Natural healing?

A study about the health benefits from natural environments in hospital outdoor areas

Lydia von Gertten

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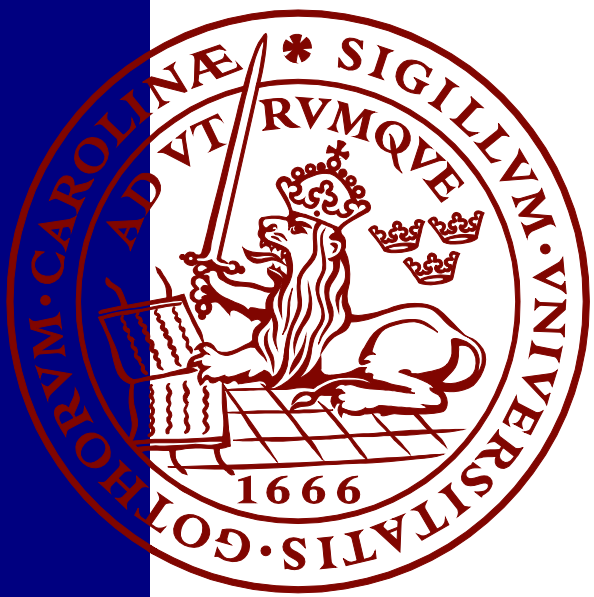

LUCSUS
Lund University Centre for Sustainability Studies

LUND UNIVERSITY

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Supervisor: Torsten Krause, LUCSUS, Lund University

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Abstract:

A growing field of research links natural environments to increased human well-being. These benefits are especially valuable for people in the process of regaining health, for instance those who are in hospitals. Through reviewing planning documents and interviewing key actors, this thesis explores how natural environments are incorporated in the planning of a future hospital in Helsingborg, Sweden. More specifically, it gains insight into how different benefits from nature are included in the planning process, as well as potential barriers to the implementation of these visions. The findings suggest that health-related benefits are included and highly valued in the visions. However, the actors perceive several barriers to their implementation, including knowledge gaps and priority of short-term economic profit. The results shine light on the complexities of green urban planning and on barriers that need to be addressed to ensure that the plans of natural environments surrounding the hospital are implemented.

Keywords: Healing, nature, decision-making, urban-planning, values, implementation-gaps

Word count: 11,892

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Abbreviations

ART	Attention restoration theory
ES	Ecosystem services
EBD	Evidence based design
GSF	Green space factor
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
MEA	Millennium ecosystem assessment
NEs	Natural environments
NCP	Nature's contributions to people
PSDs	Perceived sensory dimensions
SLU	The Swedish university of agricultural sciences
SET	The supportive environment theory
UN	United nations
WHO	World Health Organization

1 Introduction

Not only is nature the foundation for human existence and societal functioning, but an increasing amount of research today links nature with direct healing properties for people (Hartig et al., 2014; James et al., 2015). Natural environments, in all its diversity, can provide humans with valuable mental and physical benefits including improved cardiovascular health, increased positive emotions, mental restoration, as well as alleviation of stress and depression symptoms (Berman et al., 2012; Bowler et al., 2010; Grahn et al., 2022; Hartig et al., 2014; James et al., 2015; Kaplan & Kaplan, 1989). Making natural environments available and accessible to people can therefore lead to major advantages. However, in our increasingly urbanized world, with 68 % of the population estimated to live in cities by 2050, city planners face, and will continue to face, major challenges trying to integrate and prioritize natural environments into the urban sphere (Mukim & Roberts, 2023).

The current state of the environment and climate is at an all-time low. Human activity has in recent generations altered the planet in such a way that it has severely impacted the earth causing massive loss of natural habitats with consequent biodiversity loss and ecosystem disruption as well as unprecedented climate change (European Environment Agency [EEA], 2020; The Intergovernmental Panel on Climate change [IPCC], 2023). On a daily basis, we see examples of new disastrous impacts of climate change with planetary destruction and subsequent human and animal suffering (Cecco, 2023; Rowlatt, 2023). Even though the latest IPCC report speaks its very clear language, the climate is continuing to spiral and, to quote the secretary-general of the UN, Antonio Guterres, “humanity has opened the gates of hell” by not responding adequately to the urgency (Milman, 2023).

Adequate responses to the environmental crises entail multiple solutions on several levels in society. According to the latest IPCC report (2023), cities, as huge drivers of climate change, need to—and have the potential to—become agents for change by both mitigating and adapting to climate change. Integrating nature into cities can therefore contribute multiple benefits: mitigation and adaptation, as well as increasing human well-being through the physical and mental benefits that science links to natural environments.

Seeing the great possibility of natural environments to be beneficial for the planet and people, this thesis aims towards examining how this may be implemented in practice. I have therefore examined how natural environments are planned in a local context, surrounding a new, planned hospital in Helsingborg, Sweden. Natural environments can provide health benefits to all people, but they ought to be extra vital around institutions like hospitals, which hosts physically and/or mentally fragile people

in need of healing. The thesis aims to examine both visions and goals, to see how research on health benefits from nature is included in planning processes, and to focus on implementation, as this step is both an essential and challenging locally as well as globally. Optimal use of research and implementation can contribute to healing for both planet and human well-being.

1.1 Aim and research questions

Natural environments are crucial for planetary and human well-being (The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES], 2019). For fragile and sick people, NEs can have valuable influence on the healing process, and they should therefore be considered carefully when planning outdoor environments, especially surrounding hospitals. Based on this premise, the aim of this thesis is to understand how NEs are considered in the construction of a new hospital project in Helsingborg, Sweden. I will examine how nature is valued in practice by uncovering what benefits from nature are included and prioritized in city-planning, and by mapping possible barriers that hinder the implementation of the initial visions of NEs. The goal of this thesis is specifically to help the implementation of health promoting NEs surrounding hospitals and to highlight barriers to promoting sustainability in urban planning in general.

The overarching topic this thesis examines is how NEs are valued in a local hospital context in Helsingborg, Sweden.

Two research questions are asked to find this out:

1) How do planners include nature and its various benefits (including health benefits) in the planning of outdoor environments of the hospital?

2) What common barriers, according to actors, hinder visions of NEs from implementation?

1.2 Contribution to sustainability science

Addressing the bridge between science and society, this thesis examines how the relationship between nature and human well-being are envisioned and implemented by city planners and in a local decision-making process. As sustainability science is “purpose bound” and “aimed at action”, this thesis aims towards shining light on barriers that can hinder the implementation of a green, healing environment in the construction of a new hospital project, hence strengthening the link between knowledge and

action (Spangenberg, 2011, p. 276). It also contributes to sustainability science by exposing and questioning institutional barriers to sustainability, which needs to be addressed for sustainability to transcend from idea to praxis (Spangenberg, 2011).

1.3 Thesis overview

The thesis has thus far begun by presenting the aim, research questions, and contribution to sustainability science. The following chapter presents the state of research on the relationship between NEs and health, the idea and concepts of nature valuation and barriers to implementation of NEs. Chapter three briefly presents the theoretical lens that have guided the interpretation of the results, after which chapter four outlines the methodology employed. Chapter five present the results in two sections: vision and barriers. In Chapter six, the research questions are answered, and the findings discussed in relation to the background and the chosen theories.

2 Background

2.1 The idea and concept of nature

Western industrialized society has a long tradition of seeing humans as separate from nature and nature as something to be exploited and dominated. Vining et al. (2008) suggest that *"ironically, the very conquest of nature, in combination with the alienation from it, promoted the idea of the sacredness of nature, with legislation enacted in many developed countries to protect tracts of pristine land from human influences"* (p. 2). In other words, the underlying ideas of humans as separate from nature and the need to conserve wild untouched nature became common ways of viewing nature, as seen in for example the U.S Wilderness Act of 1964. In this thesis, I have used the following definition of nature, by Hartig et al. (2014) as a guidance:

> *Physical features and processes of nonhuman origin that people ordinarily can perceive, including the 'living nature' of flora and fauna, together with still and running water, qualities of air and weather, and the landscapes that comprise these and show the influence of geological processes* (p. 208)

Cities, including basic institutions and structures such as hospitals, are sometimes considered opposite of *"natural",* as they are human made (Hartig et al., 2014). They consist of both gray infrastructure[1] and green and blue areas such as urban gardens, street trees, green roofs and lakes. Structures like green roofs and urban gardens are artificial in the sense that they often are *"designed, constructed, regulated and maintained"* but they still *"comprise natural features"* and *"appear natural"* (Hartig et al., 2014, p. 208). I include these phenomena under the umbrella term nature. To describe different terms for natural environments like green spaces, green infrastructure, blue and green structures, I have for the sake of consistency used the term natural environments (hereafter referred to as NEs), throughout the paper.

2.2 The role of natural environments in urban areas for sustainable development

Over 75 % of earth's surface has been altered by human activity and there is a global degradation of NEs and the crucial benefits they provide to humanity which encompass biodiversity and the functions of ecosystems (IPBES, 2019). Efforts need to be urgently directed towards conserving, restoring, and using land in a sustainable manner to halt the current crisis (IPBES, 2019).

[1] . "Gray infrastructure refers to built structures and engineering equipment (such as reservoirs, embankments, canals, and so on) embedded within watersheds or coastal ecosystems" (Mukim & Roberts, 2023, p. 315)

By 2021, 52 % of the global population lived in cities, a number expected to increase to 68 % by 2050. With this, Infrastructure and transportation are large contributors of CO_2 emissions and around 70 % of global greenhouse gas emissions are estimated to come from cities (Mukim & Roberts, 2023). As such, cities need, and have the potential, to play an active role in combating climate change. They need to be built in ways so that they can withstand the effects of climate change such as sea-level rise, storms, and heatwaves (IPCC, 2023; Mukim & Roberts, 2023). Future urban planners therefore need to address climate change from both a mitigation- and an adaption perspective.

With increasing urbanization, cities face development pressures, putting outdoor open space and NEs in at risk (McDonald et al., 2023). Research suggests a negative correlation between population size and greenness in cities, which can indicate that when a population increase, space that is dedicated towards NEs, decrease (Robinson et al., 2022). NEs have competed, and still sometimes compete, with built environment and infrastructure in the city (McDonald et al., 2013). This can influence NEs negatively if there is not enough pressure and incentive for prioritizing NEs.

The role of NEs in cities have shifted over time. It is only in recent decades that the numerous benefits and necessities from NEs have become more known and acknowledged, such as how they filter air pollution, regulate rainwater, buffer against noise, sequester carbon, their importance for biodiversity and, overall, their importance for climate change mitigation and adaptation (IPCC, 2023; Robinson et al., 2022). Natural elements like parks, trees, green walls, and lakes are therefore crucial elements to make a city sustainable as well as to halt the trend of loss of NEs, biodiversity and ecosystem functions (IPBES, 2019).

2.3 The role of natural environments for human well-being

Scientific research on the connection between NEs and health has grown in the last decades. A search on Web of Science on the term *"greenspace"* and *"health"* yielded 19 hits for 2000-2009, 206 for 2010-2019, 706 for 2020 to September 2023. The dramatic increase points towards a growing interest to understand the role NEs have for human well-being, which ultimately can be a part of influencing how we decide to prioritize NEs in urban areas.

Aside from the planetary well-being, NEs can play a tremendously important role for human health. Health, as defined by the World Health Organization (WHO), is a *"state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"* (n.d.). Poor mental health is one of the main health crises of the 21st century. There are many reasons as to why this is the case;

uncertainty and fear about the future due to climate change effects and economic uncertainty, are two which have contributed to the decline in mental health worldwide (WHO, 2022).

The impact of NEs on mental health has been examined in various studies. One of earlier publications in the field and a well-known theory is the attention restoration theory (ART), which suggests that mental fatigue, caused by an overuse of directed attention, can be restored by being out in and experiencing nature (Kaplan & Kaplan, 1989). The potential of nature experiences to restore attention has been further proven in later studies (Samus et al., 2022).

Recent studies within the topic of psychological effects from NEs have focused how time spent in nature can decrease stress (Hartig et al., 2014; Hunter et al., 2019), enhance positive emotions (Bowler et al., 2010), and decrease depressive symptoms (Berman et al., 2012; Klein et al., 2022). One study suggested that walking in nature (rather than in a city environment) increased memory span to a higher degree for people with depression (Berman et al., 2012). A recently published study suggested significant mental-health benefits from fulfilling a plan of street greening in Barcelona. The results indicated that *"13,000 annual cases of antidepressant use could be prevented with the full implementation of the Plan",* which would equal annual savings of around 45 million Euros (Vidal Yañez et al., 2023, p. 7).

Focusing on making NEs available to people is certainly something that has proven to correlate positively to human well-being. NEs often are considered more attractive for physical activity than built environments and having access to green space has been linked to an increase in exercise (McMorris et al., 2015) and improved cardiovascular health (Nguyen et al., 2021). The proximity to green areas from one's home is a factor that influences the level of physical activity in green areas, with the exercise level being higher the closer green spaces are to one's home (McMorris et al., 2015; Neuvonen et al., 2007). This points to the importance of including NEs in cities and to ensure that they are accessible for all citizens.

To guide future urban planning, it is crucial to know what parts and aspects of NEs that are health promoting. As NEs are not homogenous but can be more or less landscaped versus wild (e.g., green walls versus grassland), there are studies that have focused on examining how different types of NEs influences health. Van den Berg et al. (2015) found a positive association between quantity of green spaces around a residential area and residents' mental health status and mortality rate. Nguyen et al.'s (2021) review study found that forests and tree canopy were linked to better stress alleviation,

cardiovascular and respiratory health than grassland, which might be related both to greeneries' capacity to improve air quality, buffer noise, and their provision of shade which can promote walking and restoration. In another study participants reported similar effects of well-being after walking in a landscaped park versus an urban forest, which indicates that environments that are less influenced by humans, does not necessarily need to be more beneficial for human well-being than their landscaped counterparts (Samus et al., 2022). Furthermore, the study found that the participants did not find the urban forest to be more wild than the landscaped park, suggesting the subjective nature of the wilderness-concept.

As a concluding remark, this section has presented research that links NEs to human well-being. Aspects such as the role of: the length of time spent in nature is for health and well-being effects (Hunter et al., 2019), what role the visual aspects of experiencing NEs have for the documented benefits (Velarde et al., 2007), nature-connectedness (Mayer & Frantz, 2004) are important but due to limitations in space they will not be further discussed. Overall, the studies presented in this section point towards the same direction; NEs have the potential to contribute to a variety of positive effects for humans and that it is important to include a variety of different types of NEs to maximize the benefits.

2.4 The role of natural environments in a hospital setting

The belief that gardens have beneficial effects on human health and can provide healing has been acknowledged in both western and Asian cultures for a long period of time. During the Middle Ages, monasteries in Europe used gardens to provide *"soothing distraction to the ill"* (Ulrich, 2002, p. 2). The prevalence of NEs surrounding hospitals decreased in first decades of the 20th century as advances in medicine led to aspects of efficiency, functionality and reducing risk of infection being prioritized, in turn leading to a sterile environment with less consideration given towards the importance of a calming and healing surrounding environment. Fortunately, in the latter part of the 20th century, with the rise of 'mind-body science', more consideration has been given to prioritize not only efficiency and hygiene, but also outdoor environments that are enjoyable and stress-reducing to spend time in (Ulrich, 2002).

Hospital patients are an especially physically and/or psychologically vulnerable group that benefit from being surrounded by recuperative and healing environments. Roger Ulrich, one of the leading scholars in the field of evidence-based design (EBD), has focused on providing insight regarding how to design care-environments in a way so they can contribute to recuperation and healing. EBD relates to aspects

such as natural light, usage of calming colors, high-quality acoustics that minimize noise, and biophilic design. In terms of NEs, EBD can entail having hospital beds turned to the window, based on research showing how patients who overlook greenery have shorter rehabilitation times and fewer complications post-surgery, compared to patients who did not have views of greenery (Ulrich, 1984, 2002).

Researchers from The Swedish University of Agricultural Sciences (SLU) have created a rehabilitation garden as a part of the research institute (Bengtsson et al., 2017; Grahn et al., 2022). They have contributed to EBD that can be used in nature-based rehabilitation. Underlying theories that have guided their work are, among others, attention restoration theory and the supportive environment theory (SET). The SET is based on the premise that some environments are more efficient in providing recovery and support for well-being than other (Grahn et al., 2022). Studies have identified eight so called "*basic qualities"* or perceived sensory dimensions (PSDs), found to support the needs of people and promote healing and rehabilitative effects for people (Grahn et al., 2005; Grahn et al., 2022, p. 304; Pálsdóttir et al., 2018) These are: social, cultural, open, diverse, cohesive, natural, sheltered, and serene. Table 1 showcases the eight PSDs with descriptions (Grahn et al., 2022, p. 304).

Table 1. The eight perceived sensory dimensions (PSDs) with descriptions. From Grahn et al. (2022, p. 304)

Natural	*"fascination with the natural world, its distinctive shapes and colors, its inherent force and power. A sense of the wild and untouched, of the passage of time".*
Cultural	*"a sense of fascination with human culture, creativity, labor and history. The cultivated, crafted and man-made, as opposed to the "self-made" or natural".*
Cohesive	*"a sense of spatial cohesion and spaciousness, an experience of a "world in itself," an extended, uninterrupted whole, possible to explore".*
Diverse	*"a sense of diversity and variation in the environment. A large variety of different species of plants and animals. A multilayered and diverse vegetation, often in combination with water features".*
Sheltered	*"a sense of shelter, safety and protection. An enclosed space, a refuge, a hideaway. The possibility to 'be seen without being seen'".*
Open	*"a sense of openness and freedom. Overviews, prospects, vistas and stays. Open space for physical activities, room to roam freely, to see far into the distance".*
Serene	*"a sense of serenity, peace, quiet and stillness. Freedom from noise and disturbances. Peaceful sounds of nature. Absence of other people, signs, signals, threatening or intrusive stimuli".*
Social	*"a sense of bustling activity, people and movement. A dense and lively place, with social activities and interactions. Often especially strong in dense urban settings; around, for example, cafés, shopping streets, squares and so on"*

Based on the eight qualities, nature-based rehabilitation acknowledges the different user needs that patients have. As an example, a person with a low sense of well-being might benefit from a type of environment that is free from social interaction and more restorative in nature, while others might benefit from more social activity. Nature-based rehabilitation differs from a solely health-promoting environment in the sense that it adds an instorative aspect in addition to restoration. Instoration is

connected to the word instauration which relate to establishing something new (Grahn et al., 2022). The theory is that *"instorative effects are about how natural environments appear to act as catalysts; speeding up the processing of mental health processes or crises so that reorientation is achieved faster"* (Grahn et al., 2022, p. 299). Nature-based rehabilitation should offer a full spectrum of needs of the user. Figure 1 provides an example of how NEs can offer the different PSDs, and how these relate to instorative, versus restorative, support.

The researchers at SLU have created a model called the four zones of contact with the outdoors which can work as a structure when planning supportive environments. The first zone begins inside of the building, looking out of the windows. Zone two concerns the transition between indoors and outdoors and can include terraces or balconies for example. Zone three concerns the green area in direct connection to the building, and the fourth zone concerns the area outside of the house and garden. The zones can be used in different ways to promote health. For example, universal benefits that all patients would benefit from can be placed in zone one, the most accessible zone, while more challenging features might be added further away from the building. The point is that different users and/or patients, can within the four zones, find what they need to feel good, be it a quiet, minimally human-influenced grove, or more social and active zones with for example raised plant beds, allowing them to interact with other people (Bengtsson et al., 2017; Grahn et al., 2022). A visual example of how nature-based rehabilitation can look and what it can offer in support is visible in Figure 1.

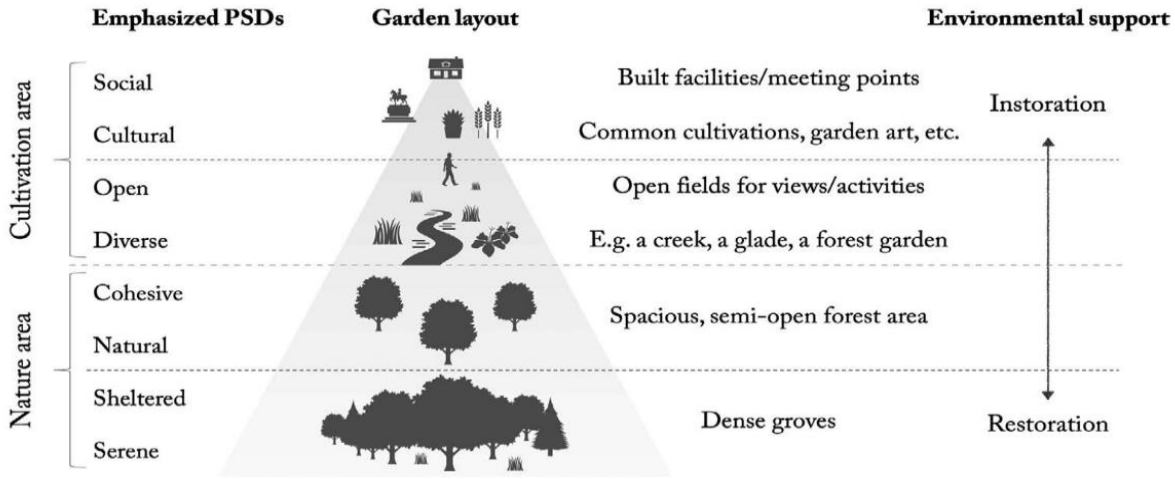

Figure 1. Layout of a supportive garden environment. The figure shows the eight PSDs and exemplifies how a garden layout can look like to fulfill these qualities. It also shows what type of environmental support the different environments might offer. From Grahn et al. (2022, p. 305).

2.5 National regulations and NEs

There is no Swedish national law or regulation that stipulates the percentage of NEs there ought and need to be in a construction project or outside a hospital. However, there are international goals used as a guidance, such as the sustainable development goals (SDGS) 3: Good health and well-being and 9: Sustainable Cities and Communities (United Nations [UN], n.d.). Within Sweden there are 16 environmental objectives, focusing on different aspects of the environment and two milestone targets that relate to urban greenery and ecosystem services. They state that: 1) *"The majority of the municipalities must utilize and integrate urban greenery and ecosystem services into urban environments in the planning, building and administration of towns and cities and densely populated areas by no later than 2025"* and; 2) *"The municipalities must have access to a developed method for utilizing and integrating city greenery and ecosystem services into urban environments in the planning, building and administration of towns and cities and densely populated areas by no later than 2020"* (Swedish Environmental Protection Agency, n.d.)

To fulfil the goals of integrating NE in cities it essential to have guidelines that can help assess nature and the great variety of services, gifts, or benefits that it provides us with. For this purpose, I will present two well-known frameworks that do this. The first is the ecosystem services framework by the UN and the second is the nature's contribution to people framework by the IPBES (Diaz et al., 2018; Millennium Ecosystem Assessment [MEA], 2005)

2.6 Valuation of nature

A commonly used concept for describing the value that humankind gains from ecosystems is ecosystem services (ES). ES gained recognition and spread globally in 2005, when the Millennium Ecosystem Assessment by the UN assessed the state of ecosystems and how changes in their functioning has affected human well-being. The idea was to establish a scientific basis that could help future conservation efforts (MEA, 2005). The aim was to explicitly present and categorize the services nature provide us with to ensure that they are included in policy and decision-making. Scholars have divided ES into four categories: regulating (for example water filtration), provisioning (for example crops), cultural (for example psychological health effects or spiritual enrichment) and supporting (for example photosynthesis) (MEA, 2005).

The different benefits are categorized into ecological values, socio-cultural values, and economic values (de Groot et al., 2002). ES have often been quantified with monetary valuation and through methods like direct market valuation and indirect market valuation. The latter include Avoided Cost,

which relates to *"services [that] allow society to avoid costs that would have been incurred in the absence of those services",* for example flood control, and Travel Cost, which estimates the implied value of for example, a recreational site, by the amount people are willing to pay to go there (de Groot et al., 2002, p. 403).

ES is still commonly used as a concept for describing the different benefits we get from nature. However, the framework has its limitations and has been subject to critique. A major point relates to its anthropocentric nature which values nature from an instrumental standpoint. Another critique relates to ES assessments focusing on the monetary value above socio-cultural and ecological (IPBES, 2022). The values of ES are difficult to estimate and quantify overall, and this system becomes even more complex when there are non-material, intangible benefits that are even more difficult to estimate monetarily such as cultural ES which can include recreation, aesthetic value and feelings of pleasure, bliss, or a sense of connection. Although these benefits are important and valuable, some scholars argue that they are not included or prioritized in political and economic decisions as well other ES (Satz et al., 2013).

As a response to the above-mentioned limitations and to propose a new shift in paradigm, the IPBES developed nature's contribution to people (NCP) in 2018. NCP is an evolution of the ES framework and the authors have aimed towards acknowledging a broader variety and inclusion of nature-human relations. It aims towards integrating a more diverse understanding of values of nature from broader perspectives of worldviews to inclusion of more specific value indicators. Worldviews relate to the lenses through which we view the world. The IPBES presents four main worldviews, two of which are anthropocentricism and ecocentrism. While the former prioritizes humans the latter sees to nature's inherent value. The different lenses of worldviews guide the broader, specific values as well as the value indicators. See Figure 2 for examples.

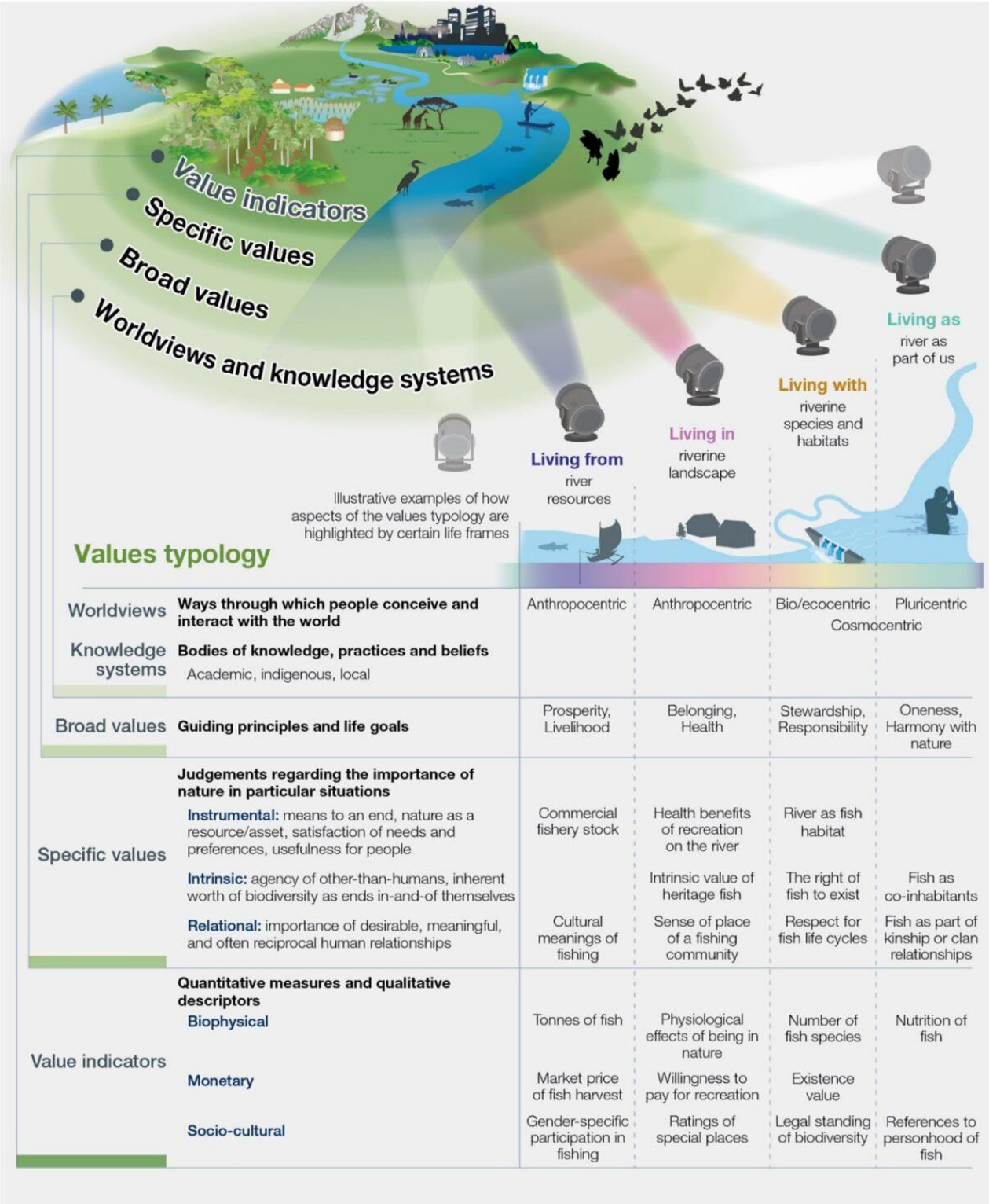

Figure 2. The values assessment's typology. The visual highlight key concepts that describe different ways of viewing nature and relating to nature, from worldviews, broad values, specific values, and value indicators. From the IPBES report 'The diverse values and valuation of nature' (2022, p, 19).

Within the NCP framework the division of the benefits from nature are slightly different than in the ES framework. NCP refers to non-material NCP, material NCP and regulating NCP. For example, socio-cultural values are referred to as non-material contributions and include aspects like inspiration from nature, people's relationship to nature and physical and psychological effects from nature. These are associated to cultural ES and are subject to the same limitations when it comes to being intangible and difficult to value monetarily (Diaz et al., 2018).

While the ES framework values nature instrumentally, NCP includes intrinsic and relational values which are values that sees nature as more than a *"resource"* and *"means to an end"* (IPBES, 2022, p. 19). Intrinsic values refer to nature's value in its own, independent of what it gives to humans and relational values refer to *"something whose worth originates from the relationships humans have with nature or with other humans through nature",* this can relate to a sense of place and reciprocity (Balvanera, 2022, p. 8). The authors propose an integrative approach, where pluralistic values (e.g., instrumental, intrinsic, relational) are all prioritized and valued (IPBES, 2022; Balvanera, 2022). For example, assessment methods that are focused on either an economic, ecological, or social analysis represent different aspects of values and need to be combined.

The IPBES argue that a paradigm shift is needed because the global loss of nature and biodiversity crisis is closely linked to the limited ways we have viewed and valued nature in the past in "political and economic decisions at all levels" (IPBES, 2022, p. 10). An inclusion of wider set of worldviews and diverse values is therefore meant to contribute to a change in trajectory and a sustainable future.

The takeaway from section 2.6 is that assessing the value of nature and the ecological and/or social processes generated by it, is not straight forward. The different terminology (services or contributions) emanates from and represent different worldviews and ways of viewing nature. This affects how we choose to value it. In this thesis, I use a conscious approach to this dilemma, and mainly refer to the services/contributions of ecosystems/nature as 'benefits from nature'. The next section will present research on how benefits from nature have been integrated into urban planning in the Swedish context as well as barriers that have been proven to hinder conservation of NEs.

2.7 From theory to practice; the implementation gap and barriers

In the Swedish context, one study examined how ES are perceived and used within six municipalities (Beery et al., 2016). A majority of the municipal stakeholders found the concept useful but there was a *"low awareness of the specific ways in which the concept could be used as a tool in planning or*

decision-making" (Beery et al., 2016, p. 125). The actual usage of the ES concept in city-planning in Sweden has increased in the last decades and a study from 2020 showed that 23 % of municipalities in Sweden mention ES explicitly in their comprehensive plans (Khoshkar et al., 2020). However, the municipal planners stated that their suggested visions and goals regarding ES were not always are prioritized in the final implementation. Even if planners work to include ES, they do not fully control implementation as this is dependent on *"political will and financial resources"* (Khoshkar et al., 2020, p. 9). Another possible explanation to this implementation gap is private land ownership that limits the possibility of the municipality to follow plans and visions. Private land ownership might lead to a prioritization of short-term thinking and actions, which can lead to negative conservation efforts for ES, since investment in ES is a long-term approach (Kaczorowska et al., 2016). Another factor is a lack of awareness and communication about ES among people involved in decision-making processes (Kaczorowska et al., 2016; Khoshkar et al., 2018).

Kronenberg's a study from 2015 examine barriers to the preservation of urban trees in the city of Lodz, Poland. More than 100 professionals share their experience regarding barriers that hinder preservation of urban trees in the city. The barriers fall under the categories of different institutional failures (originally distinguished by Opschoor, 1994): transaction failure, government failure and empowerment failure. See Table 2 for a complete table of these failures and examples of them.

Table 2. Institutional classification of failures and their environmental implications. From Kronenberg (2015)

Type of failure and specific problems	Examples considered in this study
Transaction failure	
Missing of malfunctioning markets (market failure)	Social groups which prefer to reduce the amount of urban greenery and effectively influence decisions
Missing knowledge/information	Lack of awareness of the significance of trees among decision-makers Lack of readily available data on the state of urban trees Lack of awareness of the significance of trees among residents
Incomplete preferences	Failure to include the benefits (services) provided by trees in household economic accounts Urban residents fail to notice trees ("trees have always been and always will be") Material gains from the sale of timber
Government failure	
Missing policies	Insufficient fund Lack of local spatial management plans
Inadequate policy objectives	Inappropriate fund distribution pattern which hinders multiannual greenery management planning
Inadequate policy instruments	Lack of economic incentives to protect urban trees Number of new trees planted to replace removed ones not adjusted to the natural value of the latter
Problems with other policies (not focused on the environment)	Regulations which downplay the significance of urban greenery or limit the possibility to protect it
Poor integration of different management activities	Lack of cooperation between experts in different fields and between administrative units
Poor enforcement/implementation of existing policies	Unprofessional actions of contractors maintaining trees and shrubs Unprofessional maintenance measures undertaken by greenery managers (e.g., drastic pruning) Public officials fail to take advantage of existing legislative possibilities for the benefits of urban trees (Lack of will) Real estate managers and public officials fail to supervise contractors and make sure they obey the law Regulations concerning urban tree protection are not being enforced
Empowerment failure	
Poor social mobilization (missing/inadequate countervailing power)	Society perceives other issues as more pressing (e.g. parking lots buildings) Trees are perceived as a problem (e.g. shade, allergies, need to clean up leaves) Individuals persons' bad habits (e.g. tree topping) (when individuals acts as managers)
Missing or inadequate remit/mandate	Lack of knowledge on the possibilities and ways of preventing tree damage

3 Theoretical lens

As this thesis focuses on following the decision-making process from beginning to end, vision to implementation, the different theories have been used in different parts, to explain and understand the findings in a bigger context. An underlying theory permeating the thesis is the SET. As I focus the paper on how nature is valued in practice, I use the conceptual frameworks ES and NCP. To understand the barriers and to link them to a bigger picture and trends, I have drawn from, and thereafter adapted, Kronenberg's 'Institutional classification of failures and their environmental implications' (see Table 2).

3.1 The supportive environment theory

As previously described, a vast amount of research links NEs to increased human well-being. This thesis builds on this premise: some environments are more supportive than others. With this basis, my thesis examines to what extent research is taken into consideration within the planning phase of the outdoor environment of a new hospital (Grahn et al., 2022).

3.2 Valuing nature - ecosystem services and nature's contribution to people

The frameworks of ES and NCP have been developed to provide an understanding and raise awareness of all the benefits nature provide, with the aim that these benefits will be included fairly in policy and decision-making. I have used these concepts to see in what way nature is valued in the case study, using concepts like worldviews, specific values, and value indicators from Figure 2 (MEA, 2005; IPBES, 2022).

3.3 Barriers for sustainability visions

Kronenberg's table (2015) on institutional barriers have been used as a guidance, or lens for viewing the ones mentioned by the respondents interviewed in this thesis. As Kronenberg's study explicitly examined barriers to implementation of conservation of NEs, I will be able to compare my findings to his and see if there are possible patterns among the barriers.

4 Methodology

4.1 Research design

This thesis adopts two methods by combining a document review with interviews. The nature of the research is qualitative. Qualitative research focuses on generating meaning and often builds upon an inductive approach to knowledge (May, 2011). This means that when the data is collected, one looks for patterns and thereafter a suitable theory to explain the results. According to May (2011), deduction and induction do not have to be incompatible but can be used simultaneously. I employed a combination, using both an inductive and deductive approach. I started off with ideas of appropriate theoretical lenses that, but throughout the data collection and analysis stage, I questioned these presumptions and looked at the data from different perspectives and I asked myself 'what can this be a case of?'. As a result of this iterative process, I chose theories that could be used to make sense of the data (May, 2011).

Seeing as this thesis aims towards enhancing the understanding of how nature is valued in a local context, I will use a single case study. A common critique of the single case study is that it is difficult to draw generalizable conclusions from just one case (Flyvberg, 2006). However, the single case study can generate new, in-depth knowledge that can be useful as it offers a "vantage point from which to draw broader conclusions about societal trends and developments" (May, 2011, p. 221).

4.1.1 The Case Study - The Helsingborg hospital project

The region of Skåne is constructing a new hospital in the city of Helsingborg, Sweden in the neighborhood of Eastern Ramlösa. If executed according to (current) plans, the hospital project will be the biggest in Sweden and will offer a variety of services – including, but not limited to, emergency units to psychiatry and care-units. The project is expected to cost approximately 13.4 billion SEK and take 11- 13 years to finalize. Previous hospitals in Sweden have been complicated projects with delays in construction and cuts in budgets. 'Nya Karolinska' in Stockholm is a prime example, having caused repeated headlines in the media due to on-going financial and technical issues (Knowborn & Derblom Jobe, 2018). Not to mention, the build-up to the new hospital in Eastern Ramlösa, Helsingborg is the result of the current hospital in Helsingborg (Helsingborgs lasarett) being fraught with difficulties for years (Korsgren, 2022).

As of today (2023), the new hospital is in its initial state, with the city of Helsingborg releasing the detailed development plan on February 11, 2023 (Helsingborg city, 2023).

As health care is the responsibility of the regions in Sweden, the hospital will be built and managed solely by Region Skåne. The project, which calls for the balancing of green values that will be included in the NEs surrounding the hospital, does, however, involve both the city and regional government and it requires close collaboration between the two (Helsingborg city, 2023). Several private firms have and will continue to be involved in designing the hospital and its outdoor environment including CF Møller and Krook & Tjäder (CF Møller Architects, 2021). Two future visions of the hospital area and the surrounding NEs are visible in Figures 3 and 4.

Figure 3. Vision 1 of the hospital in Helsingborg. From Helsingborg city (2023).

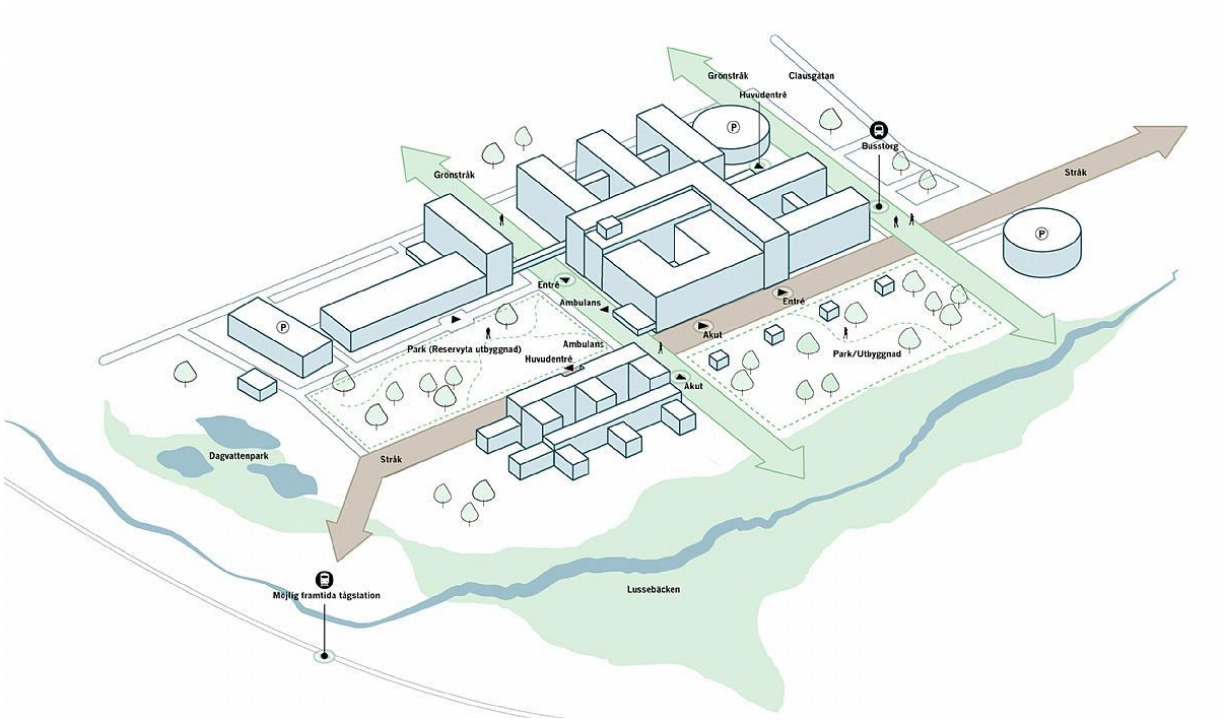

Figure 4. Vision 2 of the hospital in Helsingborg. From Helsingborg city (2023).

4.2 Data collection

4.2.1 Document review

The purpose of the document review is to get an understanding of how NEs are thought of and considered in the construction of the outdoor environments of the new hospital, as well as to gain an understanding of how health promoting benefits are included. To fulfill these aims, I examined two documents.

Document 1.	The detailed development plan (Helsingborg city, 2023)
Document 2.	Planning document for Malmö hospital area's outdoor environment; part 3 of 3: design programme; chapter: healing greenery (Region Skåne, 2022)

Document 1 is the legally binding detailed development plan from *Helsingborg city*. Document 2 is from the planning document for *Malmö hospital*, developed by Region Skåne. This second document consists of three parts, the third part relates to the outer environment of the hospital. The chapter 'greenery' in the third part therefore relates to the NEs surrounding the hospital (Region Skåne, 2022). Ideally, Document 2 would relate to the Helsingborg hospital but as that project is in its infancy, the equivalent of this document for the Helsingborg hospital has not yet been finalized or

released by Region Skåne. However, as the region will be the developer in both cases (Malmö and Helsingborg), the description of the outdoor environment for the Malmö hospital will, in this case, represent the region's perspective of NEs in a hospital environment.

In both documents, the parts that discussed outdoor environments related to the hospitals were examined. I narrowed down the outdoor area to parts that focused on the NEs. For example, in the main planning document for the hospital in Malmö, the authors determine four core values to strive for in the outdoor environment: greenery, safety, meetings, orientation. Out of these four, I examined greenery. All sections in the documents that described greenery were coded and categorized into sub-categories, for example if the value of NEs is associated with climate regulation or health promoting benefits.

The goal of the document review was to gain a broad understanding of what benefits from NEs that are included in the visions of the two hospitals, and to identify if some aspects are mentioned repeatedly and given priority. The goal was not to get an exact number and comparison of how many times certain words, for example 'health promoting' or 'biodiversity', were mentioned.

4.2.2 Interviews

The respondents in this study were chosen in a few different ways. Through contact with one of the architectural firms involved in planning the outdoor area for the hospital, I was provided one regional contact that, through a snow-ball effect, led me to find the respondents on a regional level. Additionally, through attending a public city meeting on the topic of the hospital at Eastern Ramlösa, organized by Helsingborg city on February 16, 2023, and through reading relevant planning documents, I could map actors that fulfilled one or two criteria below and contact them by e-mail.

The choice of interviewees was based on two criteria:

1) they had a connection or was involved in the new hospital project in Helsingborg in some way (or, as in one case, to other hospital projects) and/or,
2) they were involved in planning of NEs or worked with environmental questions

Five out of seven respondents fulfilled both criteria, and the remaining two fulfilled one of the two criteria. As previously described, the hospital project involves both the private sector (employed to construct the green areas), the region and the city. These sectors were therefore represented in the selection which generated broad perspectives; both visionaries working on a regional level to 'hands-

on' landscape architects working on a level much closer to the practical stage of an urban development project. A majority (five out of seven) of the respondents had an educational background as landscape architects. All respondents had substantial experience working with environmental questions and/or planning of NEs on city- or regional levels. One person did not have this but was still deemed relevant as they had been involved in the detailed development plan for the hospital. In total, two interviews were conducted with representatives from Helsingborg city. In one of these interviews, two people were present. These two respondents were treated as one respondent. They also overall shared experiences and perspectives and did not disagree with each other. Treating them as two individuals would not contribute anything new to the results. See Table 3 for a list of the respondents.

Table 3. List of respondents

Ref.	Position	Description of relevance
I.	Planning architect/landscape architect	Involved in creating the detailed development plan document for the hospital.
II.	Analyst	Works with creating a visionary/strategic document of green areas in Skåne to be used as a guidance for areas around property of region Skåne.
III.	Community planner	Is a part of a design council of the hospital project, that will meet regularly throughout the hospital construction. Will represent landscape architectural values.
IV.	Environmental strategist	Has experience from working with planning of natural environments within city and regions.
V.	V.1. Planning architect. V.2. Landscape architect	Has been involved in creating the detailed development plan document for the hospital area/works with landscape architectural in a phase close to construction.
VI.	Landscape architect	Has worked with the outdoor environment on several hospital projects.

Note. The table shows the interviewed respondents. Orange = Helsingborg city, green = Region Skåne purple = Private architectural firm

By conducting interviews with actors that are involved in a case, one can gain valuable insight into their perspectives of a matter and their values, feelings, and experiences (May, 2011). Prior to the interviews I created questions that were relevant based on the research questions. I employed a semi-structured technique and let the conversation flow naturally. If the respondent had anything more to add beyond the specific questions asked, they could do so. The same interview guide for all interviews was used, but it was slightly altered to fit the different respondents' current and previous work experience.

When conducting interviews, it is crucial to be mindful of how one (the interviewer) engages with the respondent. It is important to create a safe space, to be honest with the aim of the research and to

follow ethical guidelines (Tracy, 2010). As such, before each interview, the respondents signed a letter of consent where they permitted me to use their responses in my paper. They also communicated any requests of anonymity. Even though only one respondent requested to remain anonymous, none of the respondents' identity are disclosed. The interviews were conducted using mainly Teams or Zoom and lasted between 40 and 70 minutes. The respondents agreed to the interviews being audio recorded. The recordings will be deleted once the thesis is finished. Each recording was transcribed using Word's transcription service and corrected manually by the author. The quotations in the thesis are translated by the author, although they have been done to the best of my capabilities, there might be some nuance lost in the translation.

4.3 Data analysis

The data from the interviews was analyzed through a thematic analysis approach which is *"a method for identifying, analysing, and reporting patterns (themes) within data"* (Braun & Clarke, 2006, p. 6). It is important to note that the process of finding themes within data is not a passive process, where the themes occur automatically or exist separate from our interpretation of it. Even though we might try to be neutral and 'give voice', the interpretation will be colored by our own subjective lens (Braun & Clarke, 2006).

One of its biggest strengths is its flexibility as it can be used with different theories and epistemologies and within a realist and constructionist paradigm. A realist method reports *"experiences, meanings and the reality of participants"* while a constructionist goes one step further and examines how these *"are the effects of a range of discourses operating within society"* (Braun & Clarke, 2006, p. 9). In this paper, I employ a perspective in between realism and constructivism which *"acknowledge the ways individuals make meaning of their experience, and, in turn, the ways the broader social context impinges on those meanings, while retaining focus on the material and other limits of 'reality'"* (Braun & Clarke, 2006, p. 9).

The thematic analysis looks for patterns within sets of data rather than within one data item and is as such a suitable choice for my data that consists of several interviews. Braun & Clarke's (2006) guide for conducting thematic analyses was used, consisting of six phases:

1. Familiarising yourself with your data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

I familiarized myself with the data by reading through the transcripts repeatedly. While doing so, I wrote down notes on points from the respondents that I found interesting and relevant based off of my research questions. I copied data from the transcripts into an excel sheet and thereafter I tried to capture the essence in each quote and what the quote was an example of. In some cases, the data could represent more than one code. They were then coded in more than one category. Once this was executed with all data, I grouped together codes that fit under the same theme. I thereafter ensured that the codes and quotes fit under each theme. After this stage, I created mind maps to easily visualize the different themes, sub-themes and how they relate to each other. An example of the thematic analysis process is found in Table 4.

Table 4. An extract from the thematic analysis

Barriers (theme)	**Sub-barriers (code)**	**Examples of the data categorization**
Economic barriers	Limited funding	"a major part of the landscape will not be built until the end. . . . in almost all building projects it is incredibly difficult to calculate how much things will cost. So often the budget gets very tight at the end. . . . And in those instances, the natural environments are threatened as they aren't built yet, that's where you take from so to speak" (VI)
Anthropocentric barriers	Human economy given higher value than ecological sustainability	"I have worked on projects where it's been decided that the emergency unit needs a specific amount of space, but then during the process this amount has increased, and they need more space based off new parameters. Then we have had to scratch things and for example had to broaden the road . . . it always happens things [like this] during the process" (V)
Technical and organizational barriers	Visions and goals get 'lost in translation'	"when a process continues over a long period of time there might be a lot people that were present in the early visions who not at all are present in the end and they cannot really hold on the early visions and make sure that they are followed through" (III)

5 Findings

5.1 Part 1 – Visions

5.1.1 Information from the interviews

The goal of interviewing actors within the region and Helsingborg city was to gain insight into the practical decision-making process when NEs are planned. The results indicated no general patterns among the respondents on their thoughts about nature, primarily due to different experiences in their work. The process of decision-making regarding how the actors think about including and prioritizing different benefits from NEs is described as well as guidelines that they use to draw up their plans. As I interviewed people from different levels (regional, municipal, private) in the decision-making process, it was evident that their perspectives and knowledge differed.

The respondents from the regional level (II, III, IV) shared the view that NEs, in general, have become recognized as increasingly important in society in the last decades. However, their perception was that the status of NEs still remains low. Respondent IV experienced that NEs are viewed and treated as less important than gray infrastructure in the city. The same respondent experienced a cut in quantitative green space, which he described as a basis to be able to work with qualitative aspects of NEs. An urgent need to first and foremost work with ensuring a certain *quantity* of green space was stated, and then *"we can work with quality at the same time too, but if we lose in quantity, we will eventually not have anything left to work with"* (IV).

The experiences from respondent IV were not shared by the municipal representatives. Respondent I stated that in Helsingborg, they have *"understood the value of nature"* which underpins how they work with NEs in the city (I). According to this respondent, there has been a shift in the last 15 years where historically gray infrastructure often was planned on areas with NEs. Today, this is avoided. In the planning process of NEs, the people who work with planning NEs for Helsingborg city are guided by goals and strategies that are established by the city like the *"strategic document . . . the climate- and energy plan . . . the green structure plan . . . that quite frankly forces us to work in this way . . . this has been established and decided within the [local] political sphere".* (I).

On a practical level, Helsingborg city employs the mitigation hierarchy, which means that one should first and foremost avoid negative impacts on nature and biodiversity and then minimize or compensate as a last resort. When planning for an area, and specifically the area surrounding a building, experts such as ecologists, landscape architects, and other people with relevant expertise for each case, are

consulted throughout the process. The idea is that all stakeholder interests are represented and taken into consideration. Specifically in the case of the Helsingborg hospital, respondent III described how a council has been set up that will represent green values. This council will meet continuously during the construction process, to ensure that important values, including NEs, are considered from start to finish.

A perspective that aligned among the municipal actors was that they cannot see that some benefits from nature are prioritized over, or viewed as more important than, others. Rather, they described a process where different benefits from nature are discussed and balanced against each other. When different experts have given their input, the planners work with trying to maximize the green space, meaning that they try to fit as many benefits as possible from nature into each space. However, an area always presents restrictions in regard to aspects such as topography or gray infrastructure, which NEs needs to be planned in relation to. Often, NEs need to be able to fill a functional purpose such as holding water, and in those cases that becomes the starting point of the planning.

The respondents had different experiences regarding what role non-material, qualitative benefits (such as health benefits from nature) are given in the planning process. According to respondent III, who has worked as a landscape architect both on municipal and regional levels for more than a decade, *"it is and has been a never-ending challenge that qualitative aspects are not taken as seriously as monetary valuation*". Respondent I, on the other hand said, "*I think the recreative benefits do get quite a lot of focus in the decision-making process, maybe even more attention than the ecological values are given many times actually".*

Methodologically, Helsingborg city uses the green space factor (GSF) for the area of Eastern Ramlösa where the hospital will be located. This is the first time the GSF has been used as early on as during the work with the detailed development plan. The GSF looks at the ratio of green area in relation to total area (Juhola, 2018). The city also uses a guide developed by Care of City called *Ecosystem Services in Urban Planning: A Guide 2.0* (Care of City, 2022). The guide uses a mix of 22 ES (from the four main categories) that have been selected as especially important. Although these methods and tools are used as guidance, the process is described as *"quite subjective"* and *"very difficult"* (I). Helsingborg city are as such working on developing their own method of estimation. On a regional level, one respondent had similar experiences: *"there are attempts [on how to estimate the value qualitative experiences and/or biodiversity] but no . . . established methods"* (III).

5.1.2 Document review

The results from the document review indicated that a variety of benefits is included in the visions and that health promotion is a central aspect, especially in Document 2. Table 5 and 6 show the benefits from nature that were present and described as important for the planning of the outdoor hospital environment in the Helsingborg and Malmö case. The categories present in the documents were: recreation, healing environment, stormwater run-off management, biodiversity, cultural value, aesthetic value, air quality and micro-climate. Examples of these categories are presented in Tables 5 and 6.

Table 5. The Benefits from NEs found in Document 1 (see methods section), with examples from each category. The color categorization of the benefits is as follows: cultural ES or non-material NCP = orange, regulating ES or regulating NCP = blue, supporting ES or regulating NCP = green.

Benefits from NEs described in the document	Examples
Recreative	The stormwater park is planned from a recreative perspective where both blue and green qualities are present (Helsingborg city, 2023, p. 7). The main idea for the green structures within the designated areas is to protect and strengthen already existing adult trees and green values as well as the Lussestream so that these areas can be available and a recreative quality for both the hospital and the district (Helsingborg city, 2023, p. 16).
Healing greenery	The closeness to a calm green healing environment will be a valuable quality from a care-perspective (Helsingborg city, 2023, p. 7).
Stormwater runoff management/Stormwater parks	The stormwater investigation has created a suggestion of sustainable storm water runoff management within the designated area with three main aspects in mind: flows, pollution and skyfalls (Helsingborg city, 2023, p. 26).
Biodiversity	Plantations can increase the biodiversity of the area (Helsingborg city, 2023, p. 26).

Table 6. The Benefits from NEs found in Document 2 (see methods section), with examples from each category. The color categorization of the benefits is as follows: cultural ES or non-material NCP = orange, regulating ES or regulating NCP = blue, supporting ES or regulating NCP = green.

Benefits from NEs described in the document	Examples
Healing greenery	Research of the outdoor environment as a health promoting resource shows the importance of contact with the outdoor environment in four different zones. With new- and re-construction of health- and care-facilities it is therefore important to incorporate a conscious design in relation to these four zones to ensure that the outdoor environments will be as much of a resource as possible for the visitors (Region Skåne, 2022, p. 16). Greenery within the city is important as a health promoting resource (Region Skåne, 2022, p. 22).
Recreation	Protect and develop the small green rooms as easily accessible places for visiting, meetings and rest (Region Skåne, 2022, p. 24).

Cultural	The cultural historical values of the outdoor environment of the hospital are mainly connected to big trees, avenues and tree rows (Region Skåne, 2022, p. 36).
Aesthetic	Green roofs to look at should be designed as green "jewelry" with perennials, bushes, and smaller trees, or as biotope-roofs. (Region Skåne, 2022, p. 32).
Spiritual	The opportunity to reflection and to experience a mirroring between one's own life and nature (Region Skåne, 2022, p. 18).
Air-quality and micro-climate	Vegetation also contributes to improved air quality and micro-climate. (Region Skåne, 2022, p. 22).
Stormwater runoff management	Through rain gardens and flooding areas, the green structure reduces challenges of heavy rains and stormwater runoff management (Region Skåne, 2022, p. 24).
Biodiversity	An orderly designed green structure with a high degree of biodiversity is the goal of the hospital outdoor environment (Region Skåne, 2022, p. 22). Biodiversity is valuable. It creates resilience against climate change, which to a higher degree ensures future ecosystem services (Region Skåne, 2022, p. 34).

The categories mentioned most often in both documents were stormwater runoff management, recreation, and health benefits. The design and management of stormwater systems are seen as especially important to be able to ensure that the technical infrastructure of the hospital will be safe from future flooding scenarios (Region Skåne, 2022, p. 24).

Cultural ES/non-material NCP and regulating ES/NCP are included more than supporting and provisioning services. Overall, both documents represent a mainly instrumental perspective of nature and usage of ES as a concept that guides planning. This can be seen in the next example where the value of biodiversity is first and foremost measured by its effectiveness in shielding against climate change: *"biodiversity is valuable. It creates resilience against climate change, which to a higher degree ensures future ecosystem services"* (Region Skåne, 2022, p. 34). Another example is how different green structures can be used to regulate the temperature: *"through rain gardens and flooding areas, the green structure reduces challenges of sky fall and stormwater runoff management"* (Region Skåne, 2022, p. 24) However, some relational values could also be detected: *"the opportunity to reflection and to experience a mirroring between one's own life and nature"* (Region Skåne, 2022, p. 18).

The document from Helsingborg municipality (Document 1) highlighted the importance of recreation from NEs to a larger extent while the document for Malmö hospital from Region Skåne (Document 2) focused mainly on the importance of NEs for mental and physical well-being – for both patients, employees, and visitors. The connection between NEs and mental and physical health is acknowledged for example by: *"greenery within the city is important as a health promoting resource"* (Region Skåne, 2022, p. 22). Research from Swedish University of Agricultural Sciences in terms of how to plan NEs for health benefits is utilized in the planning document from Region Skåne. More precisely, the 'Four Zones of contact with the outdoor' are discussed and suggestions of how to design the different zones to maximize health benefits are put forth. Furthermore, the eight PSDs presented in the background were

included in Document 2. See Table 7 for a description of how the different PSDs are intended to be represented.

Table 7. The representation of the perceived sensory dimensions (PSDs) in the documents.

The PSDs	Included in the vision	As described in the document
Social	Yes	Access to social and physical activities (Region Skåne, 2022, p. 18).
Cultural	Yes	Access to contact with surrounding life, social stimuli, impression from culture and artistic design (Region Skåne, 2022, p. 18)
Open	Yes	Views over open, welcoming green spaces (Region Skåne, 2022, p. 18)
Diverse	Yes	Diversity of species and plants, that gives a varied impression of life (Region Skåne, 2022, p. 18)
Cohesive	Yes	The feeling of being in a world of your own (Region Skåne, 2022, p. 18)
Natural	Yes	A sense of nature that has not been influenced by humans, with the impression that trees and vegetation have grown naturally (Region Skåne, 2022, p. 18)
Sheltered	Yes	The opportunity to access secluded places surrounded by greenery alone or with some loved ones, friends or colleagues in safety (Region Skåne, 2022, p. 18)
Serene	Yes	The opportunity to reflection and to experience a mirroring between one's own life and nature (Region Skåne, 2022, p. 18)

5.2 Part 2 – Barriers

The results from the interviews indicated several barriers that hinder implementation of visions. These related to 1. Anthropocentric barriers, 2. Economic barriers, 3. Power-related barriers, Technical and organizational barriers. See Table 8 for the four main barriers and sub-barriers. The categories are structured from a broader (anthropocentric) to smaller (technical and organizational).

Table 8. A synthesis of the four barriers mentioned and experienced by actors.

1. Anthropocentric barriers
- Human economy given higher value than ecological sustainability - NEs are seen as flexible - Knowledge gaps
2. Economic barriers
- Short-term economic thinking over long-term well-being of people and the environment - Limited funding
3. Power-related barriers
- Regulations or lack thereof - Lack of leverage for small and unattractive cities - Private landownership
4. Technical and organizational barriers
- Lost in translation - Maintenance restrictions - Short-term involvement

5.2.1 Anthropocentric barriers

Human economy given higher value than ecological sustainability

Construction projects, especially in a hospital context, are *"very much ruled by technology"* (VI). There are lot of different parameters that need to work to ensure patients' safety – technical aspects, functioning infrastructure, water management to suggest some. Several respondents said that they had experienced visions of NEs to sometimes change in the end, due to other aspects in the project being prioritized. In a hospital case it might relate to roads having to become broader than anticipated

to make room for large vehicles (V). Or in a city-environment it might happen that "a *pipe occurs that no one knew about"* which then might lead to *"these trees not being able to be planted here"* (III). Overall, a lot of things can happen, and new parameters can come up that change the plans of NEs.

NEs are viewed as flexible

The place of the landscape in the construction process is usually at the end. As a result, *"it is often the case that it doesn't 'make it', or at least rarely without being altered"* (VI). As a result of other aspects being prioritized, NEs sometimes becomes a parameter that *"has to be flexible"* (VI). This might be problematic considering, as respondent VI put it: *"landscape architecture isn't flexible"* (VI). NEs grow from often slow biological processes that take a substantial time to reach their full potential. This aspect of time is included in the planning of NEs, and if, for example, a tree is removed earlier than planned for "*its purpose was a sort of aesthetic, it will not have time to sequester any carbon"* (VI).

Knowledge gaps

Multiple respondents mention a lack of knowledge and understanding of the value NEs and the many benefits that they generate, from people who work in other parts of the construction project than planning the NEs. Respondent III experienced that the general knowledge of NEs and their benefits had increased in in society in general, but that it often was low among people representing so called the *"harder values"* (in comparison to "softer" landscape architectural values) of gray infrastructure in a construction project (III).

5.2.2 Economic barriers

Short-term economic thinking over long-term well-being of people and the environment

According to two respondents (III, IV), the priority of short-term economic profit is a symptom of an underlying worldview that prioritizes economic interests over others. One respondent described it as using the *"economic glasses"* (IV). Respondent III described it as "absurd" (III), how: "*one can save [money] in a project even though one is aware that it will lead to negative consequences for society, and then the result is that it is the society that will bear the costs, while the project is profitable* (III). Unfortunately, the priority of short-term profit might unintentionally lead to economic loss in the long run, as described by respondent IV: *"In the short-term everything costs, but eventually it's a benefit for the region with less health problems and less strain on health care".* This points to an issue where shorter rehabilitation time due to exposure to NEs might not be included in the calculations.

Limited funding

A common experience among the respondents was restricted budgets in construction projects, and how NEs often were impacted negatively by these. The fact that NEs are built at the end of a project, after buildings and infrastructure can contribute to budget restrictions, as respondent VI described:

> *a major part of the landscape will not be built until the end. . . . in almost all building projects it is incredibly difficult to calculate how much things will cost. So often the budget gets very tight at the end. . . . And in those instances, the natural environments are threatened as they aren't built yet, that's where you take from so to speak*

This describes a reality where the quantity of space planned to be devoted towards green areas is precarious and dependent on factors outside of the people, who work to plan the green areas, control. Respondent III shared this experience and said that this *"common knowledge . . . as it's the last part added, then that is where they save [money]".*

5.2.3 Power-related barriers

Regulations or lack thereof

A majority of the visionary and strategic documents of NEs are not legally binding. This can hinder implementation of a NE because, even though documents might be helpful in guiding planning, they lack enforcement. Implementation of visions mainly depends on engaged and informed people who have the courage and energy to push ambitious agendas.

Lack of leverage for small and unattractive cities

Two respondents mentioned the benefit Helsingborg had in the case of the hospital. They described how Helsingborg is a thriving and residentially attractive city and how this has contributed to the ambitious plans of the NEs. A city in this circumstance can put higher demands on the developer. In cities who do not have that benefit respondent I commented that *"it is not possible to put as high demands, because then no one wants to build there. In those cases, they have to be more accommodating to what the developer wants"* (I).

Private landownership

An additional aspect that can become a barrier is private land ownership. This decreases a city's leverage to choose who will exploit the land. Owning the land becomes a pre-requisite for choosing a developer with high environmental standards. In the Helsingborg case, there was a land-usage

competition that granted Krook and Tjäder the mission to be a part of planning for the green and blue structures (CF Møller Architects, 2021).

5.2.4 Technical and organizational barriers

Building a hospital is a long process with involvement from several stakeholders including region, the municipality, developers, and consultants, that operate on different levels, during different times. In the case of Helsingborg, it is 10-13 years until finalization (from start year 2021).

'Lost in translation'

On a regional level, there are several documents aimed towards informing regional and municipal planning of NEs. The aim is for this to influence municipal comprehensive plans, and thereafter the detailed development plan for the construction project. As there are many different levels involved and phases of a construction project, ideas and visions go through what one respondent called a *"filter-process"* for each level (IV). What one workgroup or person has prioritized on one level, might be omitted, or changed further down in the process.

The long process also often means that people who were *"present in the early visions might not at all be there at the end, and as such they cannot ensure that the initial visions actually are implemented"* (III). The filtering effect can change the outcome of an initial vision and in the end, it might be hard to know where the changes occurred, as they might be a result of numerous small adjustments along the way.

Maintenance restrictions

The people who work with planning the NEs outside of the hospital have visions of how ideally the area should be built to maximize health promoting benefits. However, the design needs to be planned with the future maintenance in mind. An area of NEs might have been planned with several benefits in mind, for example stormwater management combined with a design of the area that is meant to include specific PSDs that fulfill certain aspects of environmental support. When the landscape architects finish their task and leave the project, future maintenance will be handled by other people. Information on maintenance needs to be available and distributed to the people who will tend to the NEs. Designing the NEs in ways to that it will be taken care of properly is essential. This might hinder initial visions by either changing them to adjust to maintenance requirements/considerations or, in the worst-case-scenario, a lack in connection between the planning phase and maintenance phase leads to green areas not being maintained properly. One respondent (VI) experienced a decrease in the

resources for maintenance in the last 50 years. Considering the ambitious plans of NEs today, which need to include various benefits for climate, health, and biodiversity to mention some, it is likely that maintenance today is a bigger and more complex task than in the past. For example, some vertical greeneries are technically advanced and require continual care and watering.

Short-term involvement

Aside from the filtering of visions and the maintenance aspect, short-term involvement in big construction projects with many phases is difficult to avoid, as most professionals involved have one task and expertise that they are responsible for. An effect of this can be that it incentivizes priority of short-term economic profit over long-term societal benefits. This can for example happen when the developer is a private company who is involved until the construction is done and thereafter leaves the project.

6 Discussion

6.1 Answers to the research questions

RQ1. How do planners include nature and its various benefits (including health benefits) in the planning of outdoor environments of the hospital?

The results show that the ambition and knowledge of the people who are involved in designing the NEs surrounding the hospitals are high. The inclusion of scientific research on the links between NEs and human well-being is also high. Document 2 is specifically named healing greenery and this document focuses in depth on the healing properties nature and its benefits can provide people with. The results further indicate that several benefits from nature are included in the planning documents. These were aspects of health-promoting benefits, recreation, culture, aesthetic, spiritual, stormwater management, air-quality, micro-climate, and biodiversity. The visions include the importance of constructing the NEs in a way so it can help adapt and mitigate future climate change scenarios.

The findings relating to the inclusion of health-benefits show that design of the outdoor areas is based upon the research from SLU and on EBD (Grahn et al., 2005; Grahn et al., 2022; Pálsdóttir et al., 2018). Both the 'Four Zones of contact with the outdoor' as well as the eight environmental qualities, or PSDs, are included in planning Document 2. Within the document, they describe what type of NEs each zone can include in a hospital context. For example, in zone 1, which relate to greenery viewed from inside a building (Grahn, 2022), this can entail taking into consideration waiting rooms and including views towards trees and other NEs.

Aside from the inclusion of the four zones, all the eight PSDs in the SET were present in the document. As described in the background, the PSDs relate to both restorative and instorative qualities. The inclusion of the full spectrum of PSDs demonstrates how the plans of the NEs fit under nature-based rehabilitation rather than solely a health-promoting environment (Grahn, 2022). The difference between the two was related to how nature-based rehabilitation includes instorative support as well as restorative environmental support. Considering the plans of the new hospital to offer a variety of services – including both emergency care, psychiatric unit, and other care-units, it is likely to assume a broad spectrum of needs of the patients. More sick and fragile people should have the possibility to access the sheltered and serene PSDs which offer restoration while more challenging, open environments with social and cultural aspects can offer other individuals another dimension of rehabilitation. Visitors (for example residents from the city) and employees can also utilize the NEs and the environmental qualities. In a world with a declining global mental health (WHO, 2022), this is an additional valuable aspect to take into consideration.

RQ2. What common barriers, according to actors, hinder visions of NEs from implementation?

To ensure that NEs in a hospital environment is built in a way so health promotion can be maximized, it is crucial to take into consideration how well visions are implemented. According to the actors that were interviewed in this study, there exist several barriers that they experienced can change plans to include NEs. First and foremost, quantity of space needs to be ensured. Respondent IV experienced an overall cut in quantitative space of NEs. Without the expected quantitative space, all envisioned benefits from NEs are threatened. Ensuring quantity of space is a therefore pre-condition to fulfilling the visions.

The barriers the interviewees perceived were categorized into bigger main-categories, relating to 1) anthropocentrism, 2) economy related 3) power-relations and 4) technical or organizational barriers. Anthropocentric barriers relate to barriers to NEs that is due to a worldview which places humans as the priority, above other species. The sub-barriers of this category related to how NEs are viewed and treated as flexible elements that can be planned around the 'harder' aspects of gray infrastructure in a construction project. Economic barriers relate to aspects of limited budgets and the priority of short-term economic profit over long term benefits for people and the environment. Power-related barriers include how cities can experience a lack of leverage to influence plans of NEs due to aspects of not owning their land and not being economically thriving and attractive cities. Technological or organizational barriers derive from the size of construction projects that include many levels, phases and people involved at different times. Impacts of this can be that visions changes and gets watered down. It also leads short-term involvement of actors, which in turn is connected to the part about incentivize of short-term economic profit.

In previous research (Kaczorowska et al, 2016; Khoshkar et al., 2018), multiple barriers to the integration of ES were found, all of which were present this study. These were: private landownership, knowledge gaps, and short-term economic thinking. Regarding the connection between the results from this study and Kronenberg's research, that focused on mapping institutional barriers to the preservation of urban ES in Poland, some overlaps of the results were present, see Table 9. The overlap in barriers points towards bigger global patterns that influence national economic and political decisions and create similar experiences of barriers across borders. However, it is important to note that majority of the barriers in Kronenberg's study were not present in this study, which points towards the non-generalizable characteristics of each case. Every case is unique and embedded in its own local

context. It also points towards the challenges in creating non-generalizable frameworks of barriers to implementation and/or conservation of NEs.

Table 9. Comparable barriers found in Kronenberg (2015) and in this study.

Type of failure and specific problems	Barriers considered in Kronenberg, 2015	**Comparable barriers found in this study**
Transaction failure		
Missing knowledge/information	Lack of awareness of the significance of trees among decision-makers	**Knowledge gaps**
Government failure		
Missing policies	Insufficient fund Lack of local spatial management plans	**Limited funding** **Regulations or lack thereof**
Inadequate policy objectives	Inappropriate fund distribution pattern which hinders multiannual greenery management planning	**Maintenance restrictions**
Problems with other policies (not focused on the environment)	Regulations which downplay the significance of urban greenery or limit the possibility to protect it	**Short-term economic thinking over long-term well-being of people and the environment**
Poor integration of different management activities	Lack of cooperation between experts in different fields and between administrative units	**Lost in translation**
Empowerment failure		
Poor social mobilization (missing/inadequate countervailing power)	Society perceives other issues as more pressing (e.g., parking lots buildings)	**Human economy given higher value than ecological sustainability**

6.2 Connecting the dots

Research clearly links NEs to vast health benefits, and in the Helsingborg hospital case, this is acknowledged and has been included in the basic planning of NEs surrounding the hospital. However, to reach sustainable solutions, in this case, NEs that can contribute to healing for people and the planet, we need to ensure that the visions are implemented, a step proven to be challenging.

With the UN in 2005 releasing the Millennium Ecosystem Assessment, the goal was that the value of NEs and all the benefits they give us, would be accurately estimated, and integrated into society. The idea was that providing a scientific basis to the value of NEs could help conserve them. The value and importance of NEs have spread in society, and a call to integrate them into cities are seen in international goals (United Nations, n.d.), as well as in national goals (Swedish Environmental Protection Agency, n.d.). On a practical level in Helsingborg, this was well-considered. The planning of NEs was backed both by several environmental plans (such as the Climate plan and Green plan) guiding the planners' work, and a carefully considered planning process rooted in consulting a variety of

experts who seek to maximize the benefits from nature into each area. Respondent I, said that, in Helsingborg, they have *"understood the value of nature".*

The respondents from the regional level (II, III, IV) agreed somewhat to this statement, by describing how, in the latest decades, the overall understanding of the value of NEs have increased in society, but that NEs still remain underprioritized. This captures the essence of the current dilemma we are experiencing in society which relates to how we, even while having access to scientific research stating the importance of NEs, inadequately translate the scientific basis into action. The questions, "why this is the case?" and "how do we solve this issue?" have neither definite nor objective answers. According to the IPBES (2022), it is the narrow set of values that we have used as a lens to view nature from and that have guided economic and political decisions that have contributed to environmental degradation.

ES has, as noted, been a dominant way of viewing nature in western society. This way of assessing nature's value is based in an anthropocentric worldview and treats NEs as an instrument for human well-being. This term occurred often in the thesis, in the milestone targets set out by the Swedish Environmental Protection Agency, in the interviews and planning guide 'Care of City' that is used by Helsingborg city, and lastly, in the planning documents of the hospital. Clearly, the ES lens is a dominant way of assessing and valuing the benefits from nature within this case study. Nature is described as important to provide for example climate change adaptation and mitigation: *"Biodiversity is valuable. It creates resilience against climate change"* (Region Skåne, 2022, p. 34). The way NEs are described to provide health benefits also comes from viewing nature as an instrument for human well-being. Few descriptions that would fit under relational or intrinsic values came up in the results.

The anthropocentric worldview could be connected to many of the fundamental barriers found in this study. However, this narrow way of viewing nature also permeates and ripples down throughout many of the other barriers. Economic barriers are also related to valuing human affairs and the economy higher than ecological functioning, and limited funding results from this. The IPBES calls for an inclusion of a wider set of values to be incorporated into our societies. This can entail assessing nature's value through an ecocentric lens, where species and ecosystems have inherent value, outside of the benefits humans can gain from them. It can also entail to increase socio-cultural and ecological valuation, alongside monetary valuation.

A complex problem requires solutions targeted from various angles. In the case of the hospital, there are indications that monetary valuation might be efficient. Vidal Yañez et al. (2023) linked how NEs can

lead to decreased use of anti-depressants and showed huge possible monetary savings from fulfilling a plan of street greening in Barcelona. Roger Ulrich's research indicated shorter rehabilitation days from viewing greenery (1984). Building on studies like these and finding ways of how to translate health benefits into monetary savings for society can be one way to incentivize NEs in our current political and economic system. Other practical solutions can be to target the issues of communication between levels in a construction project. In the Helsingborg case, there was an initiative to set up a council that will represent green values. This council will meet continuously during the construction process, to ensure that important values, including landscape architectural ones will be represented and remain throughout the process. Future research could determine its degree of success.

7 Conclusion

With human societies facing unprecedented challenges in adapting to and mitigating the impacts of climate- and biodiversity crises, green innovative solutions on all levels in society are necessary. The connection between research, planning and final implementation has proven a challenging task and adequate societal responses to the crises seem glaringly absent. We continue to see examples of political decisions worldwide that de-prioritize the environment and, as a result, the health and well-being of people. A recent example is how in September 2023, the Swedish government decided to cut a third of the national budget aimed towards climate adaptation, a decision for which they were heavily critiqued (Wahlstedt, 2023).

This thesis set out to examine how NEs are valued in a local hospital context in Helsingborg, Sweden. The results show that the visionary planning documents of the hospital outdoor environment are well-grounded in research that links NEs with health impacts as well as research on how these environments can be planned to maximize health benefits for future users. However, as indicated throughout the paper, the road from goal and claim to implementation has proven to be filled with obstacles. This is the case in this study too, several barriers that might impede the implementation of a healing environment were discovered. The barriers ranged from more fundamental worldviews to organizational aspects.

The big question of if, and in such case how, we can move forth and transition into a sustainable society that prioritizes people and the planet remains truly unknown. Although this thesis does not present any major solutions, it does provide insight into varying angles that can be targeted and productive in trying to address the issue of implementation. These can include improving the connection and communication between different phases in a construction project and focusing on improving assessment methods (e.g., from monetary to multi-variant valuation) to incentivize conservation of NEs. However, continuous efforts to challenge the dominant anthropocentric worldview and include a more diverse understanding of NEs in economic and political decisions, is essential for true transformative change.

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9 Appendix

Interview guide

Background
What is your professional role and education?
Are you involved in the Helsingborg hospital project/what is your connection to it?
Part 1.
How is it decided within the region or municipality how much area that is devoted towards constructing green and blue spaces? (actors, guidelines etc.)
What does the process look like when you decide what you are going to use that area for? For example: park or nature reserve, wetland, number of trees etcetera.
How does it work in practice when you are to prioritize between different benefits from nature / ecosystem services, when these are not valued or measured in the same way?
Are there certain benefits from nature/ecosystem services that you experience are prioritized more and some less?
From your experience, how is more qualitative benefits from nature – like health benefits, included in the decision-making process? - If they are included and prioritized – how? - If they are not included and prioritized – why?
Do you have any thoughts on how they can be enhanced and prioritized more?
4. Part 2.
What is your experience of how an initial vision in the end turns out in practice?
Do they see any barriers that limits the intended visions and goals?