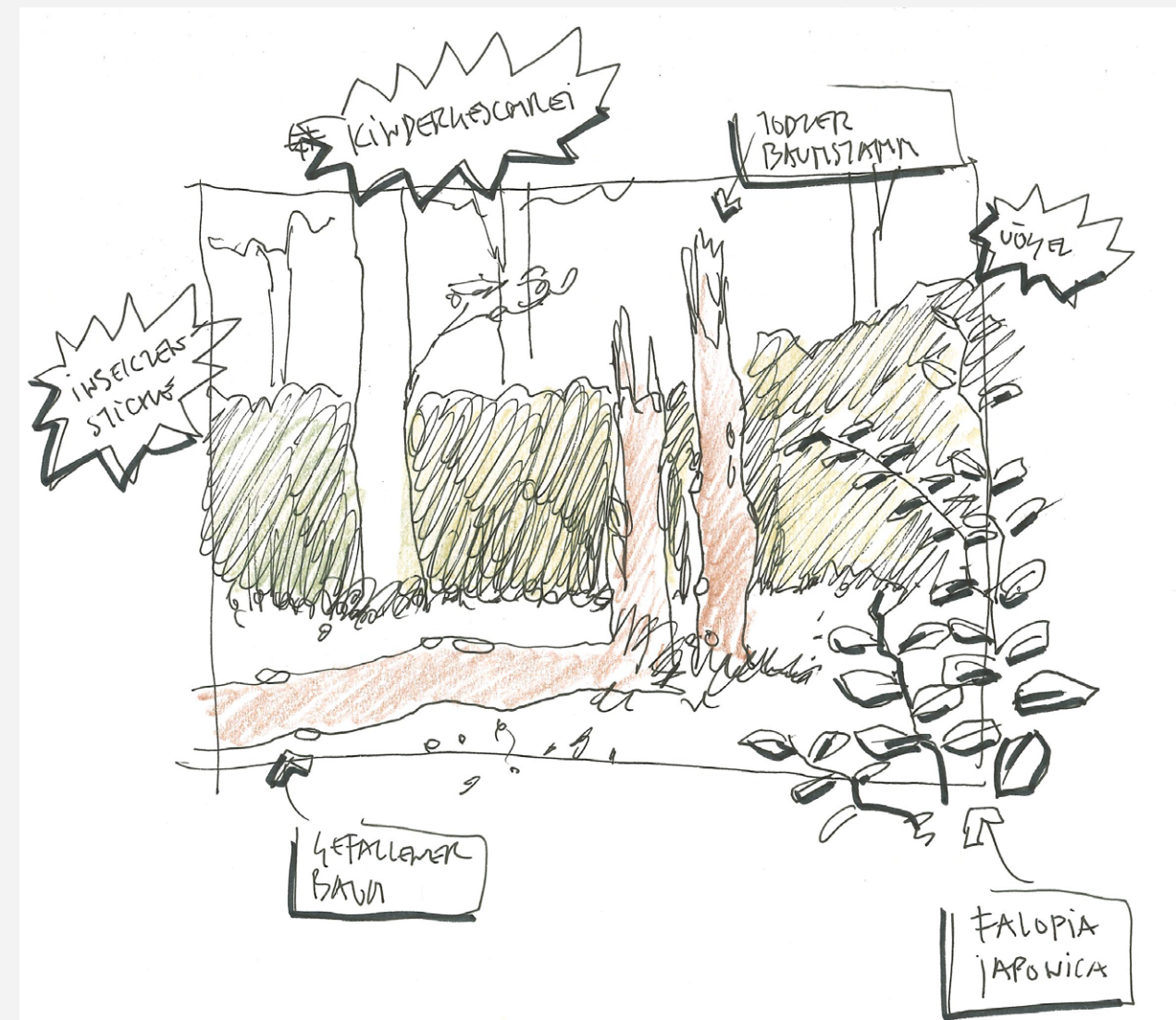


Fig. 78: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

or their sounds, or through changes in atmosphere, light, and smell caused by the shifts in vegetation communities and the slow large-scale ecological processes of the changing climatic conditions such as persistent drought in the urban setting.

The majority of participants noticed these aspects. Some explained them further with ecological background knowledge, while others just noted them as a discrepancy and dissonance in the sensory experience of a park: *“I always see dung beetles crawling around when I’m out in the woods. Here, I didn’t see a single one. And I guess it is because there’s no big game, so no deer is leaving their manure here. When I walk a forest paths, I usually see something bluish glittering; dung beetles. I found it curious that this wasn’t the case here. Just a small aspect.”*

“It’s a little bit like a forest that isn’t one?”

“Yes, that’s what I mean. There are little hints that something is different. That it’s more like a park here, than a woodland.”

The forest park is full of artificial sounds penetrating in it from its urban surrounding, yet its auditory backdrop transmits a sense of tranquility. The typical woodland sounds, such as the rustling of leaves, the wind, and the twittering of birds, created a sense of calm because they reminded the workshop participants of pristine environments. *“I felt like I was in a rainforest, even though I knew these were local species like chaffinch and tit. But if you don’t listen closely, the diffuse soundscape could just as well be in a rainforest, the way I know it from television.”* The sound of wildlife was vital to the nature experience in the park, as several participants reported. The sound was often perceived as silence due to its capacity to blend away the perception of the urban soundscape. *“The sounds of civilization, cars, airplanes, power generators, appear further away than they actually are.”*

Habitats that were singled out, isolated, or had unusual sculptural forms were often metaphorically referred to as art objects in participants’ narratives. *“We saw a fallen tree with a hornets’ nest in the park. It was fenced and looked ugly because of the fence, but it was fascinating to watch. Like land art. A hornets’ nest looks really impressive.”*

“For me, it’s a great nature experience when I see a woodpecker’s nest [e.g. in a tree trunk]. Animals have to find their place somewhere. But I also think it looks great. There is the value of an old tree for itself, but also as a biotope tree.” (see Figure 78).

→ LOCATION:
WITTMOOR, NATURE CONSERVATION AREA

At Wittmoor, several group discussions in the workshop revolved around ecologically appropriate management regimes for wet meadows. Grazing as a grassland management technique was discussed in terms of appropriate species and breeds for maintaining diverse grasslands and the appropriate number of animals per hectare. There was consensus among the participants that too many grazing animals can degrade the meadows and that the practice is costly and laborious, but it was seen as a practice with high aesthetic value. An example from Berlin was mentioned: *“A lot of people come to see the water buffalos arrive at the pasture. Children come and stand at the fence in awe.”*

“I find the presence of domesticated animals in the landscape positive. Grazing animals. Because it’s so rare to see cattle in a pasture in the city nowadays. Or even horses. There seem to be too many in Wittmoor, as the grassland has deteriorated. But [...], it’s nice to see horses and cattle outside. Otherwise, they’re just in a stable.” (see Figure 79). Also nibbled edges of the woodland trees signaled that there was grazing in the area. Whether by wild animals or domesticated remained an open question in the discussion. Interestingly, participants reported more wild animal encounters in the park setting in Altona than in the nature conservation areas. Here, the conversations about fauna revolved around the damage animals



Fig. 79: Unknown Participant, Wittmoor Co-design Workshop

Perceived slow ecological processes: bog related geological processes and water regimes, vegetation succession processes
Perceived fast ecological processes: grassland management practices with grazing

cause to habitats, such as loose dogs and overgrazing by cattle. Whether the sightings of wild fauna were rarer in the nature conservation areas is not clear. One explanation could be that the participants reported encountering animals more frequently in the park because they were more surprised by their presence. In the nature conservation areas, the participants were on the lookout for rare species that are less likely to be spotted, so they might not have remarked on the ubiquitous wild fauna as noteworthy. Rare fauna, however, generated much excitement, in Wittmoor Common European viper (*Vipera berus*), rare dragonfly and rare bird species, such as European stonechat (*Saxicola rubicola*).

Wild fauna was frequently mentioned in the context of scenic beauty: *“When the woodcocks [Eurasian woodcock (*Scolopax rusticola*)] make their spring migration in March, they fly westward in the twilight. They fly past one in the last evening light, which is just magical.”* It was observed that visitors or perhaps voluntary maintenance crews secretly cut windows in the thick poplar tree growth along the paths. Participants speculated that it was done for birdwatching, as the spots were chosen accordingly. In this case, it was not part of official maintenance works related to ecological aims; it seems to be done to increase the experiential quality of the habitats and open scenic views into the landscapes (see Figure 80).



Fig. 80: Unknown Participant, Wittmoor Co-design Workshop

3.5 Decay

Traces of ecological decay in the landscapes had a strong aesthetic impact on participants because of the uncanny atmospheres they evoked and the perceived tension in the transformation from living organisms into decomposing, inanimate matter. Observing these ecological processes prompted participants to reflect on cycles of life and death, often through symbolic cultural references. The motif of life emerging from decaying organic material was another mesmerizing aspect that participants frequently reported on.

The workshop participants' reported individual experiences of ecological processes correspond, to some degree, with the theoretical concepts of aesthetic perception identified in the first part of the dissertation (see Katarina Bajc, Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. 2026. Birkhäuser Basel). Participants' on-site aesthetic experiences and perception of decay encompassed the following categories:

- atmospheres
- play and discovery
- dissonance and friction
- tension in transformation.

→ LOCATION:
ALTONAER VOLKSPARK

Perceived slow ecological processes: local and regional climate, water regimes, mature forest succession processes and forest rejuvenation
Perceived fast ecological processes: forest maintenance practices

One particular situation was mentioned repeatedly in the Altonaer Volkspark workshop: a staked pile of tree trunks in a forest clearing that had begun to rot and molder. The decay processes of large deadwood trunks, marked by varying signs and stages of decay and decomposition, eventually metamorphosing into other forms of life, had a strong aesthetic impact: *"It was like an art installation, full of life. There were fungi, there were young saplings growing out of it, there were critters and cavities."*

Workshop participants tended to describe the tension inherent in the transformation from vital trees into deadwood and, ultimately, into decaying matter with poetic terms in their narratives. In this specific situation, their descriptions also related to the fact that the trunks were neatly arranged in very large stacks, amplifying and condensing the experience of decay in one place. This ordered structure presented

an invariant against which the different forms of decay became easily discernible and were referred to as an *"art exhibition"* (see Figure 81).

Some workshop participants with a sound understanding of the ecological role of deadwood in the forest ecosystem, for example, as a habitat for saproxylic insects, framed the value of ecological decay in these landscapes through scientific concepts. However, the large majority of workshop participants did not emphasize the precise mechanisms through which decaying matter performs an ecological role in the forest. Instead, in their conversations they more frequently referred to the presence of deadwood as an aesthetic contribution to the parks authentic woodland atmosphere. Areas of the forest park with a greater presence of decaying organic matter were perceived as more pristine. The characteristics of these sites, such as piles of moss-covered woody material,

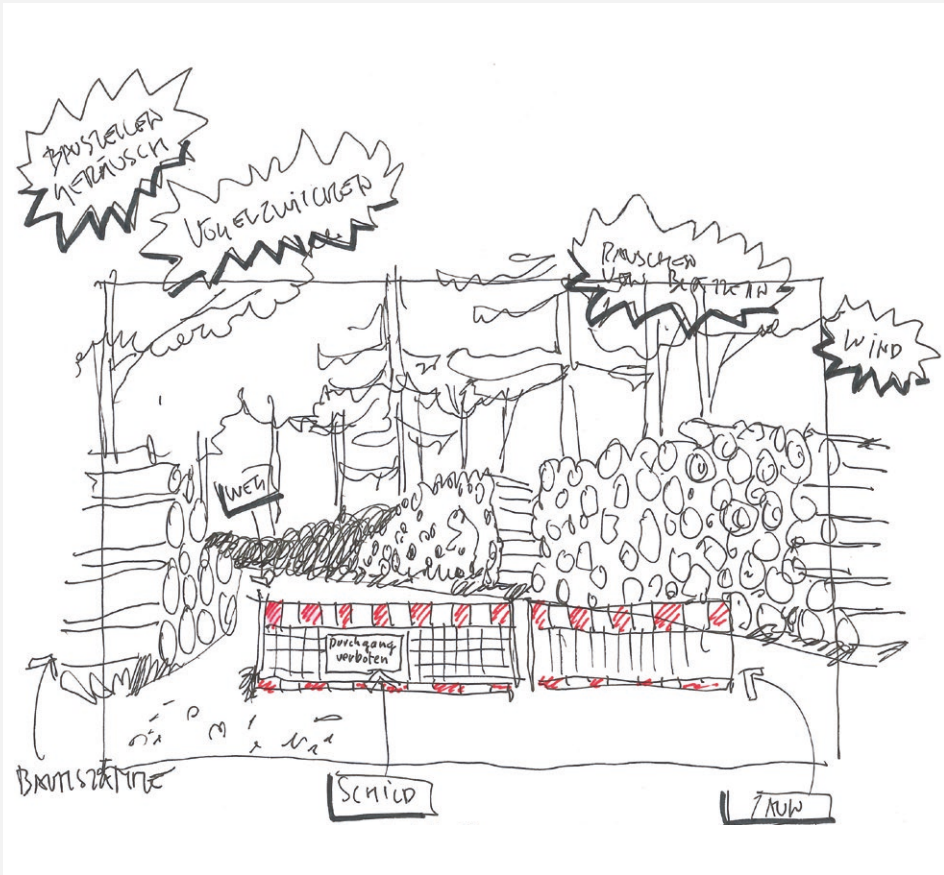


Fig. 81: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

exposing the processes of decay, was reflected upon in terms of the transitory nature of ecological dynamics. At the same time, decay was discussed in the workshop groups, as a cultural representation of naturalness, and participants emphasized its intrinsic value.

Several study participants referred to it as “art”, implying that these sites exposed the cultural idea of nature, which can be additionally strengthened by intentional design decisions. Although deadwood is not specifically a landscape design feature in the Altonaer Volkspark, it seems to function as a projection surface or a carrier for imagery in connection with popular culture and fine arts, such as myths, fairy tales, literature, and known artworks: “A tree stump with roots stretching out was like a work of art. It reminded me of a Rodin statue—two people moving.” “It [fallen tree] looked like a dugout canoe. You could make a boat out of it, it wasn’t bad!” (See Figure 82).

Ecological decay processes in the forest park were associated with attributes including “mysterious”, “dangerous”, “romantic”, and “natural” in addition to emphasis of their value as a biotope. The near-natural islands of in the forest with deadwood, even small ones, that were only accessible by informal desire paths with the soft leaf-covered ground, were predominantly described with affection in participants reports.

Another distinctive feature of plentiful deadwood in Altonaer Volkspark is its use for play (see Figure 83). Many participants were fascinated by the observation that visitors build teepees from fallen branches. “I used to build structures like that as a child, too. I think it’s important because it’s how I first developed a connection with nature. So, there must be more opportunities for children to engage in these activities in public parks.” When used as objects for play and tactile engagement with forest material, wood debris appears to enable a relational aesthetic experience based on direct agency and creative expression, rather than mere observation.

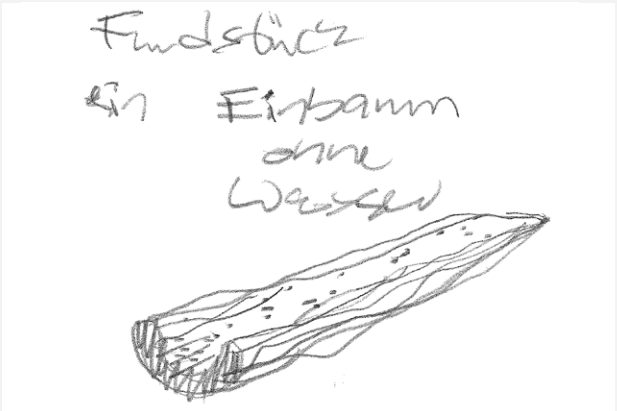


Fig. 82: Ando Yoo, Altonaer Volkspark Co-design Workshop

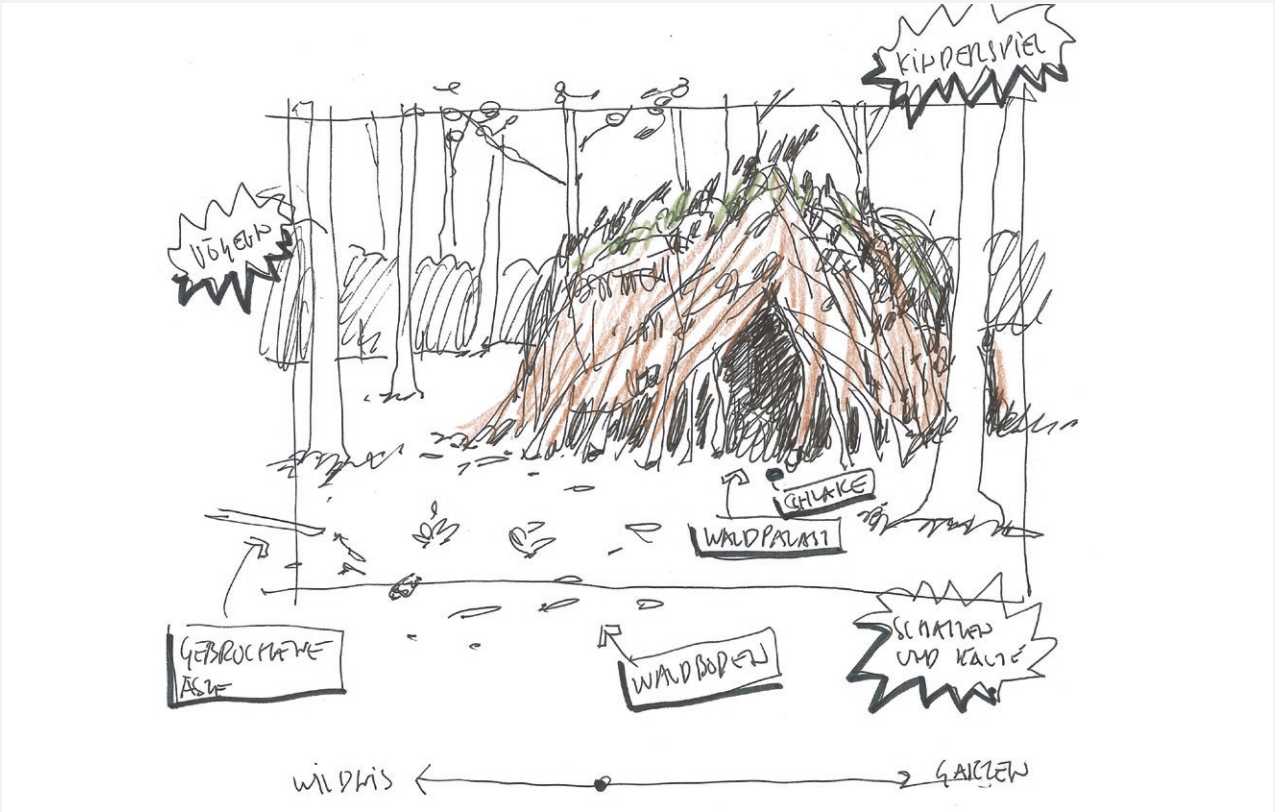


Fig. 83: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

→ **LOCATION:**
WITTMOOR, NATURE CONSERVATION AREA

The processes of bog formation and related management of water regimes are conspicuous in Wittmoor and attract attention because of the resulting striking and unusual landscape. The artificially dammed bog lake in the middle of the protected area is slowly engulfing the pioneer vegetation: “ [...] a place of contrasts, where dead birches stand beside blooming calla lilies”. Inundated tree trunks protruding from the water surface were described by a workshop participant to create “highly charged atmosphere”.

Although this landscape is ecologically very different from the forest park, processes of decay also here attracted considerable attention and prompted reflection on the aesthetic impact of ecology related management regimes in the area: “There were sedges, moor grasses, quite a lot of dead trees. Behind them, fresh birches grew in the swamp as a symbol of passing and becoming, that one can experience in nature. It appears again and again. It is so familiar. It’s this cycle of life that I read in the image of this landscape.”

These markedly perceptible processes of ecological decay in the flooded landscape are vital to understanding the newly introduced water management armatures in Wittmoor and the related slow processes of the bog landscape.

Perceived slow ecological processes: bog related geological processes and changing water regimes, primary and secondary succession processes
Perceived fast ecological processes: seasonal bog maintenance practices

As in Altonaer Volkspark, also in Wittmoor these processes were described in poetic terms, ranging from “idyllic” and “peaceful” to “morbid” and “dramatic.” They were also depicted in several scenic portraits of the area (see Figures 84 to 86), revealing the ambivalent aesthetic value the study participants recognized in the inundated, decaying vegetation.



Fig. 84: Julia Krause, HCU University Design Studio



Fig. 85: Katrina Westphal, HCU University Design Studio



Fig. 86: Lea Gotthardt, HCU University Design Studio

3.6 Walking

Walking and movement through the landscape was a continuous underlying narrative in participants' reports, even in discussions of other topics. Participants were mindful of the fact that following the paths and trails inevitably placed them in relation to the landscape in a particular way and thus also guided their perception. They questioned and reflected upon this extensively as a result of their experiences during the expedition. The choreography of movement was remarked on directly by evaluating the experiential quality of the paths and indirectly by describing the kinesthetic and experiential sensations of walking through the landscapes.

The workshop participants' reported individual experiences of ecological processes correspond, to some degree, with the theoretical concepts of aesthetic perception identified in the first part of the dissertation (see Katarina Bajc, Ecological Processes in Landscape Architecture. Everything Flows, Everything Grows. 2026. Birkhäuser Basel). Participants' on-site aesthetic experiences and perception of walking encompassed the following categories:

- atmospheres
- play and discovery
- dissonance and friction
- landscape choreography.

→ LOCATION:
ALTONAERVOLKSPARK

The amount, detail, and complexity of participants' testimonies about walking and moving through the landscape in this study point to the significance of embodied environmental perception. Walking and landscape choreography of the park were discussed in the workshop groups more frequently and longer than other topics and perceptual phenomena encountered during their expeditions. The workshop participants reflected on paths specifically, as design elements that connect visitors to the surrounding landscape and on the movement through the landscapes more generally as a perceptible process.

The logic of the routes and paths within Altonaer Volkspark is not immediately evident or intuitive. A hierarchy between the main paths and side paths is lacking, and stark changes in topography further obscure orientation. This was irritating to the participants on the one hand but encouraged the discovery and supported the perception process on the other. "It leads to situations where you always come across unexpected places, like little islands that are scattered in the park, which provide a moment of surprise. An 'aha' moment."

The vegetation composition and attractions alongside the path guided perception and movement by inviting, drawing in, or deterring participants, often in opposition to what the planned route itself prescribed.

Perceived slow ecological processes: geological processes of the glacial armature, weathering and erosion of sand quarry armature, fading park heritage armatures, forest succession.
Perceived fast ecological processes: seasonal, forest and park maintenance practices

"The less a path does that, the faster children start to get bored when walking." Entrances to small informal desire paths leading through areas of spontaneous vegetation seemed to present diverse experiential affordances. They also foster the sense of discovery and adventure. This reflects in many participants' accounts of their expeditions: "The fact that the paths are a bit undefined and you don't know - am I allowed in there, do I want to go in there, should I go in there - I actually didn't find that negative, but something stimulating and exciting." (see Figure 87).

Informal trails were popular among the participants because of their ability to support a feeling of connectedness to the surrounding "nature" and the underlying landscape armature. "The landscape has to communicate itself through the path. That's what's so great about informal trails, because both the landscape and the use of the path, so to speak - traces of cultural use - reveal itself through the path, for example, whether the path is heavily or lightly trodden [...] And of course, because a path takes part in everything in, and on the ground, adapts to every curvature, the landscape communicates it self through the path." (see Figure 89).

The main paths in Altonaer Volkspark are three to five meters wide, and they appear even wider, because the rainwater trenches on either side of the paths are clear of vegetation (see Figure 90). The



Fig. 87: Unknown Participant, Altonaer Volkspark Co-design Workshop

feeling of being disproportionately small in comparison to the width of the path created a sense of walking very slowly and contributed to a feeling of monotony and disconnectedness from the surrounding landscape. *"In my experience with my children, when I take them for a walk; for instance, when we walk on a three-meter-wide sandy path, after three kilometers at the latest they start whining about how boring the walk is. But if we have a very narrow path, where you can only walk one behind the other, or even better, when there's water on your right and a cliff on the left, then they walk for eight hours without complaining. Because the experience is just way more intense."*

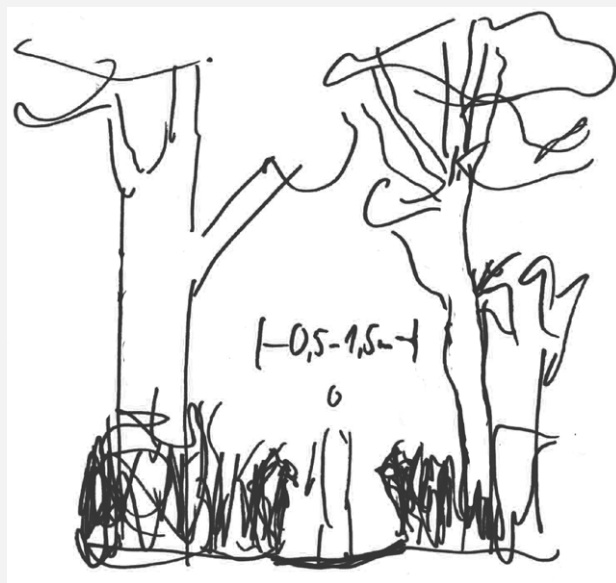


Fig. 88: Maite Maaß, Altonaer Volkspark Co-design Workshop

The width of the path influences how intensively the natural processes along the route, as well, as the broader landscape context surrounding it, can be experienced. Several participants noted situations where space narrowed and widened according to the different vegetation along the path's edge, which increased perception of the diverse ecology of the ecotone zone, wildlife sightings or traces of forest succession. *"Down here [...], there were many smaller paths; they were maybe about a meter wide or so. And there was undergrowth to the left and right, knee high or waist high. So, I was diving in this undergrowth, but I didn't have to fight my way through, I could walk normally. And I found this exciting because the proportion [of the body in relation to the path] was totally beautiful. It allowed me to be in a discovery mode but in civilization at the same time and be able to walk comfortably."* (See Figure 88).

The manifold reports of walking through the thicket were filled with excitement and wonder. *"I work in a conservation area and our first task is to tell visitors: stay on the path. But here in the forest park, I could invent my own paths. And so, I dared myself to overcome this mental barrier. It was really great; I flourished. I noticed that I rather like these narrow natural paths."* Informal trails also unlocked childhood memories: *"I was reminded of a time when I could just roam about. I'd have nothing to do, and I'd go alone by bike or on foot. I'd come to a landscape and explore it. I was so immersed in its microcosm, and I'd look at plants, stones, things, that I somehow found touching. And that experience is obviously still strongly imprinted*



Fig. 89: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

because when I was on the path, I could tap into this feeling mentally and emotionally. It was beautiful, here in this area. This wider official circuit path on the other hand I found more profane."

In Altonaer Volkspark, informal trails often branch off and form a network of narrow paths that extends across the entire area, as people avoid the already dense official path system in search of near-natural experience. *"I consciously chose not walk on the path, but close to it."* Study participants noted that the informal paths present an experiential quality particular to Altonaer Volkspark compared to more intensively maintained urban parks. However, the density of informal trails and desire paths was also criticized due to vegetation damage that is caused by trampling. *"I also prefer smaller paths to these large paved paths. But I noticed that as a biologist it's really hard for me to leave the path. I just don't want to spoil anything, or disturb any species. It's breeding season now, too. That's why I didn't pick up any [field samples] to show you."*

For example, a wildflower meadow implemented as a part of a public program for increasing biodiversity in the city offered an opportunity for a desire path, and one soon emerged. Such situations were discussed ambivalently: *"People might know they're compromising the meadow, but they still walk in it, because that's exactly the experience they want. To walk through the middle of a flower meadow where the flowers grow waist high."* These observations in the park were taken up in the co-design workshop as further evidence in support of intentionally designing larger areas

with fewer official paths in which unconfined natural development can be more frequently explored and experienced in an urban context.

Landscapes that resemble more pristine, undisturbed, and distinct landscape types, such as flower meadows or beech woodland understory, seem to be appealing not only for their scenic views, but also as environments to move through and become immersed their atmosphere. Participants reported that these situations effectively facilitated a meaningful sensation of being part of a living organism or natural system that is larger than oneself. They physically envelop the body, immersing participants in the aesthetic and ecological presence of the landscape.

Areas in the park that are designated for unconfined secession growth or those with limited maintenance regimes for natural rejuvenation, have no official paths leading through them and function as refuge areas for wild fauna. Therefore, participants with a professional background in ecology stressed the vital role of these undisturbed spaces in the urban environment in terms of their ecological, as well, as aesthetic quality. *"These have a different kind of path type, not sealed, not lit at night. Where you can really have the experience of a woodland."* In the forest park, participants valued the possibility of walking in darkness, noting that few large open spaces in the city allow for such an experience.

Dense, wilder thicket areas with visually unappealing pioneer growth appeared in several reports as sites of aesthetic dissonance. Entering these involved an unsettling sense of risk, transgression, or



Fig. 90: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

departure from the permitted route. *"I found the official paths too wide, and then I saw some desire paths leading into the thicket. But you have to dare to go in there ... On a regular stroll, I wouldn't do it. But this time I wanted to experience it. Even though I didn't feel really drawn in. I consciously had to cross a threshold."*

Similarly, signage forbidding access to an area raised curiosity, prompting several participants to enter: *"The charm of the forbidden plays a big role in the experience of wilderness. The enchanted places and everything that goes with them, I associate with the sign: no entry."* Participants also reported that purposefully getting lost and walking without a map increased the sense of discovery and percipience. Remarkably, such moments of dissonance and friction can function as affordances for experiencing nature to the same extent as attractive destinations do.

In addition to the size and landscape context of the paths, materiality was often mentioned in connection

with ecological processes. Participants mainly referenced haptic aspects, such as soft, cushioned, permeable forest ground or moss; the texture and smell of decomposing foliage; and the cracking of small twigs underfoot. *"As a field samples to show, I brought moss because it's my favorite material in the forest. Its muffled quality was what I missed at the beginning of the walk on the gravel road. It was only when I was walking on it barefoot that I consciously noticed I'd missed it. The moss."* (see Figures 91). Many participants regarded climbing over exposed roots along the paths and the slopes as a characteristic kinaesthetic interaction with the forest environment. (see Figures 93 and 94). Several reports also related to walking barefoot *"so one could develop sensitivity and ground oneself again."*

On the day of the workshop expedition, there was new topsoil spread along the sides of the paths due to recently undertaken maintenance works. *"I found these newly created topsoil trails quite interesting; there were footprints in them, mostly next to the paths, from dogs and people, but there were also two sets of deer footprints. So, it looks like the gravel path is actively avoided [when there is an opportunity to walk next to it on organic material]."* Several participants remarked on this preference and speculated about the role changes in path material play in the perception of the environment. *"I noticed that something changed, the ground was different. I imagine that it can be quite an interesting means of design, because it's experienced bodily. When the ground changes, the posture changes, you align yourself differently, you have to find balance again. You discover something new with the feet. I found it quite exciting as a perception phenomenon because I was regularly confronted with it on my walk and each*



Fig. 91: Collected field samples, Altonaer Volkspark Co-design Workshop



Fig. 92: Collected field samples, Altonaer Volkspark Co-design Workshop

time I realized, 'ah, okay, now it's a new situation'." (see Figure 92).

Most participants reported exploring the park without a plan or defined rules. They drifted, each creating their own landscape choreography as they went. Yet, accounts of the affordances facilitating this process were often similar:

- Sharp contrasts between landscape types with clear atmospheres of ingression, for example between forest and clearing, and other aesthetic or ecological threshold situations, such as ecotones.
- The prospect of an exciting discovery, such as the start of a small trail, informal desire path or a warning sign saying "no trespassing".
- Designed or visibly maintained invariants in an otherwise untamed vegetation matrix, such as clearings, cut trees or hedges, a solitary exotic tree species, or a wolf tree.

Discovering such invariant structures or changes in an atmosphere within the homogenous matrix of one landscape type, for instance, a forest cover, aided the exploration process. It offered diverse affordances in

the individual's perceptual flow. These were situations where participants were drawn into taking a different route in their movement through the landscape. In this context, several participants also described forks in the path or other situations of surprise and ambivalence: *"Moments where I have a choice. Where I say, hey, I could dive into this world here, or into another world. I found that quite delightful. Sometimes [these situations were] wild or designed, or semi-designed [...] This was exciting to observe. Places where my body was tempted to go, where I could walk in between the trees, or go around. Where can I dive in, where do I have to stop? I'm in between, I'm above, I'm below; in general, how does the body automatically relate to the space you're in."* (see Figure 95). *"An oak tree stood in the middle of the path, which is rather unusual [...] to have a tree on the path. As a very concise marker and somehow also like a gate. Which way do you go?"* These ambivalent decision-making moments generated interest and stimulated a conscious perception of the landscape context. *"They're a bit like promises, these nodes. [...] What does this route advertise, what does another route suggest?"*



Fig. 93: Ando Yoo, Altonaer Volkspark Co-design Workshop



Fig. 94: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



Fig. 95: Robin Winogrand, Altonaer Volkspark Co-design Workshop

Beyond the characteristics of the paths themselves, the surrounding landscape type creates invariants and affordances that support the choreography of movement. The vegetation structure is guiding and directing visitors' attention while shaping their flow of exploration. The experience specific to the woodland landscape type was reported to encourage a different mode of walking through the landscape than low vegetation with an open expanse. Workshop participants observed that movement coreography in grassland the is often oriented toward landmarks visible on the horizon, such as solitary trees. A forest offers a sensation of being enveloped in its high, dense vegetation: *"The ceiling of leaves changes my perspective. I am surrounded by the forest, and the path offers me a clear route, so I can let my gaze wander. My gaze travels to the ground, or up into the canopy. I really liked that the view also moves vertically, if you're not always searching for the horizon."*

"These are impressions of the Rivière. Rivière means river in French. In this context, it signifies the strip of sky that you can see above a corridor of trees. This effect is often used in historical garden art, where the trees are trimmed to offer a view of the sky." (see Figures 96-98).



Fig. 96-98: Nil Lachkareff, Altonaer Volkspark Co-design Workshop



→ **LOCATION:**
WITTMOOR, NATURE CONSERVATION AREA

In Wittmoor, the traces of slow ecological processes are clearly revealed in the logic of the pathway network (see Figure 99). The few paths are positioned on the two elevated dams that hold back the water of the moor lake and on the geological elevations of the geest along the edges of the Wittmoor bog (see Figure 101). They form a circular route that is clearly legible as an artificial armature within the bog

Perceived slow ecological processes: bog related geological processes and changing water regimes caused by artificial landscape armatures, primary and secondary vegetation succession processes
Perceived fast ecological processes: heathland and bog vegetation maintenance practices

landscape, constructed to support nature conservation management. Large areas of the bog are inaccessible due to its protected status and mostly because of the wet ground, so few informal trails or desire paths emerge. Workshop participants praised this path logic for providing clear orientation, while also noting that it constrained direct contact and immersive experiences of moorland and heathland atmospheres.



Fig. 99: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



Fig. 100: Photograph Wittmoor, Katarina Bajc

At selected locations along the edge of the revitalized peat bog, however, the path and the dam are designed to allow water to overflow into adjacent areas when the water table rises after heavy rainfall (see Figure 100). This detail attracts little attention during dry periods. In rainy seasons, however, the bog's geology becomes apparent: its impermeable underlying layers cause it to retain water like a bathtub without an outlet into the groundwater. Visitors must cross a series of elevated stepping stones on the path to avoid getting their feet wet from overflowing rainwater. In this way, both the bog's natural water regime and the human interventions that regulate it become directly perceptible along the path on the armature structure of the dam. This small designed element embodies the tension between two competing slow ecological processes, the re-wetting and drainage of the peat bog, making them palpable at a human scale through a moment of friction and dissonance.

The materiality of the paths also helps visitors develop an intuitive, kinesthetic connection to the geological armatures of the landscape. In the bog area, this was reported on a dam path that is built on a peat foundation. While walking on the dam, one can feel the cushioned turf material underneath bouncing softly but noticeably with each step. The dry sandy paths at the heathland edge of the moor valley offer contrasting, but just as a tangible experience of its geological past. In the heathland, they split into numerous informal, narrow, winding desire paths with characteristic grinding sound as one's feet sink into the sand (see figure 101).

Official and informal paths featured prominently in the discussions of all Wittmoor co-design workshop groups, with participants expressing conflicting opinions. Designated paths for visitors in Wittmoor are wide and form a double loop. *"What I want to stress as a negative aspect is this: again, here was a long stretch of straight path. On the right and left were three-meter-high poplars. I saw nothing of the landscape."* In Altonaer Volkspark, the opportunity for individual discovery experience by choosing desire paths was praised. In Wittmoor, this affordance was missed, which sparked a disputed conversation about the necessity for additional smaller trails, which are as a rule, not permitted in conservation areas. *"The feeling of experiencing wilderness usually arises when there is somehow a confusing, ambivalent situation [on the walk]. But here, you have to follow a predictable circular route, and then you get back into the car."*

On the one hand, participants assessed that a possibility of unconstrained exploration is critical to a sense of connection and curiosity for the natural environment. On the other hand, they condemned deviating from formal paths due to the disturbance of protected fauna. It was cautioned that if a path design does not offer satisfactory exploration opportunities, people create their own paths, additionally compromising the core habitat areas. The affordances for discovery, embodied contact and relational aesthetics, therefore, seem to be relevant design parameters in parks as well as in nature conservations sites.

Where the official paths did not offer affordances for contact with nature, even the workshop participants were tempted to take informal trails. *"The whole time I had a bit of a feeling I just missed the area. So, I really had the need to get off this main path, on which I could see five hundred meters ahead and knew what to expect."* Some ventured into protected areas in search of closer contact with the distilled atmosphere of this familiar, yet, special landscape type: *"I wanted a certain feeling that I associate with moor landscapes and has deep roots in my childhood. Moreover, this is exactly the season for it, so I entered here, where large multi-stemmed birch trees rose above the surrounding moor grasses."*

Most participants in the co-design workshop groups agreed that with intelligent design, the conservation goals and official paths that foster a sense of discovery can be combined. As was discovered in a northern part of the Wittmoor nature conservation area: *"The paths in the area here are really very diverse and charming. Even Olmstead couldn't have come up with much more variety. You always encounter alternative paths that lead back to a spot where you've already been, and you think, huh, here I am again! As was done so well in Central Park. It's actually such a beautiful combination of park motifs and natural setting here [...]. A romantic, very classic park motif in a nature conservation area."*

In Wittmoor, for example, the logic of the geest landscape armature and the formation of the bog are revealed through the choreography of movement and

particular situations in which paths enter and lead through the moor valley: *"One always enters over these steep hills and can look into the distance. It's the same when you enter from the north in the moor lowland, across the meadows, or from the south, where you descend into the depths of the narrow gully with its stream and dark and damp atmosphere. This is great as a landscape experience and also quite diverse choreography. What do I encounter when I walk through the area in one direction? How do I experience it if I come from the elevated areas with the heath and the sand, through the wet meadow, and into the core bog area with the lake, and then follow the flow of the water? These two directions of experience are both very exciting."* (see figure 102).



Fig. 101: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



Fig. 102: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

3.7 Conclusion

The act of narrating ecological processes perceived on site during the expert workshops and university design studios displayed different personal predispositions. Some study participants drew exclusively on their professional knowledge to explain the observed spatial traces and atmospheres in the landscapes caused by the ecological dynamics. Most participants, however, offered more intimate, personal and sensory accounts of particular sensations or memories triggered by the landscape experience, although these accounts were, inevitably, also shaped by underlying values and judgements.

Participants’ perceptions of the landscape sites were strongly informed by Western cultural references and a sustainability-oriented worldview. This was to be expected, as the experts and students participating in the study, came from Europe, mostly Germany and had backgrounds in landscape architecture and planning, nature conservation, biology, botany, urban planning, and the fine arts. The invited experts represented the German Federal Agency for Nature Conservation (BfN), Hamburg’s Ministry for the Environment, Climate, Energy and Agriculture (BUKEA), Universität Hamburg UHH, HafenCity Universität Hamburg HCU, several private landscape architecture firms, non-governmental nature conservation organisations, and associations dedicated to the preservation of garden heritage. The mandate of these institutions is to develop and safeguard the ecological and cultural values of landscapes. However, the study group was diverse and interdisciplinary, and participants’ perceptions of the ecological and cultural qualities of the explored sites, as well as the values they projected onto them, varied accordingly.

Translating and narrating the perceived ecological processes on site addressed different spatial scales and exhibited varying degrees of detail. Despite this heterogeneous data, several observations, positive and negative alike, were consistently repeated in descriptions of the landscapes and were discussed from different points of view within the interdisciplinary groups. These were synthesised into the categories presented in the preceding chapters:

- topography
- light, shadow, and microclimates
- vegetation communities and composition
- wildlife encounters
- decay
- walking.

Most of these pressing and contested topics motivated participants to react to them with solution proposals and project their experiences and opinions on the matter into design ideas. This allowed me to discern continuity between participants’ aesthetic observations of the ecological dynamics immediately after the on-site expeditions and the subsequent phase, where design suggestions and concepts were discussed and developed.

4.

**DESIGN APPROACHES TO STRENGTHEN
THE PERCEPTION OF ECOLOGICAL
PROCESSES**

The design approaches produced by the workshop participants and students within research-by-design phase are presented in this chapter. They are illustrated with images and transcribed oral accounts of the design process. In the co-design phase of expert workshops and university studios, the design suggestions were developed specifically for the three case landscape types and sites:

- moor landscapes with wet grasslands and peat bogs: Wittmoor
- arid landscapes with heathland with dunes: Wittenbergener Heide
- urban forest: Altonaer Volkspark.

Although these design proposals are related to each site's aesthetic context and specific local ecological processes, they form a few general categories according to the design strategies they employ. This enabled me to summarise them concisely in this chapter of the dissertation. The following section presents the design approaches for enhancing the perception of ecological processes, as identified through the research -by-design study:

→ COMMUNICATING ARMATURES

The striking topography of the large-scale armatures in Altonaer Volkspark, the linear elements of the raised water-retention infrastructure in Wittmoor, and the steep slopes of the geest in Wittenbergener Heide all captivated the participants' imaginations. Their observations of the large-scale and slow ecological transformations visible on site were translated into design suggestions aimed at communicating these armatures and the slow ecological processes associated with them.

→ PATHS AS A MEDIUM OF AGENCY AND PERCEPTION

Participants reflected on how landscape choreography influenced their movement and choice of walking routes during the expeditions, and how it served as an essential parameter for the active landscape perception. As a result, several of their proposed design approaches acknowledged the role of paths as a medium of agency and aesthetic participation in the ecological context of the landscape. Several design proposals for the path

networks, materiality and related spatial affordances along those routes were created during the co-design phase. These are aimed at supporting the exploration of the landscape over time and thereby facilitating the perception of the dynamic ecological context immediately around the path and across the entire local armature.

→ CURATORIAL PRAXIS AND CARE

Ongoing ecological change within vegetation communities produces particular spatial and aesthetic effects through atmospheres, vegetation patterns and textures, light and shadow, microclimates, and processes of decay. The conscious observations of these phenomenon in landscape sites inspired design suggestions that apply long-term curatorial praxis and care as a design strategy. These design approaches focus on guiding and adjusting ecological processes of development of vegetation communities over time in response to the vegetation's existing ecological and aesthetic quality.

In this long-term, process related design, the atmospheres, patterns, and textures of the vegetation change and disappear while new plant composition or adjusted communities emerge, influenced by the active curatorial praxis and care. Rather than a fixed outcome, these design approaches aim to respond to and support the ongoing development and landscapes' ecosystem health as well as their experiential value by continuous maintenance, and curating the design outcomes that emerge over time. Additionally, this approach aims to actively create and sustain habitats in which visitors can encounter local fauna.

→ HARVESTING, FORAGING, COLLECTING, RECYCLING, PLAYING

In addition to curatorial praxis and care intended to be carried out by professionals, several design proposals focused on fostering activities where laypeople can actively partake in landscape experience, including harvesting, foraging, collecting, recycling, and playing. These design approaches encourage an emotional bond to landscapes through relational aesthetics. The perception of ecological dynamics can be intentionally fostered by offering

opportunities for direct participation in the seasonal changes and long-term development of the site. As these activities are carried out repeatedly, they require attention to the ecological processes related to the vegetation's growth, maturing, fruiting, and decaying. Such a sustained relationship with the landscapes over time can support perceptual learning and a sense of responsibility.

→ CREATING HABITATS TO BE EXPERIENCED

Wildlife encounters can generate excitement and vivid emotional responses, as reflected in participants' reports from their own site visits. In several study groups, participants discussed how such encounters foster affective bonds with the ecological context of a landscape and how this can be intentionally supported through landscape design and management. The related design proposals developed in the workshops thus aimed to create habitats that could simultaneously be actively experienced by humans.

Nature conservation organisations already deliberately diversify and develop the ecological composition of landscapes to provide suitable habitats for endangered species, including within urban areas. However, the design approaches developed in this study went a step further by suggesting that habitat design in cities should also intentionally create opportunities for chance encounters with wild fauna, including the ubiquitous species. The study participants stressed that habitat creation and development should be recognised not only as a nature conservation task but also as an aesthetic one.

Co design workshops and the students' design proposals offered several innovative approaches to revealing, interpreting, and strengthening the aesthetic experience of ecological processes in urban landscapes and nature conservation areas. In the Chapter 4 several of these design proposals and ideas are presented synthesized into design strategies applicable to other comparable landscapes:

- communicating armatures
- designing paths as a medium of agency and perception
- enabling curatorial praxis and care
- harvesting, foraging, collecting, recycling, playing
- creating habitats to be experienced

4.1 Communicating Armatures

→ COMMUNICATING ARMATURES BY LANDSCAPE MANAGEMENT

Communicating landscape armatures and the related slow ecological dynamics, such as geological processes of peat accumulation in a raised bog (see Figure 103), is a difficult task for a landscape architect, as humans' ability to perceive vast temporal and spatial scales is limited. Yet, in the co-design workshops conducted within this study, moments where participants could grasp a landscape armature with one gaze or within a single walk had a strong

aesthetic impact (see Figure 104). Many favorite spots that participants marked on the map of the area were in locations that facilitated intuitive understanding of the underlying landscape armature and its formative slow ecological processes: *“From this bench, you have a beautiful view down here, and you can understand the moor, so to speak, and the different layers of peat cutting. Because there is the heath on top, then the quarry edge here and the bog down below. And you have a very long view into this moor landscape and a very protected situation with large oaks behind you.”*

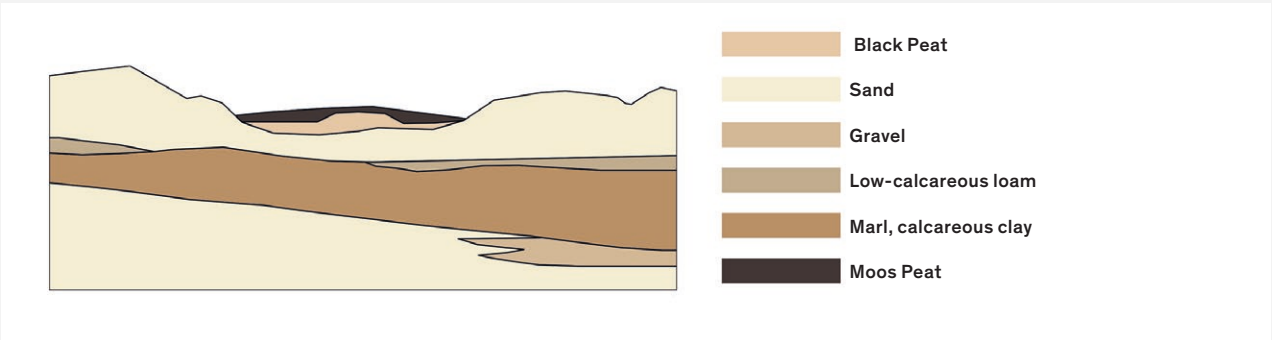


Fig. 103: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio



Fig. 104: Gabriele Pütz, Wittmoor Co-design Workshop

The gradual alternation of landscape types from bog lake in the lowlands to dry heathland on the surrounding slopes is a signature feature of Wittmoor (see Figure 105). The moorland geology and water regimes offer clearly readable landscape armature and host recognizable regional habitats and vegetation communities, ranging from wet bog vegetation to dry sandy heath scrub. In Wittmoor, these are expressed in related landscape types with contrasting atmospheres juxtaposed in a relatively small area so they can be encompassed within a single gaze.

Workshop participants expressed concern that an emerging random patchwork of pioneer vegetation stands at different stages of succession was increasingly obscuring this distinctive and valued landscape character, defined by its expansive open horizon. The small pioneer forest patches result from the fragmented logic of land parcels and property

ownerships in the area, each with its own landscape use and development strategy.

One of the co-design workshop groups proposed a landscape management solution to challenge this trend (see Figure 106). The concept of a “pancake” envisions a management plan for the nature conservation area based primarily on the local slow processes of bog rejuvenation, organised as a series of concentric landscape zones extending outward from a wet bog core. At the centre, the bog lake, described as “the most scenic place”, and the surrounding peatlands should be inundated by regulating the water regime through drainage control and other bog restoration measures. Whenever opportunities arose, the municipality would acquire adjacent properties, rewet the drained peat soils, and thereby gradually expand this central bog area outward, to avoid fragmentation. This core would retain typical bog vegetation entirely without taller or denser

growth of shrubs and trees. A first ring around it could conversely, consist of small patches of young, slender birch groves with a moor-grass understory, reflecting the moorland atmosphere that participants praised as particularly attractive during the site visits. Beyond this, a broader ring of wet meadows would extend around the sparsely wooded zone, saturated with water to the extent permitted by the topography and soil conditions. Finally, an outer ring of sandy heathland terrain would enclose the entire area, following its natural topography. The grasslands and heathlands around the wet bog core would be maintained through mowing and grazing. This should be organised locally with a permanent sheep herd moving along the outer ring, rather than through the temporary introduction of herds transported to the site for short-term maintenance. The workshop group speculated that an “ideal-typical landscape” or “image” would form from this management scheme over time

due to rings of clear homogenous landscape types with mostly low vegetation around the core bog lake. The concept would hence foster a robust experiential connection to the underlying armature and to the aesthetic character of the local ecological processes intrinsic to it. “There would be no more horses or small fragmented land parcels with fences, but [...] a flock of German Grey Heath sheep [regional moorland sheep breed] that moves around the rim area and grazes. So, you can experience the generosity, the open expanse of this landscape, the way it merits to be experienced. At the same time, this exquisite, precious core in the middle stays untouched and protected.”

Few urban landscapes possess such a clear spatial expression of its underlying ancient landscape armature as Wittmoor. The continuation of slow ecological processes is vital here both for biodiversity, as the area provides habitat for several endangered



Fig. 105: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio

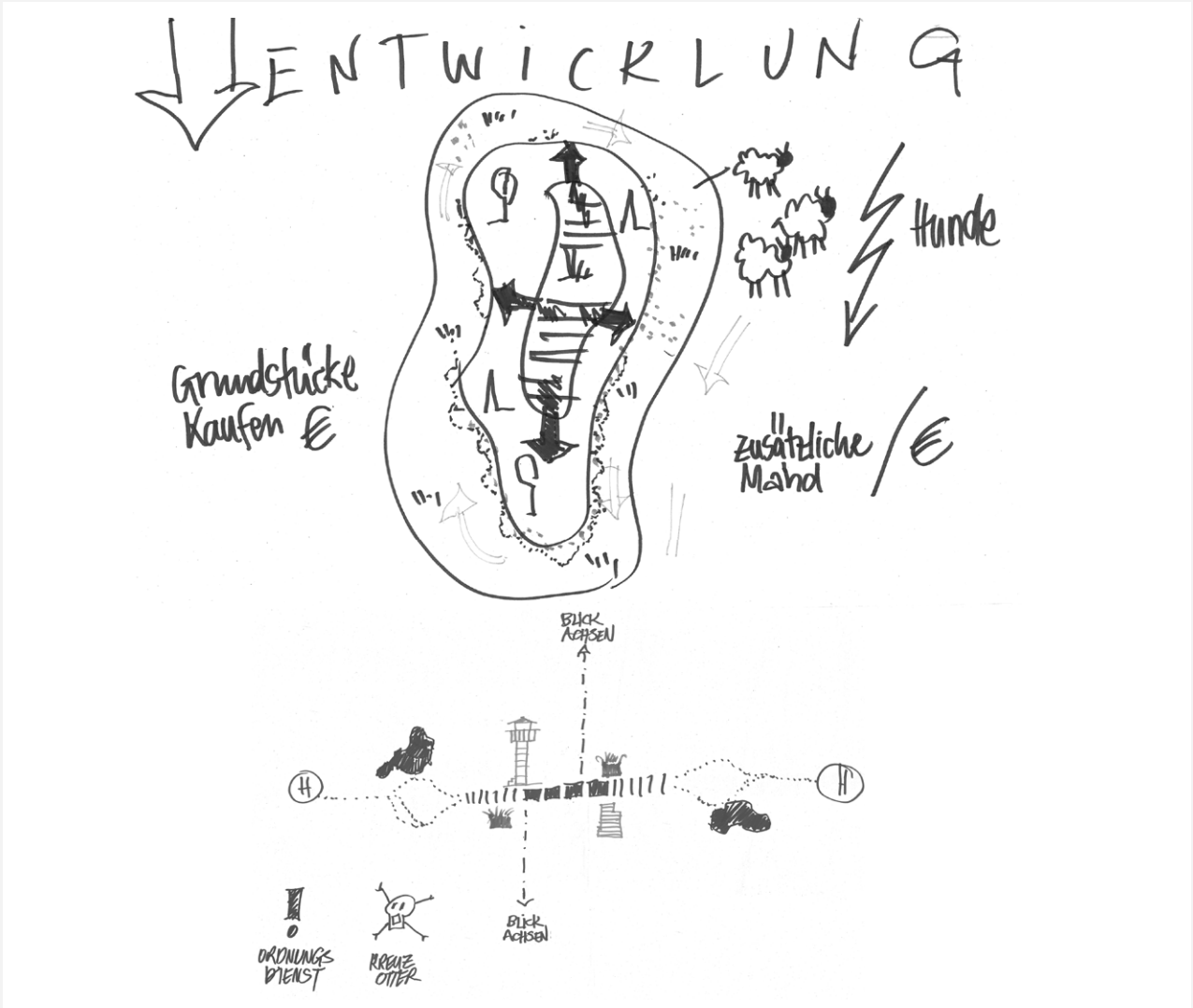


Fig. 106: Interdisciplinary Co-design Group, Wittmoor Workshop

bogland and heathland species, as well, as for climate-change mitigation, as substantial carbon stocks remain stored in the underlying peat layers. The ecologists in the co-design group, therefore, naturally, advocated for the large scale revitalisation and expansion of the peat bog. Landscape architects and planners, however, likewise strongly agreed that land-use management and spatial design should reinforce the existing bog armature in this landscape. The reasoning behind this were striking atmospheres of moorland vegetation communities and the vast open expanse of this landscape that is increasingly rare and unique in urban areas. They proposed placing particular emphasis on aesthetically facilitating the perception and understanding of the bog's formation and development, to prevent its fragmentation. Both agreed this can only be achieved at the large scale by communicating the integrity of this landscape armature, and by preserving the continuity of its slow ecological processes and functioning water regimes.

→ **COMMUNICATING ARMATURES BY DESIGNING PERCEPTUAL AIDS**

Design suggestions to facilitate the experience of the landscape armature by implementing perceptual aids span from towers and platforms overlooking a large area, to paths crossing a range of landscape types and their succession stages in a sequence. Adapting paths to the natural topography was most frequently proposed for supporting the perception of landscape armatures through design, as participants had observed is experiential effect in the Wittmoor nature conservation area: “[T]his border area of the moor is exactly where you can walk a little higher up, and you can look into the valley with the bog. I don’t even know where else I would choose to walk. It felt very harmonious.” Each of the design suggestions intended to condense the armature experience and perceptually overcome its vast spatial scale. As one participant of the workshop in Wittmoor summed up: “Just two, three meters above ground, you

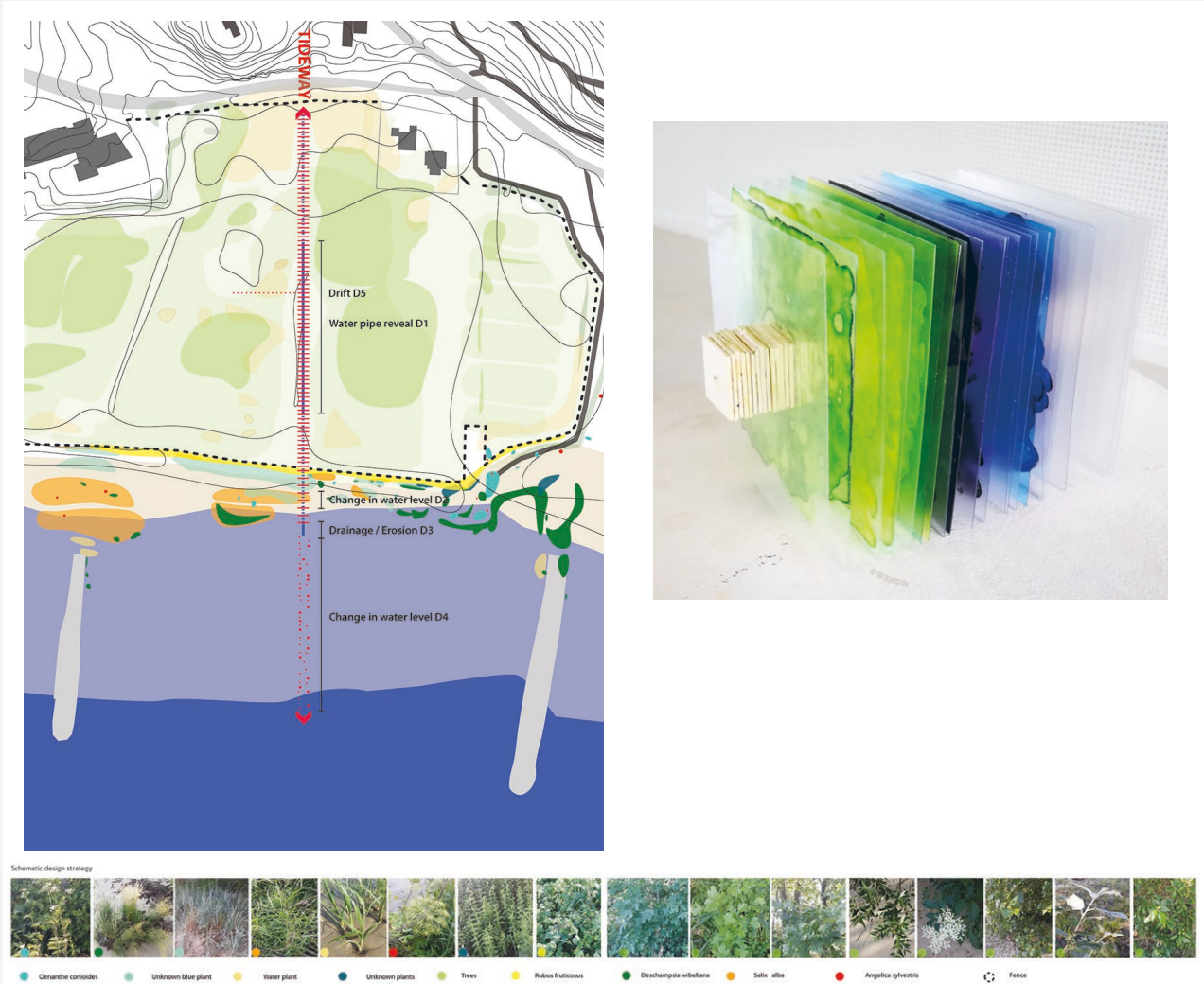


Fig. 107: Andra Nicolescu, Iulia Miclea, Margaux Monzée, HCU University Design Studio

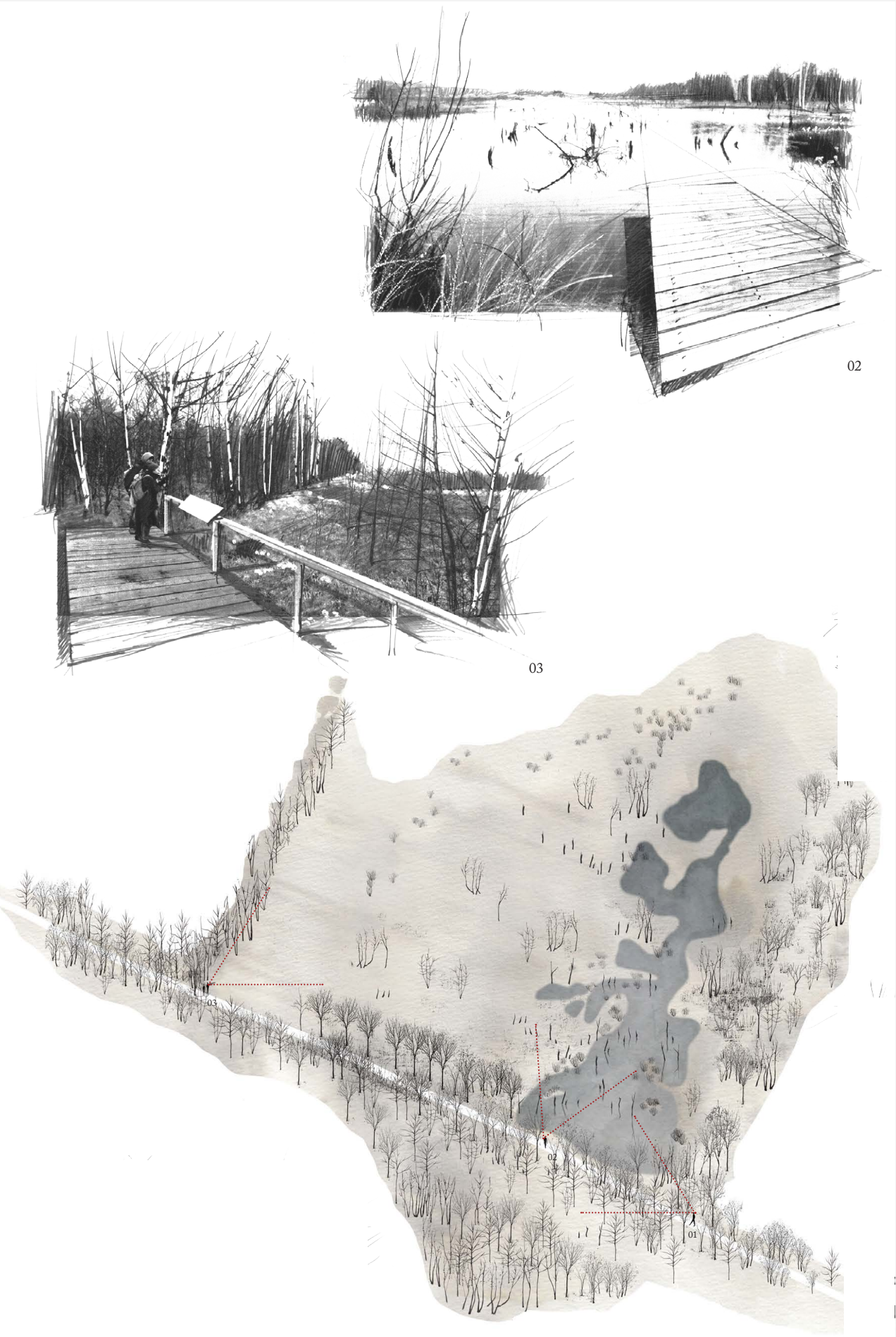


Fig. 108: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

already have a wide view into the landscape. I don't care much for giant, high towers, but a small pedestal, or even just a small elevation in the topography at the right spot, can make a big change in perception." Paths or boardwalks that cross a remarkable landscape armature in a straight line, like a section, can have a similar effect by staging the sequence of different landscape types and their distinct atmospheres (see Figure 106).

This strategy was also employed in a student proposal for an installation that would traverse the landscape armature of the Elbe River coast to reveal its constituent slow processes; the tidal dynamics and geology of the geest elevation at Wittenbergener Heide. The "Tideway" project envisioned a long, straight boardwalk elongated by the floating elements in the Elbe that would serve as perceptual aid to strengthen the experience of the river tide, the periodical flooding of the meadows and alluvial forests along the flat shore, and the erosion of the geest edge, to expose its glacial geology. The abstract model for this project shows stark contrasts in the succession of atmospheres that could be experienced along the way (see Figure 107).

Since modernity, and increasingly in the Anthropocene, slow ecological processes that influence the functioning of entire regions have been shaped and managed by humans on an ever-larger scale, effectively designing landscape-wide armatures. The public is usually unaware of these landscape engineering practices, especially in nature conservation areas, where the scenic visual character of the landscape

conveys the impression that the site is developing naturally, without human interference. This is also the case in Wittmoor. Here, the water regime of a protected area is continuously artificially altered on a large scale to revitalize and rewet the bog ecosystem (see Figures 105 and 108).

Atelier le balto landscape architects proposed discrete perceptual aids in the form of viewing platforms positioned strategically at sites that reveal different stages of landscape transformation and provide information about the landscape engineering involved in the slow ecological processes of bog revitalisation (see Figure 108).

The student group in the university design studio developed a more comprehensive, landscape-wide proposal to communicate the inner workings of this artificial water-regime armature. Their proposal focused on making the slow process of bog revitalisation perceptible to visitors during a walk by shaping the large-scale landscape choreography, strengthening the bodily experience of the armature, and enabling a kinaesthetic engagement with the peat ground (see Figures 109 - 117). The students identified an opportunity to engage with the existing ongoing landscape transformation through a design proposal that would, over time, enable visitors to participate in the bog revitalisation process by experiencing it aesthetically and returning repeatedly to observe the gradual changes in the landscape atmospheres, before the area is eventually closed off for visitors permanently.

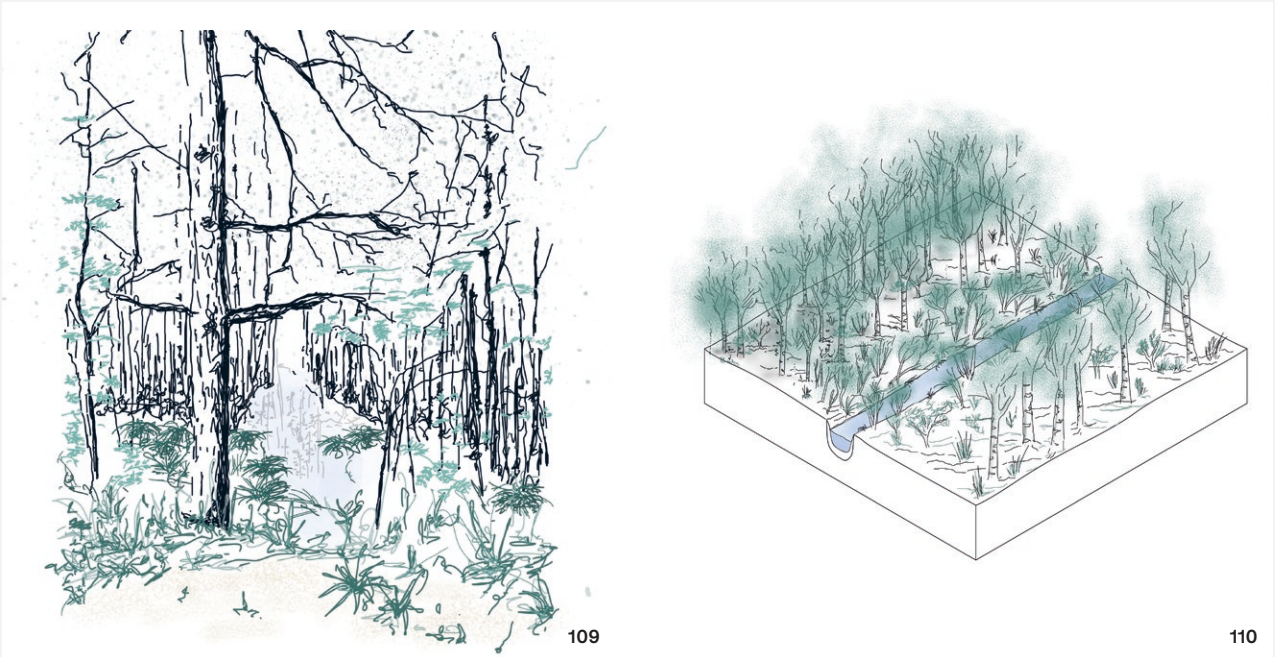


Fig. 109, 110: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio

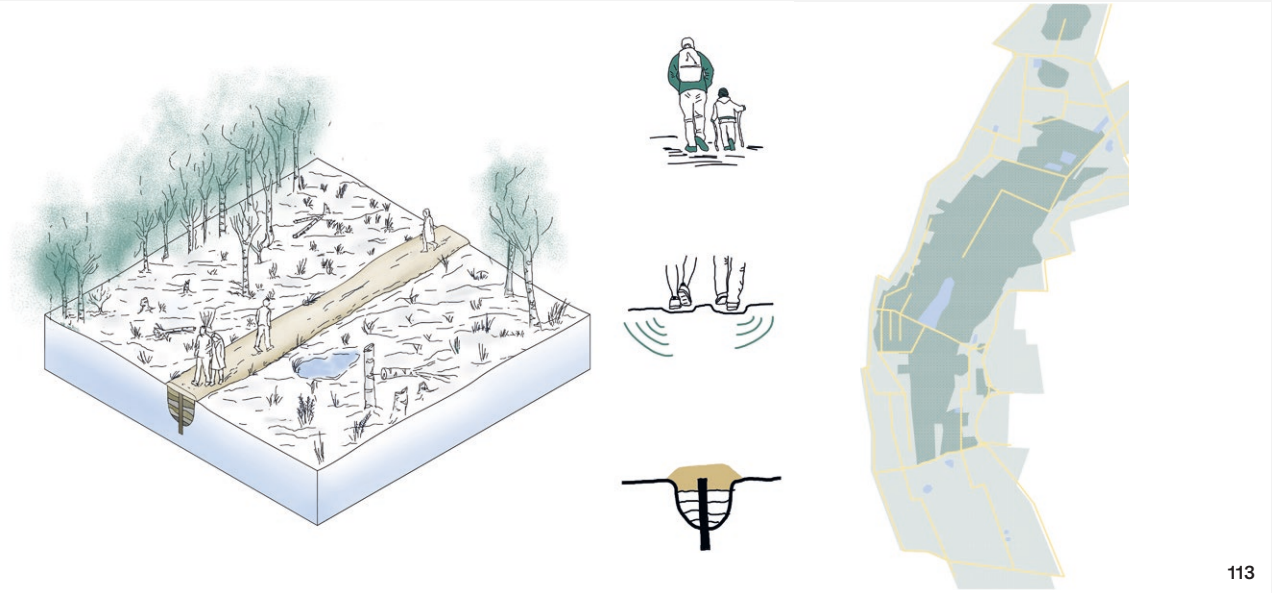
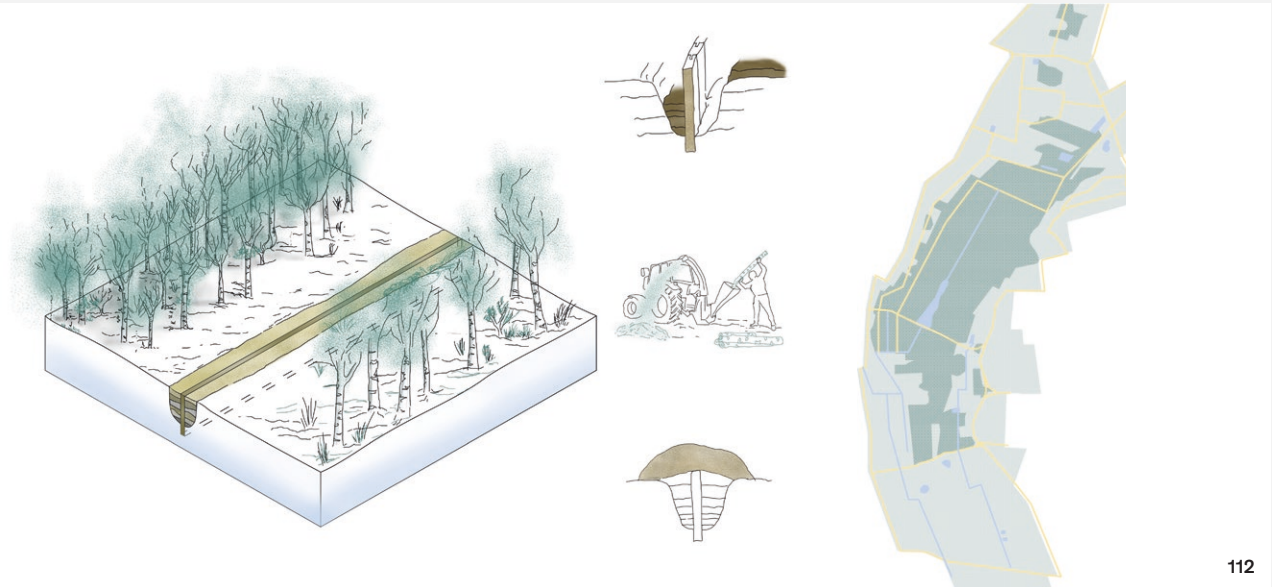
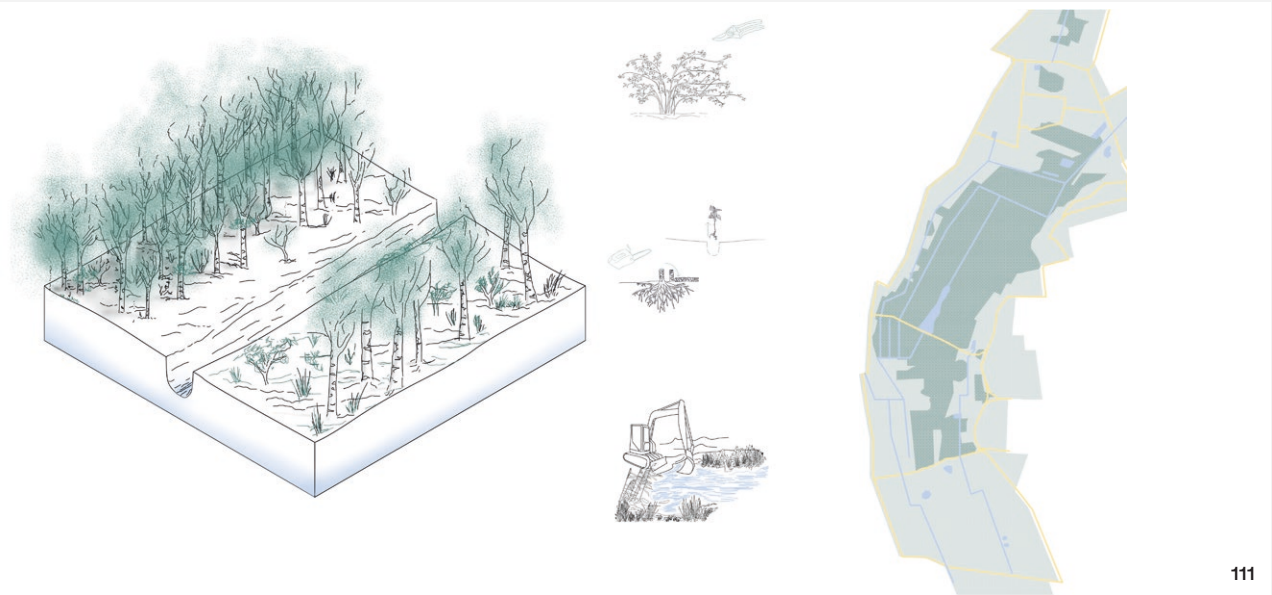
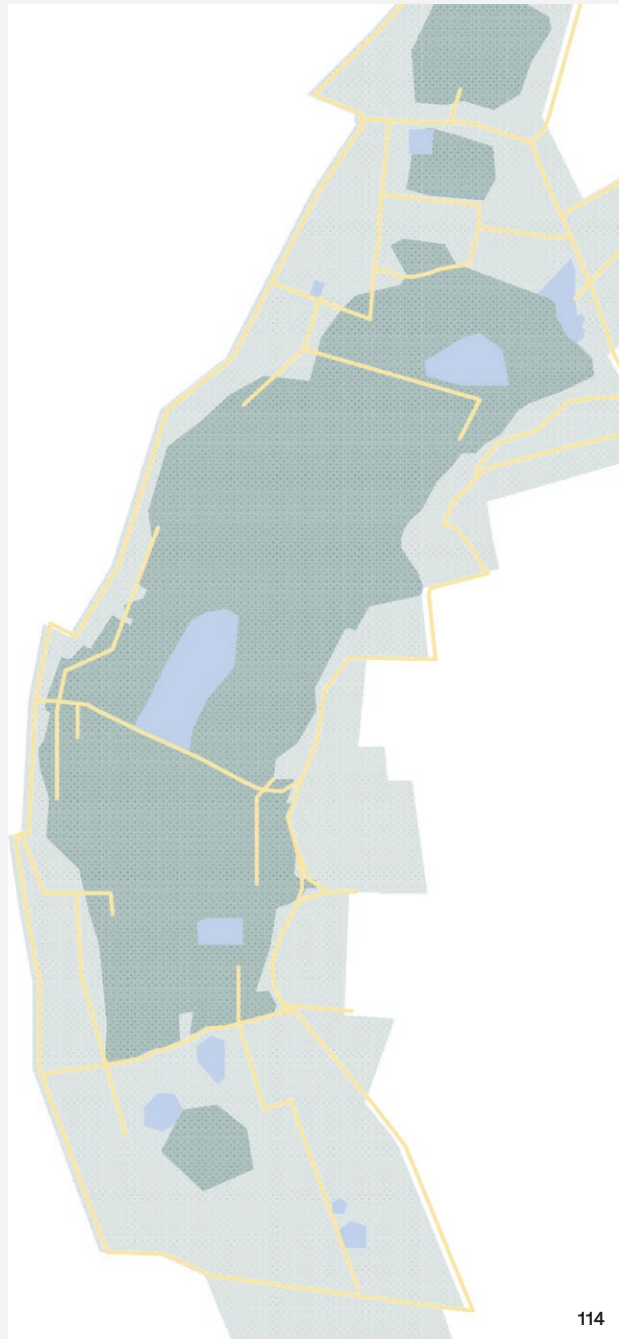


Fig. 111-113: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio



The basis for their design suggestion is existing landscape management through which drainage ditches are taken out of use and filled in, while long dams are constructed to prevent water from flowing out of the area. Following their first visit to the area, the student group reflected on the reasons underlying the unusual landscape structure they had observed on site: *"The moor drainage infrastructure, originally created for peat cutting, hides behind densely overgrown birch stands and is concealed by a narrow curtain of leaves. Due to their geometric pattern, these scenic wet axes certainly stand out in an aerial view. But when walking, you only discover the small slow-flowing rivulets if you are very attentive. The dense greenery of grasses, scrub, and the accumulation of mud in the obscure the drainage pattern. The sprouting birch trees are not a good sign; they testify to the dehydration and degradation of the*

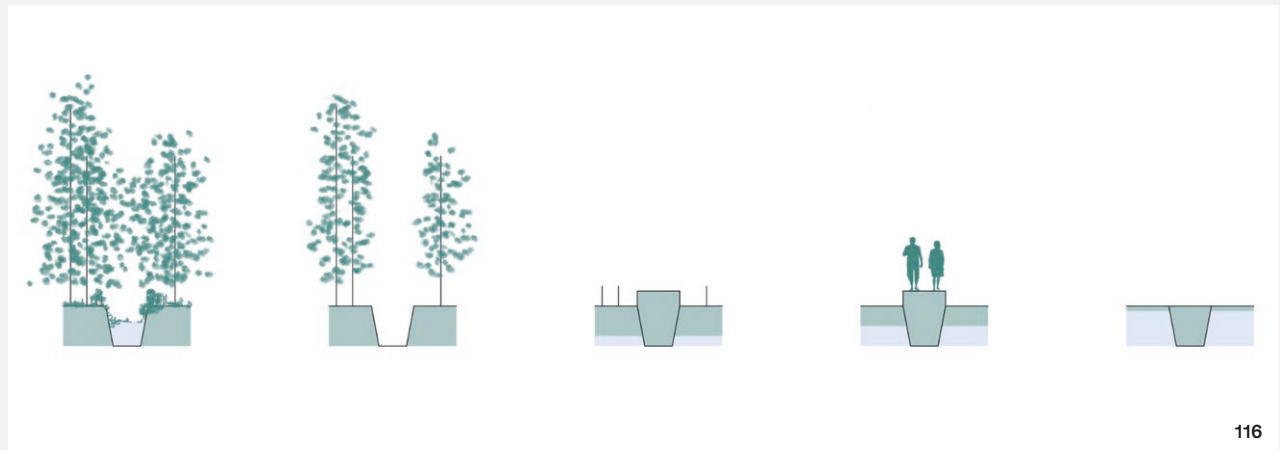
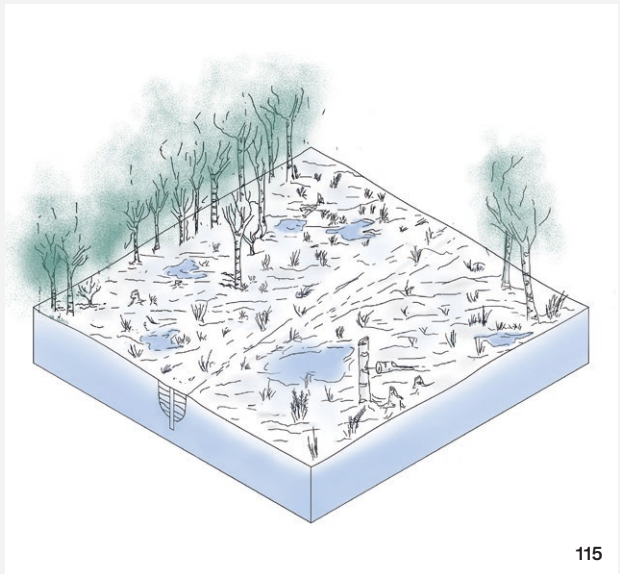


Fig. 114-116: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio

moorlands, as the trenches deprive the bog of water. They must be filled to make revitalization of this valuable biotope possible and guarantee moisture in the long term. As the visitor's gaze follows the axis of the tunnel-like path, what lies beyond remains hidden and can only be imagined. A bright clearing? Wooded areas? Flat grassland? Only the circular paths are accessible. But what if one could enter the moor area? What if, instead of merely walking around it, visitors could experience it directly? Curiosity is rising." The design proposal envisions temporary access to the bog core during its revitalization process. When the network of drainage trenches traversing the area is gradually filled with turf and reinforced with dams to keep the water in the bog, it could be temporally used as a network of paths to make the transformation process of this vast landscape armature perceptible (see Figures 111 - 113 and 116).

"The possibility of direct encounter with the moor could draw attention to its currently unbalanced state and support the perception and understanding of revitalisation processes in the future. A design process could be developed in which the essential revitalisation and rewetting of the moor gradually create a temporary network of paths, offering visitors new forms of access. An experiment." When the landscape conversion goal is achieved, the paths, now flooded, would be closed again, and information about the revitalization process would only be offered at the access points (see Figures 114 and 115).

Besides the rainwater drainage infrastructure, the artificial armature of historical peat cutting heritage is still present in many local bog landscapes. These

existing orthogonal topographical structures in the landscapes, created through former peat extraction, can provide a basis for initiating bog restoration. The rewetting of the peat-cutting pits with gradually developing wetland vegetation communities can be juxtaposed with its existing orthogonal invariant armature. The perception of the restoration process can thus be intensified by heightening the aesthetic tension between the slow ecological processes that dissolve the artificial orthogonal framework of the pits and the comparatively fast development processes of moorland vegetation within them. In the co-design workshop already existing examples of this design approach were mentioned, as a viable design strategy for Wittmoor: *"In Pittmoor, near Schneewalddingen, one can walk along the rectangular chambers, or peat-cutting pits, now filled with water and the emerging turf layer. One can stroll from chamber to chamber; some are completely flooded, some are still partially overgrown. Even as a regular person who is not trained in moor ecology, one can experience this transformation process here clearly. And all the butterflies and the dragonflies - they sit on the boardwalk and sunbathe there, or on top of the handrail; one can take beautiful photos."*

Both landscape design and ecology experts in the co-design workshop in Wittmoor emphasized the significance of aesthetically highlighting the existing peat-cutting armatures and situating them within the broader history of exploitation that continues to influence the moorland ecology today (see Figure 117). *"It's important to show visitors how these anthropogenic structures got here and show the destruction of the bog. To give an account of on that. One can hardly experience it on site, at all. Everything looks 'fine' to the average person; it's a completely 'normal' landscape. However, there is an exceptional history, and it would be interesting to make it a little more tangible in practice. To point it out."*

According design proposals were developed in the workshop that draw attention to the glacial geology by revealing the soil profile. In this way, the slow formative processes of the bog landscape, rooted in deep time, could be made visible below ground, allowing visitors to enter, descend, and observe the peat layer several metres deep. *"so one can document it and make it tangible. An information plaque is nice, but standing two meters deep in the ground and looking up at the sky - now that's interesting! And there could be a pole with markers on it, so you can see how much the peat layer has sunk over a hundred years."*



Fig. 117: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio

4.2 Path as a Medium of Agency and Perception

Paths were among the most frequently discussed topics in the study workshops, perhaps unsurprisingly, as they most directly determine the choreography of movement through landscapes. In this regard they were assessed as an essential facilitator of the perception process in the landscape. Their structure and position significantly influenced the participants' overall experience of the ecological context encountered during their site expeditions. Accordingly, numerous design suggestions in the study focused on designing the walking experience.

Based on the participants' own preferences, paths that enable discovery and close encounters with plant and animal life were particularly emphasized in the co-design workshops: *"Paths are always more beautiful when they have the character of a trail. You want to enter it; it just looks much more exciting, more enchanting. When you don't know how it actually goes on further along, the path can be wider, then narrower later, and you can see traces of use."* (see Figure 118). This particular quality was seen as the explanation for the high density of informal trails observed in all three case study areas. Study participants considered the demand for natural-looking routes in urban public green spaces and nature conservation areas to be

disproportionately high relative to their availability. They observed that visitors wish to extend their experience of nature beyond what is available on a main path, as a result creating numerous new informal trails. Workshop participants from municipal and district-level public administrations also stressed that informal trails as one of the most significant challenges to maintaining the quality of urban public green spaces. The problem is especially pressing in the near-natural sites with sensitive or rare habitats, many of which are protected and are often damaged by trampling, excessive nutrient input and local fauna disrupted by the unleashed dogs.

The spontaneous development of desire paths was thus assessed as problematic because of its potential to disrupt habitats, while also being valued for its experiential appeal. As a result, several path design suggestions by the study participants proposed adding attributes to existing path network that would make visitors feel closer to the natural world and facilitate physical contact with local materials and vegetation. Furthermore, ambivalent paths that offered surprises and a sense of *"losing oneself in the landscape"* were found to sharpen the senses and intensify the perception of the surrounding environment by triggering active involvement. Intentionally creating situations in

which visitors might encounter the unexpected and experience a sense of discovery emerges as a clear design approach in several study groups (see Figures 120, 121, 124, 125).

Conversely, wide, straight paths in parks or nature conservation areas were recognized to cause a feeling of detachment from the surrounding landscape. None of the *"favorite spots"* mentioned in the study by the workshop participants and students were located on a formal, paved main path (see Figure 119). However, participants also stressed that wide paths are needed for peak weekend visitor times and occasionally for maintenance vehicles. The design response to this problem was a flexible path developed from the analogy

of hydrological engineering: *"There is a new trend in the revitalisation of watercourses that says: if you restore a stream that has been artificially altered, the most important thing is to narrow the water bed for times when the water is low. Because artificially developed streams are all relatively wide, and then in summer, when there is drought, the flow speed is low, or the water doesn't flow at all and starts to foul. And if you just narrow the bed of these streams a bit on the bottom, the water can move well, with low, medium, or high water."*

This concept translated into path design would result in very narrow hard-surface paths with extended areas on each side that are reinforced underground but covered with porous material, where low vegetation can



Fig. 118: Elbe Coast at Wittenbergen, Hamburg.

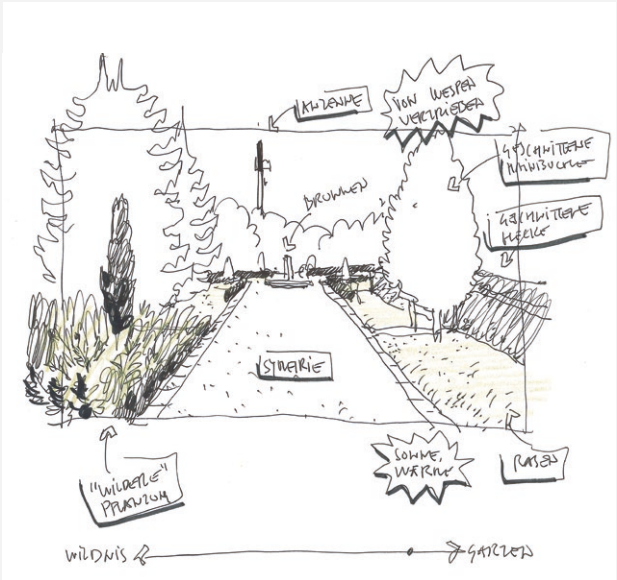


Fig. 119: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

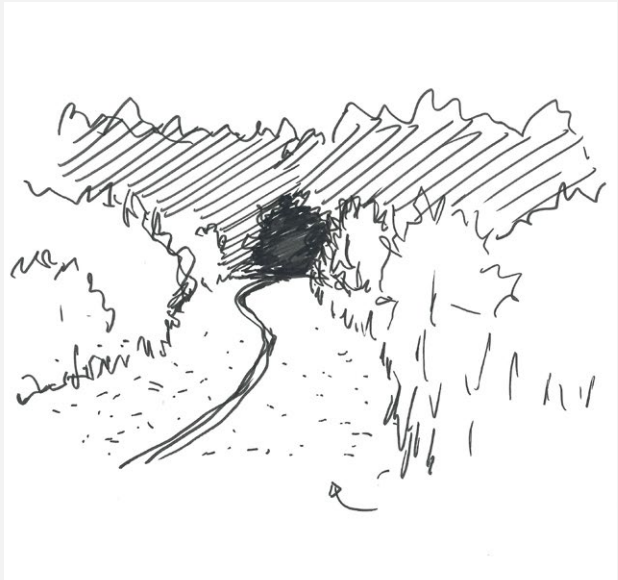


Fig. 120: Unknown Participants, Wittmoor Co-design Workshop



Fig. 121: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

grow. Visitors could choose to walk on the soft carpet of the low grass, moss, or other herbaceous plants on both sides, as well as on the narrow, hard-surface path itself. This concept offers flexibility and haptic variability, as the tactile contact with organic material was identified as one of the main factors in nature experience by the study participants (see Figures 120 and 121).

Paths also mediate visitors' sensory engagement with the surrounding vegetation matrix. Several design suggestions in the Altonaer Volkspark, therefore, focused on this design parameter by proposing to enhance the transitional belt, the ecotone zone between the path and the adjoining forest (see Figures 122, 123). Increasing the diversity and strata of the vegetation along the path, offers the opportunity to experience the rich ecological processes of the forest edge: *"I found the paths with a gradual transition into the surrounding vegetation particularly beautiful. The path, with a little bit of short lawn next to it - because people like to walk on [the soft material] -, then after that, a classic forest fringe with tall herbaceous vegetation, then a shrub layer, succeeded by the stratification of the pioneer forest and finally older trees. These are the most interesting structures [along the paths], because*

they form subspaces, [...] a variety of particular spatial effects, where the light falls differently. There are different shadows, spaces that open and close again. And further aesthetic qualities are provided by the herbaceous plants that, for example, attract butterflies. The pollinators in general need these clearings in the forest."

Both the landscape design and ecology experts in the study stressed that paths function as the primary medium to facilitate an authentic experience of the local ecological context. They also agreed that bans are generally ineffective in preventing informal trails. It was surmised that intentionally providing the near-natural experiences sought by visitors would reduce the uncontrolled proliferation of informal trails: *"Trails [designed specifically] for adventure and discovery, for example where the path suddenly stops, or there is a fallen tree and you have to climb over it, or [the ground] is excessively wet. We might need to offer more diverse paths that reveal a specific character of the landscape, where one can walk over sand, through water, mud, over tree roots. Paths that stimulate all the senses."* Several design approaches the co-design workshops for increasing an authentic experience of local landscapes

suggested minimal changes in the materiality of the paths by covering, reinforcing, or framing the paths or trails with leaves, twigs, and other local organic refuse material that is regularly left on the site after vegetation maintenance works (see Figure 123).

The choice of path material was recognized as a vital affordance for kinaesthetic perception of the ecological context while on a walk and for the intuitive agency of way-finding: *"Here one walks on a grass path. That's how I know that, the next pasture gate is over there, and that is where I am headed. And then [in the direction] of forest there's another surface: mulch. And across there is a wooden footbridge through the bog. For the wetter areas, we could use the Pompeii stones. These are higher stones that were used in the streets [of Pompeii], because they were sometimes flooded. As stepping stones."* The search for appropriate design approaches for trails and natural-looking paths in public green spaces pointed to the need to expand this field, especially considering the issues of technical implementation, maintenance effort and robustness. Flexible paths were also suggested to be mown as a temporary pattern in the meadows. *"One could intentionally make hidden 'natural Hamburg' paths."*

Here, it's a park, so they would need to be officially maintained but could be designed in such a way that visitors would indulge in an illusion: 'I'm going off the beaten track, and I'm sort of on a wilderness tour'." The intentional design of natural-looking trails and flexible or temporary paths has yet to become standard in mainstream landscape architecture practice, as few examples exist. The intentional design of natural-looking trails and flexible or temporary paths is not yet established in mainstream landscape architecture practice. The concepts developed here would require further testing to assess their potential for broader application and upscaling.

During one of the workshop discussions in Wittmoor nature conservation area, an idea emerged to systematically create smaller alternative trails that lead to the same destination as the main paths but offer different experiences (see Figure 125). Selected paths in Wittmoor that seamlessly support the experience of the armature, were reflected by the workshop participants: *"The path that crosses through the heart of the whole area could be strengthened by staging the view, the movement of the body, how you advance in space, for example, the small three-way intersections are not*



Fig. 122: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



Fig. 123: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

bad. Here, a surprising view opens up that one didn't necessarily expect. But usually people walk past it, because the main way is so dominant." This suggestion be particularly appropriate for areas with a sequence of different recognizable landscape types, where visitors wish to immerse in distinct atmospheres, that they can actively choose or discover by chance. "Through the materiality of the paths, making them either more like trails or like main paved ones, one could develop a subtle differentiated guiding system." Workshop participants estimated that an intentionally planned hierarchy of small trail-like and main path networks in protected landscapes could reduce the number of harmful informal desire paths by fulfilling the need for variety of experiences. "Offering small parallel paths doesn't have to fragment large areas. [...] I liked such places because the paths here branched off. It's good when one has the freedom to choose. On the main route, one has to follow this given situation and has no alternatives, no possibilities."

To address the problem of invasive informal paths and trails, participants proposed design approaches for guiding through public green areas with intentional but subtle affordances that lure visitors to specific spaces and discourage them from others (see Figures 124, 127). The choreography of movement has to be "somehow steered, but one shouldn't get the impression that one is being controlled. Like at the supermarket, where this is implemented perfectly; there's always chocolate in front of the checkout so children can grab it." This subtle and indirect design

approach proposes creating views from the path at strategic points where individual landscape elements most clearly reveal their contribution to the wider ecological context. "[...] not in the didactic sense of 'look, you can see this from here,' but seamlessly, by walking along a path. I walk and let my gaze wander." Scenic views in this proposal are combined with those that foster understanding and perceptual learning of landscape context along the route. Selected areas are designed to spark interest through subtle affordances, for example, by selectively thinning the vegetation to open views towards glades that draw visitors from afar through shafts of light falling through the canopy onto the forest floor (see Figure 127).

Further affordances could take the form of a landmark element, an old tree, inconspicuous furniture, or artwork that sparks curiosity. The workshop group envisioned that such places in the vegetation matrix be accessible but not connected by a paved path. "The trail emerges on its own over time. Normally, landscape planners say that if you have trails, then you have planned badly. However, one could also plan exactly with this intention." The goal here is to deliberately establish a sensation of discovery, wonder, and immersion in the local landscape type, by creating subtle incentives to enter interesting locations within the vegetation matrix such as islands of pioneer growth, forest glades with unique soils or rock formations that inhibit tree growth or sites with single wolf-trees. "We should highlight the exceptional spatial points that intensify the landscape experience while walking." (see Figure 127).



Fig. 124: Mareike Oberheim, Mirco Ristau, HCU University Design Studio

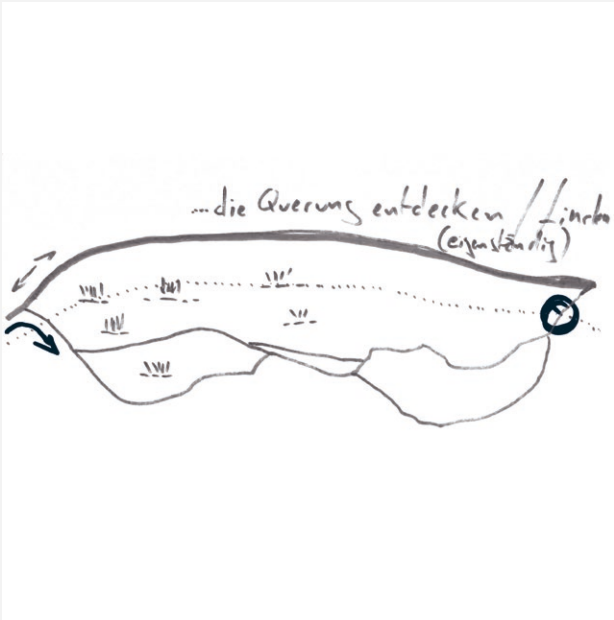


Fig. 125: Unknown Participants, Wittmoor Co-design Workshop

Concurrently, this design approach underscores that ecologically significant areas are to be protected by measures designed to impede entry, such as dense, impenetrable vegetation corridors that do not encourage the visitors to diverge from an official path (see Figure 126). In Wittmoor co-design workshop such negative affordances were discussed, with even higher urgency as the area is protected by the nature conservation act. Refraining from maintaining the drainage in the affected areas of the revitalised bog habitat was suggested as a measure here: "Just let part of the path become marshy. Then, the informal trail problem would solve on its own. If people still want to pass, they have to take off their shoes and wade through."

However, the participants also raised concerns about spatially extensive access limitations that restrict the opportunity to experience unique landscapes up close. Suggestions were made to instead introduce differentiated access regulations in selected protected areas by allowing a limited number of narrow trails, no more than 20 centimetres wide and constructed without foundations or imported materials. These could be specifically aimed at children: "Where they can jump over the roots, get wet shoes in rainy weather, and where they might sometimes have to push through the shrubbery." Access areas could be encouraged in the vegetation matrix with ubiquitous vegetation. "Of course, it shouldn't be allowed where sensitive species are, like wild orchids. But these classic, common species-rich wet meadows or hayfields with crocus and

carnations, with sorrel and [similar], are spectacular to walk through."

The discussions in the co-design workshops revolved markedly around the educational role of nature conservation areas in the urban context. Near-natural landscape types within a dense urban fabric were particularly highlighted because of their potential to attract a considerable number of citizens in their daily life. Therefore, the landscape design and ecology experts involved in the study discussed alternative approaches to blanket access restrictions in which fostering public awareness of nature and advancing nature conservation could operate in synergy: "When deciding to specify areas for local recreation and environment education, the question arises: Are there any really harmful effects on the area's ecological quality, and do the positive effects of nature experience and awareness compensate them? Or is the positive effect exclusively in environmental education? [...] With [measures] like mowing paths in existing, relatively degraded patches of meadow with low biodiversity, I actually only see a positive outcome. We might scare off a few deer, but deer have enough habitat here. The paths that we mow in will develop a more species-rich composition and also promote a few additional plants than if we maintained everything uniformly, once a year."

It was also pointed out that in heathland or on dunes, moderate trampling can contribute to the preservation of these habitat types by maintaining patches of exposed sand for insects and lizards. Areas where additional small trails are permitted must be

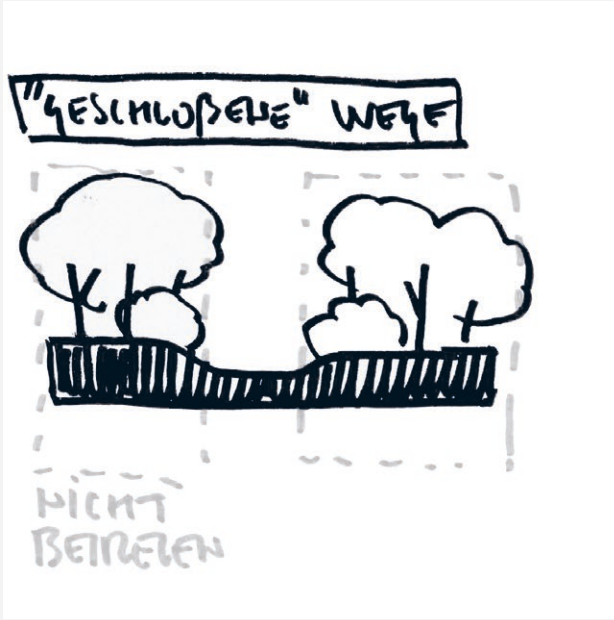


Fig. 126: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

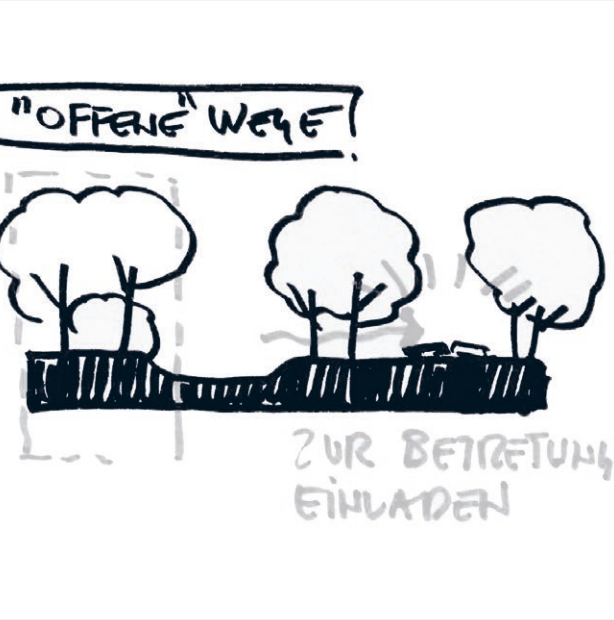


Fig. 127: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

carefully chosen within protected landscapes to minimize damage, whereas endangered habitats should remain fully inaccessible.

The study participants also suggested that in larger public parks and urban green spaces under excessive pressure from use, limiting access to selected smaller areas might have experiential benefits. It was argued that, when implemented in an engaging manner, such “wild islands” can foster the perception and appreciation of succession and other ecological processes over time. Marking these areas with strong invariants, such as geometric structures, can contribute to their recognizability and appeal. Such design

solution was proposed by the HCU student group in the study (see Figures 128-130). Enclosed wild islands offer refuge zones for wild fauna, which is much needed in urban parks that are often frequented by dogs and cats. They also create opportunities for perceptual learning about pioneer vegetation, growth, decay, and processes of ecological succession for humans. In general, when creating paths and way-finding systems, it was advised that strategic decisions be made about which biotopes to keep open, which to make accessible only by crossing a barrier that would limit the number of visitors, and which areas have to be completely closed off.

Co-design workshop participants recommend that paths through the landscape offer frequent alternation between open, light-flooded vegetation and dark closed shaded cover; lower and higher humidity; vegetation across all vertical strata ranging from herbaceous layer to the tree canopy; and other contrasting experiential parameters that can be found in the area (see Figures 131-132). They advocated for an alternating rhythm between the atmospheres of immersion and ingress, in which each new situation can be seen or sensed on approach, to spark curiosity. This was directly informed by observations made during the workshop expeditions by the study participants, that frequent change stimulated a more conscious perception of new ecological contexts and offered enhanced aesthetic stimulation. Adapting the path to the vegetation structure can also be used to communicate different succession stages within a single landscape type by placing a route through a

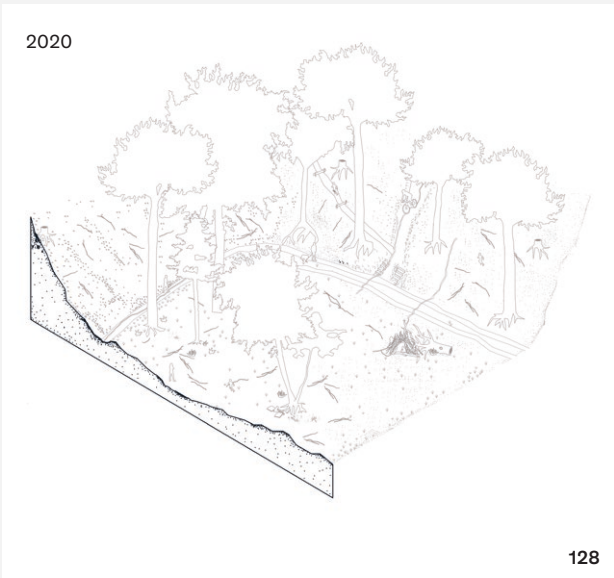
sequence of diverse development stages, as is already the case in Wittmoor: “All in all, this succession stages of birches should be made visible! A plea to designers: preserve the mosaic character of this landscape with all its experiential qualities.” This design proposal sought to differentiate stages of succession through long-term landscape management and maintenance practices and to make the resulting transformation process perceptible as a spatial sequence along a path crossing the site. Related design proposals were linked to the broader premise that a diverse vegetation mosaic also supports greater diversity of habitats than homogeneous vegetation cover and therefore makes biodiversity more readily perceptible to humans.

The unifying experiential link between the large scale armature of a landscape and the choreography of movement was stressed in discussions of several workshop groups: “This is not considered adequately in the existing development plans; they mainly show fragmented management and maintenance measures.” The participants remarked that the resulting path systems often stem from the administrative logic of plots, their maintenance infrastructures, property ownership, and uses, such as pasture (see Figure 131).

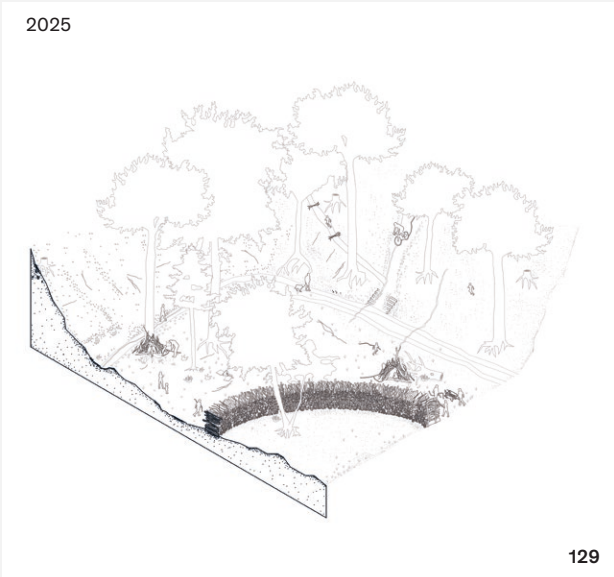
Walks that facilitate the perception of the large-scale landscape armatures through the kinaesthetic experience of topography and the use of matching materials was appreciated widely in the reserch-by-design part of the study. The springy property of peat paths in the bog areas (see Figure 132), soft sand in the heathland, or uneven soil seamed with roots in the woodland, were advocated for in design suggestions.

“The ground makes a statement: bouncy peat, moist locations, dark-colored soil compared to the sand. The soil, firm or loose, makes you aware of how you walk and also of its texture. It is part of experience.” This might sound like an obvious observation, yet in all three case study sites, most paths were built with foreign material. This can be explained by financial constraints or construction considerations, but it was not appreciated aesthetically. “A different path material or type would perhaps invite a bit more to walk slowly, stroll, to linger. I could imagine corduroy roads in the bog. That’s what people did 500 years ago. There are historical models for how such paths can be built and for what makes sense in each specific context.”

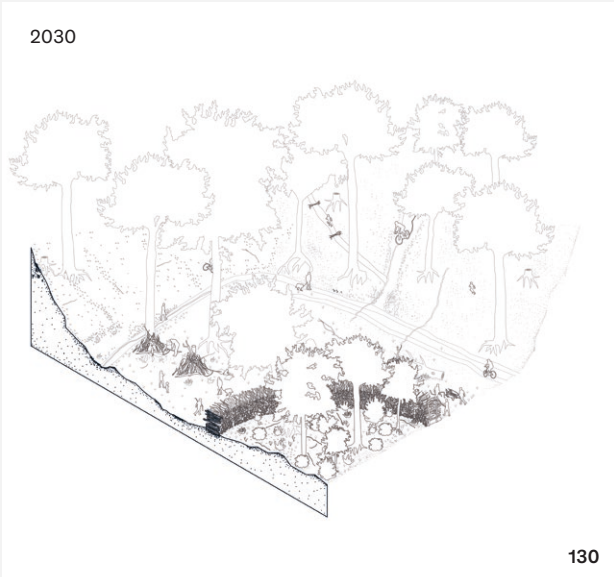
Design approaches regarding choreography of movement in the study attempted to link the logic of the slow ecological processes and the vast scale of the landscape armatures with an experience on a human scale. One such proposal was developed by students on the geest slope along the Elbe and the nearby Witenbergener Heide nature conservation area (see Figures 133-135). The path layout is adapted according to the contrasting local ecological context, geology and materiality. It makes use of existing lookouts, landmarks and different kinaesthetic climax points where the walk is lighter or more strenuous; the ground sandy or flooded, to stage the experience of the landscape armature as a whole. The included climbing infrastructure offers a double use. It keeps the slope free of vegetation and helps maintain permanently sun-exposed patches of bare sand that provide nesting habitat for local wild bees (see Figure 134).



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Fig. 128-130: Leon Dünkel, Marc Sommer, HCU University Design Studio



Fig. 131: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



Fig. 132: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

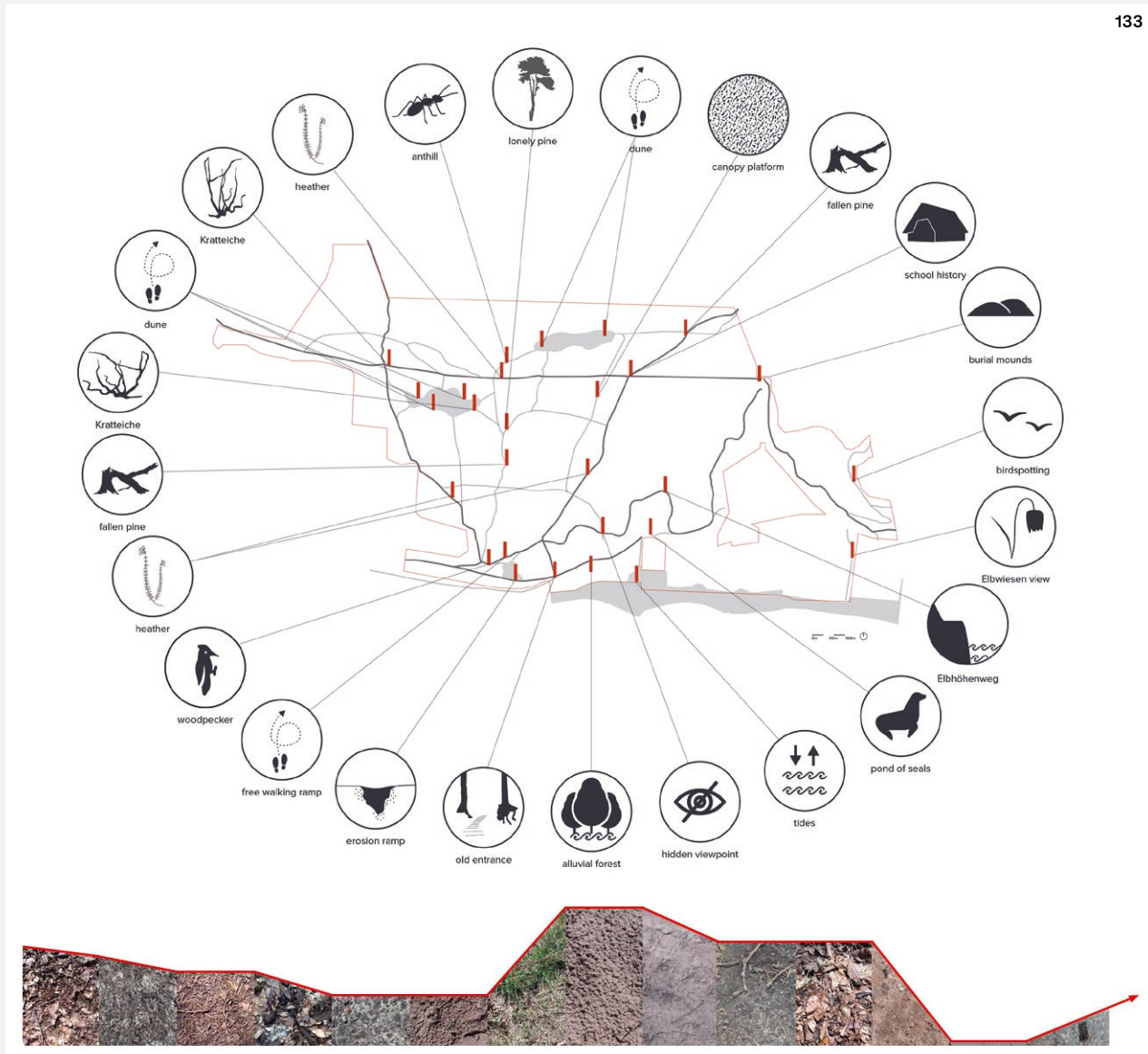


Fig. 133-135: Mathias Neitzel, Inken Reimer, Marisa Santos , HCU University Design Studio

In distinct ecologically valuable landscapes types within nature conservation areas, traces of slow ecological processes seem to be more tangible than in the urban park, and the landscape choreography could be more readily adapted to the local armature. Urban green areas are often built on artificial armatures, where the slow processes of erosion and changing water regimes are hidden or locked in time. Several design approaches for Altonaer Volkspark sought to address this challenge and establish an embodied connection between the walker and the landscape by responding to the site's topography, path materiality,



and proposing subtle way-finding systems. It was suggested that wayfinding elements, such as signage, should be designed to directly support the perception of ecological processes while also benefiting local biodiversity. Wayfinding structures could, for example, integrate insect-habitat structures that provide cavities for shelter, nesting, and egg-laying or include binoculars that allow visitors to scan the canopy for birds and guide visitors along paths that intensify the kinaesthetic experience of the landscape.

Landscape design and ecology experts in the study discussed the way-finding systems ambivalently. On one hand, they are seen as a mandatory necessity in public open green areas. On the other hand, establishing contact with the landscape by the active agency of the discovery process, even the experience of getting lost, was praised for sharpening the senses. Leading visitors seamlessly through the landscape with subtle affordances combined with a clear hierarchy of paths and matching materiality was regarded as the most effective strategy (see Figure 136).

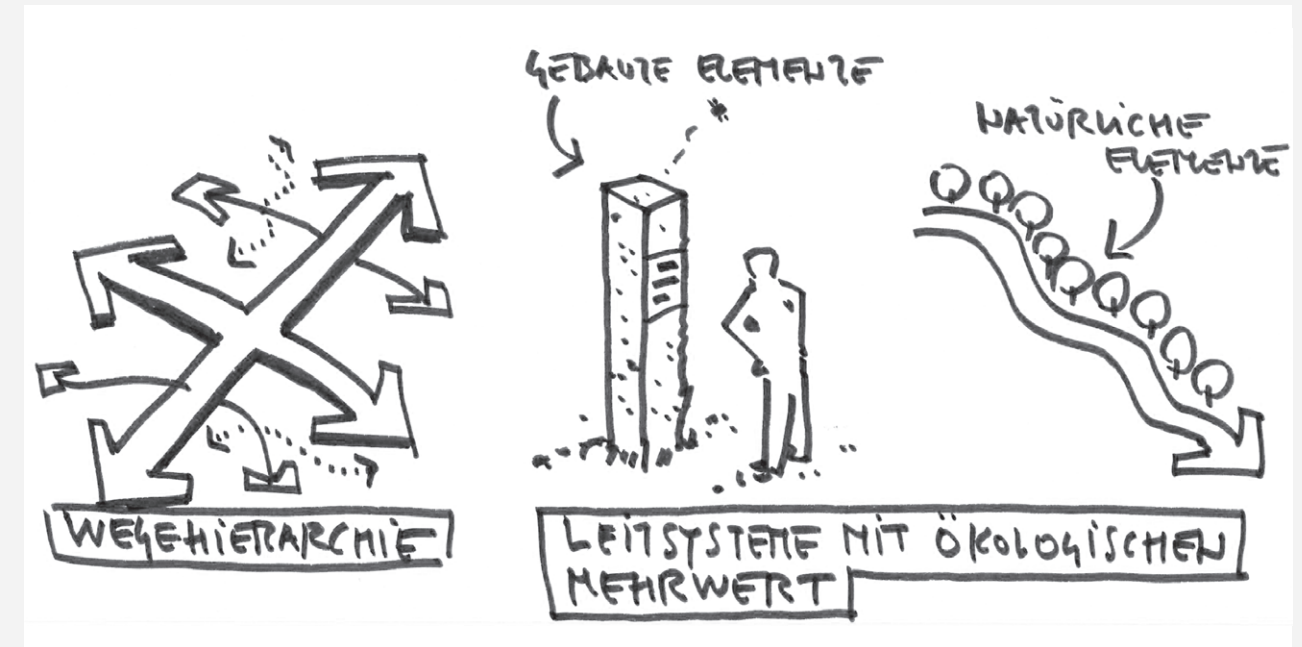


Fig. 136: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

4.3 Curatorial Praxis and Care

Participants in the study directly and indirectly identified the landscape architect's role as a curator of the ecological processes. They interpreted continuous management activities such as shaping vegetation over time by pruning; steering or interrupting successional processes; altering water regimes; and gradually influencing the outcomes of other ecological processes as forms of spatial design. As a method, such curatorial praxis responds to, and selectively shapes ongoing ecological processes to achieve future outcomes through often minimal interventions and sustained care. The discussions in the co-design workshops acknowledged that processes in the landscape are open-ended and never complete. However, participants also occasionally emphasized a particular durable cultural image related to heritage conservation (see Figure 137) or ecological state in the natural development of a landscape that is specifically valued as endangered habitat. These stages of landscape development were sought to be recreated, restored, or maintained through design.

Co-design workshop groups advocated for applying sustained curatorial praxis and care to gradually achieve aesthetic impact in conjunction

with ecological development goals over extended time periods. However, they also estimated that it is challenging to achieve design interventions that benefit ecological, aesthetic, and experiential outcomes equally in all respects. The interests of habitat protection, human use, and aesthetic preferences were regarded as incompatible to some extent, with viable solutions depending strongly on the challenges and potentials of the local ecological context. For this reason, participants cautioned against one-size-fits-all courses of action and stressed the need for sufficient financial and human resources to respond more effectively to specific conditions of different habitats by site specific design. The curatorial design and maintenance approaches proposed in the co-design workshops sought to reconcile the diverging aims of landscape design and nature conservation. Owing to their dependence on local ecological contingencies and processes, these approaches were developed for specific landscape types, including forests, grasslands, and heathlands. The following summary presents the design approaches developed by participants during the research-by-design phase of the study, organised according to the landscape types to which they apply.

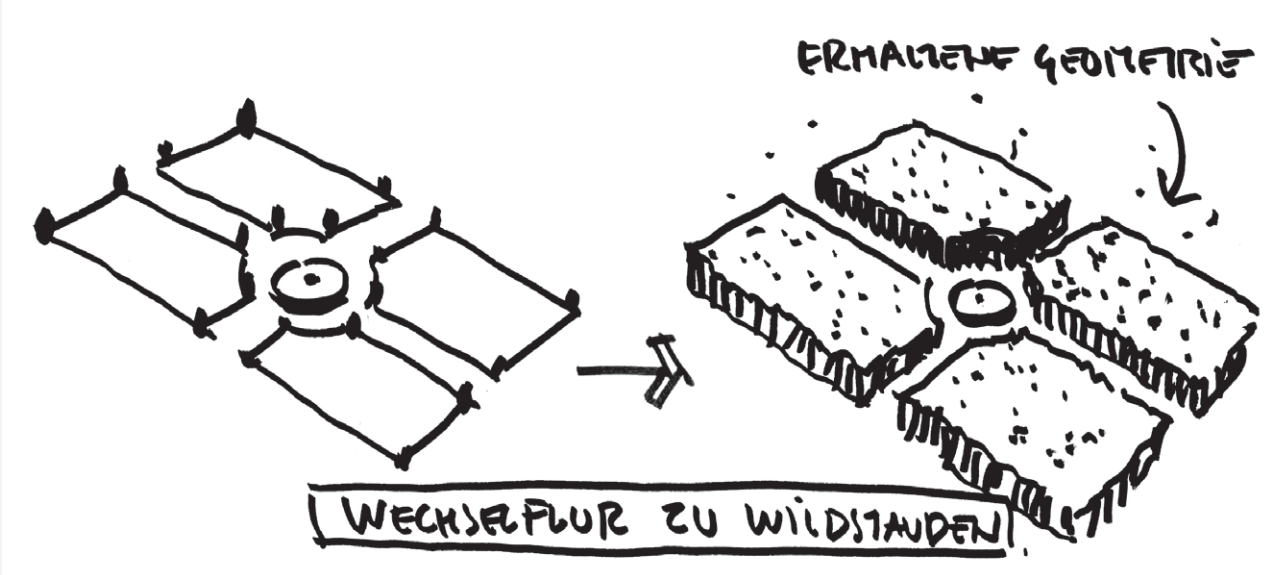


Fig. 137: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

→ CURATORIAL PRAXIS AND CARE IN GRASSLAND LANDSCAPES

Grasslands and meadows cover vast areas of urban landscapes in parks and nature conservation areas in Hamburg. In both settings, management practices, such as mowing and grazing, shape their experiential qualities and habitat conditions over both the short and long term. The method of designing maintenance regimes as a curatorial praxis can unlock these landscapes' aesthetic and ecological potential. With mowing, the visual outcome of influencing the fast ecological processes is instant and distinctly recognizable in its spatial contours, so the marked landscape change can be intentionally designed as an invariant to momentarily attract the visitor's attention (see Figure 138).

In the long term, grazing management, changing water regimes, and periodic grassland rejuvenation techniques can steer habitat development to accommodate particular target species. These changes can be experienced aesthetically through gradually varying vegetation compositions, scent, texture, sound, and color that affect the atmosphere of the grassland subtly over time. According to the experts in the workshops, ecological and aesthetic goals of these processes can be designed to complement one another in the long term. Design proposals for meadows and grassland landscapes therefore emphasized designing the maintenance regimes annually, with strategies over extended periods, additionally to designing the spatially

engaging patterns of perceptible invariants on the scale of each land parcel.

Currently, grassland in nature conservation areas in Hamburg and many other cities alike are managed uniformly by mowing large areas at the same time with modern agricultural machinery (see Figure 137). Ecology experts in the Wittmoor Workshop group formulated an alternative concept of mowing small patches over several intervals to achieve a gradually changing landscape mosaic. This can improve grassland habitat quality and support existing hotspots for meadow insects by giving them time to migrate from areas currently being mown to intact patches to complete their life cycle. The grass is to be left to dry on the surface area for a few days before storing it as hay. Silage operations and driving a baling press on the grassland should be avoided to protect the soil.

Participants in the Wittmoor co-design workshop recommended undertaking the works with small machines or scythes. However, they also pointed out that this approach is very labor-intensive and consequently more expensive. *"It's just much closer to the traditional way the grassland was cultivated. It is very likely to benefit conservation goals and the protected species that actually live there. I assume that's the most essential thing we can do to influence the direction of grassland development."* Design experts in the group advocated this suggestion also because of its aesthetic outcomes that can be adjusted to the specific composition of grassland species in each site. It was emphasised that differentiated maintenance



Fig. 138: Lise-Meitner-Park, Hamburg

regimes produce diverse and experientially attractive grasslands, with rich structure, texture and abundant fauna (see Figure 139).

During the discussion, study participants noted that grasslands tend to have less spectacular scenic impact than other landscape types; for example, heather with its sea of purple blossom in late summer, landmark water bodies glittering in the evening sun, or woodlands with their immersive character. Landscape design and ecology experts, however, also stressed that enhancing the aesthetic experience of grassland can be offered by quick, uncomplicated, temporary measures that are easier to implement than in other landscape types. The experience of walking through tall grasses, immersed in a layered scent of grasses, wildflowers, herbs, sun-warmed soil and rustling sound, is impressive and hard to find in urban green spaces. It can be easily achieved with paths and patterns mown into the meadows and with seasonal events held in these spaces. *“Let’s foster the experience of these landscapes, especially for children, who can run around in the meadows and feel like they’re in a maze or a primeval forest. This could be a low-threshold approach for promoting grassland care with a nature experience.”*

Workshop participants emphasised that such interventions should not be undertaken before the end of the breeding season, which in Hamburg extends through June. Additionally to short term events, purposeful and long term differentiated design of maintenance regimes was called for to enhance the experiential quality of grasslands and increase their

perceived aesthetic and atmospheric impact across different temporal and spatial scales. *“I want to point out: grassland generates a different diversity of species at different times of the year.”*

Grazing as a maintenance practice was discussed in the co-design workshops positively as it can have a beneficial long term ecological effect on the grassland habitat. However, it was also reported that it is challenging to implement in urban green open spaces. To address these constraints, it was suggested that rotational mowing patterns of a small-scale mosaic could be introduced immediately as a transitional measure until permanent urban grazing systems become feasible. Once a small-scale differentiated maintenance regime is established, the mown material, with its seeds, can be brought to new areas to propagate native flora in districts where these species have already disappeared. As an example, it was suggested in Wittmoor co-design workshop that propagation of the local bog habitat target species, the marsh gentian (*Gentiana pneumonanthe*), ragged-robin (*Silene flos-cuculi*), and fen violet (*Viola persicifolia*) could be facilitated by distributing their hay over extensive areas.

The gradual enhancement of biodiversity lies at the core of this approach, with aesthetic impact emerging as an integral part of the process. *“The meadows must become more colorful!”* Plantings that display seasonal peak effects were suggested as a means of creating striking experiences through the careful selection and propagation of plant species.



Fig. 139: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

Expansive displays of radiant blossoms were suggested in areas that are easily accessible to visitors.

Combining long-term differentiated management of grassland and meadow habitats with curated seasonal aesthetic outcomes requires sustained care and expertise. This approach is also more costly than contracting a company to mow a large area once a year. Procurement procedures for external maintenance services tend to prioritise the lowest-priced bids. Consequently, responsibility for a particular site may shift between several contractors over time, while cost pressures can encourage the employment of workers with limited specialist training. Workshop participants therefore emphasised the need for establishing permanent, municipally managed landscape maintenance centres to ensure greater continuity and foster long term and site specific expertise. These should secure continuity in management measures over decades, with regular staff acquiring the opportunity to design the public green spaces through consistent curatorial praxis and care.

Differentiated management of the meadows was found to be particularly relevant for urban parks. It can ensure that areas used intensively for sports and leisure develop and maintain short, robust lawns. Simultaneously, the surrounding surfaces, steep slopes, and small unused meadow patches in the park can develop diverse meadows with insect-friendly species. It was estimated that, even in popular and heavily frequented parks, the less intensively used fringe zones surrounding lawns collectively constitute

a substantial area and, if managed accordingly, could make a considerable contribution to overall biodiversity. Additionally, aesthetic value can be enhanced through visually distinctive mowing regimes that generate diverse textures, patterns, scents, and sounds. By shaping paths, views, and spatial structures differently across seasons and over several years, these regimes can also influence movement through the park and contribute to its landscape choreography.

→ CURATORIAL PRAXIS AND CARE IN FOREST LANDSCAPES

The curatorial approach was also proposed for designing the woodland environments and was exhaustively discussed in the co-design workshop in Altonaer Volkspark related to urban forest typology prevailing there. Forests develop over extended timescales, and the effects of their deliberate shaping through targeted landscape management are less immediately perceptible than those of seasonal mowing interventions in the grasslands. Nevertheless, similar design processes can be carried out in forest environments to foster biodiversity, influence succession patterns, sculpt vegetation volume, and create experientially rich landscape atmospheres. Forest restructuring already occurs in many urban forests in Hamburg and other German cities such as Berlin and Frankfurt. In most cases, the conversion processes are triggered by pests or drought which are



Fig. 140: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

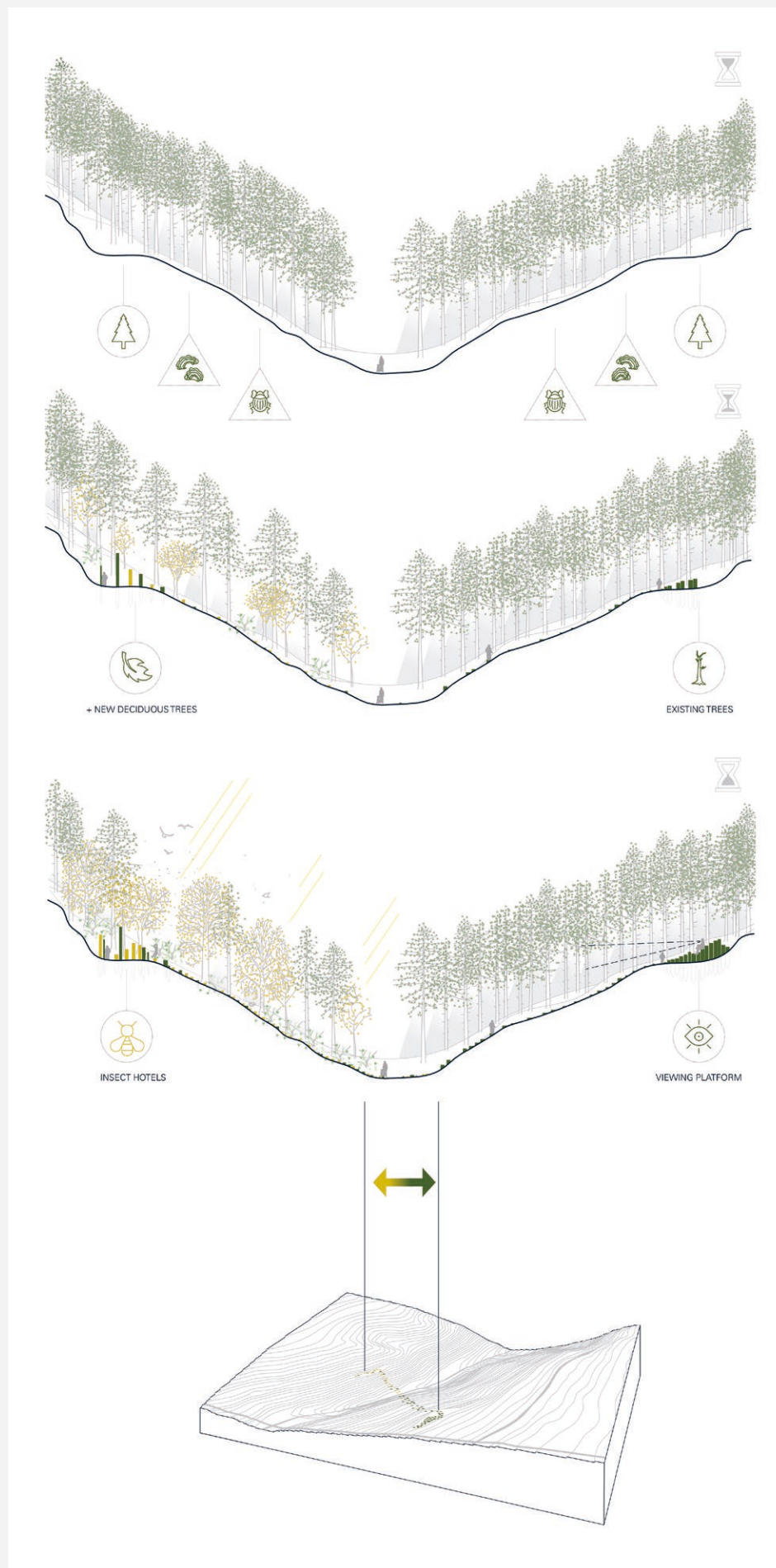


Fig. 141: Gesche Delfs and Sarah Schmidt, HCU University Design Studio

affecting particular species, and have to be replaced by more resilient trees. In some instances, forest conversion aims to enhance biodiversity by diversifying monocultural stands, such as spruce plantations.

These maintenance and care processes offer an opportunity to simultaneously influence and design urban forests' aesthetic character. *"There are different ways to convert a forest. Of course, one can make a clear-cut, or initiate a natural regeneration, [...] or make a forest pasture. Or implement it selectively - start with small clearings."* The sensory atmosphere of any of these situations is primarily determined by the spatial and experiential effects of such measures and the tree species that constitute the forest. When the species composition is altered, the experience of the forest also changes. Hence, several workshop groups in the study suggested to make these rather subtle, slow transformation process more accessible to the perception of an average visitor by highlighting their impact on the microclimate, light, colors, textures, sounds, smells, soil, and animals that thrive in a particular forest segment.

A student group in the HCU design studio employed the direct juxtaposition of contrasting forest atmospheres as a design approach to render the associated ecological processes of forest rejuvenation perceptible (see Figure 141). The design proposal addressed a ravine area with spruce monoculture in Altonaer Volkspark. This segment of the forest is characterized by tall, even-aged trees forming a wall of leafless trunks, with no understory and a dark, shadowy

atmosphere. The workshop participants discussed the low biodiversity of this forest stand and its vulnerability to pests and storm damage as reasons for initiating the forest regeneration process in the near future. The student group took this ecological condition as an impetus for design intervention. They suggest that the striking aesthetic character of the spruce forest can be perceived most clearly when directly contrasted with a young, light-filled deciduous pioneer forest. To heighten the experience of this shift in atmosphere between monocultural spruce stand and the mixed deciduous forest, they proposed initiating the forest transformation process gradually, beginning on only one side of the slope. The opposing slopes with contrasting forest types are to be connected by a path that runs between lookout points on each side, offering the chance to observe the forest conversion process over time and in two different characteristic distilled forest types (see Figures 141 and 142).

Urban forest maintenance and care processes usually do not involve extensive forest conversion. The intention is to maintain and develop the existing ecological quality while offering an attractive open green space as a public asset. Therefore, curating the forest experience is often limited to recognizing and establishing access to diverse already existing forest types and atmospheres via paths, small platforms, and lookouts that facilitate immersion in the existing vegetation matrix. *"There was a pretty birch grove. I went in because there was already a tiny trail. Even though I'm not a big fan of this kind of installation,*



Fig. 142: Gesche Delfs and Sarah Schmidt, HCU University Design Studio



Fig. 143: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

I thought a small wooden platform, just a couple of planks, not intrusive, would be nice here."

Other low-key design measures that were suggested in the co-design workshops include cutting corridors into the thicket to open up views and removing the understory around particular landmark trees to protect them from competition. Most of these subtle, curatorial design suggestions relate to participants' observations and aesthetic experiences of the ecological particularities encountered during their site expeditions. *"Around the multistemmed birch trees—also quite typical for heathlands—the grass and the heather pattern form something like a wreath. They give it a frame, a collar. So, it seems singled out. It's just very subtle. It's just an example that shows how it could be achieved - with very simple means - to emphasize a quality that's already there. This is less concerned with design than with practices of care."* (see Figure 143).

In nature conservation areas, the forest processes of succession and rejuvenation are frequently left to develop spontaneously, starting with pioneer species. In Wittmoor, the pioneer birch tree stands were praised for their particular atmosphere, which cannot be experienced in a regular park. Therefore, design suggestions attempted to support this experiential quality by maintaining a mosaic of different succession stages of the birch forest. *"After all, there's no regular windfall or natural flooding here, so we actually have to artificially create this mosaic of different successional*

stages if we want to keep them indefinitely." It was advised to foster the experience of succession development intentionally by implementing diverse management regimes to retain the aesthetic quality of both pioneer and mature stands in selected smaller areas with visitor access (see Figure 144 and 145).

Curating and opening views within the higher vegetation matrix is often the only way to let visitors partake in protected landscapes where they are obliged to walk on designated paths. In Wittmoor, existing historical hedgerows or *"Knicks"* along the paths enclose visitors in a green corridor. A design response was to open temporary views each season by coppicing the hedgerow structures along the paths in different sections. These structures would eventually grow back, but they would afford an open view for approximately two years before growing taller than a human. Another section could then be cut to open the view. This would secure regular rejuvenation of North German hedgerows or Knicks, which are a protected cultural heritage, yet their maintenance is currently not organized systematically.

Creating an appropriate backdrop for valuable landscape sites was suggested as an vital design approach, particularly in nature conservation areas. *"The backdrop is certainly very important, as there are very few places in the city where you can only see nature everywhere on the horizon."* Participants described the open expanses of grassland in Wittmoor

as having *"spatial generosity"* that is very rare in a dense urban landscape. Therefore, they recommended keeping the existing larger areas free of higher plant cover and planting a layered and closed edge of vegetation around remarkable open landscapes, such as extensive grasslands or heathland (see Figures 146 - 185). This design approach was traced back to the English landscape garden style; however, participants discussed it more frequently in the context of nature conservation sites. More generally, workshop participants advocated moving beyond the perceived distinction between nature conservation areas and parks, as both are designed landscapes and can therefore benefit from similar design approaches regardless of their legal or administrative status.

Various design suggestions developed in the study positioned individual ancient trees as aesthetic counterparts to vegetation corridors and dense forest vegetation matrix. In urban green spaces, tree branches that are asymmetrical or grow all the way to the ground are usually cut for pedestrian safety (see Figure 146). Venerable trees with sculptural forms are, therefore, relatively uncommon in urban landscapes and were very much admired in the nature conservation areas in the study. *"At these transitions between heath, moor, and forest, there are quite striking individual trees because they had the space to develop like this. They can't develop so freely in the woodland and usually neither in a park. I think that's something very special here that*

you can't experience otherwise."

Ancient free-growing trees were frequently anthropomorphized in the discussions and were revered in the descriptions of the aesthetic character of the local landscape. *"One can almost address them as persons, they are so gnarly and old, the oaks that have been coppiced down again and again so they've branched out so many times. These trees need to be supported and protected individually."* Beyond sparking the imagination through their individual biographies, ancient solitary trees, particularly oaks, served as indicators and symbols of habitat health. *"When trees get older, they contribute considerably to biodiversity. [...] So we have to consider how to better preserve them."*

It was recommended implementing tree-care practices in both parks and protected areas that allow old, free-standing trees to develop their characteristic form and retain deadwood, thereby enhancing their distinctive aesthetic presence, their affordances for climbing and sitting, and their value as habitats for saproxylic insects, bats, and birds (see Figure 149). *"Open up the clearing here and there, plant an oak occasionally, because they rarely sprout on their own, just because one would want them to. Think more in the direction of designing natural processes."* Historical coppicing techniques and implementation of grazing were likewise proposed as a form of landscape care that fosters more varied tree growth forms and habitus.



Fig. 144: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



Fig. 145: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“



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147



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Fig. 146-148: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

→ CURATORIAL PRAXIS AND CARE IN MOOR LANDSCAPES

The curatorial approach for ecological processes in moor landscapes is implemented most effectively by regulating the water levels. In Wittmoor, the ecological negotiation processes between the formation of the peat bog and the development of the birch forest are experientially most palpable through the tension between the two. Several workshop participants described the dramatic image of the decayed birch forest with its deadwood remains protruding out of the water as a representation of the healthy ecological systems as a “circle of life.” Accordingly, most design solutions aimed at making this poignant process of bog formation by inundating the pioneer forest perceptible and comprehensible to the average visitor.

In many boglands, peat-cutting traces are still discernible as orthogonal topography with low inundated depressions. Also, in Wittmoor, birch woodlands highlight the historical topography of the peat-cutting edges and appear in dryer areas where the original drainage system is still intact. This offers an opportunity to observe the different stages of bog formation and the related processes of growth or decay of moor-specific vegetation in adjacent plots. This allows different stages to be experienced sequentially along a single walk or perceived simultaneously within one view (see Figure 150).

A central argument advanced by the landscape design and ecology experts in the study workshops

was that design and management should reveal the interdependencies between the urban landscape’s water regime, soil formation, and vegetation development, as well as the extent to which these processes are artificially constructed and regulated. The premise of these discussions was that humans have the power but also responsibility towards bog landscapes and habitats to support their fundamental ecological processes accordingly on the scale of the landscape armature. They advocated for design approaches that make these process and correlations more evident. *“And that could also be done in the form of a provocation. Something that points out the contradictory, the unnatural, the artificial. Let’s consider possible places for this and what it could look like!”* Artworks and other accentuating interventions, including temporary ones, were discussed as means of highlighting the dissonance and friction between artificial landscape management and ecological processes of the bog formation. This inspired one of the student design-studio groups to propose an installation that stages, at a small scale, the gradual atmospheric transition from wet to dry landscape types, thereby communicating the phases of bog formation as part of a continuous ecological process (see Figure 151).

Ecologists and landscape designers in the Wittmoor workshop pointed out that birches with an understory of *Molinia* grasses that grow on lower moist bog grounds and are more stable in their appearance and ecological development than other succession stages. Dense *Molinia* moor grasses prevent the birch



Fig. 149: Coppiced trees and deadwood enhance nature conservation areas.

trees from colonizing the area fast, so ecologists prefer to leave this protective layer untouched. This succession stage also creates the iconic moorland landscape atmosphere, with its lush filigree green grass carpet and slender and delicate white tree trunks that do not quickly consolidate into dense stands of mature trees (see Figure 152). Nature conservation experts participating in the Wittmoor workshop noted that, over the years, the removal of birch saplings through scrub-clearance practices has been observed to have the unintended effect of stimulating their regeneration within these pioneer vegetation stands. The birch forests colonized the bog faster and grew denser after initial removal. Therefore, participants felt it was unreasonable to oppose the natural pioneer succession processes on a

large scale by removing trees. Instead, they proposed a careful, scrupulous curatorial practice in the degraded moor areas, acting on a small scale with precisely aimed interventions. This approach was reported to be more beneficial to selected protected biotops while requiring fewer resources than the complete removal of pioneer stands by heavy machinery. It also allowed aesthetic considerations to be addressed more deliberately alongside ecological objectives than is typically the case in nature conservation areas. *“Let’s make sure that also some old birch trees, which are particularly beautiful to look at, are preserved.”* (see Figure 152).

It was suggested that selected smaller woodland stands located on elevated ground and therefore not subject to flooding should be designated for



Fig. 150: Pia Brockmann and Katrina Westphal, HCU University Design Studio

process-oriented conservation and left to progress through natural stages of forest succession. In more degraded lower lying bog areas, where dense birch stands extensively dehydrate the peat layer through evapotranspiration, their removal was recommended. Interestingly, aesthetic considerations were raised in this context as well: *“Some birch forest plots must be deliberately thinned out so they don’t become too dense. To keep the light character.”*

However, the manual removal of trees is costly and labour-intensive. The study participants therefore agreed that artificially rewetting the area represents the most effective strategy for bog revitalisation. Stands of wet birch carr and declining, inundated birch woodlands enriched with deadwood additionally create

a distinctive landscape atmosphere and render the dynamic interplay between water and land perceptible. It was suggested that wherever feasible, the drainage network of trenches should be filled allow local flooding, while dams should be constructed to recreate the bog valley’s original impermeable geological conditions. These interventions would initiate the processes of bog regeneration. Communicating the interdependencies among water regimes, succession processes, and the associated life cycles of flora and fauna was central to the proposed design decisions. Accordingly, many design proposals for Wittmoor firstly centred on enlarging and staging the scenic lake that forms a landmark within the bog landscape (see Figure 153), before designing management and care

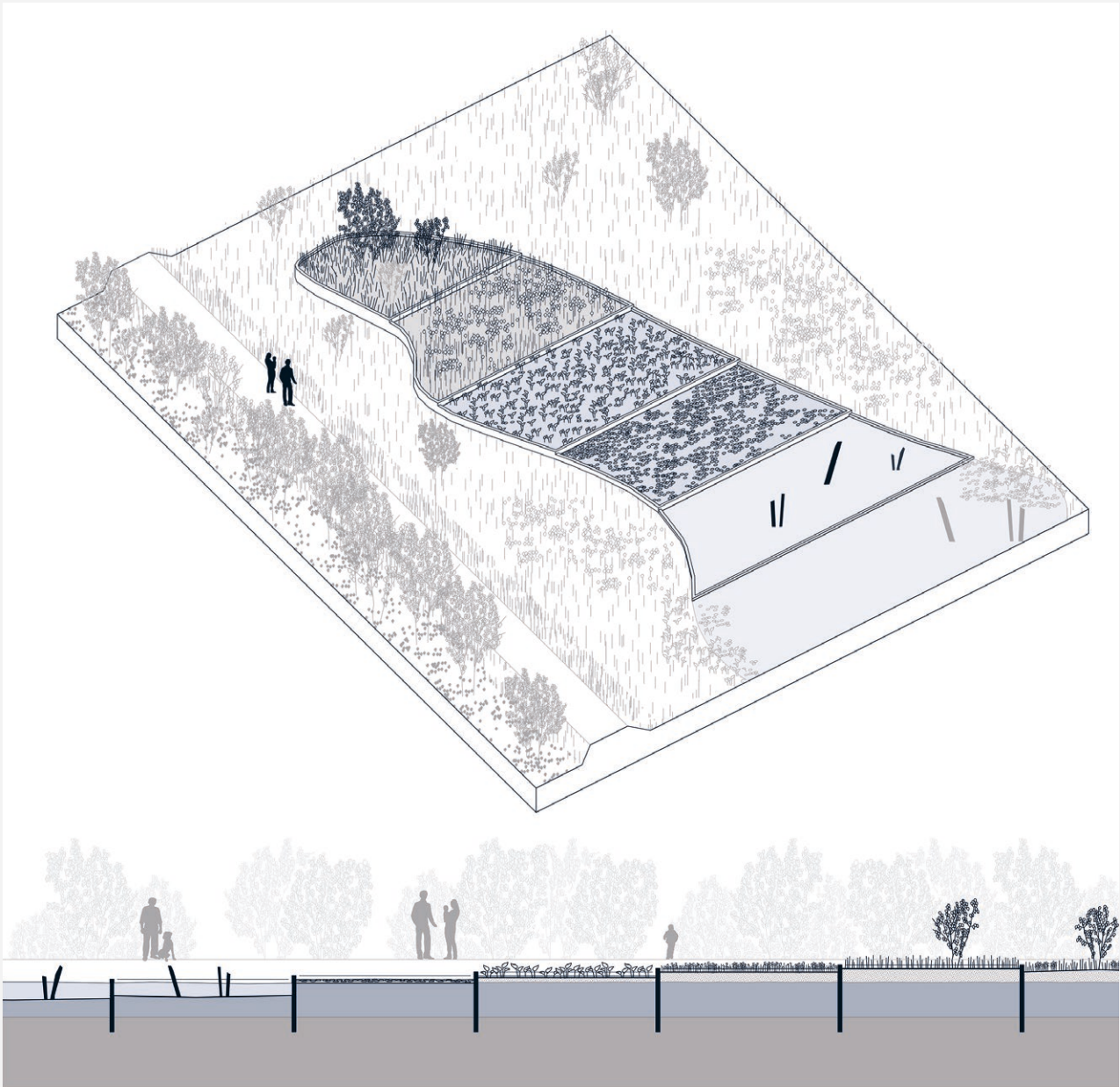


Fig. 151: Pia Brockmann and Katrina Westphal, HCU University Design Studio

regimes for the surrounding landscape mosaic. Several co-design workshop groups emphasised that the less visually appealing stages of bog development should be deliberately revealed through design interventions, thereby making their ecological significance and function more perceptible. *“The exciting value here is that we have many pioneer species that have a very fast life cycle. So, you get deadwood very quickly and then old trees again and so on.”* The curatorial design approaches developed by the workshop participants and students, in various forms, all suggested a landscape mosaic of different successional stages, managing them so they coexist alongside one another, thereby fostering the landscape’s ecological and experiential diversity. *“Towards the heath landscape, there are these small crippled oaks that are hardly more than a meter high. Behind them, there are the same tree species, but big and magnificent, due to different circumstances. And that’s the interesting part of the nature experience: being able to notice these differences. To experience this mosaic through stations along the way that show the moor landscape in its various manifestations. That should be maintained, preferably along the path.”*



Fig. 152: Birches with an understory of Molinia grasses are colonizing and drying out the bog in Witmoor, Hamburg.

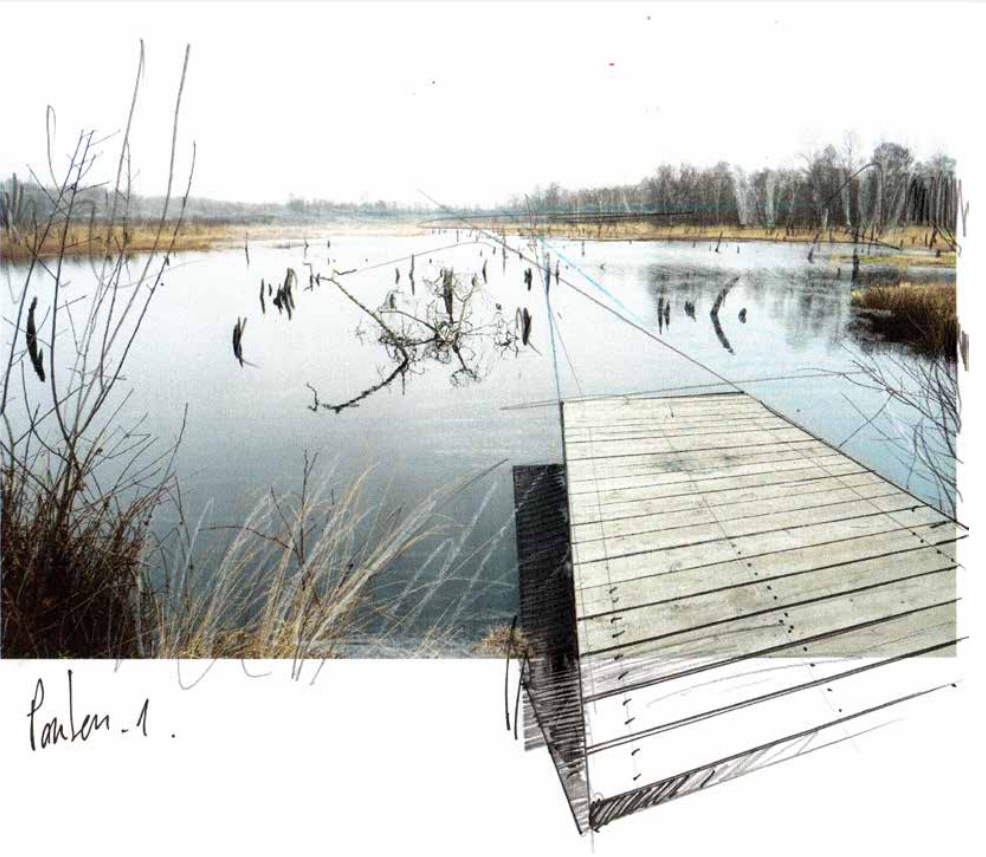


Fig. 153: Senses-based site analysis by atelier le balto - developed to inspire sensitive design solutions in the project „Natürlich Hamburg!“

4.4 Harvesting, Foraging, Collecting, Recycling, Playing

Activities that individuals undertake in the landscape, especially if sustained over long periods, can impact the perception of ecological processes through perceptual learning and first-person embodied experience. In urban conservation areas in Germany, thousands of volunteers already take part in yearly campaigns to care for habitats, mow or remove young pioneer tree saplings and prune wooded vegetation. These activities are usually organized by non-profit nature conservation associations, such as NABU and BUND, and mainly attract already environmentally aware members: *“In the context of care and maintenance as an event with the citizenry: I don’t think every activity is for everybody. Certain maintenance can only be carried out when it’s below zero; that is when the soil is frozen. Keyword: rubber boots! Because otherwise, you’re up to your neck in mud. That is rather for the interested citizen, who is happy to be allowed to leave the path [in a nature conservation area] and help with the maintenance so they can enter a protected area. To really experience the terrain itself.”*

Participants in the study workshops therefore suggested integrating a broader range of activities and stakeholders into urban green spaces to engage members of the general public from diverse social backgrounds. This would require systematically organised participatory and performative programmes tailored to specific target groups and ecological contexts, supported by institutionalised funding to ensure continuity and the employment of appropriately qualified staff. Landscape design and ecology experts noted that local ecological context can best be made perceptible in relation to the organic material that perpetually grows and transforms in the landscape. In the workshop discussions they explored design approaches that could combine the natural dynamics landscape care and maintenance with play, art, education, recycling, harvesting, and similar to engage a broader public. These activities can foster a cognitive understanding of ecological processes while simultaneously also enabling an intensive experience of their sensory dimensions. A student in the

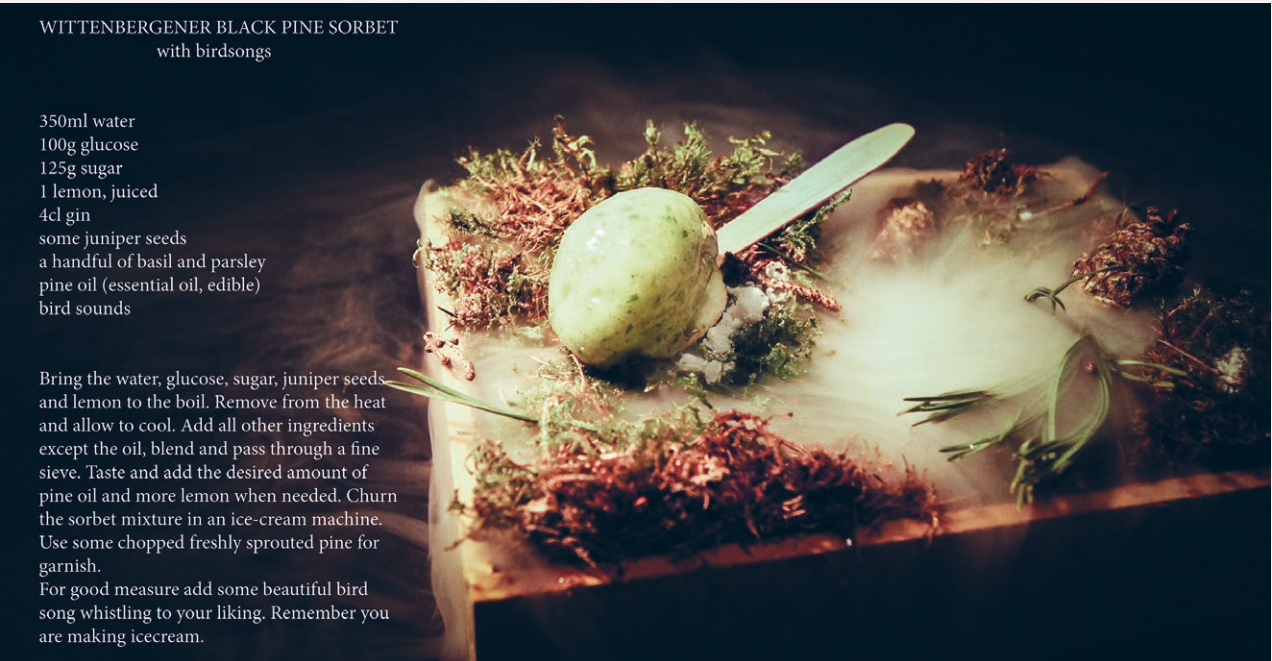


Fig. 154: Raul Stubbe, HCU University Design Studio

Wittenbergener Heide design studio proposed a recipe for pine sorbet to highlight the diverse possibilities of experiencing the heathland's distinctive scent and sensory aesthetic character (see Figure 154).

Flows of organic matter, including nutrients, seeds, and genetic material across the landscapes and the landscape-management practices that shape these flows in pursuit of nature conservation objectives are largely imperceptible to the untrained eye. In some conservation areas, flowering mesophilic plant communities depend on nutrient-poor conditions; nutrient inflow must therefore be prevented by raking and removing the cuttings after mowing. By contrast, leaving cuttings on site may be recommended for certain park meadows.

The study participants emphasised the need to foster a broader understanding of maintenance practices, and how they are shaping local ecology by adding, redistributing, or removing seeds and nutrients. As these processes are difficult to perceive visually without prior knowledge or experience, participants discussed how such practices and their ecological effects could be made perceptible to the public through participatory events and long term performative landscape-care programmes. For example, as a communally organised manual mowing with scythes to support awareness of how the large-scale use of rotary mowers is harmful to insects and small animals.

The workshop discussions emphasised that, to attract broader participation in landscape care these activities these should be conceived as appealing



Fig. 155: Community harvest and apple-pressing event, Hamburg.

leisure experiences. Regular landscape-management personnel employed by municipal authorities are generally not trained to organize participatory events for people of diverse social backgrounds and age groups. Integrating such activities into routine practice would therefore require additional staff with social sciences and participation training within landscape management departments to combine landscape care with tailored environmental education and awareness-raising.

It was remarked that local experts and stakeholders currently managing on-site processes and educational formats are often-times individual volunteer non-profit organisations that should be supported more systematically for sharing their experience and knowledge with the general public. *“It’s clear that there’s a need for a long-term accompanying group of people who know the local area and who can observe it, evaluate, and adapt [...] the [maintenance] measures in the long term.”* Stakeholder-oriented approaches and local networks, including citizen science and monitoring, were deemed essential for connecting people to the landscapes through perceptual learning about ecological processes over time. The role of caretakers and facilitators was estimated to be central for the success of such concepts. *“Perhaps this should be institutionalized more strongly. Starting with the pool of people who know the site and are already active there. And then new interested people can join an established network.”*

Harvesting edible plants, fruit, and other foods that can be foraged in the landscape was suggested as an attractive way to increase awareness of the life cycles, seasons, and local characteristics of vegetation. Related landscape design suggestions in the Wittmoor workshop focused on developing specific areas where such activities can take place in connection to their ecological context. Participants mentioned traditional orchard meadows as a precedent. As a historical extensive land use, orchard meadows are valued as cultural heritage and, in some cases, protected for their significance as a habitat. Their number and ecological quality have declined in German landscapes in recent decades as the urban fabric and more intensive uses encroach on them. Nevertheless, several remnants of these extensive agricultural landscapes persist, including in Hamburg, prompting ecologists to strongly advocate for their restoration and protection within the city. The management of orchard meadows combines fruit-tree cultivation with the maintenance of species-rich grassland. Key activities include planting new

trees in winter, harvesting fruit in autumn, pruning trees to create open crowns, and mowing or grazing the meadows to encourage wild-flower development. These historically communal practices, together with the scenic character of orchard meadows, offer considerable potential for year round educational and social participation centred around fruit harvesting events, juice and cider production, tree pruning, meadow cutting, and beekeeping (see Figure 155).

Participants generally recommended emphasizing the performative and playful dimensions of historical landscape-management and care practices that are no longer common and may therefore offer unusual and engaging experiences of nature. It was speculated that as a curiosity, they might attract non-expert members of the public more than ubiquitous landscapes do. Distinct landscapes such as boglands or heathlands are already popular among tourists due to their extraordinary visual scenery. Workshop participants in Wittmoor suggested that involving visitors more actively in communal landscape-management activities, such as removing tree saplings or invasive species, could also strengthen the landscape's relational aesthetics. Communicating efficiently that these might be idyllic landscapes but are highly managed sites that must be invested with care to retain their beauty and ecological quality, was regraded as essential task for their preservation.

The topic of recycling was addressed in this regard in the Wittmoor workshop. *“I found it interesting that these birch trees seemed to be cut down by people who live in the area. If people want to cut them for*

firewood, we could consider allowing it under certain circumstances. But only by hand, not on a massive scale. It would need to be organized so people harvest the birches themselves, just from particular places where it’s actually beneficial for the habitat.” The Workshop discussions revolved around the potential of recycling and reusing waste left behind by maintenance works as a device to communicate the material flows and cycles occurring within urban green and conservation areas (see Figure 156). Organic waste from households, including fallen leaves from private gardens in autumn, is already recycled by the municipal utility company and transformed into humus for gardening. Customers who buy the humus are informed of its origin to raise environmental awareness.

The study participants discussed further concepts for recycling and reuse that could be introduced in the public urban spaces, both to support sustainability and foster understanding of ecological relationships. Cutting meadows and grasslands and pruning woody vegetation in public areas produce large amounts of organic matter that is currently taken to landfills. Workshop participants recommended using the organic waste from public grounds to create renewable energy, by producing biogas. This was seen as a suitable approach because green waste from public urban areas can be contaminated with bacteria and parasites from the fecal matter of pets and other pollutants and cannot be recycled into humus. A biogas plant with bacterial decomposition could be combined with a power plant that generates electricity and heat in a climate-friendly



Fig. 156: Organic waste left behind by peat bog maintenance works, Wittmoor, Hamburg.

way. Involving the general public in recycling organic matter from green areas in everyday life could advance information about related life cycles and ecological processes. Workshop participants, therefore, recommended organising landscape maintenance processes in urban areas as conspicuous as possible, with public relations campaigns and participatory events: *“We have to embed these landscape cycles more strongly in the everyday life of society, just like it’s common to collect and separate household waste to recycle.”*

It was recommended that infrastructure for participatory activity such harvesting, recycling, playing, maintenance, and care should be anticipated and accommodated in the spatial design and layout of public urban green spaces. Curators or stewards of local ecological processes must guide their long-term development, to be able to design and facilitate perceptual learning to the general public. Landscape architecture office Rabe Landschaften accordingly proposed a design for a composting system for a small park in Hamburg within the “Natürlich Hamburg” program. The steps of the recycling process and

transformation of the organic matter in nutrients could so be directly experienced in the park, by the participating visitors (see Figure 157).

Participants suggested tailoring activities to different target user groups. *“I think it’s important to reflect on what adults need, to be able to experience and understand nature processes, what seniors need, what children need.”* Deadwood in the landscape was, for example, frequently discussed in the study workshops as an aesthetic element, material for play and creating artwork, and in the context of the relational activities of recycling and upcycling: *“When I make activities with school children, we collect deadwood and make a charcoal pile. To show how you can use wood to make a new product.”* A charcoal pile is an arranged pile of wood covered by turf or another layer, inside which a fire is lit to produce charcoal. A charcoal burner tends to the pile and can involve a group in an entertaining, shared activity. Such roles include organizing performative and participatory activities centred on the use and care of landscapes and habitats while sharing the knowledge of the invisible flows of energy, material, and living organisms within the landscape.

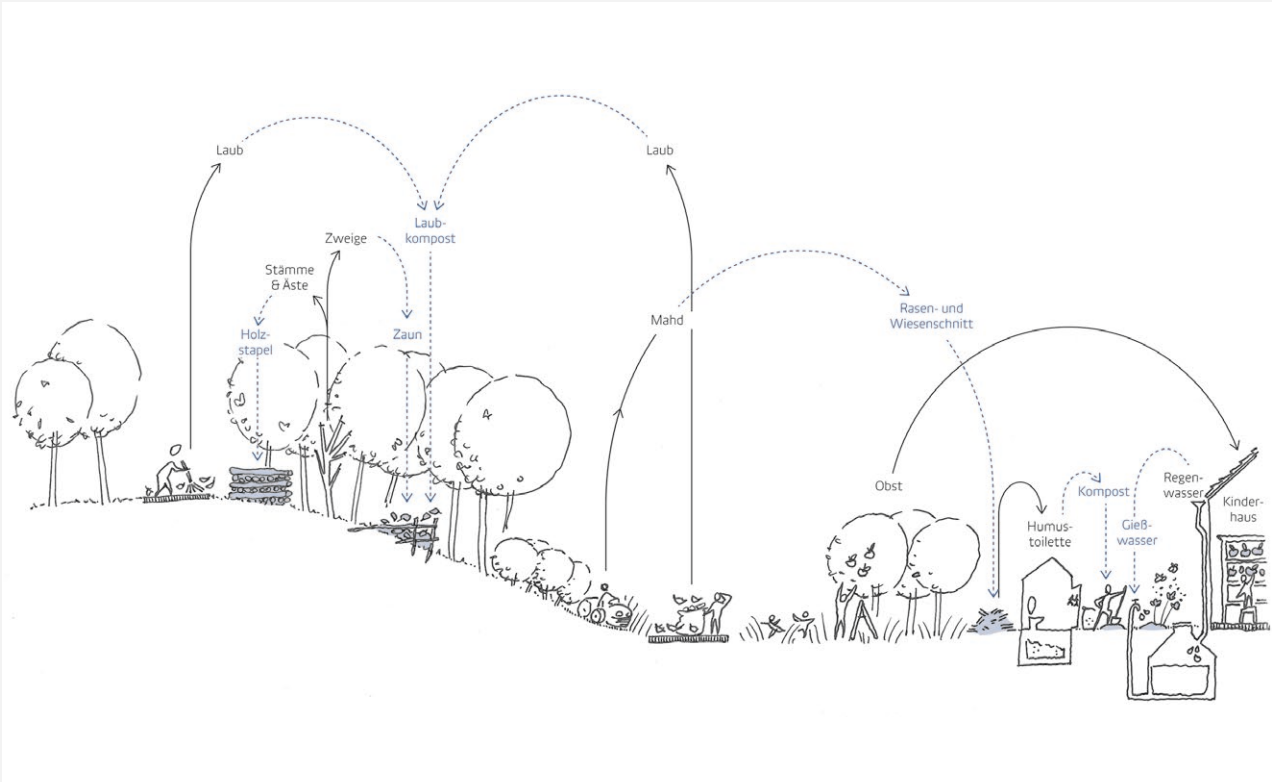


Fig. 157: Design proposal for a composting system in Horner Park, by Rabe Landschaften within the project „Natürlich Hamburg!“.

4.5 Creating Habitats to Be Experienced

In the face of species extinction and declining biodiversity, protecting, enhancing, and creating valuable habitats in urban green spaces are clear ecological priorities. As public awareness of their importance grows, biodiversity and sustainability may also gain higher significance as aesthetic and social objectives. Every two years, the German Federal Agency for Nature Conservation (BfN) conducts a survey on public attitudes towards nature and biodiversity. In recent years, most respondents have identified environmental and climate protection as essential policy priorities, ranking them above issues such as poverty, social justice, and healthcare. Support for nature conservation and an understanding of the importance of biodiversity, also concerning human well-being, is high overall in Germany. The opportunity to experience nature on a daily basis was voted as a vital parameter contributing to the quality of life, with over 90 percent of respondents in 2021 stating that spending time in nature makes them happy and 89 percent that nature is a significant dimension of well-being (Bundesministerium für Umwelt, Naturschutz, nuclear Sicherheit und Verbraucherschutz, 2023, p. 44).

Cities worldwide are already home to wide range of wild fauna and rare specialized plants. However, except for the most charismatic species, city dwellers do not yet acknowledge them as a matter of course. There is a discrepancy between the perceived biodiversity and the measured diversity of ecosystems and species in urban sites, such as urban forests (Rozario et al., 2023).

In the co-design workshops this tendency was reported and several suggestions were made for implementing deliberate habitat design that enables a broader experience of biodiversity. Nature conservation participants in the workshops stressed that opportunities to encounter wild animals and rare plants in urban public green spaces should be increased intentionally by developing habitats and corresponding maintenance regimes. This would result in landscape settings where people could encounter diverse non-human living beings in their everyday environment, on several scales, from individual plants or nesting places to entire landscape armatures. Curatorial praxis after the initial implementation of a biologically diverse landscape setting should mediate its perception and ensure ecological quality long-term.



Fig. 158: Conversion of monoculture spruce stands into a mixed deciduous forest, Witmoor, Hamburg.

This was recognized as an urgent new task for landscape architecture in urban green areas and an essential measure for raising awareness of environmental issues, supporting affective links with non-human life.

These sites do not usually boast a scenic and visually pleasing appearance. The participants in the co-design workshops rather stressed the aesthetic value of habitats in urban landscapes that is inciting curiosity, awe and reflection. A particular situation in the Wittmoor nature conservation area, for example, sparked a discussion on habitat design with deadwood in the workshop. The landscape management team in charge of forest conservation works had left tall deadwood trunks standing on a site where a monocultural spruce forest was undergoing a transformation into a more diverse deciduous forest (see Figure 158). Several participants remarked on the forest stand's unusual and slightly unsettling atmosphere on their site expedition. The intervention to diversify the forest structure was

considered ecologically necessary, and the presence of several woodpecker nesting cavities remarked on with excitement. However, their aesthetic responses to this landscape were ambivalent; either highly positive or firmly negative, depending on whether the individuals believed that such landscape management and habitat creation should blend discreetly into the landscape or remain deliberately visible. Through the polarizing discussion about the appearance of this measure, participants reflected on the role of human in landscape processes.

This was a compelling example of how confronting observers with dissonance in the landscape and creating friction in aesthetic perception can spark much-needed discussion of ecological issues. Although this was a regular landscape maintenance measure in the nature conservation area, a similar effect can be achieved more deliberately through design by leaving selected standing deadwood and tree stumps on site.

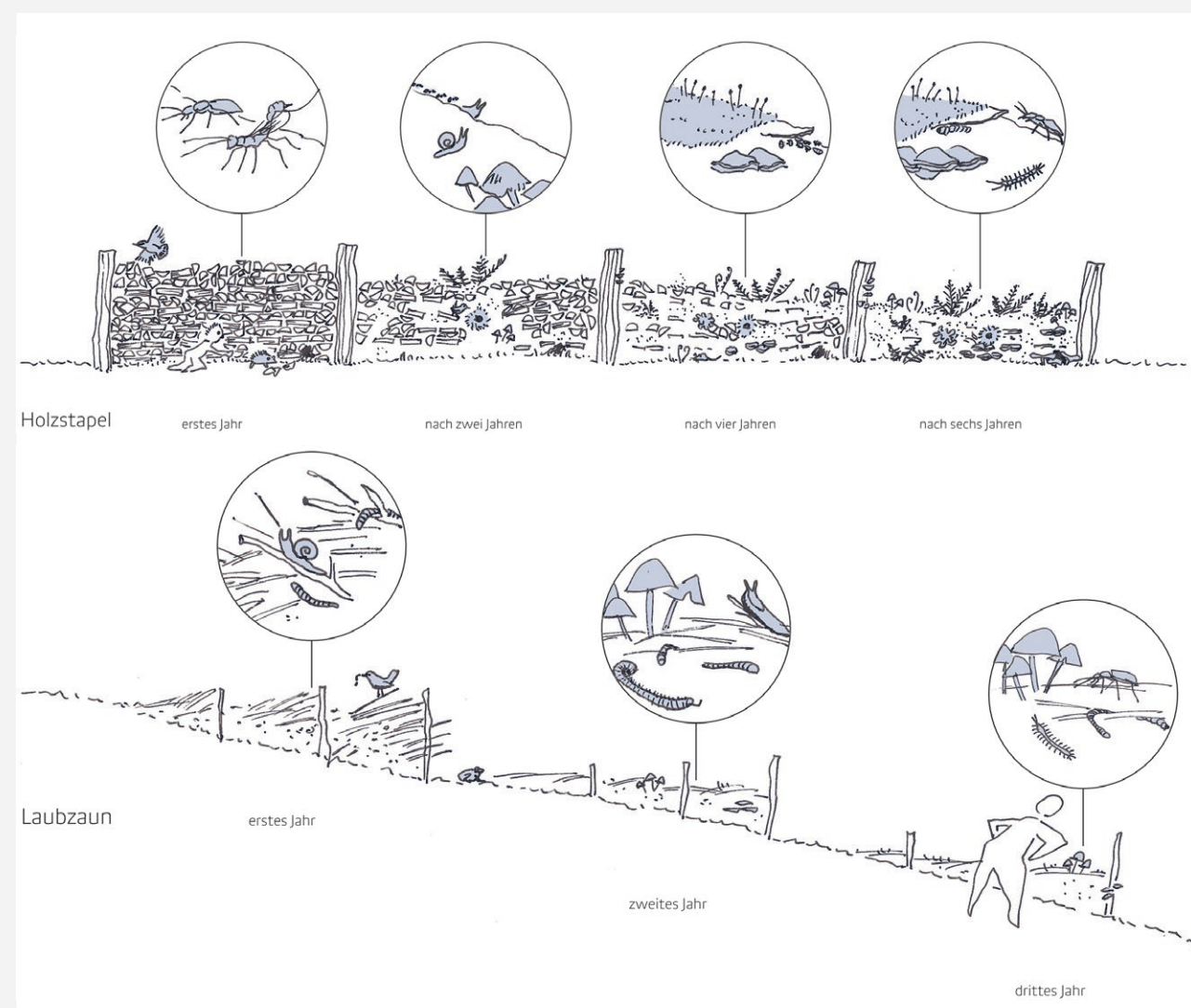


Fig. 159: Design proposal for hands-on nature education and stewardship in Horner Park, by Rabe Landschaften within the project „Natürlich Hamburg!“.

During the workshop expeditions in a park participants were generally fascinated with the aesthetic impact of the presence of deadwood in the landscape. They recommended integrating it into urban public green spaces more regularly. Standing deadwood and ancient solitary trees, in particular, are to be protected and staged to stimulate an atmosphere of dissonance, reflection on deep time, and the slow ecological processes at work. Saprophytic insects, invertebrates that use existing holes and tunnels for their broods, wild bees, wasps, bats, woodpeckers and other birds can thrive even in urban areas if deadwood is kept in place.

Grouping and arranging trunks and decaying wood in public green spaces was also recommended as a design measure. These can be used by salamanders, toads, other amphibians, lizards, slowworms, snakes, and other reptiles for cover, sunbathing, and hibernating. Several participants praised these elements as having the character of an artefact, and as such they attract attention and sustained perceptual learning. Landscape architecture office Rabe Landschaften built on this potential and proposed a design for a composting system for a small park in Hamburg within the “Natürlich Hamburg” program (see Figure 157 and 159). The composting installations aim to reveal the gradual decay of different forms of organic matter over the years; wood in one installation and green waste and leaves in another; while highlighting the new life that emerges from the ecological process of decay, vegetation, fungi, and wildlife. The workshop participants reported that such installations evoke a stronger sense of awe and interest when unusual

or rarely encountered life forms, such as fungi or slightly intimidating species like the European hornet (*Vespa crabro*), can be observed emerging from the decomposing material.

The educational value of such installations, as well as the possibility of encountering debris left on site after storms and other disruptive events, was highlighted by a participant working for a non-profit environmental organization. In Altonaer Volkspark, they referred to several fallen trees with exposed root plates: *“That’s what I’m looking for when I’m outside with the kids. These are the best examples to show: ‘Look how big a root plate is,’ and so on. That you can just go, take a walk, and find things like that is of great value here in the park. And you can explain a lot through them.”*

Participants in the co-design workshop explored how cultivating biodiversity in everyday spaces could, in the long term, strengthen the perceived connection between ecological qualities and their aesthetic expression to influence public acceptance. *“This has aesthetic consequences. It’s not just quirky conservationists of botany who are interested. A colorful meadow is something that attracts many people. Urban population doesn’t know diverse meadows anymore. Nowadays meadows are green, and the people are content because they don’t know how it used to be. This is sort of a misunderstanding.”*

The discussions in the co-design workshops revolved much around the challenge of implementing areas with diverse vegetation and healthy habitats in urban green spaces more often so that they can be encountered frequently, easily in passing, with no barriers. *“[...] it shouldn’t limit people’s use, which is*

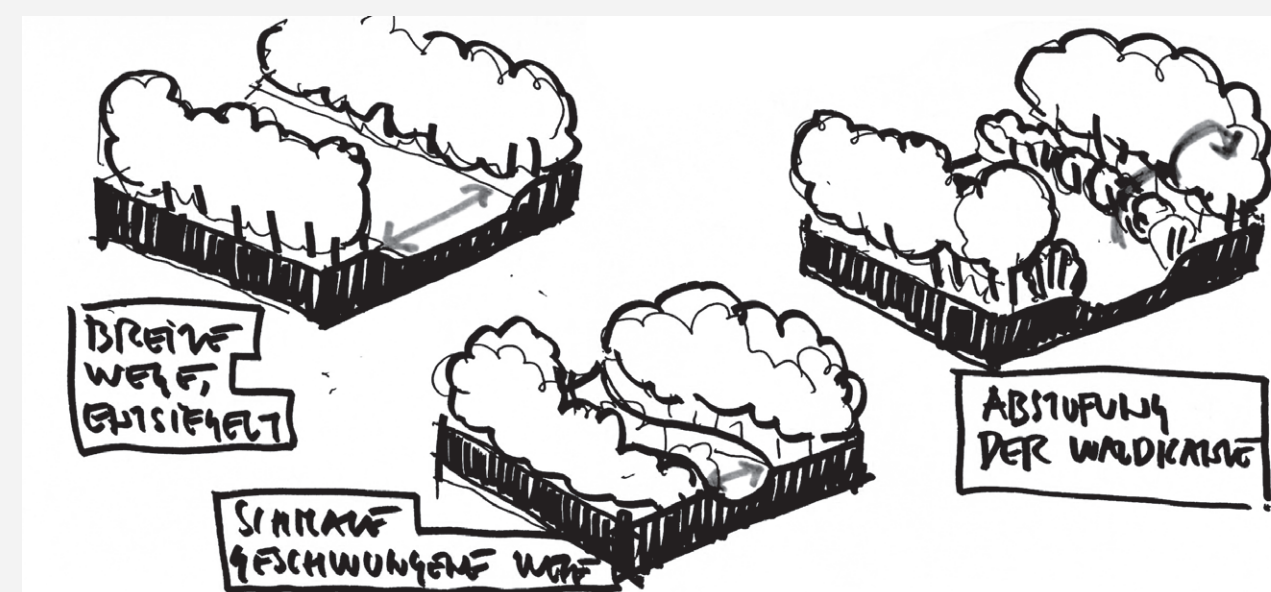


Fig. 160: Gašper Habjanič, Altonaer Volkspark Co-design Workshop

absolutely in the foreground in a park, of course. But we're looking for opportunities where we can implement small measures to foster these encounters." Programs for enhancing habitat diversity along edges of paths and other frequented areas were suggested (see Figure 160, 163). These are to improve the ecological context of the immediately surrounding vegetation matrix, for example by implementing additional diversity of vegetation that attracts pollinating insects, butterflies, and other charismatic fauna. "We should evaluate the existing edge zones carefully and create an abundance of flowers!"

In a forest park, the edge habitat along a path will support a different plant community from the ecotones between forest and meadow or along a hedgerow. Forest-path edges are typically shaped by partial shade, soil compaction, disturbance, and nutrient inputs, whereas forest-meadow ecotones receive more sunlight and often contain a structurally diverse transition of grasses, herbs, shrubs, and young trees. Hedgerow margins provide dense woody shrubs and sheltered spaces, serving as habitats and movement corridors for insects, birds, and small mammals. People could experience all these situations more consciously during their commute or in public spaces in everyday situations, if they are enhanced by design.

In this context, several environmental education and ecology experts in the study reported that the younger generations are becoming desensitized to other living beings and are afraid or feel a sense of revulsion when confronted with them.

"From this year, a ninth-grader at a high school no longer touches pond water."

"Are they not allowed to?"

"Yes, they're allowed, they're supposed to take water samples. They try to get the water with a bottle because they're afraid of touching the pond with their fingers. I've been offering classes for 17 years and this year, for the first time, children were also no longer willing to carry captured newts, which were supposed to be taken from the pond with their hands to the collection point as part of the project. Out of 50 students, I had one who said: fine, I'll do the transport. All the others strictly refused; they felt repelled, unsettled. Because the alienation from nature has gone so far. This is a global problem. It starts in school education, continues into university and ends with the teaching staff. These things just aren't done anymore, people are disgusted by them." (see Figure 161).

Therefore the overall objective of the suggested design approaches discussed in the workshops was to familiarize the general public of all age groups with the aesthetic character of healthy habitats in the long term and foster an intuitive understanding of ecological value and biodiversity through direct experience. The participants advocated for pleasant settings, such as diverse blossoming meadows, and also more eerie ones, such as places where one might encounter a hornet's nest or a snake. They stipulated that both types of experience are essential for inhabitants of urban areas to become inured and habituated to common natural phenomenon.



Fig. 161: Tadpoles collected from the pond.

Landscape design and ecology experts in the study recommended intentionally designing habitats with a focus on particular target species. These can be chosen according to parameters determined by nature conservation for their value within the ecosystem, or with more ubiquitous species also for their contribution to the nature experience and positive interaction with humans. "The forest here is very fragmented. You don't really get the big forest animals, but there are pollinating insects, deadwood insects, and small mammals, which are all attractive in the forest park." The workshop participants stressed that design concepts should include reproduction, feeding, shelter, and nesting opportunities for these target species within the accessible area of a park or urban landscape. They also recommended identifying hotspots in parks that already show potential as valuable habitats and supporting and expanding them by design, including opportunities for encounters with wildlife. "This combination of ancient trees on a clearing in the park and the surrounding forest edge area is already a very good starting point for fostering wildlife."

Participants emphasized that buildings within parks should also be incorporated into habitat-development strategies. Examples included an old farm building with timber façades, an abandoned shooting range, and a bunker in Altonaer Volkspark. A population of bats already inhabits the niches in the old farm building, so participants advocated considering their needs during its renovation. "This was an old milk hall—a cultural monument. I think we have these situations in

many parks in Hamburg. They're not always beautiful structures. But we do have to check these existing buildings and their ecological context for possibilities as habitats." The workshop group suggested that the surrounding park area could be developed accordingly, focusing on the meadows and pond that provide essential foraging habitats for bats. Birds that nest in buildings, such as the spotted flycatcher (*Muscicapa striata*), as well as various insects, including butterflies and moths, would also benefit from such a comprehensive and integrated combination of design measures in park infrastructure and the surrounding areas. These should consider compatibility with other possible building uses, such as gastronomy, education, or a community garden project.

The workshop groups highlighted the role of playful educational formats and storytelling in enhancing visitors' understanding of ecological processes and interrelationships within a site (see Figure 162). However, participants also observed that people usually seek out such programmes only if they are already curious about or emotionally connected to a particular place or to nature-conservation issues. This interest and emotional connection must first be fostered through engaging sites that provide opportunities for encounters with wildlife. Discursive and interactive educational formats were advocated for, such as live thematic tours with tour guides, digital apps, and audio tours that focus on active participation, and can guide visitors on a search for particular species, or inspire activity that fosters perceptual learning.



Fig. 162: Gašper Habjanič, Altonaer Volkspark Workshop



Fig. 163: Lina Maria Bienmüller, Lea Gotthardt, Dimitrios Traianos, HCU University Design Studio

Fixed information panels presenting scientific data to support observation were viewed less favourably, as they offer passive engagement and do little to encourage visitors to recognize and discover new affordances for experiencing nature. Moreover, species occurrence within an area can change over time, meaning that the information displayed may quickly become outdated.

Domesticated animals, such as sheep, goats, and horses, as well as less familiar grazing species such as water buffalo, can generate excitement similar to that evoked by encounters with wild animals in the landscape. *“For example, water buffalo are a huge attraction at Tegeler Fliess wetland. In the winter, the animals are not there, and they come back for the summer season in spring. A lot of people come to see these water buffalos arrive in the area. And children come and stand at the fence and marvel at them. That’s something that we should implement more often intentionally as nature experience.”* Grazing was discussed in the study workshops as an effective, sustainable grassland habitat maintenance method and an aesthetic asset for visitors.

A student group developed a related design proposal to expand the heathland vegetation in Wittenbergener Heide by introducing a permanent flock of sheep (see Figures 164, 166). As this protected landscape historically emerged through intensive grazing, reintroducing this practice could be one of the most effective ways to prevent the encroachment of the heath by pioneer vegetation. In the proposed concept,

the ground is initially prepared for heath germination through controlled burning, also a historical precedent that can improve the germination and rejuvenation of the heath plants (see Figures 165, 166). It is also creating a striking aesthetic experience of dissonance. Such measures, which may appear harmful at first, must be intentionally integrated into the narrative of ecological dynamics to foster public sensitivity and awareness to their beneficial long-term outcomes. Wittenbergener Heide is a popular leisure area, so the sheep rotation concept could be established as a performative event and include educational activities. The curatorial practice of slowly shaping the landscape by steering the grazing process could be incrementally implemented with the public’s participation through activities such as honey-making and bee-keeping.

Pasture management in public urban green spaces and nature conservation areas can be implemented in differentiated manner and cover smaller patches than commercial pasture, as the maintenance process is designed, adjusted, and steered over time according to the conservation parameters. Selective grazing patterns that prevent the establishment of shrubs and trees, by interrupting forest succession and maintaining an open landscape, also create more varied landscape atmosphere than by mowing. Grazing tends to produce evocative, sharply defined boundaries between browsed woody vegetation and grassland. Recognizing its dual benefits, as an ecological and experiential value might encourage its wider implementation in urban public green spaces.

Workshop participants from public administration, however, reported that grazing is initially considerably more costly than extensive mowing. As an approach to maintaining intensively used public green areas in the urban context, pasture grazing is not standardized and is currently applied mostly in small model projects with external funds. It requires expertise and personnel that are not readily available in cities as in Western Europe, where pasture is no longer common, even in rural areas. Sheep and goats can be introduced in smaller urban meadows and grasslands, such as parks, levees, and other infrastructure. *“It has to happen in a network of several small areas. The same personnel has to accompany the sheep herd in one area for a while and then to the next. But for that, management with a lot of know-how is needed, because they can’t just lead animals to a new spot, they have to know the right density, which species, and which breeds fit the area.”*

The workshop participants therefore suggested that, grazing would have to be newly established specifically as a landscape care and design practice. Specialized expertise, planning processes, and cooperation between public agencies and private herders, municipal enterprises, or other public-private partnerships would need to be formalized. In organizational models where herders receive a fee for grazing public land, they are not subject to the same competitive pressures as those operating on the open market. They can afford to adapt to the requirements of nature conservation or landscape design, for example, by reducing the number of animals per hectare, avoiding

particular protected or sensitive habitats, and can organize regular animal migration on a smaller scale.

“If one wants to support nature conservation measures, they have to think carefully about how many animals should be in which area at what time. Whether it can be done with a shepherd, or whether you need a paddock or a pasture, depending on the situation. There are three or four ways pasture is possible in urban areas, and then you have to assess which one is right for a particular nature conservation goal.” The most promising option discussed in the study was to keep the cattle permanently within a larger urban green area equipped with the necessary infrastructure, including stables. Another suggested format was the temporary implementation of grazing maintenance. This is can be done with sheep herds, which are brought to a particular area to graze for a couple of weeks or even months. Temporary fences are erected around the areas that need to be maintained by grazing, and these are gradually moved to a new tract of land when the biomass of the first plot is grazed. The animals rotate among the available plots, and different animals may be deployed depending on the vegetation. In the wetter marshy areas, water buffalos can be introduced, as goats and other cattle are sensitive claw disease. German Grey Heath and White Polled Heath are sheep breeds known to graze on the heathlands and bog areas. They select their diet carefully when grazing, avoiding particular plants.

Using grazing for nature conservation requires management concepts tailored to the existing

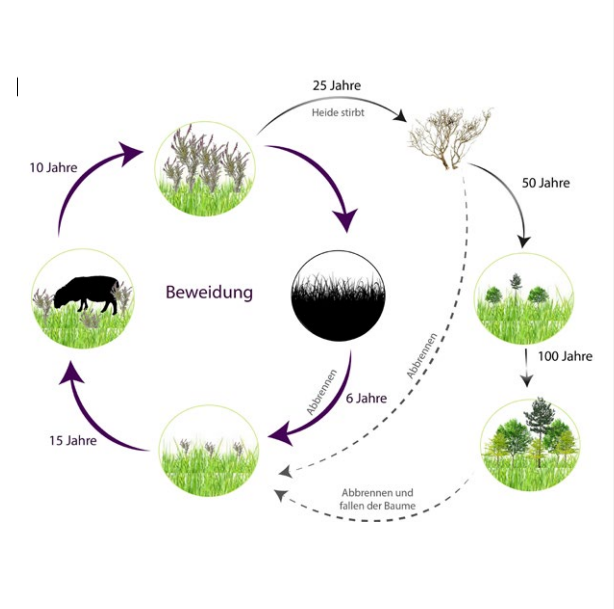


Fig. 164: Mélanie Girault, Clarisse Jouan, Lea Meincke, Mareike Oldörp, HCU University Design Studio

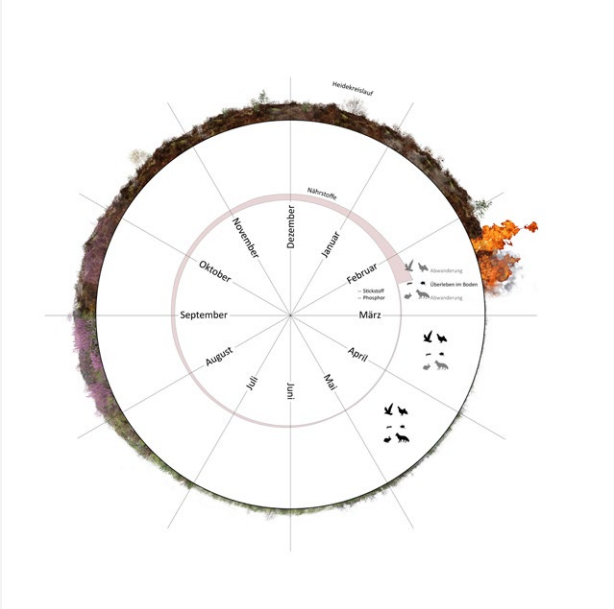


Fig. 165: Mélanie Girault, Clarisse Jouan, Lea Meincke, Mareike Oldörp, HCU University Design Studio

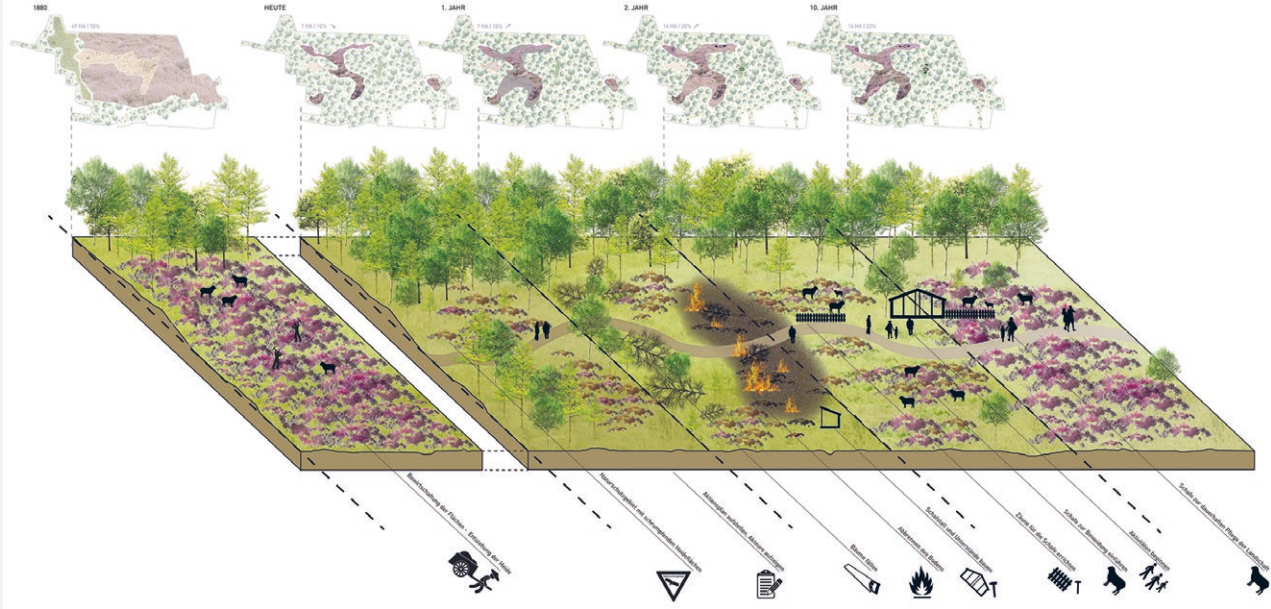


Fig. 166: Mélanie Girault, Clarisse Jouan, Lea Meincke, Mareike Oldörp, HCU University Design Studio

ecological development of the grassland community and may need to be combined with other maintenance and landscape design methods. *“It has been shown that animals don’t graze intensively enough in wet areas. Rushes and sedges in the pasture landscapes tend to be eaten less than originally hoped. And so, some areas with valuable small-scale orchid occurrences need to be mown additionally. In general, sheep grazing is a very good measure, but mowing is meaningful as a corrective element.”* The number of grazing animals per square hectare and the choice of species are adapted to the desired ecological outcome. The workshop participants stressed that the amount of stock must be smaller than for commercial pasture to ensure that nature conservation and landscape design goals are met. Regarding sheep grazing, participants suggested a general stocking density of approximately seven sheep per hectare.

The movement of cattle through the landscape, especially uncommon animals, such as water buffalo, European bison, and Galloway cattle, has a performative character and can support people’s understanding of grassland or heathland ecological processes. However, the workshop participants also cautioned that ensuring the quality of urban pastures is essential for securing political and public support for such concepts. *“Because, of course, the people involved are afraid of press reports like “animals starved,” or “injured by wrong conduct.” Then the whole concept would have a lasting negative image. Of course, everyone who wants to do this professionally is interested in setting common standards and exchanging ideas.”*

The ecological and experiential value of pasture in the urban context was undisputed by the participants of this study. Discussions rather revolved around the problems of implementation and costs, which can be a challenge in small heterogeneous green spaces in cities. *“We did a comparison for one of our green areas in Berlin and calculated the grazing cost compared to what would it cost to maintain by mowing. In the end, pasture pays off after five to six years. Of course, in the beginning, you have to buy the animals or build up a herd, but at some point, it is established. It has to reach stability. In the beginning, of course, it’s more work. So the argument can’t really be that it costs money, but rather, how do the maintenance costs that you otherwise have compare to grazing? These are often small areas. For example, a small meadow with shrubbery has annual mowing costs of 3,000 euros for 0.8 hectares. And that’s quite a lot. But with grazing, it’s the transport distance between all the small land patches that you pay.”*

Habitats designed to be experienced can be created in intensively used urban green public spaces with mostly ubiquitous vegetation and in nature conservation areas with rare habitats. Wittmoor and other moor landscapes in Hamburg are attractive because of their unique, specialized vegetation that cannot be experienced elsewhere in the city. This includes white feathery fields of cottongrass (*Eriophorum*) in the spring, calla flowers, and also less spectacular characteristic bog species, such as bog-rosemary (*Andromeda polifolia*), cranberry, cross-leaved heath (*Erica tetralix*) and sphagnum mosses. Enhancing the experience of the distinct and rare landscape type and immersion in its characteristic atmospheres by choreographing the movement through them is the least intrusive design strategy in protected landscapes. Additionally, landscape maintenance and curatorial measures can intentionally strengthen and distill the recognizable landscape types locally and, consequently, their specific, often rare, habitats.

Nature conservation areas usually have fewer official paths, and protection regulations restrict access to reduce landscape fragmentation and trampling. Therefore, signature plants or habitats may not be observable up close. For example, *Drosera*, commonly known as sundew, is one of the largest genera of carnivorous plants, and exists in Hamburg, however it can very seldom be seen clearly from the path. A design suggestion as proposed by one of the co design groups in Wittmoor was to cultivate additional protected plants in the vicinity to the paths, even though they would not usually develop in these locations independently. These plants are not easy to cultivate and would need sustained, regular care and attention from maintenance personnel and ecologists to settle in a desired spot. However, participants suggested that this extra effort and use of resources in the short term could be an investment in fostering long-term awareness. In protected areas, which usually exhibit high biodiversity already, it is vital that typical plants and animals can be seen or otherwise experienced from sites where visitors are permitted. Adjusting the paths to the topography and vegetation and adding screens with small openings can be helpful for visitors to stay hidden while observing the wildlife and bird-watching. Creating favorable conditions along the paths for local species, such as frogs, other amphibians, grass snakes, and dragonflies, for example, by adding a waterbodies was also recommended. These “eye-catchers” can spark an initial sense of wonder and effectively trigger interest that can be further expanded through educational formats for visitors.

5.

**PERCEPTION OF ECOLOGICAL
PROCESSES AS A SHARED BASIS FOR
LANDSCAPE DESIGN**

5.1 Conclusion: Research-by-Design Case Hamburg

The research-by-design process carried out in Hamburg was a test case of whether the direct experience and perception of ecological processes at a particular site could inform the creative process in landscape architecture to aesthetically convey the landscape's ecological context. It was also a test case of whether direct experience and perception of ecological processes can offer an interdisciplinary basis for discussing landscape design among experts from different planning and ecology related disciplines. Instead of using maps, the participants used their direct, intuitive perception of the landscape, combined with their existing expertise, to discuss and develop landscape design solutions. In this way, the planning and design negotiation

process actively included the temporal, intangible and aesthetic aspects of the site's ecological context, as these were still present in the participants' minds and embodied experience immediately after their site expeditions.

The participants in the study, including landscape design experts, rarely talked about the three landscape sites they visited in terms of formal composition or gestalt. Their reports mainly highlighted particular experiential aspects they noticed with varying intensity over the time they spent moving through the landscape. In agreement with the concept of perceptual flow (Gibson, 1979/2015), the narratives of the direct experiences on site were tied seamlessly with memories of previous visits of the area or to similar landscapes. The participants site observations were also inextricably tied to abstract thoughts about how the underlying ecological processes function, and ideal future development scenarios. It was challenging for participants to conceptualize and talk separately about a single ecological issue or point in time of

landscape development. Like landscapes, composed of ever-evolving, complex, interrelated ecological processes, the narratives of experiencing and perceiving landscape could not be reduced to formal and static aspects. In this regard, the accounts from the research-by-design phase supported the theoretical foundations and models of perception outlined in Chapter 1.

During the coding process and data analysis, it was challenging for me as a researcher to clearly separate perceptions of the current state of ecological processes from projections of how they should be designed in the future, how they develop differently elsewhere, and how they evolved in the past. This fluid perception of landscape in connection with all other imaginary states supports the idea that humans; including landscape design experts, rarely perceive living landscapes as static images. Despite landscapes being designed on the basis of maps, which only capture one moment, frozen in time, the perceptual flow that humans experience when they move through landscapes over time and the mental imagery,

metaphors, and memories that landscapes inspire are considerably more complex. Design solutions in landscape architecture are usually represented in renderings, or perspectives, that only reveal snapshot images of a site. In the co-design workshops within the "Natürlich Hamburg!" project it was liberating for the participants to be able to express different time-spans, memories and intangible experiences verbally, through collected items on site and record sounds, odors and other sensory dimensions to explain their visions and design ideas with alternative means of communication.

The research-by-design process helped identify immaterial, animated, mobile, and changing phenomena in landscapes that go beyond the formal aspects of landscapes design, but seem to considerably intensify the landscape experience for humans. These exhibit vast, unused potential to be included in the design repertoire of landscape architecture. The affective impact these phenomena had on the participants of the study suggests that their intentional implementation in design process



Fig. 167: Research-by-design processes in Altonaer Volkspark urban forest within the interdisciplinary Project "Natürlich Hamburg!," 2018. The on-site methodological formats employed in the study, ranging from site explorations and visual or oral translations of subjective experiences to speculative scenarios, served as structured entry points for open, reflexive discourse about the existing ecological dynamics.



Fig. 168: On-site exploration as a core method of direct, situated observation and as a basis for interdisciplinary exchange within research-by-design processes in the Wittmoor Nature Conservation Area, 2018.

could strengthen the emotional bond between the humans and landscapes and perhaps increase our sense of responsibility and being one with the world. Examples of affective bonds from the study workshops included encounters with charismatic wildlife; the uncanny, elevating, wholesome atmospheres found in certain vegetation communities; and affordances that triggered or motivated prolonged activity in the landscapes as well as increased emotionally triggered motivation to cherish and preserve them for their complex aesthetic dimensions.

In workshop discussions, participants reported on the atmospheric aspects of the landscape sites considerably more often than on their material origin. Instead, of the formal design elements they reflected and attempted to describe the characteristic atmospheres that occur in different vegetation communities in terms of their aesthetic and spatial effects. Immaterial phenomena observed in nature conservation areas and traces of ecological processes in other landscapes, such as light, texture, microclimate, odor, and sound, were associated with aesthetic outcomes that can be intentionally strengthened or carried out by design. Participants frequently recognized that atmospheres they find attractive develop through management, maintenance, or a combination of particular local unconfined ecological dynamics. Therefore, design decisions often focused on recreating particular ecological process, such as succession of specific vegetation communities, and development of long term maintenance regimes rather than shaping vegetation mass into a preconceived form.

The site expeditions were held immediately before the co-design workshops, and these experiences markedly affected the focus assigned to selected design issues in the discussion. For example, extensive discourse emerged on the design of paths and their immediate surroundings. This was due to the participants' personal experiences and their recognition of the limits of the human perceptual realm within a landscape. The role of choreography of walking, which is usually guided by paths and other affordances for movement, was given more attention than it usually has when designing paths on the map. Similarly, compelling experiences, such as seeing and hearing other species of fauna or recognizing distilled and distinctively legible landscape types, inspired several design suggestions for strengthening and protecting habitats so visitors could experience them. Encounters with animals were described with great emotional intensity and featured prominently in the study. They found their way into design discussions and decision-making in the co-design workshops disproportionately more often than they would in the regular landscape architecture design process.

Participants remarked on the choreography of the movement and kinesthetic experiences, such as strenuous walking on a steep eroding slope or the awareness of walking on different natural substrates. They reflected on the way affordances guided their movement through the landscapes. These were often clearly described by participants as a motivation, a draw, or an active decision to move towards something, such as a clearing with light, a tree, a bird sound, a smell, or the topography. From these

observations, participants recommended designing landscapes with a more extensive repertoire of affordances, including those that can provoke or cause irritating experiences of dissonance and friction. It was estimated that this would increase experiential variability and support exploration and reflection on the natural environment: One learns about the erosion processes from a slippery slope in the park that they climb; one learns about the vegetation succession from an overgrown patch of pioneer species in an urban forest they pass on their commute daily; one learns about the water regimes when the path across the meadow they usually take is flooded. Landscape design and ecology experts in the study advocated that such authentic and often irritating experiences of landscapes be integrated into the design more often.

Finally, participants championed the public's active involvement in designing, caring for, and maintaining the landscapes to steer their ecological dynamics. This was motivated by a premise that indirect learning about environment cannot replace the affective tie and understanding of an ecological context that develops from sustained, intimate contact with landscape processes. Participants endorsed opportunities to experience entanglement with other living beings and cooperation with other human stakeholder groups. They stressed that the processes of curating the landscapes, such as care and management, must be designed as performative events with an aesthetic aim, not merely as a technical or ecological measure. Maintenance and care processes should be added to the landscape

architecture design repertoire, along with the design of material appearance and form. According to expertise profiles, resources, and creative processes should therefore be developed and integrated into established landscape architecture practice.

The role of local stakeholders with knowledge and affiliation with a site in enabling participatory care and maintenance, play formats, and discovery was stressed in the study workshops. Currently, in Germany, they are mostly implemented on a voluntary basis through nature protection associations, such as NABU, BUND, and other nonprofit public interest groups.

"Plans are drawn quickly, and you know everything that would be great to have, but in the end, nobody thinks about the long-term implementation! We need a lot more of resources for stakeholder approaches. That's a whole other story. Whether for maintenance of urban green spaces or elsewhere. Only so can these ideas actually be implemented on site." It was recommended that participatory approaches to co-design, maintenance and care of ecological context be included in the institutionalised planning processes and receive regular funding. This would elevate them from voluntary supplementary activities to an integral part of regular landscape design practice.



Fig. 169: The on-site methodological formats employed in the study contributed to establishing a shared and collaborative dialogue among interdisciplinary experts on the future development of these ecosystems. Wittmoor Nature Conservation Area, 2018.

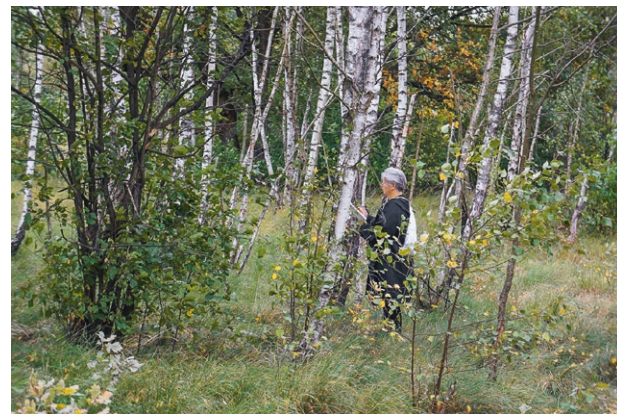


Fig. 170: In addition to sketches, maps, and written or oral accounts, plant material and other physical artefacts were collected to connect analytical documentation with situated, material-based knowledge production. Wittmoor Nature Conservation Area, Hamburg, Germany, 2018.



Fig. 171: Research-by-design collaborative setting in Wittmoor Nature Conservation Area, Hamburg, Germany, 2018.

5.2 Hopeful Outlook

Building on the insights generated by this research, I outline below key aspects in which future work across academia and practice could open new pathways for designing ecological dynamics in landscape architecture (see also Bajc, 2026):

→ AESTHETIC ASPECTS OF ECOLOGICAL PROCESSES BEYOND FORMAL PARAMETERS

The research-by-design investigation exposed a far richer spectrum of environmental perception than official planning criteria for the aesthetic character of landscapes offer, revealing dimensions of landscape experience that present assessment frameworks entirely overlook. Future work in landscape architecture should open new pathways toward the development of methodologies for recording aesthetic perceptions of ecological processes that extend beyond the purely formal and visual parameters.

Germany's Federal Nature Conservation Law acknowledges that landscapes may possess "a particular character or outstanding beauty" – besondere Eigenart oder hervorragende Schönheit (BNatSchG, 2009, §1), in addition to their ecological value. In some cases, a particular character or outstanding beauty can even be a criterion for acquiring nature conservation status for landscapes. The BfN (German Federal Agency for Nature Conservation) recently commissioned an assessment tool to evaluate these legally defined aesthetic parameters using snapshot images for each square kilometer of land. Such emphasis on assessing landscape perception through photograph representation is widely prevalent (Roth & Bruns, 2016; Tveit et al., 2018; Roth et al., 2021) and perpetuates the notion of landscape as a static image or scenery in environmental planning and governance processes. However, assessment tools based only on visual parameters are greatly limited in the aesthetic aspects of ecological dynamics they can represent.

The research for this book, conversely, revealed the immense complexity of the perceptual flow

humans experience when moving through landscapes over time. Each step and shift in perspective can trigger a cascade of mental imagery, metaphors, and memories – drawn from both the material presence, the immaterial qualities of a place, and the perceiver's past experiences. This intricate interplay was not only observed in the first person by the study subjects but also echoed in the theoretical models of environmental perception reviewed in this study. To address the gap between landscape experience and its assessment, it is essential to develop a methodology capable of capturing the perception of aesthetic aspects of ecological dynamics in real-life settings, extending beyond purely formal and visual parameters. Such a methodology, when embedded in governance and planning decision-making, could expand its focus on visual and scenic compositions to include a broader spectrum of cultural, experiential and kinesthetic landscape qualities. These dimensions could then be more meaningfully integrated into official planning practice.

The research-by-design workshop conducted in Altonaer Volkspark in the context of the "Natürlich Hamburg!" nature conservation project, revealed the lack of systematic approaches for capturing and translating experiential landscape qualities in relation to their ecological context. In response, Hamburg's Public Agency for the Environment, Climate, Energy, and Agriculture (BUKEA) commissioned a pilot methodology aimed at addressing this gap. The landscape architects from atelier le balto took on this task, proposing the concept of "Sensitive Mapping" as an experimental tool for recording the perceptual dimensions of a landscape (atelier le balto, 2019). This approach produced cartographic representations of bodily experience, atmospheres, and views as encountered in situ by an individual walking through the sites of Altonaer Volkspark and Wittmoor. While the methodology was deliberately constrained to the perception of two selected sites within the scope of the "Natürlich Hamburg!" project, it constitutes a valuable precedent for the ongoing discourse on the possibility of embedding the analysis of intangible, temporal, and sensory dimensions within institutional landscape planning requirements.

By foregrounding first-person, phenomenological engagement as a source of spatial knowledge about ecological dynamics, the proposal contributes to a growing body of experimental practices in landscape architecture that challenge the

dominance of purely formal and visual assessment methods. Nevertheless, further research is needed to develop a widely recognized, transferable methodology capable of systematically documenting landscape perception and analyzing a site's transitory characteristics, atmospheres, and affordances across diverse ecological and cultural contexts. Capturing the aesthetic character of ecological processes requires methods and tools drawn from both the natural sciences and the fine arts, capable of revealing landscape qualities that remain invisible in conventional photographs or maps.

When adequately articulated through design-based methods, the phenomenological nuances of ecological dynamics could be translated into impulses for sustainable landscape design. In order for them to be integrated into official planning processes, such methodologies must be standardized while remaining sufficiently open to accommodate creative exploration and the specific ecological and cultural *genius loci* of each site.

→ DIRECT EXPERIENCE AS SHARED TOOL FOR INTERDISCIPLINARY COMMUNICATION

Institutionalized landscape planning is currently organized along sectoral lines, separating the goals and instruments of different fields of expertise and professions, such as nature conservation and landscape architecture. Sector-specific planning instruments – ranging from leitmotifs and guiding principles to building codes, master plans and management guidelines – reinforce this divide. To address contemporary socio-ecological challenges and the emerging interdisciplinary tasks of landscape design, existing planning methods must be expanded to foster intersectoral collaboration.

On the one hand, design approaches that enable habitat development and ecological functions are gaining influence in the design of intensively used urban green spaces. On the other hand, nature conservation areas – especially those located in close proximity to residential neighborhoods – are increasingly required to accommodate additional functions such as sports, cultural activities, and environmental education. To address these multi-functional demands new interdisciplinary planning procedures, instruments, and design tools must be developed, or the existing ones adapted, to foster cooperation and facilitate negotiation processes

between potentially divergent objectives.

During the research-by-design processes conducted for this study, the direct exploration of the landscape and embodied perception of ecological processes as a collaborative format was tested with over 80 participants. This moderated process successfully established a common neutral starting point for participants from different disciplines such as ecology, landscape planning and fine arts to discuss conflicting landscape development scenarios and ideas. It was found that facilitated, shared experience of real-life settings can serve as a productive entry point to initiate interdisciplinary and transdisciplinary working relationships. A workshop setting in a real landscape site, such as park or nature conservation area, provided a common experiential foundation to foster shared understanding and initiate communication among experts from diverse fields. It helped to establish a more direct language among professionals who would otherwise limit themselves to the specific jargon of their respective professions in a planning discourse.

The on-site methodological formats employed in the study – ranging from site explorations, visual and oral translation of subjective experiences of the ecological context to speculative scenarios – functioned as structured entry points for open, reflexive discourse. These formats facilitated the articulation and comparison of individual and collective perceptions, while enabling the formulation of value assessments regarding the ecological dynamics of a specific site. In doing so, they elaborated a shared analytical framework that bridged disciplinary perspectives and supported integrative evaluation and collaborative proposals for the design of ecological processes in each respective landscape context.

Participants combined their direct, intuitive reading of the landscape – which they had just experienced while exploring the site – with their specific professional expertise to develop landscape design solutions. Through this method, participants from different disciplines could relate to shared experiences on site, despite potentially advocating for different interests or outcomes in landscape development. As an interactive framework it demonstrated the significant influence that direct exposure to ecological contexts in real-life settings can exert on creativity and design decisions among landscape professionals. It proved to be a valuable gateway for interdisciplinary exchange, as it

compelled participants to initially engage with the ecological context directly rather than through the already interpretative and biased lenses of mapping and representation tools such as GIS or photography.

The direct engagement on site also had a further benefit in the interdisciplinary discourse as it prompted simultaneous consideration of both past developments and possible future scenarios of the site's evolving ecological context. Temporal considerations are often lost in maps and other representation tools, which typically show only a specific snapshot in time. In the co-design workshops, by contrast, discussions revolved around the developmental stages of landscapes. Participants also more frequently referred to personal experiences of managing or designing similar landscapes over time, drawing on memory and thereby inciting discussions on probabilistic scenarios. The discourse less often revolved around fixed, linear trajectories of landscape development, as are commonly proposed in abstract ecological models within individual scientific disciplines. This shift is productive, as ecological science itself is constantly evolving, and experts in the field routinely conduct their own experiments and observations on site. When they are able to discuss these outcomes within interdisciplinary groups, more innovative ecological solutions are likely to emerge than would result from the mere superimposition of maps and development templates from different professional disciplines.

The development of interdisciplinary instruments and shared communication formats based on real-life experience has become a core task in planning of multi-functional open spaces. As one workshop participant noted, *“We may all have different landscape images and visions in our heads. But we can come together if we detach ourselves from the images that we each assume the other has and talk openly about creating a shared vision.”* Further research and testing are needed to explore and develop standardized design methods that foster interdisciplinary dialogue and decision-making, grounded in a shared experience of ecological processes in real-life landscape settings. Such a methodology should facilitate the integration of stakeholders from diverse epistemological backgrounds into a shared discourse, thereby fostering mutual understanding and supporting a long-term, process-oriented landscape design approach.

→ BRIDGING PLANNING INSTRUMENTS OF NATURE CONSERVATION AND URBAN LANDSCAPE DESIGN

There is a need to establish planning instruments that combine the goals of nature conservation and urban leisure in planning processes for public green areas. Ecologists and landscape planners interviewed for this study stressed that current practice in nature conservation mainly focuses on endangered species and rare landscape types. However, they also emphasized that in terms of biological diversity, urban landscapes that host ubiquitous species require more attention. Compared to nature conservation areas, they encompass a larger total area in the city and are spread more evenly across the urban fabric. Therefore, green urban landscapes have the potential to establish habitat networks for species migration and offer abundant habitat niches. In nature conservation areas, human access is limited or not permitted, so ubiquitous and easily accessible landscapes that are not under nature protection offer vital opportunities for embodied multi-sensory experiences of ecological value and biodiversity in urban settings. Urban parks can combine manifold ecological processes and related experiences in smaller, well accessible areas, and offer interchanging atmospheres of ingress, transformation, and dissonance. This is helpful for communicating ecological value to a broad audience that might not be familiar with near-natural and wild sites.

Conversely, in nature conservation areas, the ecological context is usually more coherent over a larger area and offers recognizable landscapes that enable the experience of atmospheres of immersion and consonance. This is attractive for an audience familiar with the specific ecological value of a particular protected landscape type and for the general public inspired by the scenic aesthetics of these sites. The landscape architecture offices involved in the municipal nature conservation project “Natürlich Hamburg!” developed ideas to bridge the divide between nature conservation management and maintenance of regular urban green spaces in the city, across different spatial scales – from a city-wide strategy for a seed bank, biomass recycling, soil production and nutrient cycles to small educational installations in parks.

To provide the public with a broad spectrum of ecological and aesthetic experiences, a city needs to

offer both a mosaic of small, interconnected, varied but ecologically ubiquitous urban landscapes, and the preservation of large distinctive and rare landscape areas of exceptional ecological quality.

The large-scale municipal nature conservation project “Natürlich Hamburg!”, attempted to bridge such, usually strict, divide between protected areas and urban green spaces in the city. However, formulating both ecological and aesthetic goals in standardized planning instruments such as maintenance and development plans has proven to be challenging, due to the limitations that emerged from the regulations and specific planning laws of each discipline involved. Planning instruments that could be applied to both categories of open spaces require revision and further development by the landscape design professionals, researchers and policymakers.

The planning tool applied in “Natürlich Hamburg!” was modeled on the landscape maintenance and development plan (BUKEA, n.d.-e), and instrument typically used in nature conservation. It was expanded to include the possibilities for additionally describing the aesthetic aspects of the planned measures in the landscape. However, its structure and format continued to focus on the quantitative parameters that stem from natural sciences. In this case, adapting existing planning tools from nature conservation proved insufficient for landscape architects to adequately communicate and represent artistic dimensions of designing ecological processes and their aesthetic experience on site over time. The development of interdisciplinary planning tools or instruments capable of accommodating and depicting both the ecological objectives of nature conservation and the artistic ambitions of designing urban green spaces within planning processes remains an unresolved challenge.

For the time being, nature conservation addresses endangered and rare species and habitats in protected landscapes, whereas landscape design of public green spaces focuses on cultural and social use for sports and leisure. In the Anthropocene, with many habitats and species in rapid decline, we can no longer sustain such a dualistic approach to landscape planning. Equipped with a diverse and growing range of instruments and tools, landscape architecture and planning must commit to shaping all urban landscapes in ways that both support life and provide meaningful experiences of ecological processes.

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List of Abbreviations

BfN: Bundesamt für Naturschutz
BNatSchG: Gesetz über Naturschutz und Landschaftspflege, Bundesnaturschutzgesetz
BUKEA: Behörde für Umwelt, Klima, Energie und Agrarwirtschaft
BUND: Bund für Umwelt und Naturschutz Deutschland e.V.
NABU: Naturschutzbund Deutschland e.V.
NSG: Naturschutzgebiet
Wittenbergener Heide: Naturschutzgebiet Wittenbergener Heide
Wittmoor: Naturschutzgebiet Wittmoor

List of German Terms

Abteilung für Naturschutz: Department for Nature Conservation
Abteilung für Landschaftsplanung und Stadtgrün: Department for Landscape Planning and Green Spaces
Behörde für Umwelt, Klima, Energie und Agrarwirtschaft (BUKEA): Public Agency for the Environment, Climate, Energy, and Agriculture
Bezirksamt: District Municipal Office
Bund für Umwelt und Naturschutz Deutschland e.V. (BUND): German Federation for the Environment and Nature Conservation
Bundesamt für Naturschutz (BfN): German Federal Agency for Nature Conservation
Bundesnaturschutzgesetz (BNatSchG): German Federal Nature Conservation Act
Denkmalschutzgesetz: heritage protection law
Eigenart: the locally specific distinct character of a landscape according to the German Federal Nature Conservation Act
Geest: a pedo-geomorphological landscape in northern Germany, Flanders, the Netherlands, and Denmark. It is characterized by sand deposits from the Pleistocene period and is situated in juxtaposition to post-glacial alluvial marshland.
Hohlweg: a sunken lane
Knick: hedgerow and trees that grow on low protective wall built of soil, stone, or peat
Kratteiche: old coppiced oak tree with a distinctive sculptural shape
Landschaftsachse: linear corridor of open green spaces
Naturerfahrungsräume: areas in which to experience nature
Naturgarten: near-natural garden
„Natürlich Hamburg!“: The large-scale nature conservation project Project „Natürlich Hamburg!“ established and run by BUKEA
Naturschutzbund Deutschland e.V. (NABU): The Nature and Biodiversity Conservation Union
Naturschutzgebiet: nature conservation area
Pflege- und Entwicklungsplan: maintenance and management plan
Schönheitswald: beauty forest
Volkspark: people’s park

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Fig.10: **The Network of Hamburg's Rivers Complements the Geological Armature of the City.** Maps from the following sources were combined, edited and redesigned: From DGM200 - GeoBasis-DE Digitales Geländemodell Gitterweite 200m [Map], Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.; Gewässerflächen Hamburg [Map] ALKIS GDB: Freie und Hansestadt Hamburg, Landesbetrieb Geoinformation und Vermessung. DL-DE->BY-2.0; DLM250 - GeoBasis-DE Digitales Geländemodell Gitterweite 250m, Gewässer. [Map] Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.

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Fig.12: **Distribution Pattern of Public Open Green Areas in Hamburg.** Maps from the following sources were combined, edited and redesigned: From DGM200 - GeoBasis-DE Digitales Geländemodell Gitterweite 200m [Map], Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.; DLM250 - GeoBasis-DE Digitales Geländemodell Gitterweite 250m, Gewässer. [Map] Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.;Gewässerflächen Hamburg, Landschaftsprogramm / Freiraumverbund Hamburg, Naturschutzgebiete in Hamburg, Digitaler Grünplan / Kataster der öffentlichen Grünanlagen [Map] ALKIS GDB: Freie und Hansestadt Hamburg, Landesbetrieb Geoinformation und Vermessung. DL-DE->BY-2.0;

Fig.13: **Hamburg’s Green Network as a Planned Future Landscape Armature for the City.** From Fachkarte Grün Vernetzen [Map], BUKEA, 2018, Freie und Hansestadt Hamburg. Retrieved August 28, 2026, from <https://www.hamburg.de/gruenes-netz/13046992/karte-gruen-vernetzen/>. Copyright BUKEA.

Fig.14: **Geological Map of Hamburg with the Three Selected Case Study Sites.**
Maps from the following sources were combined, edited and redesigned: From DGM200 - GeoBasis-DE Digitales Geländemodell Gitterweite 200m [Map], Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.; Gewässerflächen Hamburg, Geologische Karte 1:50 000 Hamburg, Genese [Map] ALKIS GDB: Freie und Hansestadt Hamburg, Landesbetrieb Geoinformation und Vermessung. DL-DE->BY-2.0; DLM250 - GeoBasis-DE Digitales Geländemodell Gitterweite 250m, Gewässer. [Map] Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.

Fig. 15: **A Peat Bog in Wittmoor with diminishing water regulation capacity creates a characteristic pattern of small dry elevations.** [Photograph] by Katarina Bajc

Fig. 16: **Drying peat bogs shift from carbon sinks to carbon sources, with significant consequences for climate change (Pia Brockmann and Katrina Westphal).**
From Project "Wechselspiel aus Schichten" In Seminar Gestaltung und Design I: Landscape architect as a curator, [Diagram] by Pia Brockmann and Katrina Westphal, 2020, HafenCity Universität (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/wechselspiel-aus-schichten/>).

Fig. 17: **Nature Conservation Area Wittmoor: Landscape Armatures and Landscape Patterns.**
Data from maps from the following sources were combined, edited and redesigned: Digitale Orthophotos (belaubt) Hamburg mit Umland, GeoBasisKarten Hamburg, Gewässerflächen Hamburg, Biotopkataster Hamburg [Map] ALKIS GDB: Freie und Hansestadt Hamburg, Landesbetrieb Geoinformation und Vermessung. DL-DE->BY-2.0; DLM250 - GeoBasis-DE Digitales Geländemodell Gitterweite 250m, Gewässer. [Map] Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.; Schutzgebietskarte Wittmoor [Map] In Pflege und Entwicklungsplan für das Naturschutzgebiet Wittmoor, Planungsbüro Tech, 2017, p. 19.

Fig. 18: **Depending on the water regime and soil moisture content, various grasses, sedges, and pioneer species colonize the small patches of land (Pia Brockmann and Katrina Westphal).**
From Project "Wechselspiel aus Schichten" In Seminar Gestaltung und Design I: Landscape architect as a curator, [Diagram] by Pia Brockmann and Katrina Westphal, 2020, HafenCity Universität (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/wechselspiel-aus-schichten/>).

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From Project "More Moor" In Seminar Gestaltung und Design I: Landscape architect as a curator, [Diagram] by Lina-Marie Bienmüller, Lea Gotthardt and Dimitrios Traianos, 2020, HafenCity Universität (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/more-moor/>).

Fig. 21: **Formation and Development of the Geest Landscape in Hamburg (Jörg Koffler, Marvin Brinkmann and Pascal Brade).**
From Project "Agora – Der Heidesandkasten" In Seminar Theorie der Landschaftsplanung: Landscape architect as a curator [Diagram], by Jörg Koffler, Marvin Brinkmann and Pascal Brade, 2020, HafenCity Universität, Hamburg (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/agora-der-heidesandkasten/>)

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From Project "More Moor" In Seminar Gestaltung und Design I: Landscape architect as a curator, [Diagram] by Lina-Marie Bienmüller, Lea Gotthardt and Dimitrios Traianos, 2020, HafenCity Universität (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/more-moor/>).

Fig. 23: **Nature Conservation Area Wittenbergener Heide: Landscape Armatures and Landscape Patterns.**
Data from maps from the following sources were combined, edited and redesigned: Digitale Orthophotos (belaubt) Hamburg mit Umland, GeoBasisKarten Hamburg, Gewässerflächen Hamburg, Biotopkataster Hamburg [Map] ALKIS GDB: Freie und Hansestadt Hamburg, Landesbetrieb Geoinformation und Vermessung. DL-DE->BY-2.0; DLM250 - GeoBasis-DE Digitales Geländemodell Gitterweite 250m, Gewässer. [Map] Bundesamt für Kartographie und Geodäsie (BKG). DL-DE->BY-2.0.; Pflege- und Entwicklungsplan, Pflege- und Entwicklungsmaßnahmen [Map] Pflege- und Entwicklungsplan für das Naturschutzgebiet Wittenbergen, EGL - Entwicklung und Gestaltung von Landschaft, 2018

Fig. 24: **Maintenance regimes in heathland and forest periodically remove large amounts of biomass from the area (Paul Allard, Anna Holzinger, and Philipp Rosenow).**
From Project "un/natürlich hamburg" In Design Studio "Natürlich Hamburg!" [Diagram], by Paul Allard, Anna Holzinger and Philipp Rosenow, 2018, HafenCity Universität, Hamburg (Retrieved August 28, 2026, from <https://stadtlandstudio.com/2018/08/21/projekt-un-i-natuerlich-hamburg/>)

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From Project "Agora – Der Heidesandkasten" In Seminar Theorie der Landschaftsplanung: Landscape architect as a curator [Diagram], by Jörg Koffler, Marvin Brinkmann and Pascal Brade, 2020, HafenCity Universität, Hamburg (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/agora-der-heidesandkasten/>).

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From Project "un/natürlich hamburg" In Design Studio "Natürlich Hamburg!" [Diagram], by Paul Allard, Anna Holzinger and Philipp Rosenow, 2018, HafenCity Universität, Hamburg (Retrieved August 28, 2026, from <https://stadtlandstudio.com/2018/08/21/projekt-un-i-natuerlich-hamburg/>)

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From Project "Licht und Schattenspiel" In Seminar Theorie der Landschaftsplanung: Landscape architect as a curator [Diagram], by Anna Krah, Amelie Radwe and Selina Sophia Neckelsen, 2020, HafenCity Universität, Hamburg (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/licht-und-schattenspiel/>)

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Data and maps from the following sources were combined, edited and redesigned: Digitale Orthophotos (belaubt) Hamburg mit Umland, GeoBasisKarten Hamburg, Biotopkataster Hamburg [Map] ALKIS GDB: Freie und Hansestadt Hamburg, Landesbetrieb Geoinformation und Vermessung. DL-DE->BY-2.0

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From Project "Hide and Seek" In Seminar Gestaltung und Design I: Landscape architect as a curator, [Diagram] by Gesche Delfs and Sarah Schmidt, 2020, HafenCity Universität (Retrieved August 28, 2026, from <https://landscapearchitectasacurator.wordpress.com/hide-seek/>).

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