From hidden water stream to green-blue network: how neighbours experience the Woluwe basin
A mixed-method approach

Ine HEREMANS

Preface

For me writing a thesis gave me the same feeling as wandering through a maze as a child. Every turn you make in a maze can either distract from your goal or lead you closer to it. Around each corner, there can be obstacles that make sure that nothing goes according to plan, and it is not nice to do everything alone. Sometimes the help of my supervisor Professor Maarten Loopmans is necessary, he sees the maze from above and can guide me in the right direction. Not only did Prof. Loopmans help me to get out of the maze in time, but also helped me to create a beautiful thesis to end my student life with.

Next, I would like to thank Margot De Groote of the 'Regionaal Landschap Brabantse Kouters'. She helped choose the thesis's subject and provide additional information about the Woluwe basin. In addition to hiking along the Woluwe to find sources, I was also allowed to witness the start of the Strategic Project 'Leve(n) de Woluwe' and give a presentation to the board of directors about my thesis research on the Woluwe. These elements gave me a better idea of what is happening in this valley and were very interesting. In addition, she was always available for, all my questions and helped to record the locations for the focus groups and supervised them. Thank you for that, but she was not the only one from the 'Regionaal Landschap Brabantse Kouters' that I would like to thank, Sofie Muller also helped distribute the questionnaire across the various municipal channels and wrote a text to send together with the questionnaire.

In addition, there are also a few fellow students that I would like to put in the spotlight. Thank you to Ona and Elisabeth for typing up the conversations during the focus groups, this made processing the recordings much easier afterwards. In addition, I would also like to thank Quentin for proofreading the dissemination texts in French and Sam for proofreading the questionnaires in French and Joery and Sam for the entire thesis on spelling errors. Without all of you, I could not have made this thesis.

Finally, I'd like to thank a few people for their assistance during this occasionally difficult time. Sara, thank you for your encouragement, support, and belief in me, I appreciate it. Your suggestions and counsel were very helpful. In addition, despite my complaints, my family always loves to see me and is supportive of me while I'm studying. Last but not least, I'd like to thank my volleyball and fistball friends who made me smile and relax during breaks. This thesis would not have been possible without each and every one of you.

Summary

This study examines how green-blue networks are appreciated, utilised, perceived, experienced, and supported in urban settings. It is a component of the Regional Landscape Brabantse Kouters strategic initiative "Leve(n) de Woluwe". This study intends to track how local communities perceive and value rivers' and streams' (re-)opening. Research is being done on the needs of the neighbourhood's residents and how to persuade them of the various landscape improvements. There are still places where the water is allowed room in the landscape by the Strategic project.

This study uses a mixed-method approach. Both an online survey and focus groups were conducted. The questionnaire was used to get a broader overview of the opinion of the Flemish municipalities' residents within the Woluwe Basin. People who were interested in participating in the research received the survey online through the appropriate municipal channels, email and social media groups in this area. To deepen our understanding of the way the re-opening of streams is appreciated in an urban environment, certain answers were given in the questionnaire and focus groups were organised.

People in the Woluwe region appreciate and enjoy the extra created green spaces through the re-opening of the Woluwe. The most common activities performed in green spaces are walking, cycling, relaxing and meeting up in this specific order. The usage of green space differs by age. The youth is not studied in this survey but there is a difference between different age groups. Looking at active activities like cycling and jogging, the older you get, the less you cycle and jog in green spaces. Additionally, the natural components of green spaces, such as trees, water, and trails, are valued the most by people. Infrastructure components like benches and trash cans come next. Other elements that were now lacking in the green spaces included connectivity between the various green spaces to create a complete green-blue network and adequate walking routes so that people could make loops without having to go backwards. The Woluwe basin is an urbanised area, so the green spaces are fragmented and have certain drawbacks, such as noise pollution from cars, trains and planes. Some individuals were concerned that when the water was stagnant, it might attract insects and generate unpleasant odours. The factors that explained the support for green spaces include natural elements and sensory stimuli.

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Introduction

A river rarely passes through an area unperceived. Yet, half of the respondents in our questionnaire were unaware that Woluwe or its tributaries flow through their municipality. This lack of knowledge can be attributed to a decision made over a century ago when the government opted to install underground water pipes to address contamination issues like foul odours and health concerns. The Woluwe was consequently confined to sewage pipes (Somers, 2022). However, with advancements in our understanding of the value of water, climate change awareness and improved water purification technologies, the time has come to reconsider our relationship with water. Climate change has brought water scarcity due to droughts and excessive water leading to floods (Arias et al., 2021; Brouwers et al., 2015, pp. 20, 120), therefore there is a need for reevaluating how we interact with water.

In recent years, efforts have been made to restore the accessibility and visibility of the Woluwe through completed and planned projects. This enables the water stream to reclaim its rightful place in our living environment (De Groote, 2021; Somers, 2022; Terrens et al., 2022). Unfortunately, residents' knowledge regarding the river's origins and location has been lost through time. The strategic initiative known as "Long Live the Woluwe" aims to rectify this by emphasizing the restoration of the relationship between the river and the residents of the neighbourhood (De Groote, 2021). This thesis will contribute to the endeavour and participate in social research. This social research explores the interaction between ecosystems and humans. This provides a framework for this study (Holahan, 1982, pp. 3–13; Ittelson et al., 1974, pp. 5–7).

This thesis not only focused on the significance of water in urbanised regions, but also on the effects of water on the neighbours' behaviour, experiences, appreciation, and support for the re-opening of the Woluwe river basin. To gain a deeper understanding of the neighbours' relationship with green spaces, several interrelated research questions will be addressed:

1) *How do people **behave** around green-blue networks? Does age influence the utilization of green spaces?*
2) *Which elements of green spaces do people **appreciate** the most?*
3) *How do people **experience** a green-blue network in an urbanised environment and what impact does the presence of water have on the landscape's **perception** of the residents within the Woluwe basin?*

By identifying the needs of residents along the Woluwe, it became possible to transform this awareness into support for the restoration efforts. Therefore, the research question:

4) *"Which factors influence the support for the projects along the Woluwe?"* will be answered.

To summarise, the thesis focuses on examining how residents in the vicinity of the Woluwe perceive the landscape in relation to water, exploring the influence of water on their experiences, and examining ways in which individuals living near the Woluwe can once again connect with this vital natural resource. Water streams should not be trapped underground but should be given space to create green-blue networks (Errigo, 2018). Neighbouring citizens need more green spaces, and opening up can provide a solution to water-related problems caused by climate change (Errigo, 2018; Kaur & Gupta, 2022; Michiels et al., 2018).

This study employed a mixed-method technique to answer the research questions. First, a survey was conducted throughout the Woluwe study area, which included the Flemish municipalities of Zaventem, Vilvoorde, Kraainem, Wezembeek-Oppem, and Machelen, where the Woluwe basin is located. The survey aimed to gather comprehensive data from the respondents like their preferences, behaviour and experiences in nearby green spaces.

Following the survey, focus groups were organised to explore multiple topics in greater detail. In total, two focus groups were conducted in Zaventem with 10 participants. These focus groups provided an opportunity for in-depth discussions and the collection of qualitative insights from participants.

This thesis is structured as follows: Chapter 1 provides a comprehensive literature review, organised into 9 topics. Chapter 2 explores the study area, including its history, geography, and relevant sub-themes, providing contextual information about the Woluwe basin and its significance to the residents. Chapter 3 discusses the research methodology, offering detailed insights into the design, execution, and analysis of the questionnaire survey and focus groups, with a focus on preparation, execution, processing, and privacy considerations. Chapter 4 presents the study's findings, utilizing graphs and tables to showcase the quantitative data obtained from the questionnaire survey, and qualitative data from the focus groups and includes a comprehensive discussion on the implications, strengths, and a critical reflection on the limitations of the research methodologies employed. Finally, Chapter 5 concludes the thesis by summarizing the key findings and their implications, suggesting avenues for future research, and giving some policy advice.

1 Literature study

1.1 Ecosystem services

"Ecosystem services are the benefits that people derive from the ecosystem and are produced by interactions within the ecosystem" (Millennium Ecosystem Assessment, 2005, p. 3). These services are broken down by Millenium Ecosystem Assessment Report into 3 categories of provisioning, regulating and cultural services. The supporting services assist each of these categories as shown in Figure 1.
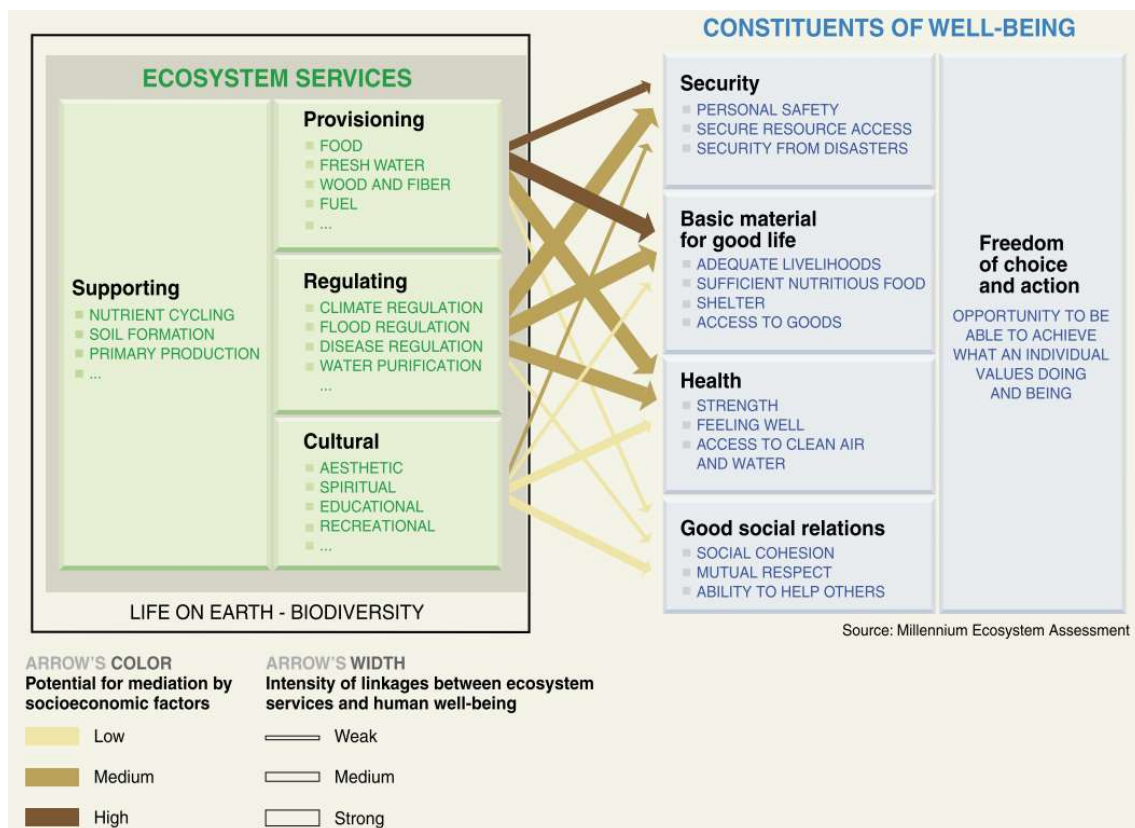
Figure 1: Ecosystem Services and their link to human well-being (Millennium Ecosystem Assessment, 2005, p. 4)

Food, clothing, and fresh water are all considered to be provisioning services. Indirect advantages of service regulation include improving air and water quality, controlling erosion, controlling disease, and controlling pests. Bees and other insects can also pollinate flowers, which brings us to our final point. The fourth category is referred to as "cultural ecosystem services," or "CES." Human experiences are absorbed in CES. This encompasses the aesthetic values that individuals value as well as the spiritual and religious values (Millennium Ecosystem Assessment, 2005, p. 7; Phillips et al., 2022; Rall et al., 2019). Last but not least, leisure and ecotourism are included under the category of CES (Millennium Ecosystem Assessment, 2005, p. 7). The cultural services provided by ecosystems will be highlighted in

this experience research. This study examines the cultural services that Woluwe basin neighbours assign to green-blue networks because it has been deployed to the Woluwe river basin.

1.2 Water

Water enables life to exist on Earth. Water vapour effectively absorbs a lot of infrared radiation due to its significant dipole moment. Our atmosphere contains water vapour, a natural gas that is essential to maintaining Earth's average temperature of 15 °C. The average temperature would be -18°C without the atmosphere (KNMI, 2010; Webber, 2016, p. 44).

Freshwater is the most useful for mankind. Most of it is stored in glaciers and snow, even though the underground storage is larger by a hundredfold. This means that only a small portion is easily accessible, which makes the role of rivers essential (Webber, 2016, p. 53). Along with surface water systems like rivers, canals, and reservoirs, large water transports also occur underground. In addition to natural processes like water penetration into the soil and infiltration into aquifers, water is transported by pipelines. The pipes that provide drinking water to each home come first, followed by the sewage pipes that transport wastewater from homes to water treatment facilities (Hoekstra et al., 2009; Webber, 2016, p. 68).

Floods occur where precipitation exceeds infiltration. People create constructions all over the place, including flood plains, this increases the likelihood of floods. Additionally the occurrence of impermeable surfaces, as a consequence of this construction, prevents water to infiltrate into the ground and causing runoff (Webber, 2016, p. 57). Second, heavy rain events such as storms increase the chances of floods (Arias et al., 2021, p. 84, 86, 122; Webber, 2016, p.57). After long drought periods, precipitation has more difficulties infiltrating which causes more chances for floods. This happens more frequently during summer (Arias et al., 2021; Brouwers et al., 2015, p. 20 & 120; Webber, 2016, p.57). Long droughts do not suit humans, plants, or animals. Excessive human mortality, animal deaths, and plant wilting are different possible effects of these droughts (Tsakiris et al., 2013).

Therefore society should adapt and mitigate towards climate change (EEA, n.d.; Silaydin Aydin & Çukur, 2012). Reconsidering our way of using water is a good first step (Arias et al., 2021; Brouwers et al., 2015, pp. 20, 120). During heavy rain events, the sewage system cannot handle the amount of rainwater (Bugajski et al., 2021; Hoekstra et al., 2009). Many sewage pipes are very small, they cannot handle significant volumes of rainwater and will overflow during such events (Brouwers et al., 2015, pp. 9, 10 & 115). This is why each street needs to have its own separate sewage system. In Belgium, this is not the case for the moment (Vlario, 2002; VMM, n.d.). Not only is it bad because the wastewater can overflow into the water stream

during heavy rain events, but also it reduces the effectiveness of water filtration (Bugajski et al., 2021). The majority of the Woluwe was running through sewage pipes (De Groote, 2021; Somers, 2022; Terrens et al., 2022). Changes need to be made in the Woluwe basin if floods and sewage pipe spills are to be prevented. VLM (The Flemish land agency) began considering options for solutions in 2011. VLM has just reconstructed the section of the Woluwe between the "Leuvensesteenweg" and the "Grote Kloosterstraat". When dealing with heavy rain, this section of the river might serve as a buffer zone. It is intended to serve as a winter buffer. This buffer zone also contains locks that can be closed so that the excess water does not flow to the river but remains in this water basin. Hereby neighbours are spared from possible water damage (VLM, 2011, 2013).

1.2.1 Water governance in Flanders

Watercourse flood management in Flanders is handled by several parties. Powers have been shared among four kinds of watercourses and four tiers of administration since Napoleonic times. Flanders has no legally mandated safety requirements, and the state is not legally obligated to provide flood protection. Flemish water management initially concentrated on lowering the likelihood of floods using traditional defensive measures. For this, a broad basis of technical proficiency has been built. But at the start of the 1990s, the Flemish watercourse managers introduced a new policy concept in the hierarchy of water management discourses, spurred by the EU Environmental Impact Assessment and Habitats Directives (1985 and 1992, respectively) and the international discourse on integrated water management, namely 'give space to water' in line with the ideas of integrated water research management (IWRM).

Around the year 2000, this discourse had a general structure and was gaining interest among academics, government workers, and politicians, especially in the wake of the 1998 floods. These floods were a disruptive occurrence that demonstrated that protection technologies could not completely eliminate flood hazards. The new rhetoric became institutionalised with the 2003 Decree on Integrated Water Policy (DIWP), which required water and space managers to "infiltrate rainfall as much as feasible" and "provide water as much space as possible." The capture-storage-drainage technique was created in reaction to this. It was inferred that all forms of watercourses should be managed by concentrating first on water infiltration, then on water storage, and last, gently draining the water. Therefore, it was a first step toward integrating spatial planning and water management into the planning discourse.

The aims that the many parties participating in Flanders' water management must put first are outlined in Article 1.2.2 of the Decree on Integrated Water Policy. For instance, preserving, enhancing, or repairing surface and groundwater bodies is necessary to attain excellent water status. Surface and groundwater pollution must be avoided or minimised. By concentrating

first and foremost on the retention of precipitation, then on its reuse, then on its infiltration, and, if that is not feasible, on progressively draining the water apart from the wastewater, the dangers of flooding must be decreased. Desiccation also needed to be stopped, restricted, or reversed. To minimise flooding outside of floodplains and its effects on flora and animals, as much room as possible must be provided for water. Last but not least, it is important to encourage people to use the water system, for instance by raising the value of urban amenities and soft recreation activities (Vlaamse Overheid, 2018).

1.3 Green spaces, green infrastructure & green-blue networks

Green-blue networks are receiving increasing interest in Europe. As a result, the European Commission (2019) has developed a definition for this as well as regulations on green infrastructures. The European Commission (2019) gives the following definition for green infrastructure: "Green infrastructure is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, green infrastructure is present in rural and urban settings." (Verheyden et al., 2020, p. 29-30). Another definition given in 'Natuurverkenning 2050' says that "Green Infrastructure is a network of high-quality natural and semi-natural areas and landscape elements that accommodate natural processes. Its management and use aim to protect biodiversity and achieve other social goals in both a rural and a more urbanized environment (Michiels et al., 2018, p. 28; Verheyden et al., 2020, p. 32).

Belgium is described as one of the most urbanized and unorganised regions in the world (United Nations, 2019). Nature is scarce in Flanders, thus there is a larger demand for green areas (Michiels et al., 2018), especially in urbanised places. This urbanization results in fragmentation that will continue to increase (Vanempten, 2014, p. 24). Green-blue networks can be used to unite all fractured bits of nature. In ecology, this is referred to as the creation of corridors (Hu et al., 2021; McPhearson et al., 2016). These networks are multifunctional to urban landscape design and provide many advantages. Examples of advantages are water management, environmental sustainability, social equality, mental health and well-being (Andreucci et al., 2019; Bacchin et al., 2014). Green-blue networks function as corridors making it easier for species to move. Besides, green-blue networks functioned as alternative stormwater treatment systems (Kaur & Gupta, 2022). This network includes blue buffer zones, which provide not only aesthetic value but prevent neighbourhoods from flooding. Rethinking urban green-blue spaces from a landscape perspective demonstrates their significance for biodiversity and human well-being (Andreucci et al., 2019; Gledhill & James, 2008). As a result,

green-blue multifunctional infrastructure has emerged as an essential system for urban landscape design.

1.4 Landscapes

Green-blue networks are frequently incorporated into the landscape and contribute to the ecosystem's general health and performance. The landscape serves as the backdrop for the green-blue network, determining the placement and scale of green and blue spaces. Landscape and social networks are inseparably linked since they both refer to the interrelated systems of natural and constructed features within a certain place. Landscapes are defined as our perception of the world around us, including its many roles and coherence. Landscapes are formed by the interaction of natural features like water, air, plants, and animals, with us humans (Antrop, 1989).

The original concept of a landscape includes a significant visual component: what is immediately apparent and what is in the viewshed. In terms of content, this is still not very detailed because it reveals nothing about what individuals are seeing. Oxford Dictionary's (first) definition of landscape, which reads, "everything you can see when you look across a large area of land, especially in the country," mentioned this as well (Oxford Learner's Dictionaries, n.d.-a). According to the European Landscape Convention, the definition of landscape is defined as: "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". Further "landscapes should be recognised in law as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity" (Council of Europe, 2023).

The definition of landscapes changed through time because landscapes are dynamic, and one of their characteristics is change. The terrain has always been altered by humans to better suit shifting societal requirements (Coeterier, 1997). The population is expanding, and people are living more urban and mobile lifestyles, which are all significant driving forces (Hu et al., 2021). When compared to centuries-old land management techniques, modern projects are proven to be less sustainable. The scattered remains of the previous traditional landscapes are being given more consideration. The landscapes of the past cannot be recreated, but it is necessary to research strategies to maintain important features and locations while integrating them effectively into the present urbanised and globalised civilization (Antrop, 2005). Urban landscapes are now considered in policy discussions as well, with the rural environment no longer necessarily taking centre stage (de Vries, 2009, p. 22).

In landscapes, you can enjoy the various aspects of looks, smells, sounds, and tastes. The feeling someone experiences about a certain landscape is personal (R. Kaplan, 1977; Kaymaz, 2012; Scott et al., 2009). Not everyone finds the same landscapes equally beautiful or pleasant (Antonson et al., 2014; R. Kaplan, 1977; S. Kaplan, 1979). Geographers, architects and psychologists all have a long history of trying to understand how people look at the landscape and what they find interesting (Antonson et al., 2014). People want to understand, make sense of their environment, search, explore, and learn more (R. Kaplan, 1977).

1.5 Behaviour

The interior settings where we live, work, and study has an influence on our behaviour and experiences in different ways. Light, sound, temperature, amount of space, privacy, and territory all have an impact on the daily activities citizens engage in built environments. The physical shape and arrangement of architectural settings affect the kind and calibre of the social and personal functions they accommodate. Additionally, the greater physical context of human activity, such as neighbourhoods, cities, and natural environments, influences how people behave (Holahan, 1982, Chapter 11). The functional component of a landscape is its use. Residents' perceptions and appreciation of landscapes are dominated by use and unity. They regard the landscape as an open system with society as the organising factor. Their perception is based on social forces rather than spatial forces; social factors dictate the spatial manifestation of functions. For example, a route leading to a rural residence should be distinct from one running past fields, even though the physical circumstances are the same. Different landscape types are characterised by land use (Coeterier, 1996). These are outlined in the regional plans of the Flanders spatial structure plan. This map distinguishes between nature areas, residential areas, agricultural areas, recreational areas and industrial areas (Vlaamse Overheid, 1997). Each region has its own characteristics that may be appreciated depending on the shape and items that belong here. Expectations regarding the manner and intensity of usage may shift over time. This has both aesthetic and social consequences: interest in the landscape, and hence social interaction, drops (Coeterier, 1996). According to R. Kaplan (1985), land use is part of an implicit classification that underpins environmental perception. The overall preference for a landscape comprises an aesthetic and a functional component. A distinction can be made between active and passive users of riverscapes. The active users are the ones that are doing and experiencing activities in or on the river. These river recreational activities can include fishing, canoeing, and swimming, … Then you have the passive users who enjoy the landscape at the riverbanks (R. Kaplan, 1977). These include activities such as walking, cycling, running and relaxing. This is the type of user that is present in the Woluwe basin.

1.6   Appreciation / valuation

The Dutch word 'waardering' has two different meanings in English both appreciation and valuation. Nevertheless, appreciation and valuation of green infrastructures have different meanings where appreciation refers more to the ecological and preference values and valuation to monetary values (Ruijgrok et al., 2004, p. 10). Green space valuation refers to the externalities of green places. This is apparent from all the costs and benefits of that green space. People are frequently unaware of the expenditures connected with these spaces (de Vries, 2009, pp. 31–32). Economic values include not only revenues but also all other wealth streams that evade the market, such as recreation and psychological impact. It is about the interest of the citizen. This can be done by providing space for sports and accommodation on the one hand, but also by preserving flora and fauna that are of underlying importance. Costs are mainly attributed to the management and maintenance of green spaces and their creation. No entrance fee is charged for staying in green spaces and access to green spaces in the Woluwe basin and because this study does not deal with ecosystem services, valuation is not discussed further. The focus and further reference will be on appreciation (Ruijgrok et al., 2004, p. 11).

The process of recognising and enjoying the beauty of the natural environment around us is referred to as landscape appreciation. This entails being aware of our surroundings and taking the time to enjoy the many landscape elements. It also entails learning about and respecting the ecological functions and processes that support these landscapes and the biodiversity they support. These are the personal and societal values that residents perceive interpret and appreciate in greenspaces (de Vries, 2009, pp. 31–32). Antrop & Van Damme (1995) indicate five characteristics that are directly linked to landscape valuation. First, there is aesthetics, which considers how appealing something is and whether the surroundings are harmonious; next, there is utility, which takes into account potential uses. The landscape is then examined from a cognitive standpoint while focusing on familiarity and trust (Antrop & Van Damme, 1995, p. 16). It then looks at the affective aspect that includes not only emotions but also feelings related to the cosiness and potential stuffiness of a landscape (Ulrich, 1983). Last but not least, the symbolic perspective is also emphasised, which alludes to both a concrete and an abstract understanding of the landscape (Antrop & Van Damme, 1995, p. 16).

Landscape appreciation may help us develop a stronger connection to the natural world, create a sense of serenity and tranquillity, and even contribute to our general well-being. Furthermore, as we grow to appreciate the landscapes around us, we are more likely to feel obligated to protect and preserve them for future generations (Dijkstra & Klijn, 1992). Appreciation and recreation are interwoven directly, people that visit nature more often tend to appreciate it

more, and people with higher appreciation for nature, visit nature more often (Alcock et al., 2020). So, in essence, value is something that is fixed and can be represented numerically, whereas valuation is something that is objective and varies from person to person (de Vries, 2009, pp. 31–32).

1.7 Perception

1.7.1 Landscape perception

Landscape perception has often been researched across different places and implemented various methods (Dupont, 2016; Kaymaz, 2012). Very commonly used methods for landscape perception are eye-tracking, interviews, pictures, and videos (Dupont, 2016; Kaymaz, 2012; Rogge, 2009; Vanderheyden et al., 2014). Over the years many theories developed, and most of these focus on how people visually experience the landscape (Dupont, 2016; Kaymaz, 2012).

The three main factors that influence landscape perception are the landscape itself, the observer, and the context (Sevenant & Antrop, 2010). To determine what purposes in life influence the observer's landscape perception, Kaplan S. (1979) developed the preference matrix (Table 1), which outlines purposes that influence an observer's perception of the landscape such as 'making sense' (what is happening at the moment) and "involvement" (people want to learn, understand and be stimulated). Coherence, mystery, legibility, and complexity are characteristics that affect landscape experience. Coherence refers to a landscape that is in harmony and objects fit together smoothly, whereas mystery refers to landscapes that invite exploration. Legibility focuses on safety and enjoyment. Complexity refers to richness and diversity. The more coherence, complexity, legibility, and mystery there are in a scene, the more it is valued (Herzog, 1985; S. Kaplan, 1979). It depends on the purposes and intentions of the people and how they look at different environments (Bell et al., 2013; R. Kaplan, 1977; S. Kaplan, 1979; Rogge, 2009).

Table 1: Preference matrix Kaplan (S. Kaplan, 1979, p. 245).

Level of interpretation	Making sense	Involvement
The visual array	Coherence	Complexity
The three-dimensional space	Legibility	Mystery

An environment must be understandable and fascinating, not only now, but also in the long run. To accomplish so, it must be perceptive, displaying order and cohesiveness while simultaneously displaying variance (complexity). In addition, it must offer perspective: where it gives the sense that it stays accessible and offer orientation possibilities (readability) and it

must give the perception that it continues to meet the demand for intriguing experiences (mystery) (Dijkstra & Klijn, 1992, p. 67; R. Kaplan, 1977).

Dijkstra & Klijn (1992, p. 67) state "The meaning and value of landscape are ultimately situated in the observer's mental and social interpretation and reflection of the environment". This definition suggests that the importance and significance of a landscape are decided by how the observer perceives and thinks about their surroundings, both in their minds and in the context of the society in which they live.

This thesis focuses on the water within a landscape. Understanding how water is perceived and valued in a landscape may have implications for the design of landscapes and conservation efforts.

1.7.2 Water perception

According to Bell et al. (2013, p. 45), perception refers to the process in which individuals receive, select, organize, and interpret information to create a meaningful understanding of the world. While there are many studies examining the impact of nature on landscape perception, research on the impact of water on landscape perception is relatively rare. Appleton, (1975, p. 9), described rivers as streams that are interconnected with the landscape and do not divide it into pieces. Also, he stated that: "Most characteristics of places derive from the rocks which underlie them, the presence or absence of water and the form in which it occurs, the cover of vegetation, the climatic conditions and the intervention of man." Nevertheless, Ulrich (1986) found that natural scenes generally elicit positive responses, and waterscapes in particular are often preferred, especially when they have high levels of participation and are well-organized. S. Kaplan's preference matrix (1979) (described above in the section about landscape perception) suggests that people tend to prefer riverscapes with high levels of complexity and coherence, as well as fresh and clear waterscapes. In contrast, waterscapes that are messy, disordered, or stagnant are often less preferred (Herzog, 1985; S. Kaplan, 1979).

When it comes to urban environments, water is an important landscape element that attracts both passive and active users. Accessible, well-designed waterscapes are valuable for their ecological, economic, and recreational benefits, and landscape architects play a role in raising awareness of these benefits through their design and planning efforts (Smardon, 1988). Studies have shown that people have a generally positive response towards waterscapes, although (van den Berg et al., 2003) have found no significant effect on landscape perception when comparing natural and urban landscapes with and without water in video-based experiments.

1.8 Experience

The experience transcends perception. Personal processing of the environment is involved in the experience. Aside from physiological processes, cognitive, psychological, and cultural factors all have a role. Experience is the result of the convergence of numerous processes in the human brain, primarily physiological and perceptual processes such as perception, cognition, and personal history. This occurs at both the conscious and subconscious levels (Antrop & Van Damme, 1995).

In essence, experience simply refers to how something, in this case, the landscape and green spaces, are perceived by the observer as a whole and the emotions it arouses. The observer's sensory impressions of the landscape serve as the starting point. The observer then interprets these impressions and transforms them into experiences. There are numerous ways to perceive a landscape. However, in (policy) practice, it is more important to assess the overall "pleasantness" of the experience or the experiential value than to describe the experience in all of its richness (pleasantness is understood to mean the pleasure that the sensory impressions provide). As a result, the experience is reduced to a judgement on a single scale. Therefore, a landscape that is experienced as being very pleasant has a high experiential value (de Vries, 2009, pp. 24–25).

People do not oppose change, but they do oppose a reduction in experience quality. They view their natural and cultural surroundings as a living whole, and growth and development are essential components of life. This suggests that an environment must be able to adapt to changing conditions and circumstances. However, they are created in a unique way. New environments can also have experiential qualities (Coeterier, 2000, p. 226). Experience evokes emotions, aesthetic pleasure, and may elicit action (Antrop & Van Damme, 1995; Antrop & Van Eetvelde, 2017)

1.9 Support

Support has many meanings and refers to a container concept (Buijs & Volker, 1996, p. 19). Oxford Learner's Dictionaries (n.d.-b) says that support means "to help or encourage somebody/something by saying or showing that you agree with them/it". Van Daele defined social support as "community support and approval. Support for nature policy refers to "the population's support for and involvement in nature and nature policy" according to de Boer & Langers (2017). The Flemish policy document refers to the preservation of natural values that a larger audience shared.

As a result, certain items appeared to return from the definitions. These resulted in two dimensions: passive and active. The passive dimension referred to policy knowledge and attitudes, as well as the refrain of resistance. While collaboration and the creation of one's initiatives defined the active dimension this can be seen as involvement (Turnhout & Elands, 2009). There are further requirements, such as expertise in the policy or project. You cannot commit or reject something that no one knows about. Before they exert support, one must also believe that they can make alternations (Buijs & Volker, 1996, p. 19).

Turnhout & Elands (2009) said that if nature satisfies people's desires, people will become interested in nature. Citizens will embrace and respect the policy they will support the nature policy. Capacity determined the policy's efficacy by either enhancing it or ensuring its implementation. People will support the Woluwe and its tributaries, if they attach importance to water, support the policy or take part in the process (de Boer & Langers, 2022, p. 21)

1.10 Overview diagram

Human perception is primarily holistic. This indicates that what one perceives is determined by the mind's processing and interpretation of what is perceived. Observation/perception, experience, and appreciation are all constantly and dynamically linked in humans. Similarly, the observer and perception will have a close link (Antrop & Van Damme, 1995, p. 12). Human perception is essential because it serves as the basis for our comprehension of and engagement with the outside world. It is the method through which we analyse and make meaning of sensory data gathered from our surroundings (Ulrich, 1986). The perception of water and green spaces is affected by several factors (Aranda, 2022, p. 110). To get a clear overview of which factors influence the appreciation, perception, experience and behaviour of residents along the Woluwe the following diagram in Figure 2 is constructed.
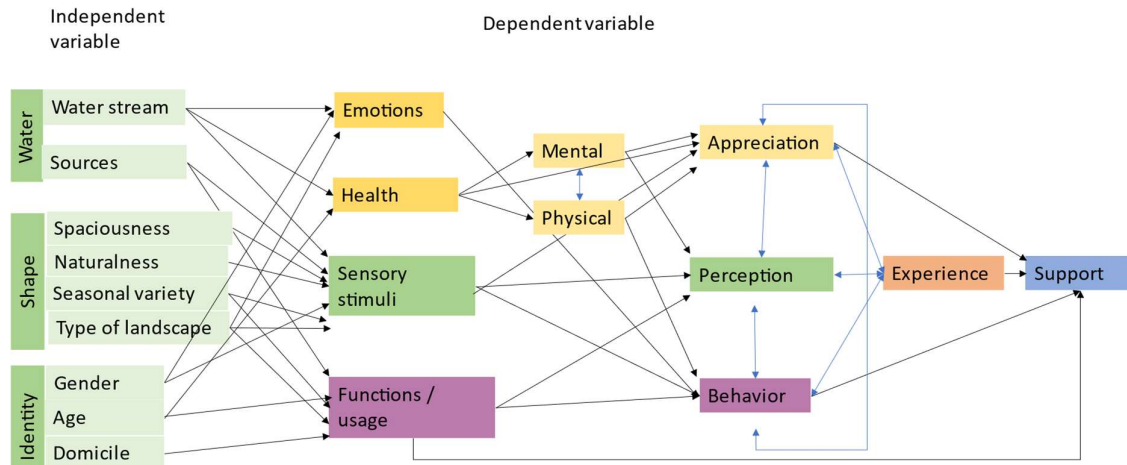
Figure 2: Overview diagram used to make the questionnaire.

Figure 2 presents different variables that are depicted in this literature study. This diagram is drafted taking the literature into account together with diagrams from other literature. (Coeterier, 2000; Gobster et al., 2007; Rauthmann, 2012, p. 521; van Zanten, 2016, p. 14). Independent factors that can be seen in the environment or the respondent's identity are shown on the left. There are also dependent variables, which emerge from the independent variables. Additionally, there are three major, overarching variables: appreciation, perception, and behaviour (Coeterier, 2000, p. 11). The interaction between these traits can be used to derive the experience. Finally, one can build support for the addition of water to the landscape based on perception, appreciation, behaviour, and experience.

In Figure 2, cause and effect relationships are indicated by a black arrow. Interactions are shown by the blue arrow. In this section, each variable and some of the interactions will be explained. Of course, one of the most crucial factors in this study is water, and the Woluwe and its subsidiary streams together with the sources form the water component. The shape of the landscape has four subcategories, including spaciousness, naturalness, seasonal diversity, and landscape type. The spaciousness of a landscape reveals information about its general spatial organisation. This is influenced by a large number of variables, including openness, the type of borders, height differences, and spatial patterns. Naturalness is defined as "an environment that has developed organically", on which flora and fauna can occasionally have an effect. Species diversity, open space, free space, and upkeep of vegetation are among the factors that can be measured (Buijs & van Kralingen, 2003, p. 29). Seasonal variety refers to how the variating seasons affected the landscape yearly. Finally, several landscape types can be identified. Forest, agricultural, meadow, grassland, urbanisation, etc. are examples of these types.

The identity of the survey respondent is the final group of independent factors. Gender, age, and place of residence are the most significant criteria. This study aims to determine how perceptions of and support for the opening up of the Woluwe vary by gender, age, and place of residence.

All senses, such as visuals, smells, sounds, and feelings, are part of sensory impressions. Seasonal effects and colour changes characterize a landscape throughout the year, these changes occur gradually. Odour, noise and artificial night light are characteristics that occur abruptly and can cause a nuisance. Some of these perceptions, such as enlightenment, are fleeting and have a greater impact than previously thought (Buijs & van Kralingen, 2003, p. 29).

For the relationship between water and health White et al. (2010) stated the aquatic habitat has cleaner air and more sunlight. This causes people to be more physically active near water. Water has a calming psychological effect; it elevates mood and lowers stress while promoting a positive outlook (Ulrich, 1983). Images of urban areas that included water were evaluated similarly to those that did not. The sound and light reflections on the water's surface are giving the water its healing power. Any type of water in the landscape is preferable to no water at all from a health perspective (White et al., 2010).

2 Study area

2.1 Localisation

The study area for this research is the Flemish part of Woluwe's stream region. This region is located Northeast of Brussels and spreads out over multiple municipalities. When it crosses the border of Flanders it enters in Sint-Stevens-Woluwe and flows through Zaventem, Diegem, and Machelen to finally flow into the Zenne in Vilvoorde. As Figure 3 shows are there besides the Woluwe also multiple side streams. The Kleine Maalbeek rises in Sterrebeek (Zaventem) and runs through Wezembeek-Oppem before emptying into the Woluwe. In Wezembeek-Oppem, the Kleine Maalbeek is supplied by the Wezembeek, which converges at the Tramlaan. Near Kraainem, the Kleine Maalbeek flows into the Woluwe. Sterrebeek is where the Kleine Maelbeek itself originates. The Kleine Beek, another tributary, begins near Nossegem and runs into the Woluwe in Zaventem. The Trawoolbeek is the final tributary to flow downstream. Starting at Melsbroek, this stream travels through Peutie before entering the Zenne through Vilvoorde. A supply canal runs along the Woluwelaan in Machelen connecting the Woluwe and the Trawoolbeek to the Trawool holding basin. The Vondelgracht, which has its beginnings in Machelen, likewise empties into the Trawoolbeek (Terrens et al., 2022).
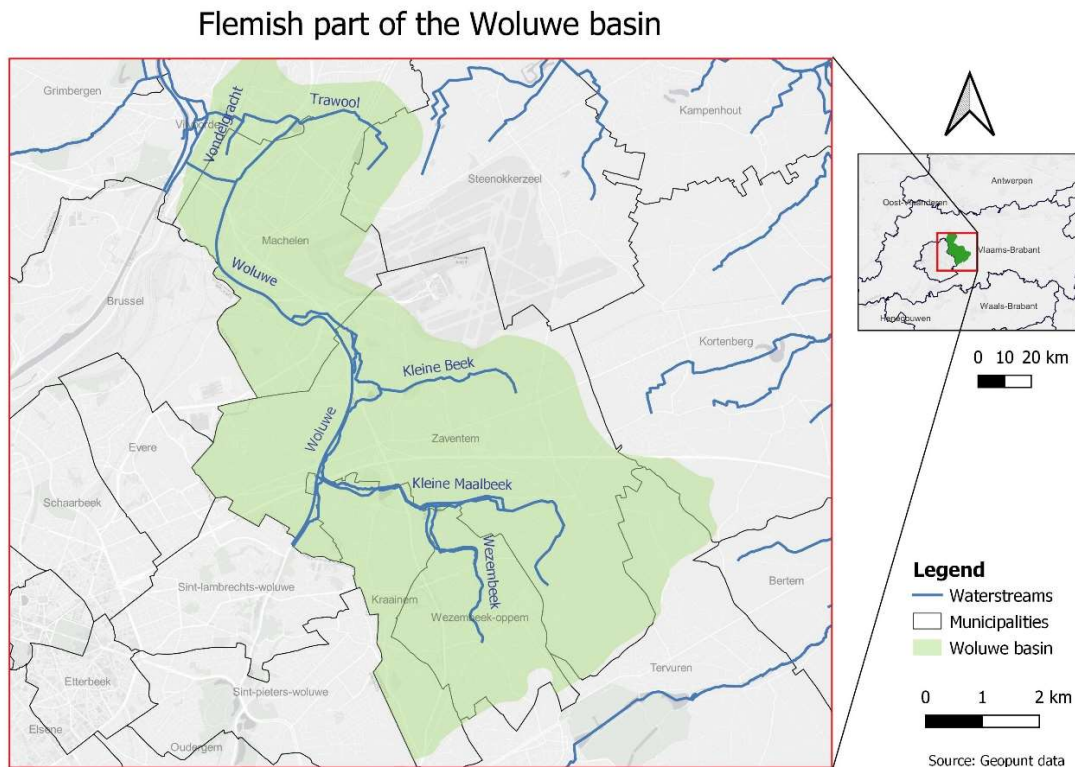
Figure 3: Map of the Woluwe basin in green and the water streams with names in blue.

The Woluwe basin is characterized by several open green spaces of all forms and sizes dispersed throughout the region. This is the result of planning and urban growth which made much of nature disappear. However, many of these open areas are fragmented and undetected by residents and tourists due to inadequate accessibility and a lack of distinguishing features. The existence of barrier-like infrastructure and weak connectivity promotes automobile use even more. Despite these obstacles, conserved open spaces have evolved to fulfil a variety of uses, including agricultural production, recreational space, and natural resource. However, there is a mismatch between planning policy and reality (Aranda, 2022, pp. 111–112; Terrens et al., 2022).

To solve this issue, a land development project was launched to turn the fringe's open spaces into deliberate and necessary components of the socio-spatial tissue. The idea is to give these open areas a distinct identity, resisting increasing urbanisation and maximising their capacity for diverse ecological services. Given the complexities of the socio-spatial context, an integrated development strategy is required (Aranda, 2022, pp. 111–112; De Groote, 2021, 2023).

Picture 1: Picture of the Woluwe taken during the start event of the strategic project 'Leve(n) de Woluwe' (Own photo, 14/10/2022))

2.2 History

There are various reasons why the Woluwe was no longer visible in the terrain, some of which date back to the Middle Ages. In Diegem, the Woluwe originally flowed into the Zenne. Beginning in 1208, the Woluwe was canalised and the Duke of Brabant gave the order to redirect the river via Machelen and Vilvoorde before entering the Zenne (Thijs & Platteau, 2020). Numerous watermills along the banks suffered from the lack of water as a result. At least 30 mills were located along the Woluwe from Bosvoorde to Vilvoorde to supply the thriving metropolis of Brussels. In the 13th century, it was mainly about grain mills, in the 15-16th century this shifted more to paper and gunpowder mills and in the 19th century, industrial factories were established (Somers, 2022; Thijs & Platteau, 2020; Vanempten, 2014, p. 159).

Due to the marshy fertile soils in the loess belt (Lodewijckx & Pelegrin, 2011), the rural region of Woluwe remained unspoiled for many years. The fertile soil was mainly used for agricultural purposes to provide Brussels with food (Somers, 2022; Vanempten, 2014, pp. 91, 142). The Woluwe was largely spared from urbanisation by Brussels throughout the years. It was even described as "a piece of the Ardennes on the outskirts of Brussels". This made it possible for wealthy Brussels residents to construct country homes there in the 18th century. However, in the early twentieth century, the region began to experience substantial changes as technology advanced and a growing population resulted in the expansion of rural villages (Vanempten, 2014, p. 163). Around the First World War, the agricultural sector also witnessed considerable changes, becoming increasingly mechanised, with tractors replacing horses in farming tasks. This adjustment resulted in landscape alterations as minor landscape features faded away and parcel structures were altered (Vanempten, 2014, p. 163, 165).

As previously mentioned, industrial enterprises were constructed next to the Woluwe in the 19th century, increasing the amount of pollution by these factories. This was harmful to both public health and the farmers who cultivated along the Woluwe and relied on this water (Somers, 2022). In 1895, it was decided to begin enclosing the Woluwe with tunnels in an attempt to reduce the health consequences. The Intermunicipal Company for the Remediation and Development of the Woluwe was established later in 1925. Construction of main sewers, collectors, and reservoirs is handled by them (Somers, 2022). They built the Woluwe reservoir in the early twentieth century to address floods and pollution caused by new industries and increased land sealing. Both floods and pollution hurt the Woluwe basin's hydrology.

Further, the German military established an airfield in the area during World War I, this became a vital engine of change and growth after the war. It produced jobs and attracted logistics and infrastructure, resulting in the development of new neighbourhoods and industrial zones on

formerly rural land. The change and growth after the development of an airfield resulted in the building of highways and trains in the region, which fuelled additional urban expansion. Population growth after the World Wars resulted in increased housing and urban development, resulting in the elimination of woods, farms, and water surfaces. Much of the Woluwe basin is now filled by industries, homes, and road infrastructure. These buildings caused space fragmentation and hardening of the soil, resulting in frequent flooding (Vanempten, 2014, pp. 167–170). The Woluwe basin has been significantly altered as a result of landscape fragmentation to prevent floods. As a result, Woluwe's mouth was once more relocated in 1940 to Machelen, where it is now. The Woluwe no longer flows through Vilvoorde (Somers, 2022).

A regional zoning plan, as well as public and governmental awareness, improved the situation in 1979, and many open areas were preserved. A municipal partnership was formed in the 1970s to safeguard the environment and regulate spatial planning. They tried to conserve green places, and numerous parks were built as a result (Vanempten, 2014, pp. 169–170). Since then urbanisation continued, nowadays the urban fringe is seen as one of the most dense regions of Flanders. There are almost no open spaces left and everything is built-up area (Vanempten, 2014, p. 171).

The strategic project Leve(n) de Woluwe was launched to expand on these objectives and provide more area for the Woluwe and its tributaries and create green-blue networks around them (Somers, 2022; Thijs & Platteau, 2020). This raises questions like: *What should the re-opening of the Woluwe look like? Where can the Woluwe be restored? What elements do the neighbours need? What are their preferences? How do they behave in the green-blue networks? How do they experience the re-opening of the Woluwe?*

3 Methodology

Landscape perception consists of many different aspects: aesthetics, behaviour, experience, and response to the environment (Coeterier, 1996, 1997; Howard et al., 2013, pp. 28–31 Ch. 2 by Thompson). Because there are so many different aspects a multi-method approach will be used in this study (Hartig et al., 2003; Johnson et al., 2007; Thompson, 2010). The two methods that are used in this research are a questionnaire to get an overview of a large group and focus groups to dive deeper into details with a small sample (Johnson et al., 2007).

3.1 Questionnaire

3.1.1 Preparing the questionnaire

It is crucial to find the most suitable indicators and understand all the different variables that are pertinent to this research before creating the questionnaire, therefore the diagram in Figure 2 was created. In this diagram, the independent variables are shown on the left and the dependent variables are displayed on the right. The goal is to supply information and answer questions about the variables that are on the far-right side. Besides, hypothesized relations between the variables appreciation, perception, behaviour, experience, and support were visualised.

A semi-structured questionnaire was developed with Microsoft Forms to find the answers to the research questions (Microsoft, 2022). Questions were drawn from validated surveys. The survey on social support for nature in the Netherlands (de Boer & Langers, 2022), the survey on appreciation and recreational use of national landscapes by its citizens (de Boer, 2010), and the surveys of Coeterier on landscape experience were used as a source of inspiration (Coeterier, 1996, 1997; Coeterier & Schöne, 1998). These studies were all concerned with residents' perceptions and experiences in their living environment. The environment in the Netherlands is quite comparable to that in Flanders, and no previous research was conducted in Flanders, the questions depended on surveys conducted in the Netherlands. The majority of the questions came from de Boer (2010), who created a questionnaire that asked about four separate topics: neighbourhood conduct in nature, perception of nature in the landscape, experience with nature, and respondent personality traits. Only the questions pertinent to this study were used. The questions were altered verbally because there were some disparities between Flemish and Dutch. In addition, questions were adapted to our research region and the several municipalities that make up the Woluwe basin. An anonymous survey was used to gather the data. Survey questions explored attitudes regarding desire, perception, and appreciation of greenspaces, including preferences for landscapes with or without water streams. The use of and attitudes about the green-blue networks themselves were also

investigated. By carefully crafting the questions and properly arranging the survey, question order impacts were reduced.

This study used both closed and Likert scale questions as its survey tool. The Likert scale is a common instrument to measure people's attitudes, views, and perceptions. Using a scale from strongly disagree to strongly agree, it assesses the degree of agreement or disagreement. The respondents were asked to rate how much each statement in the survey they agree or disagree with as it relates to the implementation of the new performance management system. The use of Likert scale questions has several benefits. First off, data could be gathered from a large number of respondents very rapidly, which helped for a thesis project with one year to complete. In addition, Likert scale questions offered accurate assessments of a person's ability. There were various methods to interpret the data's veracity. Lastly, it was simple to compare and combine the outcomes of questions using a Likert scale with the additional qualitative information obtained from focus groups. To provide comfort and ease of access for the participants, the questionnaire was delivered using an online platform. To ensure the validity and reliability of the instrument, a test case was carried out with a small sample of individuals (Dobbie & Farrelly, 2022).

The first survey questions were centred on respondents' knowledge of the Woluwe in their living environment. It was interesting to know the answers to the questions if the Woluwe is a river that rises in Watermaal-Bosvoorde and empties into the Senne near Vilvoorde. This question was asked in a PhD study before (Aranda, 2022) and it is interesting to know that there are improvements in the knowledge of citizens in the last years. To learn more about the municipality where the respondent resides, the second question is asked. Also, a Likert scale inquiry about the presence of green spaces in their immediate surroundings is included. Then, in order to determine how frequently the respondents engaged in various outdoor activities, a question concerning the current use and purpose of the green spaces was posed. An inquiry about the causes of people's appreciation of nature uses the best-worst scaling. The characteristics of the green places that respondents value the most are revealed by this method. The appreciation of various features in green places is the subject of the following questions; once more, the level of agreement is indicated using a Likert scale. The importance of various environmental factors is then evaluated according to the respondent's opinion.

Support for the Green-blue Network, the significance of Woluwe's re-visibility and accessibility, and the respondents' readiness to participate in this process were then discussed. The final set of questions are personal in nature and are intended to elicit details about the respondents'

housing status. Respondents were questioned regarding the time they already live in the Woluwe basin. The number of people living in their households, their age, level of education, and their gender, as well as their access to private outdoor places, were asked. This section ended with a question about taking part in a follow-up survey. The whole questionnaire was attached in Appendix 7.1.

Although even with the test case there were some misunderstandings of some questions of the survey. The question about households and the number of children is interpreted wrongly. Afterwards, some respondents filled in that their households existed out of 2 people, but if you asked how many of the people in your household were below 18 years old they answered 2 as well. Looking at their age group, they were between 61-70 years old, so this is an inconsistency. This happened multiple times, so it was not possible to use this information in the analysis. This happens more often, Schio (2023) mentioned this during a guest lecture. They had the same inconsistency of people with a two-person household with more children living in that household.

Another question where something went wrong was the ninth question: *Around the Woluwe, several projects have already been completed including the Woluwe pad and visualisation of the Woluwe with winter bed. Would you want to contribute to actions and increase the visibility and accessibility of Woluwe and its tributaries?* Normally everyone should have answered this question, but afterwards while cleaning the data, it became clear that this was not the case. Something went wrong with the conditions attached to the ninth question in the Microsoft Forms file. With all the other questions everyone had to respond to this question otherwise they could not go to the next one but this was not the case for the ninth question. Only a part of the respondents filled in this question. This question was intended to provide further information regarding people's support for environmental projects, but due to this error, it was unable to include all findings related to this question.

3.1.2 Selection of participants

The main objective of this study was to understand how neighbours of the Woluwe use, behave, experience and appreciate the green spaces and the nature around the Woluwe in their living environment. Because this study was conducted specifically for the Woluwe basin the participants need to live nearby. As a result, the municipalities where the Woluwe has its catchment area were used to search for respondents.

The respondents of the different municipalities were contacted through the information channels of the relevant municipalities. Because the municipalities and 'Regionaal Landschap Brabantse Kouters' were only allowed to communicate in their official language, the questionnaire is also distributed through social media groups like 'Je bent van Diegem als …', 'Durf te vragen Vilvoorde' or 'Nous aimons la commune de KRAAINEM (CRAINHEM)'. This allowed the questionnaire to be distributed in 3 languages (Dutch, English and French, respectively). Appendix 7.2 contains the text that was used during the questionnaire distribution via social media. Additionally, associations of the relevant municipalities were invited through email. The active associations in the area could be found on the municipality's website. All of these associations' email addresses were collected, and the link to the questionnaire was provided along with the question of whether they wanted to distribute it to their members.

Another sampling method used is gathering answers on the local market. This was done with a tablet from the 'Regionaal Landschap Brabantse Kouters'. Therefore, respondents do not need electronic devices to answer the questionnaire. In this case, responses arrive directly, and they could ask for clarification. Furthermore, posters were also distributed in the public buildings of the various municipalities such as libraries, sports halls, cultural centres, etc… In the end, respondents between 20-50 years old were still needed. Therefore, flyers were handed out at the primary school gates. For these methods, there is a high rate of non-response because people are not really interested in the topic or do not have time or other excuses to not fill it in.

The described methods above to gather as many as possible respondents in a short period can be called convenience sampling. This is the easiest sampling method because only people that are interested, available and willing to participate are taken into account (Gideon, 2012, pp. 66–67).

3.1.3 Statistical analysis

The results of the closed question had mostly categorical variables and Likert scale questions created ordinal variables. These factors are classified as qualitative and are thus treated differently from quantitative variables (de Vaus, 2002; Hubert et al., 2015). Excel and SPSS were used for the descriptive analysis (IBM Corporation, 2022). The findings were visualised using bar and pie charts. The sample was compared to Statbel's population statistics of 2022 to see whether the sample was representative of the whole population or not.

The age groups, gender and residence were then subjected to a goodness-of-fit test, namely the Chi-squared test because it is appropriate for discrete variables. This study investigated if the observed frequencies differed considerably from the anticipated frequencies when all classes were treated equally. A p-value less than 0.05 indicates that there is a significant difference between the observed data and the expected data. Besides is the frequency distribution not caused only by chance (Pallant, 2011). Furthermore, principal component analysis was employed. The PCA analysis narrows down the questionnaire findings to the components that account for the most variance. Mutual correlations between distinct aspects described by the same component might give a foundation for analysing potential underlying links (Pallant, 2011, pp. 181–200). Then the Likert scale scores could be added to each other, and a mean was calculated. This allowed to create new variables that could be used in the logistic regression.

For other relations that were between different variables and not the observed and expected values, the Chi-Squared test of independence was used. Because this statistic generates less reliable findings for modest absolute frequencies (five as a minimum recommendation value), classes were sometimes combined or removed. If this was not an option, the Fisher-Freeman-Halton test was used. In addition, Spearman Rho tests were carried out to evaluate correlations between continuous or ordinal variables (Bryman, 2016, p. 343; Pallant, 2011). Finally, to answer the main objective of this thesis a regression analysis was used to see which factors have an impact on the support for the re-opening of the Woluwe. All statistical analyses were carried out using IBM SPSS Statistics version 29.0.0.0 (IBM Corporation, 2022).

3.1.4 Ethics and privacy

Ethics and privacy were considered in many different ways. When contacting respondents, for example, the goal of the research and the questionnaire were conveyed. At the start screen of the survey, a more extensive explanation of the research was provided. For example, it was stated that the survey responses would be kept anonymous, would only be used for research purposes, and would not be shared with anyone else. Participation was completely voluntary and could be stopped at any time. Contact information of both me and 'het Regionaal Landschap Brabantse Kouters' were supplied at the start of the survey in case of questions or concerns.

3.2 Focus groups

In addition to the survey questionnaire, focus groups were conducted to gain a deeper understanding of the attitudes and perceptions of the participants. Focus groups are dynamic and interactive discussions that are conducted in a group setting (Barbour, 2018, p. 2; Boeije, 2014, pp. 81–82). This allows participants to interact with each other and articulate their views and opinions on the green-blue networks along the Woluwe. The goal of the researcher is to guide the participants with topics and let the participants discuss on their own with less interaction from the moderator (Barbour, 2018, pp. 2–3; Boeije, 2014, p. 82). Although focus groups consist of 6-10 people, the conducted focus groups contained three and seven participants, respectively. No-show is a very common phenomenon with focus groups (Barbour, 2018), luckily everyone that agreed to come, was present in the discussions. The focus groups were conducted in person on March 29 and April 13 2023. The preparations for the focus groups are attached in Appendix 7.3. The focus groups were audio-recorded using a microphone linked to a laptop.

3.2.1 Sample method

Similarly, to the questionnaire, convenience sampling was used here as well. This sampling method was very limited. Throughout the questionnaire, email addresses were collected. In the survey, they were asked whether or not they would be willing to participate in a follow-up survey. If they said yes, they may provide their email address so that contacting them was possible. This provided a database of people to contact by email for the focus groups.

For the first focus group that was centred on the active population, people under the age of 60 were invited. Not only this, but they also indicated that they were interested in participating in the follow-up research when prompted. Furthermore, only those who had completed the questionnaire in Dutch were invited to the focus interview to ease communication. Finally, the focus groups were held in the municipality of Zaventem, thus only people from that area were invited. The second focus group included mostly retirees. The different criteria described above were likewise applied here, with the exception that the age category was 60 and up. In total, during March and April, 47 email invites were sent. For the first focus group, 27 email invites were sent out and 20 persons were invited for the second focus group.

3.2.2 Description of Sample

By using the sampling method described earlier, ten respondents ultimately participated in the two focus groups on March 29 and April 13, 2023. The sample consisted of three women and seven men. The first focus group, which was previously aimed at the active population, had the least success, with only three people present. For the second focus group on April 13, six

invitees showed up and an additional respondent who had not participated in the survey arrived because she was informed by one of the six participants present. The age of the participants is between 30 and 80 years. The first group consisted only of working people, the second focus group consisted mainly of retirees. Table 2 shows a summary table of the participants. The participants were given a code that included either the first or the first two letters of their first name. This code is also used during focus group transcription.

3.2.3 Analysis of focus groups

For analysis, the focus group recordings were transcribed and coded using the intelligent verbatim principle, which means that all words and general conversations were written down. Stop words and slips of the tongue have been eliminated (McMullin, 2023). Dialectical terms were translated into common Dutch. Finally, punctuation marks and capital letters were added to improve clarity and readability. The conversations were put up as accurately as possible, however, this was not always possible because sometimes everybody spoke at the same time during the focus group. The transcripts were transcribed anonymously since the proper names and personal addresses were omitted. These were replaced with abbreviations of X and Y according to the focus group and a number (see Table 2). Additional resources utilised during the focus group, such as a map and a mind map diagram, might also be analysed.

These transcripts were qualitatively coded. Coding is used to investigate data to make it more manageable and understandable (Boeije, 2014, pp. 111–112). This is accomplished by labelling and grouping data that falls into the same category. Finally, the many categories are grouped under the same subject (Boeije, 2014, pp. 111, 125; Saldaña, 2013, p. 51). Focused coding was employed using NVivo 12 the categories can be found in Appendix 7.4 (Saldaña, 2013, pp. 213–214).

3.2.4 Ethics and privacy

During the focus groups, the participants' privacy and ethics were also considered. When the participants were invited by email to the focus groups, they were given an explanation of the research and the goal of the focus group. There was also a quick explanation of how it worked and what the purpose was at the beginning of the focus group itself. They were then asked if the conversation may be recorded. Furthermore, the recording of the discussion will be utilised just for this research and will not be disseminated. The participants' confidentiality was likewise ensured; their full names and addresses were not revealed. During transcription, only codes like X1 and Y2 were used. Locations mentioned during the conversation have been kept since they give fascinating information for this research.

4 Results + discussion

This chapter addresses the results of the questionnaire and focus groups. In total 255 responses were gathered through the survey. The questionnaire findings are based on a sample of 230 respondents from the target audience. The focus group results were based on 10 participants in two focus groups. This chapter will explain the response rate and profile of the respondents of the focus group and the survey.
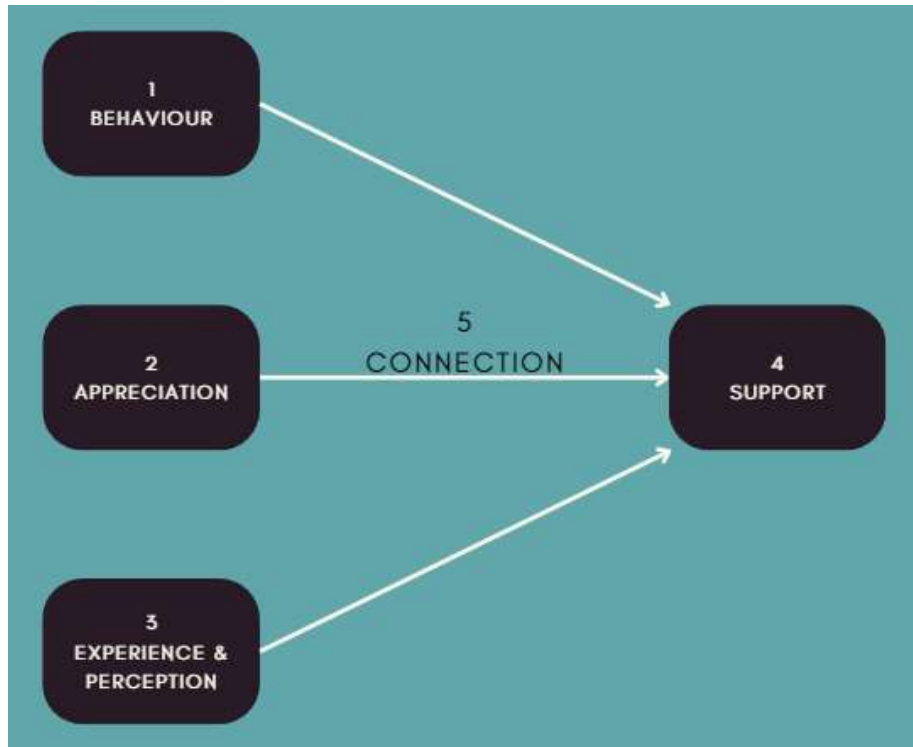
Figure 4: Overview of the different sections of the result and discussion chapter (Own work, 2023)

Thereafter, the result chapter is divided into 5 parts shown in Figure 4. First, all the results from the survey and the focus groups that are linked to behaviour are explained. Secondly, the same is done for the elements linked to the appreciation of green spaces. Next all variables linked to experience and perception are analysed. After the analysis of behaviour, appreciation and experience & perception the first three research questions related to these topics are answered. In the result section for each topic a new variable specific to this topic is created that can be used in the regression.

The next section is about support. It discusses everything that is mentioned in the questionnaire and focus group related to the support for the re-opening of water streams or the Woluwe project in general. The last step is describing the connections between behaviour, appreciation, experience and perception, and the support for the 'Long Live Woluwe' project. The final section of the Results and discussion describes the limitations of this thesis.

4.1 Response rate and profile characteristics

First, an overview of the focus group participants is given. Table 2 is based on the questionnaire responses and the information from the personality cards that were filled out before the focus group. As mentioned in the methodology section, two focus groups were organised, with three and seven participants, respectively. Table 2 discusses several participant characteristics such as gender, age group, career, area of residence, and interests. Each participant is also assigned an abbreviation, which is used to anonymize the focus group transcripts.

Table 2: Characteristics of focus group participants.

Date	Age group	Gender	Residence	Job	Hobbies	Abbreviations
29/03/2023	51-60	Female	Nossegem	Jobless	Volleyball, walking	Y1
29/03/2023	51-60	Male	Sint-Stevens-Woluwe	Teacher	Gardening, walking, reading	Y2
29/03/2023	41-50	Male	Zaventem	Museum conservator	Walking, cycling, sailing, climbing	Y3
13/04/2023	71-80	Male	Sterrebeek	Retired EU officer	Travelling, wine, sports	X1
13/04/2023	18-30	Male	Zaventem	Civil servant	Running, cycling	X2
13/04/2023	61-70	Male	Zaventem	Retired	Sports	X3
13/04/2023	71-80	Female	Zaventem	Retired	Okra, collecting stamps, culture	X4
13/04/2023	61-70	Male	Nossegem	Retired	Aviation, nature, travelling	X5
13/04/2023	61-70	Female	Zaventem	Alderman local government	Dancing, cycling, walking, skiing	X6
13/04/2023	61-70	Male	Sint-Stevens-Woluwe	Retired	Cycling	X7

Subsequently, this information provides a picture of the composition of the sample group that completed the questionnaire. In total 255 respondents complete the survey. Sample sizes across different municipalities vary, with the smallest one contributing 4 respondents. As a result, non-parametric statistical analyses were conducted. 22 respondents live in a municipality outside the Woluwe Basin. Therefore they did not belong to the desired population and were removed from the data before the remaining 234 responses were analysed. After looking at the residence even 4 extra responses were removed.

The sample size required to get generalizable results is determined by the desired degree of confidence and maximum error (Taherdoost, 2017). The total population of all municipalities is 126.794 people (Statbel, 2022). A confidence level of 95% would equate to around 383 completed questionnaires. For this survey, just 255 questionnaires were returned. This signifies a greater than ten per cent inaccuracy. This error is fairly substantial, implying that the survey results are only to a limited extent generalizable (Taherdoost, 2017). Furthermore with the Chi-squared test goodness-of-fit is determined whether the data is representable for the population. Therefore it is still possible to revive trends and gather extra information through focus groups.

Gender and age

Of the 230 people that filled in the questionnaire and belong to the target group, 54.7% of the respondents are women and 44.9% are men. One respondent (0.4%) did not want to respond to this question and belongs to the category 'rather not say'. In 2022, 51.3% of the inhabitants of the municipalities of the Woluwe basin were women and 48.7% were. This suggests that the distribution between both genders is rather similar to that of the population.

This survey included more females than males. According to Smith (2008), this is to be expected since there is often a gender bias in online surveys. Women are more likely than men to complete online questionnaires. This is mostly due to differences in how people interact with online environments. Furthermore, because women are more empathic and emotionally open, they can better empathise and connect with people, allowing them to engage in questionnaires more rapidly (Smith, 2008).

To decide whether there is a relation between the gender distribution in the survey and the expected gender distribution in the population a Chi-squared goodness-of-fit test was used. This test indicates that there was no significant difference in the proportion of males and females identified in the current sample as compared with actual population data of the different municipalities, $\chi 2$ (1) = 1,27 with n = 229 and p < 0,26.

Besides gender, the age group distribution of samples was also compared to the real population numbers. Figure 5 visualises the age distribution of the respondents of this questionnaire and Figure 6 shows the age distribution over the whole population.
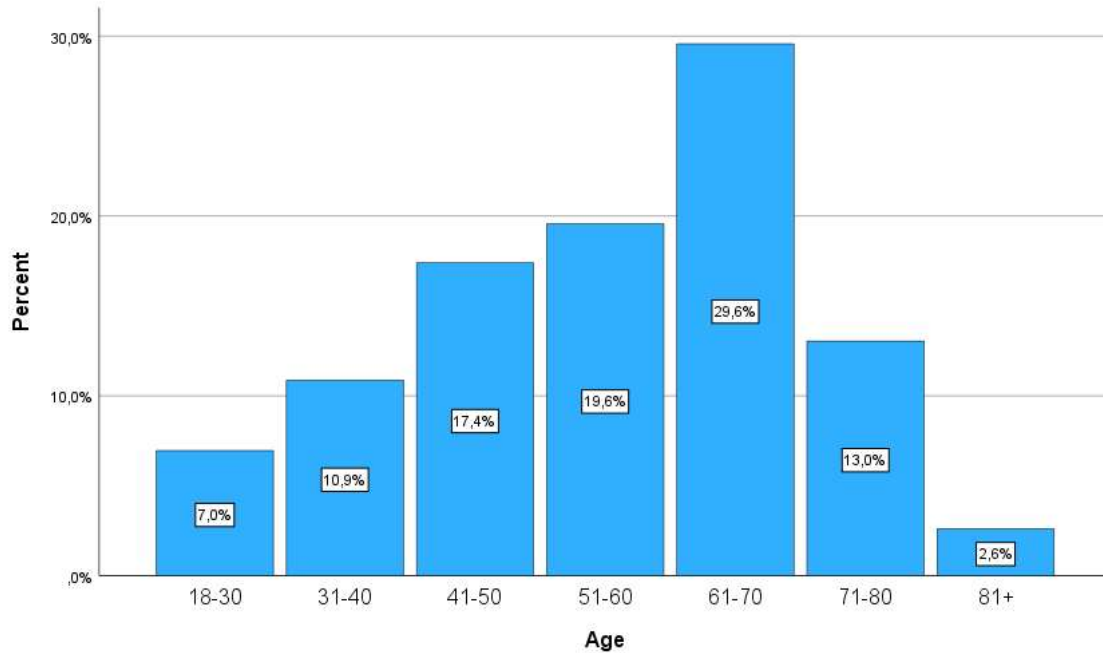
Figure 5: Bar chart percentage for each age group (Own survey, 2023, n = 230).
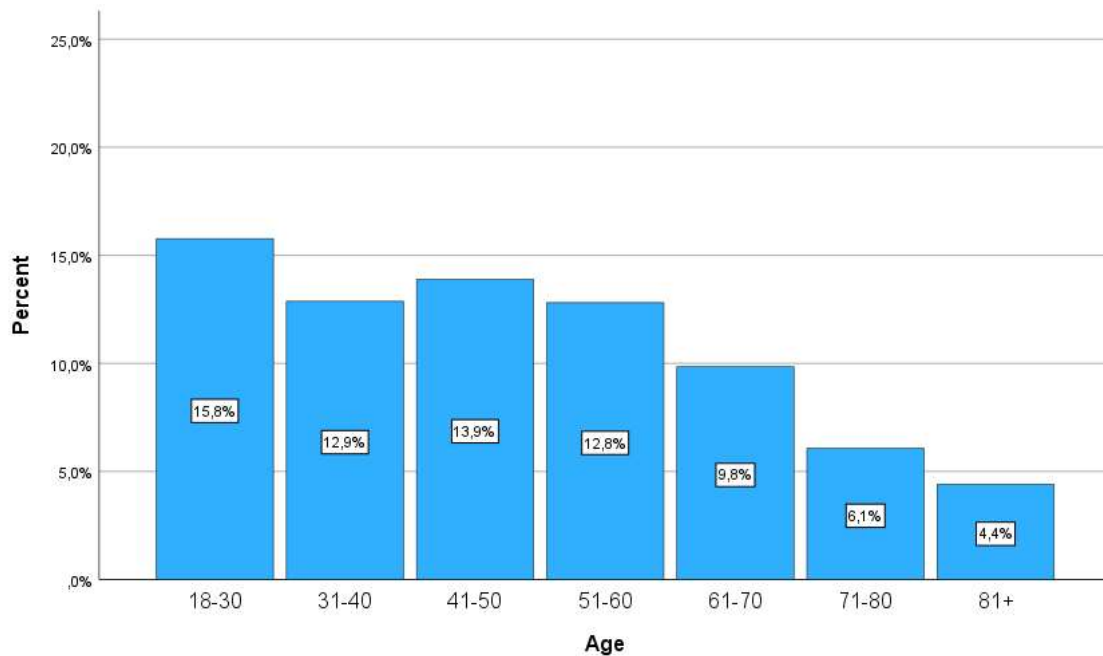
Figure 6: Bar chart percentage age group whole population (Statbel, 2022)

Comparing Figures 5 & 6, it is clear that there were some major differences. First and foremost, the category of -18 years old is not present in the sample, although this age group represented 24,3% of the population. The age group -18 years old is left out of Figure 6 to make it easier to compare both graphs. The age groups 41-50, 51-60 & 61-70 are overrepresented in the sample, the other age groups are underrepresented. The Chi-squared test determined the considerable differences in age distribution between the sample group and the relevant population. The Chi-square goodness-of-fit test indicates there is a significant difference in the proportion age distribution of the sample and the actual age distribution in the study area [$\chi2$ (6) = 87,783 and p < 0,0005, n = 230]. The P-value is smaller than 0,05 thus the null hypothesis saying that the age groups of the sample and population are not different is rejected. This result must be taken into consideration during further analysis. The age distribution of the sample is not representative of the population and therefore it is not possible to generalize the results.

Finally, a summary of the gender distribution across the various age groups is provided in Figure 7: Age and gender (Own survey, 2023, n = 230)Figure 7. This demonstrates that while men and women are equally distributed in the age groups of 18 to 30, 41-50 and 81 and older, women outnumber males in the age groups of 31 to 70. Men only make up the majority in the age range of 71 to 80.
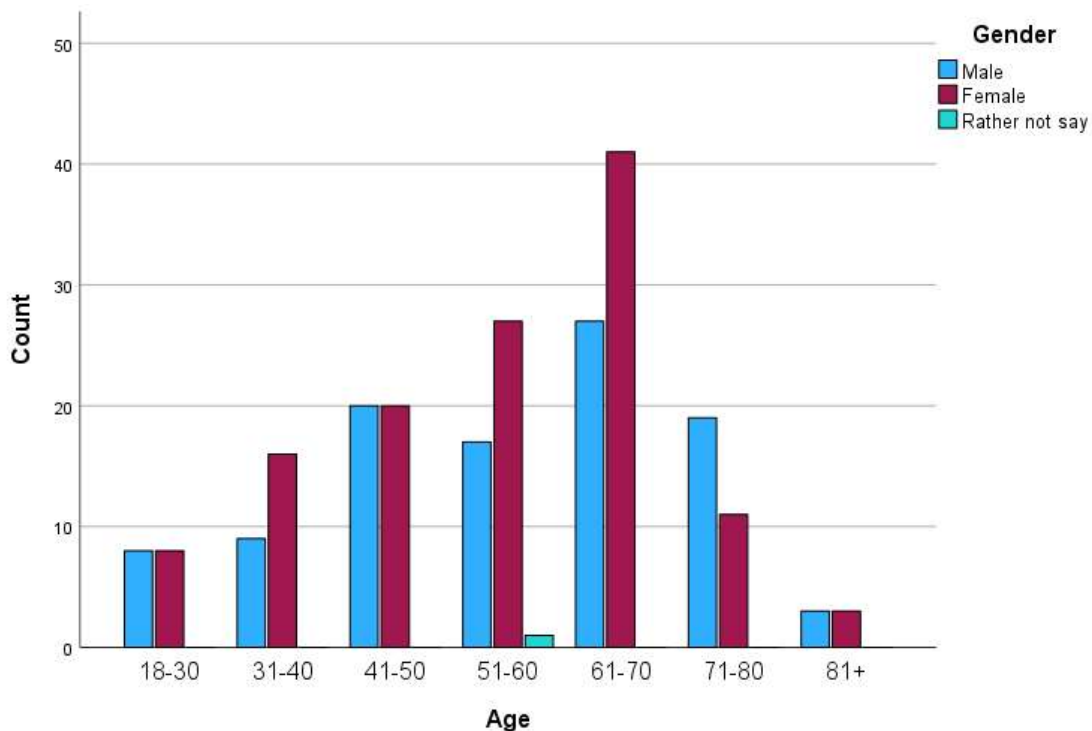
Figure 7: Age and gender (Own survey, 2023, n = 230)

Residence

Besides age and gender, the questionnaire also inquired about the respondents' place of residence. First, they indicate in which municipality they live. Then, how long they have already lived in this region? Next, which private green spaces are at their disposal such as: a garden, courtyard, front garden or terrace.

Figure 8 shows that most of the responses are obtained from Zaventem. The lowest representation comes from Peutie, Melsbroek and Diegem with each representing less than 5% of respondents. To facilitate the analysis and get a better distribution, municipalities and sub-municipalities are combined into one category. Since Melsbroek belongs to Steenokkerzeel, but only Melsbroek is part of the Woluwe catchment area, the 4 responses from this region will not be considered in further analysis. This merge resulted in Figure 9. Where it becomes even more clear that Zaventem is the most represented municipality.
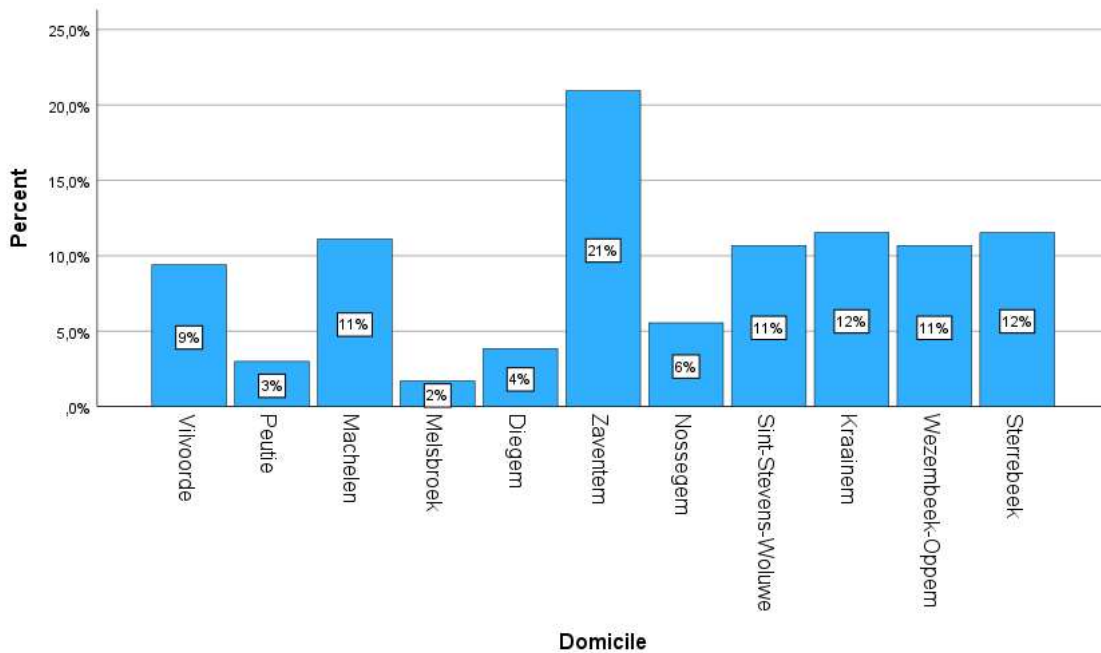
Figure 8: Residence municipalities (Own survey, 2023, n=234)
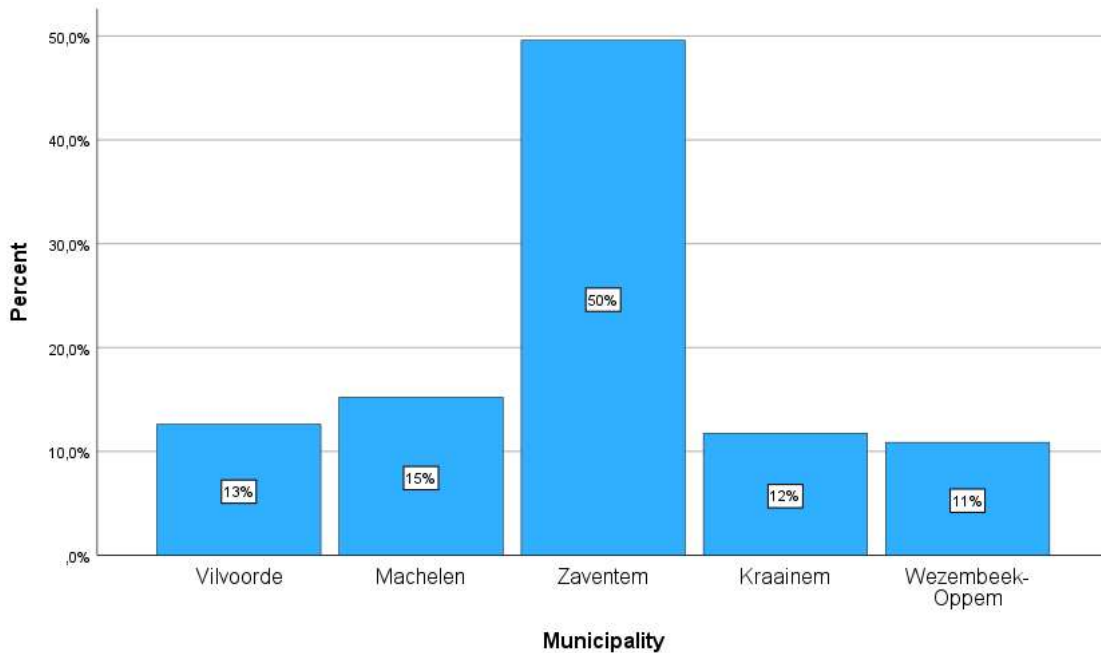
Figure 9: Distribution of the respondents over the different municipalities (Own survey, 2023, n=230)

The question arises whether it is logical for the municipality of Zaventem to have the largest representation. This is explored by comparing the actual population sizes from Statbel with the sample of the survey (Statbel, 2022).
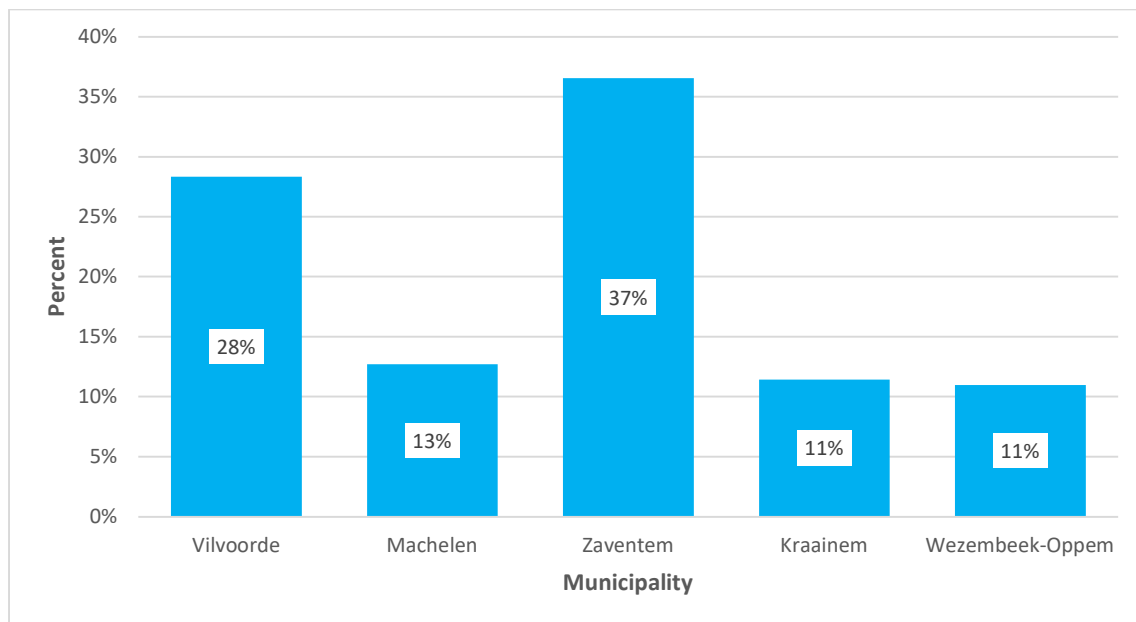
Figure 10: Bar chart showing the population distribution over the different municipalities (Statbel, 2022, n = 126.809)

Comparing Figures 9 and 10 indicates that the population of Zaventem is indeed the largest, but for Vilvoorde there is an underrepresentation. A Chi-squared test is conducted to see whether the differences between the distribution over municipalities of the sample and

population are significant. The result of the Chi-squared goodness-of-fit test shows that our test sample is statistically significant: $\chi^2(4) = 74{,}2$ and $p < .0005$. Therefore, the null hypothesis is rejected and the conclusion is that there is a significant difference between the distribution over municipalities of the sample and the actual population distribution. This is something to consider in the analysis. The sample is not representative of the population, because the age distribution is too highly loaded towards the elderly, besides there is an underrepresentation of the municipality of Vilvoorde and an overrepresentation of Zaventem. Therefore the sample is not representative of the population and generalizing is only possible to a certain extent, taking into account the age and residence distribution of the sample.

In the survey, participants were questioned about how long they have been residing in the Woluwe basin and how this is connected to their knowledge of the region's changes through time. The survey results revealed that the majority of respondents have been living in the region for at least 20 years (72.2%). All the other categories, under 20 years of residence, contained less than 10% of the respondents. However, it became clear during the focus groups that many of the region's citizens were expats who stayed for only 3-5 years while working for NATO in Brussels (Mares, 2012). This indicates that the 5% of people that lived there for less than 5 years is an underestimation. According to Vlaamse Overheid (2021), the number of expats varies between 15-30% in the municipalities along the Woluwe. In the focus groups participants mentioned this about the short-stay residents.

"A lot of bureaucrats live in my street. That is a coming and going of people. They are people of all nationalities, Italians and so on, all nationalities of Europe. They have no feeling for the village or green elements." (Original: "In mijn straat wonen heel veel bureaucraten. Dat is een komen en gaan van mensen. Zijn mensen van alle nationaliteiten, Italianen en noem zo maar op, alle nationaliteiten van Europa. Die hebben geen voeling met het dorp of met groene elementen.") (Y2, 29/3/2023)

"10% non-native speakers is not the reality of the population of the Woluwe valley" (Original: "10% anderstaligen is niet de realiteit van de bevolking van de Woluwevallei") (Y3, 29/03/2023).

"But of course you do have quite a lot of people who do stay here for short periods. You do have permanent residents but you also have a lot of temporary ones who only stay for 3-5 years." (Original: "Maar je hebt natuurlijk wel toch tamelijk veel volk dat hier wel maar korte periodes blijven. Permanente bewoners heb je wel maar je hebt ook veel tijdelijke die maar 3-5 jaar blijven.")(Y1, 29/3/2023)

As mentioned in these comments, the participants emphasize that there are many short-stay residents in their neighbourhoods. Besides, the language in which the questionnaire was completed was for 74% of respondents Dutch, only 14% and 12% chose French and English, respectively. The population data of Statbel shows that in all the municipalities of the Woluwe basin more than 45% of the population is from foreign origin. Machelen has the highest percentage of 64%, followed by Vilvoorde, Kraainem and Zaventem with 59.7%, 56.7% & 55.1%, respectively. The lowest percentage of foreign origin is in Wezembeek-Oppem with 45.8% (Statbel, 2022; Vlaamse Overheid, 2022). This suggests that most (short-stay) non-native speakers did not fill in this questionnaire. Thus, although long-term inhabitants offered valuable insights, the study lacked the input of a large proportion of the population.

4.2 Activities and behaviour

This section presents the results of the survey and focus groups regarding their use of green spaces, respondents' behaviour and the different activities undertaken within green spaces. The combined findings offer a comprehensive understanding of green space utilisation and answer research question 1.

In the questionnaire, the respondents must indicate how often they practice certain activities in green spaces in their living environment. The results are indicated in Figure 11.
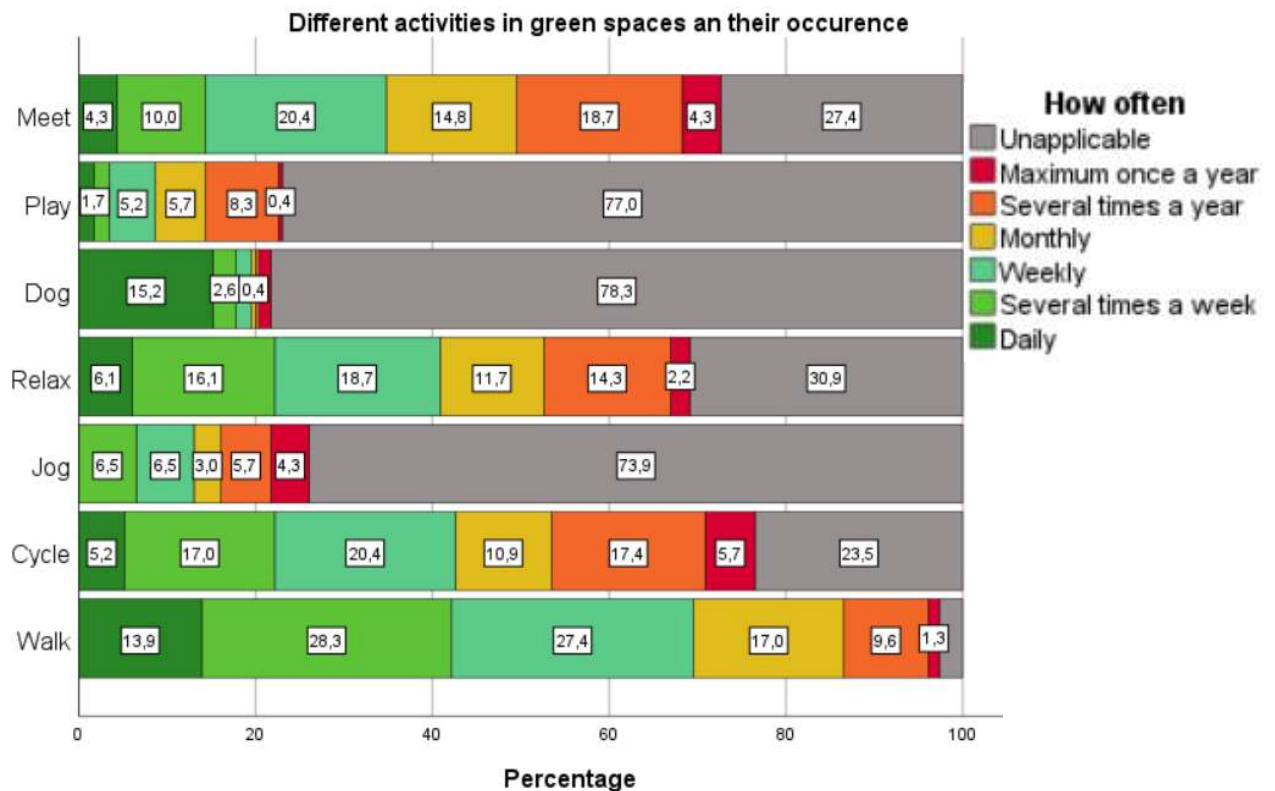

Figure 11: Stacked bar chart showing how often respondents do different activities (Own survey, 2023, n = 230)

Figure 11 demonstrates that individuals primarily go for a walk. 69% of people practise this habit once a week or more. Additionally, many people cycle, 42% of respondents cycle in green places every week or more. The least frequent activities in the green spaces of the Woluwe basin are jogging, playing, and dog walking and more than 70% of respondents said that these activities were not applicable for them. It is evident that the most popular activities in green areas are walking and cycling, but 41% of people also go there to unwind at least once a week.

According to the research of de Boer (2010) conducted in the Netherlands, 64% of people cycled and 65% of people walked at least four times a year. Applied to the findings of this study, excluding several times a year, maximum once a year and not applicable, the percentage of walking is 86% and 53%, respectively. These numbers in Figure 11 are more in line with the study by van der Wulp (2008) that found 80% of people took walks more than four times per week. As can be observed, there is a significant variation in the percentage of respondents who say that cycling is not applicable. This may be because the elderly, who are not always adept to bike, filled out the questionnaire in large part.

To see whether there is a significant difference between the activities undertaken by various age groups, principal component analysis and Spearman Rho correlation are conducted. The PCA analysis narrows down the questionnaire findings to the components that account for the most variance. Mutual correlations between different characteristics provided by the same component may provide a framework for investigating potential underlying relationships. Mutual correlations between diverse features covered by the same component may provide a basis for investigating potential underlying linkages (Pallant, pp. 181-200).

SPSS version 29 is used to perform PCA analysis on the seven different activities. Before using PCA, the data's suitability for factor analysis is evaluated (IBM Corporation, 2022). Several coefficients of 0.3 and higher are found in the correlation matrix. The Kaiser-Meyer-Olkin value is 0.619, which is more than the indicated value of 0.6 (Kaiser, 1970, 1974), and the Bartlett's Test of Sphericity with 10 degrees of freedom is statistically significant, showing that the correlation matrix is factorable (Bartlett, 1954).

Table 3 shows the outcome of the principal component analysis that revealed the presence of three components with eigenvalues larger than one, which explained 34.8% and 23.1% of the variance, respectively. Parallel Analysis with Monte Carlo PA produced two components with eigenvalues larger than the acceptable criterion values for a randomly generated data matrix of the same size (5 variables, 230 respondents, and 100 iterations) (Pallant, 2011, pp. 181–200).

The two-component solution explains 57.8% of the variance. Oblimin rotation is employed to aid the understanding of these two components. The rotating solution reveals a basic structure, with all components displaying a number of strong loadings and all variables considerably loading on just one component. Components 1 and 2 have a very minor positive connection (r = 0.054). The study's findings support the use of separate class components (Pallant, 2011, pp. 190–200).

The scores of the jogging and cycling are added and a mean is calculated. This new score is called active activities. The activities of meeting, relaxing and walking are summed up and the mean is calculated. Besides, the other new variable 'passive activities' is created. Further analysis is done with the new variables: active and passive activities.

Table 3: Results of PCA analysis on the different activities (Own survey, 2023, n = 230)

Activities	Pattern coefficients		Structure coefficients		Communalities
	Component 1	Component 2	Component 1	Component 2	
Meeting people	**0,773**	0,034	**0,775**	0,075	0,485
Relaxing	**0,757**	-0,077	**0,753**	-0,036	0,595
Walking	**0,693**	0,043	**0,695**	0,080	0,638
Jogging	-0,184	**0,787**	-0,141	**0,777**	0,573
Cycling	0,206	**0,732**	0,245	**0,743**	0,601

Table 4: Spearman rho correlation between active and passive activities and their correlation with age groups.

Correlations

			Age
Spearman's rho	Active	Correlation Coefficient	-,385**
		Sig. (2-tailed)	,000
		N	230
	Passive	Correlation Coefficient	,051
		Sig. (2-tailed)	,444
		N	230

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows a significant negative medium correlation of -0.385 between active activities outdoors like cycling and jogging with age. There is no significant correlation between passive activities like meeting people relaxing and walking with age. Active and sportive activities are done more frequently by younger people and older people tend to participate in less sportive activities. For less intense activities there is no such trend, these activities are not age-dependent.

The reason the elderly participate in less active and sportive activities has to do with their ability to move at a later age. Having more time does not mean that individuals can engage in such activities. This is caused by several impediments that restrict the elderly from getting out. The combination of increased frailty in later life and environmental constraints causes the elderly to engage in fewer outdoor activities (Sugiyama & Thompson, 2013). Therefore outdoor greenspaces must be easily accessible. According to Sugiyama & Thompson (2008), the tranquillity of open space encourages walking for enjoyment among the elderly, whereas accessible and decent amenities influence walking for transportation. So focusing on calm, accessible, and adequate amenities will result in a more active lifestyle for the elderly. This preserves and improves older people's quality of life (Sugiyama & Thompson, 2013). Even though many people use green spaces to meet people and relax in groups, there is little interaction between different groups. People tend to socialize or relax in groups but do this mainly with acquaintances (van Aalst & Brands, 2021).

This survey revealed, using Chi-squared tests of independence, that there is no significant difference in the number of days people went for a walk between those who do not have a private garden [χ^2 = 0.062, Φ = -0.016, Cramer's V = 0.016 and p = 0.804]. Also considering the other activities like cycling [χ^2 = 2.505, Φ = Cramer's v = 0.104, p = 0.113], jogging & playing (not enough respondents in each category), relaxing [χ^2 = 0.042, Φ = Cramer's V = 0.014 & p = 0.837] and meeting [χ^2 = 0.004, Φ = -0.004, Cramer's V = 0.004 & p = 0.0949] there is no significant correlation with the presence of a private garden. Considering that only 10 out of 230 respondents did not have a garden this is something to take into account (Own survey, 2023).

This is an unexpected outcome since the study of van Aalst & Brands (2021) showed that people without private green space spend more time in public green spaces. Besides they also found that younger people spend more time in green spaces. Comparing age with the number of days spent in green spaces suggest that there is no significant difference between young people and adults. However, take into account that only 16 people considered as young, under 30 years old, filled in the questionnaire (Own survey, 2023).

The results gathered in this section can answer research question 1: *How do people **behave** around green-blue networks? Does age influence the utilization of green spaces?*

The respondents mostly walk and cycle in green spaces. There is an effect of age and the use of green spaces but it depends on the type of activity. For walking, relaxing, and meeting people there is no observable difference between the age groups. Contrasting active sports like cycling and jogging that have a negative correlation with age, indicating that younger people do these kinds of activities more. Further is there no correlation between spending time in public green spaces and having private green spaces.

4.3   Appreciation & needs

This section discusses the results from the questionnaire, and the quotes from the focus groups, regarding appreciation and needs. PCA techniques are used to "reduce" data into associated "factors" that give a conceptual and mathematical understanding of the construct of interest. The following question was asked in the survey: *"How important do you consider the following elements in your living environment?"*. This question is connected to the study topic *"Which elements do people appreciate in the landscape?"*. Assuming that the selected elements were somehow related.

Table 5 shows the results of the performed PCA analysis on the seven questionnaire elements using SPSS version 29 (IBM Corporation, 2022). The eligibility of the data for factor analysis was determined prior to doing PCA. The correlation matrix indicated the presence of several coefficients of 0.3 and higher. The Kaiser-Meyer-Olkin value was 0.605, which is above the previously suggested value of 0.6 (Kaiser, 1970, 1974), and the Bartlett's Test of Sphericity with 21 degrees of freedom gained statistical significance, indicating that the correlation matrix was factorable (Bartlett, 1954).

The presence of three components with eigenvalues greater than one was discovered using principal component analysis, which explained 33.3%, 20.4%, and 18.8% of the variance, respectively. Parallel Analysis with Monte Carlo PA yielded three components with eigenvalues greater than the appropriate criteria values for a randomly created data matrix of the same size (7 variables 230 respondents x 100 iterations) (Pallant, 2011, pp. 181–200).

The tree-component solution accounted for 72.4% of the variation. Oblimin rotation was used to help in the comprehension of these two components. The rotational solution indicated the presence of a simple structure (Thurstone, 1947), with all components exhibiting a number of strong loadings and all variables significantly loading on just one component. Positive affect components dominate Components 1 and 3, whereas negative affect elements dominate

Component 2. The correlation between all the Components is weak, as expected. The findings of this study justify the usage of distinct class components (Pallant, 2011, pp. 190–200)

Table 5: Outcome of PCA analysis on different elements (Own survey, 2023, n = 2023)

Elements	Pattern coefficients			Structure coefficients			Communalities
	Comp 1	Comp 2	Comp 3	Comp 1	Comp 2	Comp 3	
Trees	**0,833**	0,109	0,136	**0,832**	-0,053	0,229	0,718
Water	**0,825**	-0,080	-0,298	**0,799**	-0,177	-0,178	0,726
Track	**0,595**	-0,139	0,228	**0,649**	-0,275	0,327	0,499
Play nature	0,019	**-0,916**	-0,011	0,174	**-0,917**	0,127	0,842
Playground	0,006	**-0,912**	0,025	0,165	**-0,917**	0,161	0,841
Garbage	-0,156	-0,110	**0,832**	-0,028	-0,206	**0,827**	0,715
Bench	0,222	0,071	**0,806**	0,316	-0,086	**0,825**	0,729

The scores of the elements in the same components were summed up and a mean score was calculated. The elements of Component 1 were called nature elements, the ones of Component 2 play elements and the Component 3 infrastructural elements.
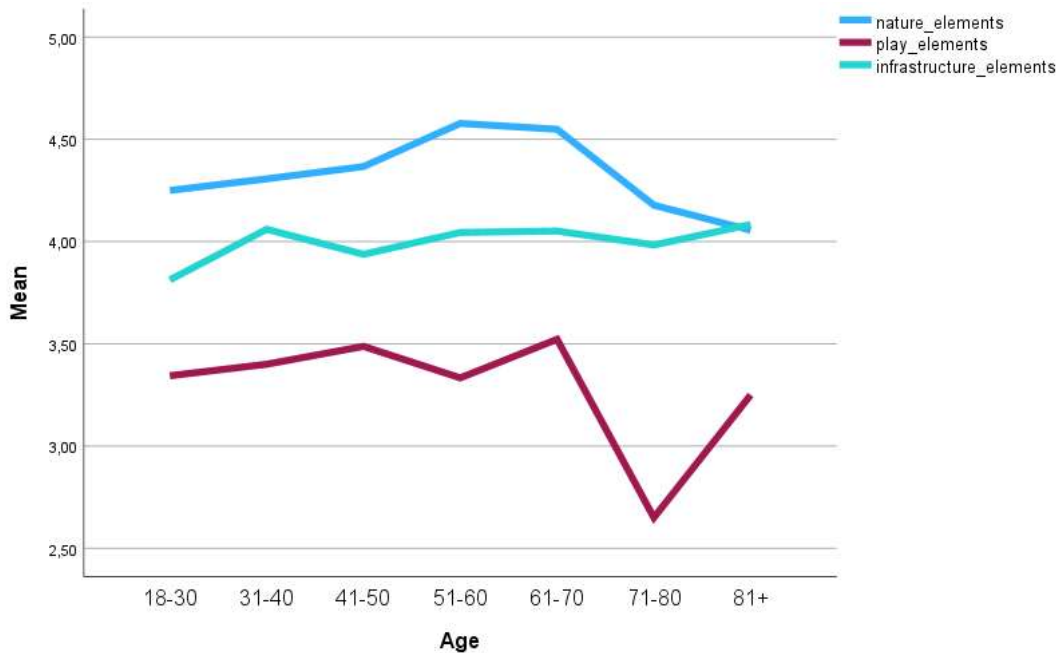
Figure 12: Line chart showing the differences in age and their mean score on the different elements (Own survey, 2023, n = 230)

Figure 12 shows that nature elements score the highest over all age groups, followed by the infrastructure, and play elements score the lowest for all age groups. This is an important insight because governmental institutions, like 'Het Regionaal Landschap Brabantse Kouters', focus on developing play components and opportunities for children throughout project implementation. However, based on the results of this survey, it appears that this is not a top priority for the majority of respondents. However, this may also be due to the fact that this sample does not represent the entire population. Mainly the older generations have filled in this survey and they tend to have less preference for play elements. Therefore, this subject was also tackled during the focus groups in the hopes of gaining further insights.

"This Sunday ... It was raining I grab the umbrella and can still go outside. At the edge of the forest I saw youth, 12 year old boys playing in shorts. It's amazing that these kids can and do that. Keep inspiring them because it is definitely important" (Original: "Deze zondag ... Het was aan het regenen ik pak de paraplu en kan toch nog naar buiten. Ik zag bij de bosrand jeugd, mannekes van 12 jaar in korte broek aan het spelen. Dat is toch magnifiek dat die kinderen dat kunnen en doen. Blijf hun inspireren want het is sowieso belangrijk.") (Y2, 29/3/2023).

"Natuurpunt says that the scouts break down that forest and make the forest dirty. But actually, those are the most intense users of that nature reserve. Those are the ones that are really going to play there. And of course, they step on plants and leave planks from which they built a camp. But these are not the people who leave cans and dog shit here, that is another group."

(Original: "Natuurpunt zegt dat de scouts dat bos afbreekt, en het bos vuil maken. Maar eigenlijk zijn dat de meest intense gebruikers van dat natuurgebied. Dat zijn degene die daar echt gaan spelen. En natuurlijk lopen zijn dingen plat en laten ze planken achter waar ze een kamp van hebben gebouwd. Maar dit zijn niet de mensen die hier blikjes en hondenstront achter laten dat is nog een andere groep.") (Y3, 29/03/2023)

"At Kersenberg (play forest) when this was newly built there it is always full of young people. From the sunrise, until late at night with and without parents, so that seems wonderful to me, a basketball court and playground." (Original: "Bij Kersenberg (speelbos) wanneer dit nieuw was aangelegd zit het altijd vol met jongeren. Vanaf het licht is tot 's avonds laat met en zonder ouders, dus dat lijkt mij prachtig, een basketbalveld en speeltuin.") (X5, 13/04/2023).

"I can't imagine anyone being against you adding those play elements." (Original: "Ik kan mij niet inbeelden dat er iemand tegen is als jullie van die speelelementen aanbrengen".) (X2, 13/04/2023)

These comments imply that it is important to maintain interest in play nature or play leads in which children can use their imagination and play even in bad weather. Moreover, young people are the most intensive users. So, chances are that people did not mention the importance of playing in nature in the survey because they no longer need it themselves. When asking them personally, they think it is good that children have their own public space outside. Although it was not their top priority, they are not against the introduction of play elements and think it is relevant to keep paying attention to it.

The question *"People value nature for various reasons. Can you indicate how important the following statements are to you?"* was asked next in the questionnaire. Figure 13 shows the top 3 reasons to value nature. There were 5 possible answers indicated in the questionnaire. Nature in itself is mostly attributed to first place by respondents. Followed by health and future generations. No one put monetary values in the first place. Recreation was a less common reason put in the top 3. Future generations were mostly placed at number 3.
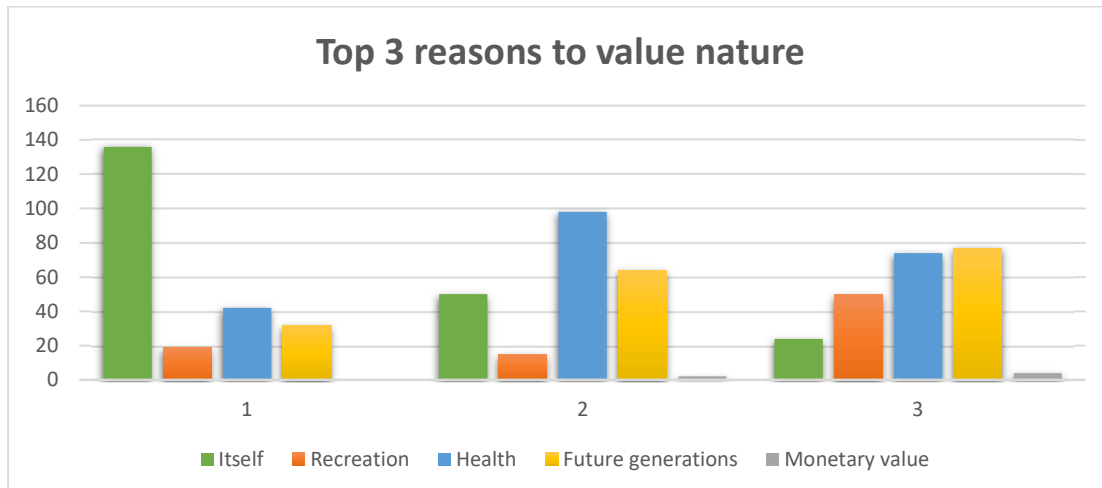
Figure 13: Bar chart indicating the top 3 reasons to value nature (Own survey, 2023, Excel)

These are not the same findings as our northern neighbours from the Netherlands got in their survey (de Boer & Langers, 2022, 2017). One of the most significant differences is the value attributed to nature itself. According to this large-scale study, ongoing since 2006 with the most current data from 2021, health was found the reason to value nature the most, not nature's value in itself. Future generations were voted second place, followed by nature and recreation. It was obvious that monetary value receives the lowest grade and is seen as negligible (de Boer & Langers, 2022). This last insight is thus comparable to the results of this study. Also during the focus groups, they mentioned that nature is the most important value. The position of health was not explained, and nobody mentioned anything about health in the focus groups.

"The importance of nature in its many aspects. Nature, from recreation and other forms of experience and from personal interest. I think it is important to preserve and restore what is there." (Original: "Het belang van de natuur in zijn vele aspecten. Natuur, vanuit recreatie en andere vormen van beleving en vanuit persoonlijke interesse. Ik vind het belangrijk om wat er is in stand te houden en terug te herstellen.") (Y2, 29/3/2023)

To conclude, an answer is given to research question 2 *'Which elements of green spaces do people **appreciate** the most?'.* The respondents appreciate natural elements and nature for itself the most. The natural elements trees, water and tracks score the highest in all the age groups. Only in the age group of 81+, natural elements score equal to infrastructural elements.

4.4 Perception & experience

In the questionnaire, different statements were used to find out how the participants perceive different aspects of green spaces. These aspects include attractiveness, safety, peace & quietness, smell, sound, improvements, whole, diversity, orientation and accessibility.
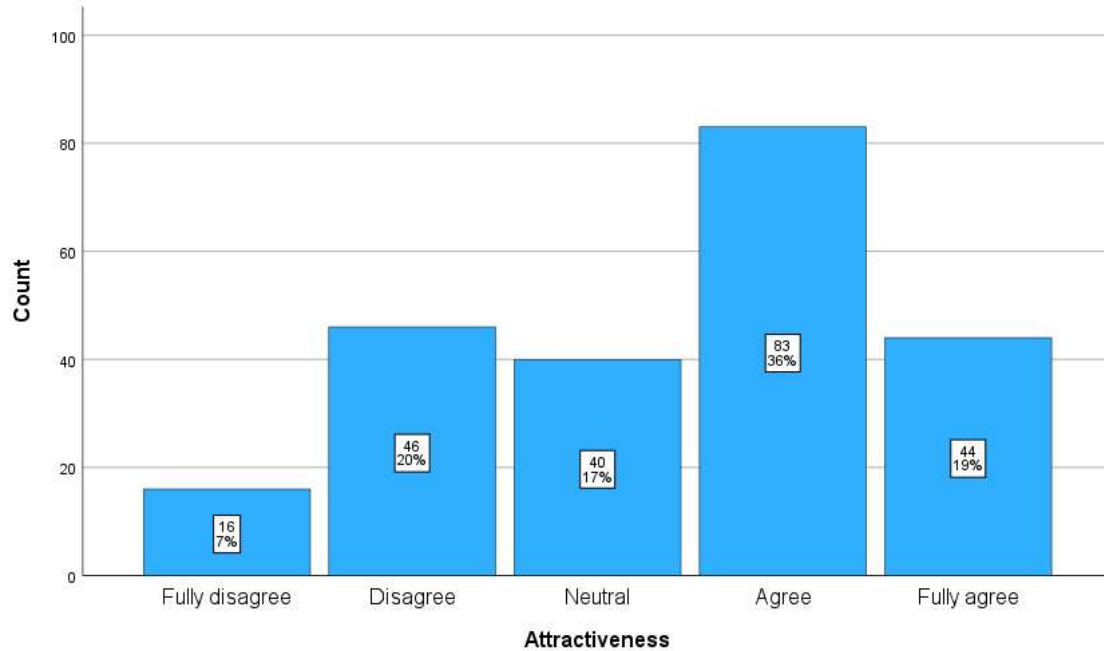
Figure 14: Bar chart displaying how attractive respondents find green spaces (Own survey, 2023, n = 229)

According to Figure 14, most respondents find the green spaces in their living environment attractive, 83 respondents, or 36%, agree that the green spaces are attractive and 19%, or 44 respondents, even fully agree. In total more than 55% find green spaces attractive. However, 27%, or 62 respondents, did not find the green spaces attractive. Besides, 40 respondents, or 17 %, did not choose a side and voted neutral (Own survey, 2023, n = 229).
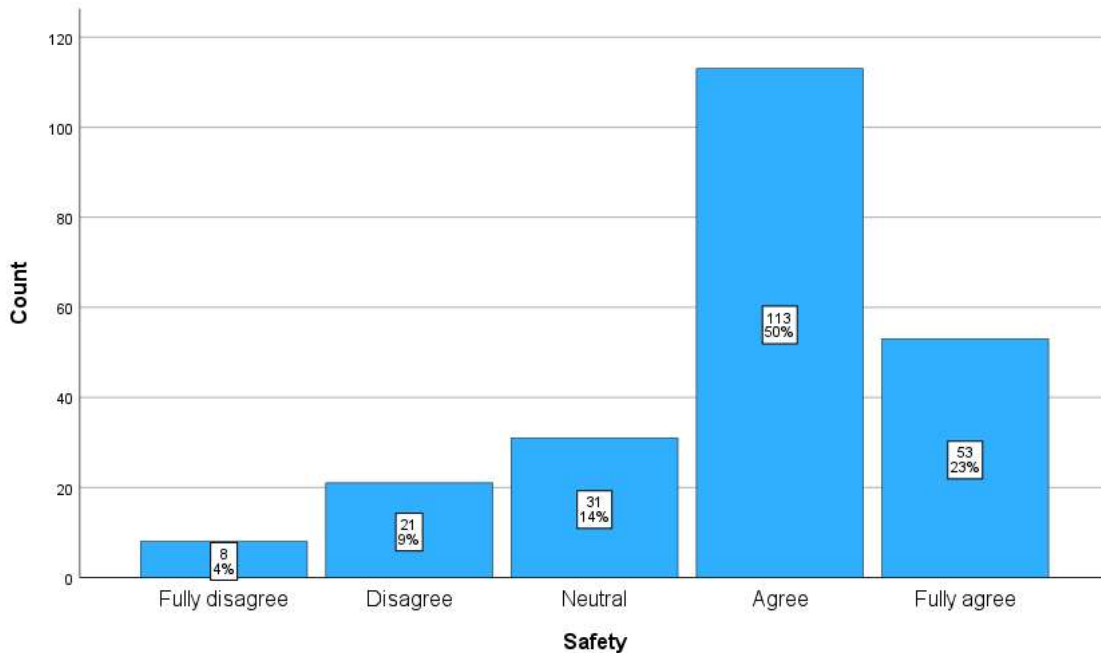
Figure 15: Bar chart displaying how safe respondents find green spaces (Own survey, 2023, n = 226)

The data regarding safety in green spaces is summarized and presented, in a visually striking and easily understandable format. Figure 15 shows that 166 respondents (73%) agree with the statement saying: "*I find the green spaces in my living environment safe*". Only 29 respondents did not agree with the statement *that they can feel safe in green spaces*. Finally, there were 31 respondents (14%) who answered neutral.

These are very positive results; however, the study of Braçe et al. (2021) suggests that women tend to feel less safe in open spaces than men. To see whether this is the case in this study, a bar chart in Figure 14 is made to show the differences. To discover if these differences are significant, the Chi-square test is used.
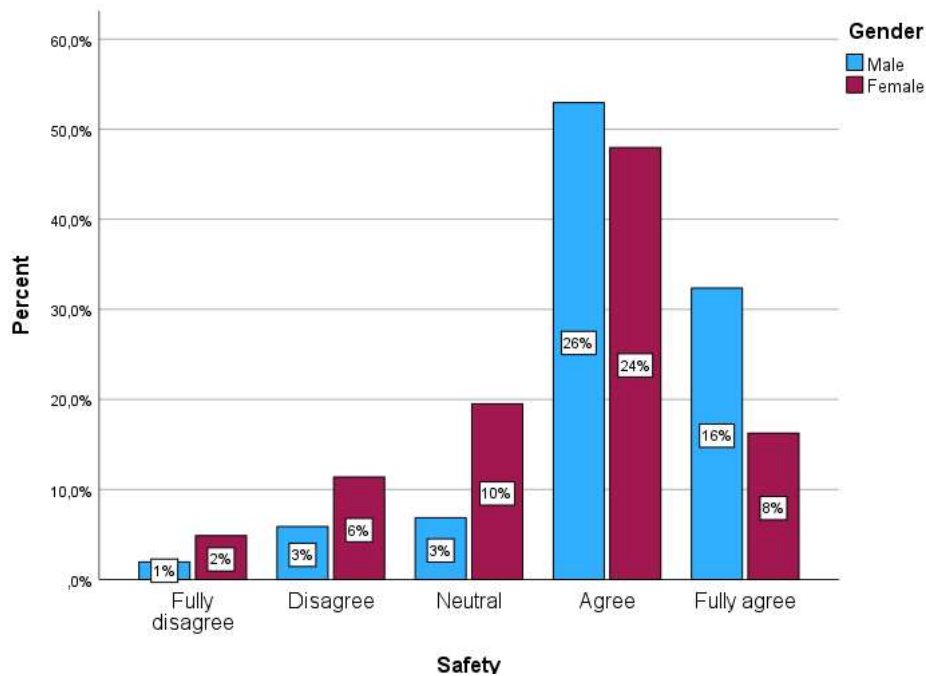
Figure 16: Bar chart showing the differences between males and females and their safety feeling in green spaces (Own survey, 2023, n = 225)

Looking at the gender distribution in Figure 16, more female respondents feel unsafe in green spaces. Fortunately, this is still only 8% of the females. Males score higher in the agreement categories than females. In all the other categories females score higher. This suggests that there is a difference between women and men and feeling safe inside green spaces.

Table 6: Result Chi-squared test and Fisher-Freemans-Halton Exact test between Gender and Safety (Own survey, 2023)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	16,113[a]	4	,003	,002		
Likelihood Ratio	16,721	4	,002	,003		
Fisher-Freeman-Halton Exact Test	16,040			,002		
Linear-by-Linear Association	12,874[b]	1	,000	,000	,000	,000
N of Valid Cases	225					

a. 2 cells (20,0%) have expected count less than 5. The minimum expected count is 3,63.

b. The standardized statistic is -3,588.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	,268	,003	,002
	Cramer's V	,268	,003	,002
N of Valid Cases		225		

The Chi-squared test for independence shown in Table 6, indicates that there are 2 cells which have an expected count of less than 5, which means that the result is given by the Fisher-Freemans-Halton Exact Test. There is a moderately significant association between gender and safety Fisher = 16.040, Carmen's V = 0.268 & p = 0.002 (Own survey, 2023, n = 225).

Besides feelings of attractiveness and safety, there were some questions about sensory stimuli of the ears and nose. Both statements 'I can enjoy the scents/ the sounds of nature in my nearly green spaces' were considered.
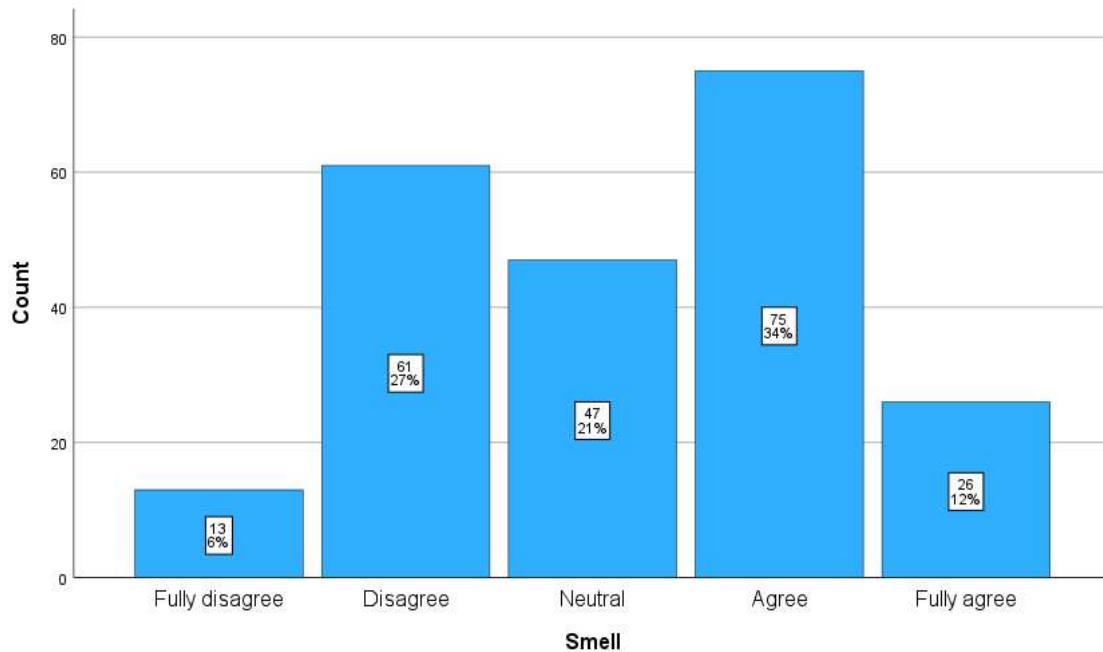
Figure 17: Bar chart showing the agreement towards enjoying natural scents (Own survey, 2023, n = 222)

During the questionnaire, the respondents were asked whether they agree with 'I can enjoy the scents of nature in nearby green spaces' or not. The result in Figure 17 shows that 46% agreed of which even 26 respondents, or 12%, fully agreed. Furthermore, 47 people filled in neutral. This left the remaining 74 people disagreeing.

"Kleine Beek is not a problem, except for a little stench" (X2) "But it stinks, it stinks" (X3). "There are sheep next to it. But those sheep are not going to drink from that" (X2) (Original: "Van de Kleine Beek geen last, buiten dan een beetje stank." (X2) "Maar ze stinkt he, ze stinkt." (X3). "Er zitten toch schapen naast. Maar die schapen gaan daar niet van drinken." (X2)) (X2, X3, 13/4/2023).

As mentioned above, the respondents find that the Kleine Beek smells bad. They said that even the sheep standing next to the Kleine Beek don't drink from it. This can of course explain

why there is 33% of the respondents to the questionnaire cannot enjoy the natural smells of green spaces.
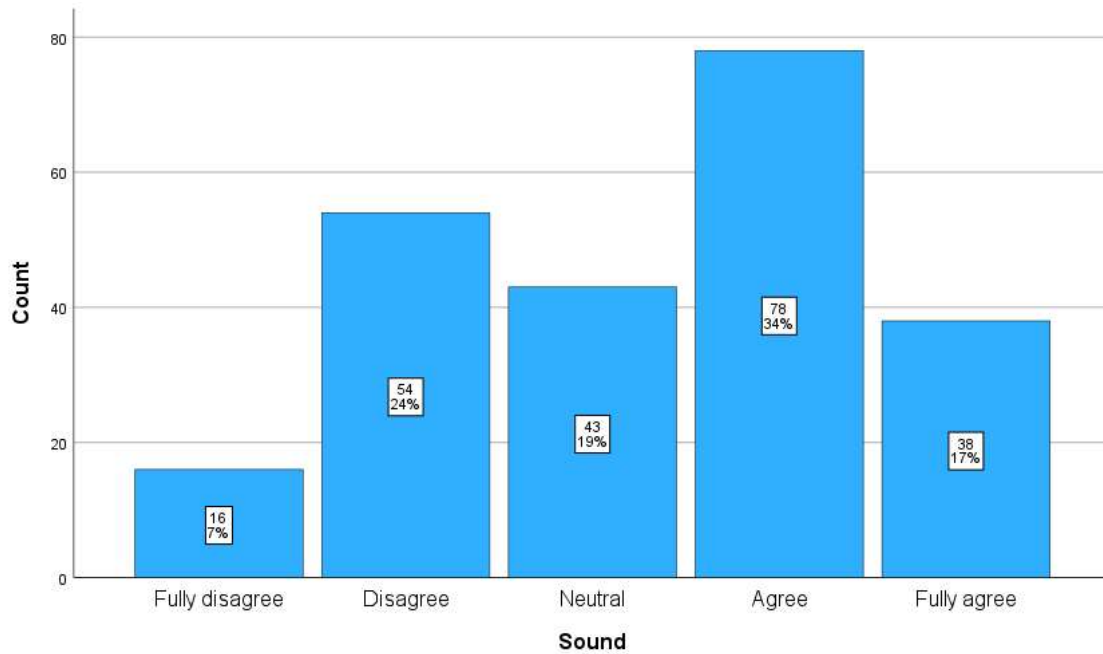
Figure 18: Bar chart showing the agreement towards enjoying natural sounds (Own survey, 2023, n = 229)

Figure 18 shows that half of the respondents can still enjoy the sounds of nature in nearby green spaces (respectively agree 34% & fully agree 17%). 19% of the respondents vote neutral indicating that 31% of the respondents (fully) disagree and do not enjoy natural sounds in green spaces.

Figure 19: Bar chart showing the agreement with finding peace and quietness in green spaces (Own survey, 2023, n = 229)

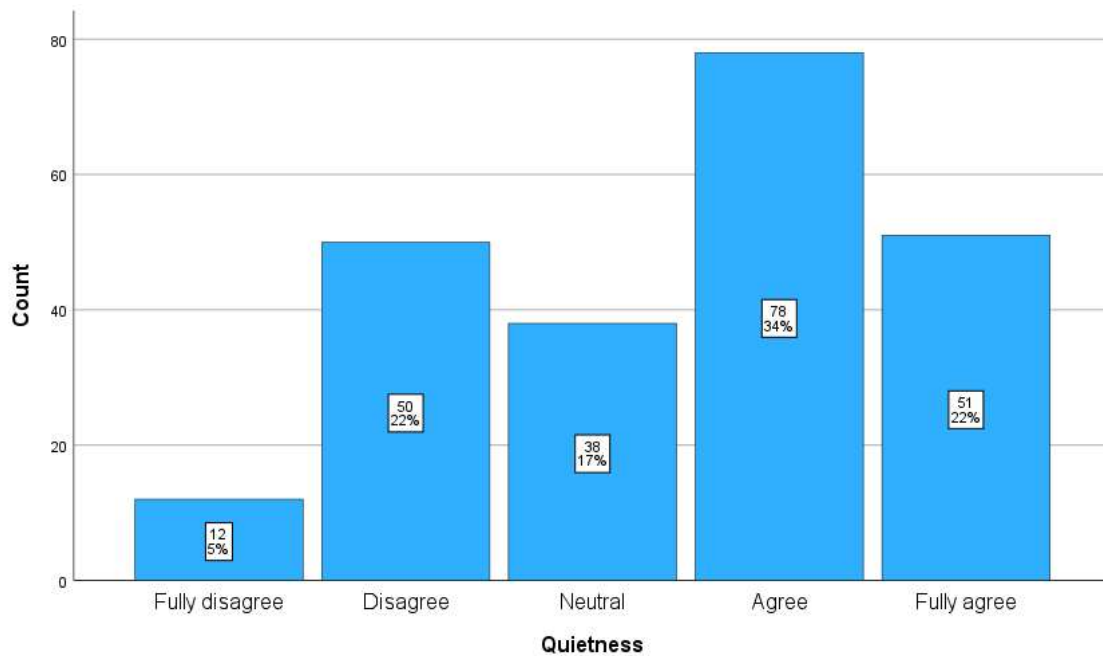Although 56% of the respondents could find peace and quietness in the green spaces of the Woluwe basin, as shown in Figure 19, still a large group of 62 respondents did not agree. These results are very similar to the results of Figure 18.

Therefore the answers to these questions suggest that the respondents link finding peace and quietness directly to sound. The results are discussed together. Some of the respondents explained in the comment section of the questionnaire why they could not enjoy the natural sound, and not find peace and quietness.

"The late and early flights from Zaventem airport disturb the experience of peace and space." (Original: "De late en vroege vluchten van op de luchthaven van Zaventem storen in de beleving van rust en de ruimte.") (Anonymous respondent survey)

"Tranquillity is relative in this area because you will have to deal with aircraft, motorway, traffic or train traffic somewhere." (Original: "Rust is relatief in deze omgeving omdat je wel ergens of met vliegtuigen, autosnelweg, verkeer of treinverkeer te maken krijgt.") (Anonymous respondent survey)

"All day long busy traffic of cars, buses and trucks that lead to noise nuisance and air pollution." (Original: "Gans de dag door druk doorgaand verkeer van auto's, bussen en vrachtwagens die leiden tot geluidsoverlast en luchtvervuiling.")

"I find it sad that there is a lot of noise from the motorway, especially when the wind comes from there." (Original: "Ik vind het jammer dat er veel lawaai is van de autosnelweg, zeker als de wind van daar komt.") (Anonymous respondent survey)

"We would appreciate to have a lower level of noise pollution in Kraainem" (Anonymous respondent survey)

Additionally, during the focus groups, some participants indicated the same.

"One of the large drawbacks is the noise. And there's nothing you can do about that. Everywhere we have to walk in beautiful natural areas. You have the noise from the motorway and Woluwelaan too. Woluwelaan makes a lot of noise actually." (Original: "Een van de grote nadelen is het geluid. En daar kan je niets aan doen. Overal waar we moeten wandelen in mooi natuurgebied. Zit je met het geluid van de autostrade en de Woluwelaan ook. De Woluwelaan maakt veel lawaai eigenlijk.") (X7, 13/04/2023)

"What was unpleasant about the Woluwe, it was the noise of cars." (Original: "Wat was er onaangenaam aan die Woluwe beek, dat was het kabaal van auto's.") (Y3, 29/03/2023)

Both in focus groups and the comments in the questionnaire, different participants mention the very loud noise of cars. This can explain why 27% of the respondents to the questionnaire could not find peace and quietness in the green spaces. Other elements that disturb the peace mentioned in the comment section of the questionnaire were airplanes and trains. This suggests that traffic is seen as a major noise polluter in this neighbourhood.

The map in Figure 20 is made with data from the MIRA noise pollution map 'geluidsbelastingskaart'. According to the Vlarem II outdoor sound quality standards, Appendix 2.2.1., the noise standard during the day in recreational areas is 50 dB. Only in industrial areas, service areas, areas for community facilities, and public utilities, the standard is less strict at 60 dB (Bijlage 2.2.1. Milieukwaliteitsnormen Voor Geluid in Open Lucht, 1995). As can be seen in Figure 20, the Woluwe and its tributaries lie for the most part in red, orange and yellow zones. In these zones the sound exceeds the noise standards of Flanders, it is therefore logical that the respondents saw the noise as a disturbing factor.
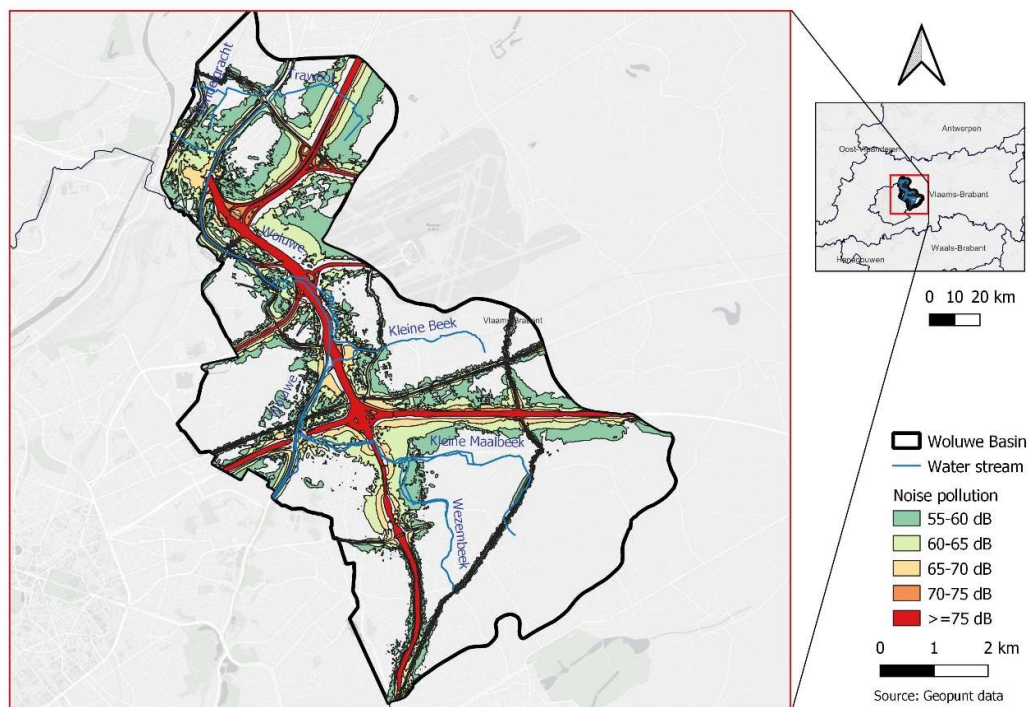
Figure 20: Map showing the noise pollution of roads in the Woluwe basin

The next question in the survey regarded the respondents' perspectives on recent improvements in their local green spaces.
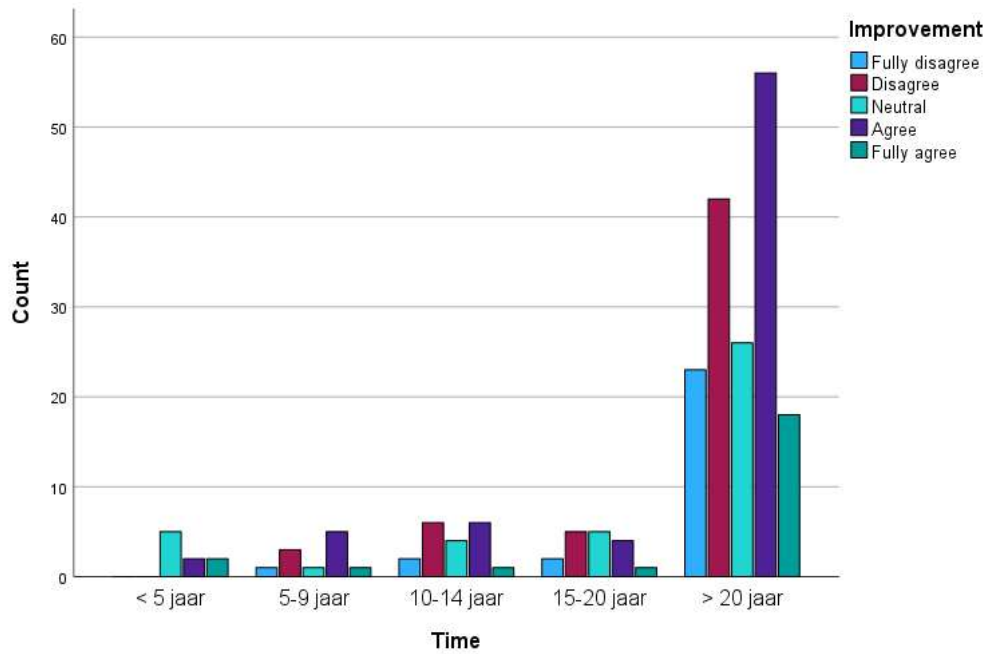
Figure 21: Bar chart displaying if people find that green spaces improved recently and how long the people live in this region (Own survey, 2023, n = 222)

The result in Figure 21 displays that everyone gave very different responses when asked if they thought that local green spaces have improved in recent years. The number of years they have lived in this area and their responses to the improvements show no differences. Even, for people that have lived here for more than 20 years, the opinions are very diverse.
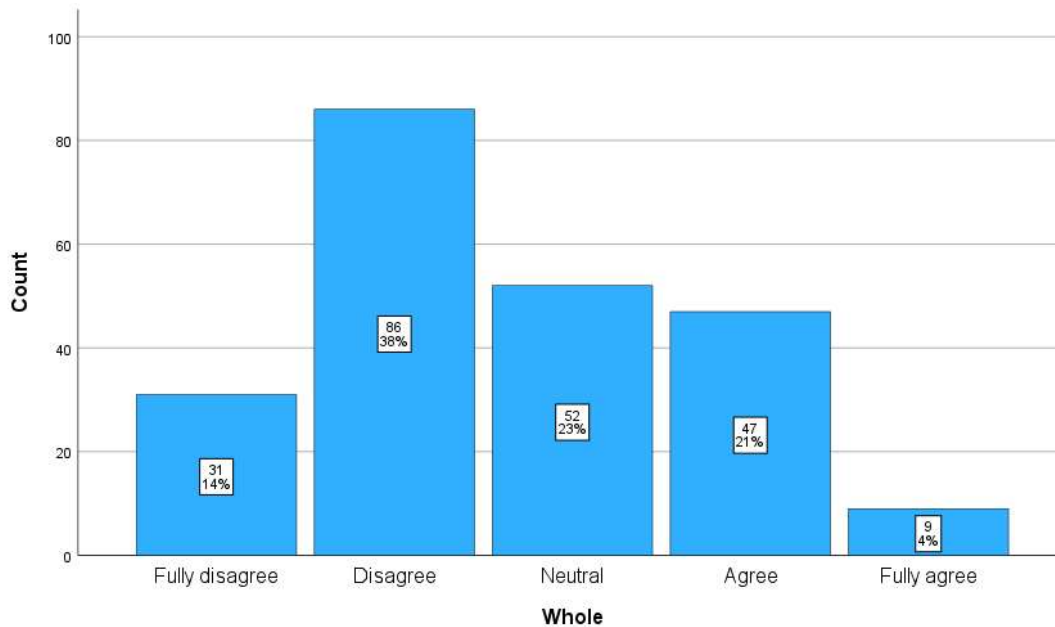
Figure 22: Bar chart displaying whether nearby green spaces form a coherent whole (Own survey, 2023, 225)

Figure 22 shows that most people disagree and do not find that the green spaces in their living environment are a coherent whole. Only a quarter of the respondents find that the green spaces form a coherent whole. This is not so strange since the Woluwe basin is very fragmented due to the wide presence of roads, railways and highways. During the focus groups, some participants also mention that the green spaces are not connected.

"What bothers me is that green spaces do not form a continuous whole along the Woluwe. That keeps me from going for a walk there. You always have to cross roads." (Original: "Wat mij stoort is dat groene ruimtes geen aaneengesloten geheel vormen langs de Woluwe. Dat weerhoudt mij om daar te gaan wandelen. Je moet altijd wegen over steken.") (X1, 13/4/2023).
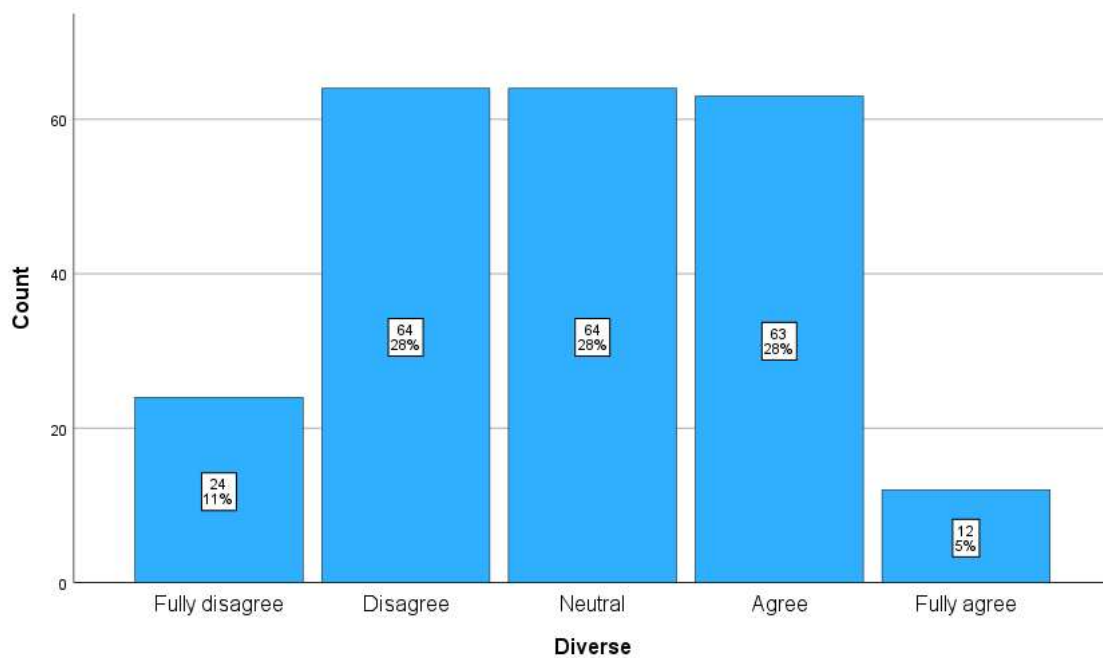
Figure 23: Bar chart showing people perception of the diversity of green spaces (Own survey, 2023, 227)

The green spaces were not seen as a whole, but maybe they are seen as diverse. The bar chart in Figure 23 shows another trend than the other aspects of green spaces. The extreme answers possibilities were not used often, only 12 people were fully agreeing, and 24 were fully disagreeing. The three middle options, disagree, neutral and agree were chosen by 28% of the respondents each.
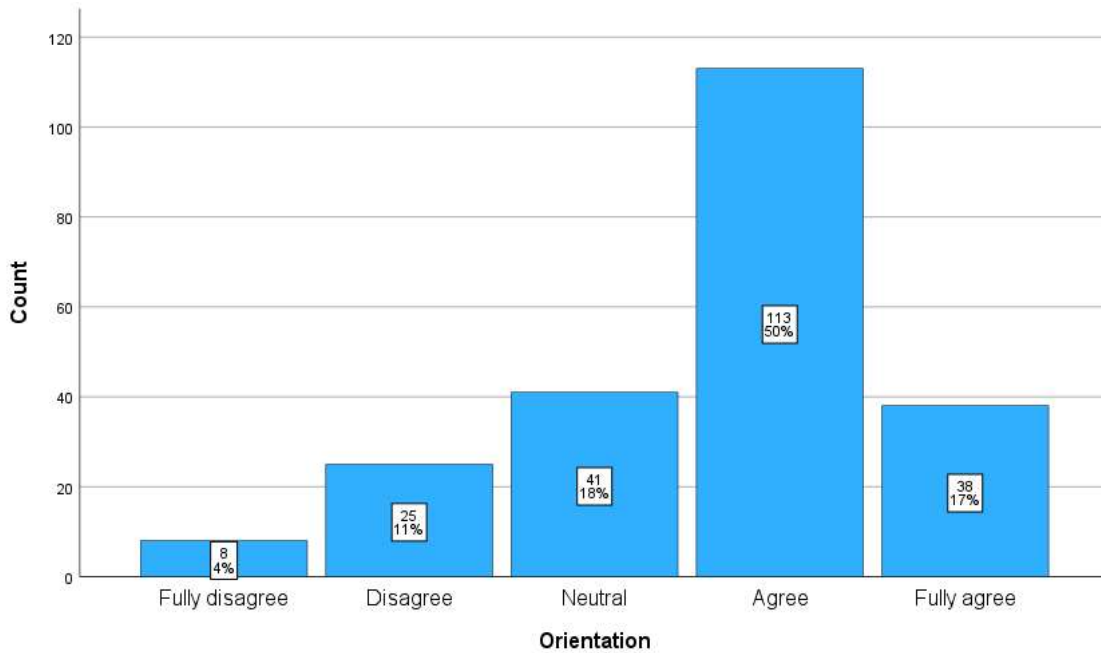
Figure 24: Bar chart showing whether people can orient easily in green spaces (Own survey, 2023, 225)

Legibility is also one of the variables inside the preference matrix of Kaplan, orientation in the landscape is part of the legibility. This resulted in Figure 24 where most respondents 67% agreed with the statement that green spaces are clear and you can orient yourself easily. Only 15% find that is hard to orient themselves inside green spaces. 18 % of the respondents answered neutral.
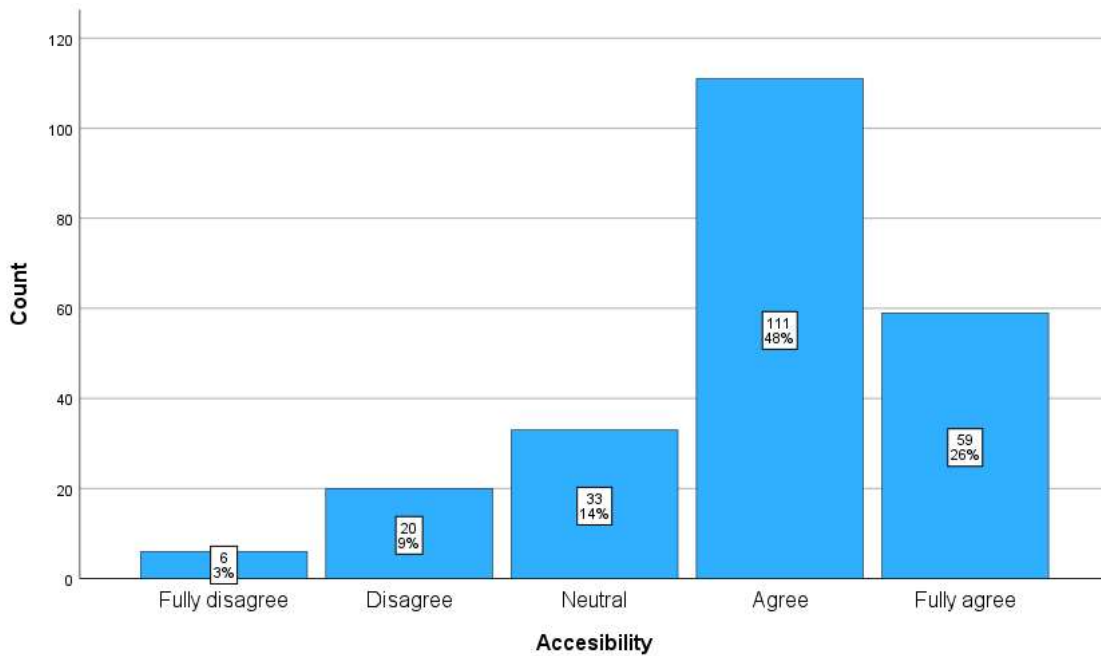
Figure 25: Bar chart displaying of people find green spaces accessible (Own survey, 2023, n = 229)

Accessibility is something very important to be inclusive for everyone. This is also something that the designers of these green spaces need to take into account. Luckily, as shown in Figure 25, almost three-quarters of the respondents find that green spaces are accessible. Only 26 respondents disagreed, and 14% is neutral.

Literature focuses a lot on the preference matrix of Kaplan. The values of coherence, mystery, complexity and legibility are conditions for an attractive landscape. To see whether this is the case in this research as well, a Spearman rho correlation was conducted on the answers of attractiveness and the mean of all the variables of Kaplan's preference matrix. Table 7 shows that there is a positive significant correlation between the Kaplan variables and the attractiveness of the landscape: R = 0.589, p = 0.000, 99% significant. The higher respondents scored on the Kaplan variables, the higher their score was on the attractiveness of the green spaces (Own survey, 2023, n = 220).

Table 7: Spearman rho correlation test between Kaplan perception variables and the attractiveness

Correlations

			kaplan	Attractiveness
Spearman's rho	kaplan	Correlation Coefficient	1,000	,589**
		Sig. (2-tailed)	.	,000
		N	220	220
	Attractiveness	Correlation Coefficient	,589**	1,000
		Sig. (2-tailed)	,000	.
		N	220	220

**. Correlation is significant at the 0.01 level (2-tailed).

A strong correlation (0.589) between attractiveness and the different indicators present in the Preference matrix of Kaplan, is also what is expected according to the literature (R. Kaplan, 1985; Memari & Pazhouhanfar, 2017).

To get an overview of all the interrelations between different aspects of green spaces, discussed in the section about perception, a Spearman rho rank order correlation is done. The result of this correlation is shown in Table 8 below.

Table 8: Spearman rho rank order correlation between different aspects of green spaces (Own survey, 2023, n = 208)

Correlations									
	Attractiveness	Safety	Quietness	Smell	Sound	Improvement	Whole	Diverse	Orientation
Attractiveness	■								
Safety	,460**	■							
Quietness	,568**	,408**	■						
Smell	,459**	,407**	,652**	■					
Sound	,356**	,295**	,510**	,622**	■				
Improvement	,350**	,280**	,333**	,146*	,211**	■			
Whole	,481**	,328**	,518**	,444**	,326**	,431**	■		
Diverse	,482**	,360**	,393**	,361**	,358**	,493**	,490**	■	
Orientation	,389**	,363**	,282**	,258**	,180**	,334**	,349**	,315**	■
Accesibility	,429**	,408**	,315**	,284**	,190**	,294**	,329**	,350**	,659**
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									
Legend correlation									
very weak < 0,2									
weak 0,2-0,4									
moderate 0,4-0,6									
strong > 0,6									

As Table 8 shows, are all the correlations between the different characteristics of green spaces significant at the 0.01 level. The strongest correlations (0,6-1) are displayed in the darkest green, moderate correlations (0,4-0,6) are shown in green, and weak correlations (0,2-0,4) in light green. Lastly, the elements with almost no correlation are coloured yellow (<0,2). Only between improvement & smell, orientation & sound, and accessibility & sound, there is a very weak correlation. The only very strong correlation of 0.659 appeared between accessibility and orientation. All the other correlations are weak or moderate.

Experience

The inquiry regarding the preferences and aversions of local green spaces is best answered by the focus group. In these discussions, participants are allowed to express their opinions regarding the green spaces in their own municipality. In particular, the projects constructed along the banks of the Woluwe are subject to several comments. The feedback is divided into different themes to get a better overview of their experiences.

Participants mention frustrations with the lack of full-loop paths and the need to retrace their steps. They desire continuous and interconnected routes without the need for detours or crossings.

"What I usually find a problem is that you can't make loops. What I find frustrating is that you have to come back along the same path." (Original: "Wat ik meestal een probleem vind is dat je geen lussen kan maken. Wat ik frustrerend vind is dat je langs hetzelfde paadje terug moet komen." (Y3, 29/3/2023).

"Loops are inviting. You'd rather not retrace your steps." (Original: "Lussen zijn uitnodigend. Je komt liever niet op je stappen terug." (Y2, 29/3/2023)

To further elaborate the loop, they suggest creating a walking map to highlight pleasant areas and connection possibilities within the Woluwe basin. Some people are unaware of the existing paths and desired better information about available routes. Currently, the municipality is creating such a map, which should be published in 2024.

"You might want to make for the people of Zaventem, a walking map. With all the nice places there, and the connection possibilities. Sometimes when you explain that you can get from there to there, they say is there a path there? People don't know that!" (Original: "Je zou misschien voor de mensen van Zaventem, een wandelplan moeten maken. Met alle leuke plekken die er zijn, en de verbindingsmogelijkheden. Als je soms uitlegt dat je van daar naar daar kan komen dan zeggen ze is daar een pad? Men weet dat niet!") (X1, 13/04/2023)

"That is in preparation. That will be made by Zaventem by 2024". (Original: "Dat is in opmaak. Dat wordt gemaakt door Zaventem tegen 2024.") (De Groote, 2023)

Further, some conflicts between pedestrians and cyclists are addressed. There is a need for separate paths for pedestrians and cyclists since it is unsafe to walk on bicycle highways, but there is no alternative for pedestrians. Furthermore, mountain bikes ruin the routes in the forest and disturb the flora and fauna.

"Actually, there should be a path parallel to cycle tracks for walkers. But then, of course, you need another meter of space." (Original: "Eigenlijk zou er parallel aan fietsostrades een pad moeten zijn voor wandelaars. Maar dan heb je natuurlijk nog een meter mee nodig." (Y3, 29/3/2023)

"For example, in Diegem and Machelen where you have good cycle highways I also see a lot of walking on them with buggies and a dog. While the roads are not meant for it, they are cycle lanes to go fast. But there is nothing else so you get this conflict. So if there are places where

there are no cars, that's where you see a lot of people going for walks. But a cycle heigway is a cycle highway, it is not meant for children with tricycles to ride on it." (Original: "Ik zie bijvoorbeeld in Diegem en Machelen waar je goede fietsostrades hebt zie ik ook dat er veel op gewandeld wordt met buggy's en een hondje. Terwijl de wegen er niet voor bestemd zijn het zijn fietspaden om snel te gaan. Maar er is niets anders dus krijg je dit conflict. Dus als er plaatsen zijn waar geen auto's rijden, daar zie veel mensen die gaan wandelen. Maar een fietsostrade is een fietsostrade, het is niet de bedoeling dat er kinderen met driewielers over rijden.") (Y3, 29/3/2023)

Water

People are becoming more aware of the importance of water, but there is still a long way to go (Arias et al., 2021; Brouwers et al., 2015, pp. 20, 120). Each column in Figure 26 represents the number of years a respondent has lived in the region. Residents in green knew that the Woluwe is a river, the ones in red did not. As expected, the largest group of people that knew the Woluwe is a river have lived there for more than 20 years. Still, 43% of the people who have lived there for more than 20 years did not know that the Woluwe is not only a street. Of the residents that have been living there for a shorter period, it was even worse, with around 60 to above 80% that did not know the Woluwe was a water stream.
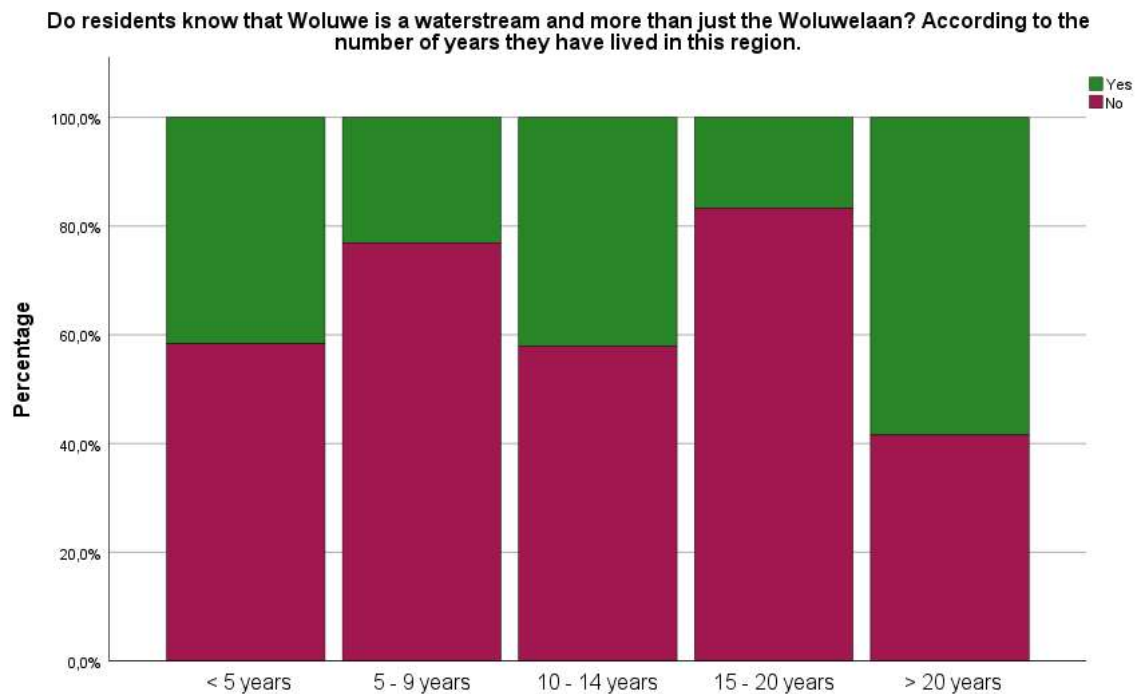

Figure 26: Stacked bar chart displaying the knowledge of the Woluwe as a river (Own survey, 2023, n = 230))

Of course, it is impossible to show support for a project if you are unaware of the existence of an underground river. Therefore in the focus group, someone mentioned that the recognisability of the Woluwe is still missing.

"The recognition is missing. Not everyone is aware where the water flows and projects are realized. People with some interest discover or see that more easily, but the average person does not." (Original: "De herkenbaarheid mist. Niet iedereen is mee waar water zichtbaar gemaakt en projecten gerealiseerd worden. Mensen met enige interesse ontdekken of zien dat makkelijker, maar een doorsnee ziet dat niet.") (Y2, 29/3/2023)

The lack of knowledge among the population of the Woluwe river basin has been known for some time. The Regional Landscape wants to change the recognizability and is also trying to do this with smaller actions such as hanging name tags on the bridges over the waterways.

"They must not know the name Woluwe. I have come to an agreement with the environmental officer G. that there will be signs on bridges. A small action that can already do a lot. I hope to make a difference through small things that don't cost much." (Original: "Ze moeten de naam Woluwe niet kennen. Ik heb met de milieuambtenaar G. afgesproken dat er bordjes gaan komen aan bruggen. Een kleine actie die al veel kan doen. Ik hoop via kleine dingen die niet veel kosten toch een verschil te maken." (M. De Groote, 29/3/2023)

To summarise this section, the research question *How do people **experience** a green-blue network in an urbanised environment and what impact does the presence of water have on the landscape's **perception** of the residents within the Woluwe basin?* can be answered.

The results of the questionnaire mention that more than half of the respondents find nearby green spaces attractive. The majority of 73% agreed that they feel safe in these green spaces, with a moderate association between gender and safety. When it comes to sensory stimuli, 46% of the respondents encounters natural smells, and 33% cannot, the Kleine Beek is an example given during the focus groups because of the bad smells. Furthermore, more than half of the respondents found peace and quietness in green spaces, while less than 30% cannot due to noise pollution caused by cars, trains and airplanes. This suggests that man-made disturbances can hinder the respondent's green space experiences.

Opinions regarding the improvement of green spaces recently varied. Respondents do not experience green spaces as a whole due to the fragmentation caused by roads. But due to this fragmentation, the green spaces are small and 67% find it easy to orient themselves in and 74% indicate that they are easily accessible. During the focus groups, they not only mentioned that the disconnection is a problem but also that they are not enough loops within

the green space. This problem will be addressed because they are creating a walking map by 2024.

Other elements that were put forward during the focus groups were the conflicts that appeared in green spaces because there is no separate infrastructure for pedestrians and cyclists further there is a lack of recognition for the projects along the Woluwe because still half of the respondents were not aware that the Woluwe is a river. This highlights the need for more awareness, one of the solutions that Margot put forward are the name signs of the water streams along bridges. Overall, the presence of a green-blue network has an impact on how respondents perceive their neighbourhood.

4.5 Support

During the questionnaire, respondents were asked if they would appreciate it if the Woluwe would become more visible and accessible. The result of this question is given in the bar chart of Figure 27.
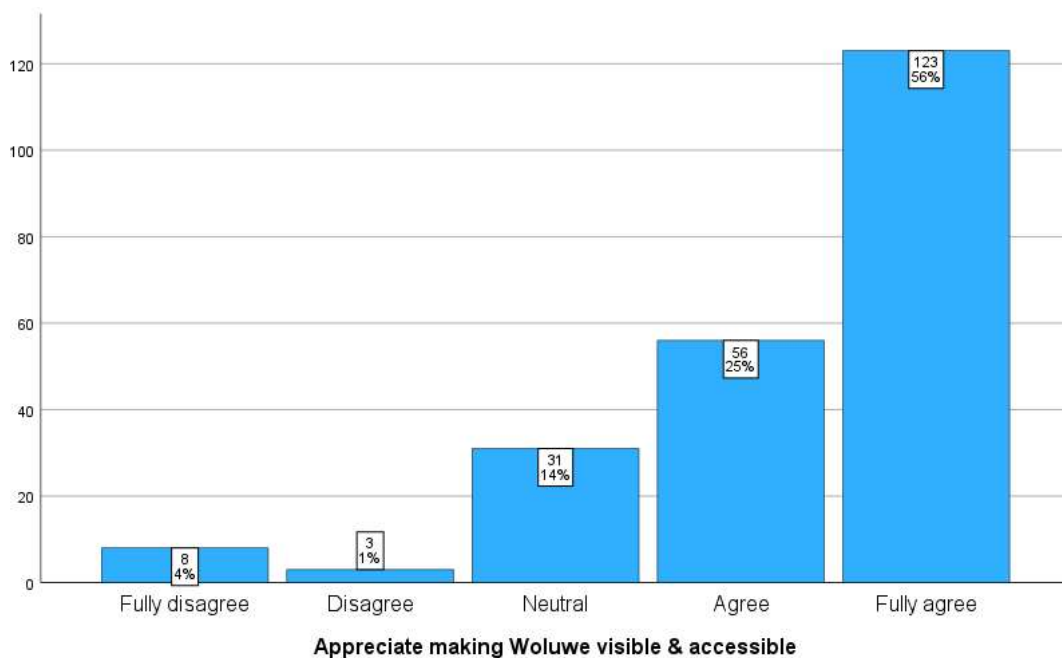
Figure 27: Bar chart making Woluwe visible and accessible (Own survey, 2023, n = 221)

Respondents in our study believe that the Woluwe needs to be accessible again, 78% of the respondents said agree or fully agree. Only 11 respondents were opposed, and 40 respondents had no clue or were neutral. Unfortunately, none of the disagreeing respondents chose to cooperate in the follow-up inquiry, so no behind their choice could be obtained. In the focus groups, the following question was raised: *What can be a reason why people are against the opening up of the Woluwe and making it accessible again?*

"All I can think about is that maybe they fear the smell" (Original: "Het enige waar ik aan kan denken is dat ze vrezen voor stank misschien") (Y1, 29/3/2023).

As mentioned above in section 4.4 and shown in Figure 17, the Kleine Beek smells bad. Odour nuisance can therefore ensure that people do not want open water streams in their living environment.

Furthermore, the issue of safety is raised. Not just for children who play near the watercourse and may fall into it, but also because cycling lanes built directly close to the water, such as on the Zenne, are unsafe. This must be considered from the perspective of the Senne being considerably larger than the Woluwe and being dangerously built with sloping edges that make it impossible to climb out of the water yourself.

"Or as they did in Zemst along the bicycle highway where people walk in it. We went there for a walk with Natuurpunt 2 years ago. I am also shocked by that. I saw a bike path there and that is really dangerous. You shouldn't do it that way. It is not only dangerous, but it also has nothing to do with nature, it is just a bicycle highway. A water highway" (Original: "Of zoals ze dat gedaan hebben in Zemst langs de fietssnelweg waar mensen erin lopen. We zijn daar gaan wandelen met natuurpunt 2 jaar geleden. Ik ben daar ook van geschrokken. Ik zag daar een fietspad en dat is echt kei gevaarlijk. Zo moet je het niet doen. Het is niet alleen gevaarlijk, maar het heeft ook niets met natuur te maken, het is gewoon een fietssnelweg. Een watersnelweg") (X1, 13/4/2023).

"Safety, children and water" (Original: "Veiligheid, kinderen en water") (Y2, 29/3/2023).

Then someone also points out that people sometimes do not have the necessary knowledge of the benefits of open water streams and that some people might be afraid of flooding. This region has suffered a lot from this in the past (Vlaamse Milieumaatschappij, 2018).

"Maybe there are people who think that if water is in a pipe, there will be less flooding" (Original: "Misschien dat er mensen zijn die denken dat als water in een buis zit dat er minder overstromingen zijn") (Y3, 29/3/2023).

The group was in full agreement about the importance of reintroducing water into the environment. They found it weird that some people were against the re-opening of the Woluwe and its tributaries. Possible explanations were put forth in the focus group, including the unpleasant odours that sometimes emanate from poor-quality water, concerns about flooding, and worries about child safety. The characteristics of the green spaces have no significant correlations with the re-opening of the Woluwe, see appendix 7.6.

Research has shown that one of the primary reasons people fear bodies of water is because of the presence of insects, particularly mosquitoes, which thrive in stagnant or slow-moving water (Ma et al., 2016). It is also important to consider the quality of the water itself to avoid unpleasant smells. The Kleine Beek, formerly known as Vuilbeek, has poor quality and a bad odour, as noted by X2 and X3, probably because of the large amount of domestic wastewater dumped into it. Thankfully, the Woluwe has better quality water, as reported by Piessens and De Bie (2022). But there is still room for improvement. Despite concerns about insects, X2 shared that they had never experienced any insect issues during nights spent near the Kleine Beek. Conversely, X6 mentioned having a fear of frogs due to their loud noises. (X2, X6, 13/4/2023). During the focus group, someone said that they liked water and thought it added value, but only if the water was healthy.

"Water adds value, it gives peace and freshness if it is healthy. In the large park you have 2 ponds and one pond is currently sick. I just want to say that the water must be healthy" (Original: "Water is een meerwaarde, het geeft een rust en een frisheid als het gezond is. In het groot park heb je 2 vijvers en een vijver is momenteel ziek. Ik wil maar zeggen dat het water gezond moet zijn.") (X6, 13/4/2023)

In addition, to the importance of making the Woluwe and its tributaries visible and accessible again, the survey asks about their willingness to contribute to the efforts to make this happen. The result is shown in Figure 28. Unfortunately, this question was not mandatory to answer, therefore 56% did not fill it in. 8% of the respondents want to help, 21% are not sure whether they would contribute or not and 13% do not want to contribute.
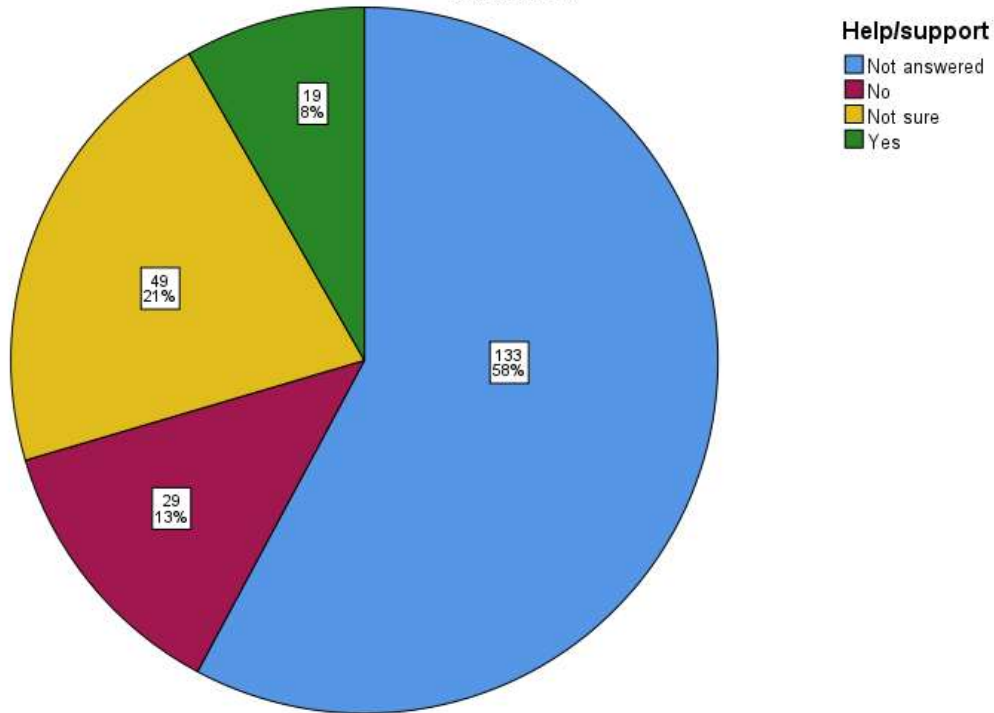
Figure 28: Pie chart showing how many respondents want to help with actions along the river (Own survey, 2023, n = 230)

It is worth noting that no one who responded fully agreed on the importance of making the Woluwe visible and accessible replied to this question. Something went wrong with this question, so it is impossible to conclude and the results should be interpreted with caution. The question about contribution to actions got only answered by 97 respondents. 133 respondents did not answer the question. 29 respondents did not want to contribute, 49 are not sure, and 19 respondents want to contribute to actions around the opening up of the Woluwe.

To summarise public support for initiatives along the Woluwe, most people believe it is critical to make the Woluwe more accessible and visible. Only 11 respondents opposed making the Woluwe and its tributaries more accessible and visible. The reasons proposed during focus groups are for safety concerns to avoid falling into the water, as well as scents and insects as possible reasons to be against open water streams. Only looking at the people that answered the question regarding contributing to action 50% are not sure, 30% do not want to contribute and 20% want to contribute.

4.6 Regression

This section calculates the relation between behaviour, appreciation, and experience & perception towards the support. The data used for this ordinal regression analysis is created for each variable in the diagram of Figure 4. Variables explaining the behaviour are the active and passive activities in green spaces. There are three variables (natural elements, infrastructural elements, and play elements) that determine the appreciation of green spaces. Experience & perception include different variables like sensory and inclusive characteristics of green spaces. Before conducting ordinal logistic regression analyses some assumptions are taken into account. First, the outliers are removed, and then the data is checked for multicollinearity. This means checking whether the variables are independent from one another. If there is a high correlation between certain variables, they need to be removed or adapted (Pallant, 2011, p. 169). Fortunately, this is not the case here, all the correlations are lower than 0.3. The result of the regression analysis is shown in Table 9 and the other tables can be found in Appendix 7.6.

Final model fitting information is significant which means that the model gives better predictions than the marginal probabilities for the outcome categories $[\chi^2(7) = 21.170, p = 0.004]$. The goodness-of-fit is not significant Peason $[\chi^2(869) = 816.742, p = 0.897]$ so is the Deviance $[\chi^2(869) = 447.411, p = 1.000]$. Thus, the null hypothesis stating that the fit is good is accepted. The pseudo-R-square of Nagelkerke 0.102, McFadden 0.042, and Cox and Snell 0.091 indicate a relationship of 10.2%, 4.2% and 9.1% between the predictors and the prediction (Crownson, 2021). These look like very low percentages, but according to Hosmer & Lemeshow, pseudo-R-square values are not easy to explain. There is confusion because they cannot be compared to the more known R² values of linear regression. Low pseudo-R² values are very common in logistic regression, 0.4 is seen as very high therefore the outcome of 10% is not as bad as it seems (Hosmer & Lemeshow, 1991, pp. 164, 167).

Table 9: Output regression analysis support (Own survey, 2023, n = 221)

Parameter Estimates

Parameter		B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
				Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold	[Intro=1]	1,852	1,3017	-,699	4,403	2,025	1	,155	6,374	,497	81,732
	[Intro=2]	2,205	1,2946	-,332	4,742	2,901	1	,089	9,071	,717	114,711
	[Intro=3]	3,805	1,3024	1,253	6,358	8,537	1	,003	44,936	3,499	577,010
	[Intro=4]	5,110	1,3200	2,523	7,697	14,986	1	,000	165,691	12,465	2202,481
nature_elements		,825	,2474	,340	1,309	11,111	1	,001	2,281	1,405	3,704
play_elements		,122	,1247	-,123	,366	,950	1	,330	1,129	,884	1,442
infrastructure_elements		-,078	,1637	-,399	,243	,229	1	,632	,925	,671	1,274
Active_use		,044	,1065	-,165	,252	,167	1	,683	1,045	,848	1,287
Passive_use		-,063	,1054	-,269	,144	,355	1	,551	,939	,764	1,155
sensory		,281	,1430	,000	,561	3,849	1	,050	1,324	1,000	1,752
inclusive		,223	,1603	-,091	,537	1,934	1	,164	1,250	,913	1,711
(Scale)		1ᵃ									

Dependent Variable: Intro
Model: (Threshold), nature_elements, play_elements, infrastructure_elements, Active_use, Passive_use, sensory, inclusive

a. Fixed at the displayed value.

Looking at the results in Table 9, appreciation for natural elements is a positive & significant predictor [b = 0.825, SE = 0.227, p =0.001]. So, the probability of a case falling into a higher as opposed to a lower category on confidence is significant. Respondents that appreciate natural elements in green spaces are more agreeing with making the Woluwe and its tributaries accessible and visible again. Sensory stimuli, including finding peace and quietness, smells, and sounds, are also a positive significant predictor [b = 0.281, SE = 0.143, p = 0.05] of the probability of a respondent falling into a higher as opposed to a lower category. Respondents who experience pleasant sensory perceptions are more in agreement with the reopening of the Woluwe.

The reason why not a lot of factors have significant results is that the question about the importance of opening up the Woluwe does not tackle all the aspects of support. The question about contribution cannot be analysed because only 97 respondents filled in the question. This extra question could have given a better idea of what factors influence the support. It could be that not all the relevant explanatory variables are used in the model and therefore it is not very accurate, also the newly created variables might not be the right indicators. Further, the sample is still not representative of the population that influenced the results.

Parameters related to behaviour and use of green spaces have no significant influence on the importance of opening up the Woluwe. The reason this could be the case is that the activities asked during the questionnaire did not need the presence of water. So people like to have green spaces available, but the water matters less. Neither do the preference for play and infrastructural elements. Last, the elements that make green spaces inclusive as accessibility and orientation do not influence the importance to make the Woluwe and its tributaries accessible and visible again.

In conclusion, the research question *Which factors influence the support for the projects along the Woluwe?* can be answered. Only the factors of natural elements and sensory stimuli influence the importance of making the Woluwe accessible and visible again are significant. These include elements like the preference for trees, water, and tracks and being able to find pleasant natural smells and sounds in the green spaces.

4.7 Limitations and shortcomings

This last section of the result and discussion chapter gives an overview of the limitations and shortcomings of this master thesis. This section starts with explaining some general limitations of the research then the shortcomings of the online survey, and finally the limitations of the focus groups.

4.7.1 Limitations research

Researchers face a variety of obstacles when using mixed-method studies, notably in terms of sample size, validity and reliability, ethical issues, time intensity, and cost. Given the variety of data formats, issues in analysis and interpretation exist even after data is acquired. Furthermore, the findings of mixed-method research may not always be generalizable due to sample size and characteristics limitations. Addressing these issues correctly can yield useful insights. To obtain meaningful findings, however, each part of the mixed-method approach must be carefully considered in a limited time frame.

Subsequently, only 255 people completed the questionnaire. This seems like a good number for online surveys without rewards. However, this amounts to 0.2% of the population. So, it is only a small fraction of the entire population. The age category of the respondents differs from the population distribution, and an entire group of expats are not considered in this study. For follow-up research, it would therefore be useful to focus specifically on this and to find out whether expats have the same needs as long-term residents. Further, the use of non-parametric tests like the Chi-squared test works better if each answer possibility has at least 5 responses. With a sample of 230 respondents for the statistical analysis and sometimes 7 answer possibilities this was not always the case. If the sample size was larger this could be avoided or answer categories needed to be grouped (Pallant, 2011).

Another limitation of the questionnaire was that not everyone understands the questions equally well, as mentioned in the methodology, the data from the question about children in the household could not be used as well as the question about the support for the Woluwe that not all respondents answered. With these questions, it was clear that something went wrong, but it is possible that there were also ambiguities with other questions. Testing the questionnaire even more in advance could prevent this in the future.

4.7.2 Online survey

An online survey method was used because it was easy to create a post online. It had low costs to create and distribute. Even after the questionnaire was launched, changes and adaptations could be made quickly and easily (Gideon, 2012, p. 184; Schmidt & Hollensen, 2006, p. 145). Furthermore, it is easy to gather data and it is possible to get all the responses in an overview Excel with one click on a button. Besides, working with Microsoft Forms made it possible to make the questionnaire in multiple languages and distribute it with only one link. This avoided confusion with having to use different internet links at the same time.

An online survey has some limitations as well. First, the results will have a volunteer bias and therefore it can be that it is not representative for the population (Dorofeev & Grant, 2006, p. 42; Gideon, 2012, p. 66). Second, computer users are a biased sample because only people that have a computer or smartphone can fill in the questionnaire (Bryman, 2016, p. 191; Couper, 2000; Gideon, 2012; Heerwegh, 2005). Besides, people that do not have social media or look at the site of your municipality have no opportunity to answer the questionnaire (Bryman, 2016, p. 191). Aside from that, internet users tend to be more educated, wealthier, younger, and not ethically representative (Bryman, 2016, p. 191; Schmidt & Hollensen, 2006, p. 145). Although, this was not the case in this survey because mostly older people filled in the questionnaire. Other variables reducing the number of answers include having many email accounts that are not all used and not having a Facebook or Twitter account (Bethlehem, 2010; Bryman, 2016, p. 191; Couper, 2000; Gideon, 2012, p. 184).

Nonrespondent bias occurs when the number of persons who replied is not representative of the entire population sample, or if they have different viewpoints than those who did reply to the survey. Because many citizens in the various municipalities did not respond to the survey, this nonrespondent bias skews the analysis (Bhaskaran & LeClaire, 2010, pp. 261–262).

Another limitation of online surveys is the lack of knowledge about whether respondents have completed the survey honestly. By anonymizing the questionnaire, the respondents can give their honest, unadulterated opinion without consequences (Aranda, 2022, p. 141).

4.7.3 Focus groups

Focus group interviews have their own set of challenges. One of the most difficult issues is that there is less control over the processes than in individual interviews. Usually, because the meeting atmosphere is unpredictable and people frequently talk at the same time, making it difficult to comprehend what everyone is saying. This makes transcribing focus group audio records harder than one-on-one interviews. Besides, it can be difficult to identify themes and key focuses while coding because the conversation wanders off quickly (Barbour, 2018, pp. 19–20). Another difficulty in the context of focus groups are group effects such as reticent speakers or those who are the centre of attention. Furthermore, rather than individual assumptions, members tend to gravitate towards certain socially expected encounters. In general, focus interviews can provide important experiences, but they require careful organization and management to ensure the stability and value of the data collected (Bryman, 2016, pp. 520–523).

5 Conclusion

In conclusion, this thesis gave an overview of different aspects of green spaces in urban environments and the need to reconsider our relationship with water. The restoration efforts by the Strategic project "Leve(n) de Woluwe" reintegrated water into the Woluwe basin and addressed water-related issues caused by climate change. By examining the perceptions, behaviours, and experiences of residents living near the Woluwe, this study has provided valuable insights into the importance of water in shaping the landscape and the potential benefits of creating green-blue networks.

Some key findings are that age plays a role in people's behaviour around green-blue networks, with younger individuals engaging more in active outdoor activities like cycling and jogging. Enhancing accessibility, amenities, and social opportunities in green spaces can encourage everyone to participate in outdoor activities and improve their overall health. The top three reasons identified to value nature are nature itself, health, and future generations. Monetary value was not considered a significant reason for valuing nature.

Overall, maintaining an interest in play nature and providing opportunities for children to play outdoors, is seen as important. While play elements may not be a top priority for respondents, they were not opposed to their introduction and believed it was relevant to pay attention to them.

People's experiences of the green-blue network in the urban environment highlighted the importance of having continuous loops, clear hiking trail information, and addressing conflicts between pedestrians and cyclists. Residents recognize the value of water in the landscape but emphasize the importance of maintaining healthy water conditions. The presence of healthy water contributes positively to the perception of the Woluwe basin's landscape.

Making water visible again in the Woluwe basin holds significant relevance for multiple reasons. Taking care of the effects of climate change through effective water management and the prevention of flooding with buffers. Furthermore, residents' awareness and support for the restoration of the Woluwe river basin are crucial in driving the project's success. The survey results indicate that the majority of respondents agree on the importance of making the Woluwe accessible again. The support for the re-opening of the Woluwe is related to the respondents' appreciation for natural elements in green spaces and their sensory perception of green spaces. However, some concerns and misconceptions need to be addressed as well. Some people may have a fear of foul odours and are scared of safety issues, and insect infestations. These concerns can be mitigated through proper water management, ensuring good water quality and maintaining a good water flow.

These findings from the questionnaire survey and focus groups have contributed to understanding the needs and preferences of the neighbouring population, ultimately aiming to gain support for the restoration efforts. The mixed-method approach employed in this research has allowed for a comprehensive exploration of the research. In the future, it is essential to continue efforts in raising awareness and promoting community involvement to ensure the successful restoration and revitalization of the Woluwe basin, ultimately creating a more sustainable and resilient environment.

5.1 Policy

One method for implementing these findings into policy is through Area-oriented work on Environmental Quality, as stated in the VLM (2015) article. This implies that the particular qualities and demands of each location are investigated. Customised policies can then be developed to improve environmental quality. To ensure the effectiveness of this strategy, it is critical to engage in communication with the neighbours and other stakeholders involved in the region. This implies that the preferences and requirements of local inhabitants can be considered, and support for the policy can be generated.

During the focus groups, it became clear that the participants were happy with the changes that have already been made. However, several factors should be considered in the future. To start, there is a higher requirement for hiking routes; people prefer to walk in circles rather than return along the same route. The present improvements are mostly focused on creating an accessible trail along the Woluwe. An extra walking route would be a welcome addition. Furthermore, while everyone recognises the benefits of opening up the watercourse, there are a few remarks, such as the water must flow to avoid bug pests and be clean to reduce odours. The relevant authorities are aware of this and will solve these problems in the coming years (Focus group, 13/4/2023).

Another essential aspect of the policy is the inclusion of diverse disciplines. Specialists of other disciplines can contribute to the aesthetics of public green space. Their skills enable them to develop new and unique solutions for enhancing environmental quality. Furthermore, adequate funds must be provided to implement the policies.

Implementing green-blue networks in an urbanised area can be a difficult endeavour that needs the cooperation of several parties. Local governments, community groups, companies, and people should all be included in the planning process to guarantee that all their needs are taken into account. Governments must consider the environmental, economic, and social effects of their decisions to ensure the long-term viability of these networks. Long-term conservation planning will benefit from investments in maintenance and monitoring initiatives,

as well as the establishment of concrete goals. Furthermore, when deciding on the best architecture for the green-blue network, planners must consider the local circumstances. During the design and implementation of green-blue networks, it is critical to consider the preferences of local inhabitants. This may be accomplished by including them in the process via participation evenings (Antrop & Van Damme, 1995; Van Damme et al., 2014).

During this investigation, the points for improvement of previously completed projects were identified. This demonstrated the need for new hiking pathways. It's fantastic that a trail that follows the movement of the river is being developed. However, many like to walk in loops, and due to the work along the Woluwe, it is not yet possible to return through a different path. Furthermore, there must be enough movement on the Woluwe to avoid stagnant water, which increases the likelihood of insect infestations (Ma et al., 2016). Further, the regression showed that the elements explaining the support for projects along the Woluwe are sensory stimuli which include smell, sound and finding peace and quietness. Natural elements also increase the support this includes trees, walking tracks and water.

Finally, policymakers must maintain and monitor the green-blue networks regularly to adapt and enhance their tactics. Measuring and publicising the success of the green-blue network with stakeholders and the general public will generate support and enthusiasm for future efforts.

5.2 Follow-up research

To get a better understanding of the interactions between humans and green spaces in the Woluwe basin, several extra elements could be studied to widen our understanding of these phenomena. First, the subgroup of short-stay residents is not studied in this research. There can be other useful insights given by this subpopulation that could have needs other than the long-stay residents. Further comparative analysis between different green spaces in the area could be interesting. Some suggestions for studies include a preference study using pictures and eye-tracking technology or making use of PPGIS these Participatory Public Geographic Information Systems could gather opinions and preferences about specific places and locations within green spaces. If this tool is made user friendly the whole community could be involved. Additionally, as some participants of the focus groups mentioned there is a need for interconnected green spaces. At the moment this is not the case, it can be relevant to study the possibilities to connect different green spaces to create interconnected green-blue networks.

Another kind of research that helps to have the leverage to negotiate is economic valuation methods. Getting an idea of the monetary value that green spaces provide can help secure funding for creating such spaces in the future. Along with creating awareness and importance for green spaces, this can help educate residents. This can lead to more active involvement in the preservation and improvement of green spaces.

Finally, this research could be expanded by not only focussing on neighbouring residents but extending the research to stakeholder engagement. Involve policymakers, designers, majors, and other key actors in these green space management. They could contribute with whole other perspectives and interests.

Addressing these suggestions could fill the research gaps and contribute to a better understanding of the cultural ecosystem services green-blue networks create for their neighbours.

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7 Appendices

7.1 Questionnaire Microsoft Forms

Leve(n) de Woluwe (Long live the Woluwe) ⅋

Deze vragenlijst kan beantwoord worden in 3 verschillende talen Nederlands, Frans en Engels. Je kan de taal aanpassen door hierboven op de taal knop te klikken en de gewenste taal aan te duiden.

This questionnaire can be answered in 3 different languages Dutch, French and English. You can change the language by clicking on the language button above and selecting the desired language.

Ce questionnaire peut être répondu en 3 langues différentes néerlandais, français et anglais. Vous pouvez changer la langue en cliquant sur la langue et en sélectionnant la langue souhaitée.

This questionnaire has been drawn up for a thesis research of a master student at KU Leuven in collaboration with 'Regionaal Landschap Brabantse Kouters'. The purpose of this questionnaire is to understand people's attachment to and interaction with the Woluwe river and its tributaries. All collected answers will be treated confidentially and with due care during the project. Only necessary, relevant information is collected to answer the research question "How do people experience a green-blue network in an urban environment?".
It takes about 10 minutes to complete the questionnaire. Both facts and opinions are questioned. You can stop at any time if you wish so. However, we hope you will try to answer each question as it will improve the quality of our research. If you have any further questions or something is unclear, you can always send an email to ine.heremans@student.kuleuven.be. If you want to know more about the Woluwe river and its tributaries you can check the website of the Regionaal Landschap Brabantse Kouters https://www.brabantsekouters.be/

Thanks in advance for your cooperation.

Use and behaviour

These questions are asked to understand the use of green spaces in your living environment.

1

Did you know that the Woluwe is a river that originates in Watermael-Boitsfort and flows into the Senne near Vilvoorde? *

◯ Yes

◯ No

2

This map shows all the municipalities that are part of the Woluwe catchment area. Please indicate where you live. *

○ 1) Vilvoorde (1800)

○ 2) Peutie (1800)

○ 3) Machelen (1830)

○ 4) Melsbroek (1820)

○ 5) Diegem (1831)

○ 6) Zaventem (1930)

○ 7) Nossegem (1930)

○ 8) Sint-Stevens-Woluwe (1932)

○ 9) Kraainem (1950)

○ 10) Wezembeek-Oppem (1970)

○ 11) Sterrebeek (1933)

○ Andere

3

What do you think of the availability of green space in your living environment? *

Green space is defined as areas of grass, trees, or other vegetation designated for aesthetic or recreational purposes in an urban environment.
Your living environment could include places that you visit with bike or by foot.

◯ Very little

◯ Little

◯ Neutral

◯ Much

◯ Very much

◯ No opinion

4

How frequently do you engage in the following activities in a green space near your home? Please provide the answer that is most appropriate for you. *

Green space is defined as an area of grass, trees, or other vegetation designated for aesthetic or recreational purposes in an urban environment.

	Daily	Several times a week	Weekly	Monthly	Several times a year	Maximum once a year	Unapplicable
Walking	◯	◯	◯	◯	◯	◯	◯
Cycling	◯	◯	◯	◯	◯	◯	◯
Jogging	◯	◯	◯	◯	◯	◯	◯
Walking the dog	◯	◯	◯	◯	◯	◯	◯
Relaxing	◯	◯	◯	◯	◯	◯	◯
Playing	◯	◯	◯	◯	◯	◯	◯
Meeting people	◯	◯	◯	◯	◯	◯	◯

Appreciation, perception and experience

These questions consider the perception, appreciation and experience of nature and green spaces in your living environment.

5

People value nature for various reasons. Can you indicate how important the following statements are to you? Put the most important at the top and the least important at the bottom.

Nature is important for recreation

Nature is important in itself

Nature is important for health

Nature is important for future generations

Nature is important because it can be used to earn money

Please indicate your level of agreement towards the statements below.
Indicate an answer in each row. *

Nearby green space is defined as areas of grass, trees, or other vegetation designated for aesthetic or recreational purposes in an urban environment that you can visit with bike or by foot.

	Fully disagree	Disagree	Not agree nor disagree	Agree	Fully agree	No clue
I find the green spaces in my living environment attractive	○	○	○	○	○	○
I find the green spaces in my living environment safe	○	○	○	○	○	○
I can find peace and quietness in nearby green spaces	○	○	○	○	○	○
I can enjoy the scents of nature in nearby green spaces	○	○	○	○	○	○
I can enjoy the sounds of nature in nearby green spaces	○	○	○	○	○	○
I find that nearby green spaces have improved in recent years	○	○	○	○	○	○
I find that the nearby green spaces form a coherent whole	○	○	○	○	○	○
I find the nearby green spaces very diverse (there	○	○	○	○	○	○

84

Needs

In this section we try to find out what local residents need in nearby green spaces.

7

How important do you consider the following elements in your living environment?
*

	Very Unimportant	Unimportant	Neutral	Important	Very important	No clue
Trees	○	○	○	○	○	○
Water	○	○	○	○	○	○
Hiking trails	○	○	○	○	○	○
Playable nature	○	○	○	○	○	○
Playground equipment	○	○	○	○	○	○
Waste bins	○	○	○	○	○	○
Benches	○	○	○	○	○	○

8

Today, the Woluwe is largely underground or invisible, would you appreciate it if the Woluwe would become more visible and accessible? *

◯ Fully disagree

◯ Disagree

◯ Not agree nor disagree

◯ Agree

◯ Fully agree

◯ No clue

9

Around the Woluwelaan, several projects have already been completed, including the Woluwepad and the visualization of the Woluwe with winter bed (see photo).
Would you want to contribute to actions increasing the visibility and accessibility of the Woluwe and its tributaries? *

◯ Yes

◯ Not sure

◯ No

Personal and housing situation

To interpret your answers to the previous questions, we would also like to know a bit more about yourself and about your home.

10

How long have you lived in the Woluwe region (estimate the total numbers of years that you lived in places inside the black line on the map)? *
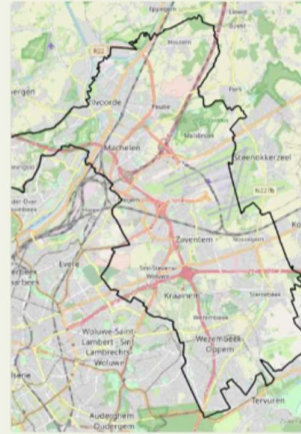
- ◯ Less than 5 years

- ◯ 5-9 years

- ◯ 10-14 years

- ◯ 15-20 years

- ◯ More than 20 years

- ◯ Not applicable

11

Does your home have outdoor spaces? Multiple answers are possible. *

- ☐ No

- ☐ Front yard (unpaved)

- ☐ Backyard

- ☐ Terrace

- ☐ Courtyard

- ☐ Andere

12

How many people does your household contain (yourself included)? Indicate with a number. *

[   ]

13

How many children (people under 18) are there in your household? Indicate with a number. *

[   ]

14

How old are you? *

○ -18

○ 18-30

○ 31-40

○ 41-50

○ 51-60

○ 61-70

○ 71-80

○ 81+

15

What is the highest level of education you have completed? *

○ Primary education

○ Secondary education

○ Higher education

16

I identify as *

○ Male

○ Female

○ Non-binary

○ I'd rather not say

17

If you have any additions or comments, please add them here.

Thanks a lot for your cooperation!

18

If you want to be informed of the results of the survey and any news about the Woluwe, leave your email address here.

19

May we also contact you about follow-up research for this study?

○ Yes

○ No

7.2 Text distribution questionnaire

Tekstjes voor de sociale media

Nederlands

Beste inwoner,

Wat vind jij van de natuur in je woonomgeving? Hoe beleef en gebruik jij het aanwezige groen en water? Wat kan er beter en mag er in de toekomst nog veranderen?

Het strategisch project Leve(n)de Woluwe wil de rivier de Woluwe en haar zijbeken opnieuw ruimte geven in het landschap. Jouw mening telt. Zo kunnen we toekomstige projecten beter afstemmen op de noden van de bevolking.

Heb je tien minuten tijd? Vul dan onze enquête in. Zo werk je mee aan dit wetenschappelijk onderzoek van de KU Leuven, help je het Regionaal Landschap Brabantse Kouters én verbeter je je eigen leefomgeving.

Alvast bedankt voor je medewerking,

Ine, student-onderzoeker KU Leuven

Frans

Cher résident,

Que pensez-vous de la nature dans votre environnement? De quelle façon expérimentez-vous et utilisez-vous la nature et l'eau environnantes? Qu'est-ce qui pourrait être amélioré et changer à l'avenir?

Le projet Leve(n)de Woluwe (Vive la Woluwe/la Woluwe Vivant) souhaite remettre en avant dans le paysage la rivière Woluwe et ses affluents. Votre avis compte. Cela nous permettra de mieux adapter les futurs projets aux besoins de la population.

Vous avez dix minutes? Alors répondez à notre sondage. De cette façon, vous participez à cette recherche scientifique de la KU Leuven, vous aidez le Regionaal Landschap Brabantse Kouters et vous améliorez votre cadre de vie.

Vous trouverez le lien vers l'enquête ici : https://forms.office.com/e/2qYsDjbTkD

En vous remerciant par avance de votre coopération,

Ine, étudiante chercheuse à KU Leuven

Engels

Dear Resident,

What do you think of the nature in your living environment? How do you experience and use the greenery and water present? What could be improved and should change in the future?

The strategic project Leve(n)de Woluwe wants to give the river Woluwe and its tributaries space in the landscape again. Your opinion matters. This allows us to better combine future projects with the needs of the population.

Do you have ten minutes? Then complete our survey. In this way you participate in this scientific research of KU Leuven, you help the Regionaal Landschap Brabantse Kouters and you improve your own living environment.

Thanks in advance for your participation,

Ine, student researcher KU Leuven

Tekstje Email

Beste

Ik heb dit e-mailadres gevonden in de verenigingengids van jouw gemeente.

Mag ik jouw hulp even inroepen. Ik ben Ine, een masterstudente aan de KU Leuven. Ik wil de inwoners van jouw gemeente graag bevragen over de natuur in hun woonomgeving. Hoe beleven en gebruiken zij het aanwezige groen en water? Wat kan er beter en mag er in de toekomst nog veranderen?

Om zoveel mogelijk inwoners te bereiken, zou ik willen vragen om deze vragenlijst onder jouw leden te verspreiden.

De vragenlijst is terug te vinden op volgende link: https://forms.office.com/e/2qYsDjbTkD

Of door deze QR-code in bijlage te scannen.

Indien nodig, kunnen de leden rechts bovenaan de taal aanpassen.

De oproep staat op deze website (https://www.brabantsekouters.be/nieuws/onderzoek-levende-woluwe) en op Facebook.

De bevraging loopt nog tot eind februari 2023.

Aarzel niet om mij te contacteren als je nog vragen hebt.

Alvast bedankt,

Ine

7.3 Preparation of focus groups

Voorbereiding focusgroepen

Onderzoeksvragen thesis:

- Hoe beleven buurtbewoners groenblauwe netwerken in een stedelijke omgeving?
- Zijn er effecten op de buurtbewoners? Gebruiken zij de omgeving anders na de openlegging?
- Wat is de impact van water op de landschapsperceptie van bewoners in het Woluwe stroomgebied?
- Waarom is het relevant om water terug zichtbaar en toegankelijk te maken?
- Hoe kunnen we een draagvlak creëren voor de openlegging van de Woluwe ten aanzien van de buurtbewoners?

Thema's

1) Gebruik
2) Beleving
3) Draagvlak

vooraf: bij binnenkomen praatje maken met iedere deelnemer en vragen om persoonlijke fiche/naamkaartje in te vullen: zo leer je naam -dat doet gesprek vlotter lopen- en je kan ook bv. woonplaats, leeftijd etc. vragen>> je leert ook wie er veel praat en wie weinig, en daar kan je je tafelschikking aan aanpassen (babbelaars/drammers naast je zetten; verlegen mensen recht tegenover je).

Vragen	Methode	Tijd	Materiaal
Naam, Woonplaats, Leeftijd Afstand tot de Woluwe of zijbeken			Persoonlijkheidsfiches maken
Openingsvraag Wat is voor jou een verborgen natuur parel in jouw omgeving?	Vertellen over waarom het jouw verborgen parel is + aanduiden op de kaart	15 min	Kaart Zaventem
Ben je op de hoogte van de werken langs de Woluwe? Heb je al gehoord van het Woluwepad? Maak je gebruik van het Woluwepad? Zo ja wanneer en hoe? Maak je vaker gebruik van groene ruimte door de projecten die al gerealiseerd zijn? Zijn er nog activiteiten die je graag zou doen in de groene ruimte maar waar nu geen plaats/infrastructuur voor aanwezig is? Maak je meer gebruik van het landschap door de openlegging van de Woluwe of een van haar zijbeken? Hoe beleef je de winter- en zomerbedding? Wat zijn positieve punten? Zijn er nog punten voor verbetering?	Laat mensen vertellen a.d.h.v. foto's over hoe ze gebruik maken van de Woluwevallei. Laat ze dan de foto's rangschikken naar wat hun het meeste aanspreekt en waarom.	40 minuten	Foto's realisaties rond Woluwe zoals Woluwe pad, winterbekken, ...
Pauze 10 minuten			
Wat vinden jullie van waterloop/rivier in een stedelijke omgeving? We willen weten waarom water relevant is voor de buurtbewoners en willen de discussie niet laten leiden door het eerste antwoord dat gegeven is. Extra vragen i.v.m. water en klimaat Hebben jullie last van water schaarste, of water overlast? Wanneer? Nemen jullie voorzorgsmaatregels om dit te voorkomen?	Omdat we de discussie niet willen sturen in een bepaalde richting en het gesprek niet willen laten afhangen van de eerste persoon die antwoord stel ik voor om gebruik te maken van een mindmap. Om iedereen de kans te geven om iets bij te dragen maken we gebruik van een stillewanddiscussie. Hier mag iedereen in stilte de mindmap aanvullen zonder dat er geoordeeld wordt op de antwoorden die opgeschreven worden. Hierna wordt de mindmap in groep overlopen om te zien waar iedereen aan denkt bij de openlegging van een waterloop. We beginnen met een centraal element in het midden namelijk openlegging van water of ruimte voor water.	10 minuten tekenen 20 minuten bespreken	Groot wit blad papier 12 stiften
Waar word je blij van? Waar voel je je thuis? Waarom voel je dit? Wat zijn elementen waarom je een project zou steunen? Op welke manier wil je nog bijdragen aan het Leve(n) de Woluwe project? Wat zijn uw belangrijkste motieven om betrokken te willen zijn bij de natuur? (bv. Betrokkenheid bij mijn woonomgeving, Leuk, interessant werk, Andere mensen ontmoeten, vrienden maken, Actief en gezond blijven, Nieuwe kennis en vaardigheden opdoen)		20 minuten	

Totale tijd: 1 uur 50 minuten

Stappenplan de dag zelf

- Materiaal klaarleggen op tafels
- Mensen verwelkomen met drankje+ persoonsfiche laten invullen
- Welkomstwoord iedereen voorstellen + uitleg over het onderwerp + uitleggen wat het doel is van deze avond
- Iedereen is vrij om te zeggen wat hij/zij wil, vragen aan respondenten om respect te hebben voor elkaars mening en iedereen uit te laten praten en niet door elkaar te praten, vertel dat de deelnemers het niet eens moeten zijn of worden
- Pauze halverwege
- Vragen om het gesprek op te nemen, dit doen met 1 telefoon en een audiorecorder verbonden aan de laptop in de hoop dat de opnames achteraf duidelijk verstaanbaar zijn.
- Iemand noteert het gesprek mee zodat het makkelijker is om dit achteraf te transcriberen

7.4 Coding categories NVivo 12

Code name	#Ref	Code name	#Ref	Code name	#Ref
accessibility	4	Fragmentation	6	sound	13
appreciation	8	crossing roads	2	recreation	10
buzzy	3	garbage (cans)	2	bad state finse piste	1
climate	2	green spaces	1	conflict	12
collaboration	1	conserve green spaces	6	cycling	16
connection	2	creating green space	8	dog meadow	3
destination plan	1	hardening	26	play nature	8
ecoduct	1	historic value mills	1	walking	20
education	8	hollow road	5	responsible water stream	5
expats	2	involvement	2	slow roads	3
experience	5	landscape characteristics	11	water	5
fauna	5	location	13	activities	7
filthy	6	loops	3	Kleine beek	6
flooding	9	missing links	4	sewage system	16
Flora	2	missing places to sit	2	sources	9
forest	4	nature management	3	water wells	1
chop trees	2	pollution	1	Woluwe	15

vliegbos	1	smell	3	wind	1

7.5 Output tables regression analysis

Case Processing Summary

		N	Marginal Percentage
Intro	1 Fully disagree	8	3,6%
	2 Disagree	3	1,4%
	3 Neutral	31	14,0%
	4 Agree	56	25,3%
	5 Fully agree	123	55,7%
Valid		221	100,0%
Missing		0	
Total		221	

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	816,742	869	,897
Deviance	477,411	869	1,000

Link function: Logit.

Pseudo R-Square

Cox and Snell	,091
Nagelkerke	,102
McFadden	,042

Link function: Logit.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	498,581			
Final	477,411	21,170	7	,004

Link function: Logit.

7.6 Spearman rho correlation table

Spearman rho correlation between the re-opening of the Woluwe and different characteristics of green spaces

Correlations			Attractiveness	Safety	Quietness	Smell	Sound	Improvement	Whole	Diverse	Orientation	Accesibility
Spearman's rho	Intro	Correlation Coefficient	-0,130	-0,027	-0,118	-0,103	-0,047	0,026	-0,117	-0,069	-0,098	0,096
		Sig. (2-tailed)	0,054	0,693	0,079	0,130	0,484	0,701	0,085	0,308	0,150	0,156
		N	221	217	220	216	221	215	218	220	216	220