



THE LIMIT OF SUSTAINABLE CITIES

Change
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here

THE CASE OF VÄXJÖ

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I would like to express my gratitude to my family for their constant support during these academic years.

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ABSTRACT

Sustainability design in Europe has focused most of its efforts on densely urbanised areas, the “cities” (which account for 3 percent of the Earth’s surface), neglecting the intermediate regions, which are however the most common condition of European territories. Designing sustainable intermediate cities remains a specific and urgent contemporary challenge that some countries have nevertheless attempted. This is the case in Sweden, a country deeply characterised by the intermediate condition that has developed strong and radical sustainability policies in recent decades.

Moving from this big picture, the thesis deals with the city of Växjö in Sweden. Its relevance depends on the radical contradictions of sustainability policies the city embeds. Despite being frequently awarded even at the European level for its sustainable policies and urban planning excellence, the city presents issues of great impact. Indeed, activists, researchers, citizens, and advocacy groups have long denounced the reduction of nature reserves and the gradual decrease in biodiversity, but they also protest corporate greenwashing and the environmental policies developed by the municipality to maintain the title of Europe’s greenest city. This thesis addresses the contemporary challenge of sustainability by developing a design proposal for the city of Växjö with the aim of incorporating society and its concerns within its urban development and heritage itself. Växjö is a forest, not so much because it is based on the overused garden-city model, but more because of the possible intertwining of community, space, and economy that the project suggests in the very concept of inter-mediation.

The thesis consists of three parts. The first frames the debate on intermediate territories in the literature and explores the Swedish case according to its historical development related to the economy and urbanisation processes. The second focuses precisely on the case of Växjö, the “European greenest city”, according to three main lines of investigation: i) the historical development of sustainability in urbanisation, moving from soil and building aspects to contemporary policy decisions; ii) the spatial infrastructure of the region, in relation to the main policies of development, protection and exploitation; and iii) the societal structure, according to some main quantitative data and statistical research. The third, on the other hand, offers a project proposal that addresses current sustainability issues in such an intermediate territory and develops three main combined “actions” that together evolve the concept of Växjö as a forest.

Both the research and the project were developed by exploring human and non-human community impacts and practices and supported by a series of interviews with local stakeholders. The project is not only a proposal for the city, but a tool for investigating contemporary sustainability urgencies and challenges for European intermediate territories.

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INTRODUCTION

The challenge of sustainability in intermediate territories

The collective imagination of urbanism is strongly connected to the idea of city development. This view is directly reflected in the almost total focus of the last centuries' research done by universities, architects and urban planners in economic growth and territorial development of densely urbanised areas. However, the data do not pair with this trend since only a little more than 3 percent of the total land surface on the Earth is occupied by the "cities" and almost all of the remaining portion, about 70 percent, is covered by an intermediate condition, also called rurban or rural-urban, that is characterised by a mixture of uses (Katsikis 2016).

The features and necessities of the intermediate territories differ from the properties of the densely urbanised areas, so the traditional approaches used for the cities were no longer functional and effective. In the last decades, the research started producing investigations and experimentation to implement methods and strategies for developing the rurban areas.

With the introduction of sustainable design, the intermediate cities remained an urgent and peculiar contemporary challenge for urbanism due to the specificity of the territory: the management and the organisation are different from the densely urbanised area due to several ecosystems barely present in the city environments that overlap and intersect their space. To have a better understanding of these connections, urbanism and architecture knowledge are no longer sufficient to produce exhaustive analyses and projects. Therefore, a multidisciplinary approach is necessary to develop the intermediate tissue.

The research about the sustainable development of rurban cities and territories is at the beginning of its path, so several aspects are still unknown or it is missing experience and practice.

Considering this evidence, is there a limit to sustainability in the intermediate territories?

This paper aims to answer the previous questions by trying to frame the actual limitations of sustainable development, analysing the weaknesses and strengths, and figuring out a specific design approach.

The chosen country for the research and analysis is Sweden, a state largely shaped by the rurban tissue. Swedish history is characterised by a predominantly rural and rurban development with a strong connection between humans and the forest environments. In recent decades, additionally, this Scandinavian state has applied strong and radical sustainable policies and investments bringing it to be one of the tops in Europe regarding environmental and ecological actions.

Specifically, the municipality of Växjö, in the south portion of Sweden, is taken as a case study in this thesis. This choice was made for the relevance and status that the "European greenest city" obtained during the last years. However, the awards on national and international levels for the high quality and efficiency of sustainable policies and urban planning excellence hide a tensional condition that has a great impact on the life in the territory. The internal conflict in the municipality created a debate about the future measures that the city would take to improve further the reduction of the emissions and the ecological aspects of local ecosystems. On one side, the public institution promotes itself as a representative case to replicate in the world due to the great experimentation not only for sustainable measures but also for the complementation of economic and social achievements to the environmental aspects. On the other side, the position of activists, researchers, citizens and advocacy groups is against the municipality due to the exploitation and industrialisation of the forests is producing a reduction of the natural reserves and the continuous diminution of biodiversity. Still, they are protesting in opposition to the greenwashing actions and the ecological policies developed by the municipality

and the policy-makers as a facade to maintain the denomination of “European greenest city”, without a real improvement in the environmental aspects.

The elaboration of the research and the project in this thesis were carried out with a bibliographic search and an on-site analysis of the territory.

The first part was intended to create a base for the history of the city, its development and connections with the surrounding territory. The research comprehended human and non-human spheres to understand the strengths and the issues affecting Växjö and their impacts on the landscape.

During the period that I lived in this city, between the 1st of March and the 30th of May 2024, there was the opportunity to explore the city and its territory to have a better understanding of the dynamics and experiencing first-hand the life within Växjö. An in-depth analysis of urban and natural trends and patterns was feasible with the contribution of Professor Ola Ståhl, Correlator of this thesis and referent of the study exchange in Sweden, of the Department of Design at the Linnaeus University of Växjö. He introduced me to the academic debate and let me participate in several assemblies and conferences about the sustainable development of the territory. With Professor Ståhl’s help, I had the opportunity to meet some professors and researchers from local universities and have a confrontation about their works, giving interesting insights for the elaboration of this paper.

To support my ideas and to confirm some elements that emerged during the research, a series of interviews were made with local stakeholders to gather as well the point of view of the municipality and their opinion about the actual situation of the city of Växjö and its future developments.

Lastly, with all the information collected, the design proposal is not only a project for the city itself but a tool for investigating contemporary challenges and urgencies of the Swedish and European intermediate tissues with the aim of considering the social and environmental spheres as part of urban development. The concept of Växjö as a forest is not only referred to the overused garden-city model, but especially to the possible intertwining of community, space and economy that the strategy suggests in its idea of inter-mediation.

This thesis is composed of three main parts.

The first chapter frames the debate about the intermediate territories in the international literature analysing its development during the centuries with an in-depth study of the sustainability issue that emerged in recent years. It also explores the Swedish context according to the historical and economic evolution and their connections with the urbanisation processes.

The second part focuses on the case study, the city of Växjö. The analysis was made by dividing the territory into three main topics of investigation:

- The historical and political development: the research comprehends the rise of Växjö as a city and its urbanisation evolution, since the contemporary sustainable declaration and policies that introduced the city as the actual relevance on the world scene in the context of environmental practices;
- The spatial infrastructure: the focus is on the space in which the city of Växjö is located. The analysis is moving from different scales, from the County dimension to the urban area, trying to connect the policies to the subdivision of the territory and its protection and exploitation;
- The societal structure: this part examines and compares the evolution of the population and the territory through the collection of quantitative data and statistical research.

The final part shows the limits and the tensions that the sustainable approach and policies proposed by the municipality had provoked between the citizens and the local associations. The following part offers a proposal for the territory of Växjö that addresses the current sustainability issues with the development of three main combined “actions” that together evolve the concept of Växjö as a forest:

- Forest City: this action deals with the problem of population growth and city

expansion. The idea combined the urban and natural environments to implement the increase of inhabitants without a loss in the ecological value of the forest;

- Energy Community: to address the issue of the mono production of energy, a diversification of the renewable source is needed giving more importance to the private sector;
- Community Forest: a rethink of a portion of the forest environment is necessary to restore the natural environment and biodiversity in the surroundings of the city.

In the last subchapter, it is described the concluding remarks about the project itself and, more generally, to the future sustainable development of the intermediate territories.

01

THE INTERMEDIATE CONDITION

01.1 Cities and urbanisation

For a long time the centre of the human economy, progress and thinking was the 'city'. Since the beginning of the intensive exploitation of European colonies' resources in the XVI century and, more specifically, from the Industrial Revolution, the world population started moving from the countryside to the densely urbanised areas where the idea of the future and the opportunities to improve conditions and life thrived in their minds.¹

This historical era, which lasts until nowadays, is contended between two main ideologies: the Anthropocene and the Capitalocene (Moore 2016). Each of these puts Humanity in the centre of the history narration. The Capitalocene arose from the Anthropocene thesis but with a difference in the cause of the global changes: the era of the Anthropos, so the humans, explains how the Second Industrial Revolution and the use of fossil fuels are the main reasons for the contemporary climate changes and environmental instability; in the meanwhile, the era of the capital, as it says the name, bring at the centre of the stage the economic system of the capitalism that had its roots with the discovery of America and the subsequent colonisation period. The new economic development had some radical modifications in the social balance of the time. The shift was from the production and harvest of resources for everyday life to the accumulation of money, so capital, and this had consequences not only for the workers but also for the ecosystems. To maintain possible this objective the production processes and the human and non-human costs must be the most feasible. The Cheap Nature and the Cheap Labour concepts were introduced for this reason (ibidem). The first notion refers to the value that is given to natural resources: the conquest of the colonies started also the exploitation of the materials in these territories; the high quantity of resources extracted decreased the price of the raw material and the industrialisation processes let kept low the cost of the production. The second argument refers to a low value, consequentially the scarce salary, that is given to the workers or the absolute free labour force with the slavery of the African and American colonies. These two Cheap Factors were necessary for the landowners, factory owners and the high class to maintain power over the population and advance in the capital accumulation path (ibidem).

However, the consequences of these actions were massive. The conversion of uses of the territories and the high pressure on the land caused social and environmental issues, such as a migration flux from the countryside to the cities, exploitation of human and non-human resources with degradation or loss of natural elements and habitats, mass industrial production, an increasing level of pollutants in the soil, air and water (Kolhe and Dhote 2016). Those effects are still visible in today's life. The evolution of the urban areas and the historical urbanisation procedures affected the social, economic and physical equilibrium on the Earth, in some cases irreversibly (ibidem), that almost all the time leads to losses in quantity and quality of the natural ecosystems and biodiversity's habitats (Hanson and Olsson 2023). The shifting process that brings people to the big urban centres had its milestone in 2007 when more than half of the world's population lived in cities (today it is almost 60 percent), following the report made one year later by the United Nations and which was previously anticipated by a research program of the London School of Economics called "Urban Age" and lead by Ricky Burdett in 2005 (Cerruti But 2021).

The achievement of the urbanisation levels was the planet questioning about the definition of city and the possible different roles that these will have. In 1940s, demographers, sociologists and historians started to be interested in and studied the urban area and its population. The topic became predominant and even the United Nations created a research team to monitor, since 1951, and produce data analysis, since 1968, about the subdivision of citizens globally (Brenner and Schmid

¹ The debate around the rise of cities in contemporary times moves from the idea of an "Urban Age" (Burdett and Suddjic 2008) to the more critical and comprehensive idea of "Planetary Urbanisation" (Brenner and Schmidt 2014).

2014).

However, the main problem was how to regulate the borders, including the urban areas and with which criteria were determined. This issue has never been settled completely, but one of the first who tried to fix it was Kingsley Davis in the 1950s. He decided to introduce urban population thresholds (UPT), a level of inhabitants that separates a city from a town. He proposed two limits for the cities: the first comprehended the urban settlements with 100.000 citizens or more and the second with a minimum of 20.000 inhabitants. These UCTs were not supported by a theoretical framework but only by empirical criteria based on the reflections made to generalise the urban areas around the world. Notwithstanding the efforts of Davis in developing the conceptual structure of the thresholds, no further clarifications were completed and the urban dilemma kept lacking in international standardisation and comparability (ibidem, pag. 735).

The ambiguous methodology of Kingsley Davis has already been criticised before its disclosure by Louis Wirth in the 1930s. He expressed his doubts about a framework in which only arbitrary numbers distinguish the urban centres from the small towns, without considering a theoretical standard based on historical and socio-spatial principles. Wirth criticism was re-proposed by the young Manuel Castells in some of his interventions in the 1970s. Castells, as well as his predecessor, disapproved of the statistical-based system proposed by Davis and emphasised the necessity of a theoretical foundation to develop and define urban centres and their characteristics. In addition, Manuel Castells defined the UCTs as a poor representation that could become outmoded due to the rapid changes of the cities in the capitalistic period in which they were living (ibidem, pag. 738-39).

After the mid-1980s, the UN started to produce previsions and reports about the worldwide future development of urban centres and the flux of inhabitants between the countryside and cities. Nonetheless, since there was no world-scale conventional method to count urban demography, the data collection was made following the single subdivisions presented by the single countries, but the criteria used were different. The two most common systems are the administrative declarations (38% of the total UN member countries), so an urban settlement can be called a city only with the nomination by the national institution without consideration of the population or other factors, and the number of citizens (34%). In this second case, the different nations used a wide range of thresholds depending on the historical and territorial characteristics of the area, some examples are the limit of 200 inhabitants for Sweden and Iceland, the 2.000 for Cuba and Angola and the 10.000 in Benin and Italy. This distinction is further complexify since many states change their norms to classify the densely urbanised areas with the possibility of causing broad fluctuation of the data (ibidem, pag. 740-41).

At the beginning of this century, new considerations and concepts about urban development stood out from the traditional and political interpretations in the international debate. The first idea was the already mentioned "Urban Age", but the social and spatial limits of what was considered an urban area and what was excluded were not well defined (Cerruti But 2020). Consequently, the data collection was too abstract, chaotic and indefinite. This urban/rural dualism was taken from Kingsley Davis' concept; these are also considered distinct spheres and the settlements are divided into discrete types: part of the urban or included in the countryside space, even if there are a multitude of connections and movements of people and resources, along with the exchange of land uses in the urbanisation process. The definition of the rural area is completely absent: it is only determined as non-urban without defining any characteristics. Despite the weak foundations on which is erected that are the same contested previously by Louis Wirth and Manuel Castells, the Urban Age Project gained so much popularity and consensus that the planners and researchers focused their work and the policy-makers concentrated their investments on the cities and densely urbanised areas (Brenner and Schmid 2014, pag. 734). Burdett's theory was rebutted by Neil Brenner and Christian Schmid in the article "The 'Urban Age' in Question" published in 2014. The idea

of "Planetary Urbanisation" proposed in the essay explains how the contemporary city is not an individual evolution separated from the other urban centres, but globalisation deleted the spatial borders making the world a historical and dynamic element in which the human settlements are adapting to the space and time of the area, so it is considered as a single territory (ibidem). Planetary Urbanisation is based on a few principles: to understand urbanisation it is necessary to analyse the historical processes and evolutions; the urban settlements were transformed during the time from monocentric to "polymorphic, variable and dynamic" centres with more polarities in the same city; the progression of urban areas must be seen with the connection with the rural and the hinterland counterpart to have a complete comprehension; the globalisation and the contemporary socio-spatial networks made the growth of the city and more in general of the whole world a factor that affects the whole territory. As a result, the population generate different shapes of urban areas. Connected to this theory, there was developed the "Operational Landscape" concept by Neil Brenner and Nikos Katsikis. It refers to the study of the hinterland, so of the totality of the territory that is not defined as an urban area, but nowadays it is still in an embryonal stage. The analysis is developed following the political, social, technological, infrastructural and ecological approaches and the various relations with the densely urbanised areas, so as not to enclose the territory in itself (Brenner and Katsikis 2020). A third theory is the "Horizontal Metropolis" proposed by Paola Viganò and developed mainly in Europe and Italy (Viganò, Cavalieri and Barcelloni Corte 2018). The land, city and countryside are considered on the same level in the understanding of urban evolution, but in the territory, there are hierarchies with notable elements.

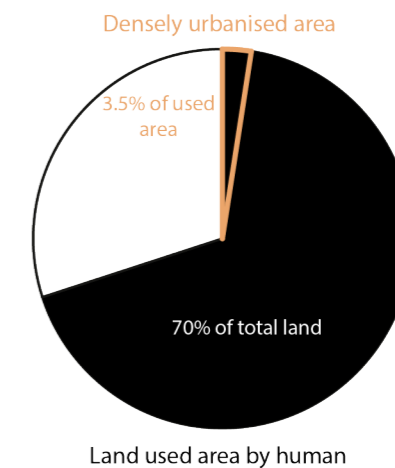


Figure 1: Land use of the planet (Source: self-elaboration by the author adapted from Katsikis 2016)

However, the statistics about the occupation of the land and the spatial distribution on the Earth [Figure 1] are in contrast with the main focus of human research, so the cities and the metropolitan areas: densely urban areas cover only a bit more than 3 percent of the total land surface (Katsikis 2016).

What happened to the other majority of the territory?

How is it composed?

For which reasons was it almost not considered?

In the last decades of the previous century, some research studies and universities have understood that a paradigm change is needed to resolve or, at least, mitigate the environmental problems affecting our planet. The range expansion out of the big urban centres created a new classification of the territory based no longer on the strictly political and administrative boundaries, such as cities, metropolitan areas, suburbs, towns and countryside; characteristics of the space and heterogeneity at an urban planning level are what divide the land. Other emerging spatial typologies besides the densely urban areas are the intermediate territories (also called rural-

urban or rural) and the internal areas, where the non-human environment prevails over human activities.²

The intermediate territory, probably the most common spatial condition in Europe, is a hybrid space between the internal and densely urban areas (Cerruti But 2020). A close interpretation of these areas defines these territories as “rurban”. The rurban regions are a fragmented territory with a mixture of urbanised areas, which are usually small villages or small to medium cities, rural and natural features with different functions (Vanempen 2009; Kolhe and Dhote 2016). The rural-urban environments have characteristics from both urban and rural areas with different land uses, such as industrial, agrarian, extractive, energetic and logistical configurations (Brenner and Katsikis 2020; Kolhe and Dhote 2016). The built-up zones are usually composed of low-scale buildings constructed with traditional techniques and materials, often with low architectural quality, large infrastructures for vehicular mobility, a mixture of factories and big commercial areas, crops, agricultural land and spontaneous nature, such as forests, surrounding the urban areas (Zaleskiene and Gražulevičiūtė-Vilenišké 2014). Socially, rurban areas often experience a trend of population ageing as younger generations migrate to larger urban centres attracted by the potential of higher incomes, larger job offers, education, social life or cultural experiences. The lack of public transport services affects part of the territory limiting the accessibility of the most remote zones, which usually are the smallest urban agglomeration. This socio-demographic shift can affect elderly people who are unable to use cars as a means of transport. All these aspects are leading a significant portion of inhabitants to move to densely urbanised areas with greater economic prospects where the services, amenities and transport are much more efficient and easier to reach.

The rurban areas have the risk of becoming a disconnected space creating an unbalanced territory landscape: both the interaction of elements such as the plurality of human and non-human actors, the diversity of characteristics and activities and the increasing number of stakeholders, combined with the long-term negligence of the national institutions about the development and the organisation of these areas create a confusing urban and natural structure. The complicated situation could have consequences on the nearby environments causing pollution or the extreme exploitation of natural resources, as well as unbalance in urban and non-urban development (Kolhe and Dhote 2016). Communities, associations, small businesses and factories truly develop and modify the intermediate territories (Cerruti But and Mattioli 2021). Albeit local entities are the social and evolving centre of the towns, each urban area is developing by itself: the final result will be an agglomeration of units that do not interface with the others even if human and non-human life in these environments is firmly entwined causing, sometimes, a conflicting interest. The several actors involved need communication and cooperation between urbanism and other disciplines. The scale of the project, the management issues due to administrative fragmentation and the new objectives through sustainability to implement in the territory development are what is challenging urbanism nowadays (Zaleskiene and Gražulevičiūtė-Vilenišké 2014B).

Starting from the 1980s, the urbanism debate slowly shifted from the city to rethinking the development systems and needs of the intermediate territories. Although the attention reserved to the metropolis is still bigger, the research field is creating methods and improvements of the rurban tissue. Since the traditional approaches used for the cities do not apply to the necessities of the intermediate territories or, at least, there is a need for adaptation to diverse problem issues, new concepts appeared for the development of rurban environments. The studies concentrate their focus on new relations that are barely or not present in densely urbanised areas, such as the consequences of urbanisation on rural and natural environments,

² The topic has been debated especially in Italy: see i.e. Lanzani A. and Curci F. (2018); Cerruti But M. and Mattioli C. (2019); Bolay J. C. and Kern, A. L. (2019); Cerruti But M. (2020); Renzoni C., Vassallo J., Donadoni E. and Lanteri S. (2023). Between the variety of the position it may be useful to trace a genealogy of the terms, clearly related to French and Italian Territorialism School, as underlined by many of these essays.

the protection of natural resources and areas and the effects of human lifestyle on other ecosystems (Zaleskiene and Gražulevičiūtė-Vilenišké 2014B). ‘La città diffusa’ of Indovina (1990) from which was developed the ‘Horizontal Metropolis’ concept, ‘The Hinterland’ of Hoggart (2005), the more modern ‘re-urbanity’ and the ecological ‘lob-city model’ are only a few examples of how the evolution of the intermediate territories has been theorised (Vanempen 2009; Viganò, Cavalieri and Barcelloni Corte 2018).

01.2 The issue of sustainability

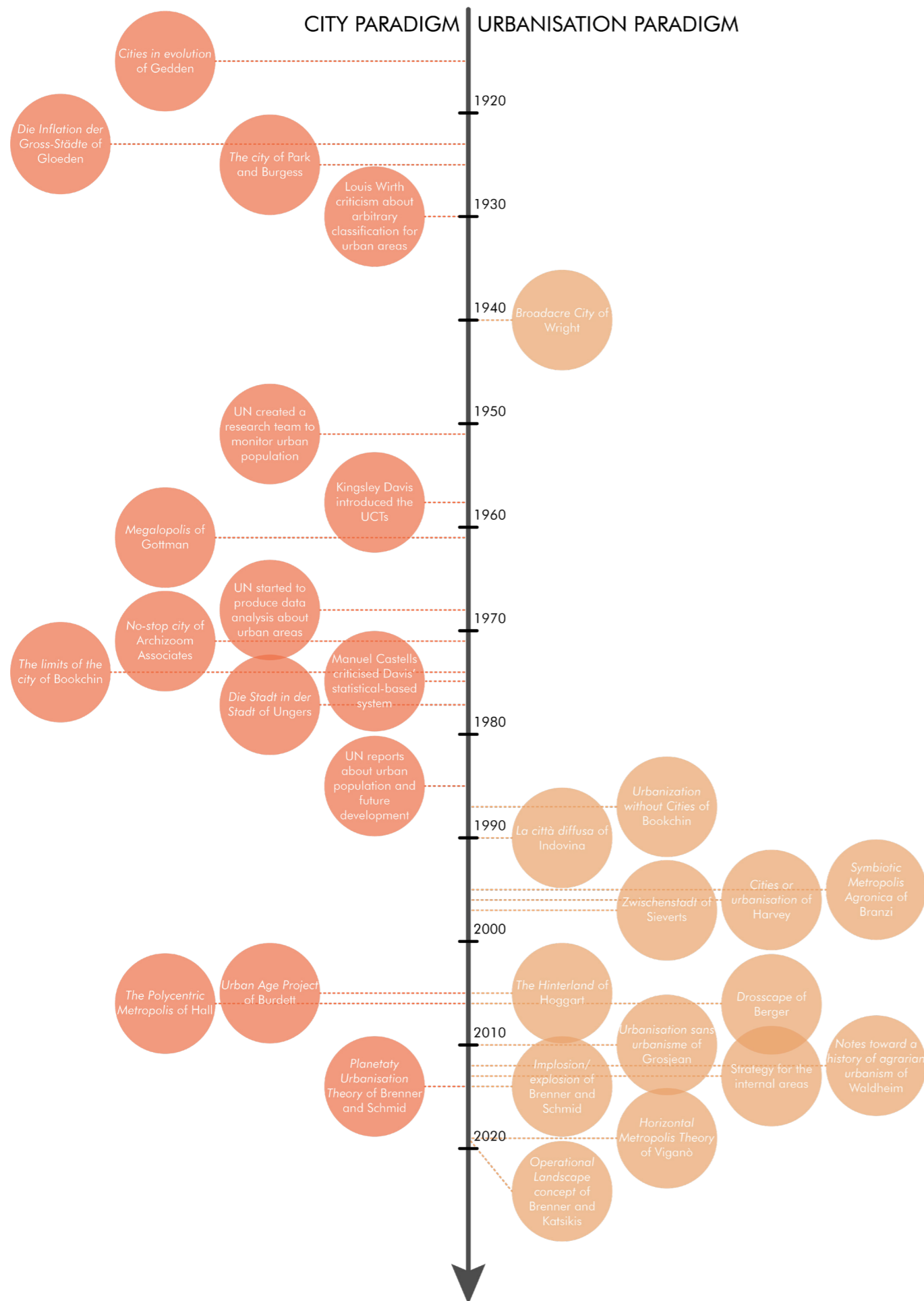


Figure 2: Evolution of cities and urbanisation paradigms

The debate focuses on sustainability at all scales and on all actors of the traditional developing models. Methods not only consider the elements and constructions that need to be planned, the urbanised areas or the use of the soil: the socio-economic, ecological, human and non-human life needs have to communicate with each other. The research sphere focuses on the interaction of urban and nature, the effects of human actions, productions, expansion and uses of the resources on nature and its protection. A multidisciplinary approach is requested due to a wider range of systems, elements, actors and aspects present in the same territory and with a strict connection between each other that architecture and urbanism are not able to manage and organise. In this context, urbanism changed its role: it became more similar to a negotiator, facilitator and coordinator between different disciplines that participated in redeveloping the territory following and integrating the distinct social, economic and ecologic needs of the actors inhabiting the region (Vanempen 2009).

Another important component to take into account is time and its relations with the spatial dimension (Lynch 1972). On the contrary to what was happening in the pre-industrialisation era, contemporaneity is composed of many sudden changes with short periods of compensation and stabilisation in between new inventions, technologies and habits that interact and alter the human lifestyle and the urban and natural space. Socio-economic reasons usually cause the instability of these areas and the endless reshaping of spaces, so the balance among the different actors is always changing looking for a new common point. (Zaleskiene and Gražulevičiūtė-Vilenišké 2014B).

Rurban areas can have different shapes possibilities and combinations due to the presence of natural environments, the influence of human-driven activities and the interaction between human and non-human spheres. The contemporaneity of intermediate territories is shaped by the high variation pace of these relations and the actual physical response of humans and nature. The consequences of these rapid changes can be synthesised in two categories: complexity or uniformity. The complexity could also be seen in the spatial development of urban areas when there is a lack of organisation in the urban development and ecological issues such as pollution of soil and water with fertilisers, intensive cultivation, natural resource exploitation and the constant reduction and destruction of natural habitats and ecosystems. As well, it can be seen on a social level: the needs of a population are not paired with the actions done by the policymakers. On the other hand, the lack of important architectural elements or particular characteristics in the rurban landscape could lead to uniformity, an alternation of house sprawls, factories, infrastructures and crops without a planning development or architectural or landscape-relevant elements. The monotony as a consequence is no longer linked to the same region or State, but globalisation effects expanded it to several places around the world. The internationalisation of technologies, technics and uses of land transformed landscapes with very different traditions in extremely indistinguishable from each other (ibidem, pag. 48).

The dynamism in the rurban environments, due to a less human-controlled natural space such as forests and rivers, but also as a consequence of the increasing climate change effects and the movement of species, has raised variations in the territory that are difficult to grasp even during the analysis or the elaboration of an urban project because some of these elements can be modified, expanded, decreased or shifted in a short period of time. Thinking of a long-term scenario with phases that incorporate all the components and actors established in a territory, the interaction of these and restoring, or bringing back, species that were degraded or extinguished are priorities when it is talking about rurban redevelopment. Research studies show how the time and the process must be linked to the space and the evolution of the project: the analysis of the historical and the present state of fact and its trends can lead to possible new outcomes and solutions for future scenarios (Zaleskiene and

Gražulevičiūtė-Vileniškė 2014A).

While the rich ecological aspects contribute to the area's high quality of life, the fragmented natural environment offers additional benefits: it creates optimal conditions for a variety of ecosystems and the discontinuity of natural environments creates the optimal situation for different biospheres and the prosperity of biodiversity, a fundamental element that needs to be preserved for sustainable development (Hanson and Olsson 2023). The intermediate territories can have enormous environmental advantages, not only to the natural areas, if these are well managed, but to the nearby urban zones as well: a balance of permeable and impermeable soils can avoid flooding during rainstorms and permit water retention in the inner terrain; vegetation, green areas and crops are able to absorb the pollution produced by factories and houses, so to have better air quality, to maintain the temperature lower than in cities with the absorption of the solar energy, but also the view on the green landscape can be useful for improving mental health and comfort. Besides the pure environmental benefits of the fragmented territory, ecological aspects influence positively social balance and the quality of life of people due to the proximity of open spaces and natural elements (Vanempten 2009).

When trying to understand spatial development, one problem that emerges is the institutional level. The boundaries of cities, towns, districts and regions are in many cases in contrast with the extension of the territory in the analysis. The administrations always have their urban development plans and they usually fail to collaborate or coordinate with others. The implication of different municipalities and stewardships can lead to diverse ideas, visions and interests in the development plan, which makes it much more complicated to work on different project scales. A more suitable administrative level for a homogeneous typology of land or more decision-making power on the development strategies on a regional level could be a solution to reach common objectives on the dynamics and evolutions of the intermediate territories (Vanempten 2009).

Challenging urbanism in recent years was an event that modified the migrant flux from the intermediate territories and the internal areas to the metropolis: COVID-19. The global pandemic questioned many assumptions about life in densely urbanised areas and their lifestyle: the comfort of the services and the limited living spaces that a city can offer were no longer a priority for the majority of the people; instead, the access to natural areas or parks, big outdoor and open spaces, higher air quality and the small nearby services available in the countryside became something to dream about (Cerruti But 2020). The standard of living changed based on the new requests of the population also about jobs and school: the home now demands a flexible space design capable of accommodating work, study and other activities, since it became the primary setting where people spent more daily life. This affects the economic dynamics that cause a redistribution of the richness. The medial city is what assembles all these characteristics. The instant change of paradigm, especially in the northern hemisphere of the world, could offer an opportunity to rethink those territories more sustainably since the progress is almost all concentrated in big urban centres.

01.3 Intermediate territories in Sweden

Swedish history is filled with territorial changes, wars, movements and migrations but the countryside, especially the use of the land, has always been at the centre of the narration in one way or another.

Since the fall of Viking dominance in the XI century (www.vaxjo.se), the Scandinavian territory was contested by the three main monarchies at the time in the North: Denmark, Sweden and Norway. During the centuries, some possibilities for cooperation and union between the kingdoms were a reality. However, short time of commercial and political alliances and truces were alternated to protracted periods of invasions and conflicts for supremacy in northern Europe (Hall 1991).

The countryside and the productive cereals crops were the basis of Sweden's survival due to the instability of commercial trades between the conterminous States. Since the actual south of the country was for a long time under the Danish kingdom's control, the monarchy was almost forced to expand its agricultural settlements through the north of the Scandinavian territory. In the XI and XII centuries, the agglomerations were born as a meeting place for workers of the zone and merchants. Only a century later, the agglomeration started to properly become towns with the construction and the development of the basic service functions and buildings. Almost all of the mediaeval towns grew in a spontaneous process in areas where resource extraction, trade and communication were favourable. The planning procedures were absent even with the development of the first cities: the introductory urban code was the Bjärköarätten, written especially for Stockholm which described the regulations, limits and guidelines about the building, such as the height, and the norms about the property ownership. These laws were implemented in the mid-fourteenth century with the Magnus Eriksson's Towns Act (Hall 1991).

Starting from the XIV century, new establishments were settled in the coastal area and the supply from the fields was guaranteed. The process of implementing grain productivity and a safer place from enemy assaults for the development of new villages in northern Sweden was possible with the help of the Church (Björling 2023). This fundamental role maintained the equilibrium between the spiritual and the Crown powers as the parishes were part of the organisational system of the villages: the expansion over new territories was the circumstance to enlarge their authority. The agricultural crops were developing throughout the territory, but the biggest part of the land was occupied by the forests. Woodlands were perceived as a common good where the natural resources were taken only for the essential needs of the population: grazing, hunting, construction and firewood were not intended with a capitalistic position of enrichment (Björling 2023). These actions were undertaken for the survival and growth of the village community. However, the Swedish villages' dimension was very little compared to the towns and cities that were present simultaneously in other parts of Europe (Hall 1991).

After the first few centuries of stability in technological and economic development, the evolution of Sweden can be divided into three phases that correspond to political shifts and, at the same time, demographic changes, according to the data proposed by Statistiska centralbyrån (the Swedish Central Bureau of Statistics):

- The first phase is between the XVI and the late XIX century: it is characterised by a growth of countryside population and constant in the urban areas;
- The second one began in the late XIX century and came to an end in the second half of the XX century: the trend inverted and the migration from the countryside to the cities rose after a great technological development;
- The last phase started in the second half of the XX century and it lasts till nowadays: the rural inhabitants reached a stable level, but the cities never stop growing.

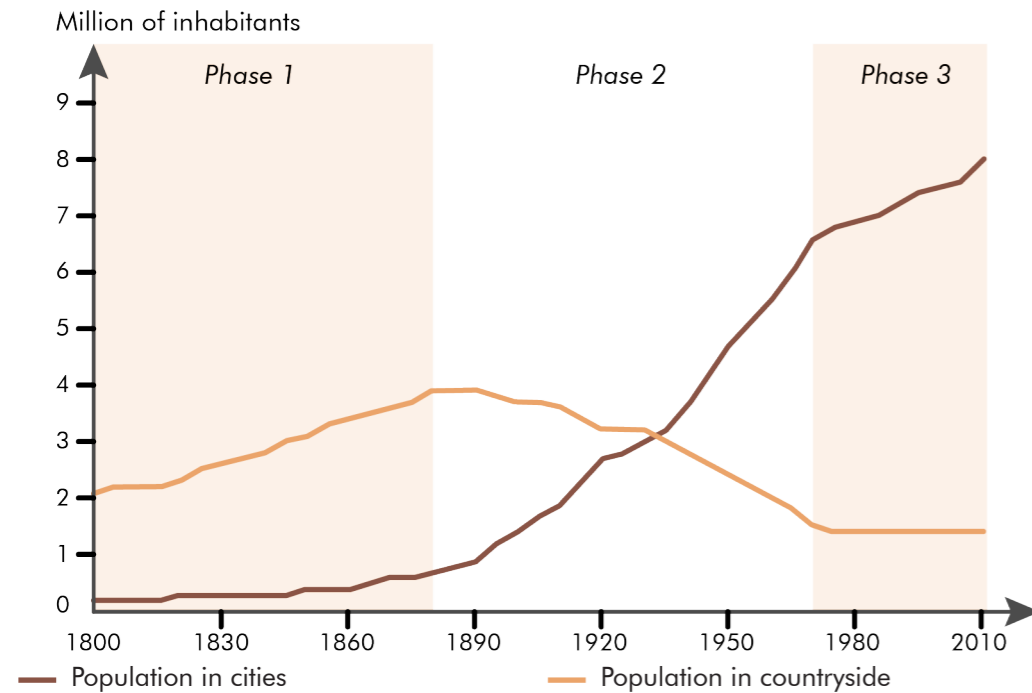


Figure 3: Urban and demographic growth of Sweden (Source: Statistiska centralbyrån)

These transformations and developments are generally simplified even if the micro-situations in the country could differ due to the differences in geographies, topography and access to natural resources. The land use and production activities are able to exemplify the situation: the southern part of Sweden had more developments of agricultural fields and the centre and northern territories are characterised by mines and forest industries (Björling 2023).

The event that pushed up the transformation processes arrived in 1542, after the end of the union of the three Nordic kingdoms. King Gustav Vasa declared the Crown of Sweden as the holder of the whole unurbanised territories, which almost **entirely were forests**. With this action, the king took the first step for his country to follow the capitalistic evolution of continental Europe (Björling 2023).

The control by the monarchy over the land started a system of **trade of resources** that was not present previously. Another decision made by Gustav Vasa for the dominance of commercial routes was the establishment of the royal family and the capital of Sweden in Stockholm due to the strategic position in the Gulf of Bothania (Björling 2023). The adaptation to the contemporary economic system of the continent transformed Swedish society. The monarchy had the chance to manage constantly the use of the land and selling portions of the territory and forests to the farmers guaranteed cash incomes that could be used for the technological and urban development and to implement the defence army. In the same century, the Crown implemented some reforms to increase the agricultural, mining and forest sectors' productivity and unfold the industrialisation of the work processes (Björling 2023).

This revolution introduced the Swedish community to a new social class: the **landlords**. The landowners gained more power with capital accumulation and continuing investments to buy forest parcels from farmers or the State at a low cost to enhance their properties (Björling 2023). At the same time, the trades were not only reserved for agricultural products and crops and natural resources but also for the expansion of the real estate and house exchange. The favourable position of this commerce was for demographic reasons: the population growth in the rural areas secured the construction of new houses. On the contrary, the urban agglomeration did not develop especially for job factors: the scarcity of work requests maintained the number of people in towns and city communities almost equal.

In the XVI century, the privatisation of land was the event that pushed the wave of planning in Sweden, even if at the beginning it was possible to talk only about urban

policies rather than urban planning. The plans were still rare because were made only in some cases of a new town construction or for redevelopment after fires and they were designed mainly by military engineers and surveyors to modernise the physical configuration of the cities reducing the gap compared to the contemporary continental European agglomerations. The aesthetic harmony was seen in the rigidity of the project: the right-angled streets and the rectangular building blocks were the principal characteristics and the topography layouts or the surviving constructions were almost not taken into account at all. Usually, the towns were rebuilt as the previous version before the burning following the remaining traces, especially for the small urban agglomerations, due to the elevated costs of urban development regulations that were not accepted by the town dwellers, but there is no certainty of this (Hall 1991).

In 1718, the death of King Karl XII led to a change in the political organisation. The absolute monarchy was supported by a parliament, the Riksdag (Hall 1991).

Magnus Eriksson's Towns Act was still active and untouched until 1734, the year when few modifications were made. The main idea was to implement guidelines to reduce the burning risk, such as the substitution of wood with bricks as construction material and the introduction of wider green streets, parks and squares to divide the neighbourhoods. This code was accepted by the town dwellers since the fire events were frequent. Nevertheless, there was not any hint of urban expansion and development in the law additions (Hall 1991).

The operations to raise the productivity of agricultural fields and the exploitation of natural resources continued in the XVII century, the whole Swedish public administration on all levels, including national, regional and municipal institutions, was focused on those objectives to improve the prosperity and the quality of life of the inhabitants. However, the great shift in the rural sector had its peak between 1749 and 1827 with three main revisions of the land and property laws. The aim was to merge the divided structures of the parcels in the countryside creating a more simple and linear subdivision of the land between the owners. The implementation of these changes has been accompanied by adverse impacts. Firstly, many farmers were forced to move their houses and farms due to the subdivision change of the land. Secondly, the political administrations had difficulties in the organisation of the new municipality borders and territorial partitions, as well as villages and communities were divided. Lastly, the reforms had a great impact on the landscape: the strong industrialisation of the forest made the countryside a homogenous surface of land. To enforce this act, the higher request for wood products caused the total or partial conversion of meadows and pastures by the farmers to implement the plantation of new trees in their properties, since the increased exportation was notably more profitable rather than the cattle. Nevertheless, despite several negative consequences, the advantages on the national scale and the living conditions were enormous. The benefits of these reforms were massive for productivity: new technologies and technics increased the amount of harvest produced and the exportation to continental Europe, especially of grain and wood products, was at an all-time high. Also, the quality of life and the population's welfare rose due to the economic growth and the higher incomes also of the small landowners and farmers (Björling 2023).

In the period between the three rural laws revisions, a radical change in the balance of the society was produced as a side effect. The self-sufficient agricultural culture shifted to one more based on the importation of agrarian and pastoral products, due to the lower cost of the food that came from continental Europe (Björling 2023). The monarchy did not entirely control this transformation, but it resulted from reducing agricultural farming practices to give more importance and space to the forest industry. In such manner, the capitalistic print in the economy was evolving and expanding in Swedish society, although with a delay compared to the rest of Europe.

In the meanwhile of the land reforms, the capitalistic system was affecting more and more aspects of social life and the economic and political framework. We may argue that to be able to sustain the structure built in the Capitalocene era,

the cost of the natural elements and products must remain low or without value at all, introducing the concept of “Cheap Nature” (Moore 2016). The industrialisation of the processes and the technological innovations supported the continuously faster exploitation of raw materials and the mass production of resources aimed at reducing or deleting the prize of Nature. The landlords imposed the capitalist system to take advantage of this situation: the intentions were to maintain their status in the countryside enlarging their properties through the acquisition of land and forest from the farmers and the Crown. The power growth of that social class did not influence only the rural side, it regarded the political counterpart as well. In 1862 the traditional organisation of the Swedish urban centres changed from parishes to municipalities and the administrative role in the local governance passed through the most powerful class of the time. Together with the local governmental passage, the cultural and social priorities changed from a community-based organisation to a more individualistic identity aimed at reaching personal achievements. The possibility of realising this situation depended on the social and educational security advanced by the Crown (Björling 2023).

As mentioned before, **the industrialisation process in Sweden, at least till the mid-XIX century, was not considered as a factory development, but rather a countryside exploitation and mechanisation**, since the economy and the labour force were concentrated in **agrarian works and forestry**. The other productions were part of the rural sphere too and were made predominantly by craftsmen (Hall 1991).

The biennium between 1868 and 1869 was characterised by a harvest crisis in the countryside. This event can be considered as a push factor for the Famine Emigration to America, a migration flux that started in the 1830s, when a few forerunners, especially from the most remote and agriculture-based regions such as Småland, tried to escape to the not optimal life conditions of Sweden with a transoceanic journey to the United States of America (Utvandrarnas Hus).

The second demographic development phase, beginning in the late XIX century, is distinguished by a shift in the population growth in the urban and rural areas. From this point forward, Swedish political and planning priorities shifted towards a more urban-centred focus, while still striving to maintain accessibility of public services and infrastructure in rural areas (Björling 2023).

In 1874, the Riksdag accepted a new building ordinance and, for the first time in Swedish history, it was not focused on small rural agglomerations but on large urban centres trying to anticipate the industrial development issues. With the introduction of this law, the stadsplan (town plan) was mandatory in the cities. The plan must show how the urban area will be expanded and the subdivision into private blocks and public spaces, such as streets, squares and parks. On the other hand, the norms had a few weak points. One of these was the impossibility of the municipality institutions to block a private project on an area designated for public space without an expropriation of the land; this practice made the costs for the plan realisation extremely high. Another fragility, that is still unresolved after centuries, is the absence of proper legal tools to block spontaneous building constructions outside the urban areas. Starting from this norm, numerous urban plans were drafted and updated, the main reason was to include the unplanned outskirts inside the operational zone of the plan, since in the exterior the construction was possible without asking for a legal permit. After the completion of the stadsplan, it must receive consent from the government and the Board of Public Works and Buildings (Hall 1991).

In 1884, the Parliament noticed the issues about the planning legislation and created a committee to analyse and correct it. The operations to undertake a new building act took more than twenty years before the approval by the Riksdag in 1907 of the Town Planning Act. The proposal fixed the contrast with the landowners: the privates were no longer allowed to build in areas projected to be public places. The municipality also has to pay a compensation cost for the portion of the property, reducing considerably the economic outlay. Another change rather than the previous version was the role of the national institution: the government did not have the

power to modify the town plan proposals, but only to refuse if they considered it unsuitable. However, the most impactful addition that was implemented in the 1874 law was detailing the limits and the possibilities for private property development, such as the height and the number of floors of the buildings. This passage was a historical step for Sweden because was the moment of the transformation from a general plan in which was described the subdivision of the urban territory to a genuine planning regulation (Hall 1991).

Between the adoption of the two building acts, at the turn of the century, a new school of urban planning came out: the new concept was based on the land composition and there was a meticulous study of the territory and topography to adapt the idea and the division of properties, streets and public spaces on the characteristics of the area. This methodology was thought with a small-scale building or villa development and not multi-storey blocks, but at the same time privileged the creation of parks and green areas in the landscape (Hall 1991).

The internal migration movements from agricultural areas to the cities, or to zones in which the forest industries and the mining sector are prevalent, were caused initially by the further mechanisation of the agrarian activities and processes, reducing considerably the need for labor power in the land. However, the population flux intensified a few years later, starting in the early 1900s, due to a period of harvest crisis (Björling 2023). The unexpected growth of the inhabitants in the urban areas astonished the work market, since in the cities, at that time, there was only the beginning of the industrial development, in which large factories replaced the craftsmen’s small businesses, and they were not prepared to receive that number of workers, although the production and service sectors were slowly amplifying (Björling 2023; Hall 1991). The industrial units were small and not chiefly urban-based in the first stages of the urbanisation process. The main sectors that first had been mechanised were the sawmills and the iron manufactures (Hall 1991).

This phenomenon caused a growing process in the urban territories, but not controlled by municipal strategies and plans: since the existing accommodation buildings in the cities were not sufficient for all the houses were constructed outside the city border where there was no necessity for building permission (Hall 1991; Utvandrarnas Hus). The quality of life of the people who tried to find better conditions in the cities did not improve and a different migration solution became more popular: the travel to the U.S.A. At the beginning of the XX century, the American dream thrived in the minds of an increasing amount of people spending their whole savings in emigrant agencies in Gothenburg or with sub-agents scattered across the country, even if there was no certainty of reaching the destination and being able to enter in the U.S.A. There was a strict screening to pass the controls with tests and health checks to prove the labour possibility; if someone over the standards requested was sent back. In the period between the 1830s and the 1930, about 1.3 million Swedish, almost one-fifth of the total population of Sweden at that time, attempted to get to the United States, with a very small number of emigrants that arrived in Oceania and South America, by leaving their native land from the Gothenburg port and passing through the United Kingdom. The 1930 was the first year in which the returning people from America were more than the emigrants from Sweden (Utvandrarnas Hus).

In 1928, Prime Minister Per Albin Hansson proposed a new vision to interrupt the flux of events that were not improving the welfare of the State and its people. His social democratic prospect was based on the folkhemmet concept, a social cohesion idea: the nation should guarantee the home (hem) for each person (folk) in its territory (Björling 2023). In this way, the focus of the government shifted from a pure economic priority to a balance between economic development and the well-being of the citizens. The exploitation of natural resources was included in this programme as a common good to reach the welfare of the population. The need for a road change was not stopped after the economic recession in 1930 due to the Wall Street Crash in 1929; on the contrary, a manifesto and popular movements were pushed in the direction undertaken by the Swedish Prime Minister. In 1931, a group

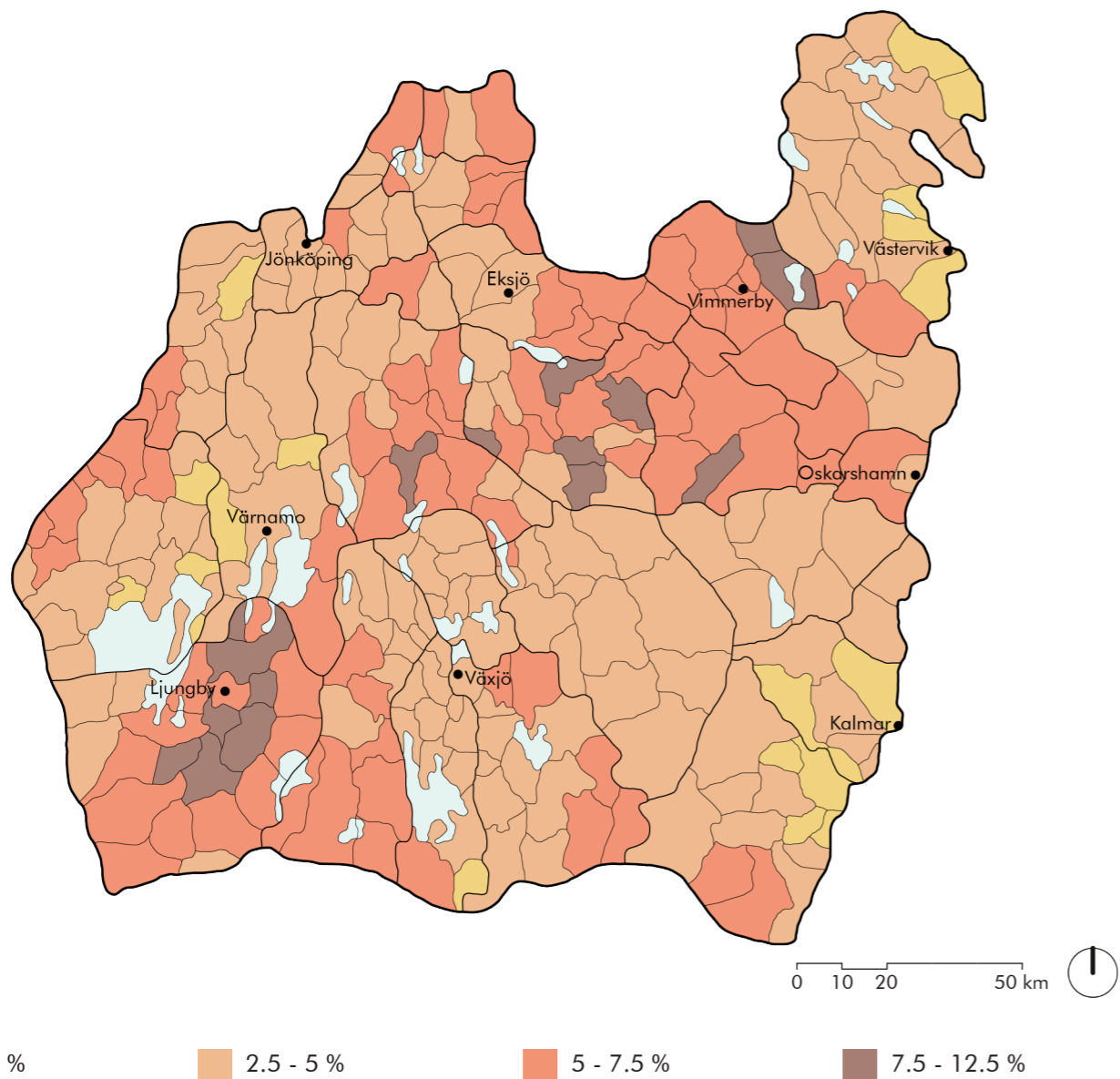


Figure 4: Emigration from the parishes of Småland during the period 1850-1930 as a percentage of their population (Source: Utvandrarernas Hus).

of architects composed of Gunnar Asplund, Wolter Gahn, Sven Markelius, Gregor Paulsson, Eskil Sundahl and Uno Åhren decided to publish a provocative manifesto, called "Acceptera" (Asplund et al 1931), in which they put the government and the whole country in front of a twofold scenario: the possibility of change of the economy following the modern Europe elites' nations (the "A-team of Europe" as Björling (2023) said) and propose a new industrial organisation or maintaining the rural, traditional and conservative status of the State and remaining in the "B-team of Europe" (Björling 2023). The manifesto also said that the development of the transportation network with roads and railways would be essential to create cultural cohesion in the country (Björling 2023).

In the same decade as the three previous events, the transformation need of Sweden was accepted by the citizens, primarily, through protest and popular movements to diverse oppositions and the liberation from the Lutheran hierarchies in the countryside and, secondly, by the social democratic parliament who approved reforms to expand the welfare state in the country, more specifically in the urban areas, and to facilitate the spread of factories. It represented a huge step forward through modernity for Sweden and its citizens (Björling 2023). The radical evolution of the State decreased significantly the number of migrants to the U.S.A. almost till to delete the emigration process, but, at the same time, did not stop the flux from the countryside to the urban areas. This cultural change produced a milestone moment in Sweden's history: the population living in the city centres exceeded the number of citizens established in the countryside (Björling 2023). Also, in the 1930s, Sweden registered for the first time in its history a larger number of workers in the factories rather than in the agrarian fields (Hall 1991).

After a period of stall, the twenty-year period after the precariousness of the Second World War was flourishing from the economic point of view due to the increasing requests for raw materials, such as wood and minerals, from the countries in Europe that had needs for the reconstruction and the immigration flux guaranteed a "Cheap Labour" force (Moore 2016), especially in the industrial and technological sectors (Björling 2023; Hall 1991). The boom of exportation generated a demand for more productivity in the rural territory and the rise of natural resource exploitation. The countryside was the portion that gained more from this situation: the growth request for materials was directly proportional to the growth of job opportunities and better living conditions. Nevertheless, this circumstance did not terminate the internal population movement to the cities since the work environments and opportunities in the industries were significantly better and with a higher growth possibility in the lifestyle (Björling 2023).

In 1947, the Building Act was once more modified to detail even more the regulation on building construction and planning development (Hall 1991).

The welfare and economic development were not the only topics on which the government was focused. The educational system and social well-being were part of the policy-makers' programmes. Although, the two most relevant reforms of the period between the 1950s and the 1970s were aimed at shaping the municipal organisation. The first ordinance, in 1952, reduced the number of municipalities in Sweden from 2.281 to 816 merging the territories of different municipalities. The second revision occurred in 1974 and was the most significant one between the two rectifications. As well as the previous reform, it merged once more the areas of several towns reducing the number of territorial subdivisions to 290. The crucial transformation was the unification of the different municipality typologies, deleting the classification based on the different origins between *stad* (cities), *köping* (market towns) and *landskommun* (countryside municipalities), in only one category, called *tätort*, which includes the densely populated areas. The definition of *tätort* was taken from the already existing division in the previous legislations from rural areas to the other urban typologies: it would be an agglomeration that comprehends at least two hundred inhabitants and with a maximum distance between the buildings of two hundred meters. The municipal reforms were implemented, primarily, to control more efficiently the land use, water purification and distribution



Figure 5: Cover of the first edition of the manifesto (Source: Andersson 2000).



Figure 6: Architects Sven Markelius, Uno Åhrén, Gunnar Asplund, Eskil Sundahl, Wolter Gahn and art historian Gregor Paulsson in protest (Source: Andersson 2000).

system, trying to protect efficiently the natural and cultural environments present in and outside the urban zones, defence systems and securing the expansion of infrastructures, energy and water supply that were essentials for the development of the industrial sector and the well-being of the citizens. Another objective of these reforms was to reduce the historical gap between the countryside and the densely urbanised areas including both portions of territory in the same administrative land. The mix present in almost all municipalities forced the policymakers to develop strategies for both categories of the territory, trying to minimise the differences in opportunities as well (Björling 2023).

The economic prosperity and the industrial focus of the institutions have shown a small regard for the effects of environmental pollution and the exploitation of natural resources. The politicians' mentality was to consider these consequences as a side effect of improving the quality of life and economic well-being (Hall 1991).

To improve the welfare state and try to resolve a problem that has been affecting Sweden since the start of the migration flux from the countryside to the cities, the government proposed the "Million Homes Programme" in 1964. The proposal consisted of the construction of one million apartments, some of them comprehended social housing, and dwellings in the urban areas throughout the Swedish territory in a ten-year period. National subsidies were given to the municipalities for implementing the public residential areas. The purposes of this action were to push technological development in the construction sector, encouraging the standardisation and the prefabrication of the elements, and reorganise the outskirts of the principal densely urbanised areas from abandonment and the high risk of violence. The preferred typology of structures thought by the policy-makers was the multi-storey apartments due to the majority of people that could move in and the pace of build (Hall and Vidén 2005; www.hdm.lth.se).

This period, which included the years between the 1960s and 1970s, was called the "record years" due to the enormous incrementation of residential dwellings in the urban areas of Sweden, the industrialised methods for the construction and the impressive State loans to privates and municipalities (Hall and Vidén 2005).

In the middle of the second half of the 1900s began the third and last phase of the development in Sweden which was characterised by the uninterrupted growth of population in urban areas due to the prosperity of industrial development and welfare state and a high internal birth rate in the cities. On the other hand, the number of inhabitants in the countryside reached a stable number during these decades (Björling 2023). However, this last stage started with a decade of emergencies and protests.

The oil crisis that affected the world in 1973 had a great impact on Sweden as well. The event queried the population about the capitalistic and imperialist system of the Western world and the impact of industrial society on the global environment. The world crash influenced social movements and critics. They began to attack against rapid urbanisation and the use of the surface, the technocratic public sector, economic rationalisation, the gender gaps in the working sectors and rights equity and the enormous environmental impact of the capitalistic society on the planet Earth (Björling 2023).

The same protest movements criticised the urban and industrial development during the same decades due to the high ecological impact and the low consideration of the natural benefits of the countryside, since the natural areas were predominantly seen as resources to exploit and a recreational zone from the urban lifestyle (Björling 2023).

The popular opposition and dissent have brought an end, in 1976, to the political and technocratic dominance of the Social Democratic Party which started with the *folkhemmet* vision by Prime Minister Per Albin Hansson. Despite the enormous progress made in the economic and welfare aspects during the almost fifty years of governance, the policy-makers were criticised for the limitation to guarantee a political renewal, low inclusion measures in the Swedish society, for restricting the

development freedom of alternative organisations in the territory and not letting be influenced by different public-private actors in the administrative and civic participatory processes (Björling 2023).

The new political course was in charge of changing public opinion on the internal aspects mentioned above, but without stopping the economic and technological rise in the European landscape. The two biggest issues on which the government focused its attention and it was divided into the actions needed: first, it was reinforcing the development of large-scale factories and the second one was implementing the power of the regions and, especially, municipalities. The final decision of the public authorities was to concentrate on expanding the economy and urban development of the *tätort*. The expansion of densely urbanised areas was passing through more flexibility in the decision-making aspects and planning processes that were almost completely in the hands of the municipalities, since the absence of a national planning institution. However, the Parliament and the Government can use initiatives and policies to guide the development made by the *kommuner* (Björling 2023; Persson 2013). The reduction of top-down decisions aimed to have more influence on the natural industrial economy development and the market, with more possibilities of the innovation of technologies assisting, possibly, a reduction of the sustainable impact in the territory with public funding from the State. To follow these ideas, in 1987, the government approved a reform of the market proposing a less strict law for the control of the exchanges and improving the competitiveness between the companies. As a result, not only internal growth was increasing but also internationalisation and exportation improved the numbers over the succeeding years (Björling 2023).

During the same year, a new compulsory tool was created to implement the long-term strategies of development and control over urban transformations, building permits and water management in the whole city's urban area: the Comprehensive Plan (CP), the so-called *översiktsplan*. It came into effect with the Swedish Planning and Building Act, or *plan-och bygglagen* (Hall 1991), and it was adjusted, during the following years, with implementing laws, the most important being the Environmental Code (EC). This instrument was and is still in use by the municipality policymakers to manage the urban zones of the *tätort* based on the national guidelines, but the power for planning and land use development is a monopoly in the hands of local institutions (Björling 2023; Hanson and Olsson 2023; Persson 2013). This new plan confirmed on a theoretical and legislative level what was already perceived by the previous reforms, so that the countryside was considered as a land suitable for exploitation without any rule to limit the natural resource extraction. The urban centres became the principal actors for economic and technological development with a beginning focus on environmental issues, since the influence of the Brundtland Report, introduced in 1987, had implemented sustainable actions in the policies and development proposals in Sweden. **The forest and agricultural sectors were not seen as a part of the territory worthy of a specific development programme, but only of regional or national policies, and entirely separated from the urban areas** (Björling 2023; Persson 2013). The only empirical law was grounded on the concept of "freedom-under-responsibility", without guaranteeing the right protection of the natural environment and biodiversity. At the same time, other types of planning documents, that are not mandatory, have been submitted to fulfil the municipal strategies, such as the In-depth Comprehensive Plan (IPC), called also local plan or detailed development plan, which is done in a specific area of a city where there is a project or a transformation of the land use, the Green Plan (GP) and the Nature Conservation Plan (NCP). Since the production is not compulsory, the plans are usually developed where there are more economic possibilities in the research programmes, so in the larger cities and the metropolitan municipalities. These planning documents, including the CP, only take into consideration the urban areas and are not legally binding but are used as guidelines (Hanson and Olsson 2023; Persson 2013).

In the early 1990s, another economic crisis affected Sweden. The entrance into the

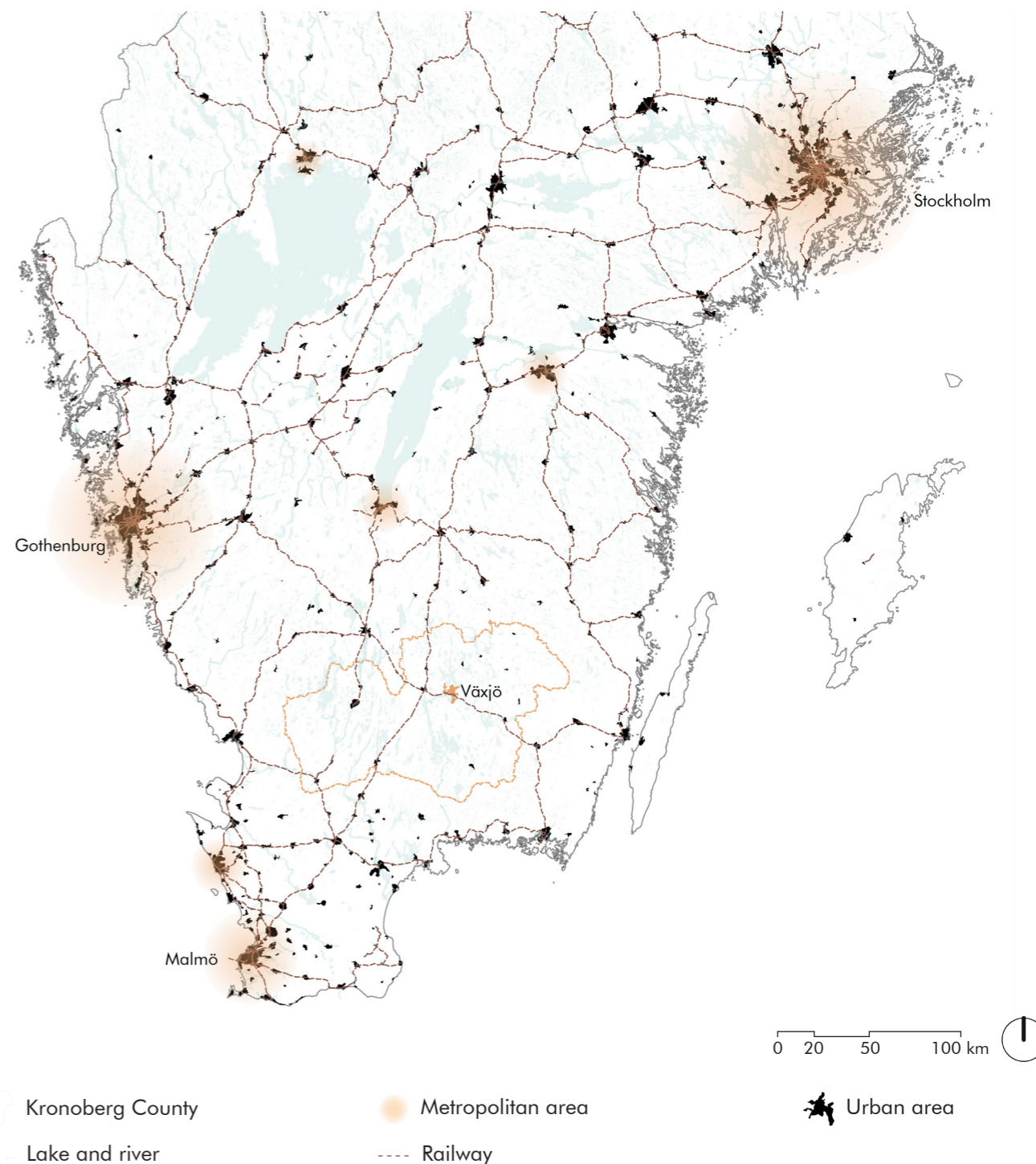


Figure 7: Metropolitan areas and intermediate territories of south Sweden (Source: self-elaboration by the author)

European Union in 1994 helped overcome the emergency and let Sweden keep growing its service economy and implementing international business connections with a more liberal market condition. The public administration accepted the opportunity and facilitated the regional enlargement and the development of metropolitan areas, moreover their attraction, especially around the three main centres (Stockholm, Gothenburg and Malmö) in the south of the State, making these territories the most technologically advanced and with the highest quality of life in the whole country, based on the data from the Swedish agency for economic and regional growth. Especially the fringe areas between the densely urbanised centres and the countryside have a mixture of characteristics of both territory categories, such as accessibility to big labour markets and large spatial voids that permit enlarging the housing market. The rural areas also combine the advantages of cultural and commercial facilities and the benefits of rural life due to the proximity to natural environments and recreational areas (Björling 2023).

So, what is the actual condition of the intermediate territory in Sweden?

The vision of the rural areas among the Swedish population is stereotyped. It is perceived as an idyllic space for recreational activities and relaxing from the vibrant urban lifestyle, without considering the industrial exploitation of natural resources or looking at it as a sustainable process. The reality is quite different: the communities and the inhabitants in the intermediate territories suffer from a lack of consideration in the majority of the municipalities from the economic and development point of view, but also, historically, the cities were seen as the centre of the progress and evolution of the society (Björling 2023).

However, in the last few years, a few rural-urban communities have tried to discover new opportunities for themselves, reshaping their possibilities for development with both public and private actors. These actions are creating alternatives to the city's polarization and attraction through community-based methods and participatory processes (Björling 2023).

A few examples of this typology of organisation can be found in Uddebo and Röstånga. The first case is in the Tranemo municipality in Västergötland; the rural village encountered difficulties after the closure of the textile factory in 2012. The drop in the house cost attracted new residents from the nearby cities. Without the industrial development core, the community found different chances starting with the renovation of the dismissed area converting it into a culture house, a playground, a community garden and a few homes. Similarly, the Röstånga example in Svalöv municipality in Skåne shows how the inhabitants have the possibility to create community development companies to realise common projects in their territory (Åkerman 2020).

The decision-making procedures were not intended to replace public governance, but to make new proposals using the community needs as a starting point. The construction of public buildings or services and the use or maintenance of public areas are necessary to improve the quality of life and welfare in small villages and the environmental impact on the local ecosystems.



Figure 8: Aerial view of an intermediate territory and the city of Växjö (Source: Växjö kommun; photo by Anders Bergön 2019)

02

“THE EUROPEAN GREENEST CITY” AS A CASE STUDY

02.1 Becoming a sustainable city

Talking about the development issues, the abandonment of policies and policymakers and the scarce level of sustainability and energy efficiency, some exceptions go against the ordinary of the intermediate territory. One of these examples is the city of Växjö. The name of the settlement came from the Swedish words *väg*, which means “street”, and *sjö*, “lake”, referring to the numerous lakes that surround the urban area, such as Växjösjön, Trummen, Helgasjön, Norra Bergundasjön and Södra Bergundasjön.

The city in the Småland region has emerged in the last two decades as one of the most sustainable cities in the world and the most sustainable city in Europe. Environmental local policies, energy efficiency and green programs let Växjö receive several international awards, such as the *Local Initiatives Award for Excellence in Atmospheric Protection*, the *Sustainable Energy Europe Award* and the *Union of Baltic Cities Environmental Award*. Data and statistics confirm the work done by the municipality in environmentally sustainable actions and programs and it explains the results and the awards obtained: from 1993 the carbon dioxide emissions per capita were reduced by 34 percent in 2009 and by 47 percent in 2013 (Andersson and James 2018) [Figure 9].

Due to its importance and relevance at the local, national and international levels, the municipality policymakers host and participate in conventions and conferences around the world to show their methods and programs. Besides, representatives from Växjö and the municipality itself are active members of international policy networks whereby Energy-Cities, Covenant of Mayors, Union of Baltic Cities and ICLEI (International Council for Local Environmental Initiatives) (Andersson and James 2018).

The history and the evolution of sustainability in Växjö started before the municipality’s declaration to be fossil fuel-free by 2030 in 1996 (Andersson and James 2018). At that time, this revolutionary statement placed Växjö in the “Olympus” of around 20 cities, which included a sustainable and environmental policy in their development programs. The city passed through different phases of policies, strategies and methods, such as degrowth, energy democracy, policy tourism and place branding, to reach and improve local sustainability.

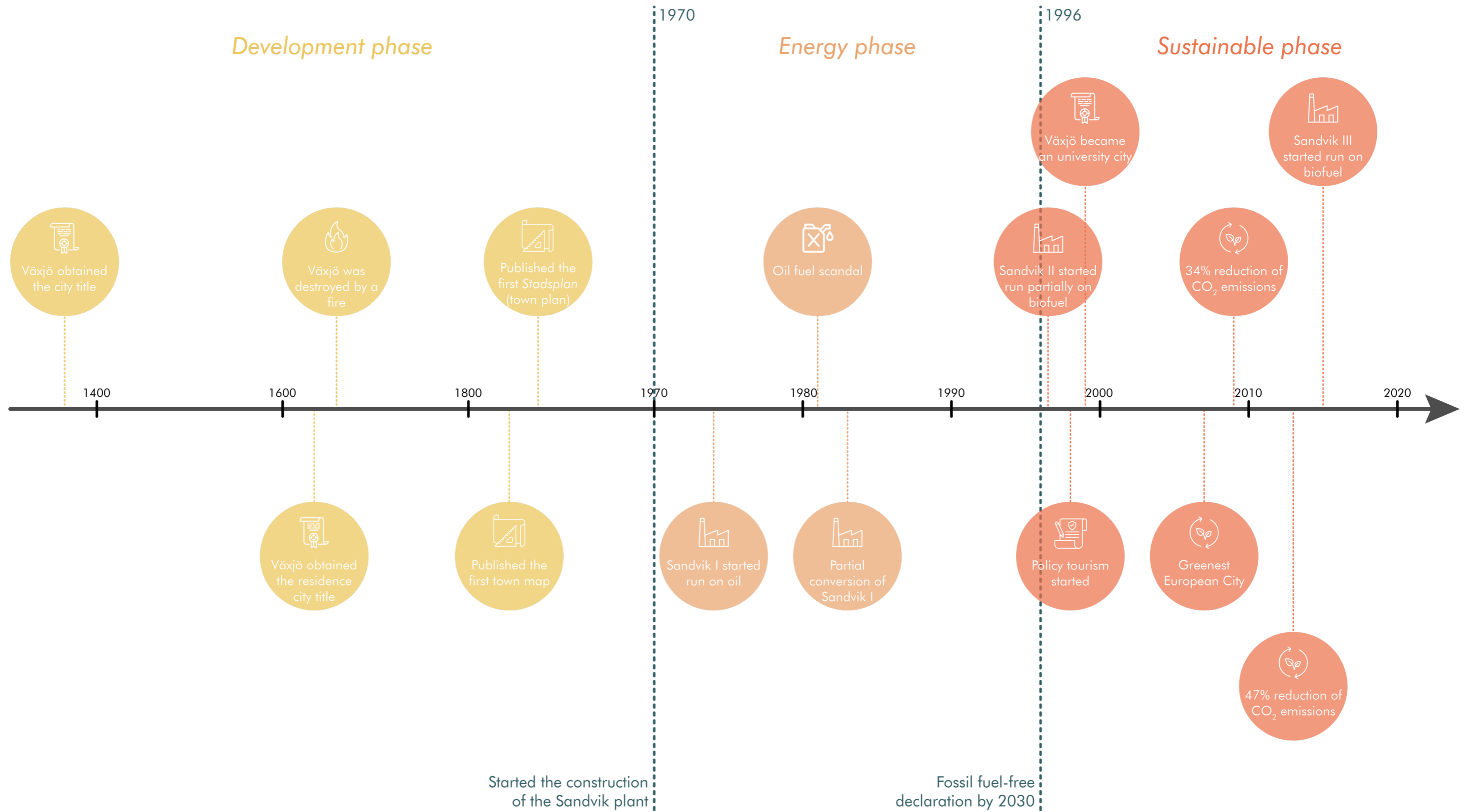


Figure 9: Timeline of the evolution of Växjö becoming a sustainable city

Before 1970

The origin of the city of Växjö can be found in the Middle Ages during the Viking era. Already in the XI century, there were some traces of the first settlement (www.vaxjo.se).

The agglomeration's growth was difficult at the beginning of the Swedish monarchy since it was situated on the border with the Danish realm and was affected by numerous conflicts. Nevertheless, in 1342 King Magnus Ericsson gave the right to become a stad, so a city, due to the population expansion exceeding the 200 inhabitants' barrier (ibidem).

The Union of Kalmar in which the three main powers of Scandinavia facilitated the development of Växjö owing to its position as a passage between the opposite coast in the trade and communication paths (Hall 1991). The growth process did not stop also after the dissolution of the alliance in the XVI century till the reaching the assignment of a residence city in the following century, more precisely in 1634 (www.vaxjo.se).

The city's exact urban area and planning procedures were tough to study and understand due to the absence of graphical plans and physical traces since the original buildings are not present anymore. However, the probability of a planning existence was very low, but any marks confirm this hypothesis at the same time (Hall 1991). The majority of wood construction was the main cause of town fires: almost one time every hundred years this event happened, with the most dangerous blaze registered in 1658 (www.vaxjo.se). The usual reconstruction process did not follow any plan and sporadically the buildings were erected in the same organisation as before the destruction (Hall 1991).

Starting from the XVIII century, the planning process became more common for constructing a new agglomeration or reorganising a town after a fire. However, it was necessary to wait until 1844 for the first urban plan for the city of Växjö, at the time was called Wexiöstad, since in 1828 the Riksdag approved a law that forbade the redevelopment without the approval of the city plan by the government and due to the last burning episode in 1843 (Hall 1991; www.vaxjo.se). As common practice at the time, the plan is characterised by a sort of "Renaissance" inspiration, even if the results were not at all comparable: the streets are right-angled creating a grid with rectangular blocks and the subdivision in lots. The organisation did not consider the land features and the topography (Hall 1991). A difference from the usual plans in contemporary Sweden is the presence of the buildings (coloured in red) that did not burn, probably because they were made of bricks or stones and not wood. Those constructions are at the border of the projected agglomeration and broke the regularity of the gridiron. By analysing the image, it is possible to observe the small extension of Växjö, compared to today's development, although it gained the terminology of "city" in the XIV century, roughly four hundred years before.

The Building Ordinance of 1874 made drafting a *stadsplan* binding for all cities. The town plan introduced, one year later in 1875, with this law differed from the previous version mainly for two reasons. Firstly, there is a difference between public areas, such as streets and squares, and private properties; furthermore, it presents the division between private and public buildings (highlighted in red). The second difference is the light-coloured area that represents the future development of the urban space. The organisational structure of the territory was basically the same as the foregoing plan, as well for the expansion: the rigid network of streets and blocks remained intact but new planning elements, that were used in Sweden Starting from the second half of the XIX century, were introduced to develop the city growth (Hall 1991; www.vaxjo.se). The design of parks and squares created healthier public areas in which the population was able to meet and these supported the evolution of the trades and commercialisation of products. However, the most important component implemented was the *Esplanaden* (coming from the French "esplanade"): it is a



Figure 10: Map of the city of Växjö in 1844 (Source: Växjö kommun)



Figure 11: Map of the city of Växjö in 1875 (Source: Växjö kommun)

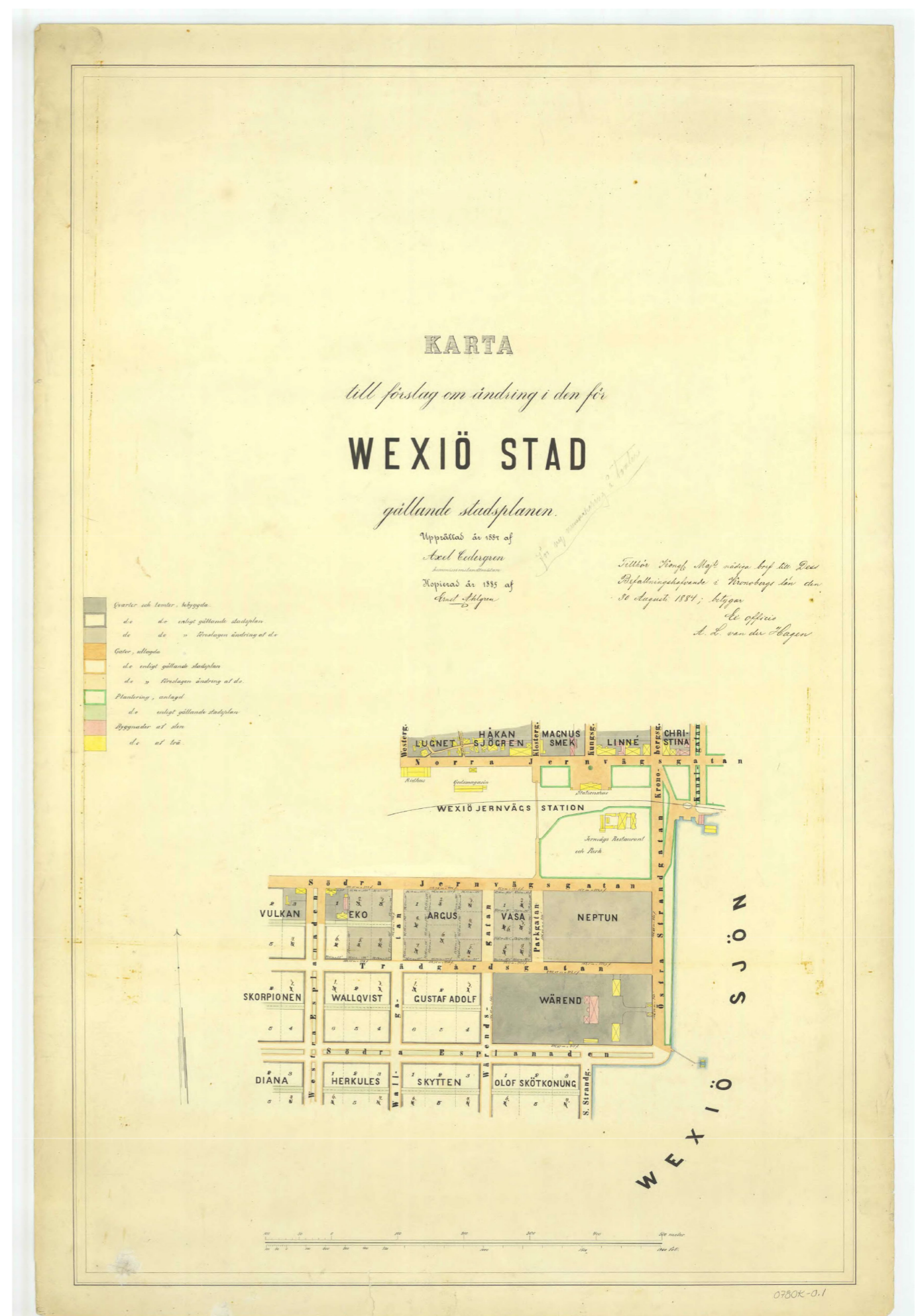


Figure 12: Modification of the stadsplan of the city of Växjö in 1884 (Source: Växjö kommun)



Figure 13: Model of the city of Växjö of 1902 (Source: Utvandrarernas Hus; photo by the author 2024)

The intermediate condition



Figure 14: Representation of the fire in Växjö in 1843 (Source: Utvandrarernas Hus; photo by the author 2024)



Figure 15: Kristinebergs bryggeri (Kristineberg's brewery), Växjö, ca 1900 (Source: Utvandrarernas Hus; photo by the author 2024)

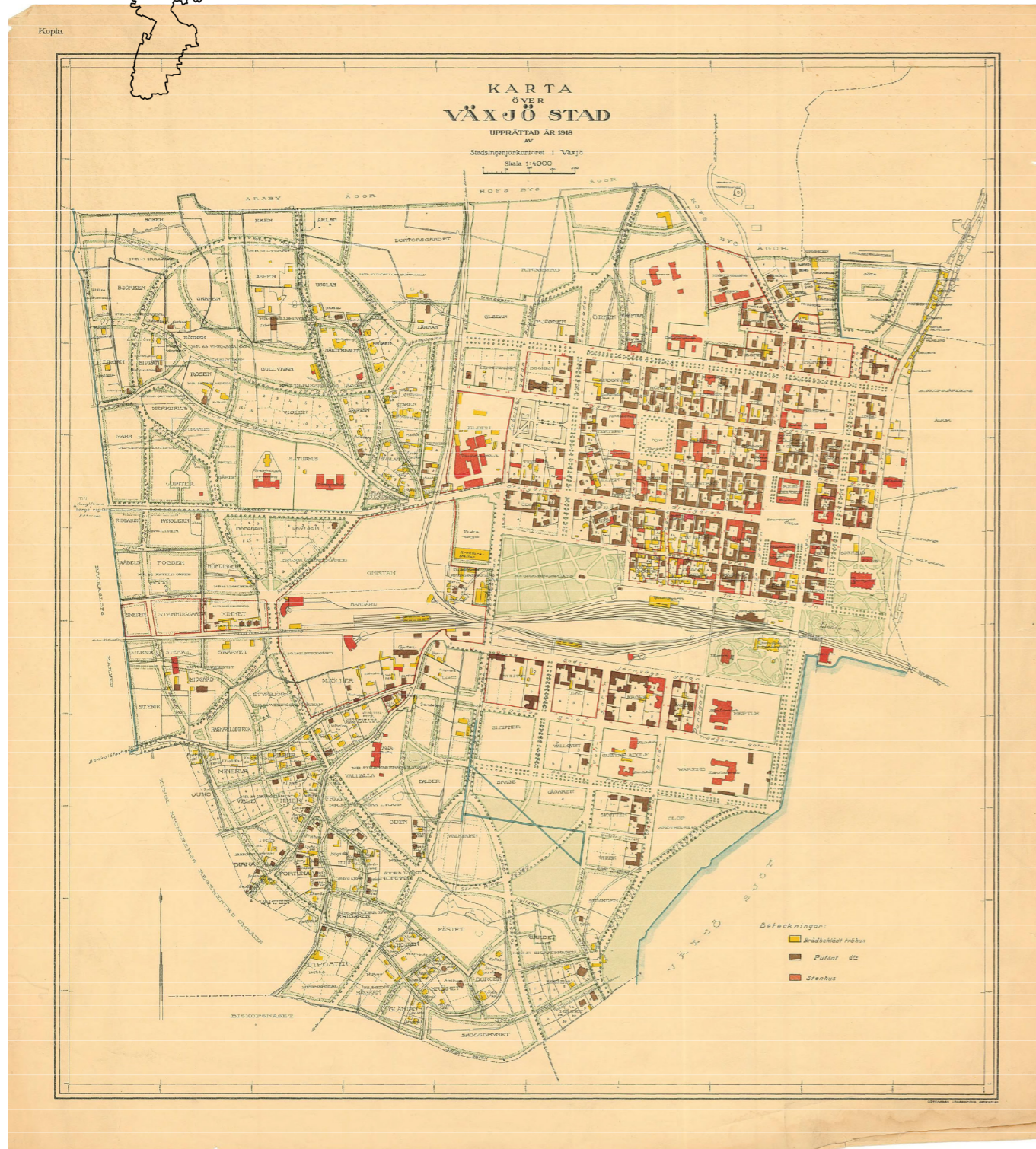
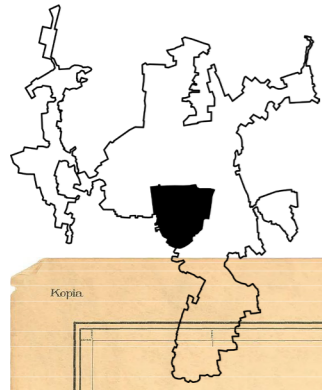


Figure 16: Map of the city of Växjö in 1918 (Source: Växjö kommun)

wider road in which rows of trees are in the middle or at the sides. The function was to sectorise portions of the town to block the expansion of eventual fires. The insertion of esplanades in urban development was a guideline of the Planning Act, but, at the same time, the ordinance of 1874 could not be considered a complete planning law since the plans that were created did not include norms and directives about limits of the building design (Hall 1991).

A notable element added in Växjö was the train station. The railway development in Sweden started in the second half of the XIX century and had its first milestone in 1862 with the West Main Railroad Line opening that connected Stockholm with Gothenburg (Utvandrarnas Hus). Along with this, new implementations of the railways were constructed, among which the one that linked the east coast, so Stockholm and Kalmar, with the south, Malmö, passing through Växjö. Facilitating and speeding up mobility helped migration from the countryside to the city, so it needed new residential buildings to receive the inhabitants. For this reason, almost a decade later in 1884, an adjustment of the previous stadsplan was needed to remove an area assigned as a park in the southern part of Växjö to increase the space for construction (www.vaxjo.se).

At the beginning of the XX century, a new school of thinking about urban development was flourishing in Sweden. It differs from the Renaissance inspiration for the more freedom in the street network composition and the less strict block geometry. The neighbourhood expansion was made following the topography of the land pointing to the landscape aesthetics as an objective. This typology, on the contrary to the previous plan's ideology in which the multi-storey construction development was favourable like in the existing historical centre, is easier to adapt to small-scale buildings and terraced or semi-detached houses with back and front gardens for the residential areas and not the construction of blocks of apartments or tall structures in general; even so, the most common building category was the villas and the detached houses. Additionally, the sinuous form of the blocks was favourable for the development of green public spaces, like parks, increasing the quality of life in the neighbourhood and the health of the citizens (Hall 1991).

In the same period of time, the migration flux grew and the urban area of Växjö was not able to receive the whole new population, therefore a portion of the incomers established outside of the border of the city where there was not necessary ask for a permit to the municipality to construct. This created a problem with unplanned territory out of the city border in which there were no security and sanitary systems in the houses and the public areas. To take care of the issue, the solution of the municipality was to enlarge the urban areas under control incorporating the nearby buildings and the urbanisation infrastructures (Hall 1991).

In the case of Växjö, this happened with the new plan proposed in 1918: it expanded the limits of the urban territory, especially in the south and west parts of the city. The right-angled road system was not functional since unplanned constructions were without a defined street network (www.vaxjo.se). For the first time in Växjö, the connections were made more naturally and practically following the existing building and the land profile, the functionality replaced the rigidity of the planning system. The analysis phase was more complex and durable in this concept since studying the terrain required awareness before the design step. Also, another implementation was made in this plan: the Building and Planning Act of 1907 introduced the mandatory development by the policy-makers of instructions about the materials, the reuse and the maintenance of the new and existing buildings (Hall 1991). The feature added is visible on Växjö's masterplan with the division of the existing constructions into three different categories: the clapboarded wooden houses (yellow), the plastered wooden houses (brown) and the stone houses (red).

In 1940, another plan was made by the municipality to increase the urban area and control the expansions of a sports centre and offices on the west and, mainly, a residential neighbourhood on the east side of Växjö (www.vaxjo.se). The

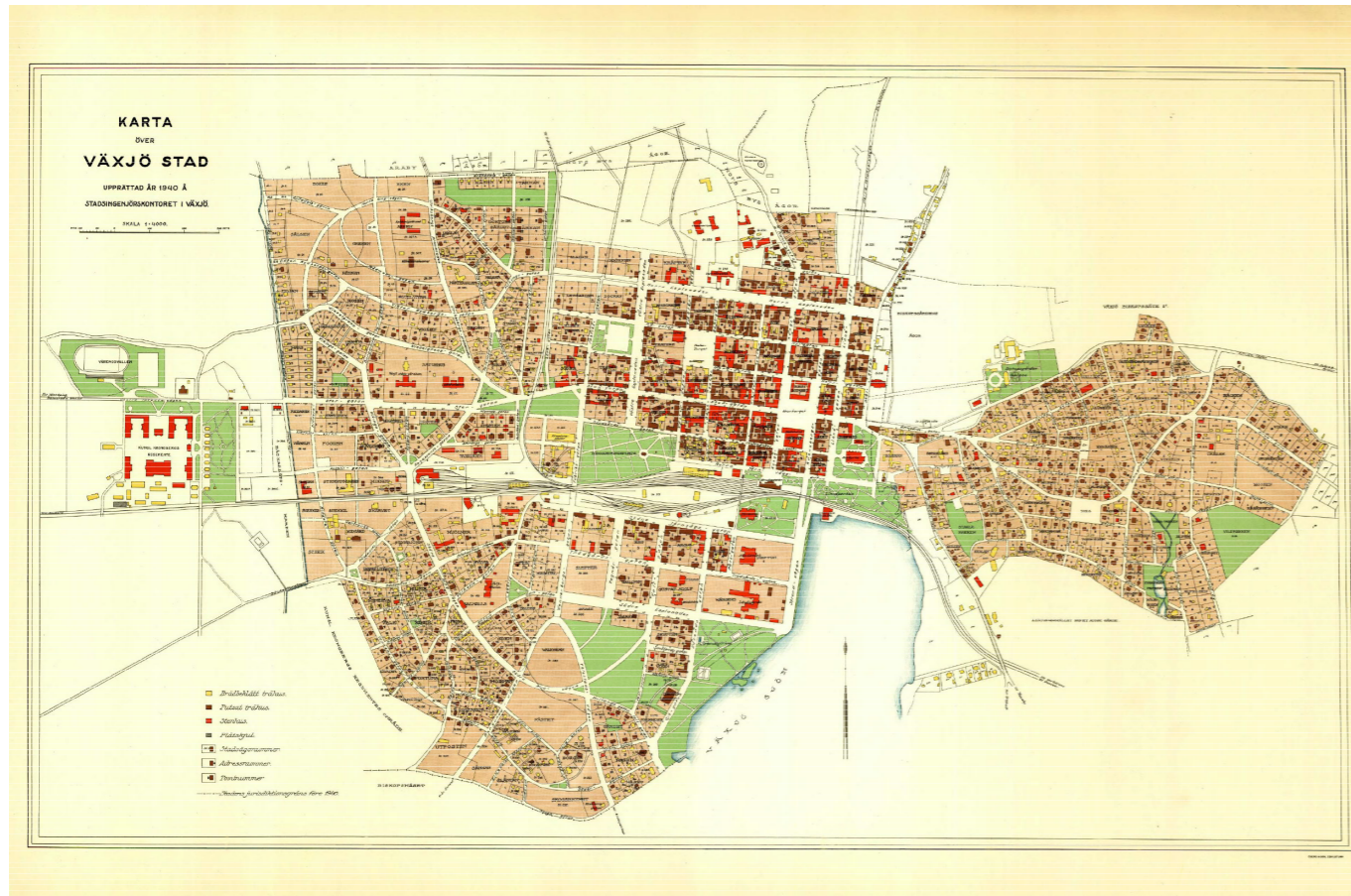
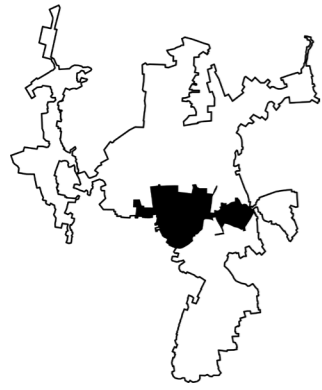


Figure 17: Map of the city of Växjö in 1940 (Source: Växjö kommun)

division of the buildings based on the construction materials was still in use. The recommendation of the National and local authorities was to implement stones or bricks as principal building materials to reduce the risk of fires (Hall 1991). For the most part of inhabitants was difficult due to the higher cost of the raw materials and because those were not as easily found locally as wood. Instead, the public properties and always more city centre structures were converted into stone constructions due to the financial availability of the municipality and the landlords that usually were living in the central area of Växjö.

The factories were already developed in the main cities of Sweden, as well as in Växjö since it was the capital of the Kronoberg County and the biggest densely urbanised area of the territory. However, at the time there was a common thinking that the industrial areas did not need a planning system to control and regulate them, so they were not included in the urban area of the stadsplan.

In 1947, the Building and Planning Act was modified another time and the details requested for the town plans were higher and stricter. This means that the municipalities were almost forced to reorganise and manage a new stadsplan if the parameters of the current city plan were not sufficient for the new law (Hall 1991). Växjö was part of this group of urban areas that required an update of the urban plan. In 1948 it was published and there were not many differences from the previous plan, but a few interesting elements were added (www.vaxjo.se). The first thing that stands out from the previous plan is no longer the subdivision of the buildings based on the construction materials but on planned blocks (coloured in orange) and the unplanned areas (yellow). The plan became more general and it was flanked by more specific detailed plans in which, in the case of a project, were explained the rules and the limits of the construction possibilities. In these areas, a more elaborate distinction could be made. The white areas with an orange border in the urban space are the development neighbourhoods in which the buildings are under construction and are not completed; these are concentrated in the north-west part of the city where the factories were establishing and in the east and south portion in which the residential areas were expanding. On the other side, in the unplanned territory, further lotting of the land was made to forestall future population growth since there was a lack of houses in the densely urbanised areas and the risk of unruly residential structures was very high as well as the following urbanisation cost of the municipality. Another element that changed from the plan of 1918 is the use of the colour red: in the previous map, it defined the stone buildings, instead in the 1940 stadsplan the construction highlighted represented public buildings and other facilities of general interest, such as churches and the theatre.

The planning system was not focused only on the building sector, the policymakers in Växjö had as a goal the quality of the public spaces, so the development of residential or industrial zones was mixed with existing or proposed parks and green areas.

A further town plan was developed close in time to the antecedent due to expansion reasons. The ongoing zones were already filled in the first half of the 1950s and the preparation of other expansion neighbourhoods was needed. In 1954, the new stadsplan was produced by the Växjö municipality (www.vaxjo.se). As in the preceding cases, the main change was the organisation of the latest development areas concentrated mainly in the northern and eastern parts of Växjö. Starting from this plan, the industrial zones, the violet-coloured blocks, became integrated into the urban borders, thus the regulations were implemented with sector-specific limits, materials and activity norms.

Following the mid-XX century, no more plans were made until 1987 with a new act and the introduction of the comprehensive plan as a tool for planning development. Nevertheless, other kinds of documentation could be useful to understand the evolution of the city during the last decades. An example, directly proposed by the

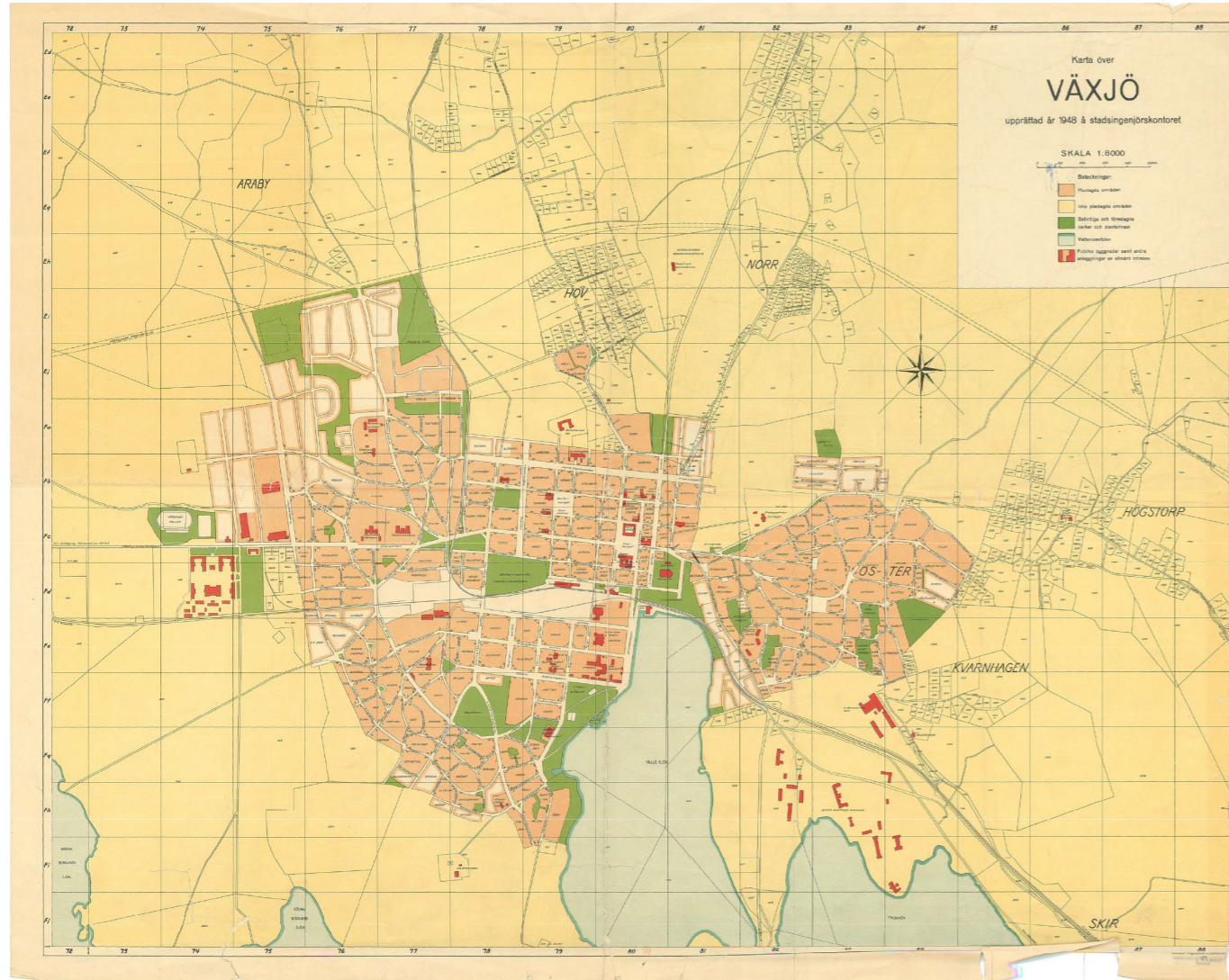
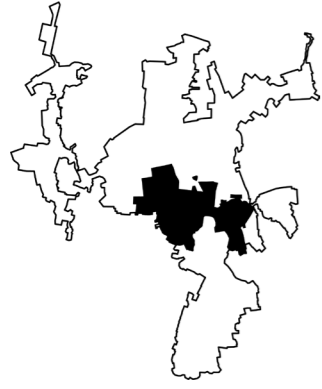


Figure 18: Map of the city of Växjö in 1948 (Source: Växjö kommun)

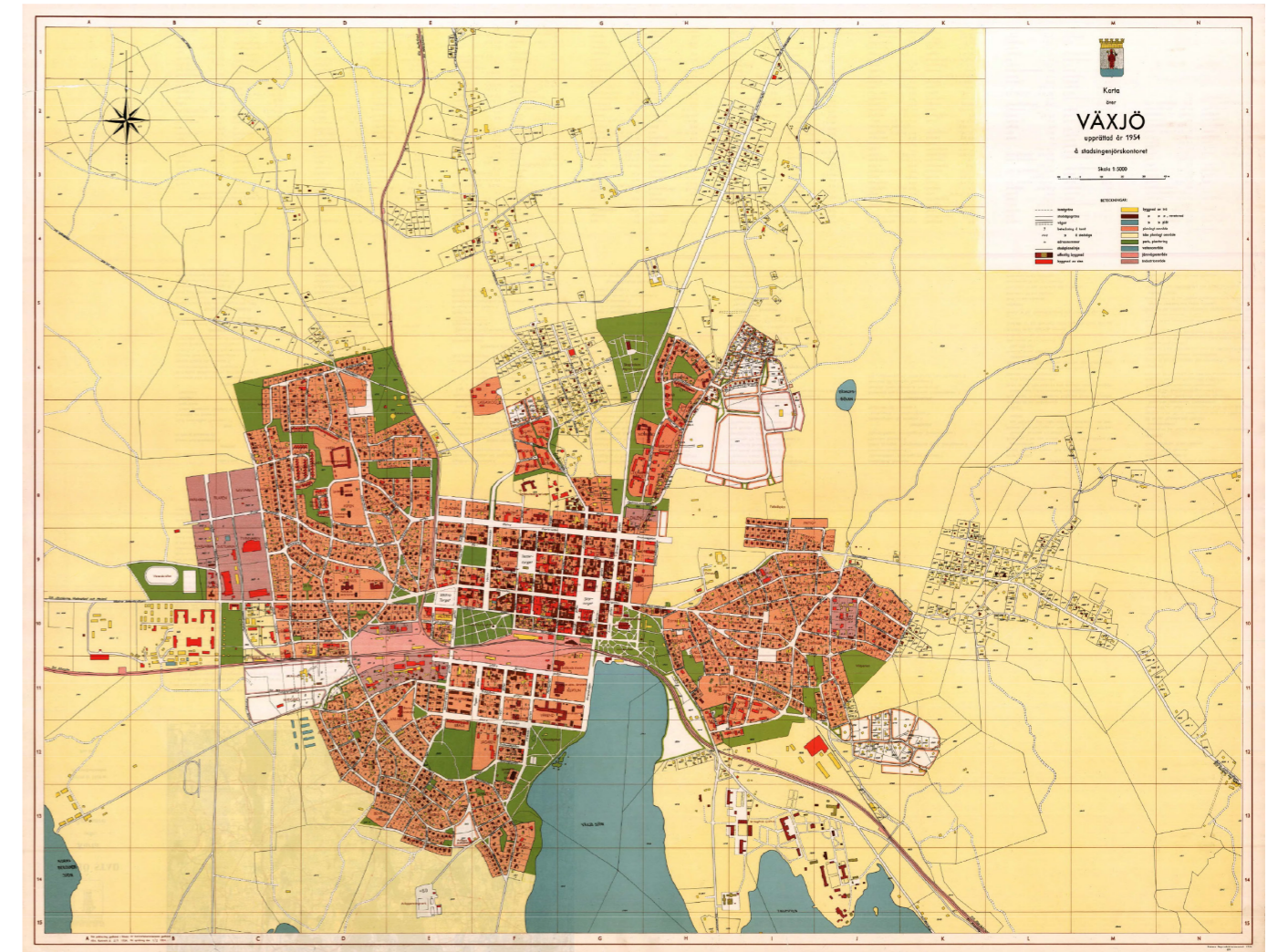
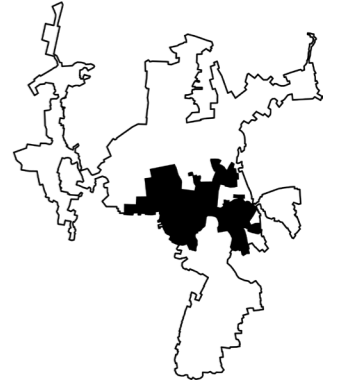


Figure 19: Map of the city of Växjö in 1954 (Source: Växjö kommun)

site of Växjö municipality (www.vaxjo.se), is the tourist map, even if is not as detailed as the *stadsplan*, a few pieces of information can be extracted.

The first one that was found was dated 1965 (*ibidem*) and showed three foremost developments: on the west side the industrial area increased in size and importance in the economic balance of the city; in the northern and eastern parts there were completed the construction of two more residential neighbourhoods, Höv and Högstorp.

In the plan, the municipality properties and the public interest buildings are highlighted, without any ordinance purpose, but to share the most important constructions in the city.

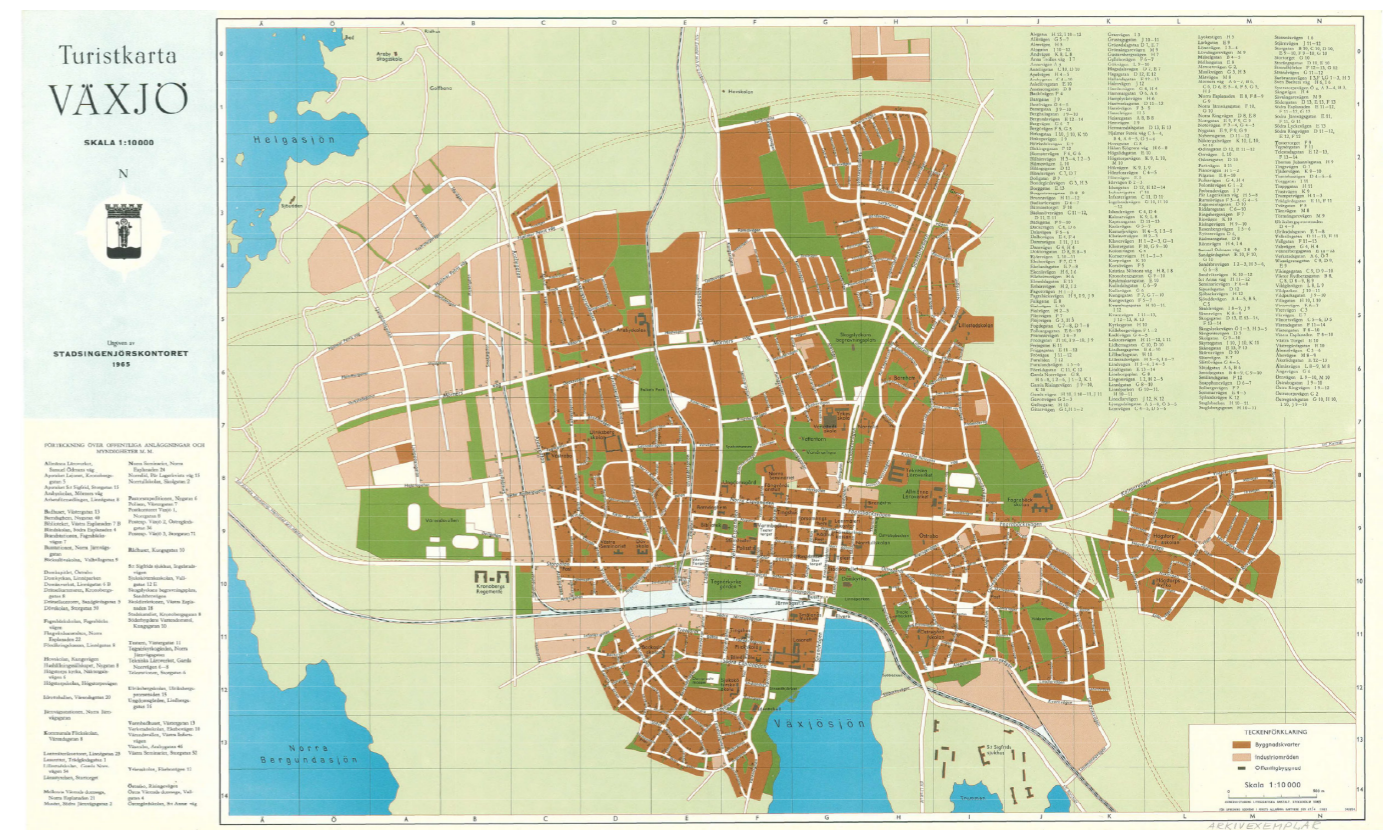
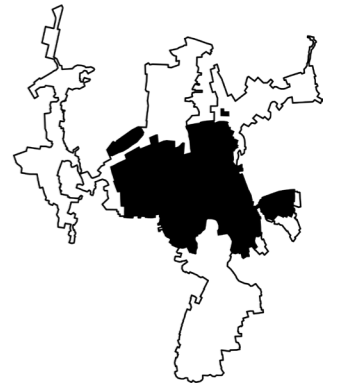


Figure 20: Tourist map of the city of Växjö in 1965 (Source: Växjö kommun)

1970s - 1990s

Starting from the 1970s, the historical sources, data and research were more frequent and detailed due to the sustainable evolution of Växjö and its importance as a guide to further environmental development and studies around the world. This made possible a more complete analysis of the growth and policies adopted by the municipality connected to the urban, political and biological spheres sparse in the territory.

To continue the narration of the previous chapter, the investigation of the urban area had a new step in 1970 with another tourist map (www.vaxjo.se). It shows how the residential area was expanding in the southern portion of the city in the new neighbourhood of Teleborg. These house constructions were part of the "Million Homes Programme" promoted by the government to resolve the residential issue in Sweden. However, the most important element that is able to be extracted from the map is the representation of the ongoing development of the energy district, just north of Trummen Lake and on the side of Växjösjön Lake. This would be one of the central points of Växjö evolution and progress in environmental and ecological terms.

From 1970 to 1974 Växjö municipality decided to build a Combined Heat and Power plant (CHP), Sandvik, that started running on oil and the distribution net. The plant and the infrastructure are owned by VAEB (Växjö Energi Aktiebolag), a municipality-owned energy company, that is charged for producing and distributing heating directly to the citizens. Bixia, an electricity trading private company, controls and manages the plant's electricity distribution (Alarcón Ferrari and Chartier 2018). Some events in this decade bring the municipality of Växjö to the decision to a radical shift from fossil fuel to another source of energy. During the 1970s a world oil crisis caused a high rise in petrol costs (Alarcón Ferrari and Chartier 2018; Hall 1991). In 1980, research on air quality was conducted in Växjö; as a result, the pollution in the city and the surrounding lakes was at a very high level and the main emission of pollutants was the CHP plant. The combination of those two factors began the policymakers questioning the benefits of a centralised heat and power production system due to the worst conditions of the city. Still, in 1981 a local scandal of fraud happened in the city: 40.000 cubic meters of heating oil disappeared from Sandvik. This action brought the attention of the municipality to investments in alternative energy resources in the thermal power plant to reduce the costs and to be more independent from imports from outside the country (Alarcón Ferrari and Chartier 2018). So, the beginning of the financing for the reduction of carbon dioxide emissions in the city of Växjö was not only driven by environmental reasons, but especially by economic concerns.

Two years after the scandal in 1983, the public-owned thermal power plant was partially converted from only running on oil to using 80 percent wood chips and sawdust as biofuel and 20 percent oil. Sandvik was the first CHP plant converted to biofuel in Sweden. These natural materials are a by-product of the forest, wood and paper industry, flourishing in Kronoberg County which the city of Växjö is part of. The percentage of a tree that should be wasted, considering the branches and roots, is at least 25 percent of the plant (Alarcón Ferrari and Chartier 2018). So, implementing biomass for energy production in Växjö permitted the wastage of the forest industry to be reduced to the minimum. To maintain the chemical and biological balance, a Swedish law established that 50 percent of the ashes produced in the wood industries and thermal plants should return to the plantations to be used as nutrients for new trees and to oppose the acidification of the soil. The other half of the ashes should be used in the building industry as a component of ecological construction materials (Alarcón Ferrari and Chartier 2018).

The substitution of fuel used allowed the municipality to cut down the costs of raw materials and to use products that would be wasted. The wood used in the CHP

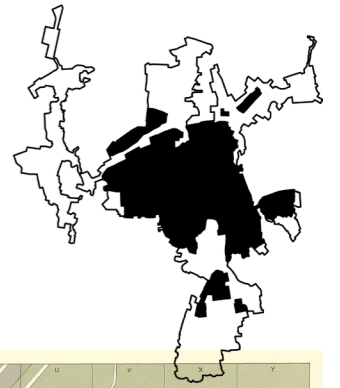


Figure 21: Tourist map of the city of Växjö in 1970 (Source: Växjö kommun)

plant all comes from the forests around Väjö and in the county, at a distance of no longer than 100 km away from the city: an important step through sustainability was also made to cut down the emissions produced by the transportation of the raw materials. Another result of this change was a more affordable price to sell the heat to the inhabitants and it was the first step to reach energy democracy in the city. Energy democracy, following the report written in 2013 by the Trade Union for Energy Democracy, is determined as follows:

[...] a decisive shift in power towards workers, communities and the public [...] implying a [...] transfer of resources, capital and infrastructure from private hands to a democratically controlled public sector [...]. (Sweeney 2013)

The definition argued in the report demonstrates some aspects that are necessary to follow and achieve a new energy system:

- a **stable, fair and more remunerative job** for workers;
- responding to **community needs**;
- finding new and more **environmentally sustainable methods** or implementing the existing ones to extract, produce, transport and use of the energy;
- **reduce greenhouse gas emissions** in all stages of extraction, work and use of energy;
- increasing **local, self-production and self-consumption** that can also lead to a reduction of the cost of energy.

To follow the input of this report, further research done by Kunze and Becker (2014) brought to the conclusion of four main principles to recognise an energy democracy project or process, especially in Europe:

1. a **public or community-based property** is necessary to maintain a low and fair selling price;
2. the **citizens or community participation** in the decision-making processes;
3. obtaining a **surplus** of the products and guaranteeing new jobs and employment in the territory;
4. the production and the products should have a **small environmental impact**.

Energy democracy is a part of the process of accomplishing degrowth and it is an alternative political approach that includes the efficiency of the production of energy and their technologies and wider social-economical aspects than energy democracy. This practice is shown as a sustainable alternative to capitalism, where the economy, production and consumerism growth are considered as the only factors to establish the development of a city or a country: rethinking the political and socio-economic paradigm in a more equal, fair and democratic way. The technologies and progress, in general, are seen in another context: the discovery or the development of these does not have the principal aim of profit, but the well-being of people and the sustainability aspects are the perspectives the researchers are looking at. Society also needs a radical change to embrace degrowth, so gender equality, a fairer distribution between work hours and free time and a different relation among the human and non-human spheres are necessary steps towards a new era of living.



Figure 22: Sandvik thermal and energy plant (Photo by the author 2024)

After 1990s

Sandvik plant demonstrates a great result as a technological and innovative system to mitigate the effects of climate change, carbon dioxide emissions and energy efficiency. A decentralised district produces the energy locally and this permits the reduction of thermal and electric energy dispersions during the transportation to the users rather than to a centralised plant system.

Moving forward a little in time, during the same year of the fossil fuel-free declaration of the Växjö municipality, the CHP plant expansion, Sandvik II, was finished. The thermal plant was improved rather than the first construction and it ran 95 percent on biofuels. About the energy efficiency and the renewable resources used in the new plant, the Swedish government gave Sandvik II a green electricity certificate in 2000 that lasted for 15 years (Alarcón Ferrari and Chartier 2018).

In 1998 Växjö municipality decided to start hosting policymakers and representatives from cities all around the world to show and let know about their actions and green programs. This practice is called policy tourism. It was used initially to promote and share what it was doing in the city and let other municipalities turn into green policies and climate actions. Policy tourism is described as:

[...] a set of activities such as conferences, fact-finding trips and walking tours where "best practices" are presented, discussed and, in some cases, experienced first-hand and up-close. (Cook et al. 2015)

Initially, the initiative and the policy tourism were completely public activities and were done with an altruistic idea of sharing knowledge.

At the same time, the municipality developed a place brand, "Dynamic Växjö". The reasons for this action were mainly to promote policy tourism, but also to catch the attention of visitors, new residents and business investments.

The concept of place branding refers to a variety of practices and tools used by political organisations and local governments to develop and market an image and set of values associated to their city, region or nation. (Andersson and James 2018)

Connected to the place branding strategy, a new concept was used by the city of Växjö to promote their works: policy boosterism. The theory was introduced in the research literature years later, in 2013, by McCann, who defined this idea as:

[...] a subset of traditional branding and marketing activities that involves the active promotion of locally developed and/or locally successful policies, programs, or practices across wider geographical fields as well as to broader communities of interested peers. (McCann 2013)

All the actions previously explained are advanced by political processes and are connected to each other. The policy tourism activity shows the presence of good policies in a city or a region. In the meanwhile, policy tourism helps to consolidate the image and the place brand of a territory by making it increasingly known and by developing business activities and investments.

To follow up on the investments and the actions done by Växjö, in 1999 it became a university city with Linnaeus University (Linnéuniversitetet), called Växjö University until 2010 when was joined with the University of Kalmar, as the most important institution (www.vaxjo.se). The improvement of the local research fields brought new possibilities as collaborations with the municipality and private sectors and factories guaranteeing the development of new solutions and tools for the progression to breaking down the emissions in the territory and protecting local natural ecosystems. The clear decision and the weight of the academic organisation into the municipality network and balance is notable as well in the map of the Kronoberg County capital of the year 2000 (ibidem). The expansion in the south part of the city was mainly advanced for the creation of the university campus: academic faculties, facilities and

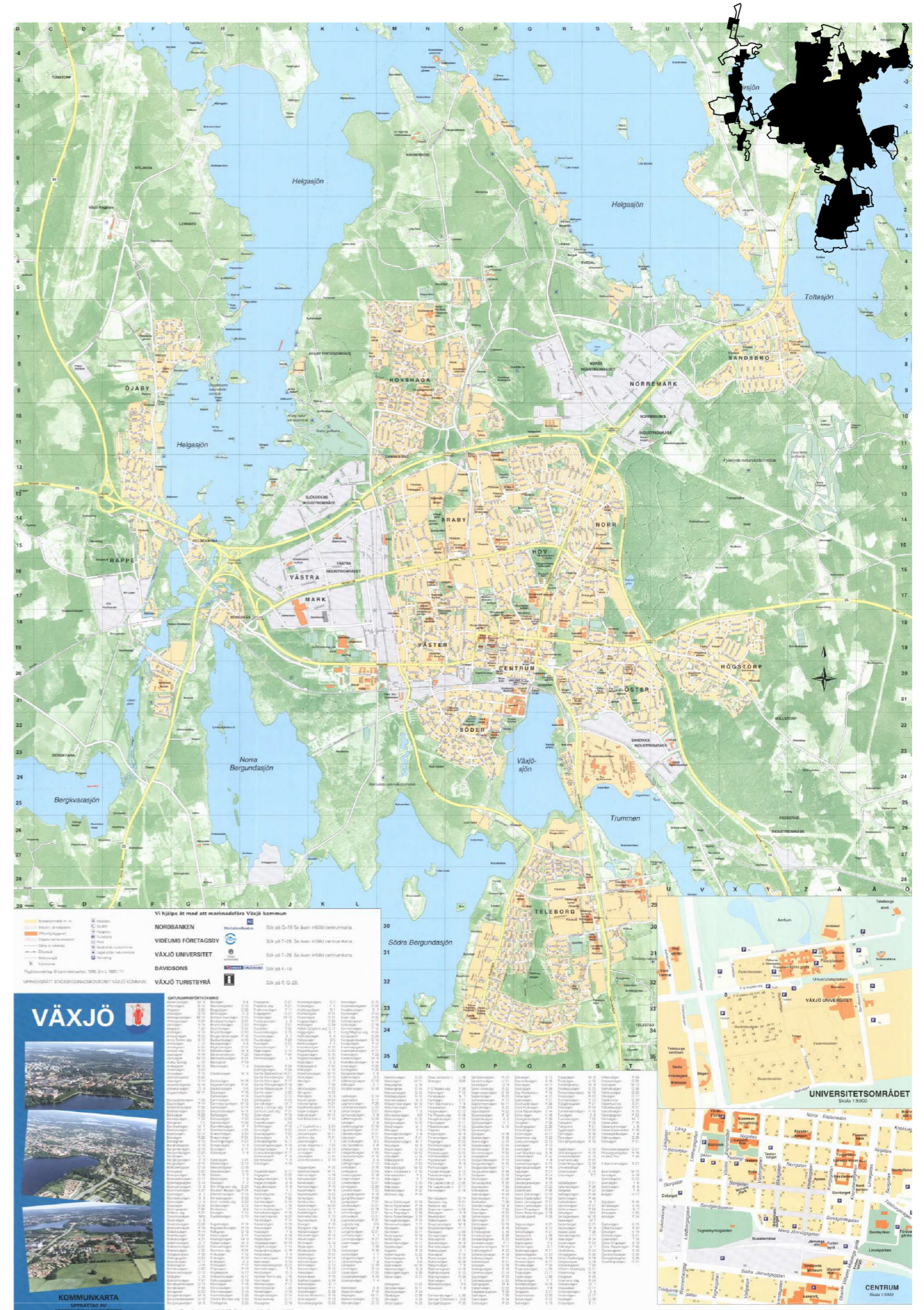


Figure 23: Tourist map of the city of Växjö in 2000 (Source: Växjö kommun)

research laboratories for the different departments were erected and surrounded by the student's residences, like creating a city in the city; this took the construction of markets and services, such as gyms and sports fields and courts, to complete the leisure time and lifestyle of the students. Since the thirty-year period from the last documents, the changes in the urban area compared to the 1970 map have been enormous. The residential and industrial zones were expanded mostly in the northern and western sides of the city. However, the other principal element that was added was the airport: the introduction of a longer mobility range close to the city made Växjö attractive from an economic point of view and for tourism, either policy or non-policy journeys.

Returning to the policy-making actions, in 2004, the local political leadership introduced the "International Policy for Växjö Municipality" which aims to facilitate international policy visits and tours and, as a consequence, to increase the investors in local businesses. This choice not only generated a benefit to the city's reputation for its environmental actions but also supported other private sectors to develop, such as the hotel industry, or to increase profit for local businesses taking advantage of tourism (Andersson and James 2018).

In the two following years, the Combined Heat and Power plant got some interventions to improve energy efficiency, such as the installation of an energy accumulator to reduce the use of oil during the heat and energy production phase, and to implement the services, start the cooling service during the summer season due to the introduction of an absorption technology in the thermal plant (Alarcón Ferrari and Chartier 2018).

In early 2007, BBC News made some TV reports and wrote articles about the city of Växjö, defining it as the "European greenest city". The municipality caught the opportunity the British television service proposed and used the slogan as a new official place brand. After these publications, the policy tourism groups increased significantly during the same year and became an international destination for researchers and policymakers who are studying sustainable urbanism and new concepts for environmental sustainability (Andersson and James 2018) [Figure 24].

To manage and organise the study tours better, in 2008, the policymakers recruited an international coordinator: a private organisation charged with expanding the policymakers and researchers pool interested in the study tours and managing the subscriptions and the fees from the visitors. In this way, study tours and policy tourism became more entrepreneurial: a private-public corporation began and one of the most important objectives was to meet new contacts and new international investments. As it is possible to see in Figure 25, the predominance of visitors in the study tours came from Europe and Asia. The intentions of Växjö were confirmed a year later when "International Strategies" replaced "International Policy for Växjö Municipality" as a city program in 2009. As said before, in the new program was highlighted that the main priorities of the Växjö policymakers were the study tours and the growth of local business investments through financing, especially from abroad (Andersson and James 2018).

The new strategy has set its objective to increase the percentage to 50 percent of people or groups involved in business activities who participate in study tours to have more possibility to reach a bigger number of contacts, investments and trade deals (Andersson and James 2018).

To follow the strategy and the goals proposed, in 2011 was established Sustainable Småland, an economic cooperative that had the aim to be the link between the public sphere and the local private sector during the study tours and to find outside funding for the development of local businesses. The association did not accomplish its work, even if the program and the activities done during the visits changed a little from the version before the institution of Sustainable Småland. The low participation and inclusion of private businesses in the study tours convinced the local entrepreneurs to rely on other forms of marketing their businesses. In fact, in 2012 the cooperative failed without closing a single investment agreement and the study tours management and organisation returned to the municipality (Andersson

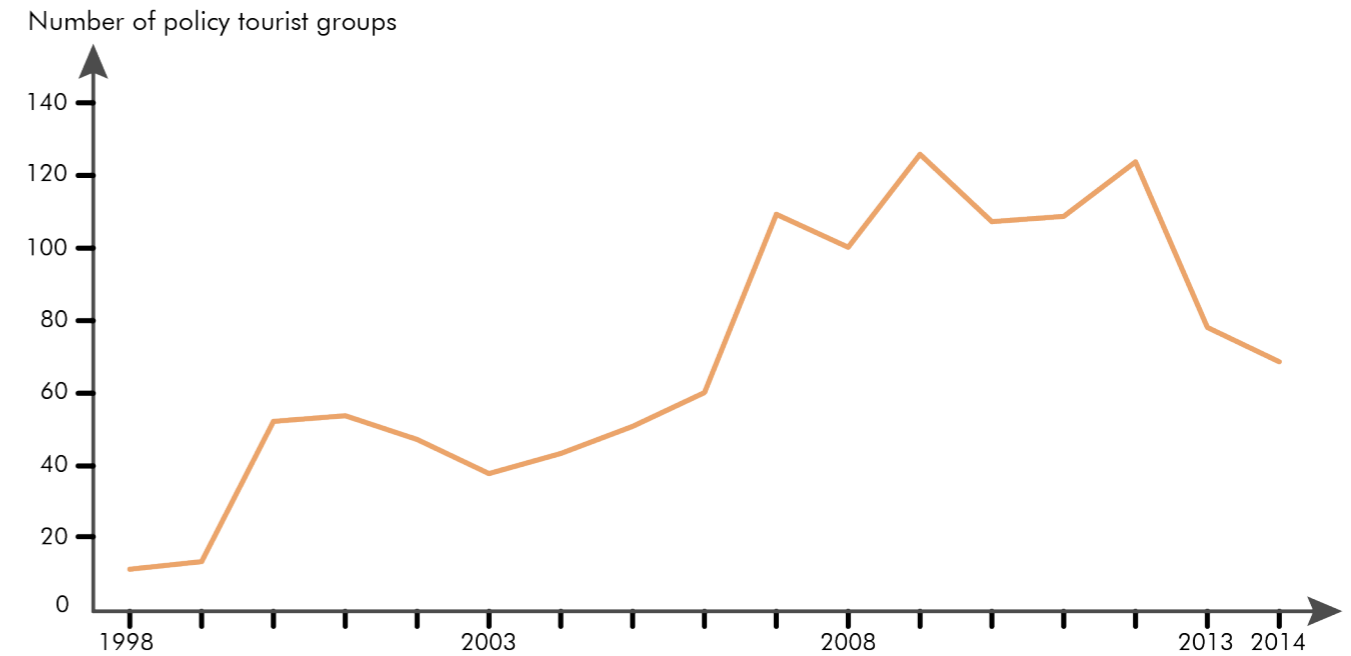


Figure 24: Number of groups visiting Växjö for environmental policy study tours 1998-2014 (Source: Växjö kommun 2014)

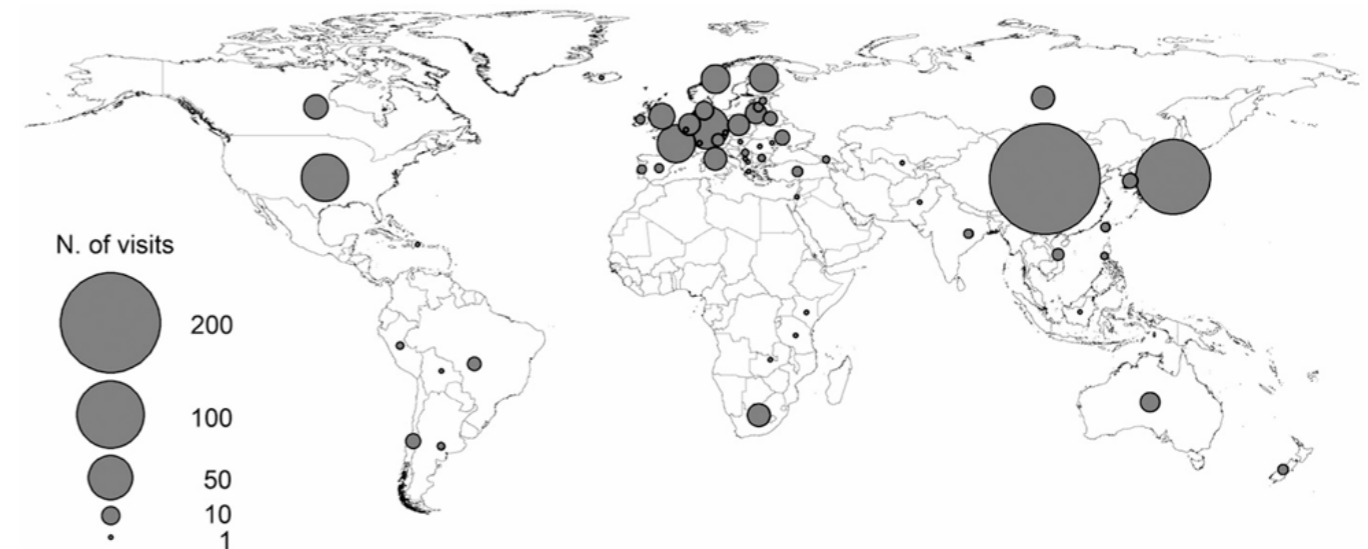


Figure 25: Number of study tour visitors to Växjö, by country, 2000-2014 (Source: Växjö kommun 2014)

and James 2018).

The recent failures of the commercialisation strategies caused a decreasing number of policy groups to take part in the study tours but also let the Växjö municipality think about their priorities and the future scenario of the city’s development. The “International Strategies” program was revised and a change of objectives was mandatory. The policymakers were focused on three main points:

- finding external funding for projects and business development;
- collaborating with other cities to share knowledge about sustainability and green programs;
- internal capacity building.

Also, the study tours were modified and the selection to participate was more controlled and with a restricted number of groups, as it is possible to see in the graph from *Figure 24*: the reason was to choose the people who interact with and with an interest in knowledge exchange. The aim was not only to explain what was done at an environmental and sustainable level but also to a participatory conversation and brainstorming where new ideas could emerge and problems could be solved. Workshops were introduced and these are based on particular environmental aspects affecting Växjö; the participants are asked to find solutions that the municipality can implement in their policies.

In 2015, the year of the expiration of the green electricity certificate of Sandvik II, was concluded the construction of the second expansion of the CHP plant, Sandvik III [*Figure 26*]. Fossil fuels were no longer needed, and the thermal power plant ran completely on biofuels. With these improvements and the clean electricity produced, Sandvik III obtained another green electricity certificate that guaranteed an economic return from the Swedish government of two-thirds of the investment done by the Växjö municipality. At that moment, Sandvik plants produced electricity power and cooling for 60 percent of the Växjö population and it covered 95 percent of the city’s heating needs (Alarcón Ferrari and Chartier 2018).

The energy democracy process for the public thermal power plant, following the principles of Kunze and Becker (2014), is not yet completed. To summarise, these points are:

1. public or community-based property;
2. citizens or community participation in decision-making;
3. surplus of the products and guaranteeing new jobs;
4. small environmental impact.

Still, many improvements have been made since the opening of Sandvik I in 1974. Almost all four points have been developed through the years, but some advancements are still needed.

Talking about the point 1, the property is completely public. The municipality owns the CHP plant and all the heating distribution network in the city. The weak element in this solid structure is the management of the electricity distribution network which is in charge of a private company called Bixia (Alarcón Ferrari and Chartier 2018).

For point 2, the party elected by the citizens is in charge of selecting the management and organisation structure of the VEAB. So, there is no direct participation of the inhabitants in the elections to designate the directive roles in the company, but there is an intermediate passage in the process (Alarcón Ferrari and Chartier 2018).

In point 3 argument, the evolution and the change of products from extracting energy assisted also the employment rate in public company: the workers are not limited specifically to the plant itself, but the majority is focused on forestry activities to harvest the biomass by-products; this progression created new jobs for the local community. In terms of sufficiency, the electricity is not enough to cover the necessities of the whole city, so some implementations from the national grid are still necessary with a higher environmental impact (Alarcón Ferrari and Chartier 2018).

Lastly, for point 4, the construction of the CHP plant of Sandvik, its energy efficiency and the policy tourism are not the only environmental actions done by the Växjö municipality to reduce the CO₂ emissions. The installation of a biogas production plant to have the possibility of replacing the fossil fuel buses with innovative ones



Figure 26: Sandvik thermal and energy plant (Photo by the author 2024)

run out of biogas, the urban expansion with the construction of low climate impact houses built using local wood structure, the submission of green space programs and bicycle planning, the implementation of waste and water management are some examples of environmental policies implemented during the years by the policymakers.

In the last decades, the urban development and the proposals of the municipality were directed to create a compact city and to densify the existing build-up areas avoiding the use of new soil for the urbanisation process. The densification of land use was and is still used in Sweden, as well as in Växjö, such a sustainable strategy to contrast population growth. The public actions and construction usually use high-scale buildings and blocks of apartments to maximise the possible insertion of the number of inhabitants with the reduced occupation of the territory. Linked to this idea, the perspective is used to contrast the uncoordinated constructions in the hinterlands outside the urban borders and to avoid the sprawl attitude of the population (Persson 2013). However, the local institution was not able to bind the urban sprawl due to the preference of the citizens to live in villas that use a much bigger portion of territory and to the lack of a formal regulation that blocks this kind of urban development.

One example of densification practice made in Växjö is the urban area expansion of "Välle Broar" [Figure 27], located in the southern part of the city. It was developed and built following the "International Policy for Växjö Municipality" introduced in 2004. Välle Broar neighbourhood is one of the biggest Sweden investments in high-rise wood construction and, at the same time, it is a long-term research project on the construction technologies and materials in collaboration with the Linnaeus University of Växjö and the wood organisation and factory Södra. The aim of the developing project was also to install low-carbon energy buildings with a low environmental impact (www.vaxjo.se).



Figure 27: Välle Broar neighbourhood (Photo by the author 2024)

02.2 The space of a sustainable city

To have a wider view of Växjö as a city and its connections with the territory, it is necessary to analyse the context in which it is suited. Växjö municipality is the capital of Kronoberg County and, as well, it is the biggest and the most populous urban settlement in the region (density of Växjö urban area 2.010,49 inhabitants/km²; density of Växjö territory 43,08 inhabitants/km²; density of Kronoberg County 21,94 inhabitants/km²). This administrative unit territory is situated in the inner part of the south of Sweden, in between the main three metropolitan agglomerations: Stockholm in the north-east, Gothenburg in the north-west and Malmö in the south-west.

The regional territory is predominantly hilly with planar areas in which the urban centres are developing. In particular, the Växjö historical area is built on a plan, but the surrounding residential areas in the northern and southern parts of the city were constructed on low-prominence land that shapes the interconnection between the artificial and natural landscape.

The absence of high pendency and peaks in the region guaranteed the presence

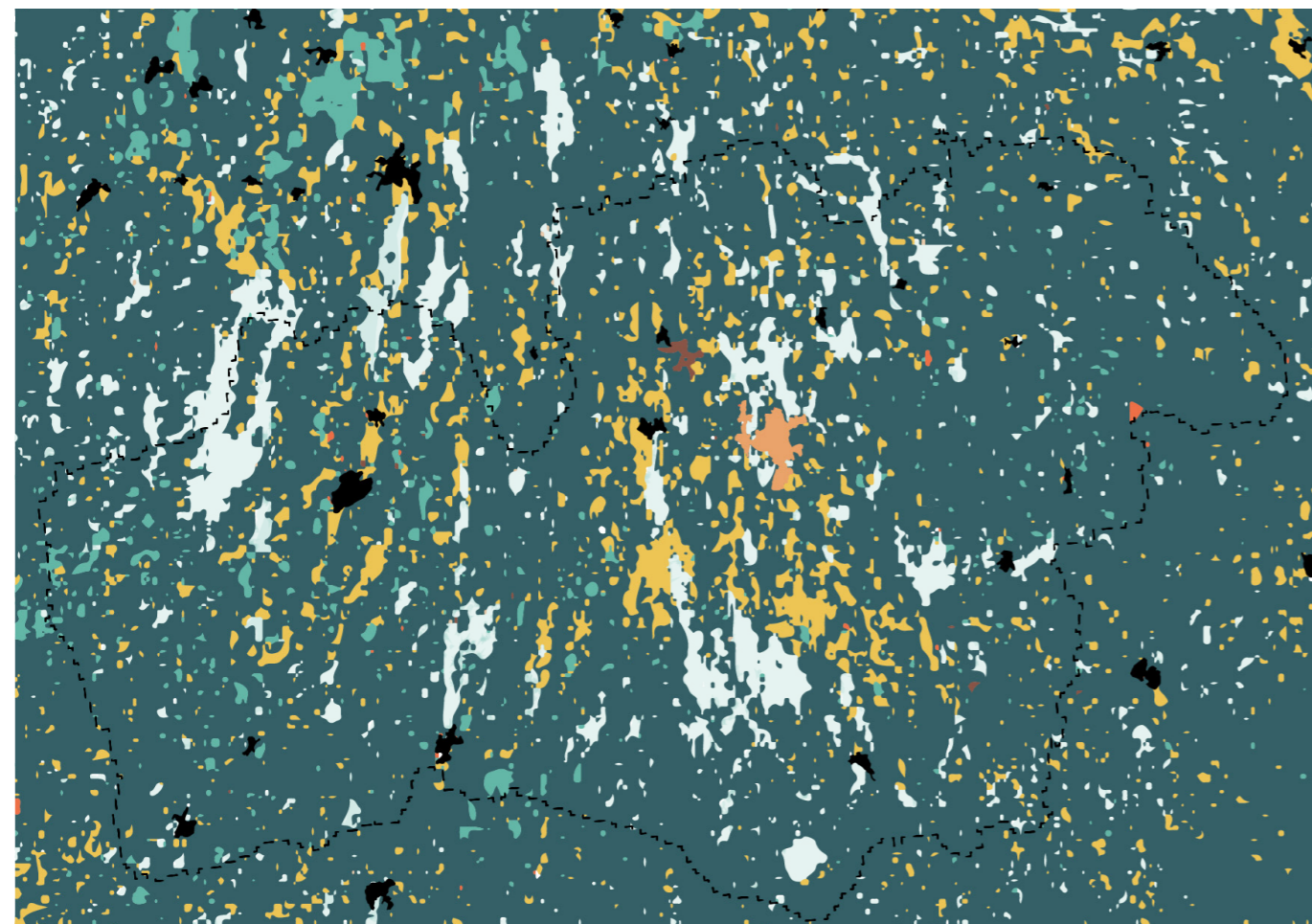


Figure 28: Land cover of the Kronoberg County in 2015 (Source: Global Forest Watch)

of numerous lakes, some with a large surface, becoming an essential element for the evolution of the local ecosystems. However, the forest is the most common biosphere covering the land. Since the vast extension, **the woodland has become fundamental for the economy of the county, due to the enormous quantity of natural resources that can be extracted from the forest, and it works as well for the whole country in general.** The industrialisation and the exploitation of wood are affecting almost every part of the landscape. Although, the plantation system in use in Sweden for more or less the last 150 or 200 years proposes a sustainable organisation that assures the regrowth of the forest with cycles of 60 or 80 years, depending on the typology of the trees (Interview Henrik Johansson 2024). In this way, there is no complete deforestation of an area reducing the negative impact on the local ecosystem and guaranteeing several environmental benefits in the same manner as the natural woodlands, a few examples could be the absorption of CO₂ improving the quality of the air and the protection from the soil erosion. However, almost the totality of forest owners usually preserve voluntarily a portion of their property excluding it from the cycles of cutting, but keep doing the maintenance works. The areas are open to the citizens and the local communities and are used such as the natural reserves for walking and supporting the well-being of the people (Interview Jon Malmqvist and Henrik Johansson 2024).

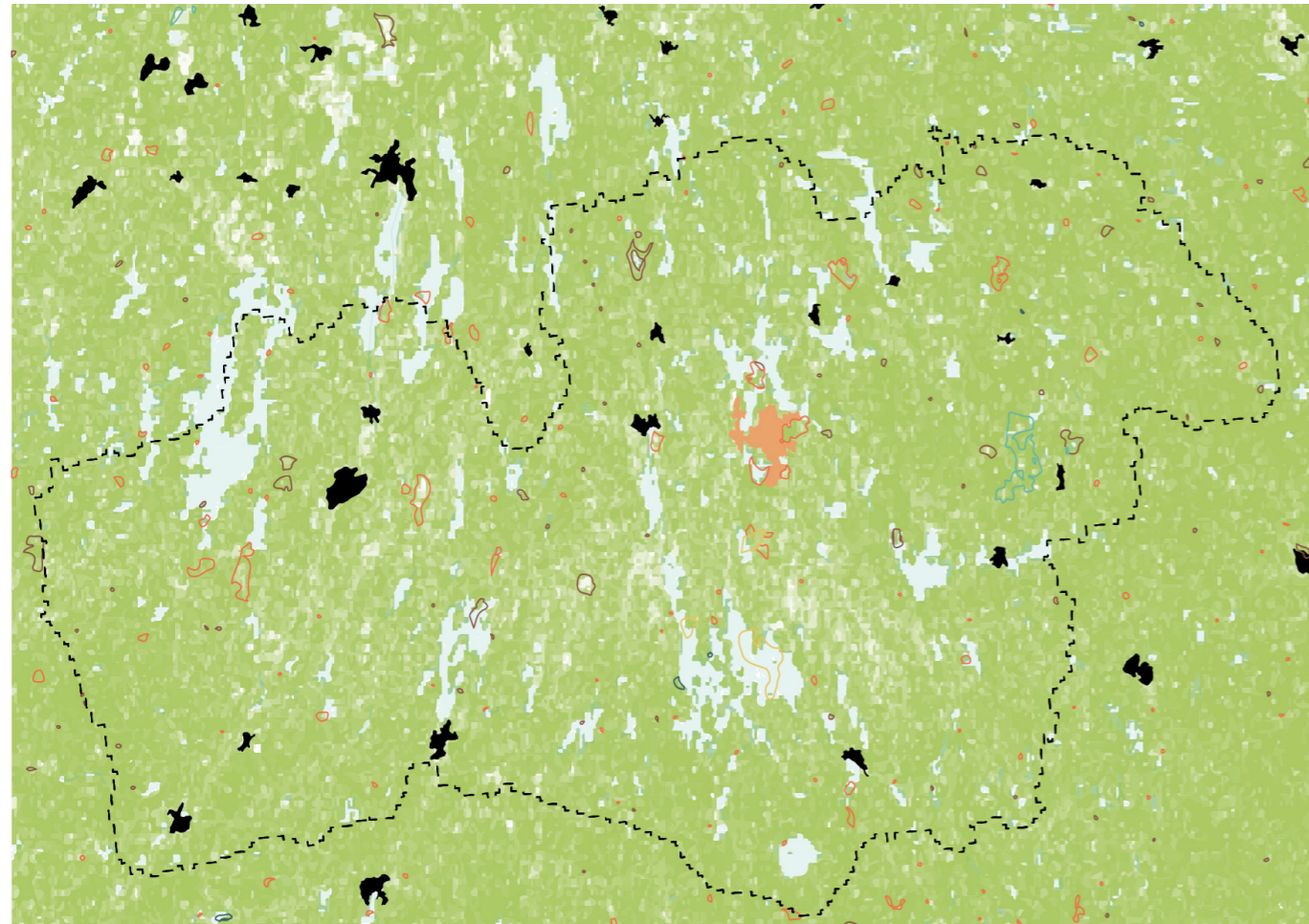
Due to a more moderate climate, the south of Sweden, in which the Kronoberg County is part of, is characterised by a modest presence of agricultural crops. These are distributed principally around the urban settlements or in proximity to the water basins.

The individual and spontaneous maintenance of a portion of forest area is not the only method used in Sweden to preserve the ecosystem. The protected areas, parks and natural reserves are used on national, regional and municipal levels to restore the habitats and the prosperity of the biodiversity. As Henrik Johansson (Interview 2024) said, the forest is not the only component of the land that is taken care of: agricultural areas, wetlands and lakes are included in the assistance programmes of the protected zone. The variety of elements, species and biospheres is a fundamental component of the success of the protection objectives.

In this direction is moving towards also the municipality of Växjö: some of the natural reserves created within the administrative border of the city are close to the main urban area to guarantee natural spaces that can be used and lived by the inhabitants. The protection of these forest areas and lakes permits a direct connection between the urban areas and the natural sphere and maintains intact the landscape in which Växjö is immersed. Another action taken in 2021 by the policymakers was to stop the exploitation of the woodlands owned by the municipality of Växjö. This measure is intended to be a model to follow for other cities and public institutions, but as well as to show the importance of the natural environments to the private sector and industry. These areas increased the benefits compared to the plantation forest: the increment of biodiversity of animal and tree species restoring various of them and their natural habitat in the territory.

I think it was maybe three years ago, [that] we managed to have a decision taken by the politicians on our forest, [...] that we as municipality own. Basically, it shouldn't be an industry anymore [in] the forest that we own. Some years ago, before that, we have like this demand that every year the forest must produce maybe 1000000 Swedish kronor or something like that. Every year you must have an income of the forest, but that is gone now. The forest just has to go like net zero. And that we don't use, generally, [...] these clear-cutting methods in the forests anymore. (Interview Sofia Gustavsson 2024)

Since Kronoberg County, and Sweden generally, are almost completely covered by green industrialised areas, that comprehend forests and crops, the protected areas have the function of balancing the biodiversity loss in the properties of the forest



- Växjö
- Surface cover by trees
- Habitat and species management area
- Wilderness area
- Lake and river
- Protected area with sustainable use of natural resources
- National park
- Strict nature reserve

Figure 29: Protected areas in 2023 and tree cover area in 2010 in Kronoberg County (Source: Global Forest Watch)

owners. Although the sustainable programmes guarantee a regrowth of the trees without decreasing the importance of the role and the quantity of carbon dioxide absorption done by the forest, they do not have the prosperity of different species as an objective due to the production necessities.

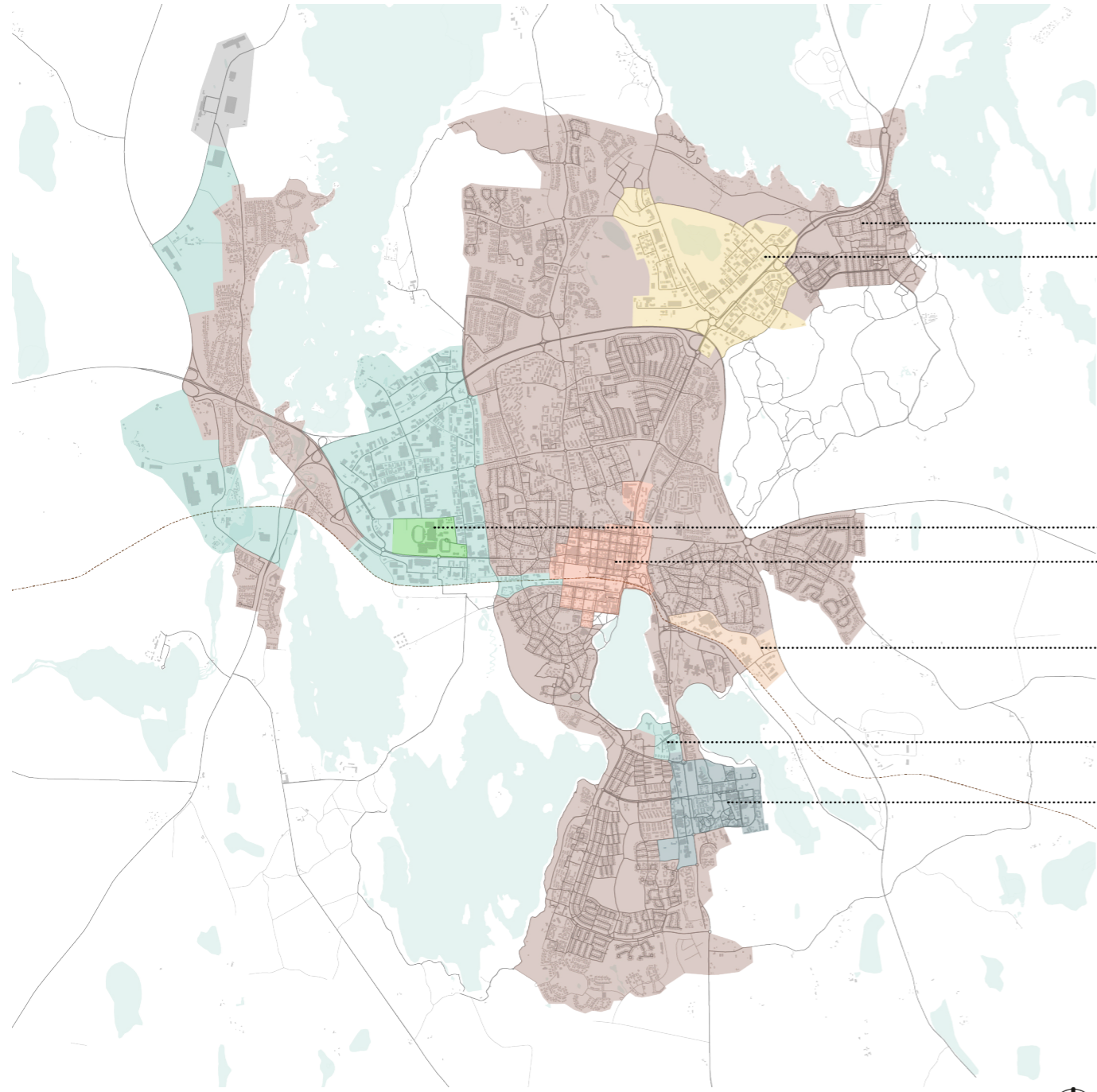
Coming closer to the urban scale of Växjö, it is possible to analyse the configuration of the city and the different subdivisions. Connecting to the historical development explained in the previous subchapter, the expansion of the urban settlement had different phases with different typologies of the planning system. However, the element that strikes one immediately is the strong zoning of the functions, with the historical city centre as the only area in which there is a mix of uses, such as residential, commercial and services. The clusters have well-defined limits and borders, such as streets, highways or natural elements, that are visible when walking through the city. The presence of different uses in a zone is rare, except for schools, a few service buildings such as gyms and small shops in the residential areas and the shopping centres in the industrial spaces.

Another component highlighted in the map of Figure 30 is the extension of the housing zone: the residential constructions are composed principally of villas and detached houses with a few and especially new multi-storey buildings. The citizens and market preferences, the techniques, technologies and materials available during the growth of Växjö were the reasons for the development of these types of dwellings, or at least for the majority of them. The large space that occupies these kinds of homes with the surrounding gardens explains the wide surface of the city compared to the Swedish metropolitan areas and the big cities of continental Europe.

In the last decades, the municipality has been trying to invert this trend. The strategy proposed was to densify the already constructed areas with taller structures to receive more inhabitants. Vidingehem AB, the municipal organisation that owns and constructs public houses in the territory, is working following that concept: multi-storey apartments are now the most common buildings developed by the municipality of Växjö in the public properties. However, these proposals have not been accepted as much as expected by the private real estate sector which keeps preferring to develop smaller houses due to the facility of selling these properties. Another problem that is affecting the city at this moment is the lack of land in possession of the public institution inside and close to the urban border of the city that has not already been constructed. This will block the intentions of the municipality in the realisation of the compact city and the establishment of new apartments, advantaging the private development and the expansion of the urban surface in the territory.

[...] one problem we have right now is the housing and the land that is most wanted right now. It is for one-family houses like villas and like that kind of small houses that you live one family in and they take a lot of land, but not for so many people, so it's not so efficient land use. Instead, if you build the flats apartments, you can have quite a lot of people for not so much land use, but the most wanted sort of housing in Växjö right now is the small house. So we cannot be so efficient when it comes to our land use. You have to exploit quite a lot of land to fit in more people, and I think that's quite a difficulty that we have and that also makes it more inefficient with like buses and trains and so on. If we spread out the population a lot. So that might be it and that's very hard to come around because that's not something that we, as a municipality, can't decide what houses will be sold, what flats will be sold or rented out. (Interview Sofia Gustavsson 2024)

With the beginning of sustainable actions in the municipality of Växjö, several issues came along and one of these was the transportation system. Since the declaration as a fossil fuel-free city by 2030 in 1996, the policymakers implemented a variety



- Residential area
- Commercial and industrial area
- University district
- Industrial area
- Centre (mixed area)
- Energy district
- Sports district
- Airport

Figure 30: Zoning and functions of the urban area of Växjö



Figure 31: Photos of the different areas of the city of Växjö (Photo by the author 2024)

of measures to reduce the emissions of carbon dioxide. The development of the cycle paths and the sidewalks, that connect the whole parts of the city, increased significantly the number of inhabitants and, particularly, students. The safety and the care of the maintenance of these ways show how much the municipalities is investing in the promotion of soft mobility. At the same time, the street width was reduced to encourage and make space for other means of transport instead of private cars.

Following the same concept, the bus network was improved covering all the neighbourhoods inside the city of Växjö, but also connecting with the urban areas in the municipal territory and the main cities in Kronoberg County. A further advancement was replacing fossil fuels with biofuel for public transportation obtained from organic waste produced in Växjö. The same ecological fuel was proposed and it has been available for trucks since the growth of the population produced a larger quantity of byproducts.

As an alternative, the citizens have the possibility of using the charging facilities for electric vehicles in which the electricity is coming to the Sandvik thermal and power plant, so using a renewable energy source.

The actions made by the municipality supported the reduction of greenhouse gas emissions offering alternatives to the actual main transport system. Nevertheless, the use of private cars is still high due to the convenience and the easiness of the mobility system.

[...] mainly all our remaining emissions come from the transport sector. That is a bit more challenging. We do work on, for instance, the production of local fuels, for instance, biogas, which can be used by buses and trucks, but also passenger cars. We invest in charging facilities for electric vehicles, and we improve the possibilities for cycle paths and pedestrians and so on to make it more safe and convenient to use that kind of transport mode [...]. If we manage to make it even more easy and attractive for people to use bus, bike and walking instead of their cars that would be the most cost-efficient also I would say because then it's just a model shift instead of new investments in the new cars and so on. So I think that would be the best for the people also. (Interview Henrik Johansson 2024)

Changing the habits of the inhabitants is more challenging rather than improving the public sector, but upgrading the options for the population is the right path to moving towards the goal of fossil fuel-free.

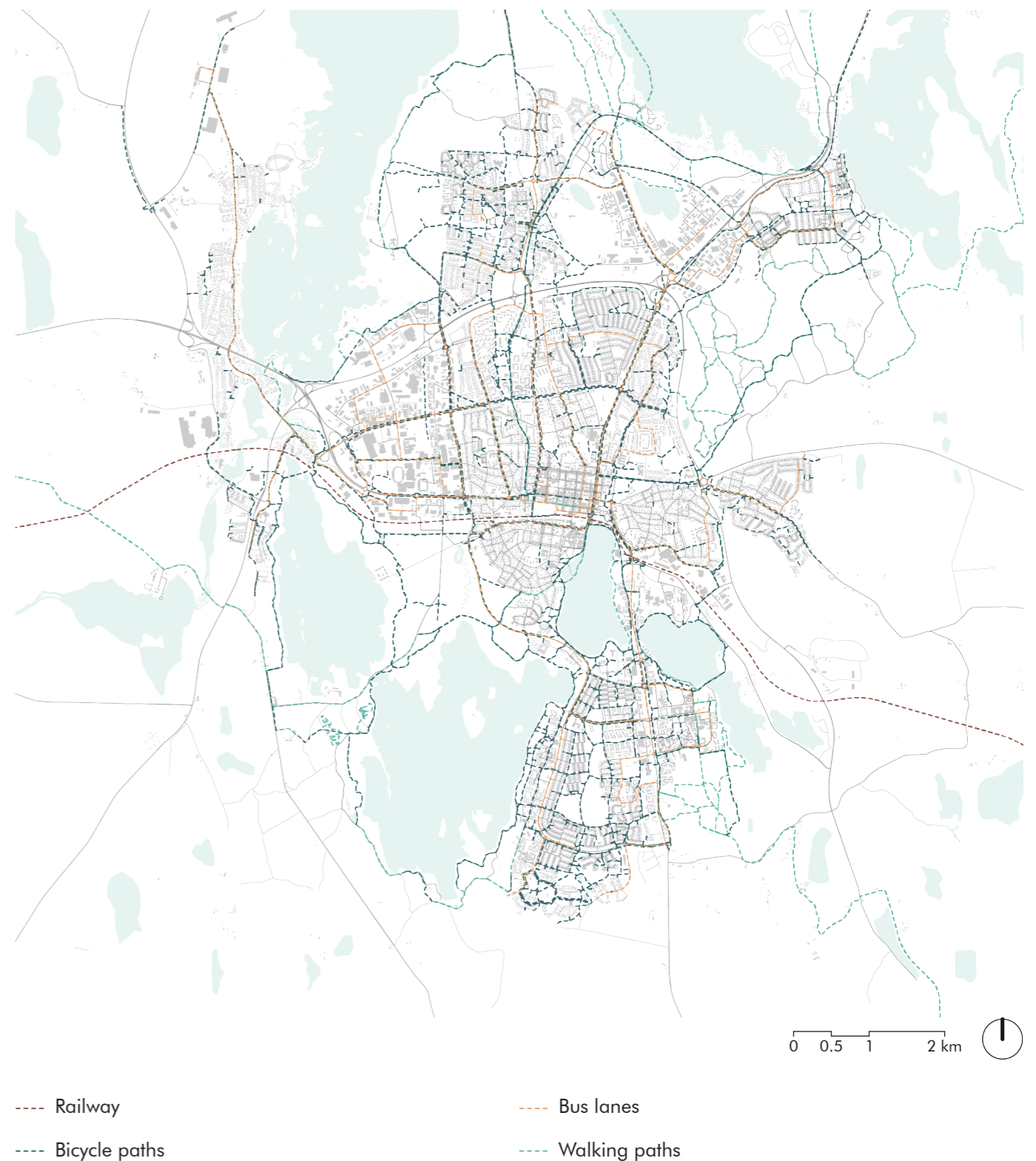


Figure 32: Transportation in the urban area of Växjö (Source: Växjö kommun)



The photos in this section were taken by the author during the onsite inspection and analysis in Växjö, Sweden, in the period between the 1st of March and the 30th of May 2024.



"The European Greenest city" as a case study



"The European Greenest city" as a case study



"The European Greenest city" as a case study



"The European Greenest city" as a case study



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"The European Greenest city" as a case study



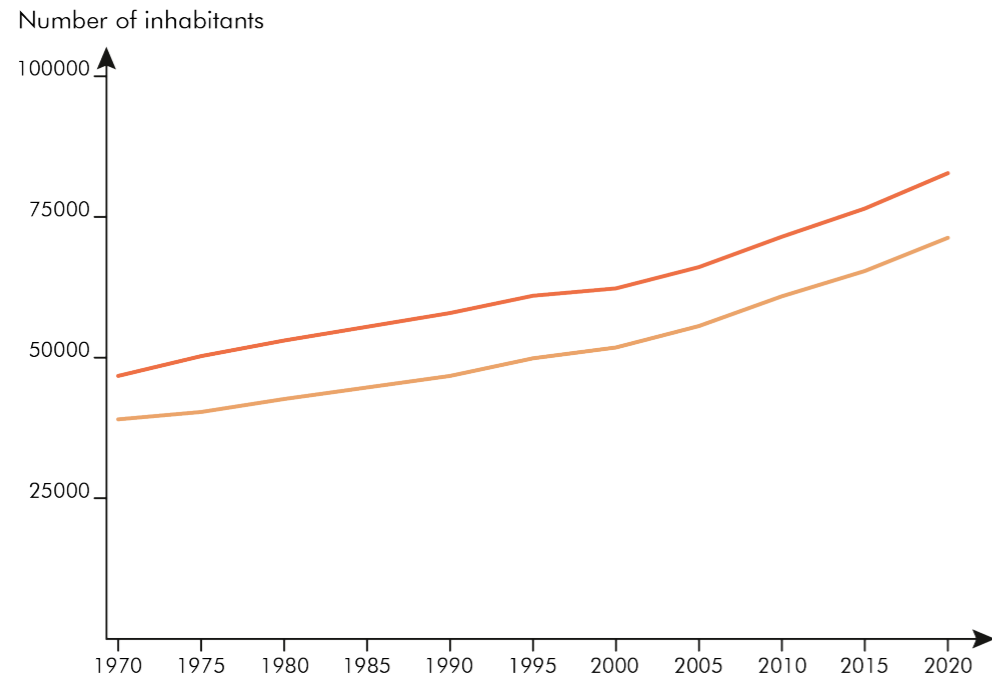
"The European Greenest city" as a case study



"The European Greenest city" as a case study



02.3 The society of a sustainable city



— Växjö municipal territory population — Växjö urban area population

Figure 33: Population in Växjö between 1970 and 2020 (Source: Statistiska centralbyrån)

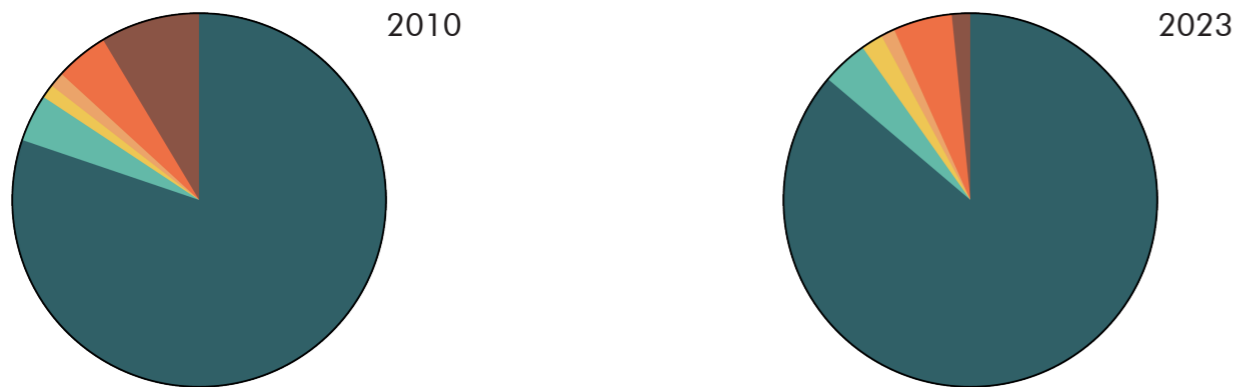


Figure 34: Percentage of residential buildings in Kronoberg County in 2010 and 2023 (Source: Statistiska centralbyrån)

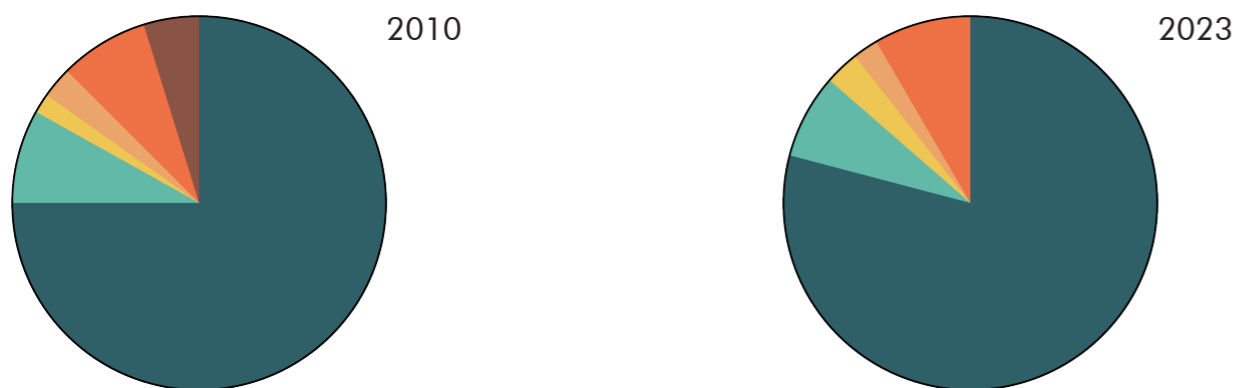


Figure 35: Percentage of residential buildings in Växjö in 2010 and 2023 (Source: Statistiska centralbyrån)

- Detached one or two dwelling house
- Row house
- House with several dwellings
- Terraced house
- Multi-dwelling house
- Uncoded

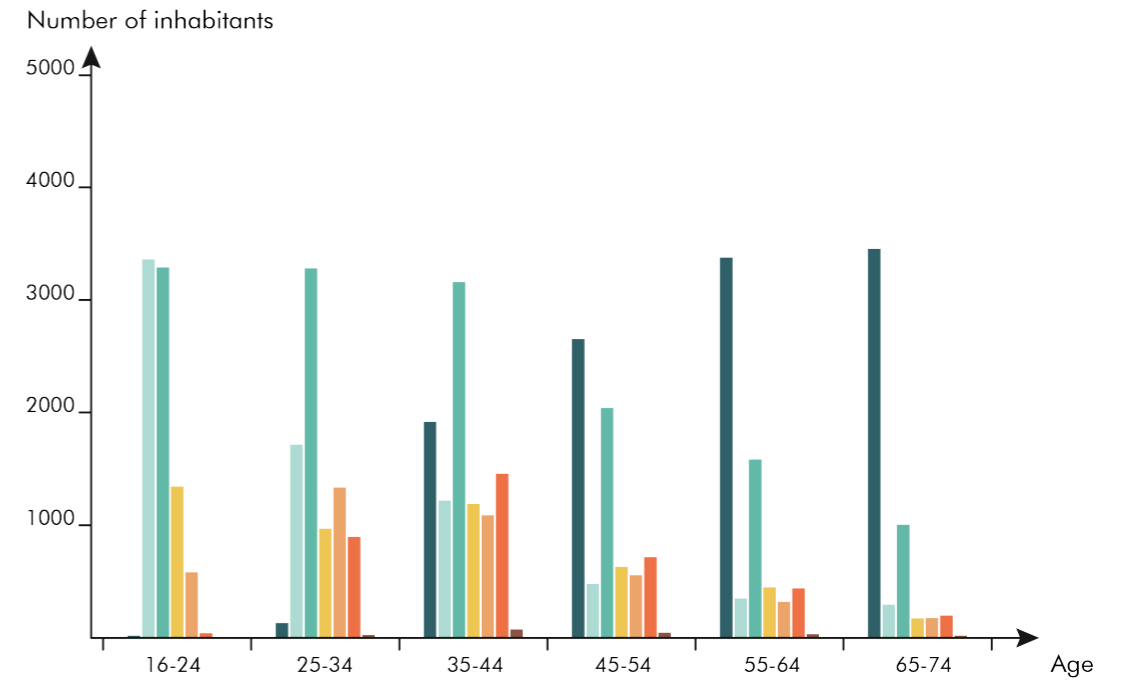


Figure 36: Educational attainment of the population of Växjö in 1985 (Source: Statistiska centralbyrån)

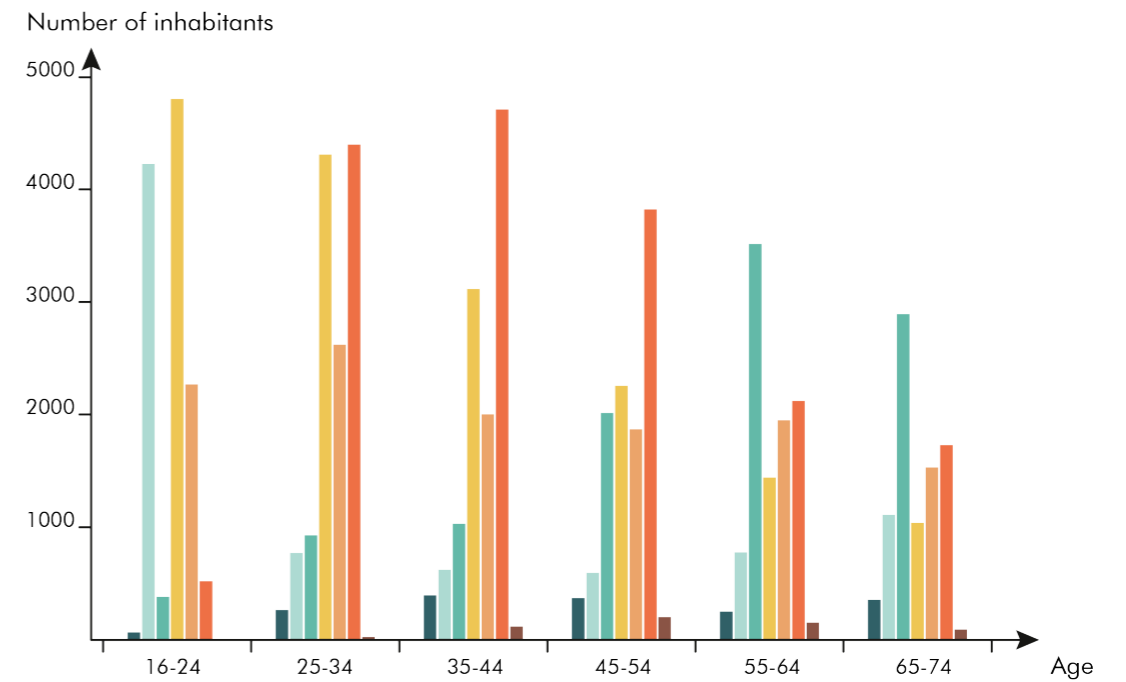


Figure 37: Educational attainment of the population of Växjö in 2023 (Source: Statistiska centralbyrån)

- Primary and secondary education less than 9 years (ISCED97 1)
- Primary and secondary education 9-10 years (ISCED97 2)
- Upper secondary education, 2 years or less (ISCED97 3C)
- Upper secondary education 3 years (ISCED97 3A)
- Post-secondary education, less than 3 years (ISCED97 4+5B)
- Post-secondary education 3 years or more (ISCED97 5A)
- Post-graduate education (ISCED97 6)

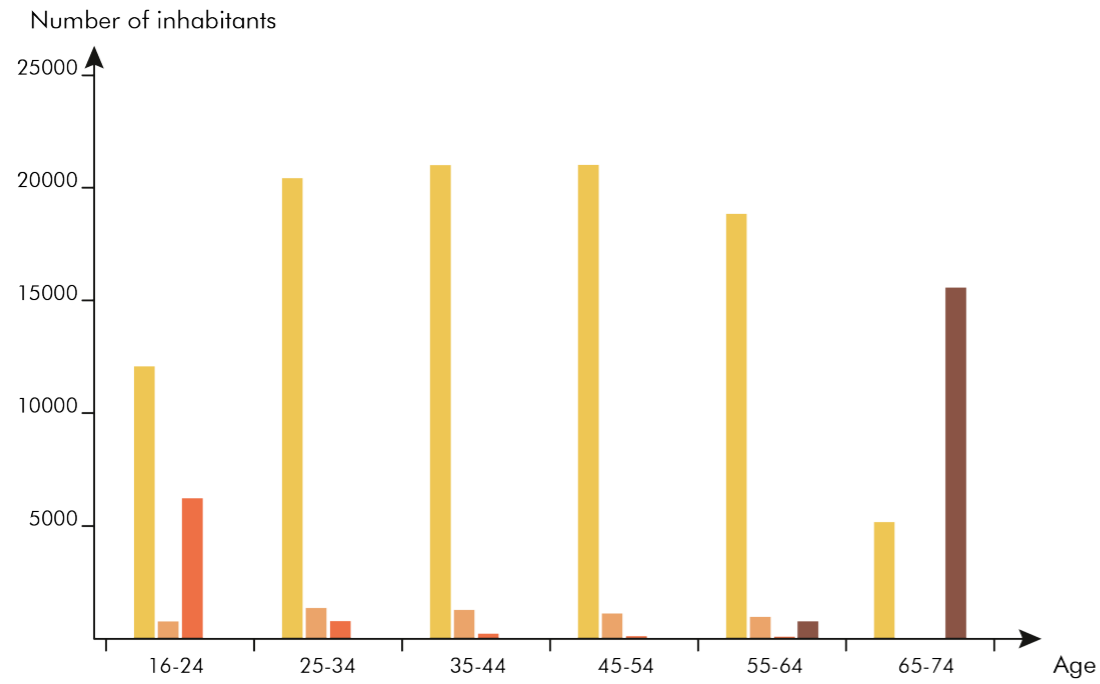


Figure 38: Labour market status in Kronoberg County in 2023 (Source: Statistiska centralbyrån)

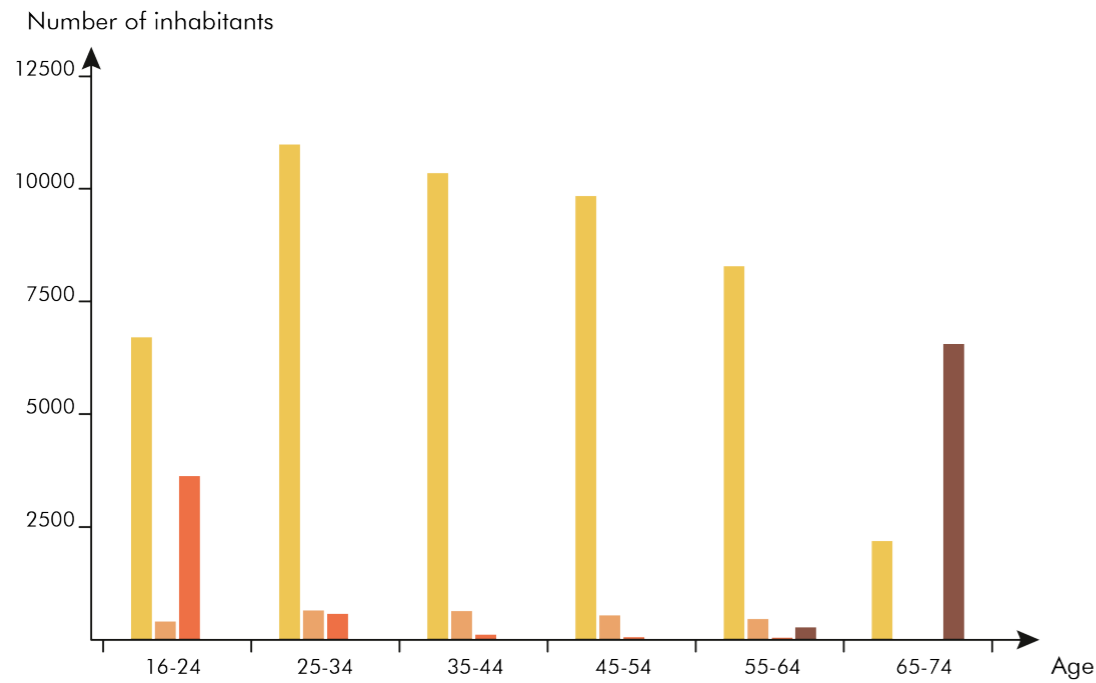


Figure 39: Labour market status in Växjö in 2023 (Source: Statistiska centralbyrån)

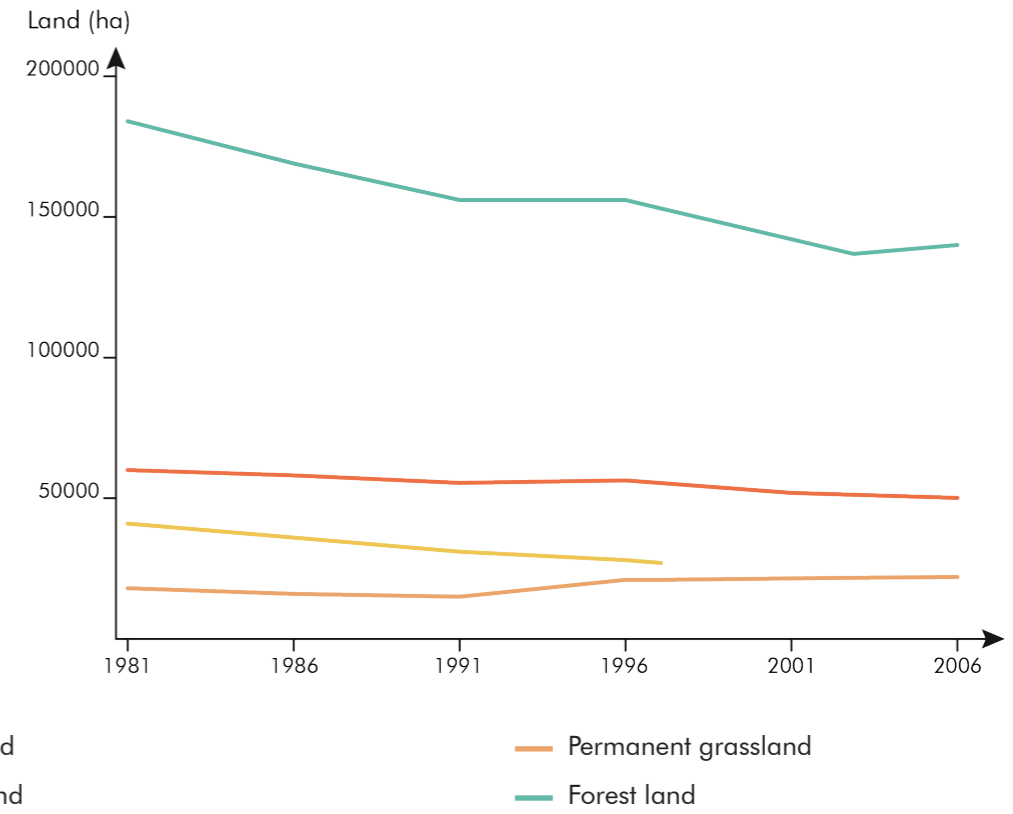


Figure 40: Type of land in Kronoberg County from 1981 to 2006 (Source: Statistiska centralbyrån)

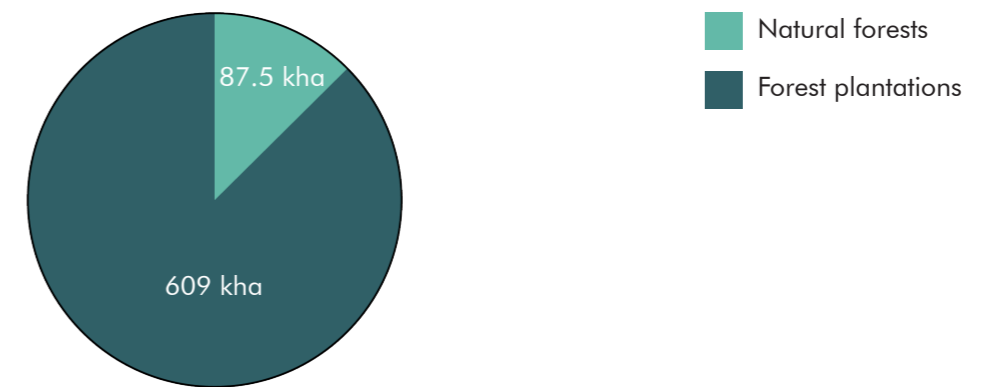


Figure 41: Forest typologies in Kronoberg County in 2010 (Source: Global Forest Watch)

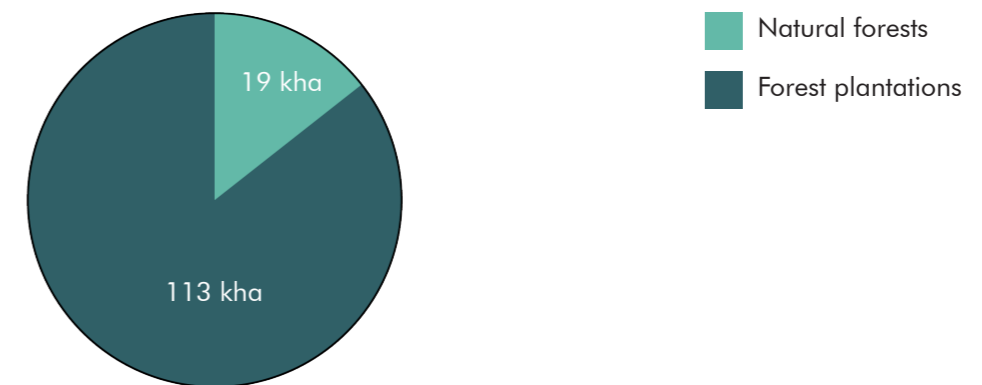


Figure 42: Forest typologies in Växjö in 2010 (Source: Global Forest Watch)

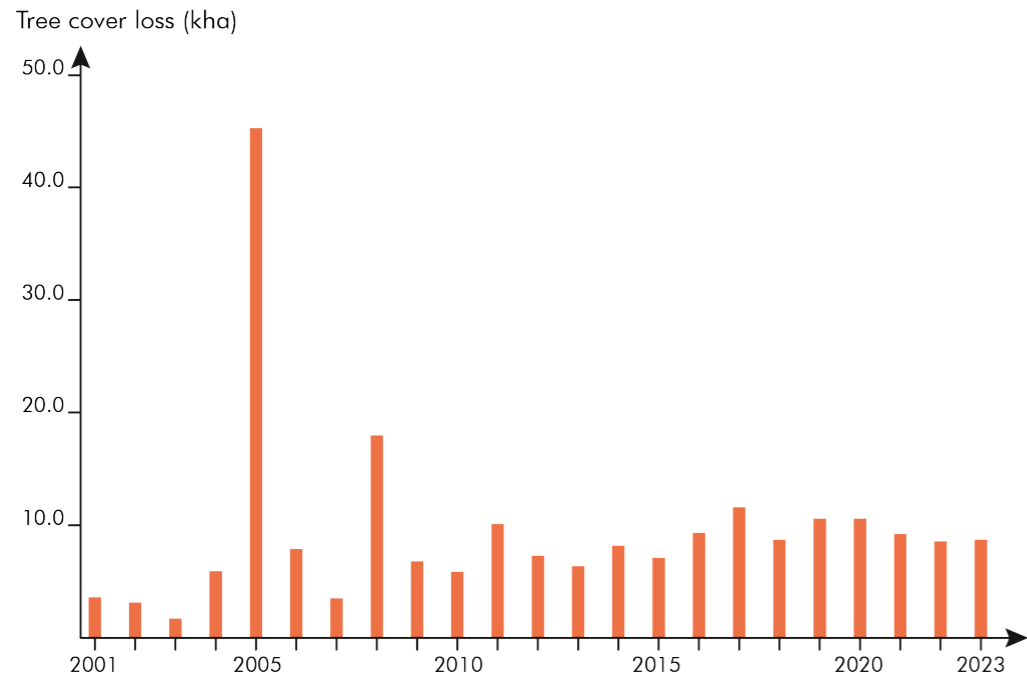


Figure 43: Tree cover loss in Kronoberg County between 2001 and 2023 (Source: Global Forest Watch)

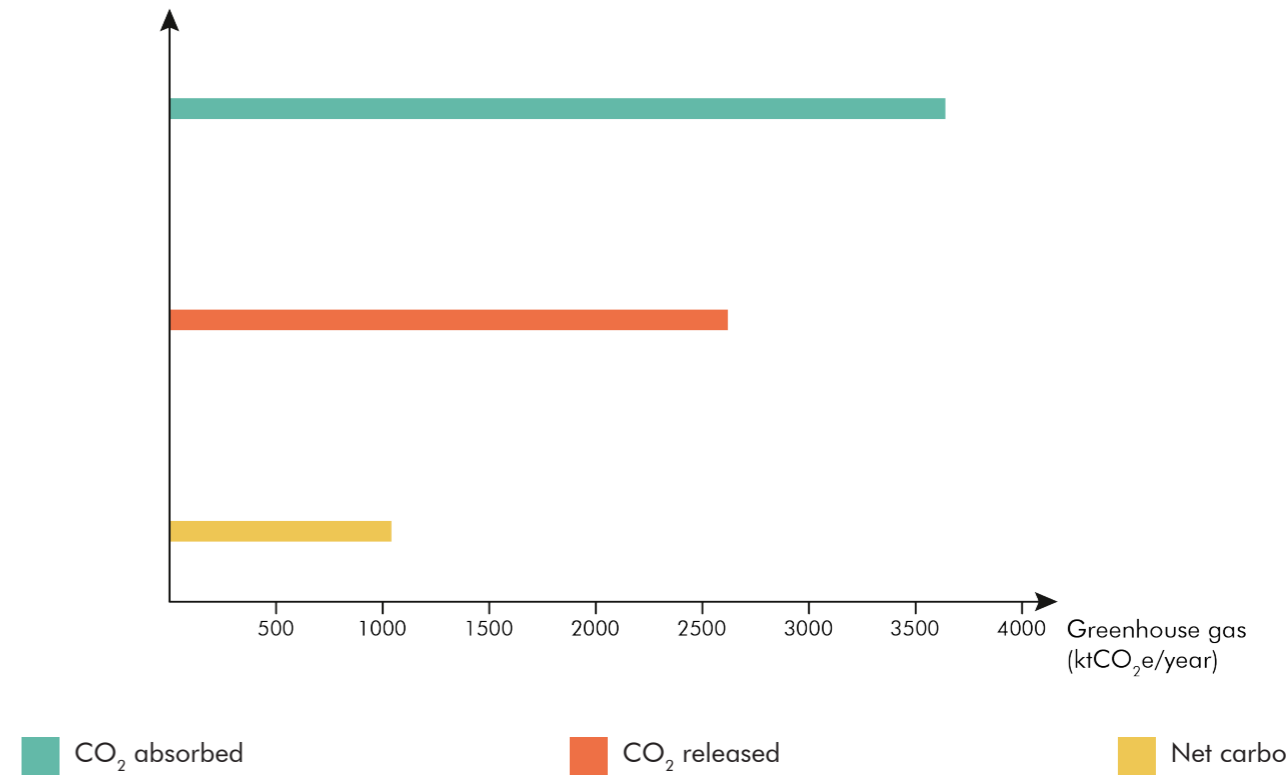


Figure 45: Average per year of forest-related greenhouse gas fluxes in Kronoberg County between 2001 and 2023 (Source: Global Forest Watch)

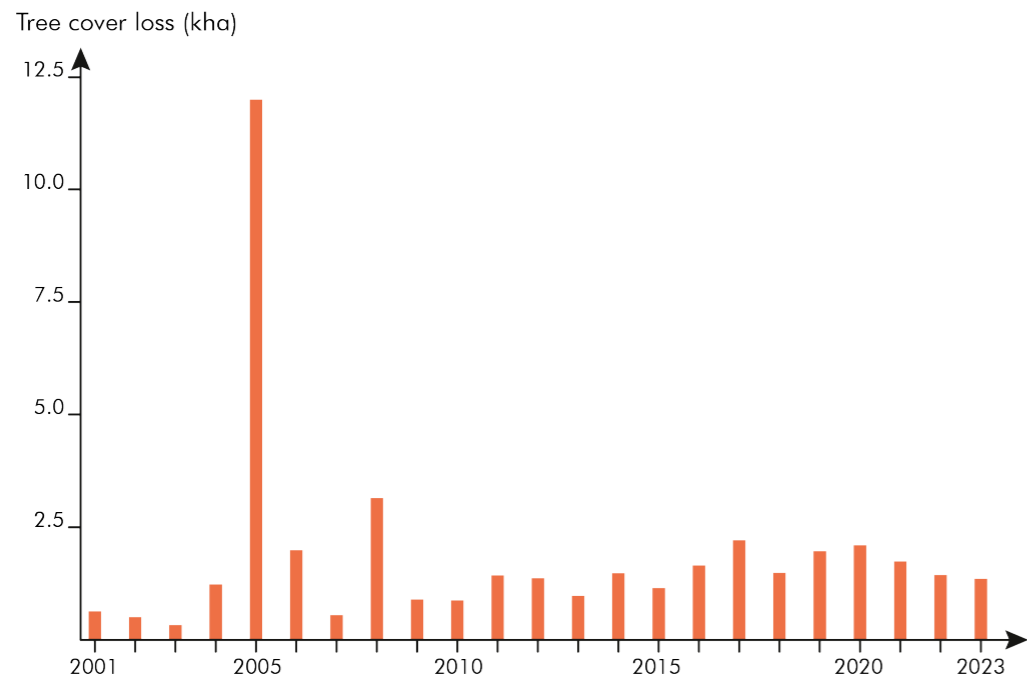


Figure 44: Tree cover loss in Växjö between 2001 and 2023 (Source: Global Forest Watch)

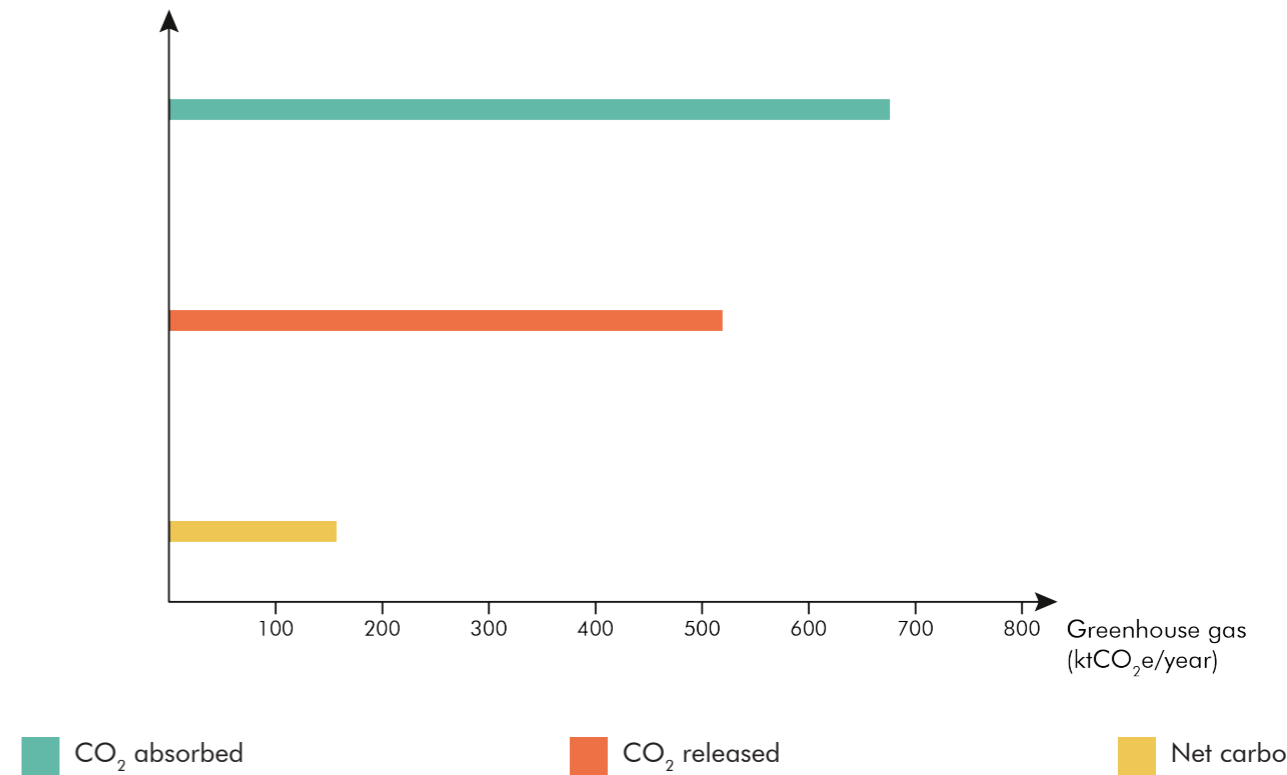


Figure 46: Average per year of forest-related greenhouse gas fluxes in Växjö between 2001 and 2023 (Source: Global Forest Watch)

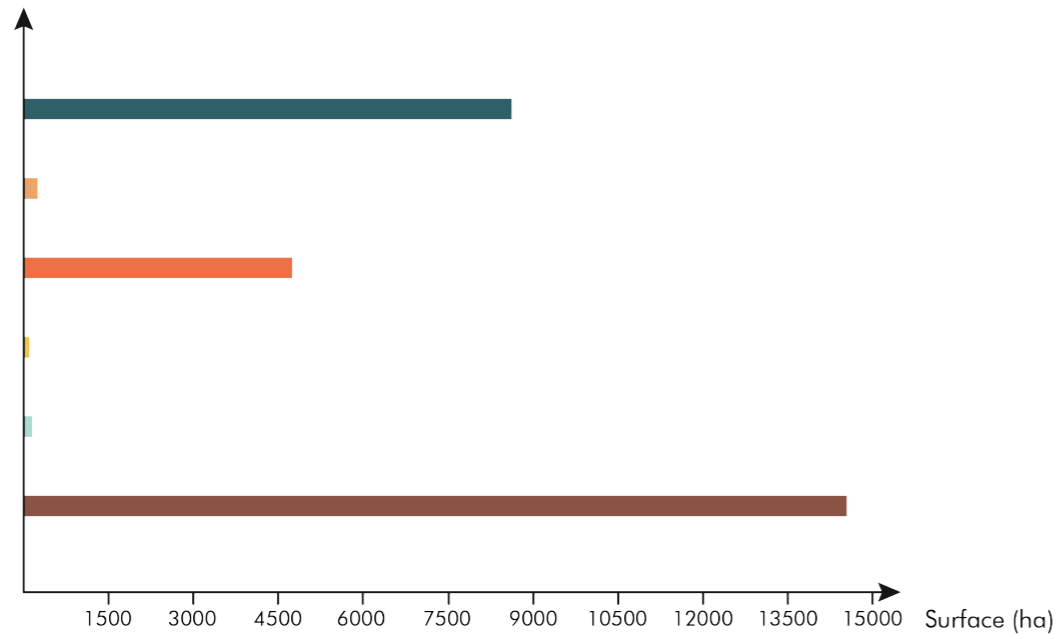


Figure 47: Green space, impervious land and other land in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

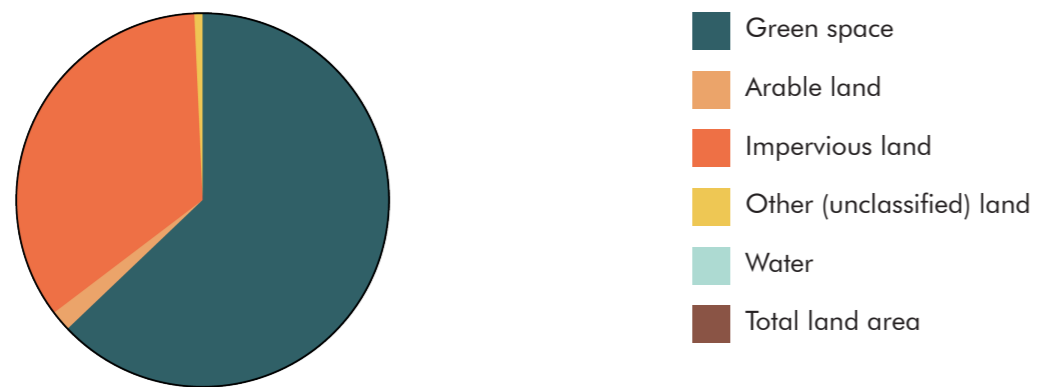


Figure 48: Percentage of green space, impervious land and other land in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

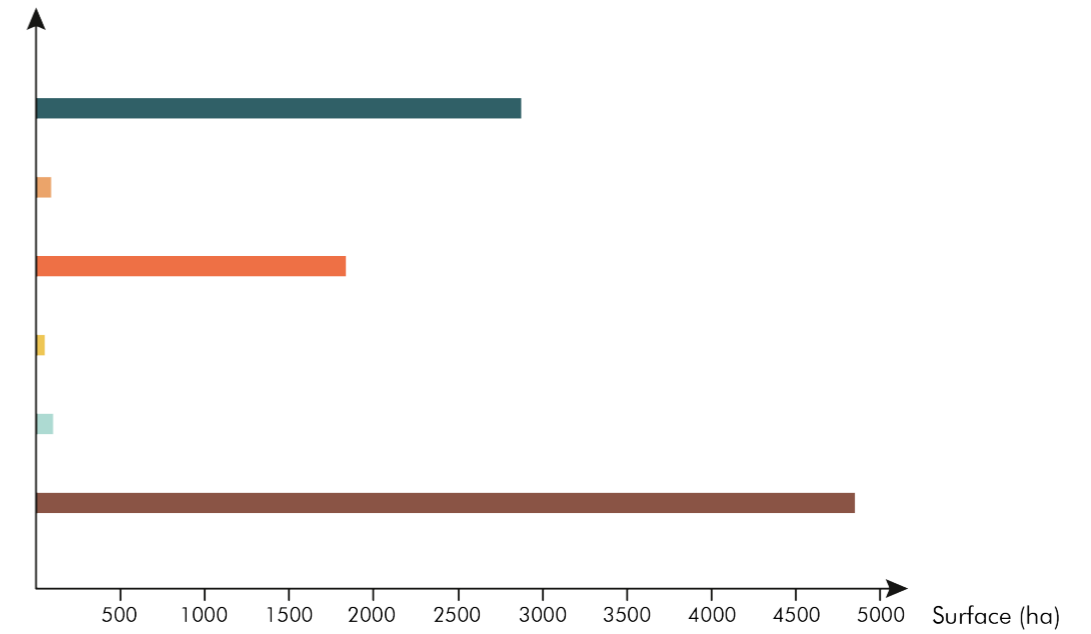


Figure 49: Green space, impervious land and other land in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

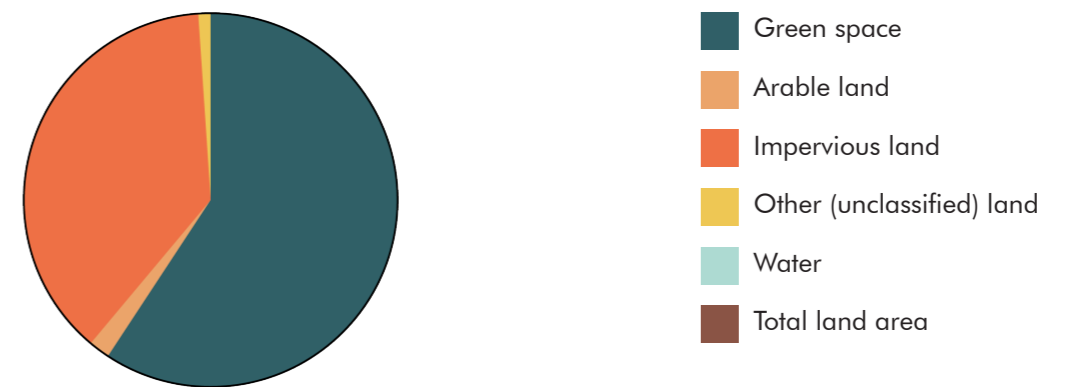


Figure 50: Percentage of green space, impervious land and other land in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

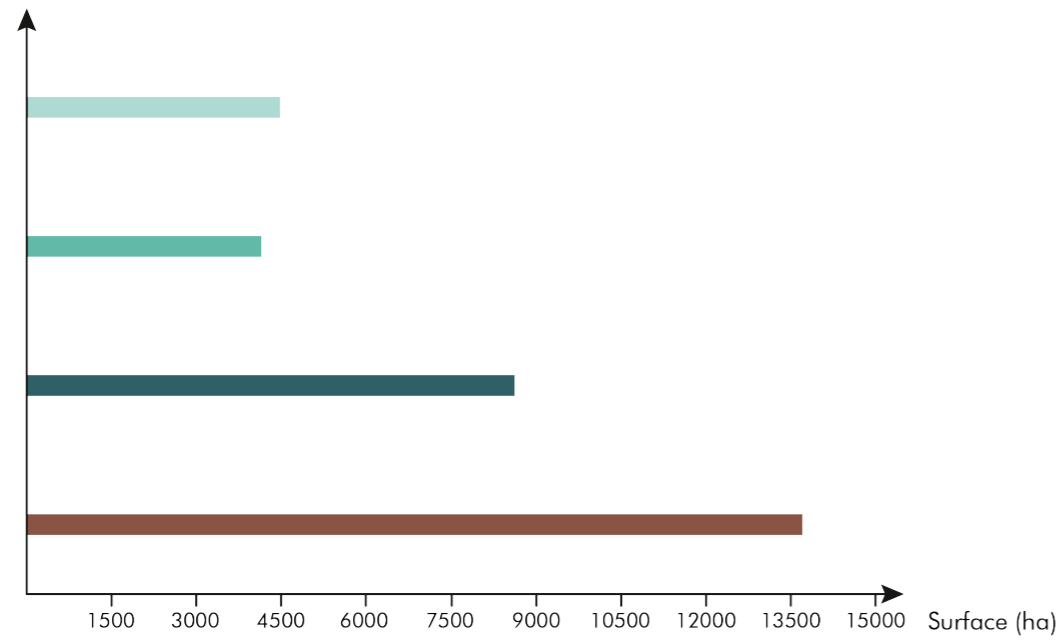


Figure 51: Green space in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

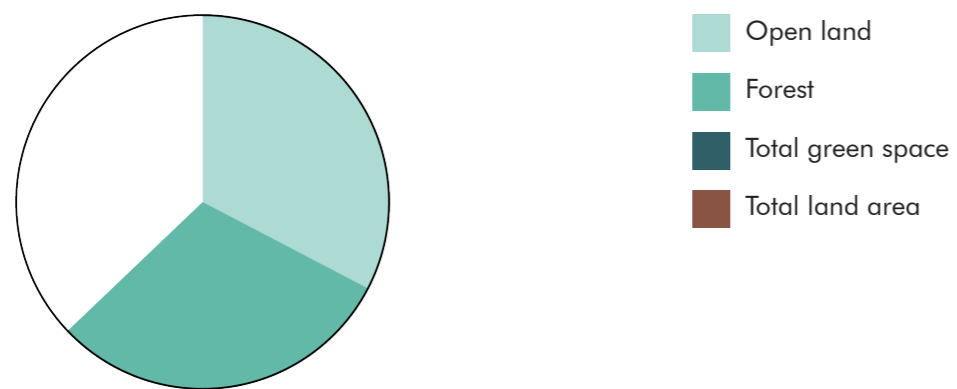


Figure 52: Percentage of green space in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

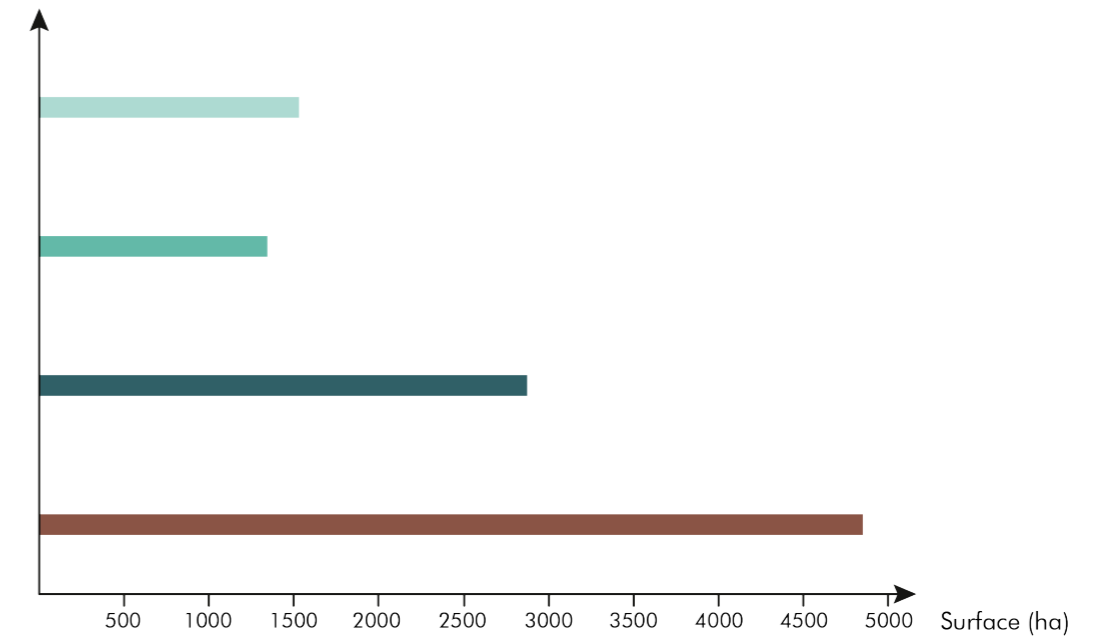


Figure 53: Green space in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

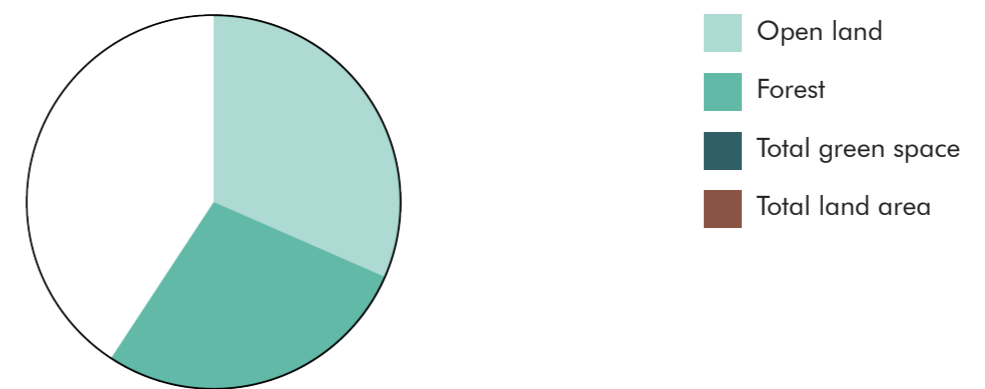


Figure 54: Percentage of green space in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

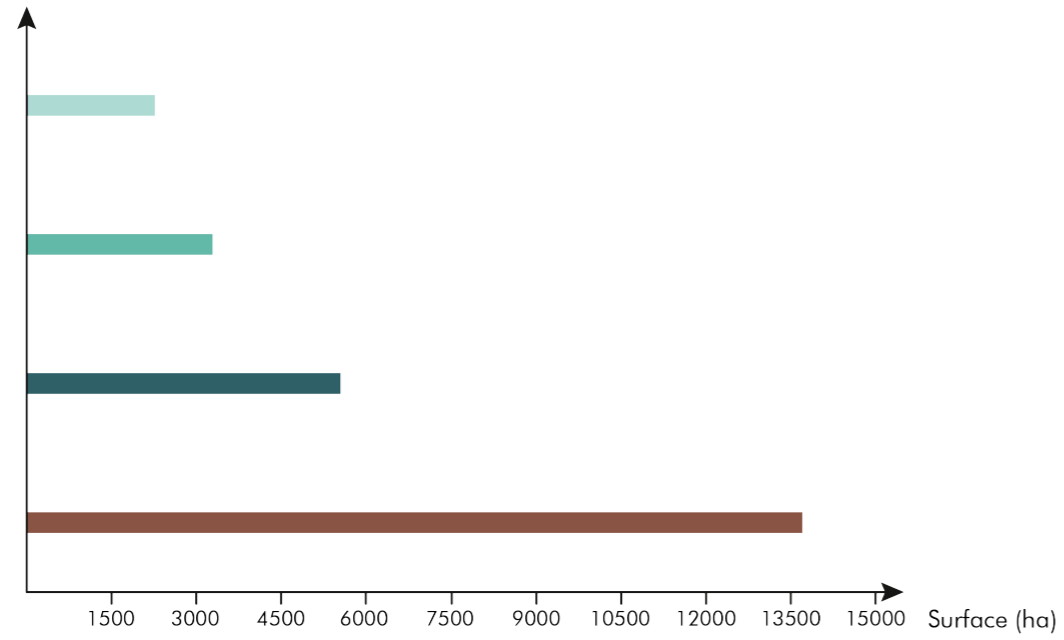


Figure 55: Public green space in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

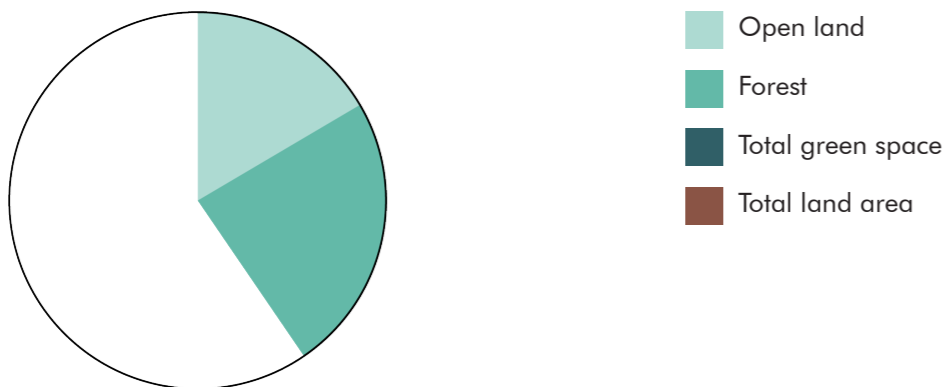


Figure 56: Percentage of public green space in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

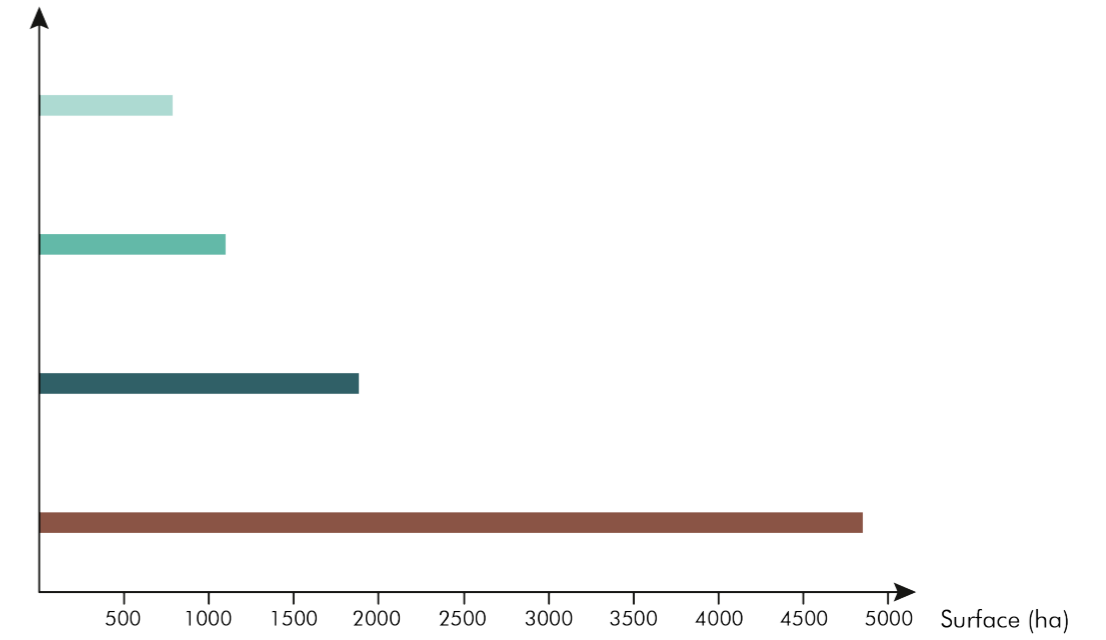


Figure 57: Public green space in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

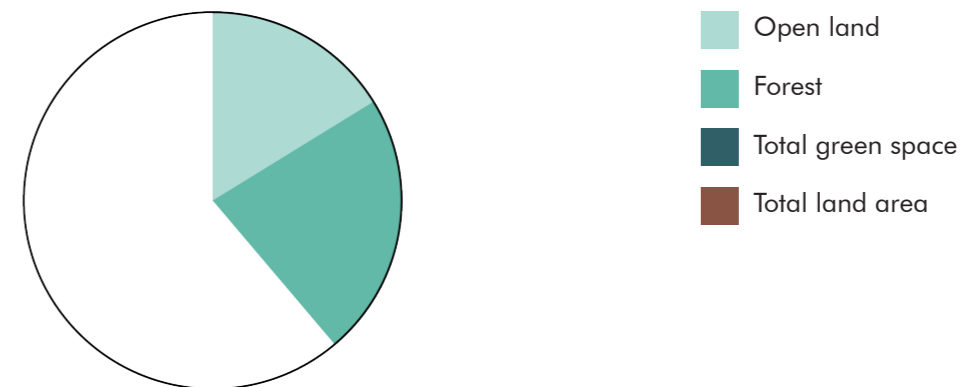


Figure 58: Percentage of public green space in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

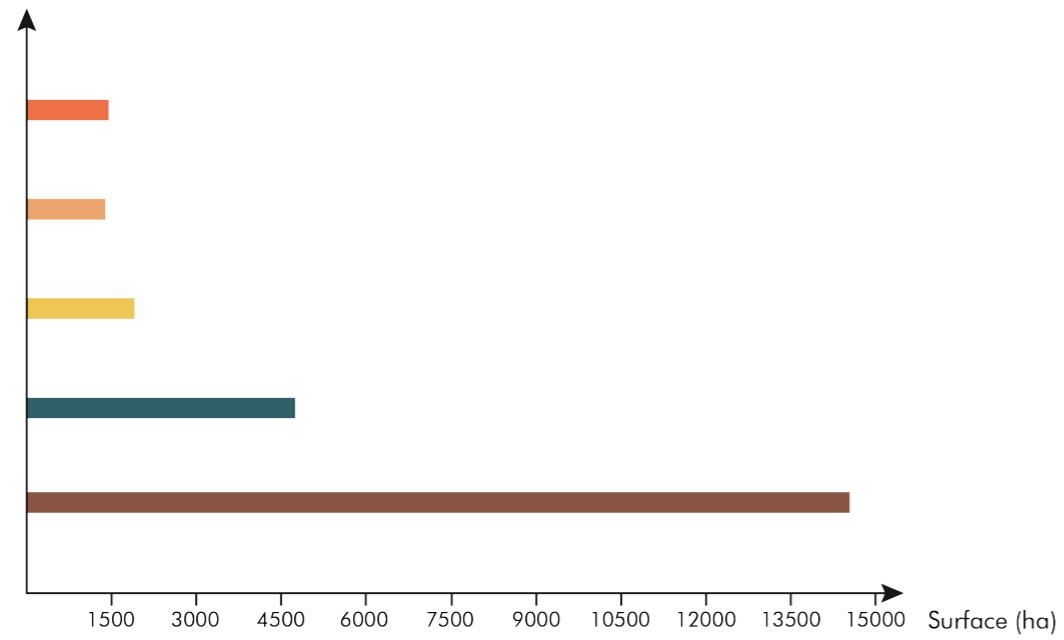


Figure 59: Impervious land in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

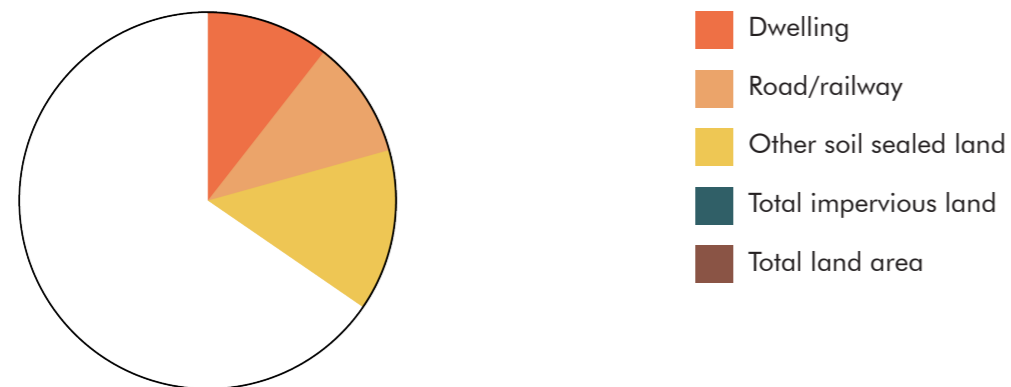


Figure 60: Percentage of impervious land in Kronoberg County within urban boundaries in 2015 (Source: Statistiska centralbyrån)

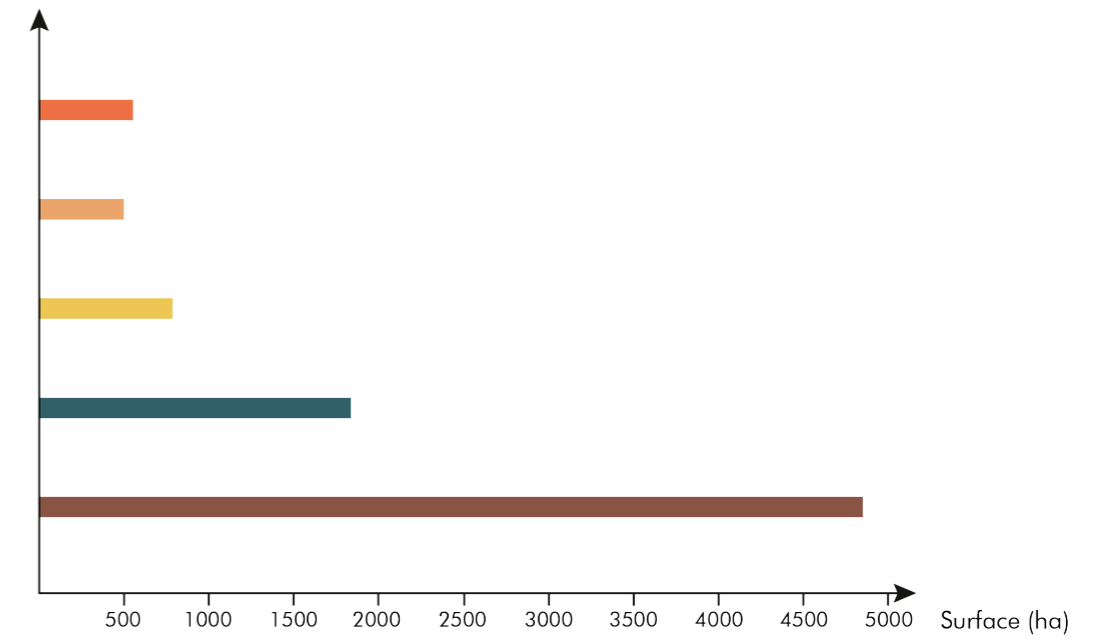


Figure 61: Impervious land in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

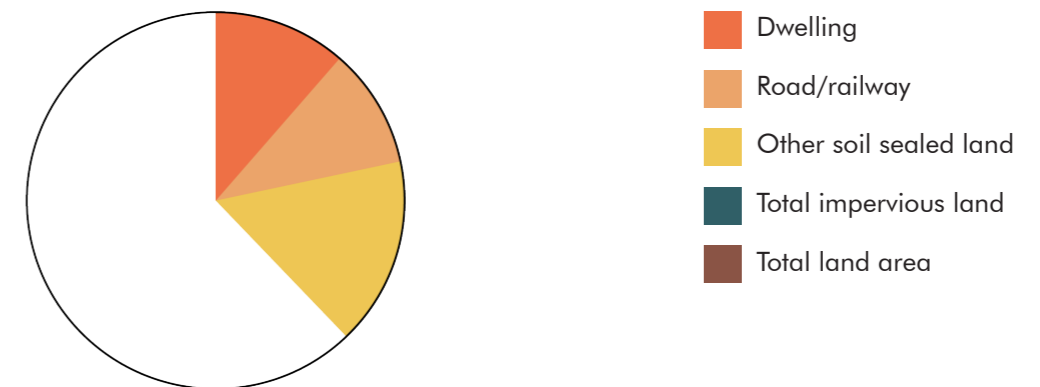


Figure 62: Percentage of impervious land in Växjö within urban boundaries in 2015 (Source: Statistiska centralbyrån)

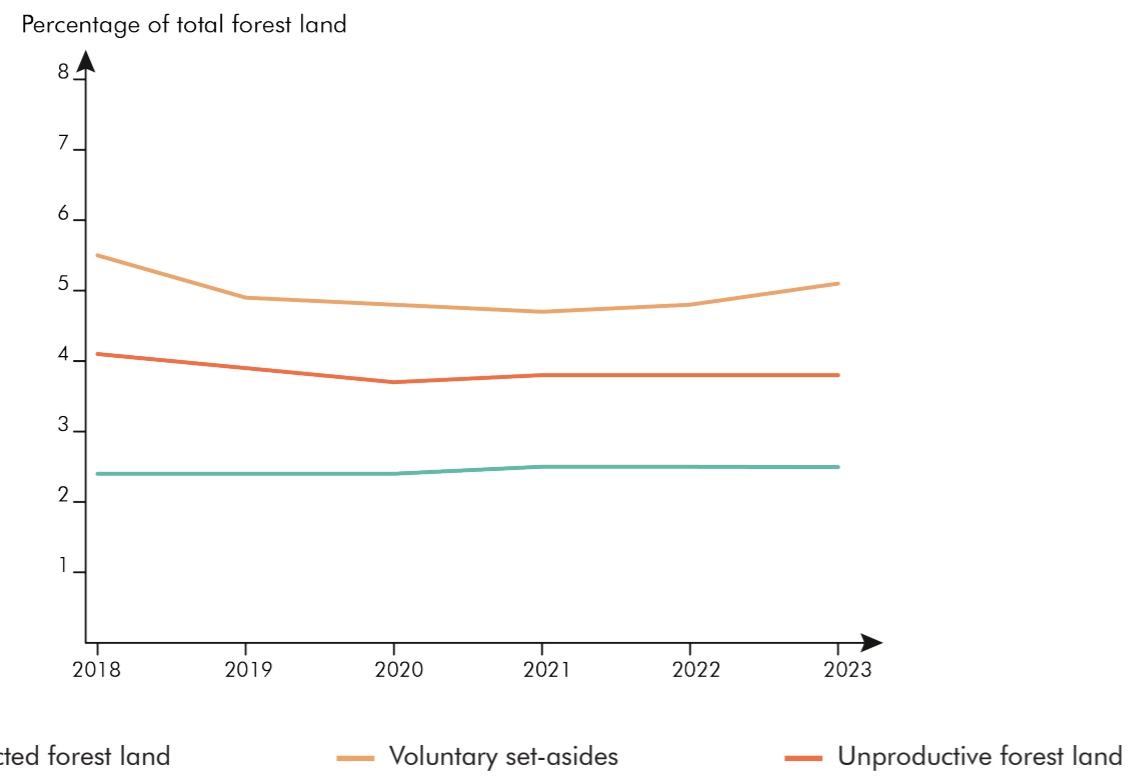


Figure 63: Formally protected forest land, voluntary set-asides and unproductive forest land in Kronoberg County 2018-2023 (Source: Statistiska centralbyrån)

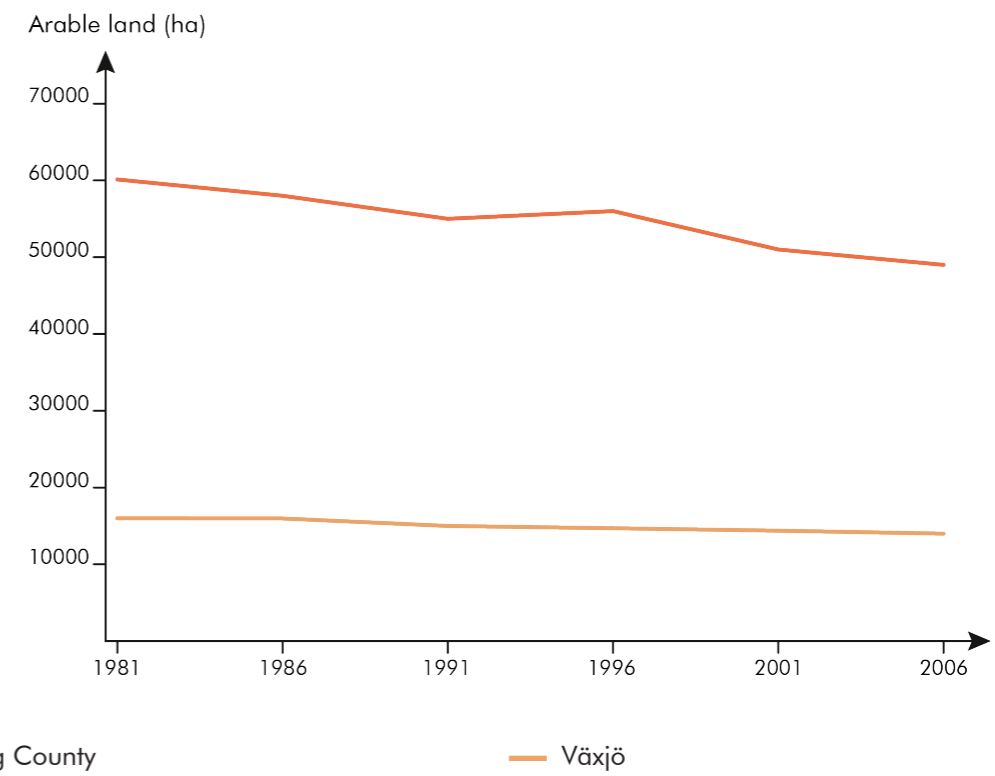


Figure 64: Total arable land in Kronoberg County and Växjö from 1981 to 2006 (Source: Statistiska centralbyrån)

03

MEDIATING THE LIMITS: A PROPOSAL FOR VÄXJÖ

03.1 The limits of a sustainable city

The improvements and achievements obtained in the last decades in Växjö are visible to everyone, confirmed by the numerous prizes gained by the municipality (Andersson and James 2018). Anyway, the run towards sustainability is not neutral. Designing a sustainable city according to present paradigms is also carrying with itself a number of relevant issues that emerge as open questions.

The aim of this chapter is not to criticise the paradigms of sustainability but to explore if there is any extent to it. Or, at the same time, understand the conditions of sustainability for intermediate territories, and their limits.

According to the energy democracy framework of Kunze and Becker (2014), the greenest city in Europe cannot fulfil the four parameters:

1. a public or community-based property is necessary to maintain a low and fair selling price;
2. the citizens or community participation in the decision-making processes;
3. obtaining a surplus of the products and guaranteeing new jobs and employment in the territory;
4. the production and the products should have a small environmental impact.

Differently from the past, the issue that is facing Växjö at the moment is the **absence of a long-term vision for its sustainability policies and actions**. The reality is that the deadline for 2030 fossil fuel-free is in a few years; however, the research and evolution will not stop in six years and the necessity for improvements is essential for the ecosystem. The goal of being no longer dependent on fossil fuels is impressive and worthy of honours, but the path to reach sustainability cannot be seen only from that point of view without considering the complexity of the biospheres that surround the human environment.

The data proposed demonstrates that the actions implemented in the territory were useful in reducing substantially the carbon dioxide emissions. However, the choices, ideas and position of the Växjö municipality regarding the development of green programs and policies evolved and changed during that time [Figure 65].

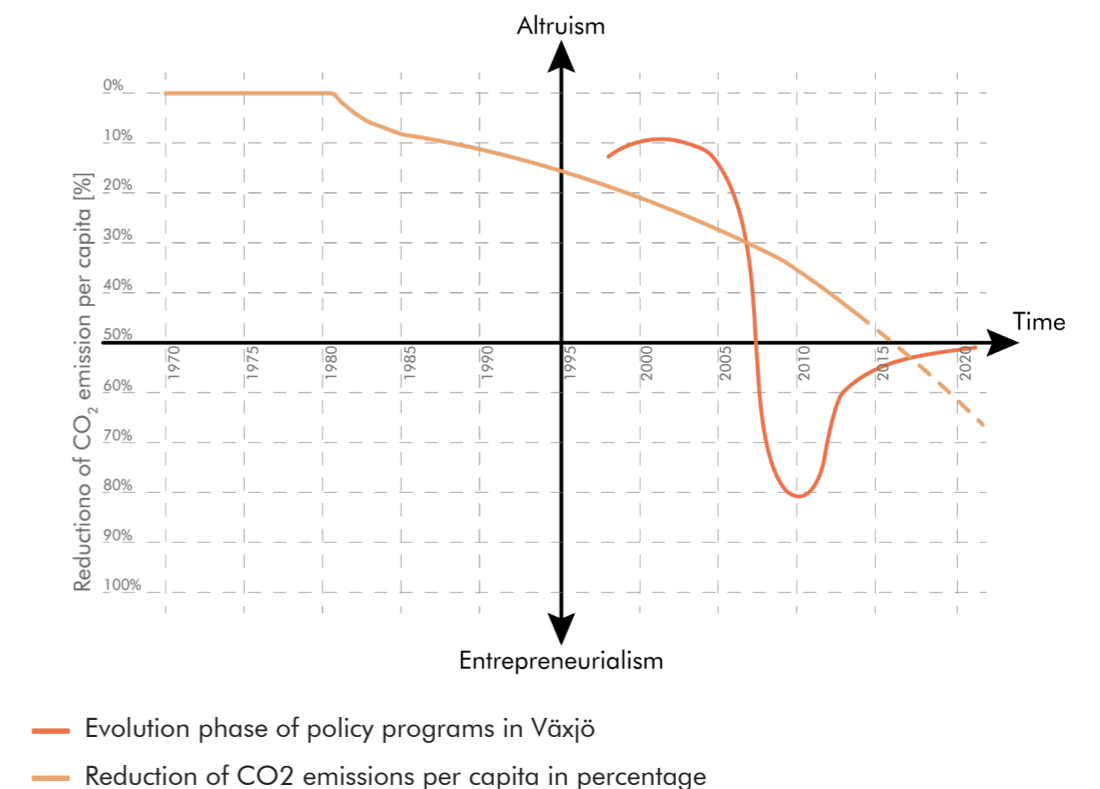


Figure 65: Graphic of altruistic/entrepreneurialism phase in Växjö policy development and reduction of CO2 emission per capita (Source: Andersson and James 2018)

Initially, policymakers aimed to share their knowledge and experience about sustainability and green actions and let the people know what was happening in the city. This can be called an internationalisation and altruistic phase in which Växjö intended to be an example to follow and to convince more and more people and policymakers to undertake green actions against climate change. It lasted from the fossil fuel-free declaration in 1998 to the explosion in the number of policy groups in study tours in 2007 (Andersson and James 2018).

Secondly, a period that began in 2008 and ended in 2012 is characterised by the commercialisation and entrepreneurialism phase. The increase in the policy group's number made Växjö municipality conscious of the possibility of having also economic revenue, due to the explosion of policy tourism and, generally, from the environmental sustainability notoriety created around the city. The rapid rise of these phenomena probably took the policymakers by surprise, leading to the failure of subsequent political programs due to a lack of organisation (Andersson and James 2018).

In 2013 the municipality understood that to reach better profit both on an economic and environmental level, a balance in development strategies was necessary. This phase is known as a strategic collaboration and it is what is characterising the political sphere in Växjö nowadays too. This process helped to consolidate the position in policy networks and to collaborate actively with other municipalities, formalising new partnerships not only on the economic level but also on the exchange of proposals, ideas and actions to enhance the sustainability path. The commercialisation aspect is present only in the research of investments for local businesses. Instead, study tours became a side support which helped the development of Växjö policies and strategies (Andersson and James 2018).

Despite the several oppositions and alternations of thought by the policymakers, the steps to reach the fossil fuel-free goal by 2030 never stop. The actions introduced from the declaration in 1996, including the biogas busses, the almost net-zero building constructions and the implementation of bicycle paths, just the same as the conversion from oil to biomass of the Sandvik power plant, have made Växjö a pioneer city in sustainability terms and these helped out to decrease about 70% of the CO₂ emissions in the urban area as compared to the 1970s (www.veab.se). Also, new strategies and research programmes are developing to push further the municipality's green actions: the Bio Energy Carbon Capture and Storage and the densification of the urban areas are part of the sustainable policies that are trying to be integrated and executed (Henrik Johansson interview 2024).

However, could carbon dioxide emissions be used as a unique parameter to measure sustainability?

The only possible answer is no. This is not argued solely by scientific research, but it receives confirmation from the citizens and community thoughts and protests.

In the beginning, right after the fossil fuel-free declaration, the policy changes were supported by the inhabitants of Växjö due to the prosperity possibilities at the economic and environmental levels and the improvements of the welfare state. The measures applied by the policymakers had the purpose of improving the quality of life of the population and guaranteeing development in the protection and restoration of the biosphere. A practical example was the modification of the terrible air and water conditions in the territory, analysed in 1980, due to the emission produced by the Sandvik thermal and power plant (Andersson and James 2018).

The collaboration and the harmonic situation between the local institution and its inhabitants reached its break point in 2008, the year in which the municipality decided to shift to policies more focused on the economic aspect rather than the effective benefits for the environment (Andersson and James 2018). The debate started and multiple proposals in these decades were contested. The people and the local associations were asking for a **wider range** when it is taking into account the **sustainable aspects of a decision-making process**: more than being a violent conflict, this "tension" is the very centre of any political debate and the key to the

future. The space, its uses and its role become the fulcrum around which revolves the tension between the different actors: the municipality, the citizens and the local associations. Little ongoing transformations generate new balances in the social and spatial environments through time (Vassallo et al 2021). An example that represents this image is the friction in the real estate market: the preferences of the private demand, detached houses and villas, differ from what the public agencies are offering and building, multi-storey apartments. In this context, the friction is hidden by the private agents that satisfy the requests of the citizens, but creating a problem with the conversion of natural land in urban areas and further widening the city borders.

The discussions do not stop nowadays and the conflicts and contradictions are present also internally in the city council. This aspect emerges perfectly in the diverse answers of Jon Malmqvist, Henrik Johansson and Sofia Gustavsson's interviews to the question about the use of the forest in Sweden and, more particularly, in Växjö territory. Each person is part of the municipality, respectively Vice President of the Community Building Board, Environmental strategist/Project financial coordinator in the Sustainability and Financial Department and Municipal ecologist in the Strategy and Planning Department; however, their ideas are conflicting. Since the first has a more political point of view, they think the forest industry is an essential aspect of the Swedish economy and its management lets the woodlands grow due to a secular plantation system. His idea promotes a quantitative exploration of the sustainable aspects only counting the absorption of CO₂.

Swedish forests are very different from Italian forest and German forest. We've been using the forest actively. [...] We have recreational forests as well, but the forest is the backbone of Swedish economy, so you can't just take 20% of our forest and make them unproductive. [...] The most attractive forests [...] are actually the old forests that are production forest because they are the forests that look really nice, you can walk. There in the National parks, where you can't do anything, it's often quite difficult because they and you can't remove trees and then it's really dense. So I think it's very important for Sweden [...] to make people understand the importance of the Swedish forest industry and the way they contribute to making environmentally friendly like buildings and houses. (Jon Malmqvist interview 2024)

On the other side, the ecologist Sofia Gustavsson is not confident and criticises the methods used to calculate the quality of environmental actions. Considering only climate change in the spectrum of situations that include sustainability is a weak defence to appear ecologically friendly.

[...] we are always bragging about our energy production and net-zero carbon dioxide emissions and everything like that and I can be quite frustrated when the environment question is only carbon emissions. [...] We have this organisation in Växjö communist healthy that works with the energy production. [...] We are trying to like lead to the question what from what forests do these products come? How does that impact the biodiversity? How does that impact the ecosystems? Because if it's from like clear-cutting and all that, yeah, it can be good for the climate, maybe, but it can be really bad for the ecosystems. [...] Because they don't think it has been investigated. When trying to be sustainable in the energy topic, if we then destroy things for ourselves, then we have to fix after. It's like what was that for? So we're like pushing the problem forward. By doing that, maybe, we solve one problem by making myself a new problem. (Sofia Gustavsson interview 2024)

Instead, Henrik Johansson explained how the balance between these two aspects, economic development and environmental protection, is fundamental. This would

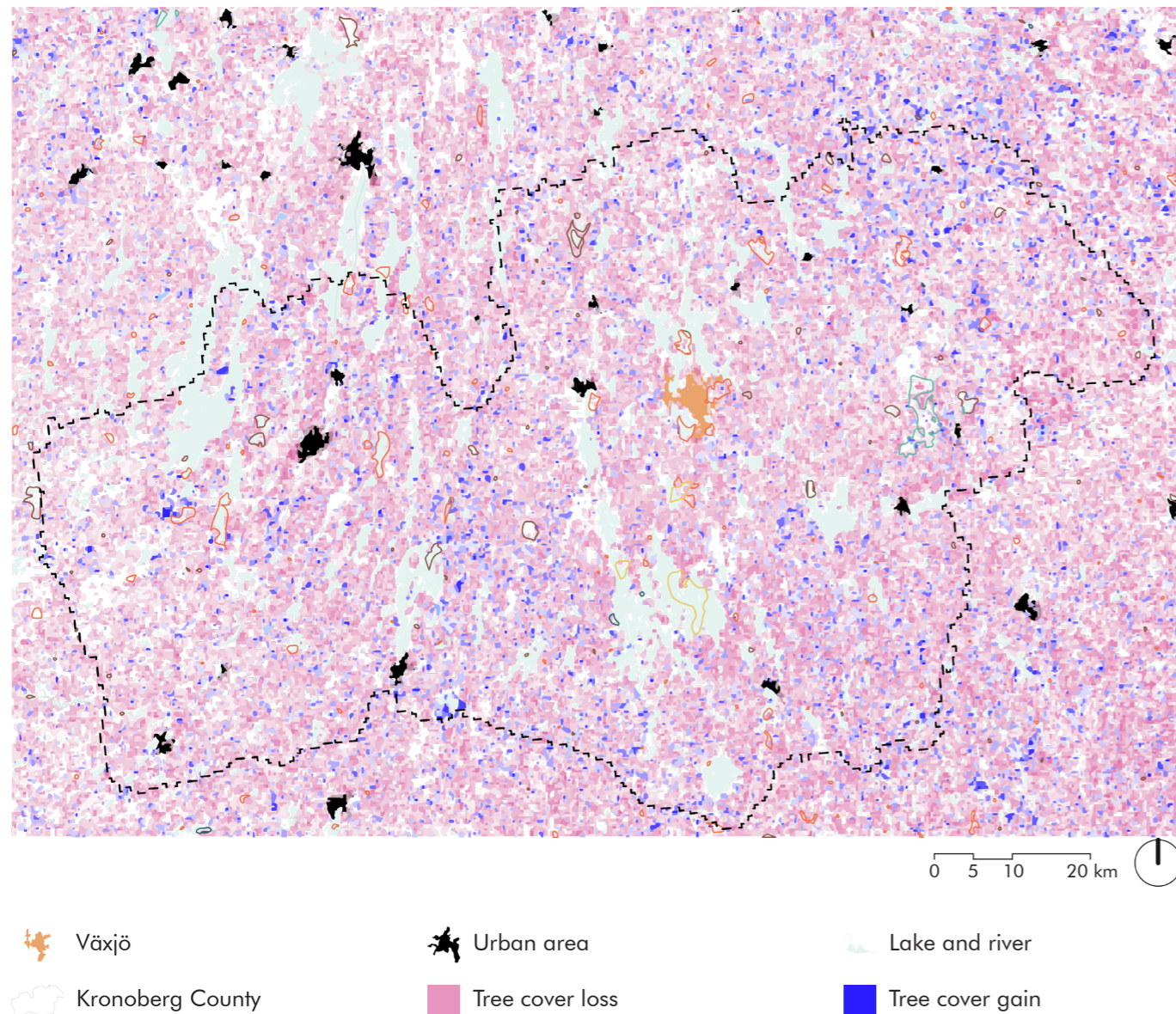


Figure 66: Tree cover loss and gain in Kronoberg County in the period between 2000 and 2020 (Source: Global Forest Watch)

guarantee the growth of the timber sector without aggravating the actual natural forest situation, but keeping the process of preservation of the natural habitats which were not part of the wood industry land.

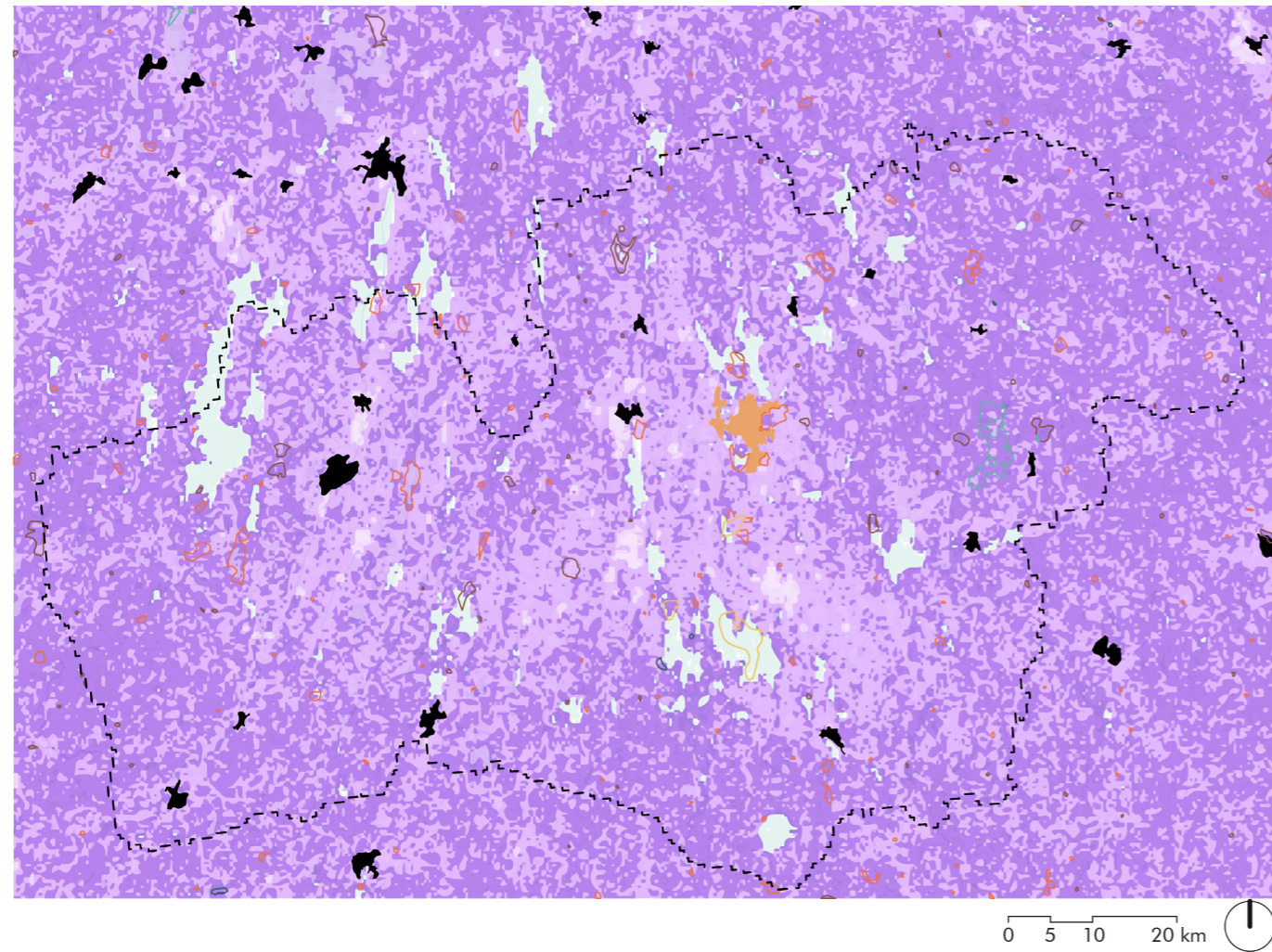
[...] protecting various ecosystems I would say is the main importance. [...] But then it is also like that a lot of the forest here, there you can consider them more or less being plantations from 150 years ago or 200 years ago that they this is the way that the Swedish forest management is working. So maybe then the important thing is to protect the forests that have never been forest plantations in that way because, in Sweden, you have this forest management where a lot of owners are owning forests, and they do that because they are growing that forest to send it as timber later on after 60 or 80 years and when they have cut down any trees they need to replant 3 trees, so there is always a regrowth of the forests themselves, but the ecological qualities of the forest plantations is less than the natural forests. (Henrik Johansson interview 2024)

The awareness about the local forest is not only a perception of some ecologists but it is confirmed by the data and the analysis made in Kronoberg County. The map in Figure 66 shows how the tree cover loss is much higher rather than the gain in the period between 2000 and 2023. The losses are not directly intended as deforestation but as a clear-cutting process that could imply a subsequent plantation of new trees. However, the areas in which it was verified an increment of plants is not relevant enough at least to balance the general losses in forest areas, around 17% of the land surface (see Figure 43 in the subchapter Structural data), and the reforestation operations of the forest industry (www.globalforestwatch.org). To contrast the loss of quality of the woodlands, some private owners protect and maintain a portion of their forest for the use of the population as a recreational area and to protect the habitat of the species (Jon Malmqvist and Henrik Johansson interview 2024). However, this practice is not regulated by norms or laws, so it is completely voluntary and is not possible to rely on this due to the uncertainty of the quantity of these surfaces and the quickness with which the privates are able to change their ideas and start using them.

Despite the diverse ideologies and the lack of regulation on the national and local levels about how should be managed the forest areas, a few changes in the actions and the mentality of Växjö municipality are distinguishable. Firstly, the increment of the protected regions guaranteed a diversification of the natural ecosystems, since they include several biospheres, such as forests, wetlands, lakes and agricultural areas, to ensure the protection of the biodiversity of trees and animals present in the territory as well. These preserved areas do not have a large extension, since it is only 3.7% of the total surface of the municipal area. Nonetheless, the majority of the protected zones are closed to the urban areas incrementing the accessibility and the recreational value for the inhabitants (Henrik Johansson interview 2024). Another strong decision of the public institution in Växjö, taken in 2021, is the conclusion to use the land owned by the municipality as a productive forest and, instead, these are growing with rewilderness methods to implement the biodiversity loss during the industrial use (Sofia Gustavsson interview 2024).

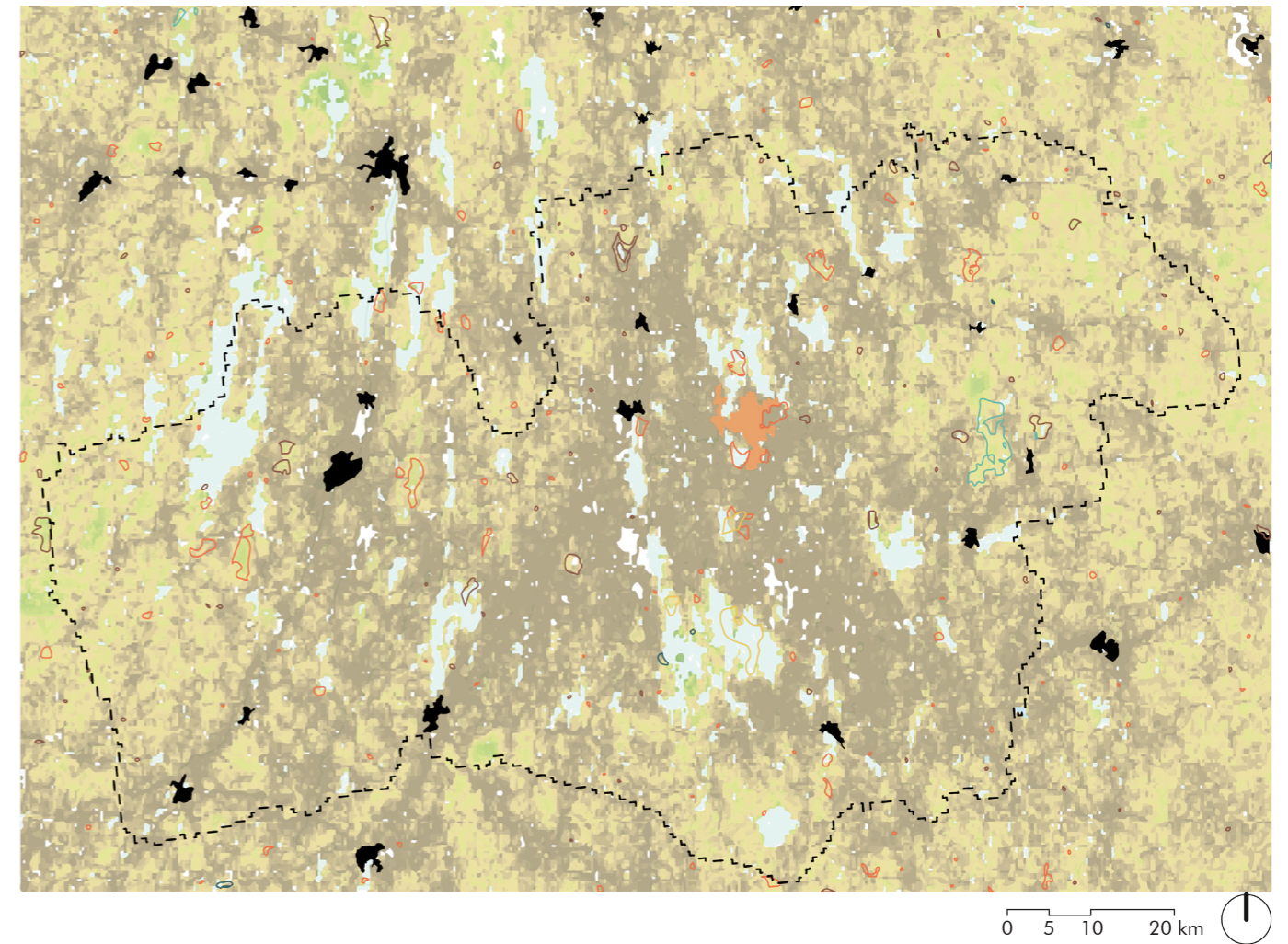
The actions of the forest industry are not only affecting the quantity of tree cover in the land, but the **monoculture** and the cutting cycles are the cause of biodiversity loss. The industrialisation and the reduction of variety for the habitat of species broke the integrity of the natural forest, and nowadays it has become a rare exception in the exploitation normality.

The few areas where humans are reluctant to bring their activities usually overlap with the natural reserves. The intactness of the biodiversity, so the situation of the actual variety of species in relation to the biodiversity that would be present without human interference, and the integrity of the forest landscape are strictly related: the higher is the human activities in a certain area and the lower would be the possibility to found different species of animals, plants and insects. An example to



■ Växjö
 ■ Urban area
 ■ Lake and river
 Kronoberg County
 Low intactness High intactness

Figure 67: Biodiversity intactness in Kronoberg County in 2019 (Source: Global Forest Watch)



■ Växjö
 ■ Urban area
 ■ Lake and river
 Kronoberg County
 Low integrity High integrity

Figure 68: Forest landscape integrity index in Kronoberg County (Source: Global Forest Watch)

prove this phenomenon is the area that surrounds the city of Växjö. The plantations are the most frequent typology of forest in the municipal territory, reaching 85% of the total woodland cover; the processes of transformation started in the last few years did not have improved significantly the situation yet, since it will be a slow operation in the mean of time. However, the measures are not enough to contrast the alterations made by the industrialisation of the forest starting from the XVIII century, new strategies, the implementation of natural reserves, the rewilderness processes and more time are fundamental elements claimed by the activist and the citizens to redefine the forest environment in the city and, generally, in the Kronoberg County and Sweden.

A topic complained about by a local association, Hofs Lifs, is the **not respecting the mitigation hierarchy of biodiversity offsetting**. In Sweden, the Swedish Government Official Report on Biodiversity Offsetting is the national entity that regulates the offsetting of natural resources for public projects and areas and from 2017 also the voluntary offsetting of private individuals. The institution suggests a hierarchy to follow in case of construction in an area in which there is a presence of natural or environmental value. The passages are: avoid, minimize, restore and, as a last chance, offset. However, each municipality in its comprehensive power plan has an interpretation of this law that differs from the proposed hierarchy with missing passages or no clarification of the offsetting rules, distance and methodologies (Hanson and Olsson 2023).

One case in Växjö represents the omission of a precise law in this context: an area of 2000 m², that was part of a park in the north of the city centre, was converted into a parking lot, but without evidence of any action of the mitigation hierarchy and no movement of the natural value. The association, with the participation of numerous inhabitants, organised meetings and activities as a protest and they tried to convince the municipality to return to the original situation (www.underekarna.com).

Connected to the forest topic, the energy production system used in Växjö is another reason for internal contradiction. The Sandvik thermal and power plant is the main energy source system in the city and since 2020 has been running completely on biomass obtained from the by-products of the forest industry (Henrik Johansson interview 2024).

The local production of heating and electricity has many advantages: starting from the use of local, raw and renewable materials to the short distance from producer to consumer avoiding the dispersion of heat and electricity. The by-products, such as branches, roots and sawdust, for creating the biomass to burn in the plant was a perfect solution to reduce the cost compared to the oil fuel and the upscaling of waste materials, otherwise unused, had a great positive impact on the environment. As well, the movement of the ashes in the plantation helped to create a circular system for the growth of the new trees.

As time goes by, the population in Växjö grows as well as the request of by-products from the municipality to the forest industry. At the same time, new plants in the County were converted into biomass and the competitiveness to acquire the materials and it became an important part of the forest business. The owners were trying to gain more increasing the cost of the by-products due to the high demand. This situation does not alarm the municipality because the policy-makers and the politicians think that the technological evolution in the topic of energy solutions will progress more rapidly than the growth of the inhabitants, so the request for by-products will be the same amount in the future or even lower. However, this assumption cannot be the only reason to avoid investments in different energy sources on the public level as the circumstances are not the most idyllic. The **lack of alternatives to the biomass** in the CHP plant could be a problem in the next few years for economic and environmental issues: the rise in price and requests of the by-products could become unfeasible for the municipality; the overdemand and the growth of biomass necessary to satisfy the needs of the inhabitants could create a cycle in which the forest owners decide to increment the cutting of trees assuring the right amount of

by-products.

The contestations about the Sandvik plant are not limited to the energy source. Up to this moment, the municipality with Växjö Energi AB, the public company that provides heating and electricity in the city of Växjö, are working on the possibility of implementing a Bio Energy Carbon Capture and Storage (BECCS). This solution will help to reach the goal of net zero emissions in Växjö, but the cost will be enormously high. For these reasons, public opinion is divided. On one side, Julia Ahlrot's opinion, Head of Strategy & Global Relations at Växjö Energi AB, is in favour of the introduction of this technology:

[...] we have a possibility to capture the carbon, so to achieve carbon capture storage and that can be a very efficient way to receive their negative emissions. (Julia Ahlrot interview 2024)

The other position represents the point of view of the majority of the population and the opposition of the local government in which Jon Malmqvist is part of.

[...] there's a discussion right now. My part is centre-right and it depends a little bit how you see how you see on these kinds of issues. So there is a discussion that we might be aware about: it's called carbon dioxide capturing. We've seen some preliminary figures, and it seems to be extremely expensive and so my part is not that much in favour of this because it's a big risk for Växjö and I think when we were talking about sustainability from my point of view, I think it's important to include not only the environment, we have to include social aspects and economical aspects. (Jon Malmqvist interview 2024)

The economic issue is not the only doubt about BECCS as was said by Jon Malmqvist: public opinion is complaining also about the not resolution of the problem of carbon dioxide emissions but only a displacement without a real reduction of the CO₂ released.

The concern about the Bio Energy Carbon Capture and Storage frames perfectly the **greenwashing** concept that is attached nowadays to the image of the city of Växjö. Most of the population is protesting how the municipality is more focused on the maintenance of its green appearance rather than developing strategies to reduce effectively emissions and improve the environmental conditions in the territory. The same effect is happening with the companies that are established in the city: to preserve the image of sustainability of Växjö, they are improving the quality of their buildings in the city, but the actions undertaken in other sites are not respecting the same standards at all.

The place brand "European greenest city" seems like affected negatively the sustainable path that began in 1996 with the fossil fuel-free declaration. The pressure present overstepped the visibility of the work done till that moment and the possibility of obtaining an economic revenue took the place of the final sustainable goal. This does not mean the complete abandonment of green policies, but a downsizing of the importance and relevance of these actions.

The peak of greenwashing in Växjö was reached in 2018 with the nomination for the *Swedish Greenwash Prize* awarded by the magazine "Jordens Vänner" with the Centre Party's board for the government elections and the Swedish Forest advertising campaign (*Svenska Skogen*) (Hanson 2018). The municipality was accused "because they profile themselves as Europe's greenest city, but at the same time make major investments in car traffic and the local airport" (*ibidem*). The contestation is about the investments in biofuels for cars and especially airplanes. The project is still ongoing nowadays confirmed by Julia Ahlrot's interview:

[...] we have also been part of actually has a lead in a project about sustainable aviation fuel. So if it would be possible to produce aviation fuel from the forest residues. (Julia Ahlrot interview 2024)

The reduction of emissions and the sustainable source from which the biofuel will be obtained is used as a reason to increase the number of flights to improve the connections of the city in Sweden and internationally. The main issue is still the same as before: the economic aspect goes beyond for importance of the environmental topic, trying to maintain the sustainable image of the city but focusing more on the municipality income.

The image of Växjö that is shown on an international level does not completely reflect reality. A spatial tension could be seen in several areas and for a variety of issues and that is the real problem in the city. A lack of communication, mediation between the public institution and the population of the territory is the limit that is affecting the municipality. Cooperation and an alternative equilibrium between the environmental protection of natural resources and the economic development of local activities are the key elements to building the foundations of a new territory.

03.2 A proposal: Växjö as a forest

The issues that emerged in the previous subchapter affirm a need to expand the sustainable argument in the Växjö territory and, more in general, in the global intermediate territory. The environmental aspect is not only a mere question of numbers, but it is a deep debate that necessitates continuous research. Taking into account only the emissions, society will become climate-friendly, but will it be environmentally friendly?

The actions done and the policies applied till nowadays by the municipality of Växjö are a huge step towards the reduction of the human impact on the Earth and this deserves the reputation and the acknowledgements received during the last decades. However, to keep the title of “European greenest city”, new solutions and a wider range of parameters to calculate the sustainability levels are mandatory.

In this context, the thesis proposes a strategy that is applied in the city of Växjö to promote an alternative vision for the urban and non-urban, human and non-human spheres. The on-site analysis and the bibliographic research carried out and explained in the previous chapters have developed stimulating insights. As well the respondents of the interviews brought to the table concepts from those who live in the city daily and work with its spaces.

The proposal for Växjö works on the very idea of “forest”.

The history of the city is deeply connected with its environment and its biodiversity community. As a forest, Växjö is a city that promotes life. Crossing the boundaries and limits of sustainability, “the life of the forest” aims at integrating humans and non-humans through forms or mediation (Grusin 2015).

Within the intermediate condition, mediating can be an alternative to the rigid modern planning that defines the city. The metaphor of the forest is intended as a form of coexistence that promotes the necessary policies related to renewable energies and green initiatives together with empowering the multiplicity of the form of lives.

The proposal for Växjö is a strategy that can be divided into three main actions, each one of which is related to one major issue and reason for conflict between the municipality and the citizens, activists and local associations:

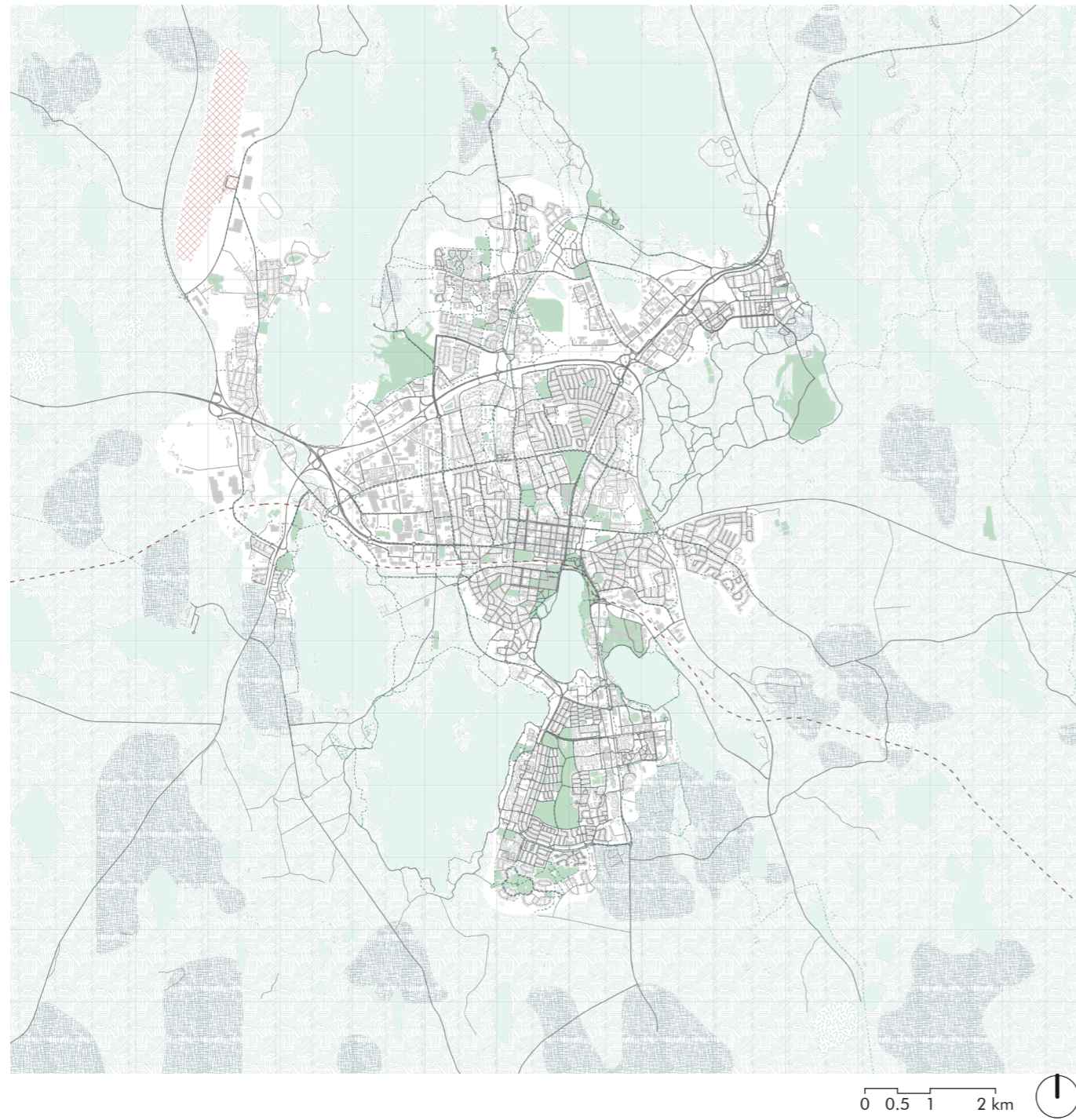
- the population growth and urban expansion;
- the energy production;
- the use of the forest.

They are followed by project proposals: the forest city, the energy community and the community forest. Anyway, each of them will be explained in more detail later in its own chapter.

The first one, the **Forest City action**, concerns the methodology with which it is possible to design an urban expansion while taking into consideration and integrating the characteristics of the forest ecosystem within it. The urban area becomes an integral part of the forest and vice versa, the two elements interpenetrate, giving rise to a different way of living than contemporary society is used to.

The second one, the **Energy Community action**, deals with an improvement of the current energy system, which is based almost entirely on the Sandvik power and heating plant. The implementation of various renewable energy sources, such as sun and wind, would allow a reduction in dependence on the by-products of the forest industry and also a greater economic return due to the almost complete absence of a constant and lasting economic outlay.

Finally, the third, the **Community Forest action**, deals with a rethinking of the use of certain forest areas currently used mainly as plantations for the industry. This change includes a rewilderness at the level of biodiversity of both animal and plant species, but also the use of them as a recreational area for the community and inhabitants. The maintenance and growth of these areas is based on a community organisation system in which any association and inhabitant can participate.



- Forest
- Wetlands
- Urban green area
- Bicycle path
- Agricultural area
- Lake and river
- Railway
- Walking path

Figure 69: Map of Växjö territory (Source: Global Forest Watch, Växjö kommun)



Figure 70: Orthophoto of Växjö territory (Source: Google Earth)

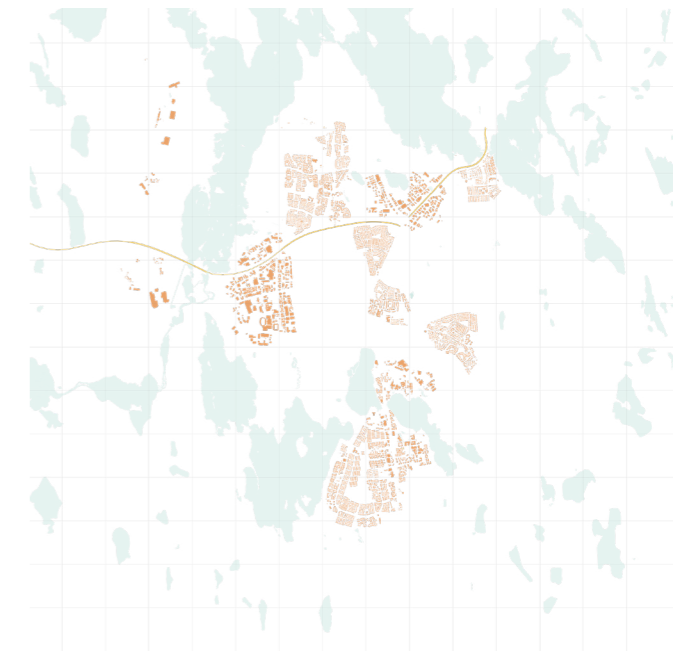


Växjö as a Forest



Forest City action

Energy Community action



Community forest action



Figure 71: Intervention areas of the strategy and its actions
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03.2.1 Action 1: A Forest City

The Forest City Action deals with the problem of expected population growth in the Växjö urban area. At present, the residential supply within the city is not able to cope with the forecasts made; therefore, there is a need for densification of the spaces currently in use through the construction of multi-storey buildings or to expand the city boundaries to find fertile ground for the construction of residences. This second option does not guarantee adequate levels of sustainability, at least in the way it has been carried out so far.

Different methodologies for urban expansion are necessary to guarantee new construction without losing the environmental value of completely cutting down portions of the forest. The emblematic example is the case study of Tapiola in Finland. Tapiola was a new settlement built in the 1950s in the Helsinki metropolitan area: it is based on the concept of sharing space between human settlement and the forest environment. The settlement aimed not to destroy the natural area, but to build within it. The project creates a space that has the least possible impact on the ecosystem including a space for human life [Figure 72, 73 and 74] (Viganò 2023). This concept of the forest city is taken up in the strategy for urban sprawl and densification areas within the city boundaries. An attempt was made to replicate the ideas expressed in the case study within portions of Växjö. At the same time, the adaptation of the areas on the city's outskirts that have not yet been fully urbanised has made it possible to partially integrate this concept by bringing the forest, or rather the forest ecosystem with its characteristics and trees, into the existing urban tissue. Building in harmony with nature allows for minimal loss of the environmental value of these areas, which is regained through the expansion of the forest environment within the city, minimising the ecological impact of human action. To continue in this direction, a change in the level of priority in the mobility system is also necessary: driveways are reduced to a minimum in order to favour the use of soft mobility or public transport, the main area according to the interviewees that are experiencing problems in achieving sustainability goals within Växjö, while minimising emissions. The area surveyed, Vikaholm, is located south of the city and has wooded areas used for industry and an urban area that is being developed and completed.

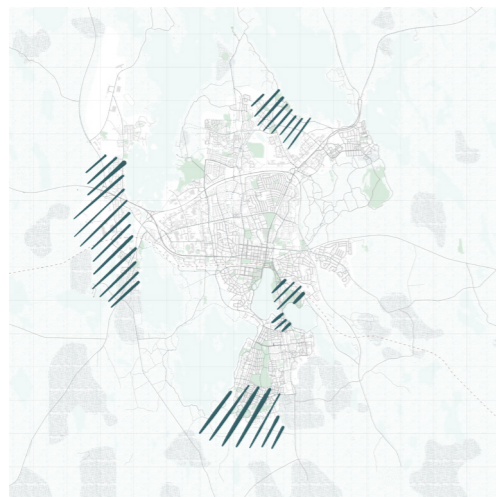


Figure 72: Tapiola garden city and its distinctive Leimuniitty park (Source: Hautamäki 2022)

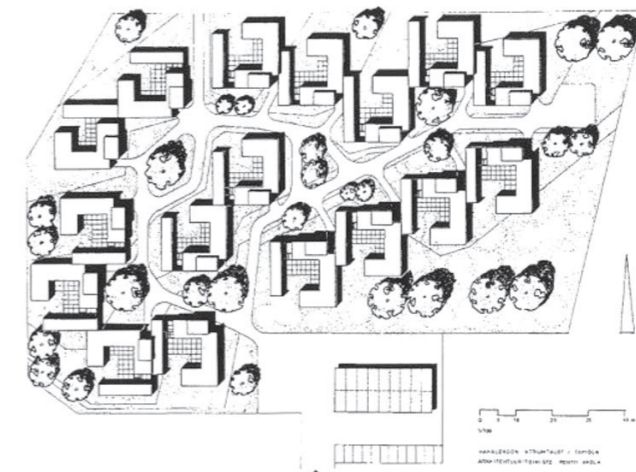


Figure 73: Pentti Ahola, patio hoses, 1962-1964 (Source: Viganò 2023)



Figure 74: Pentti Ahola, patio hoses, 1962-1964 (Source: Viganò 2023)

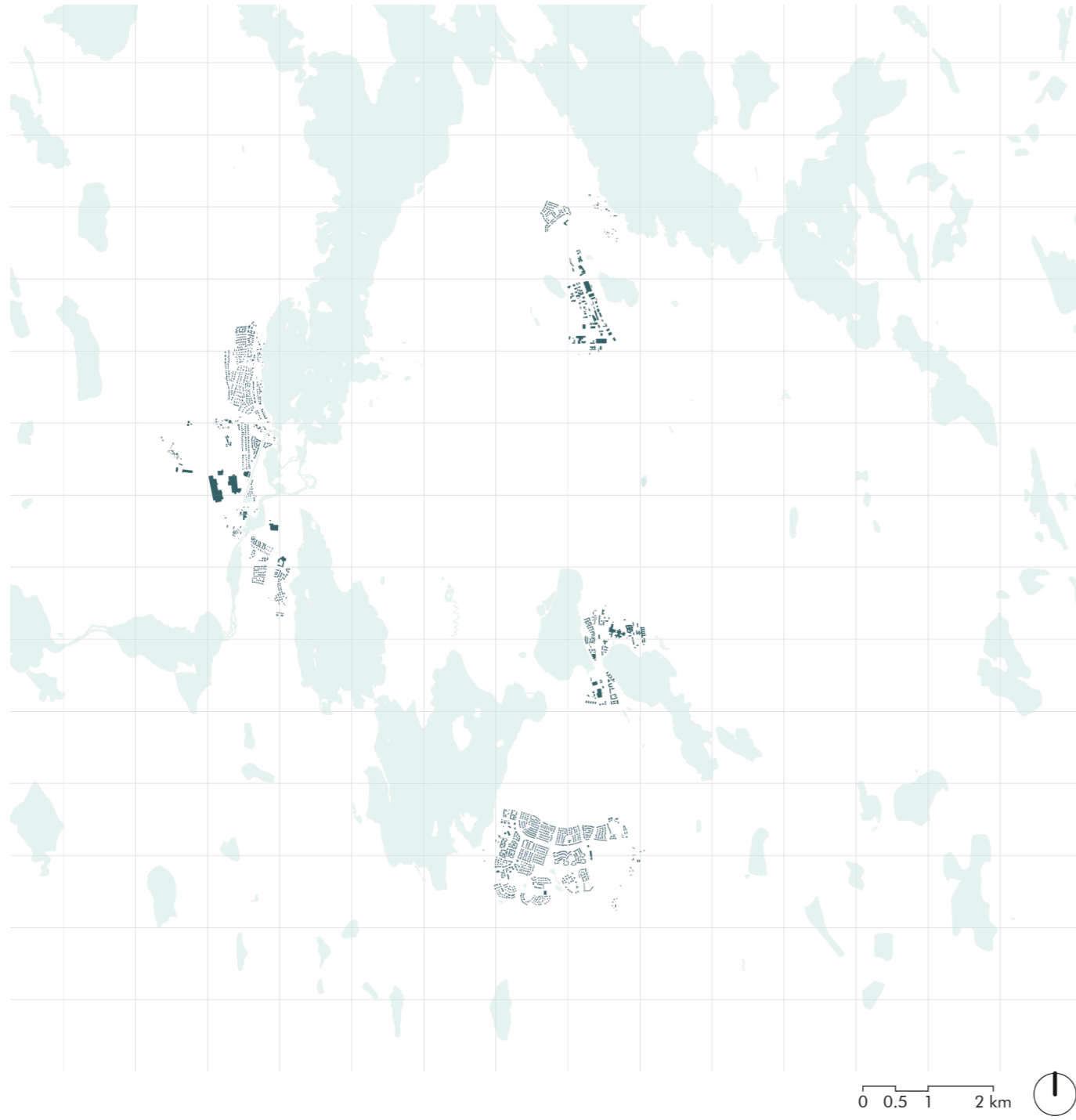


Figure 75 : Intervention areas of the forest city action

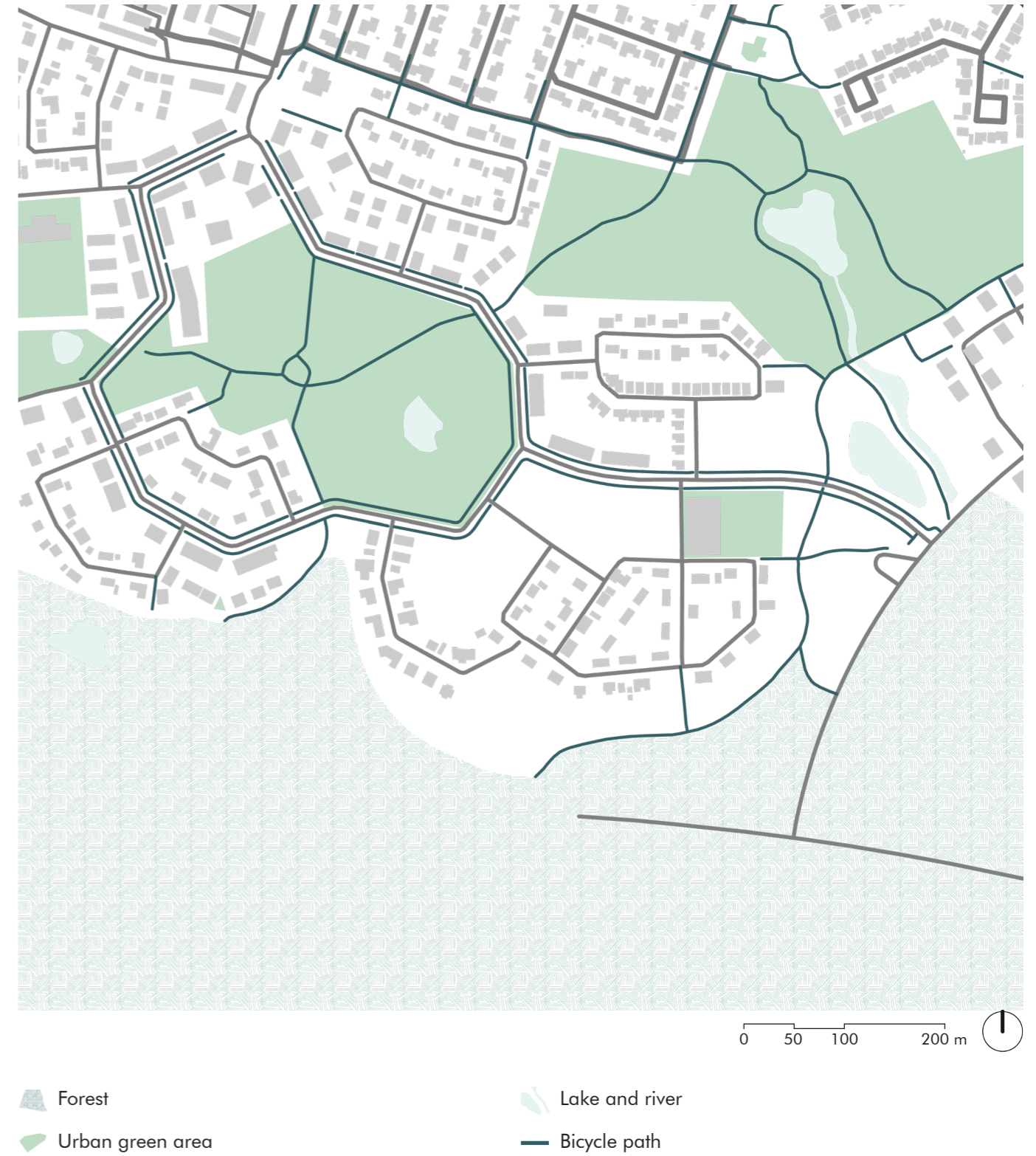


Figure 76: Map of Vikaholm, Växjö

- Forest
- Urban green area
- Lake and river
- Bicycle path



Figure 77: Orthophoto of Vikaholm, Växjö (Source: Google Earth)

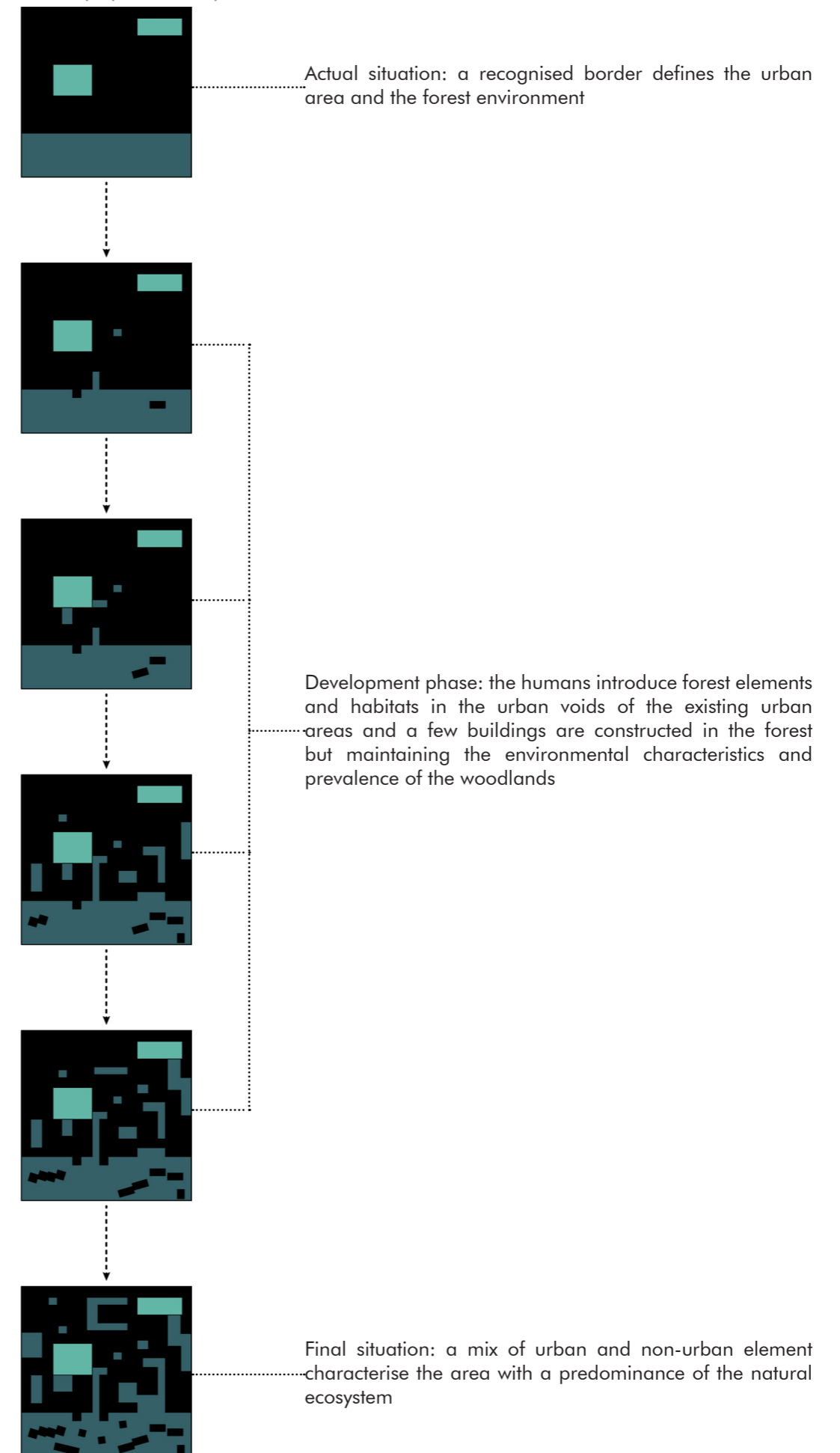


Figure 78: Evolution scheme about the transition to a forest city
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-  Forest city building
-  Road
-  Parking area
-  Urban forest area
-  Bicycle path

Figure 79: Project of the forest city action

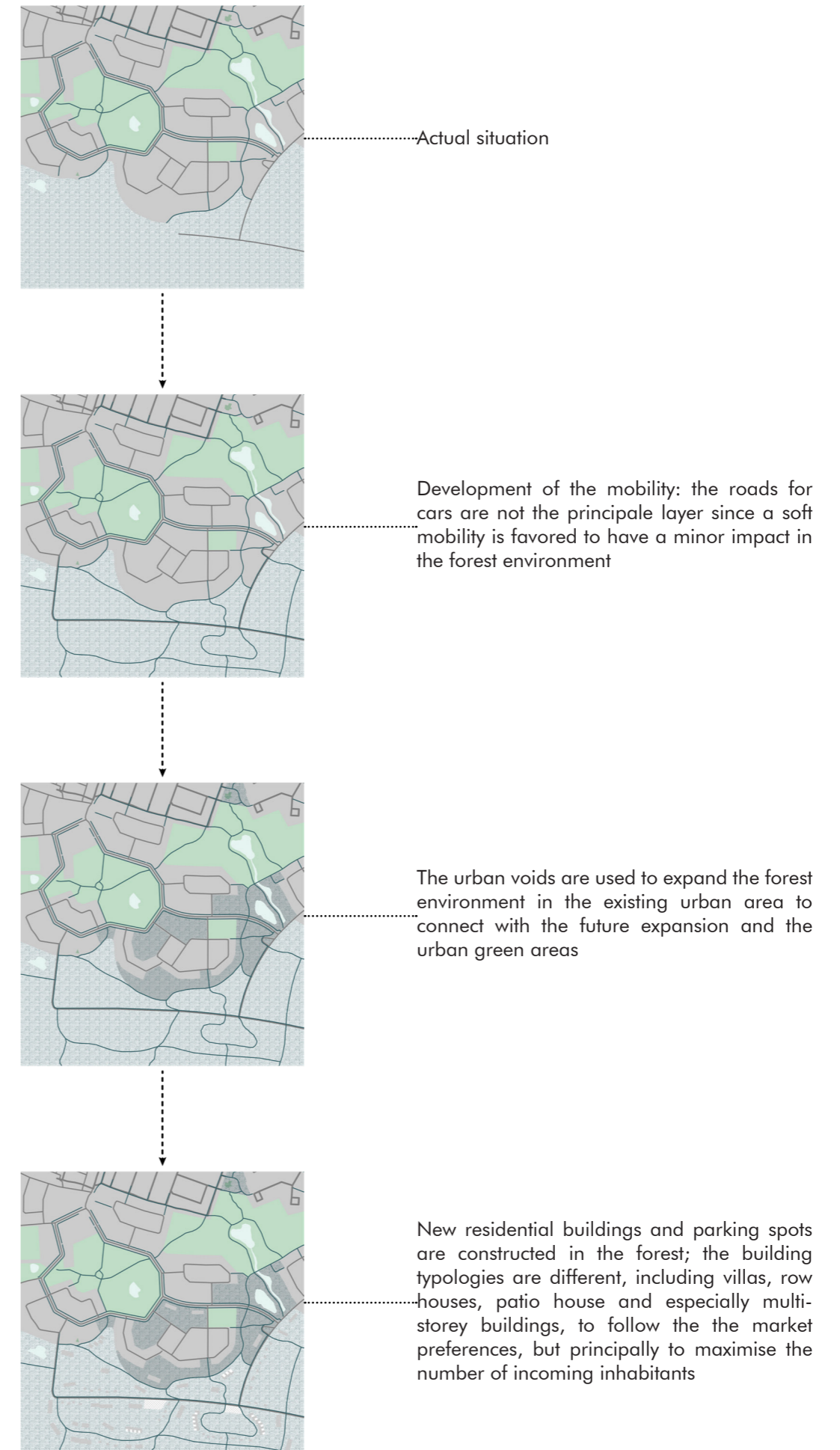


Figure 80: Development phases of the forest city action in Vikaholm, Växjö

03.2.2 Action 2: An Energy Community

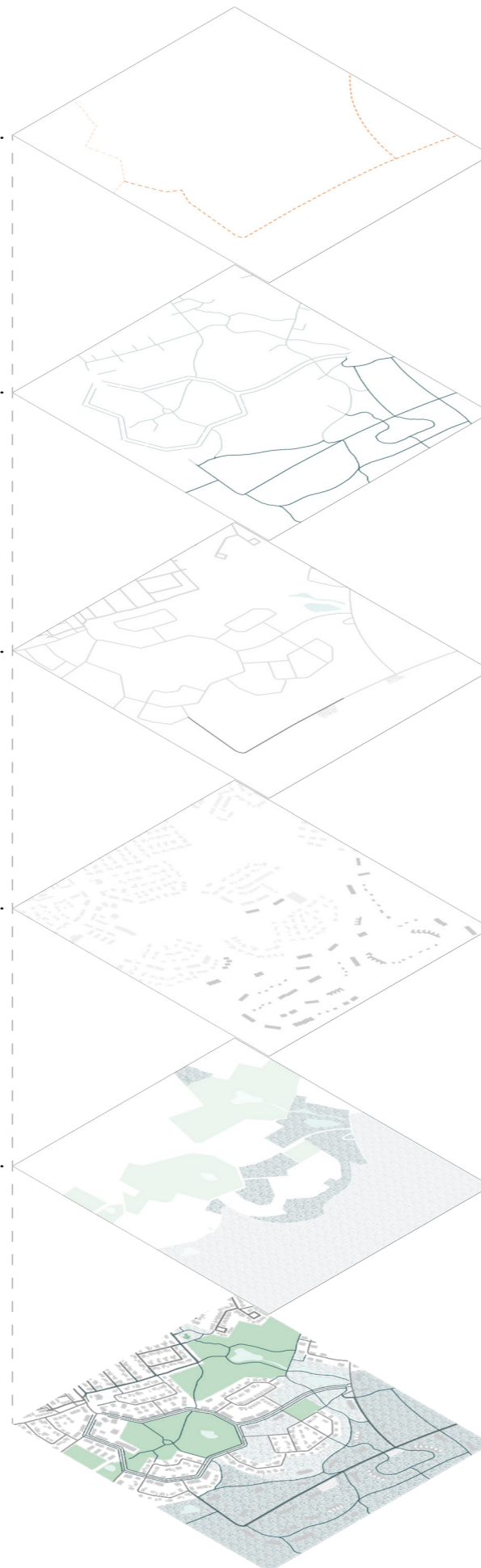
The bus line are extended already during the construction of the buildings to show an alternative mean of transport to the future inhabitants

Pedestrian and cycle paths connects each part of the expansion area and with the existing network to privilege a soft mobility and, consequently, the reduction of emissions caused by the transports

The shinking of roads is due to disadvantage the use of cars for the mobility in the city

Diffuse new constructions in the forest areas have a low impact on the ecosystem without a massive biodiversity loss; the prevalence of multi-storey buildings let introduce in the city the maximum number of inhabitants with the less possible use of soil

The expansion of the forest environment permit a major quality and health in the existing urban area with an implementation of biodiversity and ecosystems



The current energy situation within the city is not the best due to the total separation between the point of view of the municipality and the one of a large part of the citizenship: the public institution thinks that the use of by-products from the forestry industry has no environmental impact; on the contrary, the population thinks that the increase in the number of by-products required for energy and heating production in the Sandvik plant is also leading to an increase in the amount of logging in the plantations so that the landowners can secure a greater economic return from their property.

This conflicting dualism can be assuaged through the introduction of an Energy Community within the city of Växjö in order to ensure a fairer division of energy power, instead of the current near-monopoly by the public institution. At the same time, including diversification of renewable energy sources, both from private and public ownership, would ensure that more green energy will be available by reducing the pressure on the existing biomass plant. Solar and wind energy are the most accredited for significant development in the area.

Photovoltaic panel systems can offer many benefits: the first is the ease of installation and adaptation to various building types, both existing and new, and thus the possibility of a rapid expansion process; the guarantee of a technology that is constantly improving in terms of resistance and efficiency; and the already existing process of installation and use by individuals within the city. The possibility of exploiting large roofs in industrial areas would allow the production of large amounts of energy without the use of new land. However, this technology has its drawbacks, such as the need to replace the panels for the medium/short term, i.e. after about 20/25 years of use.

The second option, wind energy, can have different developments due to the various technologies and solutions that can be used. Wind turbines can be of different sizes and installed in several locations. The solutions used in the strategy, which are perfectly suited to the characteristics of the area, are the use of micro turbine systems installed both on the ground and on industrial buildings, and also roadside wind turbines. Unlike solar energy, the strong presence of wind throughout the year ensures constant energy production. In contrast, the solar energy and the energy produced from biomass in the Sandvik plant are complementary: the solar energy produced is greater in the summer season when the number of hours of sunlight is high; on the other side, the plant has a considerable production of electricity in the winter season and in autumn and spring as it is produced at the same time as heating.

The composition of this system guarantees a greater amount of energy production in general, but, simultaneously, a diversification of the energy source so that we are no longer solely dependent on forest industry waste.

The area surveyed, Hövshaga, is located north-east part of the city and it is characterised by an industrial area.

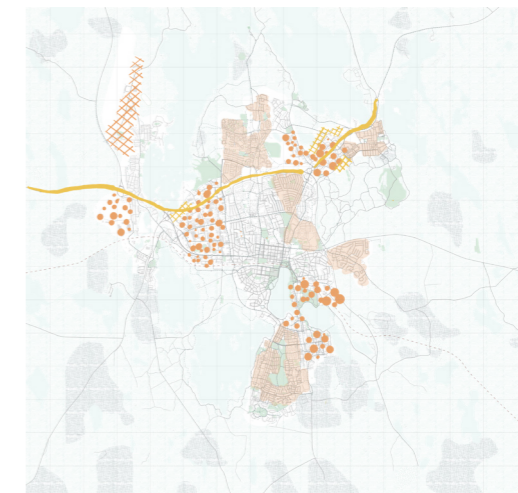


Figure 81: Action components and strategies development

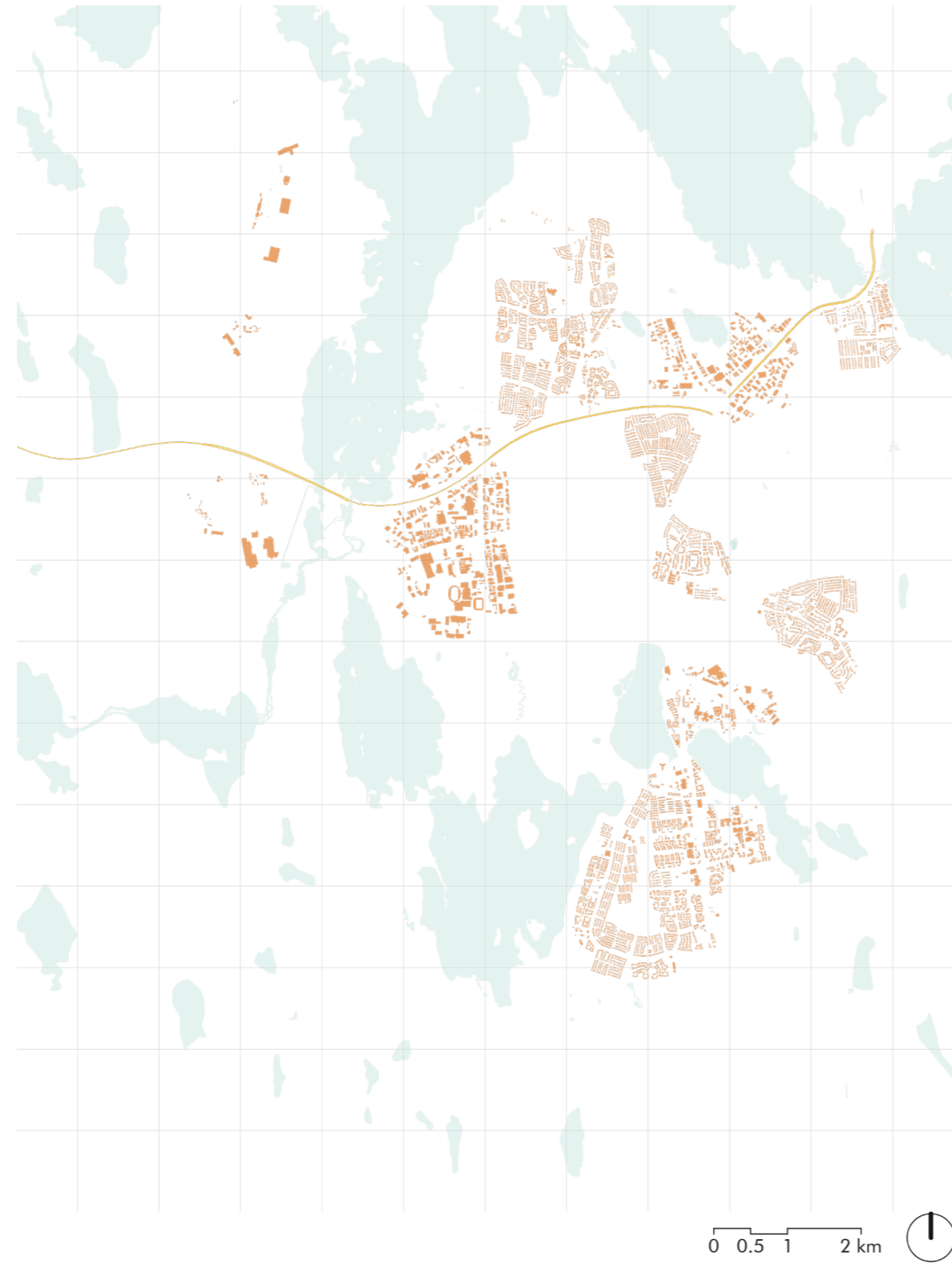


Figure 82: Intervention areas of the Energy Community action



Figure 83: Map of Hövshaga, Växjö

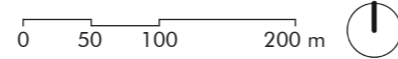
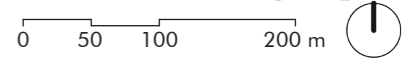
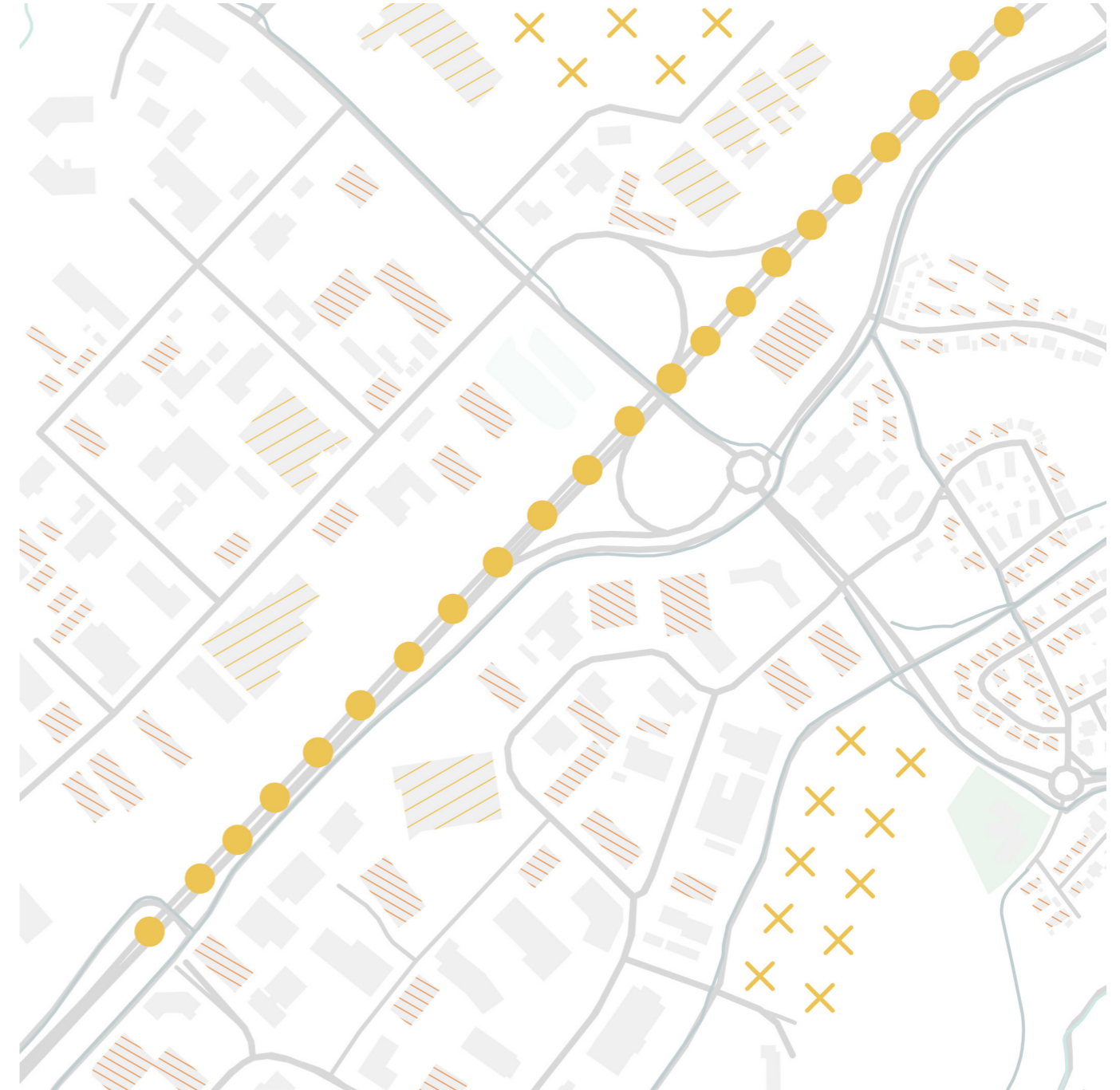


Figure 84: Orthophoto of Hövshaga, Växjö (Source: Google Earth)



- Roadside wind turbine
- Micro wind turbine
- Micro wind turbine on buildings
- Solar panels

Figure 85: Project of the Energy Community action 131

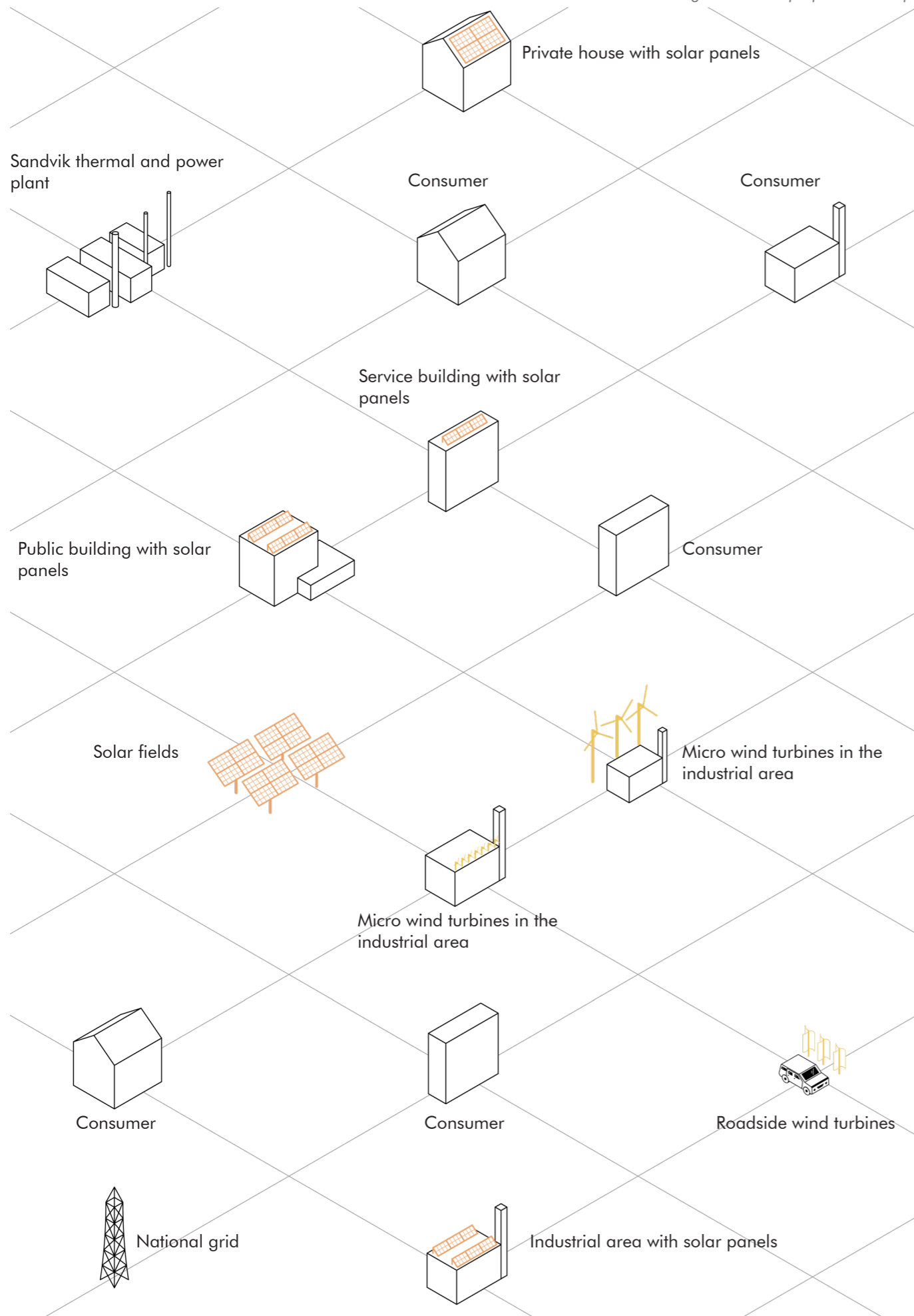


Figure 86: Scheme about the development of the Energy Community in Växjö territory



Figure 87: Expectation of renewable source of energy production in the different seasons

03.2.3 Action 3: A Community Forest

Lastly, a rethink of a portion of the forest environment is needed due to the exploitation of the natural ecosystem during the last centuries of plantation and industrialisation. The idea proposes a communitarian use and maintenance of woodland areas in which the population is directly involved in the protection measures.

The creation of a Community Forest is probably the most complex action of the three proposed in this thesis, at least from an organisational point of view. It consists of the creation of formerly productive forest areas and converting them into community-managed areas.

The main objective of this strategy is the restoration of natural environmental values through a process of biodiversity conditions lost in the industrialisation of these ecosystems. Equally, the return to a natural environment brings with it considerable benefits for both the natural sphere and the well-being and quality of life of citizens: accessibility to natural areas increases people's mental well-being and rewilderness would lead to an increase in the biodiversity of animal species in the area. The coexistence of the space between humans and non-humans is a fundamental element on which the action must be based. To be able to achieve this objective, the use of these spaces can vary widely: starting with recreational use, a use to restore the local fauna and flora with low interaction with the human sphere, or a mix of these two options, ensuring that the area is shared. However, the intervention and the construction of artificial paths or structures is the least possible to have a reduced ecological impact and to maintain intact the lives of the local biodiversity. These protected areas could be useful in the future to block eventual urban expansion and guarantee the level of biodiversity offsetting in some urban areas in the city.

The process for the management and decision-making of these areas requires the creation of ad hoc systems. The creation of a committee is necessary so that all representatives of the various associations, landowners and citizens are involved. However, it still needs control by public institutions in order to guarantee and control the sustainability standards of decisions and actions carried out in these spaces.

The area surveyed, Hövshaga, is located in the northern part of the city and it is characterised by a majority of forest development.

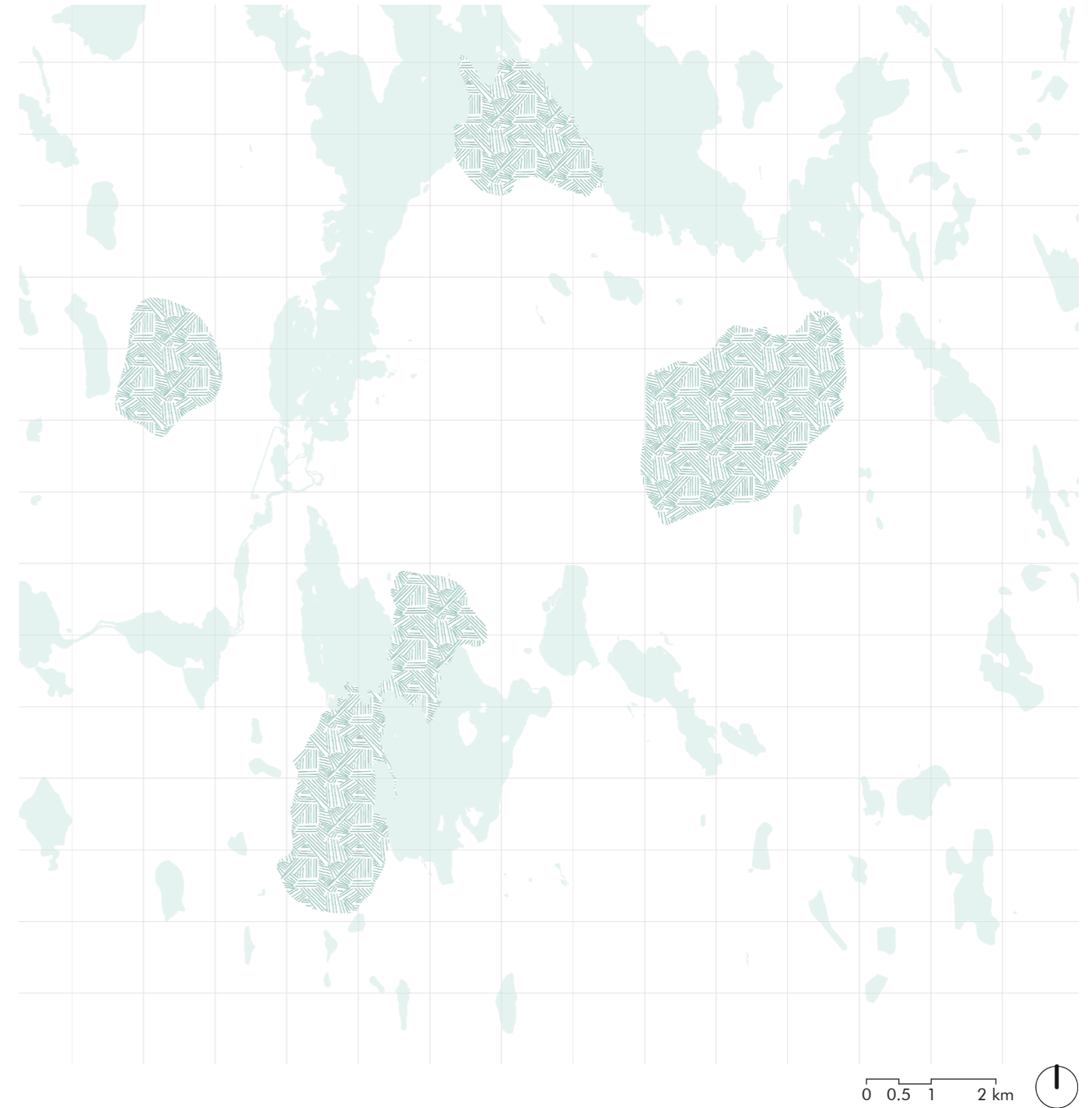
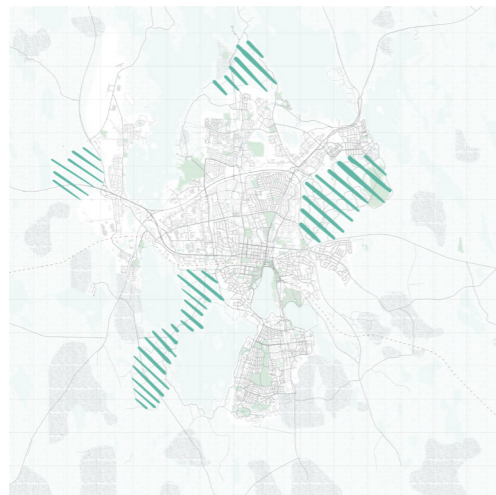
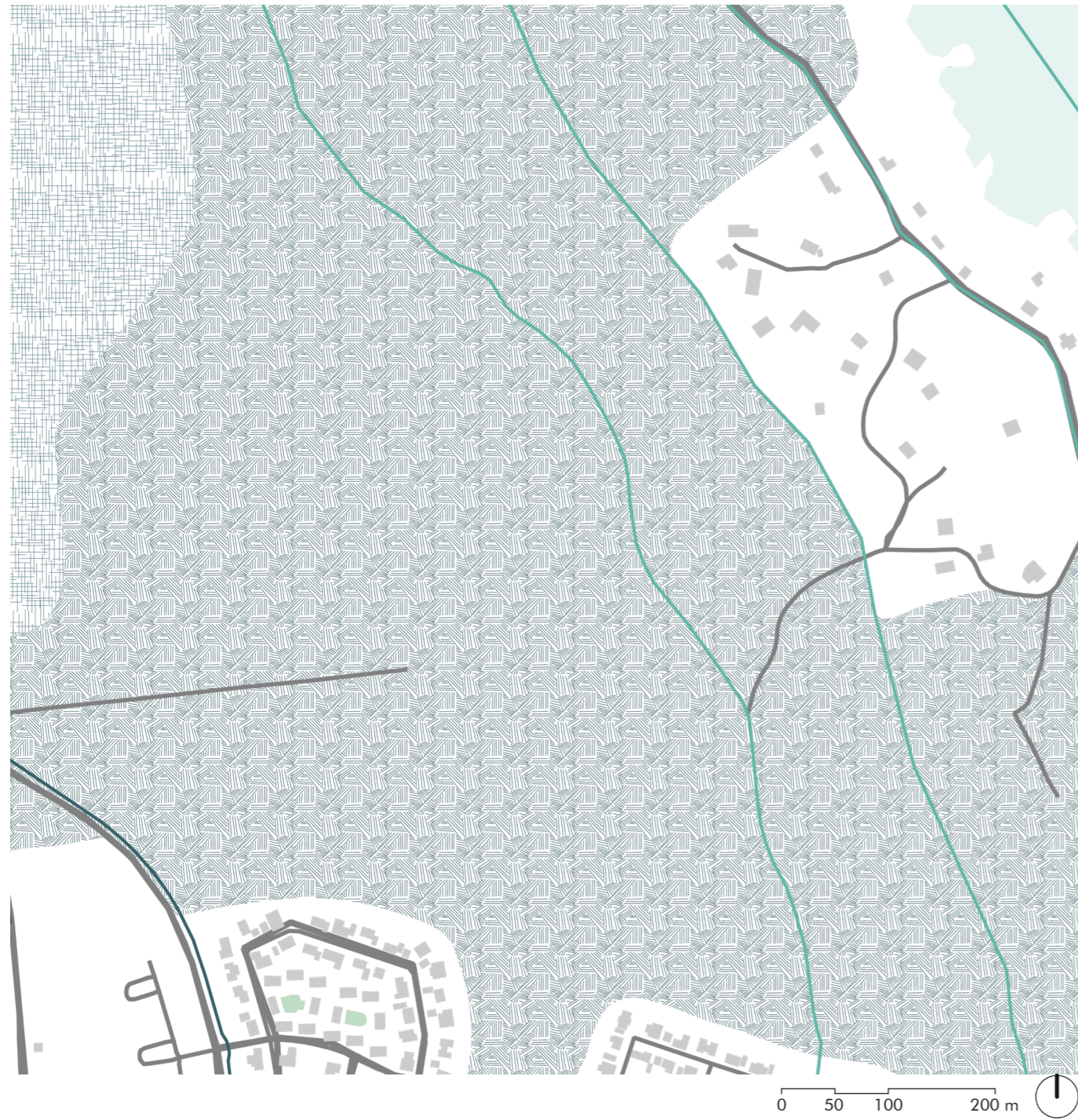


Figure 88: Intervention areas of the Community forest action



- Forest
- Urban green area
- Bicycle path
- Agricultural area
- Lake and river
- Walking path

Figure 89: Map of Hövshaga, Växjö

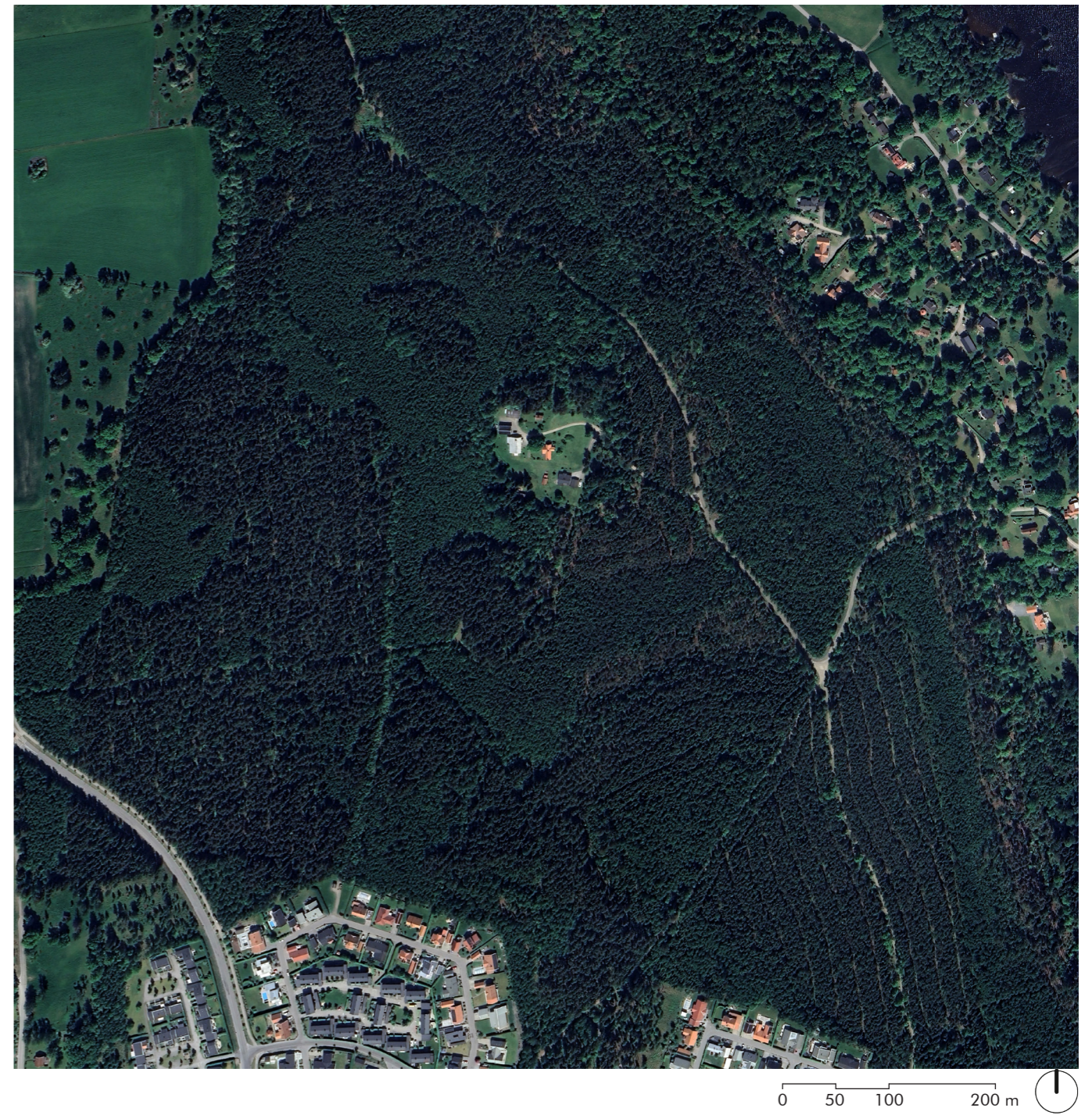


Figure 90: Orthophoto of Hövshaga, Växjö (Source: Google Earth)

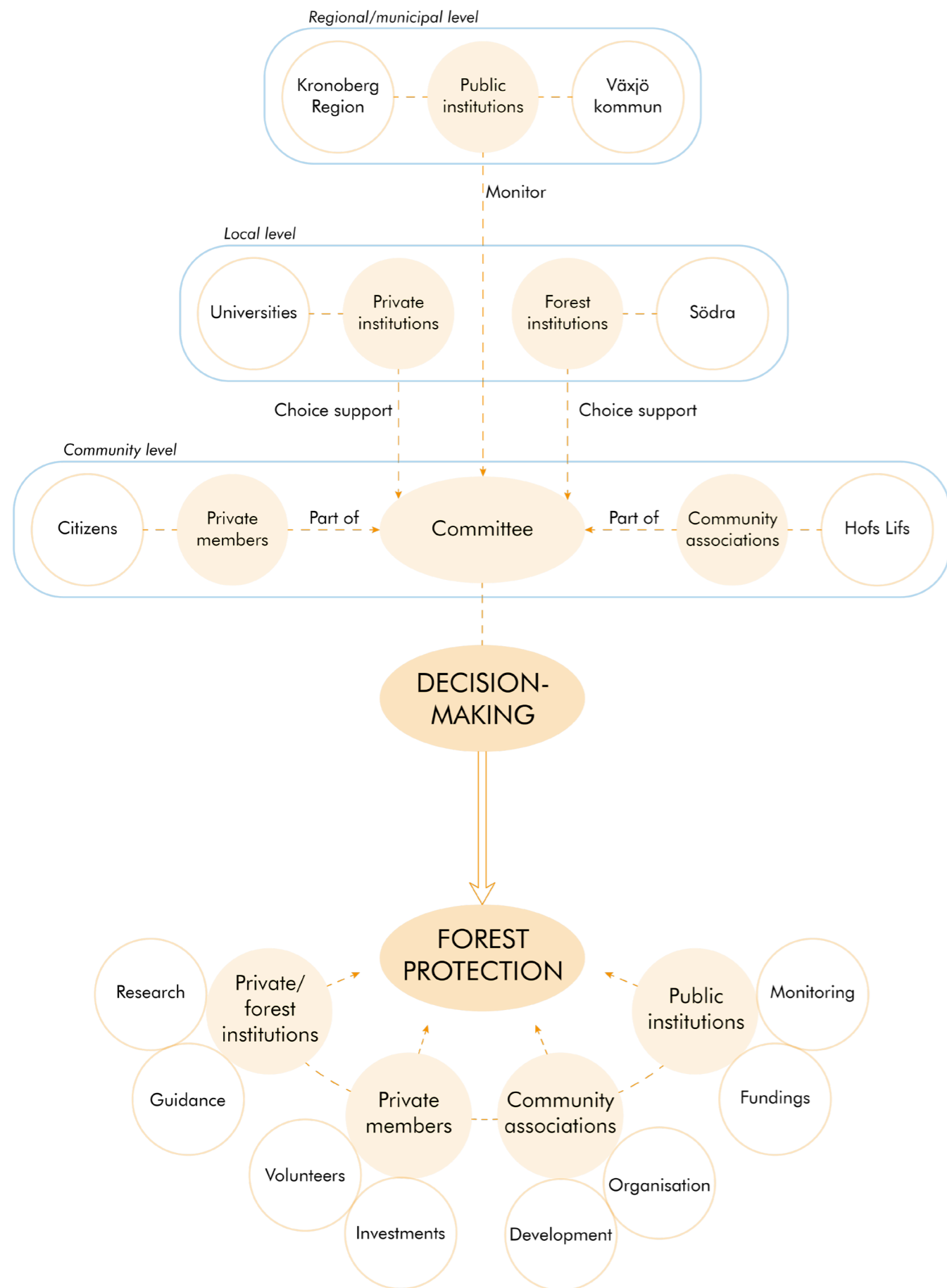


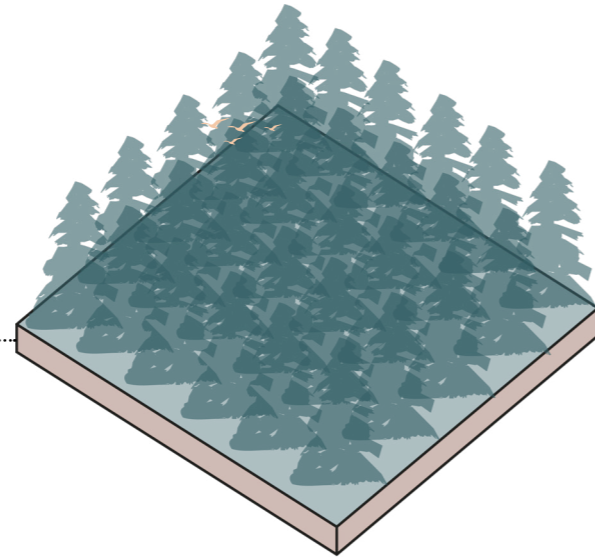
Figure 91: Scheme about the roles and the decision-making organisation in the Community forest

	Stakeholders	Objectives	Actions	Tools/activities
Regional/municipal level	Public institutions Växjö kommun Kronoberg Region		Monitoring of the decisions made by the committee Investments and fundings in forest protection projects	Laws and policies Attraction of investors
Local level	Private institutions Universities Linnaeus University Forest institutions Södra	Forest protection	Research and studies on the evolution of the forest ecosystem Data analysis Guidance in the committee decision-making process from researchers and experts	Seminars Workshops
Community level	Committee Community associations Hof Lifs Private members Citizens		Organisation of the meeting of the committee Development of the projects Volunteering participation of the citizens in decision-making and protection of the forest environment Investments and donations in forest protection forest	Participatory design

Figure 92: Summary of the stakeholderes, objectives, actions and tools in the Community forest organisation

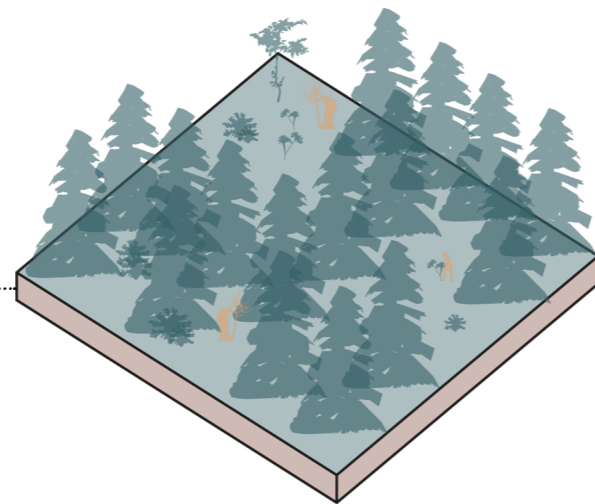
ACTUAL SITUATION

The forest is used especially as an industry for wood production and it is characterised by a monoculture of the trees without a high presence of biodiversity



REWILDERNESS

The communities, associations and the citizens plant local species of trees to increase the biodiversity level and create an habitat for different species



BIODIVERSITY FOREST

The growth of new plants create the optimal habitat to the return of animal species, implementing the biodiversity in the forest environment and developing an ecosystem more similar to the natural forest

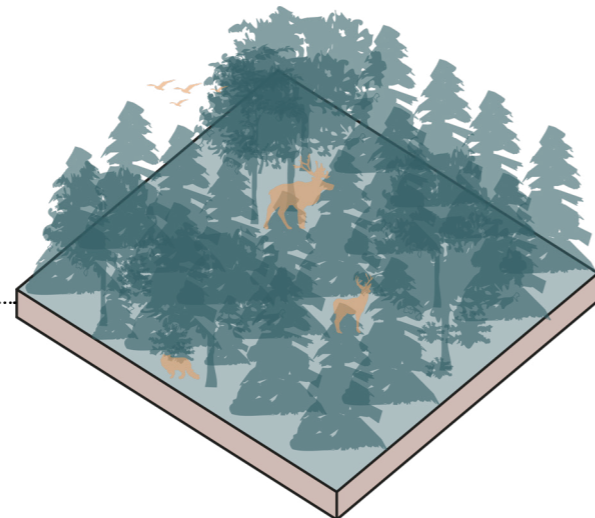
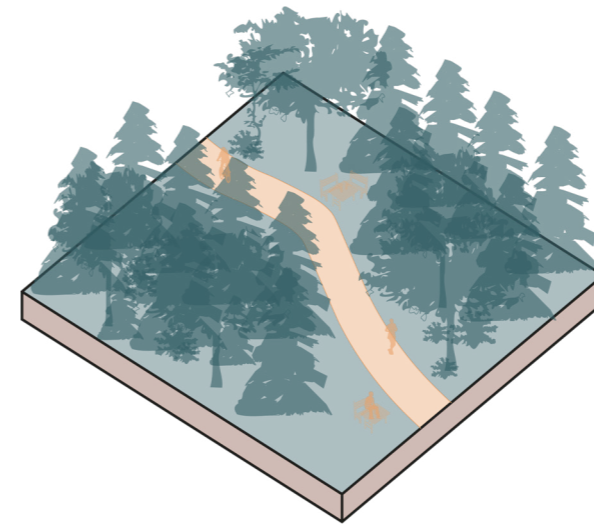


Figure 93: Evolution of the rewilderness process for the community forests

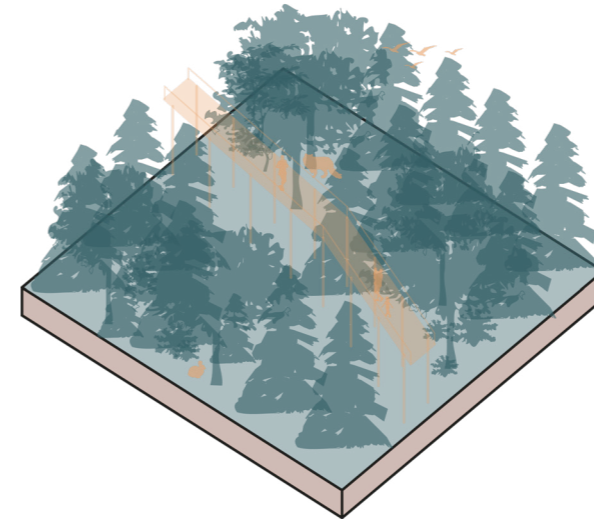
RECREATIONAL AREA

The community forest is used principally as a recreational area for the humans, increasing the well-being of the inhabitants that can use these spaces to walk, ride a bike and as a meeting point



COEXISTENCE

The citizens can benefit the forest environments through elevated walkways without disturb and have a direct contact with the local fauna



BIODIVERSITY USE

The community forest is maintained only for the restoration, the development and the protection of the local biodiversity

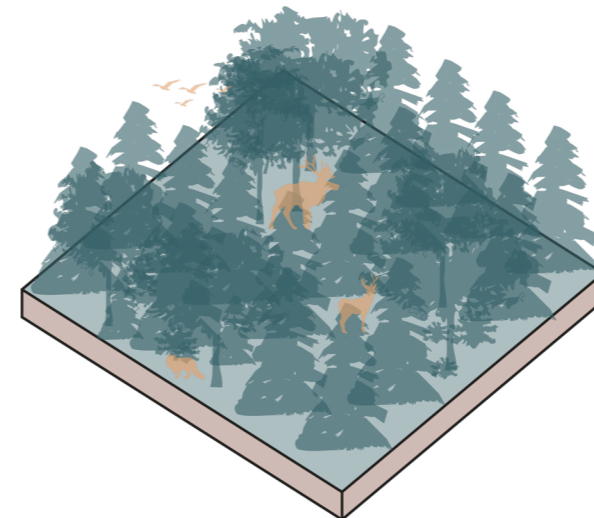


Figure 94: Different uses of the community forests

03.3 Inhabiting the limits of a sustainable city

The thesis has examined the case of Växjö from several perspectives in the analysis and research chapters producing valuable insights that have resulted in the proposed strategy for a possible development of the territory. While the research has provided a solid foundation, there are a few areas that require further exploration and consideration to enhance the understanding of the city's sustainability challenges and opportunities.

The case of Växjö is unique.

The history, the policies and the sustainable development applied not only in the urban area but in the whole territory of the municipality, have produced a city internationally recognised for its reputation and relevance. However, the analysis also shows us all the limits of this approach.

Firstly, a social limitation is visible. The change in the sustainability policy objectives, shifting from a pure sustainable achievement to a dominant economic goal, has accelerated a rift between the municipality and the population. The reasons for this breaking point can be attributed to the alteration in policy-making and the lack of a participation process that includes the inhabitants' proposals and ideas. In practice, it is a matter of democracy.

Moreover, there is an environmental limit. The industrialisation and the exploitation of the forest ecosystem have generated the depletion of biodiversity species and variety in the local region. This loss has consequences for the possibilities of regeneration of lives in the natural biosphere, but also an erosion of a qualitative environment for human welfare and well-being.

Växjö is an exemplary case.

The elaboration of the strategy allows us to highlight several critical aspects of the sustainability policies applied in the territory. A rethinking of the contemporary shape and function of the project for the development of the city is necessary.

The proposal elaborated in this thesis for the territory of Växjö does not have the claim of being a problem solver of the tensions between the different actors or to extensively exploring the future of the city. However, it is an attempt to propose the project as a "knowledge tool" (*strumento di conoscenza*) (Viganò 2010). The plan would try to deal with the urban, environmental and political issues for the growth of the human society, but also for the prosperity of non-human life and ecosystem. What emerges, above all, is the urgency of a mediation plan, capable of reimagining authorship in forms of co-participation between the municipality, the citizens and the local associations to shape together the evolution of Växjö with a common vision. It is a "relational" form (Cerruti But 2024) in which sustainability is not intended as a policy but is more similar to a process.

The intermediate condition could be an approach.

The peculiarities and the characteristics of Växjö show several common features with the intermediate territories: sustainability must be interpreted in a specific manner. It cannot be treated univocally, and policies cannot be generalised. This is noticeable in the urban planning theories and evolution during the time. A rethink of the methods of analysing and producing strategies and plans for the urban areas' development is essential due to the incompatibility with the traditional approaches, that evolved during the centuries but were only applied for densely urbanised areas. The needs, the uses and the issues are different, so an adaptation of the methods and objectives is requested.

However, the intermediate condition could be the key. The same design approach can shift in the direction of mediation between those who inhabit a space and the territory itself.



BIBLIOGRAPHY

Alarcón Ferrari C., Chartier C. (2018); "Degrowth, energy democracy, technology and social-ecological relations: Discussing a localised energy system in Växjö, Sweden"; in *Journal of Cleaner Production* 197; 1754-1765.

Andersson I., James L. (2018); "Altruism or entrepreneurialism? The co-evolution of green place branding and policy tourism in Växjö, Sweden"; in *Urban Studies* 55.15; 3437-3453.

Andersson T. (Ed.) (2000); *Södra Ängby: den vita staden*; Footlights Publishing.

Archizoom Associates (1971); "No-stop city: Residential parkings, climatic universal system"; in *Domus* 496; 49-55.

Asplund G., Gahn W., Markelius S., Paulsson G., Sundahl E., Åhrén U. (1931); *Acceptera*; Tiden förlag; Stockholm.

Berger A. (2006); *Drosscape: Wasting land in urban America*; Princeton; New York.

Björling N. (2023); "Planning for quality of life as the right to spatial production in the rural void"; in Johansen P. H., Tietjen A., Iversen E. B., Lolle H. L., Fisker J. K. (Eds.); *Rural quality of life*; Manchester University Press; 215-232.

Bookchin M. (1974); *The limits of the city*.

Bookchin M. (1992); *Urbanization without Cities: The Rise and Decline of Citizenship*; Black Rose Books.

Bolay J. C., Kern, A. L. (2019); "Intermediate cities"; in *The Wiley Blackwell Encyclopedia of urban and regional studies*; 1-5.

Branzi A., Donegani D., Petrillo A., Raimondo C., David T. B. (1995); "Symbiotic metropolis agronica"; in Manzini E.; Susani M. (Eds); *The Solid Side: The Search for consistency in an Changing World*; V+ K publishing; Holanda; 103.

Brenner N., Katsikis N. (2020); "Operational landscapes: Hinterlands of the Capitalocene"; in *Architectural Design* 90.1; 22-31.

Brenner N., Schmid C. (2014); *Implosions/explosions*; Jovis; Berlin.

Brenner N., Schmid C. (2014); "The 'Urban Age' in Question"; in *International Journal of Urban and Regional Research* 38.3; 731-755.

Burdett R., Sudjic D. (2008); *The Endless City: The Urban Age Project*; Phaidon Press Inc; London.

Cerruti But M., Mattioli C. (2019); "L'Italia di Mezzo dei territori distrettuali. Casi "estremi" di trasformazione."; in *Quodlibet Studio. Città e paesaggio*; 58-65.

Cerruti But M., Mattioli C. (2021); "Welfare: l'impresa membrana. Le medie imprese dell'Italia di Mezzo come soggetto intermedio"; in *QU3: iQuaderni di U3* 22; 39.

Cerruti But M. (2020); "Medial territories"; in *MONU* 33; 114-119.

Cerruti But M. (2021); "L'Italia di mezzo"; in *Doppiozero*, 27/02/2021.

Cerruti But M. (2024); "Un'urbanistica relazionale"; in *Itinera* 27; 110-125;

Cook I. R., Ward S. V., Ward K. (2015); "Post-war planning and policy tourism: the international study tours of the Town and Country Planning Association 1947-1961"; in *Planning Theory & Practice* 16.2; 184-205.

Geddes P. (1915); *Cities in evolution: an introduction to the town planning movement and to the study of civics*; Williams; London.

Gloeden E. (1923); *Die Inflation der Gross-Städte und ihre Heilungsmöglichkeit*; Berlin; Der Zirkel.

Gottman J. (1961); *Megalopolis: the urbanization of the Northeastern Seaboard of the United States*; Cambridge.

Grosjean B. (2010); *Urbanisation sans urbanisme: une histoire de la "ville diffuse"*; Editions Mardaga.

Grusin R. (2015); "Radical mediation"; in *Critical Inquiry* 42.1; 124-148.

Hall P. (2006); *The Polycentric Metropolis: Learning from Mega-City Regions in Europe*; Earthscan, Pub.

Hall T. (1991); *Planning and Urban Growth in Nordic Countries*; Routledge; London; 1-6, 190-280.

Hall T., Vidén S. (2005); "The Million Homes Programme: a review of the great Swedish planning project"; in *Urban Forestry and Urban Greening* 80; 127841.

Hanson H. I., Olsson J. A. (2023); "Uptake and use of biodiversity offsetting in urban planning – The case of Sweden"; in *Planning Perspective* 20.3; 301-328.

Harvey D. (1996); "Cities or urbanization?"; in *City* 1.1-2; 38-61.

Hautamäki R. (2022); "From sparse to compact city - shifting notions of nature in post-war residential landscapes in the Helsinki region"; in *Planning Perspectives* 37.6; 1179-1203.

Hoggart K. (Ed.) (2005); *The City's Hinterland. Dynamism and Divergence in Europe's Peri-Urban Territories*; Aldershot; Ashgate Publishing Ltd.

Indovina F. (1990); *La città diffusa*; Daest.

Interview Henrik Johansson; *Environmental strategist*; Växjö municipality; 9th August 2024.

Interview Jon Malmqvist; *Vice President of the Community Building Board*; Växjö municipality; 19th July 2024.

Interview Julia Ahlrot; *Head of Strategy & Global Relations*; Växjö Energi AB; 15th August 2024

Interview Sofia Gustavsson; *Municipal ecologist*; Växjö municipality; 14th August 2024.

Katsikis N. (2016); *From hinterland to hinterglobe: urbanization as geographical organization*; Doctor of Design degree thesis.

Kolhe N. P., Dhote K. K. (2016); "Rurban Centres: the new dimension of urbanism"; in *Procedia technology* 24; Elsevier Ltd; 1699-1705.

Kunze C., Becker S. (2014); *Energy democracy in Europe: A survey and outlook*; RLS.

Lanzani A., Curci F. (2018); "Le Italie in contrazione, tra crisi e opportunità"; in *Riabitare l'Italia. Le aree interne tra abbandoni e riconquiste*; Donzelli; 79-107.

Lynch K. (1972); *What time is this place?*; MIT Press; Cambridge.

McCann E. (2013); "Policy boosterism, policy mobilities, and the extrospective city"; in *Urban Geography* 34.1; 5-29.

Moore J. W. (2016); *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*; PM Press.

Park R. E., Burgess E. W. (1925); *The city*.

Persson C. (2013); "Deliberation or doctrine? Land use and spatial planning for sustainable development in Sweden"; in *Land Use Policy* 34; 301-313.

Renzoni C., Vassallo J., Donadoni E., Lanteri S. (2023); *Territori intermedi. Cuneo, un atlante interpretativo*; LetteraVentidue.

Sieverts T. (1997); *Zwischenstadt: zwischen Ort und Welt Raum und Zeit Stadt und Land*; Vieweg+Teubner Verlag Wiesbaden.

Sweeney S. (2013); "Resist, Reclaim, Restructure: Unions and the Struggle for Energy Democracy. Discussion Document Prepared for Global Union Roundtable, Energy Emergency: Developing Trade Union Strategies for a Global Transition"; in *Trade Unions for Energy Democracy*.

Ungers O. M. (1977); *Die Stadt in der Stadt. Berlin das grüne stadttarchipel*; Studioverlag für Architektur.

Vanempen E. (2009); "Challenging urbanism: the rural reality of the Brussels metropolitan area"; in *Transcending the Discipline: urbanism & urbanisation as receptors of multiple practices, discourses and realities*; KU Leuven; 201-212.

Vassallo I., Cerruti But M., Setti G., Kercuku A. (2021); *Spatial Tensions in Urban Design*:

Understanding Contemporary Urban Phenomena; Cham: Springer International Publishing.

Viganò P. (2010); *Territorio dell'urbanistica. Il progetto come produttore di conoscenza*; Officina.

Viganò P. (2023); *Il giardino biopolitico: spazi, vite e transizione*; Donzelli Editore; Roma; 43-69.

Viganò P., Cavalieri C., Corte M. B. (Eds.) (2018); *The horizontal metropolis between urbanism and urbanization (Vol. 1)*; Springer; Switzerland.

Waldheim C. (2012); "Notes toward a history of agrarian urbanism"; in Krause L. (Ed); *Sustaining Cities: Urban Policies, Practices, and Perceptions*; Rutgers University Press.

Wright F. L. (1940); "Broadacre City"; in Wright F. L. (Ed.); "Broadacre City: the new frontier"; in *Taliesin* 1.1.

Zaleskiene E., Gražulevičiūtė-Vilenišké I. (2014A); "Landscape aesthetics theories in modeling the image of the rural landscape"; in *Journal of Sustainable Architecture and Civil Engineering* 7.2; Kaunas University of Technology; 10-21.

Zaleskiene E., Gražulevičiūtė-Vilenišké I. (2014B); "Landscape research trends and some insights from rural landscape"; in *Environmental Research, Engineering and Management* 67.1; Kaunas University of Technology; 43-53.

Åkerman, A. (2020); *En annan landsbygd: om gestaltad livsmiljö på landsbygden*; Falkenberg; Rian designmuseum; 32-73.

SITOGRAPHY

Global Forest Watch; *Biodiversity and forest data* in globalforestwatch.org
Available online (last view 30/08/2024)

Google Earth; Växjö in earth.google.com
Available online (last view 25/08/2024)

Roos E.; *Million housing program in Sweden* in hdm.lth.se
Available online (last view 15/05/2024)

Statistiska centralbyrån; *Urbanisering – från land till stad* in scb.se
Available online (last view 08/07/2024)

Statistiska centralbyrån; *Statistical database* in scb.se
Available online (last view 08/07/2024)

Under Ekarna; MAT2022: *post_pavement* in underekarna.com
Available online (last view 02/09/2024)

Under Ekarna; *Vinterträdgård 2000 m2 - Interaktiv konstutställning* in underekarna.com
Available online (last view 02/09/2024)

Växjö Energi AB; *Satsningar och projekt* in veab.se
Available online (last view 02/09/2024)

Växjö Energi AB; *Så fungerar koldioxidinfångningsworks* in veab.se
Available online (last view 02/09/2024)

Växjö kommun; *Fakta Växjö kommun* in vaxjo.se
Available online (last view 26/07/2024)

Växjö kommun; *Historiska kartor* in vaxjo.se
Available online (last view 02/04/2024)

Växjö kommun; *Pressbilder Växjö* in vaxjo.se
Available online (last view 01/08/2024)

Växjö kommun; *shapefiles* in vaxjo.se
Available online (last view 20/03/2024)

Växjö kommun; *Välle Broar* in vaxjo.se
Available online (last view 05/03/2024)

Växjö kommun; *Översiktlig planering* in vaxjo.se
Available online (last view 31/07/2024)

ANNEX: INTERVIEWS

To gain a comprehensive understanding of several issues about Växjö territory, such as sustainability development, energy production, forest administration and urban expansion, in-depth interviews were conducted with key stakeholders. These interviews provided valuable insights into the actions that are developing at this moment in the city and discovered a few details about the life and the organisations of the citizens and the workers in the territory, which are not possible to catch in the written bibliography.

To have a wider point of view on these topics, the research of the interviewees was made trying to find several actors with different roles within the public debate about sustainable measures that the municipality is developing. Diverse backgrounds, job positions and specificities were other essential elements to obtaining dissimilar opinions about the same arguments for building a critical idea.

Specifically, the people who have accepted to participate in my research thesis are:

1. **Henrik Johansson**, Environmental strategist;
2. **Jon Malmqvist**, Vice President of the Community Building Board;
3. **Julia Ahlrot**, Head of Strategy & Global Relations;
4. **Sofia Gustavsson**, Municipal ecologist.

Each of these interviewees is part of the municipality of Växjö (Växjö kommun), Henrik Johansson, Jon Malmqvist and Sofia Gustavsson, or a public company (Växjö Energi AB), Julia Ahlrot.

INTERVIEW HENRIK JOHANSSON, Environmental strategist

- **Which do you think is the most efficient strategy to reduce further carbon dioxide emissions in Växjö territory?**

Well, we have already managed to reduce, remove the emissions from everything that comes to the use of energy, because all of the energy production is already renewable. So well done there, but we can always make sure that we continue working on that of course and therefore mainly all our remaining emissions come from the transport sector. That is a bit more challenging. We do work on, for instance, the production of local fuels, for instance, biogas, which can be used by buses and trucks, but also passenger cars. We invest in charging facilities for electric vehicles, and we improve the possibilities for cycle paths and pedestrians and so on to make it more safe and convenient to use that kind of transport mode, however, we are quite dependent on policies from national and EU levels when it comes to the use of biofuels, what kind of cars there are and so on. So the progress in the emission reduction will probably be a bit slower from now on, but on the other hand, we have had a I would say a very good reduction pathway during the last 25 years. So due to the transformation in the energy. So what could be the most efficient? Well. If we manage to make it even more easy and attractive for people to use bus, bike and walking instead of their cars that would be the most cost-efficient also I would say because then it's just a model shift instead of new investments in the new cars and so on. So I think that would be the best for the people also.

- **What is your office/company doing to improve the territory's quality of life and conditions?**

We are focusing on that [transportation]. We have been focusing on that for a long time as well, but it takes time and as you then if I don't know how much you have studied Växjö, but you in case you don't know, Växjö is quite big. In geographical size, it's like the size of Luxembourg and we have almost 100000 inhabitants. I

think it's 97000 and about 2/3 of them are living in the city and the rest in the countryside, so quite many people are living in the in the countryside and the to a higher extent are depending on their cars as well. So making it possible to use public transport in those parts are crucial that we say, but we continue working on the plans to make it easy and possible and attractive for the citizens to use more sustainable transport modes in various ways: to improve the standards of the cycle paths, for instance; to make them more safe when it comes for what kind of vegetation is around; is there enough lights in the evenings and nights time; [...] there are no obstacles in the way; and the same goes for pedestrians, of course. It's easy and safe to walk around from point A to point B. And we are also saying that we want to make it, at the same time, as we are doing it, making it easier for that kind of travel most we cannot make it easier for cars. So for instance, we try to make sure that it will be more difficult to go by car from point A to point B without going like this. So you have to go further distances so it could be more easy and convenient to go by bike bus for instance. We have invested in like more faster lanes for buses where cars can't go. So if there are traffic jams for cars, then the bus can pass anyway. [...] Also when we are exploiting new areas, when we are building new residential areas, even if when there are no houses there, we make sure that there is already a bus going there. So when the houses come and when people start moving in there, they will see that there is already a bus going here. So they will understand that there's a possibility to use public transport from the new buildings. Also, we are trying to keep the city quite dense, which means that whenever we build more buildings and if we build it in a more dense place, we already build it where we already have other buildings. It means that it will be even more feasible to use public transport because you will have more possible bus users in the same area and if you have a dense city means also that you will not need to have the use of cars in the same way as you would have other ways.

- **Which area or sector do you think is the most problematic or has more difficulty reaching pre-established sustainable objectives? (e.g. transportation, construction, energy production, ...)**

Yeah, I would say that apart from transport, if we solve something with a transport, you will also achieve good results in public health and attractiveness and safety and so on. But apart from that, I would say that circular economy, waste management, consumption patterns like to have a low environmental impact due to our consumption patterns, that is a big challenge because it means that the way we are consuming things means that we use a lot of materials, we are using a lot of energy, contribute to more emissions and what we can do is, of course, to make sure that things are being recycled, which we're quite good at, but we need to make sure that even more things are really used and maybe upscaled, undesigned. So if something that I have I don't want it anymore, maybe someone else can do something else with it and make it even better for them. But when it comes to waste, the best is, of course, to not get that waste at all. So we need to reduce the total waste amounts, even if they are recycled and reused, we need to reduce the total amounts. That is a big challenge. One thing is of course what can we do? What kind of facilities can we have to make it as possible? But then, on the other hand, it's the behaviour of each individual, and that is a big challenge. How do you influence that? What are we, as the city, supposed to do when it comes to have an influence on people's behaviour and the consumption patterns? What kind of influence you want to have there, it's obviously strongly depending on what kind of political opinion you also have, I would say. Another part is to make sure, for instance, we are building a lot of things, but we're also refurbishing a lot of things, that means that we have a lot of building materials that we could possibly use for other things in other buildings. For instance, if we are if we are refurbishing an apartment maybe it's something there that we can use in a new school instead, like bricks or something like that. We're trying to find those solutions better and better, but we need to be even better there. So the circularity of materials is one big challenge, I would say. Biodiversity, ecosystem services are also there, of course, but we are what we have managed to

do there is that, from the from the municipal point of view, in all steps of the of the planning process, for instance, like from the overall master plan of the of the use of the land in the whole city and the whole municipality down to the decision on this specific buildings and or neighbourhoods, we have policies and structures for how to consider ecosystem services in each part. This is the result of EU project. So we have been able to work on those policies to make that possible, and that is now like being a normal use in our planning process. And I think that has been a good thing. So we can make sure that we always consider what kind of ecosystem services we have in different places when it comes to, for instance, like green structures providing shadows and so on instead of investing a lot in air conditioning systems, and so then if we don't have a lot of trees, maybe that is enough. So that's the kind of things we're working on as well.

- **What would you consider the most effective forest protection strategy in Växjö territory considering the forest as an ecosystem?**

I think that we can always be better at that as well. When it comes to the forests, there are so many forest owners, that is difficult to Sweden, that it's not only big companies that own the forest, but also families. There are also strong regulations on how to manage your forests, and if you're going to like, protect a certain percentage of that. In Växjö, we have quite much protected land very close to the city, so we have many natural reserves close to the city. This is good from the biodiversity point of view, but also from a recreational point of view. It's easy for the citizens to actually have access to nature and if people have access to nature, it also means that it's good for mental health. It's good if you have the possibility to be in the in the nature, it's good for you. But I think that we can always be better in what kind of nature we are protecting and where it to be, we are currently protecting about. 3.7% of the total area of Växjö, which is not so much. On the other hand, many of those natural areas are protected very close to the city. What else to say there? I would say that the important thing is that we also protect various kinds of natural ecosystems. So it's not only forests but also lakes and wetlands and agricultural areas and so on, to make sure that you have a variety not only for a variety of nature assistance but also that means that you will protect a variety of species. It's one part of our work, but protecting various ecosystems I would say is the main importance, and I think that our municipal ecologists, we have two of them, are quite good in identifying what kind of places are more important to protect right now and so on. They have plans for the next area to work on and so on. But then it is also like that a lot of the forest here, there you can consider them more or less being plantations from 150 years ago or 200 years ago that they this is the way that the Swedish forest management is working. So maybe then the important thing is to protect the forests that have never been forest plantations in that way because, in Sweden, you have this forest management where a lot of owners are owning forests, and they do that because they are growing that forest to send it as timber later on after 60 or 80 years and when they have cut down any trees they need to replant 3 trees, so there is always a regrowth of the forests themselves, but the ecological qualities of the forest plantations is less than the natural forests. Even if it's of course possible to go there and pick berries and mushrooms, you find everything of that also in the planted forests.

- **The growing request for forest by-products for energy production in Sandvik power plant, due to population growth, could have negative impacts on the local forest?**

I don't think so. Well, it is true that we use rest products from the forest trees as an energy production in the Sandvik plant and they're using 100% from forests since four years ago. But what we need to consider is that we never cut down forests to burn them as an energy source. We only take the rest products that are not used. So when a forest owner grows his forest to sell at this timber, then when you take down those trees, there are always branches and the tops of the trees and the bark, the skin of the trees, and when you make the furniture and the building material you will always get sold dust and it's that kind of things that we are using for energy

purposes. And since we are always planting new forests, that means that there will always be new material to take. All the energy sources that we are needing, it can be taken from within 70 kilometres away from Växjö, so it's very local. And still we don't see that we have like less forests, so less quality of the forest. We'll make sure that the nutrients that were in this biomass is being sent back to the forest, so we get take the ashes back again in the forests. What do we do? See, of course, in Sweden as such, is that more and more, not only energy companies but more and more companies are trying to find more and more uses for material from the forests. We want to make building materials, we want to make energy preheat and power, we want to make the fuel for vehicles, we want to make things that can be used instead of plastics, we can use parts from the forest to produce fabrics for clothes. I mean, there will be a bigger competition for the material and what that would generate is that would be a higher price for the resources. That can lead to a higher price for energy and so on. We don't really see that, at least for when it comes for production of heat, there will be not so much more need for the energy resources because, at the same time, we have the climate change. So it is getting warmer, so we don't need the same amount and even if we are growing in the number of citizens we will probably have the same amount of total energy resources or maybe lower because we're getting more and more energy efficient as well. Also, the newer buildings are more energy efficient and so on. So, I think that we are more or less at their maximum need of the outtakes from the forest energy. But it's very important to have this in mind that we only take what is like the rest products from the forest trees. So it's not that we cut down forests to the because that is also why the Swedish and Finnish policies are different from what many other countries in the European Union think about using biomass as an energy source, whether it should be sustainable or not.

- **Besides the design and construction of BECCS (Bio Energy Carbon Capture and Storage) technology in Sandvik power plant expansion, is there the development of other energy production systems on a public level?**

We have the Sandvik power plant produce heat and power, but also a bit cooling to support the university and hospital and some shopping malls where the cool air instead of electric air conditioning. And it is, as you say, that we are also trying to see the possibilities to invest in a carbon capture storage system. We have a pilot facility going on right now to see how it works and other costs and so on. We have calculated if we want to make this full scale to be able to collect, I think 240000 tonnes of CO2 every year, which means that we which practically means that we become climate neutral in Växjö or climate positive, even more. That would cost a lot so we are waiting to see if the municipality will give an investment decision in this because it will mean a lot of money. So we'll see about that. But anyway, there are Växjö Energi AB and Sandvik plant are not the only energy production facility in Växjö. In the smaller villages, four of them, there are also smaller distinct plants. Three of them are owned by Växjö Energi AB. Växjö Energi AB is the same owner as the Sandvik plant and it's a municipal company and one is owned by another village, is owned by a private company, but they are only producing heat. Then during the last two years, there have been lots of investments from private companies in in wind power. So nowadays, even lots of investments well, but it's still I think it's 10 plants, so it's not so many, but they are producing more power than the Sandvik plant is doing so suddenly we have instead of 35% local electric production now we have 70% local power production, I mean compared to what we're using. So that's very good. And of course, apart from the Sandvik plant and those windmills, we also have very small amounts of the hydropower, small scale hydropower and we also see that the solar power is increasing about 50% every year, mostly that is of course on schools and public buildings, but also it's very getting more and more interested by citizens to have that on private houses, and there are also a number of applications that has come from private companies to build solar power plants. So I expect that within a few years, we will also have quite big solar power plants that will contribute to generate the local renewable power, and that would be amazing.

So we have a big variety of different kinds of energy sources to produce energy. And also different kinds of owners to do that.

The different energy sources are now developing more on the private part.

Yeah. Because it's right because it's the private companies that invest in the wind power and also in the solar. While, of course, the public house, we are investing in solar power on our own building.

- **What are the main obstacles to implementing energy production on a public level with different renewable energy sources other than the Sandvik power plant?**

I'm not sure because I don't think that. Well, well, money is, of course, one of that things or maybe to make sure that there is actually someone there that can install their plans. Because, as far as I have understood, also there are long delivery times for new solar power plants for instance, and some need to install that and that can take some time. But the will is there, the political will is there to install more solar power, for instance, and the will from our municipal housing companies and the municipal company owning the schools and the offices and so on. They are interested in doing this, but you can't do everything at the same time, so there are priorities. How many can you do every year or so on? And of course that is partly financial, but also partly something related to the access of all the staff and availability. But the interest, what you want to do it's there already.

- **The energy produced by privates independently with different sources, such as solar panels, could be a possibility for the development of exchange between these and other consumers?**

I don't know so much about that, but I know that I mean that also has to do what kind of legislation is in Sweden, what you can do and so on, but the interest is there. First, the interest is there from many households to have their own PV plants. What they do is like the power they don't use themselves, they're selling it to the grid. But what do you thinking about: can we sell it to someone else? Right. So, like smaller energy clusters and so on.

- **The creation of an Energy Community in Växjö could be the next step to reduce energy waste, especially from private producers, and have an even more fair energy cost?**

Yeah. There are some talks about it but we haven't really landed there yet, as far as I know. So what more and more people are doing at least meanwhile, is to invest in their own batteries and so on. They can, if they produce more solar power, charge their own batteries and use that power when they need it instead. So you should for example during nighttime to charge electric cars also. So that is one thing how to solve it. But, as far as I understand, it's also connected to what kind of legislation is in Sweden as such when it comes to produce power in one place and sell it to another one and so on.

So the energy communities, at least on European level, is like a solution that could be used to have less energy waste, especially from little producers and to have a more fair price because also if you sell it, you will sell it much higher cost than the National Grid that you give you, but also a lower cost for who buy it, especially from the from the National Grid. So it could be a possibility for the development, also for contrasts the higher cost, as you said before, of the byproducts for the energy power plant and to be more fair and to have less waste in the city itself.

Yeah, surely. And there I see also another opportunity would be like when it comes to energy security. If something happens, then you will still be able to have your smaller energy community where you can have energy coming from somewhere else. So I think that the energy communities or the kind of systems would probably be a good thing. I think that we have been discussing in one of our new exploiting areas where we're going to build apartments and like companies and so on. That would be a more pilot area, what can we do there? So I think that there we have been talking about energy communities as well, how can we do that even more.

So it's more for the new development areas than the existing ones.

Yeah. I would say so that's where we are right now when we want to try it, but I also think that if Swedish legislation is giving those opportunities even better because I think there is something that that stops this a bit right now for some reason, but if it would be easier to do this, I am quite sure that the citizens are quite eager to be on board on that. That will surely be the next step because now so many people have been seeing the possibilities of producing their own electricity. They also see that we are producing electricity when we do not need the electricity in the same way and therefore there are lots of people investing the batteries and that also means that they could earn more money in selling to someone else who needs the electricity, I think that would totally be the next step. If it's not already there, but I think, in that case, it's only in the start.

- **The forest in Kronoberg County is almost completely considered part of the wood industry. Is it possible to rethink the forest, at least part of it, as a shared space for human and non-human life?**

And that is also why we have a lot of the lands that are protected. That is also why we have it close to the city, because then it's to high extent also of recreational values and that is also one reason for protecting it. So sometimes it's not for the natural values, but it's sometimes for the recreational values, but then every forest owner has some, as far as I understand, also some, if it is a requirement to replace something that is good for them, they protect a certain percent of their forest, even if it's not the nature reserve, then it's more like a biodiversity protection. I think that if they want to sell their forests as like an FC, you know FC what that is or stewardship councils. Is like a standard for sustainable forestry. And since many users of products from the forests require that they should be sustainable production, it means that they also need to follow those requirements when it comes to how they are working in their forest, how they are managing it, how they are protecting parts of it, how do they cut down forests. So they don't cut down everything, maybe it means that they cut down parts of it like small parts, so you would still leave parts would be possible for animals to still be safe in the area and so on. So you will try to make sure that you don't have huge cutted areas, but instead very small in small scattered. So it would be a better way of also maintaining the forest. So, I think that most forest owners are aware of this, so even if it's not protected as a natural reserve or natural conservation area, there is still lots of work on making it sustainable.

So there could be a possibility for implementing this system to connect these private owners. Maybe with one protected area, rather than a lot of small areas for implementing this system.

I would think that it's good to have lots of smaller protected areas. Like if you have 1000 forest owners in Växjö, I think that it's good that maybe all of that, in some way, protect a few percent of their own forest, instead of having one big area protected because it means that you will have protected areas like everywhere. But then, of course, it's good to also have bigger areas protected due to its natural values and so on. But I think it's a good way to work on sustainability in all those products.

- **According to the actions done in urban green areas by associations, such as urban gardens done by Hofs Lifs, is it possible to replicate and implement the community use and maintenance for forest areas?**

I would say when it comes to the forest owners, we also have a certain company or association called Södra working in the entire South of Sweden and they are all like an association of all forest owners. They help them with all of this work when it comes to sustainable forest management and how to work on that. So I think they do know quite well how to work on this and what to do and how this can be done in an efficient way and that they also try out pilot solutions and so on in that. So, I think that is more of policies from a national perspective or the forest agency, I think it's called the National Forest Agency, what kind of rules they put on forest owners because it's from there they say you need to protect this much percent of your land in various ways. And then how to do that and if that means that forest owners that have forests very close to each other, if they say OK, let's protect areas that are close to each other, then it would be up to them. I would say with the help of this

situation to manage that and then of course from the municipal point of view we have a forest plan, our forest management plan, to see how are we as forest owners and our considerations when it comes to the use and management of our forests and what kind of policies do we have to make sure that we have sustainable forest management. And then, of course, we have the natural protection plants and so on.

INTERVIEW JON MALMQVIST, Vice President of the Community Building Board

- **Which do you think is the most efficient strategy to reduce further carbon dioxide emissions in Växjö territory?**

We have done a lot and, as I told you, this is not my main focus as a politician. But I can tell you and if you've been to Växjö, I'm sure and study this, I'm sure you know quite a lot already. But the main thing that we did and we are thinking about expanding is our energy plant. As you know it's, it's not burned on fossil fuels or anything else, it's burned on wood basically. And there's a discussion right now. My part is centre-right and it depends a little bit how you see how you see on these kinds of issues. So there is a discussion that we might be aware about: it's called carbon dioxide capturing. We've seen some preliminary figures, and it seems to be extremely expensive and so my part is not that much in favour of this because it's a big risk for Växjö and I think when we were talking about sustainability from my point of view, I think it's important to include not only the environment, we have to include social aspects and economical aspects. But I don't have a really good answer what we can do to further reduce emissions. That's specific for Växjö, where we, as in Italy, in Sweden we have the electrification is the big called and try to use nuclear power more than we do. I don't think you do with that much in Italy, you have still natural gas.

Yes, we don't implement it a lot because we don't have as you did. We don't have like local production of energy. So we have big, maybe some solar panels fields or hydroelectric electricity. But it's really a small part, a small percentage, including the whole territory.

That, I might say as well, even though Sweden today, Sweden is sunny, but it's not like in Italy. There's been some interest in solar panels in Sweden as well, and Sweden has a lot of area, so it's perhaps a little bit easier than it is in Italy. We where you have like 6, 5 or 7 million people. It's not that densely populated in Sweden, so it might be a good place.

- **So if I'm not getting wrong, you are part of the office in the municipality for the community development.**

You could say so. And I'm in the opposition. We have the responsibility for roads and stuff like that, but I'm not responsible for the local traffic and things like that.

What is your office doing to improve the territory's quality of life and conditions?

We have the responsibility for planning, so one thing that we are doing, we're trying to connect the university campus area with the city. I don't know if you remember, but the road was built in the 70s and it used to be a road that was you can drive 100 kilometres an hour on the road. It's a really, really wide road and we're trying to reduce the width of the road and build houses closer to the road, so this main artery from the South of Växjö into the centre. It will be more attractive for bicycles and the pedestrians.

- **Which area or sector do you think is the most problematic or has more difficulty reaching pre-established sustainable objectives? (e.g. transportation, construction, energy production, ...)**

OK. I would say if you frame the question, if you ask me what's the biggest problem when it comes to sustainability, if there's a focus on environment, it's public acceptance and I think there's a reason for it. I mean people, Sweden has done quite a lot and

we've been talking a lot about it. At some point, you reach the level where people get a little bit tired of it. Maybe they think some things are exaggerated, so I think we are starting to lose a little bit of the of the momentum in Sweden. So I think the main problem is public acceptance when it comes to these issues.

- **What would you consider the most effective forest protection strategy in Växjö territory considering the forest as an ecosystem?**

I'm not sure if you're familiar with some European Union rules that were really. Yeah, this spring a lot there was the Restoration Act and Sweden was fighting against it quite a lot because Swedish forests are very different from Italian forest and German forest. We've been using the forest actively, I guess in Spain and Italy and Germany they are much more for recreation. We have recreational forests as well, but the forest is the backbone of Swedish economy, so you can't just take 20% of our forest and make them unproductive. And if people should know about it, the most attractive forests, they are actually the old forests that are production forest because they are the forests that look really nice, you can walk. There in the National parks, where you can't do anything, it's often quite difficult because they and you can't remove trees and then it's really dense. So I think it's very important for Sweden and my part of Sweden to work, to make people understand the importance of the Swedish forest industry and the way they contribute to making environmentally friendly like buildings and houses.

- **The energy produced by privates independently with different sources, such as solar panels, could be a possibility for the development of exchange between these and other consumers?**

I think we've done, when it comes to solar panel, we had a big governmental proposition that was quite popular. The government-subsidised solar panels on houses and if you walked around, I mean where you lived in Höv, there's quite a lot of villas, perhaps you saw quite a lot of them have solar panels on their roofs. If you're walking in the Swedish villa area, you will see them. They don't look that pretty and they're trying to make them better looking, but they are there and one of the reasons so many have them is that it was governmental subsidies. But in Växjö, I think we produce about 50% of the energy in Växjö that Växjö uses, so we have to import a lot of energy from neighbouring areas so that we are discussing this a lot that we have to improve, increase our production of energy in Växjö and we're discussing different ways to do it.

- **The creation of an Energy Community in Växjö could be the next step to reduce energy waste, especially from private producers, and have an even more fair energy cost?**

Yes. We always try to reduce energy and we have building buildings that are net-zero buildings. I'm not sure what the English term it but. We're trying to build as many of these kinds of houses as we can and we have the system that we think that most other European countries should adopt, at least once in the North. We have the system where heating is produced centrally and you have pipes in the ground. So a lot of houses, especially the big houses, they are heated with in a very efficient way.

What I understand is not there are a real energy community now in Växjö but it's like the energy produced by the private for itself. Energy community is like an association or collaboration between public and privates where the network of the energy is before exchanged in the between of the area. So there are different producers and consumers that can exchange buy directly from the producers the energy source also between the privates. It is not passing through the national networks only if there is a surplus is selling to the National grid.

OK. Yeah. I'm not sure about these kinds of collaborations there, I think there are either private or public, but I'm not sure, but of course, we have the opportunity if we produce as a private person with the solar panels, when we produce more than we use, we can push the surplus out on the on the National Grid.

- **The forest in Kronoberg County is almost completely considered part of the wood industry. Is it possible to rethink the forest, at least part of it, as a**

shared space for human and non-human life?

I think you're correct and I think that the Swedish maybe you know that in the South of Sweden, it's quite different from the north of Sweden. In the north of Sweden, it's mainly big companies that own the forest and the South of Sweden, it's mostly privately owned, small farmers that own the forest and many of them, without having to do so, they put some areas aside that they think they're beautiful and they keep it beautiful just for their own pleasure, and they don't use it as a production force, but it's also very difficult. [...] There is a kind of a beetle that is hurting the [...] trees and, in areas like in national parks where these kinds of small animals that they thrive in the national parks. Owners of land that have forests that are agents are close to this. They have lots of problems with this box that come and destroy their forest so. But as you may as you question if I understood it correctly, I think that the individual forest owners, they have responsibility to biodiversity, and I think that they are doing a good job, in general.

- **According to the actions done in urban green areas by associations, such as urban gardens done by Hofs Lifs, is it possible to replicate and implement the community use and maintenance for forest areas?**

Yeah, yeah, I understand what you mean. I think the main thing is, from my perspective, that it's voluntary that that I think is really important that if one individual who owns let's say 200 acres of forest, if he wants to use all of these 200 acres as a production for us, sell it to big companies. In your share should be able to do that. In general, I think it's working quite fine. I don't see any major problems with the Swedish way of forestry.

- **The high-quality and sustainable level of the apartments built in the last few years could be an obstacle for people with a low income due to the high rent cost?**

That is true. I agree with that. In Sweden at the moment, and sure in Italy and in Växjö especially, we have problems and it's just, it's not just the apartments that are net zero, it's generally all new apartments. It's so expensive to build new apartments that people can't afford to live in them, so we have quite a lot of problems with the apartments that no one is living in because the rent is too high and we have a problem with that. But I agree, and it's also, I'm not sure how it is in Italy, but in Sweden being environmentally aware is kind of a social, I don't know how to sell it, etiquette. [...] You say something about yourself that is not necessarily true, but if you live in these kinds of buildings, you are regarded and you get a higher social status in some aspects of life.

- **The construction of new apartments and houses, due to the city expansion and population growth, would be made for all social and economic classes (including the construction of social housing)?**

It's something that we always discuss. There've been examples from Toronto that we're talking about, and sometimes we compare ourselves with Canada in many ways and that's absurd, Växjö shouldn't compare ourselves to Toronto. But we've had politicians over in Toronto looking at the social housing, generally, I don't think it's a good idea. I think the Swedish way of placing people has certain challenges, trying to put them all over the town. I think that is a better way than having a particular part of an area designated for people who are in need of cheap housing. I think that's the preferable way. We've discussed it a lot and I believe that almost all politicians are united in the way that we don't think social housing is the way to go.

INTERVIEW JULIA AHLROT, Head of Strategy & Global Relations

- **Which do you think is the most efficient strategy to reduce further carbon dioxide emissions in Växjö territory?**

And I think we need to continue to decrease the emissions and transport sector. We

have already done a lot talking about heating and housing. But still, we have a lot of emissions from the transport sector. So there are of course then here because I am working at the energy company Växjö Energi AB and we have a possibility to capture the carbon, so to achieve carbon capture storage and that can be a very efficient way to receive their negative emissions. That is not enough. We really need to be free from the use of fossil not just to, you know, have negative emissions to reach 0. To become free from fossil energy.

- **What is your office/company doing to improve the territory's quality of life and conditions?**

Yeah, exactly. And with the negative emissions, even if we stop use fossil energy tomorrow, we have too much of CO2 in the atmosphere. So we need to help that. Hope to reduce the amount of CO2 from old bad things we have done.

- **Which area or sector do you think is the most problematic or has more difficulty reaching pre-established sustainable objectives? (e.g. transportation, construction, energy production, ...)**

I think we are, as a society, very dependent on vehicles like cars and also heavy vehicles like trucks. And you know, we buy, we buy food and stuff from all over the world. So we, in some way, really need to rethink if we need all things that we buy and then we use send off and throw away, but this is, you know, a huge question and it's not just for Växjö to solve. But I think we need to encourage and to talk about it, so people, at least, are aware of how to behave in a more sustainable way. But I think we need to find renewable fuels, especially for heavy vehicles. For private, I hope that the electric cars can be a good solution. The amount has increased in a very successful way for let's say in the last three years. But the sad thing is that now the price of fossil fuel has decreased and then people are not that, you know, eager to buy e-cars anymore. So I think we need to have a high price for fossil fuels.

- **What would you consider the most effective forest protection strategy in Växjö territory considering the forest as an ecosystem?**

Yeah, yeah. I think we need to use the forest we have. You have been here and you have seen, you know, whole Sweden more or less is like a big forest. So we have a huge amount of it and I think we should use the forest, but we should use it in a sustainable way and we do it already today I think in a sustainable way, but maybe there can be some improvements. But my opinion and my company's opinion is that we should continue to use that the forest just to live. More or less whole Sweden have forest to be there and we don't use it in any way then we are even more dependent on fossil alternatives because we use the forest for a lot of good things and we need that industry.

- **The growing request for forest by-products for energy production in Sandvik power plant, due to population growth, could have negative impacts on the local forest?**

So we, in Sweden, are very careful that the forests grow quicker than we harvest. So we have more and more forests in Sweden and for our combined heat and power plant, we used the forest recipes. So we don't cut any trees at all just to heat the houses, but in the forest industry, they receive a lot of byproducts like branches and tops and barks and so on. Those parts we use to heat the houses in Sweden and also to produce electricity in the combined heat and power plant.

- **Besides the design and construction of BECCS (Bio Energy Carbon Capture and Storage) technology in Sandvik power plant expansion, is there the development of other energy production systems on a public level?**

We have the cooperation with the Linnaeus University about if it is possible to produce hydrogen at the combined power plant. And we have also been part of actually has a lead in a project about sustainable aviation fuel. So if it would be possible to produce aviation fuel from the forest residues. Both the studies showed that it can be possible to produce some hydrogen, but today, it is still too expensive compared to the fossil alternatives, unfortunately. But technically it could be possible.

And instead for electricity, you are trying to develop like solar campus, solar panels or your think is to use the wind to improve the energy production.

Yes. So we try to encourage, maybe, but we try to achieve wind and solar power in Växjö and it can be the energy company who is the owner. But it can also be other companies who own their plants and then we can support by, you know, electricity grids and so on. So it can be working.

- **What are the main obstacles to implementing energy production on a public level with different renewable energy sources other than the Sandvik power plant? The energy produced by privates independently with different sources, such as solar panels, could be a possibility for the development of exchange between these and other consumers?**

I think the obstacle for wind is one where to put the windmills and secondly, who will pay for the investment. For solar, I think we have a lot of interest, possibly investors and also private houses and so on if you want to put solar panels on the roofs so there we can see a lot of interest. Maybe a problem is that the electricity curve during summertime it's quite cheap with electricity during daytime when it's sunny outside. So then you will not be rich in what you buy and then the price of electricity is most expensive in cold winter days and maybe also in the night and then we don't have any sun in Växjö. So, my family and myself, we have solar panels on the roof and they work very well. But as I said, when we have most of sunny, the price is not that good for electricity. But it is possible and we can put it on many many roofs, it is no problem. And then if we say something about the combined heat and power plant and we have a good possibility to produce electricity in the plant. But how much electricity we can produce is depending on the district heating. So the demand of heat. But we don't want to, you know, incinerate a lot of biomass only for electricity. We also want to use the heat for this.

So in the summertime, the production of electricity is also less respect to the wintertime.

Exactly. But solar power together with power plants that is excellent because then the solar PV plants produce a lot of power during summertime and they combine heat and power plant produces during wintertime.

It's compensating a bit.

Exactly.

- **The creation of an Energy Community in Växjö could be the next step to reduce energy waste, especially from private producers, and have an even more fair energy cost?**

Yeah, this is something we discuss and we said that we think Växjö as a city is maybe the most efficient electricity community or energy community because we have the electricity grid on a local level, we have the responsibility and within the city, it is possible to ask people to use electricity when it's cheap, and be careful when it's expensive and we cannot them with crisis and the information and so on. We think it is harder to optimise the system just some houses going together like neighbours and so on. And we have a well-working local electricity grid, so it's quite easy to move electricity, so to say, between different parts of Växjö. So, for a well-working electricity grid and we don't need to have small units, but if we have customers who are interested, we of course we are open to discuss and to try to find a good solution.

OK. So it's not like a proper energy community, but there is an exchange between private and public and not between private and private. What I understand.

Yeah, we can say so and as the local energy company we try to be the coordinate vessel, to say, so we take the responsibility to have a stable system and a working system.

So. It's not a proper energy community as the definition of European level, but it's a coordination with the public institution at the centre and the privates that try to exchange with you before to sell to another private customer.

Yeah. So for example, me as a private family, when we produce too much of power from our PV panels, we sell the electricity to the grid and then, next day or next hour, we can buy when we need electricity. So in that way we have the cooperation with the energy company.

But it is not on the national level, but it's on the local.

Yeah.

INTERVIEW SOFIA GUSTAVSSON, Municipal ecologist

- **Which do you think is the most efficient strategy to reduce further carbon dioxide emissions in Växjö territory?**

That's a quite tricky question for me because I don't work so much with carbon emissions. That's mainly Henrik you spoke with earlier, but I know that one of our biggest problem areas is transport. A lot of people in Växjö municipality own not only one car but maybe two cars and everyone is very used to travel by car and they're getting around by car and do not like to maybe park away from the city centre to take a bus into town or something like that. So I think transport is a very challenging topic for us.

- **What is your office/company doing to improve the territory's quality of life and conditions?**

So I work at the urban planning department and we are always working continuously with our master plan. You know the big territorial plan for the whole municipality and that is updated at least every four years, but sometimes more frequently. I have one role in that trying to maintain and preserve the most valuable nature areas and to develop and a point in time of the development direction in the most sustainable way, according to biodiversity, according to carbon emission, according to footprint in all kinds of ways and also social sustainability. We have segregated areas, but we are trying to work with as well of course. So I think that the masterplan has the big role here and shows the direction both the physical direction but also like the visionary direction of how we want to develop the municipality.

- **Which area or sector do you think is the most problematic or has more difficulty reaching pre-established sustainable objectives? (e.g. transportation, construction, energy production, ...)**

Yeah, one problem we have right now is the housing and the land that is most wanted right now. It is for one-family houses like villas and like that kind of small houses that you live one family in and they take a lot of lands, but not for so many people, so it's not so efficient land use. Instead, if you build the flats apartments, you can have quite a lot of people for not so much land use, but the most wanted sort of housing in Växjö right now is the small house. So we cannot be so efficient when it comes to our land use. You have to exploit quite a lot of land to fit in more people, and I think that's quite a difficulty that we have and that also makes it more inefficient with like buses and trains and so on. If we spread out the population a lot. So that might be it and that's very hard to come around because that's not something that we, as a municipality, can't decide what houses will be sold, what flats will be sold or rented out.

But you also have an organisation that is constructing houses and apartments in the municipality?

Yes, we have. We have that in the municipality, but we also have a lot of private companies of course. So, the municipal organisation builds mainly flats and apartments, but then if you have private landowners, they build what the market wants because they want to sell. Maybe 20-30 years ago the municipality owned a lot more land around the main city mainly. But that's almost every land that is built now, and now the land around is mainly private owned. And that makes it more difficult for us to navigate and in what will be built and so on. So it's the market mainly that decides what's being built right now.

- **What would you consider the most effective forest protection strategy in Växjö territory considering the forest as an ecosystem?**

Yeah, that is quite my topic. I think it was maybe three years ago, we managed to have a decision taken by the politicians on our forest, the ownership, the forest that

we as municipality own. Basically, it shouldn't be an industry anymore the forest that we own. Some years ago, before that, we have like this demand that every year the forest must produce maybe 1000000 Swedish kronor or something like that. Every year you must have an income of the forest, but that is gone now. The forest just has to go like net zero. And that we don't use, generally, that we don't use these clear-cutting methods in the forests anymore. Maybe just in some special cases, but generally not, and that is the decision that was taken by the politicians, I think three years ago, in 2021. We also work with protecting and legally protecting the forest, but that is not so urgent anymore when we don't use it as an industry because it's quite maintained well anyway, but we of course work with the legal protection, of course.

- **In your opinion, is the Swedish Forest policy, which is based on "freedom-under-responsibility", an advantage for increasing wood production without guaranteeing the right protection of forest environments?**

Well, that freedom under responsibility I think it's mainly just freedom. I think it's very uncommon that private forest owner takes that much responsibility because it's especially in our part of Sweden in many other parts, it's like for the forest industry that made our land healthy and economic growth and all that. So it's so, so important in many ways with the forest industry as well as it can be very challenging for us if we have severe ecosystem failure as well. But I don't think we don't have any legal framework right now that works, I will say, to combine these two industries and the ecosystem framework. But it's hard, that's just mainly my personal opinion because that's not the municipal question really. We have a National Forest agency that has these questions mainly, but it's mainly voluntary now if you want to and how you want to manage your forest.

- **The growing request for forest by-products for energy production in Sandvik power plant, due to population growth, could have negative impacts on the local forest?**

Yes. Yes, because that's one of the Växjö they're like, we are always bragging about our energy production and net-zero carbon dioxide emissions and everything like that and I can be quite frustrated when the environment question is only carbon emissions, and that's the only question that is like taking into account. And we have, I think Henrik maybe told you about that we have this organisation in Växjö communist healthy that works with the energy production. They are underneath our umbrella organisation, but they are on their own. So I don't have any like insights or I don't work with them. But we are trying to like lead to the question what from what forests do these products come? How does that impact the biodiversity? How does that impact the ecosystems? Because if it's from like clear-cutting and all that, yeah, it can be good for the climate, maybe, but it can be really bad for the ecosystems. And that's the thing. I can be a bit critical about that, and I know I have colleagues that are as well. We are not there yet and to be like yes, it's climate-friendly. But is it biodiversity-friendly? Maybe not, I'm not sure. Because they don't think it has been investigated. When trying to be sustainable in the energy topic, if we then destroy things for ourselves, then we have to fix after. It's like what was that for? So we're like pushing the problem forward. By doing that, maybe, we solve one problem by making myself a new problem.

- **What are the main obstacles to implementing energy production on a public level with different renewable energy sources other than the Sandvik power plant?**

That's a really good question. I think that maybe it's hard to see one energy source that is like perfect because there are pros and cons with all energy sources. Like we have a lot of companies establishing solar cells here in our municipality on private land right now. And they are really good in one way. But they also have a lot of cons with taking a lot of land area and so on. And we have really a lot of negative, like opinions about wind turbines at it's very sustainable in one way, but we have a lot of negative opinions on them being disturbing and disturbing people's lives in the rural areas and so on. So I think it's hard to find that one energy source that is sustainable

and that everyone will agree on proceeding with and it will be such high investments that you really need to agree and abroad political level. So I think that the energy topic overall is hard to find like perfect source.

- **The forest in Kronoberg County is almost completely considered part of the wood industry. Is it possible to rethink the forest, at least part of it, as a shared space for human and non-human life?**

I think the most important thing to like reconsider how we are view on the forest is that we, the official organisations like the municipality and the state, own a lot of forests as well. We have a state company like owned by the Swedish Government, that owns a lot of forests as well, and they use it as an industry. So I think it's very important that first of all, the official organisations, like municipalities in the state and so on, [...] take a decision like we're not using this as far as an industry anymore. I was there when there was, like, a debate on the politicians and they said that we, as municipality, don't own forests to earn money. We can't do that. That cannot be our mission. We owe it to be a resource for our inhabitants, to be a resource for biodiversity, to show other forest owners how you can manage your forest and so on. So I think it's the most important is for the official organisations to show the way. And then if we don't do it, then we can't ask the private owners to do it.

- **So in your process of protection, and I think maintenance as well of the forest, you are doing like all by the municipality or there are also some associations that help you for the maintenance, for the use of the forest?**

I think it's mainly the municipality. I'm thinking if there are some other organisations, but I think it's mainly the municipality and then we have like these protected areas by the state where we maintain and so and vice versa. So we have like collaboration with the state as well. But no like NGOs or so on, it's only mainly the municipality.

- **According to the actions done in urban green areas by associations, such as urban gardens done by Hof's Lifs, is it possible to replicate and implement the community use and maintenance for forest areas?**

Yeah, both yes and no. We had our experience of like privates and organisational maintenance is not always very good because it's like they maintain it in one or two years, but then maybe the main person moves to another city and then it's not taken care of and then we have to go back there and maintain it again and so on. So, it's hard to find a model that is working, but I know a couple of places where it is working in a State area where like the natural protection organisations and so on are engaged, so I think it can work, but it's quite complex because people are, like, very engaged, he wants to do this and then they leave two years later and we have the responsibility again. So it's like ups and downs in that. But I'm not against it at all, but it's not always that simple.

- **The high-quality and sustainable level of the apartments built in the last few years could be an obstacle for people with a low income due to the high rent cost?**

Yeah, totally. It's a high standard and high like investments and I think that is super tricky because we want to build sustainable and we want to build for the future and we want to build houses that can stand there for hundreds of years not only like 20 years. Unfortunately, those houses often are placed in areas where there are people that afford to rent them, so that is exactly what they I'm not so invested in them, in building houses, but I totally agree with what you say. And I'm not a social expert in any way, but I agree with the problem. One good thing is that our most segregated area, it's the part of the city or the neighbourhood that it maybe has the most green common spaces. So it's actually very nice, but the house, the buildings are not that high standard, of course, but the area, how it's planned, urban planning of the area that was dealing, maybe the 60s is super nice. So we always say like it's the nicest neighbourhood park. It's very nice. Yeah, it's super nice, well planned and the housing and the standard are very low.

- **So you're talking about in the South part of the city in Teleborg or where?**

No, I'm talking about Araby.

Change
starts
here

