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Soundscapes of the Kehä Vihreä Urban Park

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Description

The aim of this research, assigned by the City of Jyväskylä, was to define the soundscapes of the new urban park network Kehä Vihreä. With the goal of locating peaceful soundscapes, qualitative focus group interviews were conducted in order to examine what perceptions and emotions the soundscapes of Kehä Vihreä evoke.

The characteristics of a soundscape were assessed using the sound walk method, which involves active listening during a predetermined walking route in the investigated area. To complement the qualitative focus group interviews with sound walks derived from the requirement that the interviewees were to observe the examined soundscape authentically prior to the interview. Five sound walks and focus group interviews were implemented in February and March 2016 with 10 interviewees in order to provide a path to the meaning of sound, and to explore what qualities make sounds to be perceived as noise, or conversely, as positively connoted sounds.

The theory and previous research reviewed revealed that a soundscape is enhanced by natural sounds whereas the sounds produced by humans—especially traffic noise—distort the perceived quality of a soundscape. The results of this study complemented these findings by revealing that traffic noise and mechanical sounds impair the perception of natural sounds.

The results provide strong support for the notion that a peaceful soundscape is closely related to a state of mind and active listening. Thus, it is suggested that the most effective way to affect the perceived quality of a soundscape is to offer citizens locations which invite them to come to a halt within the hectic city environment and to use their senses. The findings serve as a platform for further developing the soundscapes of Kehä Vihreä.

Keywords (subjects)

soundscape, sound, Kehä Vihreä, urban park, noise

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Tiivistelmä

Opinnäytetyön tavoitteena oli tarkastella Jyväskylän kaupungin uuden kaupunkipuistokokonaisuuden, Kehä Vihreän, äänimaisemia. Opinnäytetyön toimeksiantajan, Jyväskylän kaupungin, pyynnöstä Kehä Vihreän rauhalliset äänimaisemat pyrittiin paikallistamaan tutkimalla, mitä havaintoja ja tunteita Kehä Vihreän äänimaisemat herättävät.

Äänimaisemien ominaisuuksia arvioitiin hyödyntämällä äänikävelymetodia, jonka aikana haastateltavien tuli kuunnella aktiivisesti ympäristöstä kumpuavia ääniä ennalta määrätyllä reitillä. Äänikävely suoritettiin yksilöharjoitteena, jota seurasi laadullinen ryhmähaastattelu, jonka tavoitteena oli tarkastella, mitkä ominaisuudet vaikuttavat siihen, havaitaanko ääni meluna vai miellyttävänä äänenä. Tutkimus toteutettiin helmi- ja maaliskuussa 2016 järjestämällä viisi äänikävelyä ja ryhmähaastattelua yhteensä 10 haastateltavan kanssa.

Teoria ja aikaisempi tutkimus paljastivat, että luonnon äänillä on äänimaisemaan positiivinen vaikutus, kun taas ihmisten tuottamat äänet—erityisesti liikenteen melu—vahingoittavat äänimaiseman laatua. Saadut tulokset täydensivät aikaisemman tiedon paljastamalla, että liikenne ja muut mekaaniset äänet heikentävät kykyä havainnoida luonnon ääniä.

Lisäksi todettiin, että rauhallinen äänimaisema liittyy läheisemmin kuuntelijan mielentilaan ja aktiiviseen kuunteluun kuin tarkkaan paikkaan tai sijaintiin. Näin ollen tehokkain tapa vaikuttaa äänimaiseman laatuun on tarjota asukkaille viher- ja virkistysalueita, jotka kutsuvat heitä pysähtymään hektisessä kaupunkiympäristössä ja käyttämään aktiivisesti aistejaan. Tutkimustulokset tukevat Kehä Vihreän äänimaisemien kehittämistä.

Avainsanat (asiasanat)
äänimaisema, ääni, Kehä Vihreä, kaupunkipuisto, melu

Muut tiedot

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1 INTRODUCTION

This thesis is a commission received from the City of Jyväskylä on November 2015. Through the landscape architect of the city, Mervi Vallinkoski, a study was requested to explore the soundscape of *Kehä Vihreä,* which is a network of urban parks, green areas and public spaces around the city centre of Jyväskylä in Central Finland. According to Vallinkoski (2016), it is necessary to examine thoroughly the content and quality of the green areas of cities, since the amount of greenery in city centres is diminishing due to the growing population and building density.

Traditionally, sound in an urban environment is largely considered through noise level and abatement (Smith, & Pijanowski 2014, 65). Nevertheless, much research argues that simply aiming to reduce noise level does not lead to improved quality of life in an urban environment (Brooks, Schulte-Fortkamp, Voigt, & Case 2014, 32). Thus, noise pollution is but only one aspect of a soundscape of a city, and sound should be considered more extensively in the city planning and architecture (Elmqvist 2013).

Consequently, during the latest decade, soundscape as a more comprehensive approach to acoustics, has been used to replace noise abatement. A soundscape is a combination of all the present sounds emanating from the landscape. (Pijanowski, Farina, Gage, Dumyahn, & Krause 2011a, 1214.) Soundscape has a significant role for the perceived quality of a place, because sounds envelop us constantly, and hearing—aside from seeing—is the most important sense used for observing and understanding the world (Wissmann 2014, 45). Thus, this thesis assess the content and quality of Kehä Vihreä by examining its soundscapes.

The main difference between the soundscape approach and noise abatement is their perspective towards sound: in the soundscape approach a sound is identified as a resource rather than waste (Kang, Chourmouziadou, Sakantamis, Wang, & Hao 2013, 8). Hence, the soundscape approach provides better tools to understand, evaluate, and eventually, improve the relationship between noise and other sounds by examining how landscape and soundscape relate (Pijanowski et al. 2011a, 1213).

The composition of a soundscape is fundamentally shaped by human activities (Smith, & Pijanowski 2014, 72). In an urban environment human activities cause predominant amount of the sounds. The high volume sounds— like traffic—mask many other sounds, whereas hard surfaces—such as asphalt and buildings—easily amplify and echo sound. Ultimately, this creates an inharmonious and inconsistent soundscape. (Wissmann 2014, 54–55.)

Nevertheless, an uncertainty remains regarding the causes and effects of interaction between soundscapes and human systems: while the majority of soundscape research has focused on quantifying the characteristics and dynamics of soundscapes and their effects on organisms, the studies focused on humans and sound is rare and fragmented (Smith, & Pijanowski 2014, 63–64). However, it is known that sound has many primary and secondary effects on human health (Wissmann 2014, 193). For example, the physiological and psychological systems of a human being are impacted by sounds, irrespective of whether people actually listen to sounds or not (Smith, & Pijanowski 2014, 72).

The review of soundscape studies revealed that exploring the soundscape of an urban environment is a relatively new aspect on soundscape research. Therefore, this thesis stands as an exploratory among the qualitative soundscape research, and focuses on examining and analysing the increasingly significant ways that soundscapes could shape cities and urban life in the context of green and open spaces of cities.

The first and foremost aim of the thesis is to explore the perceptions and emotions evoked by the soundscapes of Kehä Vihreä. In addition, the thesis aims to provide understanding on how sound effect people and their well-being. Through these two aims it is targeted at facilitating an appreciation of soundscapes by the City of Jyväskylä, so that they may see and utilize the soundscapes as a resource.

2 KEHÄ VIHREÄ

Kehä Vihreä is a network of urban parks circling around the central parts of the City of Jyväskylä. Kehä Vihreä will connect already existing green, recreational and cultural areas in order to create a coherent and guided ring route around the city. The route is intended to function as a path which provides access from one area to another, as well as between the lakes of Tuomiojärvi and Jyväsjärvi. (Jyväskylän kaupungin viherpolitiikka [The Green Policy of the City of Jyväskylä] 2012, 16–18.)

Figure 1. Kehä Vihreä (Oilinki 2016)

The main locations of Kehä Vihreä are Harju, Viitaniemi, Taulumäki, Tourujoki, Lutakko, Mattilanniemi, Hippos, and Seminaarinmäki. These locations include roughly three different types of landscapes, which are

- ridge-like areas, such as Harju, Taulumäki, and Seminaarinmäki,
- park-like lakesides, such as Lutakko, Mattilanniemi, and Viitaniemi, and
- the steep and wooded river valley of Tourujoki.

In addition, Hippos, Seminaarinmäki, and Mattilanniemi represent built landscapes, including sport and campus areas. (Oilinki 2016).

The main purpose of the Kehä Vihreä concept is to improve the functional use of the green and public spaces of the city by developing their accessibility and usability. The peculiar shape of Kehä Vihreä, as a ring park, will serve as a connective route throughout the city, as well as between the three lakes surrounding Jyväskylä. In addition, it is wanted to increase the awareness of the green areas by launching a Kehä Vihreä brand connecting the green and public spaces of Jyväskylä. (Kehä Vihreän Kehittäminen [Development of Kehä Vihreä] 2016.)

Kehä Vihreä is an outcome of the green policy of Jyväskylä made in 2012, and the first concrete operations in establishing and building the Kehä Vihreä complex have started in 2016 (Kehä Vihreän Kehittäminen [Development of Kehä Vihreä] 2016). The themes of the green policy of Jyväskylä are well-being and health, accessibility, biodiversity, environmental consciousness, maintenance, events and tourism (Jyväskylän kaupungin viherpolitiikka [The Green Policy of the City of Jyväskylä] 2012, 8–9). The implementation of these themes on Kehä Vihreä are presented in Figure 2.

The Green Policy of Jyväskylä (2012)	**Kehä Vihreä**
Well-being and Health	*Kehä Vihreä will function as one of the most important destination for sports in the centre of Jyväskylä.*
Accessibility	*Due to high amount of elder residents in the centre, Kehä Vihreä's routes will be as accessible as possible.*
Biodiversity	*Preservation of already existing nature, especially in Tourujoki and Harju.*
Environmental Consciousness	*Cultural awareness and environmental education function together.*
Maintenance	*Maintenance is well-functioning all year around and the goals of the maintenance are variable from natural to built parks.*
Events and Tourism	*Kehä Vihreä covers the areas where are the biggest events and touristic destinations of Jyväskylä.*

Figure 2. The green policy of Jyväskylä and its implementation on Kehä Vihreä (Jyväskylän kaupungin viherpolitiikka [The Green Policy of the City of Jyväskylä] 2012, 17)

As a consequence, Kehä Vihreä has an important role in the strategies, values and goals of the city. In 2014 Jyväskylä established a strategy, which aims to have "active, happy and healthy citizens" through values, such as confidence, courage, creativity and caring, and goals which aim to promote wise use of resources and bold business policies (City Strategy 2014, 1–2).

Thus, in 2030 Kehä Vihreä is envisioned to be a comfortable, engaging, active and well-known urban park. The city wants to create a recreational public living room, which offers the citizens and visitors opportunities to recover amongst nature and culture. The vision highlights enhancing citizens' sense of community, and overall recognition of Jyväskylä by Kehä Vihreä becoming a well-known brand and city image. This is to be achieved by using Kehä Vihreä as a platform for events and culture. (Kehä Vihreän kehittämisselvitys [Development Report of Kehä Vihreä] 2015, 13.)

Presently, the City of Jyväskylä does not have a vision or strategy concerning the soundscapes within Kehä Vihreä. Therefore, this thesis will function as a robust basis for exploring soundscape design as a new perspective in developing and envisioning Kehä Vihreä.

3 SOUNDSCAPE

A soundscape reflects the relationship between landscape and its activities by including all the sounds present at given time and place (Pijanowski et al. 2011a, 1214). Since conscious listening may reveal near and far-off information about the environment throughout 360 degrees, Krause (2013) has stated that if "a picture is worth a thousand words, a soundscape is worth a thousand pictures".

In order to understand this phenomenon fully it is defined in a theoretical sense the concept of soundscape and its contents: different sounds sources and their variations in rhythms of nature. Furthermore, the concept is evaluated by setting boundaries and narrowing the context down into an urban environment, and ultimately, into an urban park.

In addition, this section will explore how sound effects people by discussing the relation of a soundscape with well-being and health. Finally, soundscapes as potential for tourism initiatives is discussed. The theoretical framework of this thesis is built on the key components of what the client, the City of Jyväskylä, requested.

3.1 Background and Definition

According to Villanueva-Rivera, Pijanowski, Doucette, and Pekin (2011, 1234), *sound* is a wave signal travelling over time and space, which accuracy and interpretation is determined by receiver's individual qualities. On the other hand, *scape* refers to an area, scene or space. Thus, a soundscape is "sounds occurring over an area". (Pijanowski et al. 2011a, 1214.)

Soundscape was first used as a term by an urban planner called Southworth in 1960's (Pijanowski et al. 2011a, 1214). Southworth (1969, 49) used the term to describe the acoustic properties that helped blind people to identify different spaces in the City of Boston. In 1977 a musician Schafer (1977, 7) formalized the term to include "any acoustic field of study" and "any defined acoustic environment" from music to studies concerning acoustic properties of a building or a landscape.

Schafer (1977) argued that an acoustic environment can be isolated as a field of study just the same as research on landscapes, although it is harder to formulate as a thorough understanding of a soundscape than of a landscape. Schafer demonstrated that even though sounds may alter and disappear it is still possible to study a soundscape by combining science, sociology and the arts. (3–5.)

To begin with, science serves to discover the physical properties of sound and its effects on human brain, whereas sociology and arts help to understand the effects of sound on human behaviour, and how people create ideal soundscapes, for example through music. Schafer was peculiarly concerned about the relationship between people and the sounds in terms of noise pollution and lack of awareness humans have of their acoustic surroundings. (ibid., 5–8.)

During the next decade Krause, a musician and naturalist, categorized the sound sources into biophony, including sounds created by animals, and geophony, including sounds created by wind and water. One more category—anthrophony—was added later to include human-produced sounds. (Pijanowski, Villanueva-Rivera, Dumyahn, Farina, Krause, Napoletano, Gage, & Pieretti 2011b, 204.)

In this thesis the definition of soundscape originates from Pijanowski and colleagues' (2011a, 1214) work stating that a soundscape is

> *the collection of biological, geophysical and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities.*

A soundscape is therefore the relationship between the landscape and its sounds. One could say that a soundscape reflects natural and human activities, and thus, serves as an excellent overview to understand the properties of a given landscape. For a concise summary of the development of the term of soundscape, please see Figure 3.

Southworth	1969	*The acoustic properties of cities that help people relate to space and activities occurring within the city.*
Schafer	1977	*Any acoustic field of study, e.g. auditory properties of a landscape.* *Any defined acoustic environment.*
Krause	1987	*All of the sounds present in an environment at a given time. Biophony includes sounds created by biological organisms, and geophony nonbiological ambient sounds.*
Pijanowski, Farina, Gage, Dumyahn, & Krause	2011	*Complex arrangement of sounds from multiple sources—including biophony, geophony and anthrophony—that creates acoustical patterns in space and time.*

Figure 3. Definitions of soundscapes in the literature

The Sound Sources: Biophony, Geophony and Anthrophony

A soundscape is integration of sounds originating from biological, geophysical and anthropogenic sources. Biophony includes sounds created by animals, geophony sounds from the movements of wind and water, and anthrophony human-produced sounds. (Pijanowski et al. 2011a, 1213–214.) More specific examples for different sound producers for each source are presented in Figure 4.

	Biophony	Geophony	Anthrophony
Sounds produced by	biological organisms	geophysics	humans
Examples	birds insects amphidians mammals	wind running streams rain thunder waves movements of earth	machines vehicles bells, sirens traffic music language
Annotations	signals are complex because they carry information	driven mostly by climate	more common during the daylight hours

Figure 4. The sound sources (Pijanowski et al. 2011a, 1213–1225)

Biophony includes all the sounds produced by living organisms, such as birds and insects, which also are generally the most frequent biophonic sound producers (Krause 2013). The landscape may shape the frequency, amplitude and directionality of the signals (Pijanowski et al. 2011b, 206). For instance, it has been discovered that birds of the same species use different pitch and frequency in their songs depending on whether they habitat a natural or urban environment. Moreover, some birds in an urban environment have been observed to sing more at night, assumedly because the anthrophonic sounds are less disturbing and intrusive during the night time. (Pijanowski et al. 2011a, 1224.)

Similarly, geophony may have influence on biophony, for example, heavy wind or rain often results in birds and insects becoming quiet (Pijanowski et al. 2011a, 1223). Geophony is also shaped by the landscape, for instance, rain is amplified by hitting concrete or tin roof (Pijanowski et al. 2011a, 1222). In addition, the geophony may also effect on anthrophony, since stormy weather conditions—as well as nearness of a loud stream or river—could easily mask the sounds of people and machines. In fact, according to Yle News, snow may muffle traffic noise for several decibels depending on the depth of the snow cover. Conversely, frozen snow may amplify sound. (Mattila 2016.)

According to Pijanowski and colleagues (2011a, 1224), anthrophonic sounds are often dominant because the amount of energy in human-produced sounds is great, and therefore, they often mask biophony and geophony. A good example of high energy sound producers are airplanes and traffic, because they mask all the other sounds, and are—in consequence—generally regarded as noise pollution (Noise in Europe 2015).

In summary, all the sound sources influence and interact with each other, as well as with the properties and activities of the landscape (Pijanowski et al. 2011a, 1213). Besides these two aspects, the sound sources are also affected by temporal factors, such as seasonal and diurnal variation (ibid., 1219–1221).

Seasonal and Diurnal Variations

Generally the seasonal and diurnal variations of a soundscape are based on the rhythms of nature. Especially the biophonic sounds are closely linked with the time of a day and year, because animals produce sounds mainly for communication, and the communicational needs differ across the seasons and circadian rhythms. For instance, birds are known to sing more intensely during spring due to the mating season. Also the time of the day effects on the amount and diversity of the birdsong, since generally birds sing more during dawn and dusk. (Pijanowski et al. 2011a, 1219–1221.)

In addition, the seasons effect on the weather conditions and movements of many migratory birds. Since the geophonic sounds are driven mostly by climate, and birds are active sound producers of biophony, it is obvious that the soundscape have significant alterations across the seasons. Furthermore, the global warming is reported to advance and impact on the seasons, and thus, also the soundscapes. (ibid., 1221–1223.)

3.2 Soundscape of an Urban Environment

In an urban environment the integration and relation of the sound sources are very different compared to natural areas, since an urban soundscape is dominated by anthrophony (Pijanowski et al. 2011b, 203). According to Wissmann (2014, 55), most sounds in an urban environment are created by traffic. In fact, the European Commission estimates that 125 million people are disturbed by noise from the road traffic (Noise in Europe 2015).

Pijanowski and colleagues (2011a, 1222) have illustrated the dominance of the anthrophony in an urban environment in Figure 5. The Figure demonstrates how the increasing level of urbanization and human activities correlate directly with the decrease of biophony. In fact, the relationship between biophony and anthrophony is inversely proportional when natural and urban environments are compared.

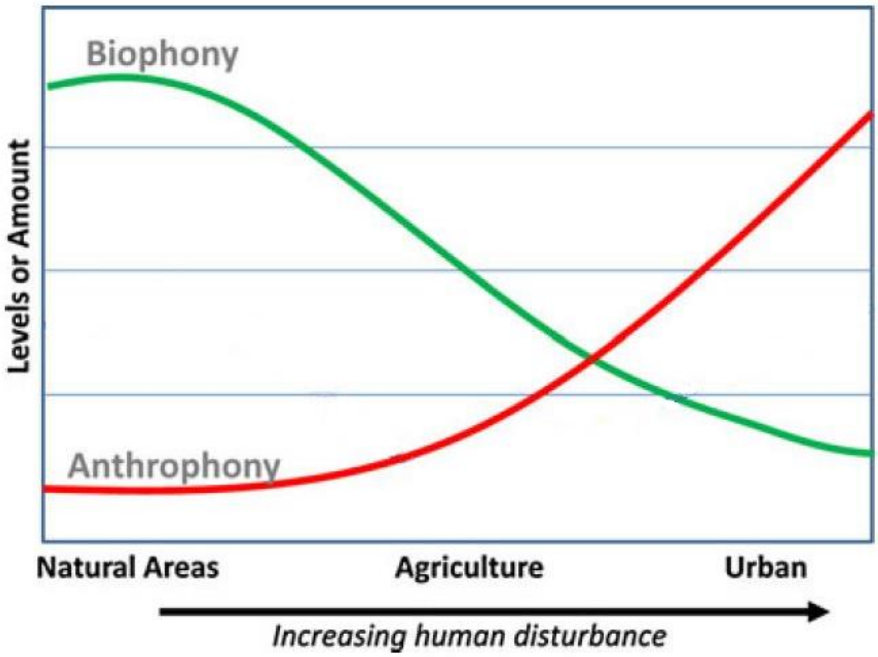

Figure 5. Relation of sound sources between natural, agrarian and urban areas (adapted from Pijanowski et al. 2011a, 1222)

In an urban environment human noise, habitat and resource distraction impact on the soundscape quality, because they disrupt wildlife behaviour, particularly in mate attraction and locating prey (Krause 2013). In other words, the drastic decrease of the biophony in agrarian and urban environment is due to human-produced sounds disturbing the communication systems of animals which are crucial for survival and maintaining thriving populations.

For example, Krause (2013) has discovered that selective logging performed in a natural area—in this case in a meadow of temperate zone—decreased drastically the density and diversity of the biophony, although the logging was not visually evident before or after photos of the meadow. Furthermore, the biophony of the meadow has not recovered in the 25 years following the logging. Thus, according to Pijanowski and colleagues (2011a, 1224), rich and diverse biophony is a sign of a prospering and undisturbed ecosystem, and therefore also a key for a pleasant and balanced natural soundscape. Nevertheless, biodiversity is scarce in an urban environment where human-produced sounds—often perceived and synonymized with noise—create predominant amount of sound.

Noise

Sound is often regarded as noise if its loudness exceeds certain decibel value or the sound is harmful for health. Noise is also described to be unwanted, undesired or accidental sound, which does not fit into the present surroundings, and therefore, it causes stress and nuisance. (Wissmann 2014, 139–140.)

Noise may be—and often is—received unconsciously (Treasure 2009). According to Wissmann (2014, 1), the unawareness of noise in cities is caused by people accepting even disturbing sounds as an integral and inseparable part of an urban environment. As the cities are expected to be noisy, it may have led people to ignore their acoustic environment while being in a city.

According to a report by Ministry of the Environment of Finland, living environments with sound levels exceeding 55 decibels during a day, are considered to be noisy, and every sixth Finn is daily exposed to noise because their living environment is not sufficiently tranquil (Valtioneuvoston periaatepäätös meluntorjunnasta [Government Resolution on Noise Abatement] 2007, 7). Nevertheless, an even higher rate of Finns might be exposed to noise. According to the Environmental Administration of Finland, also sounds which are not considered noisy when measured by decibels, can be experienced as noise, if the sound has obtrusive, trembling, disturbing or annoying characteristics (Melu [Noise] 2013). In fact—although measuring noise only by decibels—World Health Organization positions noise to be one of the leading environmental nuisances in Europe causing a considerable amount of short and long-term health problems (Noise: Data and statistics 2016).

The noise is presently controlled by regulations, such as *Environmental Noise Directive* (2002/49/EC) of European Union, and *Government Resolution on Noise Abatement* (2007) of Finland. Nevertheless, these public policies often focus extensively on traffic noise on heavily used highways and airports, and sound is only measured by its pressure level (Smith, & Pijanowski 2014, 65).

It has been discovered that a simple objective to reduce noise does not necessarily lead to improved quality of life in urban areas (Brooks et al. 2014, 32). According to Kang and colleagues (2013, 8), the type of the sound sources and individual characteristics of a listener, signify more than the mere level of a sound when examining the perceived quality of a soundscape.

In his book *Geographies of Urban Sound* Wissmann (2014, 55–56) has listed noise of an urban soundscape to include sounds from seven main sources, which are

1. motor vehicles,
2. aircraft,
3. railways,
4. industrial and commercial enterprises,
5. demolitions, construction, road works,
6. racing tracks, amusement parks, night clubs, discotheques, and
7. local human activities, such as noisy persons, slamming of car doors, lawn mowers.

The impact of these anthrophonic noise sources can be reduced by masking or covering them, but only reducing noise to an accepted level does not necessarily improve the overall acoustic environment. A more effective and proactive way to improve a soundscape is to add positively connoted sounds, because relative increase of pleasant sounds is discovered to decrease the perceived loudness and annoyance of the receivers. (ibid., 56.)

Schafer (1994, 268–269) discovered—in an international sound preference study—that the most pleasant sounds were all natural sounds, such as birds, rivers and breeze. Therefore, it could be assumed that adding natural sounds into an urban environment could help to mitigate the experienced noise and improve the overall soundscape. One way to increase the amount of natural sounds in an urban environment, is to have proportionally sufficiently urban parks and green areas within a city.

The Role of Parks and Green Areas in an Urban Environment

According to The World Bank, more than half—almost 54% in 2014—of the global population lives in cities. In the European Union the same rate exceeds 75%. (World Development Indicators 2015.) In Figure 6 it can be seen how the urbanization in Europe has been especially fast-paced during the 20th century, and although the growth has slowed down during the 21st century, there has been uninterrupted annual increase. Moreover, globally the growth of urbanization continues steadily.

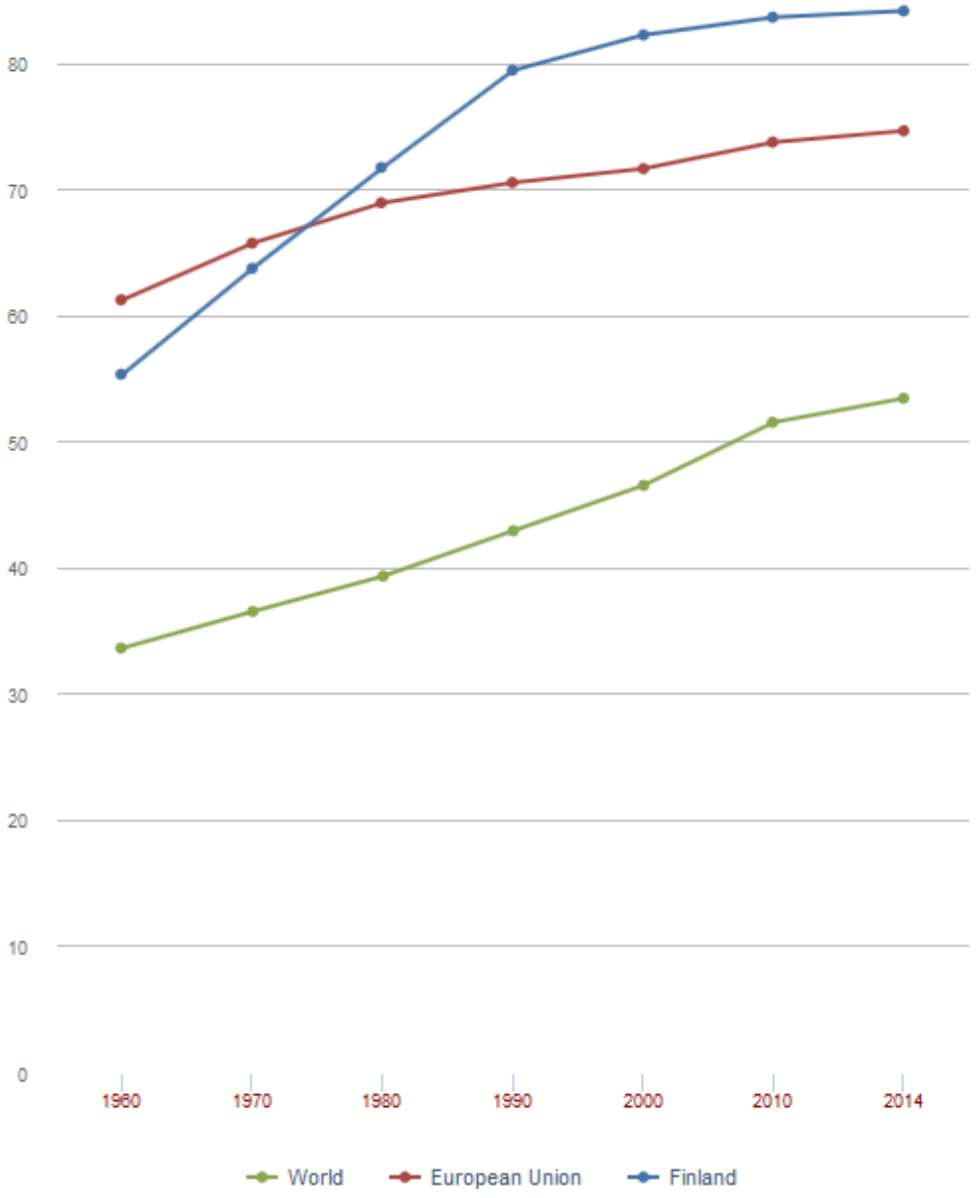

Figure 6. Urban population percentage in world, EU and Finland (World Development Indicators 2015)

As a consequence of the rapid and constantly growing level or urbanization, building healthy, recreational and sustainable spaces for the increasing number of citizens is a demanding challenge, especially in countries which suffer from pollution and scarce nature resources. Green areas have a significant role in responding to this challenge, because they can improve health and well-being, as well as increase the biodiversity of an urban environment. Moreover, green areas may increase a city's economic and community value, improve air quality and provide healthy habitats for wildlife and vegetation. (Nagel 2015.)

The first green parks were built in response to the Industrial Revolution which increased urbanization, and consequently, caused cities to become more packed, polluted and unhealthy. The earlier parks were built for the elite's health and enjoyment, and they often resembled the country side. The use of green areas has changed, and although well-being and observing nature are still fundamental elements of urban parks, there are new aspects in the role of greenery in an urban environment, such as climate adaptation, heat alleviation, biodiversity and enhancing the sense of community by offering open spaces for all the citizens to meet, spend leisure time and connect with nature. (Shepherd 2011.)

Nevertheless, the role of urban parks is still changing, especially in developed countries. Cities, which are top rated in liveability and health, do not anymore necessarily need to provide parks for their original intentions as private natural space for well-being and diminishing pollution from industry. For example, the capital of Denmark, Copenhagen, has invested in creating pocket parks—maximum 5,000 square meters sized parks—so that all the citizens are able to walk into an urban park in less than 15 minutes. The vision is to create a green, variable and liveable city, which will be a model for responding to global warming. (Copenhagen - Pocket Parks, a Drop of Urban Green 2014.) Thus, the role of these pocket parks is to improve and highlight a global problem, and consequently, enhance the city image of Copenhagen.

Another example of the new role of urban parks is from the German city of Hamburg, where it is envisioned to have a car-free green network which will enable the citizens to walk or cycle all the way from the borders of the city to the city centre. Hamburg wants to be a forerunner in creating a city that can be experienced exclusively by bicycle or foot. (Maya-Drysdale 2014.) The green network will definitely serve the citizens, but also attract tourists and residents. In fact, especially in many modern and western cities, the role of parks are more and more about gaining competitive advantage and attracting citizens and visitors.

The role of green areas is relatively different in Finland, where—due to relatively small sizes of the cities and extensive nature reserves— there is easy access to unpolluted and wild nature. In fact, the Environmental Administration of Finland estimates that the vast nature reserves and outdoor possibilities in Finland—as well as such norms as everyman's rights—are unrivalled by most European countries (Green and recreational areas 2013).

In conclusion, parks and green areas in the cities of Finland could be seen more as a service and experience. Involving soundscape design into the green services of Jyväskylä can be a noteworthy opportunity for tourism and achieving a competitive status of a role model and forerunner in an urban design. Given the above examples, information and the new context for urban green areas in Finland, it needs to be defined the role of sound in urban parks.

3.3 The Role of Sound in an Urban Park

Green areas can offer an escape and pause from the city environment, which is often considered—but accepted—to be hectic and noisy due to traffic and other anthrophonic sound sources. Since roads and traffic are presently unavoidable within cities, it is important to preserve spaces—such as urban green areas—where citizens are able to enjoy peaceful and natural soundscapes.

According to a survey conducted in The Netherlands (Chiesura 2004, 132–133), the two main motivational reasons for people to visit urban parks are “to relax” (73%) and “to listen and observe nature” (54,4%). Consequently, urban parks could be regarded as safe havens within a city, where people are constantly surrounded by accidental and unpleasant sounds, like vehicles and machinery.

Good soundscape quality is a valued feature of green areas in Finland. Tyrväinen, Mäkinen, and Schipperijn (2007, 5) discovered that one of the most important quality of citizens’ favourite green areas was tranquillity. Moreover, a value mapping made in Helsinki, the capital of Finland, revealed that 77% of the respondents hoped for more peace, silence, wild animals and multisensory experiences in the green areas (Tyrväinen, Mäkinen, Schipperijn, & Silvennoinen 2004).

Soundscape of an urban park plays an important role in observing and experiencing nature, because the soundscape reveals information of the surrounding environment in 360 degrees (Krause 2013). While eyes can show us only a limited frontal perspective, ears reveal also what is around and behind us. Ears can also reveal what is behind some visual obstruction, such as a wall or a hill. Thus, soundscape should be integral to the landscape design and management.

Managing Sound in an Urban Park

Wissmann (2014, 1) and Elmqvist (2013) consider sound to be a fundamental part of an urban environment, because sound has significant impact on the perceived quality of a place. Since the vision of Kehä Vihreä is to create a recreational public living room, which offers the citizens and visitors opportunities to recover amongst nature and culture, it is valid to acknowledge and manage the soundscapes in Kehä Vihreä in order to achieve—and actualize—the vision.

It is challenging to measure, understand and manage soundscapes which contain many elements, such as loudness, human perception and variation in space and time (Pijanowski et al. 2011a, 1226). These challenges—as well as a lack of information due to soundscape study being fairly new science—might be the reason why soundscape is not frequently taken into consideration in urban landscape architecture (Elmqvist 2013). In addition, unawareness and acceptance of noise in cities, may have led sound to be a neglected aspect in city planning.

A good start for soundscape management is to understand the relationship between a specific sound source and the level of annoyance it creates. If the sound sources causing annoyance are removed, it may also improve the total quality of a soundscape. For example, a research examining the perceived soundscape quality of urban parks in Sweden, discovered that a good soundscape quality could only be achieved if the traffic noise exposure during day time was below 50 A-weighted decibels. (Berglund, & Nilsson 2006, 903.) Thus, the result suggests that traffic noise was the main sound source reducing the perceived quality of the soundscape.

In addition, a research from Finland states that the urban park of the City of Pori provides the citizens an acoustic refuge, since the traffic sounds were not too intrusive and the natural sounds could be heard well (Simonen 2011). Nevertheless, the urban park of Pori, as coherent park located in an islet and covering approximately 10 square kilometres, has significantly different shape to Kehä Vihreä. Therefore it could be assumed that the soundscape of Kehä Vihreä does not necessarily provide similar acoustic refuge than the urban park of Pori.

In fact, Pijanowski and colleagues (2011a) indicate that geophony between forest edges and cores differ greatly, because the edges are discovered to contain increased wind and turbulence compared to forest interiors. In consequence, also biophony vary between the forest edges and core, because more resonant species—able to be heard over the stronger wind speed—are likely inhabit the edges. (1223.) As a result, the shape and size of a forest can have both positive and negative affect upon the soundscape.

The same phenomena could also occur in an urban park, and especially in Kehä Vihreä which has relative narrow ring shape and therefore many edges. Most likely Kehä Vihreä, as a ring park, will face particular challenges on achieving a soundscape which geophony would resemble the interior of a forest, and block and mask traffic noise in a similar way that the urban park of Pori does.

On the other hand–as already mentioned–simply reducing and removing noise sources does not necessarily improve the soundscape quality (Kang et al. 2013, 3). Moreover, some studies have indicated that reducing noise level–for example with narrow belts of vegetation–might actually increase the perceived noise, because sounds which cannot be identified visually tend to be listened to more cautiously (Wissmann 2014, 134).

Therefore, a more holistic, efficient and resourceful view on noise pollution could be achieved by considering and utilizing the soundscape approach considering sound as a resource rather than a waste. In fact, EU COST Action on Soundscape of European Cities and Landscapes, has been promoting, involving and training soundscape research as a new multidisciplinary approach to sound due to the inadequacy of noise abatement in improving the quality of life in urban areas (Kang et al. 2013, 3).

Smith, and Pijanowski (2014) argue that holistic and successful soundscape management requires integration between sciences. For instance, spatial ecology can provide information on how topography and vegetation influence the soundscape. (63.) Since, soundscape is not created only by the present sound sources, but also by how a sound signal travels from the source to the listener, it is important to examine how different surfaces could reflect or absorb sound (Kang, & Schulte-Fortkamp 2015, 2). In an urban park the surfaces could be designed with consideration of their effect on sound propagation.

Pijanowski and colleagues (2011a, 1221–1222) have discovered that the vegetation structure impacts directly on the diversity of species. For instance, the amount of different insect species correlates directly with the amount of plant species. Given this, it may be possible to enhance the biophony in an urban park by increasing the density and diversity of plants and trees in order to attract more diverse range of animals.

The measurement and management of a soundscape quality could be followed by figures. For example, in Sweden the goal is that 80% of the visitors of the quiet areas perceive the soundscape as good (Berglund, & Nilsson 2006, 903). Similar goals could be set and evaluated regularly in Kehä Vihreä. The measurements could, in addition, offer valuable information to audit how the soundscapes of Kehä Vihreä are developing and responding to changes and improvements.

Since soundscapes may vary from day to night, and season to season, managing soundscapes is complicated (Kang, & Schulte-Fortkamp 2015, 2). Nevertheless, soundscape research could be utilized in landscape design far more, because it highlights sound as a resource. In addition, through soundscape research a broader and deeper understanding over the properties of a landscape may be achieved, because sound reveals many details which cannot be observed visually (Krause 2013). For instance, the soundscape approach combined with social sciences, could be utilized in urban context to discover how humans perceive and respond to a soundscape of a place (Smith, & Pijanowski 2014, 64). This type of co-operation between different scientific fields could reveal, for example, why a certain public space is unsuccessful.

In fact, sound has many ongoing and subconscious effects on people, because sound envelops us constantly. Whether listened or not, air conditioners, people talking, machines humming and mere bustle of a city create an orchestra of continuous background sound for our sensitive ears. Therefore, in order to manage—and to understand why it is essential and valuable to manage soundscapes—it is necessary to examine how sound affects people, and especially, what impacts sound has on human health and well-being.

3.4 Soundscapes and Well-being

The effect of sound on people is vast because sound is always present, since human ears are functioning continuously, even when asleep (Kang, & Schulte-Fortkamp 2015, 1). According to Treasure (2009), sound is underestimated as a key element in quality of life although it affects people physiologically, psychologically and cognitively. In Figure 7 some of the researched impacts of sound and noise on human health are presented.

	Health Impacts	Annotations
Physiological	changes in blood pressure heart rate depth and speed of breathing muscle tension hormone level in addition, hearing loss tinnitus	Often sort-term responses in automatic nervous system. Prolonged exposure may contribute to numerous health problems, such as increased probability of a heart attack.
Psychological and Cognitive	annoyance changes in emotional state sleep deprivation and disturbance mental health problems reduced cognitive processing abilities reduced productivity memory impairment	The level of the impact depends on subjective appraisal.

Figure 7. Impacts of sound and noise on human systems (Smith, & Pijanowski 2014, 66)

Although, the physiological impacts are initially sort-term responses in automatic nervous system, prolonged exposure often contributes to various progressive and long-term health problems, such as cardiovascular and heart diseases. Alternatively, the level of the psychological impacts are experienced individually. (ibid., 66.) The individual perception is discussed in more detail in the next section (please see page 25).

According to World Health Organization (Burden of disease from environmental noise 2011, 100), the psychological and cognitive impacts of noise affect a larger amount of people than the physiological impacts. Figure 8 illustrates an estimation of WHO that the "feelings of discomfort" and "stress indicators" are the two largest categories when compared the impact on amount of people affected. However, the illustration is simplified, since such diseases and risk factors as sleep disturbance and blood pressure, are likely to contribute—or be connected with— stress indicators and feelings of discomfort.

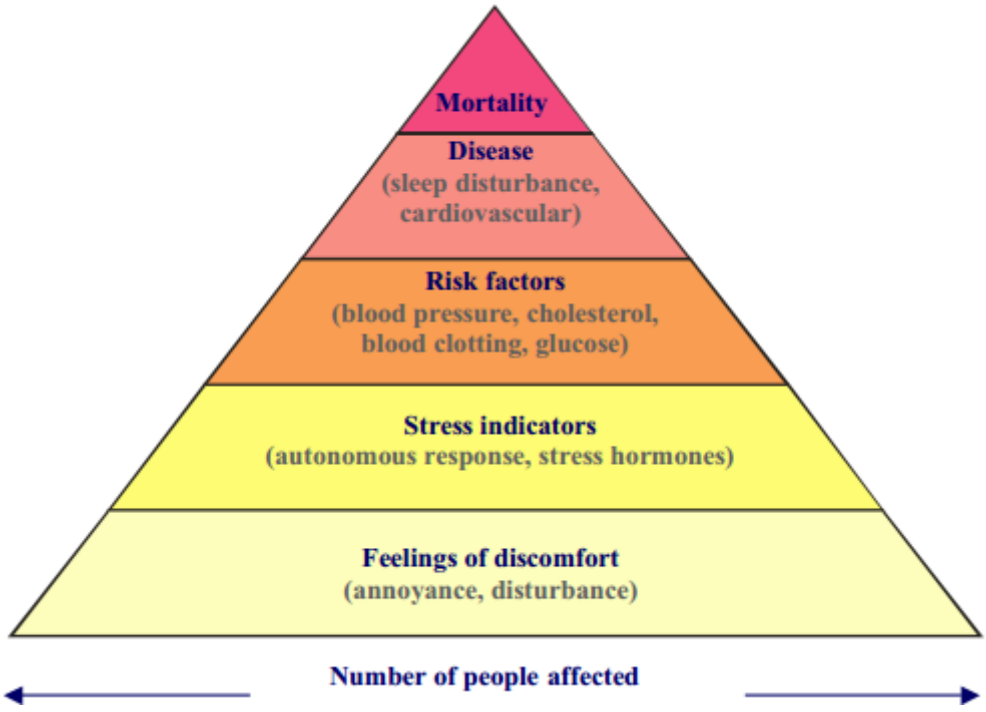

Figure 8. Severity of health effects of noise (adapted from Burden of disease from environmental noise 2011, 100)

Sound does not only have negative health impacts, since a peaceful and harmonic soundscape can also cause positive physiological and psychological changes. For instance, most people find many natural sounds—such as bird song and waves—reassuring and soothing, which is likely to lead to decrease in blood pressure and stress level (Treasure 2009).

As already discussed, increasing the amount of positively connoted sounds is a more efficient and potential way to improve the overall soundscape quality than noise abatement (Wissmann 2014, 56). In order to know, how sound could be used as a resource for enhancing the positive impacts, it is important to examine how sounds are perceived and how they make people feel.

Individual Perception

> *The perception of a soundscape is inherently personal and affected by what a listener, each with a unique set of experiences and preferences, brings to the listening situation (Jennings, & Cain 2013, 295).*

Individual qualities have a significant role in what and how people perceive their environment (Wissmann 2014, 9). For instance, individual's physical capabilities—such as age and hearing problems—may impact on the experience, since the older people get, the less accurate they are able to hear. In addition, individual's cultural background and personal preferences are likely to effect on, how certain sounds are received. Children playing is a good example of a sound, which may be perceived very differently among individuals: while others may find sounds emanating from a playground pleasant, for others it may cause annoyance. (ibid., 46–49.)

In addition, people always interpret what they hear. The interpretation is based on, and built by, individual significances, social meanings and cultural contexts. (Wissmann 2014, 45.) For example, language is built by a combination of sounds—i.e. letters—which are agreed to have a certain meaning when they are put together in a specific order (Mercer 2000, 5–6; Trask 1995, 3–4). Therefore, cultural and social interpretation is needed in order to understand a language.

Furthermore, a place may have a role in experiencing a soundscape, since the way people sense their environment is affected by place attachment and place identification. Place attachment stands for individual's emotional bonding to a place through unique and memorable experiences, which also include sounds heard in the place. Place identification describes the individual's relationship to a place and its physical elements, such as landmarks. (Wissmann 2014, 17–25.)

Since sound is created by physical elements, soundscape may play an important role in the place identification, as Southworth (1969, 49) discovered in his research on examining how blind people used sound in identifying their whereabouts within a city. Thus, expectations and experiences are significant parameters which explain the different perceptions on a same stimuli (Brooks et al. 2014, 35).

In addition, a person's emotional relationship with a sound has a significant role in how a soundscape is evaluated (Smith, & Pijanowski 2014, 65). People often connect some sounds to be part of a certain place or memory—or alternatively—a certain sound may contribute to a specific memory or experience.

Emotions and Soundscapes

Human physiological and psychological systems are impacted by sound (Smith, & Pijanowski 2014, 72). Thus, the relationship between people and sound is dynamic and complex—especially psychologically—because individual perception determines how an individual's emotional state is affected by the soundscape

Emotions are either primitive automatic responses, or driven by personal beliefs, attitudes or desires. Emotions are evoked by different categorized objects. For example, fear is often triggered by an object, which is categorized as harmful. (Juslin, & Solboda 2001, 26–27.) The relationship between the complexity of information and human curiosity simplifies, how people react emotionally to stimulus. For instance, when complexity of information of an environment is very low, the situation is usually found unattractive, whereas if the complexity is too high or demanding, people tend to react with annoyance. (Elmqvist 2013.)

Arvonen (2014, 12–18) estimates that the complex and constantly changing stimulus of an urban environment demands direct attention, which cause people to be in an alert mode for long period of times. Wissmann (2014, 54–55) agrees with Arvonen by stating that the problem of a soundscape in an urban environment is the disproportionate and excessive amount of sound sources, which create an inharmonious field of stimuli.

Thus, the various and inconsistent stimuli of a city can offer a challenging environment to accommodate an emotional balance. Nevertheless, the truth may not be as simple, since a relative increase of pleasant sounds—which in fact is also an increase of stimulus—actually decrease the level of annoyance (Wissmann 2014, 56). Therefore, it could be assumed that the quality of stimulus is more significant than the amount or level of it.

Wissmann (2014, 45) indicates that a positively connoted sound may have a therapeutic effect on a human being. For example, music is an efficient and common tool used for triggering certain emotions or fostering specific behaviour (ibid., 49). Nevertheless, engagement with the sound should be authentic, as Largo-Wight, Chen, Dodd, and Weiler (2011, 128–129) discovered that a direct nature contact had the strongest positive impact on the stress and health of the office workers, whereas an indirect nature contact—such as nature sounds played in the office—had the weakest impact.

According to Wissmann (2014, 49), people tend to notice sound only when it is bothering them, while they pay less attention to sounds which could have positive effects on their well-being. In fact, in cities relationship with sound has become largely unconscious, because the high intensity of unpleasant and accidental sounds has caused people to suppress and pretend that sound does not exist (Treasure 2009). For example, headphones are used extensively to disconnect from the environment and block inharmonious soundscape of cities (Wissmann 2014, 69).

According to Wissmann (2014), silence—although often inaccessible—is particularly desirable in an urban environment. Since, total silence does not exist, silence usually refers to tranquillity and lack of disturbing or intrusive sounds. (69.) Silence may also be used to describe a soundscape which consist chiefly of natural sounds and lacks sounds caused by human activities (Hedfors 2003, 61).

The value mapping of the green areas of Jyväskylä made in 2008 exposed that there are only few areas on Kehä Vihreä which are presently experienced as peaceful and silent (Viheralueiden arvojen kartoitus [Value Mapping of the Green Areas] 2008, 17). As can be seen in Figure 9 the red areas of the left picture indicating peaceful and silent locations, correlate little with the right picture presenting Kehä Vihreä.

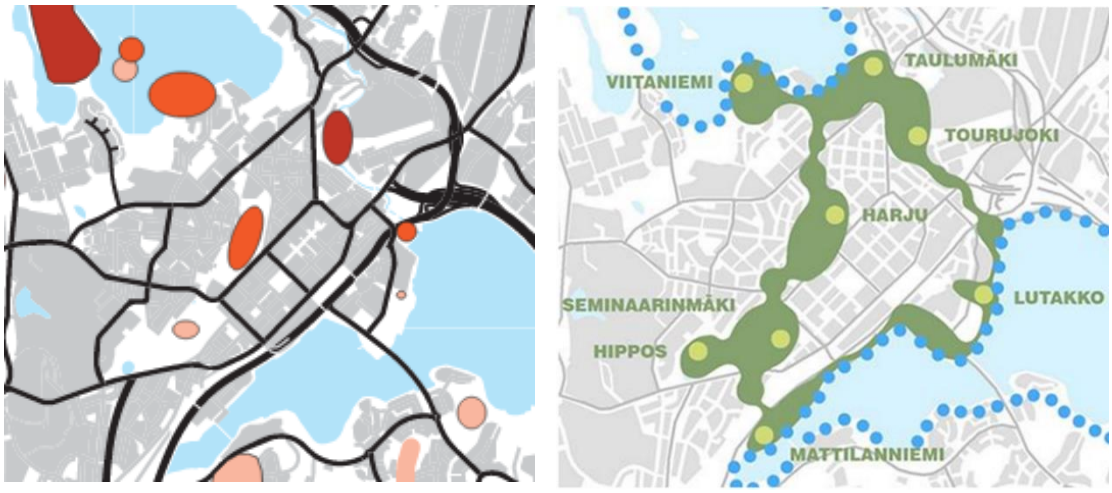

Figure 9. Peaceful and silent areas in Jyväskylä (Viheralueiden arvojen kartoitus [Value Mapping of the Green Areas] 2008, 17)

The depth of the color indicates the amount of the reponses, for instance, due to the darkest red color, Tourujoki has been valued as the most peaceful and silent location within the city centre. Otherwise, there is a clear emphasis that the largest green areas, such as Harju and Viitaniemi, were perceived as more peaceful and silent than the smaller and narrower green areas, such as Lutakko.

Smith, and Pijanowski (2014, 65) believe that quiet locations make people desire solitude. Since solitude is also often inaccessible in an urban environment, it could be argued that cities are in trouble with meeting the emotional needs and desires of their dwellers.

In fact, Staatsa, Kievieta, and Hartig (2003, 155) discovered that people suffering from attentional fatigue expected to recover better and faster in a natural environment—where social encounters were anticipated to be fewer—than in an urban environment. The result suggests that the objectives of peacefulness and recreation are driven by emotions of privacy and tranquillity, which are also commonly accepted as the key elements of a successful urban park experience (Wissmann 2014, 193). Therefore, a soundscape management accommodating different emotional needs and desires of urban dwellers, could be a key component in improving health and well-being.

In addition, Brooks and colleagues (2014, 33) state that "a natural resource is anything obtained from the environment to satisfy human needs and wants". Thus, if soundscapes were considered as a natural resource, the sounds could also be harnessed to create attractive, liveable and popular spaces.

3.5 Touristic Potentials of Soundscapes

The Environmental Administration of Finland (Green and recreational areas 2013) describes recreational areas and outdoor routes as "an important part of the services offered by the society". However, if the soundscape approach was embraced to enhance the urban parks from a service into an experience, the possibilities of green areas could be greater.

For instance, a peaceful soundscape could be an extensive touristic opportunity, since noise is estimated to be one of the leading environmental nuisances in Europe (Noise: Data and statistics 2016). In addition, utilizing soundscape is a relevantly new and unused asset in tourism, for instance, a research examining the use of sound in marketing in southern parts of Finland, revealed that sound is rarely utilized for promoting and identifying a place (Laaksonen 2014, 45).

On the other hand, silence-based tourism has been promoted in more remote parts of Finland, such as North Karelia and Lapland, due to the vast natural resources and sparse population of the areas. In these rural areas developing silence into a tourism asset is based on offering "services and time in a special, nuanced, and silent environment". (Silence and Listening as Resources of Tourism Expertise in North Karelia; Industries in Lapland.)

Although accessing and creating these kind of silent environments within cities is more challenging, the soundscape approach offers vast touristic potential for an urban environment. Since expectations influence strongly on how people perceive a soundscape of a certain place, it is important to promote soundscape in a manner which raises sustainable expectations. Urban parks, for instance, are often expected to offer a relaxing, quiet and pleasant soundscape in which natural sounds mask most of the disturbing sounds of a city (Wissmann 2014, 193).

According to Leus, and Herssens (2015, 25–26), soundscape is the key component of the genius loci of a public space, because soundscape has a major impact on the perceived quality and essence of a space. For instance, libraries, museums and churches are public institutions where silence is a mental state created to support privacy and unique sense of the place. In these places quietness is expected and experienced through awareness in which silence is emphasized between the sounds, and the sounds amplified through the silence. (Wissmann 2014, 196–199.)

Creating a similar mental state into an urban park, could allow the citizens to observe their surroundings in a new conscious way. For instance, in Kehä Vihreä zones or sacred spots could be implemented, in which people are instructed to observe the place through active listening, which is also a common method in ecopsychology used for recovery and empowerment (Arvonen 2014). Thus, a soundscape should be regarded as an immaterial resource offering possibilities to create and promote multisensory experiences.

When considering a soundscape as a mirror of the properties and activities of a landscape, its vital role in identifying a place, and variable effects on well-being and health, it is evident that soundscapes will have a significant role in the future as a resource. Consequently, tranquil areas ought to be preserved and enhanced due to the opportunities they offer for recreation and tourism (Bernat 2014, 114). Moreover, the soundscape approach conforms to the principles of sustainable tourism, since visiting and experiencing a place with distinctive soundscape requires that the natural and cultural values of the environment are respected and perceived (ibid., 108).

4 RESEARCH DESIGN AND IMPLEMENTATION

Research design is the backbone of any research, guiding the data collection and analysing the results. Research design also connects the research implementation to the research questions, and eventually to the conclusions. (Oliver 2008, 104.) Thus, the main purpose of a research design is to function as a blueprint for examining the research questions through appropriate and applicable data. By designing the research properly an investigator can avoid a situation where the collected data does not address the initial research questions. (Yin 2014, 28–29.)

According to Yin (2014, 29), a research design should as a minimum answer the following questions:

- what questions to study,
- what data are relevant,
- what data to collect, and
- how to analyse the results.

These research design questions are addressed and answered in this theses in the following sections:

- what questions to study → 4.1 Research Aims, Questions and Objectives
- what data are relevant → 4.2 Research Methodology
- what data to collect → 4.3 Research Methods
- how to analyse the results → 4.5 Analysing the Data

In addition, the section 4.4 Data Collection discusses the process of acquiring of the data.

4.1 Research Aims, Questions and Objectives

Since sound is a fundamental part of an urban environment, a significant resource opportunity, and a major element in perceived quality of a place, *this study aims* to define the soundscapes of Kehä Vihreä by treating sound and soundscapes as a resource, and by highlighting the role of sound in the development of Kehä Vihreä.

Through these preliminary aims three research questions were formulated in order to clarify and define the research problem and the focus of the study. The research questions were discussed, adjusted and determined together with the representative of the client Mervi Vallinkoski, the landscape architect of the City of Jyväskylä. Ultimately, the *following research questions were set* to meet the research problem:

- What perceptions and emotions do the soundscapes of Kehä Vihreä evoke?
- Where are the peaceful soundscapes on Kehä Vihreä?
- What are the development opportunities for Kehä Vihreä's soundscapes?

In addition, it was necessary to unpack the research problem into a series of objectives in order to evaluate the research questions. *The objectives of the thesis are*

- to observe how people respond to sound,
- to understand how sound affects people,
- to define a peaceful soundscape,
- to understand the value of a peaceful soundscape, and
- to explore the development opportunities for Kehä Vihreä's soundscapes.

The path and relationship between the research aims, questions and objectives are described in Figure 10. The flowchart of Figure 10 is a combination of the research phenomenon and the structure of the thesis. When the flowchart is read horizontally, it reveals the relationship between the research aims, questions and objectives, whereas a vertical observation reveals the general structure of the thesis and hierarchy among the research questions.

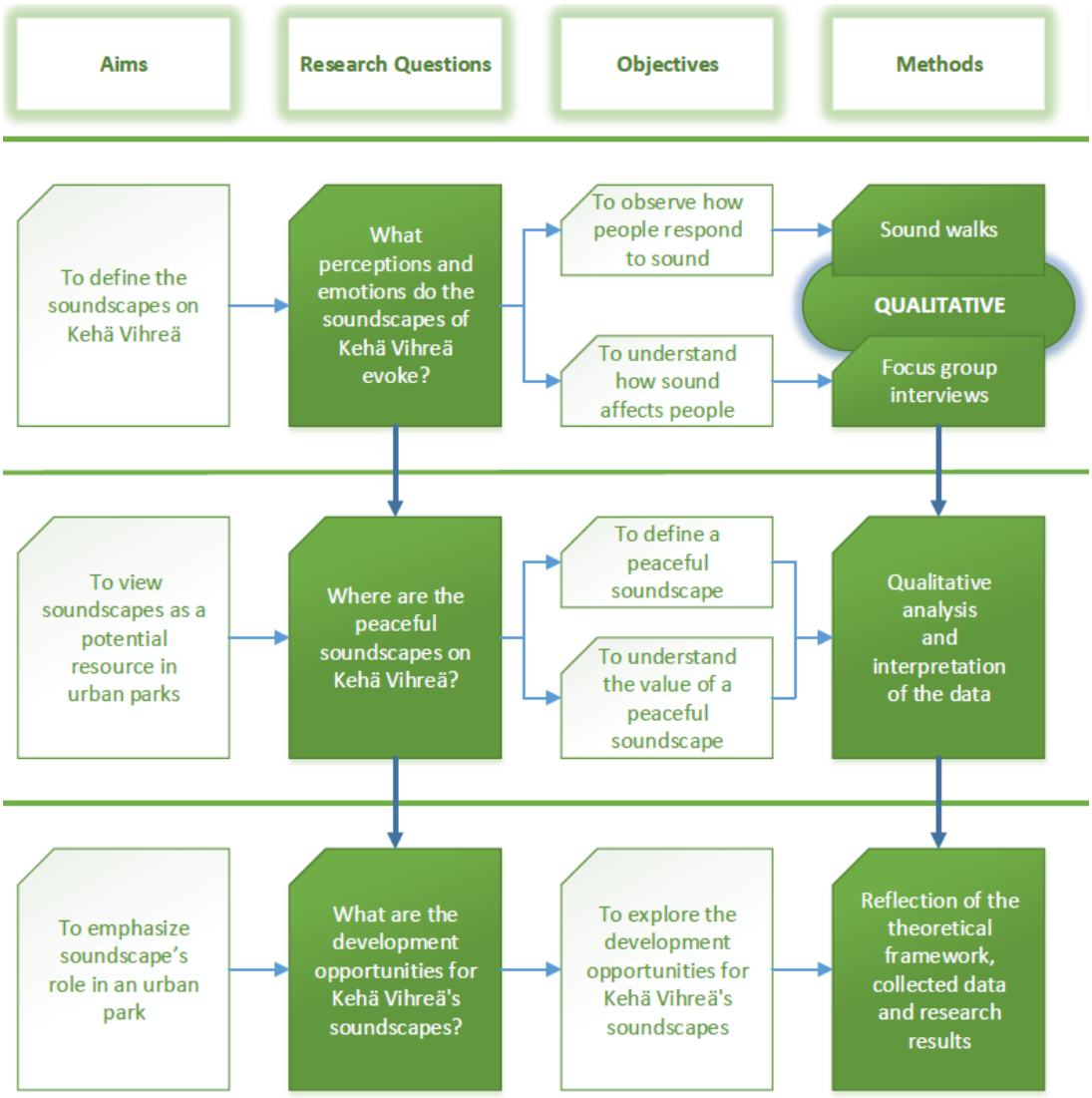

Figure 10. The research design and implementation

The first top row of the flowchart represent the theory (section 3) and data collection (section 4.4) phases of the research, whereas the middle row represents the research results (section 5). These first two rows are the main focus of this research, which is to analyse the soundscape of Kehä Vihreä and to observe what emotions and perceptions the soundscape arise in the focus group.

The last bottom row of the flowchart embodies the content of the conclusions (section 6), which is also the last section of this research. The last row was added as a sub-question, since—with the help of this research—it will also be possible to suggest approaches for developing the soundscape in Kehä Vihreä further.

4.2 Research Methodology

Research methodology contemplates “the nature of reality” and “how that reality can be known” and is therefore a foundation, which provides philosophical and theoretical framework for the examined phenomenon (Denzin, & Lincoln 2000, 100–101). Thus, research methodology provides a rational perspective on what data are relevant to interpret the research questions. Research methodology ought to be chosen to accommodate the best scientific principles and methods for observing the research topic (ibid., 122).

The most common division of the methodological approaches are qualitative and quantitative research (Kananen 2011, 147). Qualitative research is generally aiming at interpreting or defining a phenomenon (Davies 2007, 10). On the other hand, a quantitative research requires a solid theoretical basis, which is tested and analysed by statistical patterns and rules (Kananen 2011, 72). Thus, for unveiling the research phenomenon “qualitative research uses words and sentences whereas quantitative research is based on numbers” (Kananen 2013, 31).

Quantitative research typically demands a large data base in order to be able to draw valid and trustworthy results and generalizations based on the differences and similarities found between the majorities and minorities. On the other hand, in a qualitative research majorities and minorities are equally examined, because the phenomenon is explored beyond the mediums by observing mental, cultural and psychological variables. (Davies 2007, 148–149.)

Nevertheless, isolating research into qualitative or quantitative is not always possible—or desirable—because the differences between the two approaches are not absolute. Since purely quantitative research requires solid theoretical base, it may be that the examined theories leave some aspects of the phenomenon imprecise, especially as in science principles and models are constantly tested and re-evaluated. (Kananen 2013, 35–36.) In this case a mixed methodology, combining quantitative and qualitative approaches, would be the most applicable research strategy so that the unfamiliar phenomenon is interpreted by using a qualitative research method in otherwise quantitative research (Kananen 2011, 42).

As conclusion, different research methodologies are used in order to examine different phenomenon. Consequently, choosing the research methodology depends principally on the research questions (Yin 2014, 4). In addition, consideration needs to be given to how the research will be implemented (Kananen 2011, 43). Sometimes a combination of different approaches can be used if there are sufficient methodological or theoretical motives for it (Davies 2007, 143).

According to Smith, and Pijanowski (2014, 63), the majority of soundscape research has focused on quantifying the characteristics and dynamics of soundscapes and their effects on organisms. Figure 11 illustrates how different research methodologies and methods have been utilized in previous soundscape research. In the examined soundscape research cases, a quantitative approach was most often used. For instance, in the first two cases, the aim was to establish generalizations for the relationship between the soundscapes and the health of ecosystems by creating models and implementing variability measurements.

Research Methodology	Examples on Research Methods Used in Soundscape Research	Author(s)	Year
Quantitative	Modeling acoustic diversity using soundscape recordings and LIDAR-derived metrics of vertical forest structure in a neotropical rainforest	Pekin, B. K., Jung, J., Villanueva-Rivera, L. J., Pijanowski, B. C., & Ahumada, J. A.	2012
	Measuring and interpreting the temporal variability in the soundscape at four places in Sequoia National Park	Bernie, K., Stuart, H. G., & Wooyeong, J.	2011
	Soundscape Quality in Suburban Green Areas and City Parks	Berglund, B., & Nilsson, M. E.	2006
Qualitative	Soundscape Transects: Case Studies from New York City and O'ahu	Parkman, J.	2014
Mixed	Case study of soundscape assessment and design methods	Siebein, G. W., Kwon, Y., Smitthakorn, P., & Gold, M. A.	2007

Figure 11. An overview on previous soundscape research

In contrast, the third example of a quantitative research, assessed the perceived soundscape quality in urban green areas. The data of the study was collected by multiple choice questionnaire, and the results were presented statistically, although Brooks and colleagues (2014, 36) emphasise that quantitative research can

> *neglect the context-dependency of human perception; they only provide artificial realities and diminish the complexity of perception to merely predetermined values, which do not completely correspond with perceptual authenticity.*

Qualitative research represented a minority among the explored cases. In the example case, the impacts of traffic noise penetration—from specific locations at specific times—were observed in a qualitative manner. In contrast, the last example utilized mixed methodology, since beside mapping and modelling long-term acoustic measurements, the research also assessed the soundscape by sound walks—as an observation method—and focus group interviews, which are common methods of qualitative research.

Sound walk and focus group interview methods will be utilized in this thesis in accordance with the aim of defining and understanding a new phenomenon: the soundscape of a distinctive location with unique characteristics. A quantitative approach was not found applicable for this thesis, because Kehä Vihreä is still a concept, and therefore, there is not sufficiently material and statistics to conduct a reliable quantitative research. Furthermore, a qualitative approach was found applicable, because the thesis explores and interprets people's emotions and perceptions evoked by the soundscapes of Kehä Vihreä. A mixed methodology was not chosen, since the focus of this research is on the personal experience at the request of the client.

In their article *Human and policy dimensions of soundscape ecology* Smith, and Pijanowski (2014, 64–65) indicate that studies focused on humans and sound are rare and fragmented, although sound is proven to have significant impacts on health and well-being. Thus, examining how soundscapes are perceived, is a valuable and exploratory approach in the field of soundscape research.

4.3 Research Methods

According to Davies (2007, 143), a researcher should always feel comfortable to use any methods which enable to obtain appropriate and aspired answers for the research questions. Thus, the research methods are chosen keeping in mind what data needs to be collected to address the research questions. Besides, the researcher has to consider the possible limitations for the research, such as timescale, costs and abilities for implementing the research (Polonsky, & Waller 2011, 127).

The most common data collection methods in qualitative research are interview and observation (Corbin, & Strauss 2008, 27; Davies 2007, 10; Kananen 2011, 48). These methods allow an investigator and the subject to interact, which contributes to the aim of a qualitative research to "describe and understand a phenomenon and give it a reasonable interpretation" (Kananen 2013, 31–32).

Observation is used when a phenomenon is studied about which little or no information is available, whereas an interview is a suitable method for obtaining knowledge on a person's thinking and reasoning (Kananen 2011, 48). Since profound information on a person's perceptions and emotions cannot be acquired with observation, an interview was found to be the most appropriate research method for this research.

Among different types of qualitative interviews, a focus group interview was chosen, because it is an effective and efficient method for examining the diversity of opinion from a large amount of people at once. Although, an in-depth interview conducted with only one person at the time, or a spontaneous and situational ethnographic interview, might have provided the investigator the opportunity to gain more underlying answers, these interviewing types were considered time-consuming and difficult to organize with the targeted interviewees. (Polonsky, & Waller 2011, 134–135.)

In addition, a focus group interview was selected, because a group interview usually encourages the participants to engage in dialog and the exchange of ideas (ibid., 134). A dialog among the participants was thought to be especially valuable and rich, because the interviewees had expertise in environmental and acoustic fields.

Triangulation

It is also possible—and recommended—to use multiple methods in order to improve the reliability and validity of a research (Kananen 2011, 130). A combination of two or several methods is called triangulation, and it is used when more comprehensive understanding of the phenomenon is required (ibid., 42).

In this thesis, the data to collect is determined through the design of the research problem: one phenomenon (perceived soundscape) is examined with two methods: sound walk as an individual observation occasion for the participants and the investigator, and focus group interview as an interactive gathering and discussion for the participants of the sound walk.

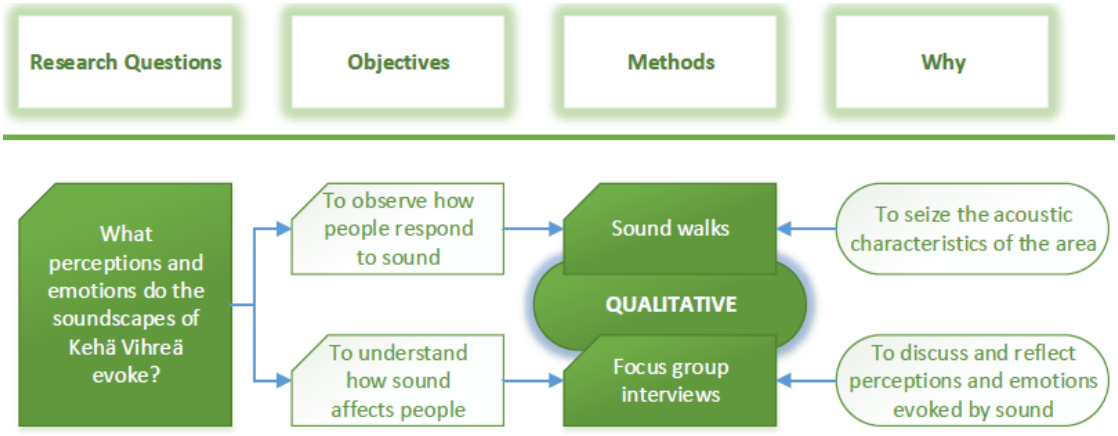

Figure 12. Triangulation

Combination of these two methods serves two different purposes. Firstly, conducting a sound walk enables the participants to seize fully the acoustic characteristics of the area, whereas an interview session held right after the sound walk, offers an opportunity to discuss and reflect on perceptions and emotions evoked during the sound walk.

4.3.1 Sound Walk

Initially it was planned to record soundscape samples from Kehä Vihreä, but the feasibility study—done in order to optimize the quality of the sample recordings—revealed that a recorded soundscape sample was not equivalent with observations the investigator made with her ears during the recordings (please see Figure 13, on page 43). For instance, the recording device Zoom H2 does not to capture the murmur of distant traffic or the roar of a river, which however played a significant role in the observations documented at present. To meet the challenges of achieving an authentic soundscape experience for the interviewees, it was decided to conduct sound walks instead of obtaining recordings.

According to Brooks and colleagues (2014), sound walk is conscious listening of the environment in the investigated area. The advantage of a sound walk is that it is payed attention to the perceptions and multiplicity of sound sources at realistic study sites. Moreover, a sound walk also includes an access to visual, geographic, social and cultural variables which help to place sound into a context. (33–35.)

The sound walks were implemented in locations confirmed by the client. Each sound walk followed a similar structure so that the research topic and content was firstly introduced to the participants. The introduction was followed by instructions for the sound walk, and ultimately, the sound walk was done individually on a predetermined walking route. After the sound walk, the participants gathered for a focus group interview.

4.3.2 Focus Group Interview

In a focus group interview the research topic is approached through different themes covering the research phenomenon (Kananen 2011, 51). Therefore, four themes were identified, which also function as the basic structure for the interviews. The identified themes are:

1. place attachment and place identification,
2. soundscapes in context of an urban environment,
3. expectations for a soundscape of an urban park, and
4. perceptions and emotions evoked during the sound walk.

It is essential that a focus group interview is flexible, approaching the phenomenon principally through general questions, which are followed by more specific questions (Kananen 2011, 54). Corbin, and Strauss (2008, 27) emphasize that "the most data dense interviews are those that are unstructured and not dictated by pre-determined set of questions".

Therefore, five general level questions were prepared to serve the purpose of starting and enhancing conversation over the themes. The number in parentheses displays the theme in which the question belongs to:

- How would you describe the place? (1)
- What do you think about the soundscape of the place? (1)
- How would you characterize a soundscape of an urban park? (2)
- What qualities do you expect from a soundscape of an urban park? (3)
- Could you describe the sounds you heard? (4)

In addition, more specific backup questions were prepared in case the conversation would not start to flow freely among the participants (ibid., 28).

- Do you usually spend a lot of time at this place? (1)
- Which sounds you identified to occur most often? (2)
- What could improve the soundscape of the place? (3)
- How the sounds you heard made you feel? (4)
- Which sounds did you perceive negatively/positively? Why? (4)
- What does a peaceful soundscape mean to you? (4)
- What does silence means to you? (4)
- From where and how often do you seek silence? (4)
- Which place(s) in Kehä Vihreä do you think would have a peaceful soundscape? Why? (4)

Nevertheless, the specific questions ought to be primarily generated by the answers of the interviewees. Therefore, the follow-up questions cannot—and should not—be extensively prepared in advance. An unstructured interview is the most effective way to embrace the interactive, reflective and spontaneous nature of a focus group interview. (Kananen 2011, 54.)

In order to enhance a relaxed and pleasant atmosphere, the interviews were held indoors utilizing nearby catering or university facilities, and the respondents were offered a hot beverage due to performing a sound walk during the winter season. The interviews were recorder with Zoom H2 recording device, because recording enables an accurate account of an interview (Oliver 2008, 117.) Since, some people might feel uncomfortable if their answers are recorded, it was asked a permission to record the dialog. In case some of the interviewees would not agree to be recorded—and in order to document any valid comment before or after the recorded interview occasion—the investigator was also prepared to write notes.

Interviewees

According to Oliver (2008, 109), the amount of the interviewees is chosen with regard to the research approach and the aspired form and structure of the data. Since this thesis is a qualitative research pursuing detailed and interpretative data, it was designed to interview 10 experts from environmental and acoustic fields. Besides aiming at achieving comprehensive amount of data, the amount of the interviewees was decided in accordance with time and research resources available (Polonsky, & Waller 2011, 127).

Nevertheless, in a qualitative research the ultimate number of interviewees may change during the data collection, if a saturation point is reached, where new interviewees repeat the answers already gained (Kananen 2011, 53). In order to acknowledge when the results of a qualitative research are saturated, the investigator needs to process the data collection and data analysis simultaneously. This way of working will also enable the researcher to adapt and improve the interview techniques if needed. (Davies 2007, 149.)

Since, it is not possible—nor necessary—to interview all the possible users of Kehä Vihreä, it were chosen interviewees who could provide significant and appropriate data due to their special insight and experience about the phenomenon (Oliver 2008, 109–110). In addition, the ideal interviewees should be involved in, affected by or knowledgeable about the researched phenomenon (Kananen 2011, 52).

The interviewees were partly selected with assistance of the client who recommended approaching the Environment and Nature Companions, who are trained volunteers helping citizens to experience their local environment and nature. The Companions were found to be appropriate interviewees, because they are involved in, affected by and aware of the phenomenon, since the soundscape is a relevant part of their volunteer work. Moreover, the Companions were chosen because they have been trained to observe their environment.

The rest of the interviewees were selected through contacting individuals, who have expertise in environmental or acoustic fields. These individuals included a noise and acoustic expert, nature conservationist, ecopsychologist and students of landscape architecture and nature guide. Ultimately, the number of the interviewees was accumulated through snowball sampling, where the information about the research spread by word of mouth through different networks (Oliver 2008, 110).

Feasibility of the Methods

According to Corbin and Strauss (2008, 27), it is essential for the researcher to prepare well for the interviews, because otherwise the interview situation might easily become impractical or awkward, which naturally affects the amount and quality of the information acquired. Therefore, the sound walks and interviews were prepared as well as possible. Besides reviewing theory, the methods were refined and practiced in advance by implementing a feasibility study in February 2016. The feasibility study included use of both research methods with the help of two student colleagues.

The feasibility study confirmed that a conscious sound walk performed individually is the best way to experience the whole range of environmental sounds. In addition, based on the participants' recommendations and remarks, the structure and practical issues of the sound walks were determined, such as an appropriate length to be approximately one kilometer and 25 minutes. Based on this distance and timescale, five sound walk routes were investigated, which were purposed to—and approved by—the client.

Implementing a feasibility interview revealed that the designed interview strategy and questions required only minor modifications. The investigator noted that the interview themes, questions and structure resulted in answers which contribute to obtain appropriate and informative answers for the research questions. Thus, the feasibility interview was included as a part of the ultimate data. The participants fulfilled the expert criteria of the selected interviewees as future facility managers concerned with physical environment and well-being management.

In Figure 13 the process of the feasibility study is presented. In addition, the flowchart includes the structure and schedule of the data collection discussed in more detail in the next section 4.4. Data Collection.

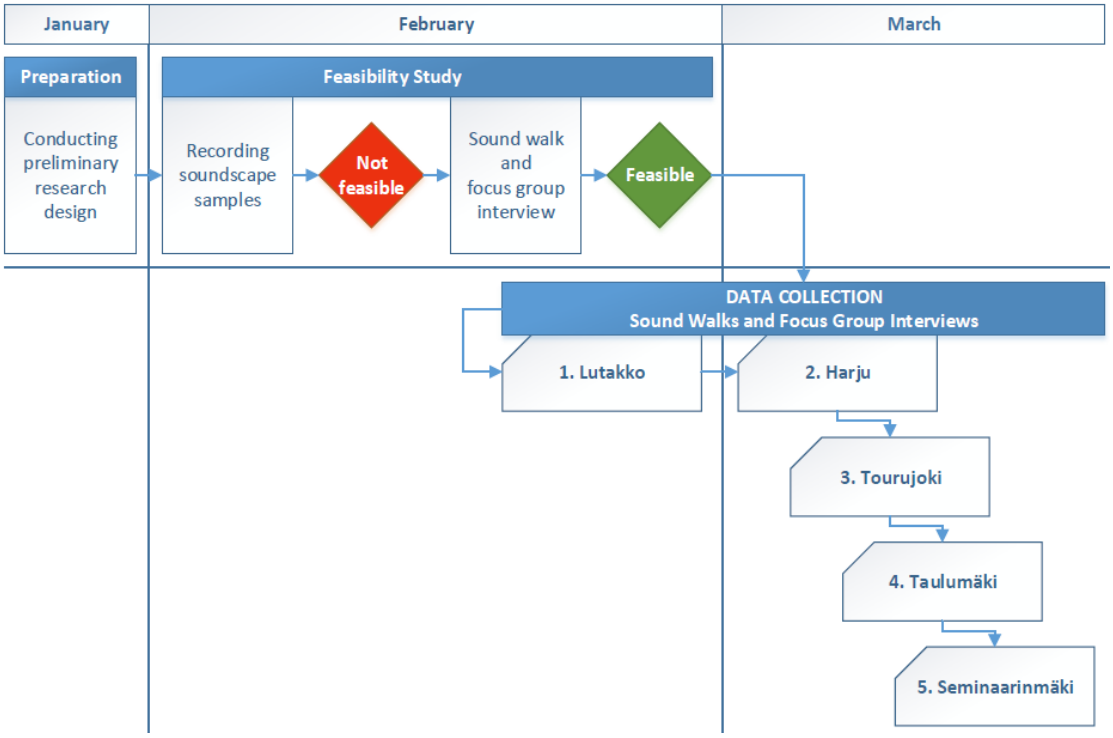

Figure 13. The feasibility study and data collection

4.4 Data Collection

The study areas investigated included five main locations from Kehä Vihreä. The chosen study areas were all popular places determined together with the representative of the client, landscape architect Mervi Vallinkoski, according to her current knowledge, on where citizens presently spend their leisure and recreational time. The landscape types of the areas is presented in Figure 14.

	Sound Walk Areas	**Description of the Landscape**
1.	Lutakko	*park-like lakeside*
2.	Harju	*ridge-like area*
3.	Tourujoki	*steep and wooded river valley*
4.	Taulumäki	*ridge-like area, lakeside*
5.	Seminaarinmäki	*ridge-like area, built landscape, campus area*

Figure 14. The landscape types of the sound walks (Oilinki 2016)

Figure 15. On left the sound walk 1 in Lutakko, and on right the sound walk 2 in Harju

Altogether five sound walks were conducted covering approximately 5 kilometres with 10 interviewees so that each sound walk and interview had two participants. The sound walks were implemented between 12 pm and 6 pm over three weeks period in February and March 2016. The length of the sound walks varied from 25 to 35 minutes and 0,9 to 1,1 kilometres depending on the type of the landscape and walking speed of the participants. The sound walk routes can be found from Appendix 1.

Figure 16. On left the sound walk 3 in Tourujoki, and on right the sound walk 4 in Taulumäki

During the sound walks the interviewees were asked to make notes about what they heard and feelings, thoughts or memories the sounds heard evoked. The provided equipment for making notes included a writing-tablet, pencil and paper with pictures of the sound walk route and Kehä Vihreä. An example of the note form can be found from Appendix 2.

The weather remained similar during all the sound walks. The temperature ranged between –4 and +2°C, and besides the last sound walk in Seminaarinmäki, the weather was windless. More detailed weather conditions during the sound walks can be seen in Figure 17.

	Location	Weather	°C	Wind	Snow Depth
1.	Lutakko	light snowfall	−1	west 3 m/s	25–50 cm
2.	Harju	partly cloudy	1	south 2 m/s	25–50 cm
3.	Tourujoki	partly cloudy	2	south 2 m/s	25–50 cm
4.	Taulumäki	mostly cloudy	2	south 2 m/s	25–50 cm
5.	Seminaarinmäki	mostly sunny	−4	north 6 m/s	25–50 cm

Figure 17. Weather during the sound walks. Retrieved from Finnish Meteorological Institute

Duration of the interviews varied from 25 to 35 minutes due to the unstructured design. The interview themes, questions and design is described in the section 4.3.2 Focus Group Interview on the pages 39–40. The interviews were held indoors utilizing nearby catering and university facilities. The respondents were offered a hot beverage due to performing a sound walk during winter season. The interviews were documented by using Zoom H2 recording device and handwritten notes.

Figure 18. Sound walk 5 in Seminaarinmäki

4.5 Analysing the Data

Analysing qualitative data has many variables, because several different stories can be interpreted from the same piece of data. Ultimately, the conclusions depend on the perspective that the researcher brings to the data. Thus, achieving valid results requires that the researcher remains flexible in the use of procedures and is constantly re-examining the interpretations against the data. (Corbin, & Strauss 2008, 47–50.)

The first step of analysing qualitative data is to become well-familiarized with the material. This process is wise to start simultaneously with the transcription and compression of the data, because the material has to be read several times in order to reveal what are the key messages. (Kananen 2011, 59.) Therefore, the procedure of getting familiar with the data was started by transcribing each interview the following day. Transcribing the interviews immediately helped the investigator to capture the content of the interviews coherently.

The transcription was done word-for-word by using a smartphone application which transcribes speech into a written form. Firstly, the investigator re-spoke the interviews, because the application was not able to catch sound played through loudspeakers. Next, transcription created with the application, was checked by re-listening the interview and correcting possible mistakes in the text. This method allowed the investigator to capture the interviews in extreme detail in tolerable timescale.

The next step of analysing the data is to compress the data by identifying segments from the material (Kananen 2011, 59). In this thesis the segments were approached through identifying themes which occurred most frequently within the material, and were recognised to provide the most relevant information to the research questions.

The third step of analysing qualitative data includes grouping concepts into each segment or theme (Kananen 2011, 59–60). Conceptualizing, alias coding, helps to organize the data so that the researcher may explore the similarities and differences within each concept (Corbin, & Strauss 2008, 51–52). Since, in a qualitative research it is not possible to generalize the findings, the similarities and differences are interpreted by the investigator in order to discover the meaning of the findings (Oliver 2008, 110).

Thus, the data was analyzed through trying to understand what the meaning of sound for the interviewees is. The meaning of sound, and why particular sound was perceived as a wanted or unwanted sound, was analyzed bearing in mind that the response to sound depends on the listener's socio-cultural background and psychological relation with the sound source (Brooks et al. 2014, 35).

Besides the transcribed interviews, the same process of analyze was done with the handwritten sound walk notes of the participants. Although, the main data of this thesis is the interviews, the sound walk notes offered the investigator an interesting view on each interviewee's observation style and focus. Moreover, the notes revealed what observations were left unsaid during the interview.

5 RESEARCH RESULTS

The results are divided into following themes, which were identified to provide the most relevant information to the research questions:

- Perceptions and emotions evoked by the soundscapes of Kehä Vihreä:
    - overall soundscape, and
    - individual sound sources.
- The peaceful soundscapes on Kehä Vihreä:
    - expectations, and
    - experiences.

5.1 Perceptions and Emotions Evoked by the Soundscapes of Kehä Vihreä

It became obvious from the focus group interviews that anthrophony—especially sounds from road traffic—had significant and dominant role in the perceived soundscapes of Kehä Vihreä. The analysis revealed that sounds from road traffic were the most often and frequently perceived anthrophonic sounds. Regardless of the location, the interviewees described traffic sounds extensively when asked to describe the soundscape experienced during the sound walk.

> *Harju 1: The whirl of the traffic, ascending and descending sounds of engines, were dominant. There was only a pretty small peaceful area after we went down the stairs [to Pitkäkatu side of Harju]. It was nice, but there again the individual cars… And right after we returned back up [to the top of Harju] it was like returning into a noise pot. I was like "ho-hum".*

> *Tourujoki 1: And then again it began, when we came up the stairs in the end [of the sound walk]. Once again the roar of the traffic started from the other side. And even an airplane flew over, completing the whole thing.*

A review of the interviews and sound walk notes indicated a pattern in which the discussion and observations returned repeatedly back to traffic related topics. In the sound walk notes the sounds from traffic are habitually linked with statements expressing continuity, such as *again*, *still*, *all the time*, *constant*, *background*, *ruling*, *continues*, and *more*.

> *Tourujoki 2: First the traffic roar was greater and ruling. Although it was there all the time.*

The results indicate that traffic was perceived as an unwanted sound chiefly due to its intrusive nature. The participants experienced that sounds from traffic masked and disturbed ability to listen and concentrate on the other sounds. Besides finding the sounds from traffic to be continual, they were also perceived to be present from several directions and distances.

> *Harju 2: On this side of Harju [Yliopistonkatu] the traffic dominates the whole soundscape. When you ascend, then the sound does not come anymore only nearby, but also from afar. Then the traffic sound becomes a constant, 180 degree sector's hustle and bustle from nearby and afar.*

> *Taulumäki 2: The buzz of the traffic can be heard from everywhere, from the Nelostie, Laajavuori, Viitaniemi, city…everywhere, really! Well, if you are directly behind the ridge, you cannot hear the traffic from Rajakatu, but then you can hear the Nelostie and Laajavuori even louder.*

However, it was clear from the results—in consistent with Wissmann (2014, 1)—that anthrophony is acknowledged as an integral part of an urban environment. Although the traffic noise was taken for granted, its intensity and continuity surprised some of the participants. The data revealed that it was common for the participants to excuse the surprisingly high level of traffic noise by the winter season and lack of vegetation.

Analysis of the data provided strong support for that the perceived traffic noise within Kehä Vihreä could be explained largely by participants' strong believe that the sounds from traffic cannot be escaped unless leaving the city far behind.

> *Harju 2: If you are seeking for silence of countryside, obviously it is not found from here.*

> *Harju 1: Even there [in Tourujoki] the noise [from traffic] can be heard all the time. Whereas in the countryside it is fairly peaceful. But no, I would not come to a city [for a pleasant soundscape], this is a noise park for me.*

> *Taulumäki 1: There even should be a proper distance to the idyllic peace of nature, because these locations nearby city center could not really be—like—very idyllic.*

It was evident that natural sounds—including both biophony and geophony—were the second largest element in the overall soundscape perception. Natural sounds indicating seasonal change from winter to spring were most frequently perceived sounds, and also among the sounds which were perceived as most pleasant. The data shows that the natural sounds were experienced to contribute to the feeling of relaxation and restoration.

> *Harju 1: The most appealing spot, besides the birdsongs, was at Vesilinna [a building on top of the Harju]. There was music created by the water drops falling down in different rhythms from the roof. I thought it as a symphonic moment, it was splendid.*

The results suggest that the perception of natural sounds could be profoundly affected by the prevalence of traffic and other mechanical sounds. Some interviewees experienced that natural sounds had to be sought and listened deliberately. Especially high volume anthrophonic sounds caused concern towards prosperity opportunities of animals and peace of nature.

> *Harju 1: The sounds of birds were delightful. But then one thinks that how the birds are able to tolerate and cope with the noise, how much they can nest here and do they have to move away from here.*
>
> *Tourujoki 2: I am aware of the changes occurring in the Kangas area. That the area is under construction. But I became worried about the preservation of the nature there. I noticed there was less [bird] sounds at the point of the construction.*
>
> *Tourujoki 1: Yes, I also became very sad, because the sounds of the Kangas construction site were so clear. I started to feel bad at that point. In a way I got a feeling that the peace of the whole valley has been lost, maybe even permanently…*
>
> *Taulumäki 2: It bugs me [sounds of frisbee golf]. And especially every time I hear a frisbee hitting against a tree. It damages the tree and shortens its lifespan. The faith of the trees saddens me.*

Although the analysis revealed wide variation in the individual sound source preferences, it became obvious that birdsong was the most adored sound source.

> *Lutakko 1: When I listened the birds singing on the tree, it was really like "aww", so nice!*
>
> *Harju 1: The sounds of crows and jackdaws were lovely. And then those "chirp chirp chirp". It was fun, the sounds of the birds, they were delightful.*
>
> *Tourujoki 2: And then was the charming birdsongs, so vibrant.*
>
> *Seminaarinmäki 1: Although a city, as an environment, is not relaxing for me—I am very sensitive to noise—but then when there was the birdsongs creating positive reactions [in me], it was very fascinating.*

The data did not reveal whether other biophonic sounds would have been as favored due to their inexistence during all the sound walks. One may speculate that since observing the birds caused such delight in the participants, observing other animals would also contribute to similar positive experiences. Nevertheless, notions of dog barks were surprisingly declaratory and unemotional, presumably due to dogs being such an integral part of a city and urban park.

The other pleasing sounds—dripping and running water, snow and sand under shoes and bike tires—belong all to geophony or anthrophony. Pleasant anthrophonic sounds appears to be distinct from mechanical sounds, which were found disturbing, annoying and dispensable.

> *Harju 2: A sound of some ventilation equipment stood out, which was annoying. Although the level of the sound wasn't loud, it irritated me because it could be silenced. So the sound seemed very unnecessary. Harju 1: I think it was sort of a dispensable sound. Harju 2: Dispensable, indeed!*
>
> *Taulumäki 1: If I would have to imagine the soundscape of that place [based only on the visual aspects], there would be only natural sounds. Expect those stupid power lines, which crosses there [over the lake]. Taulumäki 2: Oh yeah, now I got it! The hum I tried to identify wasn't wind, it was the power lines!*
>
> *Seminaarinmäki 2: A distant buzz of some machine; normally unnoticeable but now stays disturbingly on the background as a distinct and separate sound.*

A bell heard in Harju was an anthrophonic exception, because it was basically only mechanical sound perceived as pleasant.

> *Harju 2: Another pleasant sound, besides the sounds of spring, was the bell of Harju. I think it is chosen a pretty good sound for the bell.*

It can be seen that the interviewees have clear preference for biophonic and geophonic sounds, whereas anthrophonic sounds are mostly experienced disturbing. Nonetheless, there is considerably higher tolerance towards sounds originating directly from human being—such as talking, steps and cycling—than towards mechanical sounds. This suggests that sounds originating from an authentic and identified source are among the most wanted sounds.

5.2 The Peaceful Soundscapes on Kehä Vihreä

It was evident that Tourujoki was reckoned to offer the most peaceful soundscape within Kehä Vihreä. Other locations, such as Viitaniemi and Seminaarinmäki, were also briefly mentioned, but Tourujoki and its qualities as a peaceful location— without exception—were discussed and described the most.

> *Lutakko 1: Tourujoki and the nature path there. In the summer time it is I like "hallelujah!", really good, because there you cannot really hear the traffic so well. And when you go there, at least when I go there, I never have any music. Because you are walking in a forest, you have there like a little getaway.*

> *Harju 2: I think it is the valley of Tourujoki. It is a steep formation. When you go down there, it is like the soundscape pearl of the center of Jyväskylä, I think. Although the place is at the heart of the city, the noise level is low and there is a lot of natural sounds. Therefore it is the best area of Kehä Vihreä.*

The results indicate that expectations have a significant role for whether or not soundscape was perceived or believed to be peaceful. For instance, it was evident that visual landscape affects overall soundscape expectations to a large extent.

> *Lutakko 2: Well, I think that the visual actually helps you to experience the sound. So I think the place, park that has a nice and relaxing environment helps you actually feel sound more and listen to it. I think it's affecting both ways.*

> *Taulumäki 1: It is not as silent as it looks like.*

> *Taulumäki 2: When you think about a place where you go to nature at any level, even though the place is in a city, you still expect to have nature. I mean [the words] Kehä Vihreä makes you to expect something green, harmonic, calming and so on.*

The importance of the expectations was revealed by the amount of concern and disappointment expressed after the sound walk in Tourujoki. The construction site of Kangas was experienced especially disturbing because the area was expected to be the quietest location in Kehä Vihreä. Although being aware of the construction site, the expectations of the interviewees were not met, since Tourujoki was not as quiet as they had thought it to be.

> *Tourujoki 1: It surprised me that sounds made by humans were present all the time, I had to really listen carefully in order to hear the sounds of the water and little streams. Somehow I thought it would have been more peaceful and silent – —. It was very alarming, I started to feel so bad when I saw the construction site of Kangas, and all the trees chopped on the other side [of the river]. It is going to change the nature of that place, totally. It won't be a similar exclusive river valley anymore, not at all.*

The analysis provided strong support for that the concept of a peaceful soundscape could not be defined solely by a location, because experiencing peacefulness was identified to be more closely related to a state of mind. Being in hurry or having an occupied mind was identified as a barrier for registering the environment, whereas consciously done sound walks were acknowledged to offer a welcome opportunity to halt for a while, to focus and use senses. The participants, for instance, experienced that the 25–35 minutes sound walk calmed them down and offered a welcome opportunity to pause.

> *Lutakko 1: I was surprised how the sound walk affected me. It was such a welcome and relaxing opportunity just to concentrate and listen to your surroundings for a while. To think what you hear and not the other stuff. Good way to be present at the moment.*

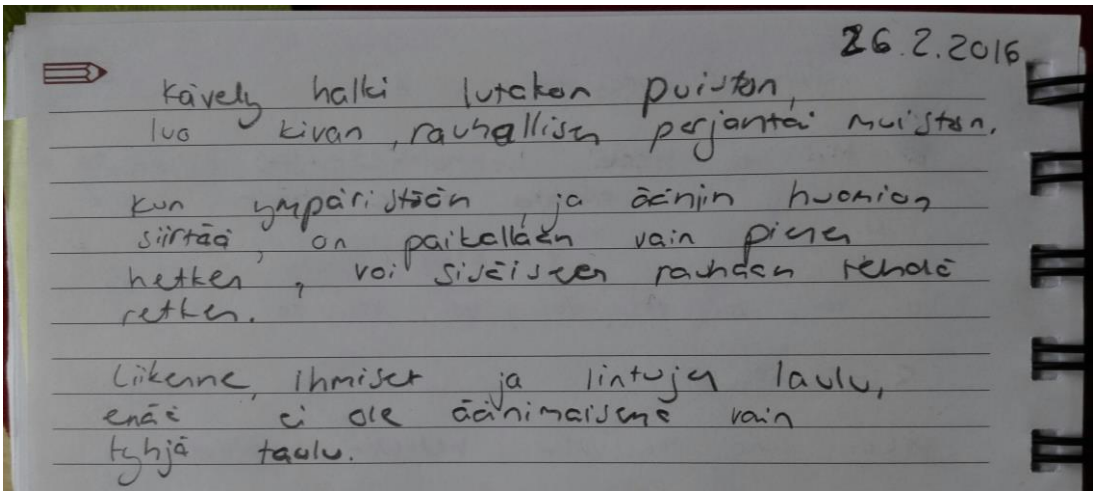

Figure 19. A poem inspired by a sound walk. Lutakko 1: "Walking through the Lutakko Park, creates a nice and calm Friday memory. Moving attention to environment and sounds, standing still just for a while, you can make a trip to the inner peace. Traffic, people and birds singing, soundscape is no longer an empty painting."

> *Tourujoki 1: When I arrived, I was in a hurry, and I felt a bit bad, the way you feel when you are in hurry and you have to be on time. I don't know whether it was the walk and the place, which made me feel good, but after we got down there [by the river], and I got to walk and listen what is around, I felt considerably better. It is interesting, ultimately the change which occurred was very powerful.*
>
> *Seminaarinmäki 1: Performing the sound walk was so enjoyable and fun, because I noticed how meditative thing it was to walk through a certain route and area, completely focused on the present moment. Usually there is always something going on in your head so that you do not observe your surroundings at all. Really, rarely one walks in a city open-minded towards to the environment because the noise is so big. So interesting, how much of the moment you actually lose, when you walk your headphones on.*

These experiences appears to be distinct from the location, since the participants made similar observation during three very different sound walks in Lutakko, Tourujoki and Seminaarinmäki. Thus, a peaceful location is not necessarily the most important aspect in experiencing peacefulness, but the environment and its components should inspire and invite the users to halt and use their senses.

The findings suggest that despite of the differences in expectations, traffic noise is perceived negatively and causing annoyance. In order to secure successful soundscapes, it needs to be provided places which accommodate different notions of peacefulness and good soundscape quality, and thus, meet or exceed the expectations of the users. Within Kehä Vihreä Tourujoki was believed to offer the most peaceful soundscape due to its nature and location in a steep valley blocking the anthrophony from the city.

6 CONCLUSIONS

The aims of this thesis were to define the soundscapes of Kehä Vihreä by treating sound and soundscapes as a resource, and by emphasizing the role of sound in the future development of Kehä Vihreä. Since the City Strategy (2014, 1–2) of Jyväskylä is to have "active, happy and healthy citizens", the aims of the thesis were approached through examining how people respond to sound and how does sound affect an urban dweller.

Presently, the City of Jyväskylä does not have a vision or strategy concerning the soundscapes of Kehä Vihreä. Therefore, this thesis was aimed to function as the first step of investigation to define where the peaceful soundscapes of Kehä Vihreä are, and to explore how the soundscape approach could be utilized in developing and envisioning Kehä Vihreä in the future.

The soundscape approach follows the principles of sustainability, since experiencing a place with distinctive soundscape requires that the natural and cultural values of the environment are respected and preserved (Bernat 2014, 108). Thus, the approach of this thesis indicates that use of soundscape as a resource would enhance the image of Kehä Vihreä as well-known green façade of the city, and consequently, contribute Jyväskylä to be a liveable and creative place to live and visit.

As shown in this research, as well as in previous researches and theoretical framework of this thesis, biophonic and geophonic sounds enhance perceived soundscape quality by being wanted and inspiring sounds, which balance and diminish the unwanted anthrophonic sounds, such as traffic and other mechanical sounds. On the other hand, it is clear that the unwanted sounds of vehicles and machines contribute to annoyance and concern towards the well-being of nature. Moreover, the inharmonious soundscape of an urban environment seems to lead to deactivation of the senses as a defensive method of an urban dweller against excessive and constantly changing field of stimuli. In consequence, it is probable that urban dwellers have become unconscious of their surroundings, and thus, suffer from lack of presence and feeling of hectic pace of life.

As Kehä Vihreä is mostly narrow and surrounded by many major traffic lanes, blocking the sounds of traffic is challenging. Therefore, the only effective way to diminish the traffic sounds within Kehä Vihreä would be to redirect and reroute the heavy traffic farther from the city centre. Alternatively, it could be estimated whether there are some specific times of the day or year—such as winter—when the traffic needs to be controlled more.

Furthermore, walking, cycling and public transportation should be planned so that they would function as the primary way of moving in the city centre. In fact, the city is already investing on repairing old and building new cycling routes, since the goal is to double the amount of cycling in Jyväskylä by 2025. Since more than half of the citizens live within five kilometres from the centre, there is potential to reach the goal. (Kakkori 2016.) Combining this goal with decrease of traffic in the centre could lead to a calmer and more attractive city centre, and consequently, improve significantly the overall quality of the soundscape.

Since anthrophonic sounds emanating from an authentic human source or activity—such as people talking, cycling or walking—were perceived as positively connoted and integral sounds of an urban environment, there should be consideration whether anthrophonic sound sources should be divided into two categories in an urban context; human-produced sounds and mechanical sounds. This division of anthrophony would ease and clarify the future research, since the soundscapes in Kehä Vihreä are dominated by anthrophonic sounds.

Overall, it seems that sounds originating from an authentic and identified source are among the most wanted sounds, and enhancing these sounds could also improve the overall soundscape experience. However, implicit in evaluation of a soundscape is the recognition of the individual's background and preferences having a significant role in how different sounds are perceived exactly (Jennings, & Cain 2013, 295). Nevertheless, the results indicated that although there are variations in individual sounds sources preferences, generally a pleasant soundscape of an urban park should consist chiefly of natural sounds.

In addition, expectations influence on how people perceive a soundscape of a certain place, for instance, in Japan the traffic noise was experienced more annoying in a quiet than in a busy street. (Berglund, & Nilsson 2006, 903.) This phenomenon was proven also within Kehä Vihreä, since in Tourujoki—a location thought to be the most peaceful in Kehä Vihreä—the traffic and construction noises were perceived especially disturbing and concerning. Overall, the expectations for soundscapes in Kehä Vihreä were rather low due to the fact that whole Kehä Vihreä is enveloped by the bustle of the city.

Tourujoki was reckoned to have the most peaceful soundscape within Kehä Vihreä, in accordance with the value mapping of the green areas of Jyväskylä made in 2008 (Viheralueiden arvojen kartoitus [Value Mapping of the Green Areas] 2008, 17). Nevertheless, the analysis also revealed that a peaceful soundscape cannot be explained solely by location and its properties. Firstly, the soundscapes alter significantly during day and seasons, as well as are affected by different activities occurring within the area (Pijanowski et al. 2011a, 1219–1221). Secondly, the results provided strong support for peacefulness to be primarily depending on a state of mind: although the soundscapes were perceived to be dominated by constant sounds of traffic, the sound walks—as individual observation exercises—were experienced as positive and effective method to calm down, concentrate and halt.

Restarting and reusing senses in an active manner was resolved as closely related to experiencing recovery and empowerment. This observation of the participants is in accordance with Wissmann's (2014, 69) estimation that since people are constantly in a hurry—especially in a hectic city environment—it is tended to block the senses as a defensive method towards the inharmonious field of stimuli. Thus, the results suggest that the most effective way to impact the perceived quality of a soundscape is to preserve and provide citizens locations which stir and trigger them to use their senses. Therefore, experiencing peacefulness should not—and does not need to be—tied into a specific location.

On the basis of these findings, the thesis argues for a peaceful soundscape being rather a conscious or guided practise or an experience which stimulate to reactivate the use of senses. Nonetheless, the location and its properties play an important role, since visually aesthetic landscape contributes to probability of an experience: people are more willing to concentrate when there is something to listen which arise curiosity or invites to focus.

One way to trigger people to listen, would be to surprise them with a pleasant sound which does not quite fit to the environment. This kind of a sound would draw people's attention and held it for a while. According to Elmqvist (2013), intermediate level of complex information generates curiosity, which might explain why the interviewees found most of the surprising sounds, such as the bell of Harju or specific bird species, pleasing. As a result, use of surprising and pleasant sounds could increase the awareness of the environment, and consequently, guide an urban dweller to be more at present.

Furthermore, people could be assigned in different ways to focus on their environment, for instance, sound walks could be arranged in Kehä Vihreä. Sound walks could be also arranged during night time when the traffic noise and general bustle of a city interferes the soundscapes less (Pijanowski et al. 2011a, 1224). Additionally, the guided route running throughout the Kehä Vihreä, could include sacred spots and instructions for active listening. Besides authentic and preserved natural spots, there could be designed and built components, especially in locations such as Harju and Lutakko, which soundscapes suffer the most from the traffic noise. For instance, the benches of Sibelius Park in Hämeenlinna have motion detectors which play Sibelius's music when activated by movement (Sibeliuksenpuisto [Sibelius Park] 2015).

Another fascinating idea, originating from Koli Spa, is to play music underwater. Based on the author's own experience, floating in a pool and listening music played under water, which isolates efficiently all the other sounds of the Spa, was an extraordinary and empowering multisensory experience. The playlist could be limitless, from music to natural sounds such as whales or rain. Optionally, this kind of element could possibly be arranged in Jyväsjärvi or Tuomiojärvi, given that the possible effects on the organisms are first carefully investigated.

Another option could be a smartphone application or game—such as Record the Earth—addressing the users to focus on the soundscape through few questions. The questions could, for example, be about the location, perceived and recognized sound sources, emotions evoked, etc. Besides guiding the citizens to halt and concentrate for a while, the application would assist the city to collect long-term data about sounds heard in Kehä Vihreä. Ultimately, the data collected through such an application, could be used for assessing and developing the soundscapes of Kehä Vihreä further.

In addition, the application could include a program—such as WASIS Wildlife Sound Identification System—which recognizes animal species based on the sounds they produce (WASIS Wildlife Sound Identification System). Environmental conservation associations might be highly interested in co-operation with a project which contributes to gather valuable data about urban wildlife. Such an application would bring Jyväskylä to be a part of an emerging new field of science of soundscape ecology (Pijanowski et al. 2011b, 203).

Although, soundscape is a crucial element in an urban environment in terms of well-being, it is underestimated as a key element in quality of life (Treasure 2009). It is clear that prolonged exposure to noise causes various health problems, such as cardiovascular and heart diseases (Smith, & Pijanowski 2014, 66). Furthermore, it is probable that stress and nuisance caused by noise contributes to various progressive and long-term health problems in an extent that is not yet fully understood.

Therefore, there is a need to protect existing quiet and peaceful areas. Since the purpose of these recreational areas is to enhance wellbeing of urban dwellers, a pleasant soundscape is a key characteristic in creating facilities which are successful and creative. An ideal soundscape of an urban park would accommodate a pleasant acoustic atmosphere in which sounds are heard but not unconsciously blocked because their nature is disturbing or annoying.

Current debates between noise abatement and the soundscape approach should give space to opportunities for co-operation in various levels. For example, combining the soundscape approach to other fields of studies would ensure a coherent and multidimensional understanding of how to create successful recreational facilities for citizens and urban wildlife.

Another approach could be designing places where noise is dimmed and positive sounds enhanced. This approach would combine the traditional noise abatement and soundscape approach. Mere level of sound is a one-dimensional measure of the soundscape quality, whereas utilizing also knowledge about the quality of stimuli, could provide broader understanding about the opportunities of soundscape.

Most of the evidence examined in this thesis highlights the necessity and need for tranquillity. This demand leads to extensive opportunities in terms of attracting citizens and tourists. Since it is evident that an urban environment is expected to include unavoidable traffic sounds, the value and potential of a soundscape lacking for these sounds within a city environment, is extremely intriguing, especially for foreign tourists, who are accustomed to traffic exposure in a different scale than Finns. On the other hand, Kehä Vihreä should primarily serve the citizens as a local green and recreational area. Therefore, soundscapes of Kehä Vihreä should first and foremost be utilized as a resource for improving citizens' well-being and health rather than be harnessed too strongly for the means of tourism. A healthy city with peaceful soundscapes should prove to be more valuable as a city image than as a tourist attraction.

In Kehä Vihreä natural sounds were verified to have a significant role for whether or not soundscape was perceived as peaceful. Therefore, it is critical to maintain, develop and promote soundscapes in a manner which answers to the expectations for urban parks: to offer a relaxing, quiet and pleasant soundscape in which natural sounds can be heard well without being masked by disturbing anthrophonic sounds. Preserving and enhancing already peaceful locations in Jyväskylä should replace modern more is more-mindset, because in built environment there is obviously a high demand and low supply for existing quiet and natural areas.

After considering the vital role of a soundscape in quality of a place, and variable effects on well-being and health, I conclude by claiming that soundscapes will have a significant role in the future as a resource, and tranquil areas ought to be preserved and enhanced due to the opportunities they offer for recreation, well-being and liveability—and consequently attractive image—of a city.

In Figure 20, the data, results, interpretations and ideas presented in this thesis are brought together as a suggestive future strategy for the City of Jyväskylä. In the strategy it is proposed how to apply the soundscape approach with the main themes of the Green Policy of Jyväskylä and Kehä Vihreä Vision.

The Green Policy	**Suggestive Soundscape Approach**	**Kehä Vihreä Vision**
Well-being and Health	Soundscapes in Kehä Vihreä will be developed to enhance recovery and empowerment.	Comfortable
Accessibility	The Kehä Vihreä route will include sound theme with authentic and designed sacred spots for active listening and observing.	Active and Engaging
Biodiversity	Rich and diverse biophony is a sign of a pleasant and balanced natural soundscape.	Well-known
Environmental Consciousness	Sound have an important role in place attachement, since sound can provide a path to connect with the environment. Sound walks are an opportunity to enhance the link between people and their environment.	Engaging and Active
Maintenance	Consideration is given whether there are times of a day or year when anthrophony needs to be controlled. Soundscape approach has the potential to be more effective than noise abatement.	Comfortable
Events and Tourism	Specific areas, such as Tourujoki, will be preserved from events which could interfere the soundscape. Soundscapes are used as a resource in well-being and promoting Jyväskylä as a liveable and creative place to live and visit.	Well-known and Comfortable

Figure 20. A suggestive soundscape strategy for the City of Jyväskylä

6.1 Future Research

In Kehä Vihreä sound issues are addressed indirectly through few projects, such as building and placing bird houses along the route. The city is envisioning that the bird houses placed along Kehä Vihreä will function as a symbol and identifier of Kehä Vihreä, because they reflect the interaction and caretaking between people and nature. (Kehä Vihreän kehittämisselvitys [Development Report of Kehä Vihreä] 2015, 20.) It could be assumed that the bird house project could increase and diversify the biophony in Kehä Vihreä, but the relation is not necessary that straightforward, especially since the target of the bird house project is to increase the visibility of Kehä Vihreä rather than impact positively to the soundscapes.

Therefore, it may be stated that more research is needed to balance the requirements of the soundscape approach with the other projects and demands of Kehä Vihreä. For instance, from land use perspective future research is needed to discover how land use planning could help to increase biophony and decrease anthrophony. In addition, nature conservationists might be interested to conduct a future research examining whether there are certain areas within Kehä Vihreä which are especially sensitive to human generated noise. Since, it is suggested that the most effective way to impact the perceived quality of a soundscape is to stir and trigger people to use their senses, future research is needed to examine if active listening increases noise sensitivity, and which is more harmful: unawareness towards the environment and acoustic surroundings or possible increase of noise sensitivity.

Because of the circular and occasionally very narrow shape of Kehä Vihreä, it would also be relevant to examine how the composition of a soundscape vary from centre to edge of an area. During the sound walks it became obvious that there was significant differences and variation in the soundscape just within a route covering approximately one kilometre. Examining the soundscape composition between edges and centres, could provide significant insight on how the green areas should be developed in the future in order to ensure more traffic isolated and peaceful parks.

Due to the fact that Tourujoki is perceived to offer the most peaceful and potential soundscape within Kehä Vihreä, the future research should examine how the construction site of Kangas, and building of a new urban park in Matara, will affect the soundscape of Tourujoki. In addition, the river is planned to be partly rerouted and restructured (Tourujoen kehittämissuunnitelma [Development Plan of Tourujoki] 2015). Thus, the future research is needed to examine how the current and channel structure of the river impact geophony, and consequently biophony, and especially the bird species being able to inhabit the area.

6.2 Reliability and Validity

Scientific evaluation of a qualitative research is challenging due to the interpretative nature of the analysis (Corbin, & Strauss 2008, 297). Thus, transparency of the process is the key point in doing reliable and credible qualitative research (Kananen 2011, 67). The reliability and validity criteria in this research is examined through questions presented in Figure 21.

Reliability	*Are the measurement and results consistent and repeatable?*	**Assessability**	*Is the thesis process documented and justified sufficiently?*
		Consistency of Interpreation	*Is the interpretation verified?*
Validity	*Did the thesis answer the research questions?*	**Saturation**	*Was the saturation point reached?*
		Transferability	*Can the results be applied to other similar situations or circumstances?*

Figure 21. Reliability and validity criteria in qualitative research (Kananen 2011, 67–69)

The transparency in this thesis is achieved through careful and detailed documentation throughout the whole process, so that the choices made and methods used could be assessed and repeated as effortlessly and precisely as possible. In addition, the research methods were tested and evaluated by performing a feasibility study. With the help of the feasibility study the author got familiar with the chosen methods and discovered that combining a sound walk with a focus group interview ensured obtaining appropriate and aspired answers.

Besides, the documentation and careful planning of the thesis, the results were examined by remaining as flexible in the use of procedures as possible. In addition, it was constantly re-examined the interpretations against the data, as well as discussed and evaluated the results with student colleagues in order to ensure the consistency of the interpretation and the end results. Therefore, the author is convinced that other researchers would achieve same, or similar, conclusions by processing the data collected for this thesis.

Due to the large amount of the data collected the analysis of the results could continue endlessly. On the other hand, large data was an advantage, because most of the answers were underlying and revealed only after detailed coding. Since the data collection and analysis were done simultaneously, the author discovered that the saturation point was reached between the fourth and fifth interviews, since the answers started to repeat and follow similar patterns.

When examining a new phenomenon—especially in context of human perception—exact interpretations are not required, let alone appropriate, due to ever-changing and multidimensional nature of human perception. Besides, it is probable that there is cultural differences in noise tolerance. Therefore, comparing qualitative soundscape researches across different studies conducted in different cities or countries, should be done very cautiously. Thus, this research is a construed snapshot of the interviewees' perception at a given time and place.

A soundscape is strongly affected by seasonal and diurnal variation, as well as local factors such as the observed place's size, geography and climatic zone (Pijanowski et al. 2011a, 1213). The multiple variations in soundscapes are likely to cause limitations in transferability of the results, and thus, they are generalizable only within Kehä Vihreä, or other urban parks with similar local factors. Nevertheless, the purpose of this thesis—to define the soundscapes of Kehä Vihreä by perceptions and emotions, and to highlight the role of sound in the development of Kehä Vihreä—was achieved since the thesis process led to valid and useful end results to the research questions.

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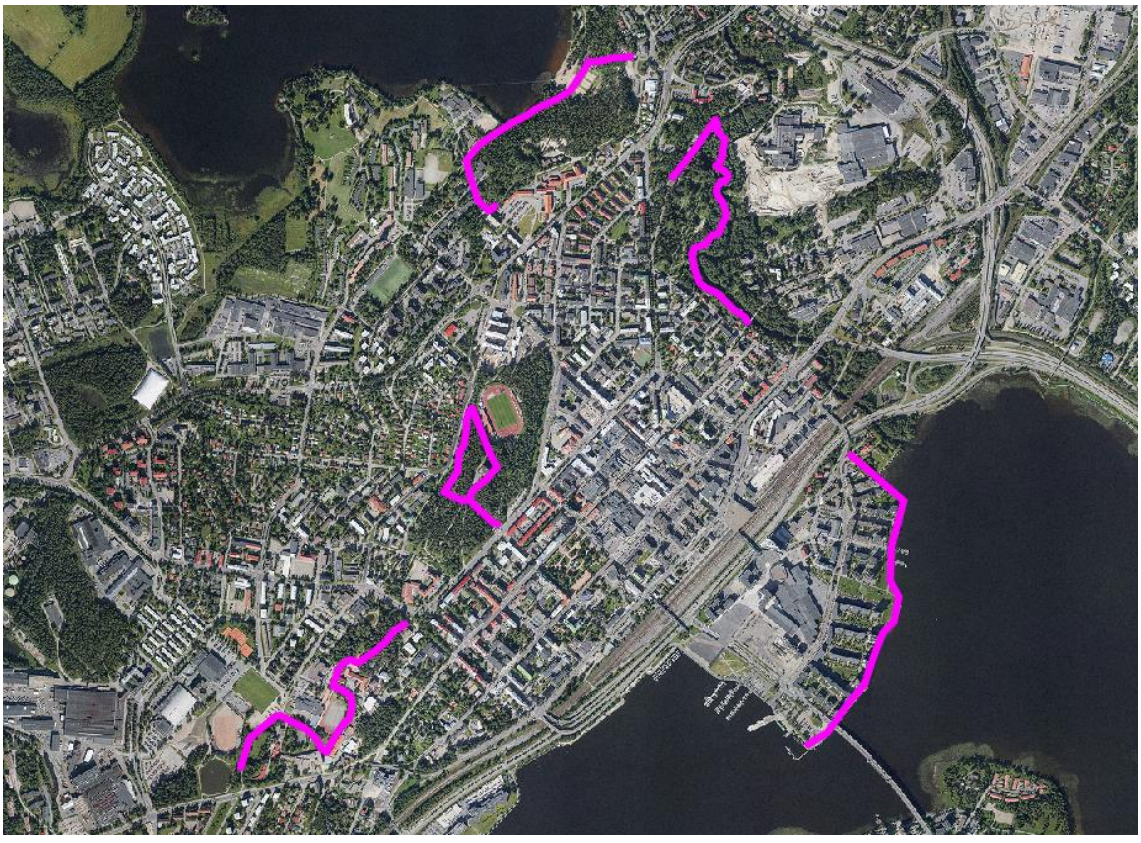
APPENDICES

Appendix 1. The Sound Walk Routes



Appendix 2. An Example of the Sound Walk Note Form

Please, make notes during the sound walk.

You can, for example,

- describe what you heard
- mention what feelings, thought or memories the sounds evoked

Kehä Vihreä

The Route