



Implications of Densification on Equal Access to Urban Green Spaces in Malmö, Sweden

A Case Study

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Degree project/Independent project • 15 credits
Swedish University of Agricultural Sciences, SLU
Landscape Architecture Planning and Management Department
Forest & Landscape
Alnarp, Sweden 2024



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Credits: 15 credits

Level: Bachelor's thesis

Course title: Independent project in Landscape Architecture

Course code: EX1011

Programme/education: Forest & Landscape Bachelor's programme

Course coordinating dept: Landscape Architecture Planning Department

Place of publication: Alnarp, Sweden

Year of publication: 2024

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Keywords: Urban Green Space, Tree advocacy, Densification, Environmental Justice, Green Gentrification, Urban Heat Island Effect, Malmö.

Swedish University of Agricultural Sciences

Faculty of Landscape Architecture

“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.”

Jane Jacobs, *The Death, and Life of Great American Cities*

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Introduction

Currently, around 50% of the global population resides in cities, and 80 to 90% of the population of high-income countries is in urban environments. Urban growth is an ongoing phenomenon happening all over the world, but it continues to be most prominent in Africa and Asia, seconded by Latin America and Oceania (Rydin et al., 2012). While considerations and implications of the expansion of cities and urban lifestyles remain immensely complex it is evident that urban growth must be strategic as to not interfere with land that is normally forested or used for agriculture. This is particularly pressing in the case of Malmö, Sweden. Situated on incredibly fertile soil in the south of the country, the city is bound to grow in population and to prevent damage to this vital land, the municipality places high importance on its preservation (Malmö Stad, 2023). Malmö is faced with the challenge of working to contain the rapidly expanding built environment within geographical limits while continuing to allow the city to develop and grow. Malmö's urban planning department intends to restrain the growth of the city by establishing urban growth boundaries, this process is otherwise known as densification.

Densification means reducing land consumption, optimizing space, and reducing travel distances; however, it also results in more people living in closer quarters. Historically, this process has been known to reduce available green space in cities which can result in increasing health issues such as respiratory illnesses caused by increased air pollution (Flanagan et al., 2023), heat stress and heatstroke caused by higher urban temperatures (Oke, 1982), as well as mental health issues as a result of increased isolation and reduced social cohesion (Beenackers et al., 2024).

The following report looks to compile academic literature and firsthand insight collected from semi-structured qualitative interviews with municipal professionals on the environmental consequences of densification in the context of the city of Malmö in Sweden. This review and analysis will be conducted using an environmental justice lens as changes in city's housing development and urban green spaces play a crucial role in how equal access is distributed among city residents. This project collects data from academic papers that target the concept of densification in Malmö as well as from urban planners working with urban development in Malmö. It analyses how different urban planning strategies are changing the face of the city and consequently, changing the lifestyle of its inhabitants.

Part of the analysis on the impact of densification in the city is narrowed down to specific cases in three neighborhoods in Malmö. Lorensborg, Bellevuegården and Hyllie. The first two are marginalized neighborhoods that will face detriment in their green areas and the removal of mature trees, and the latter has gone through a housing and office development that failed to involve local residents leading to segregation.

Finally, the document highlights the relevance of trees, their importance for normal functioning of the city, their exceptional benefits to the residents, animals and other organisms, and the necessity to increase their volume throughout the entire urban territory.

The objective of this thesis is to determine how the application of policies and strategies in urbanism affect the overall wellbeing of the residents in the city. The following sub-objectives will guide the research:

1. Define what densification is and how it is applied in Malmö
2. Identify consequences of current development strategies such as densification and to highlight the benefits of trees for the city and the necessity to safeguard and increase the number of trees in the urban perimeter.

1. Conceptual Framework:

The direct impacts of densification on Sustainable Development Goals (SDGs), climate change, public health, and more specifically on mental health and exposure to traffic pollution, are yet to be measured and contrasted with the direct and indirect effects of urban expansion. As with the benefits, the costs of densification may not be evenly distributed amongst the population and amongst different cities. Unintended consequences of densification can reduce the affordability of housing and thereby cause displacement and increase the commuting distances (Teller, 2020).

The following is a definition of concepts that relate to densification and its nuances in relation to the way urban development is framed in Malmö. This conceptual framework paves an understanding of novel concepts that are important to dissect in order to better grasp the intricate riddle urban planning represents today.

1.1 DENSIFICATION

Urban densification, also named compaction or intensification, refers to the inward and upward development of the settlement by optimizing the available land reserves within the building zones. Urban densification is therefore achieved by “increasing the density of already developed land with the potential for densification and/or by increasing floor space” (Haaland & Konijnendijk, 2015). Densification can further be defined as the usage of spaces in areas with low density to construct high-rise buildings used for either housing, commerce, industry, or a combination of the three, one example of this is the use of parking lots for housing developments. Densification is also the repurposing of used or previously built land and spaces, such as abandoned industrial sites, and turning them into a multifunctional space that can now accommodate various purposes. Other ways of densification include the usage of reserves at the edges of settlement areas or gaps between existing buildings, and plots with potential for inwards development, such as parks, courtyards, or lawns (“Flood Risk Change,” 2023).

Densification can be understood as the opposite of urban sprawl and although there is dispute among the application of these two terms, both hold benefits and disadvantages. Some of the benefits of densification include; (i) the reduction of land consumption by accommodating increased population, business and other activities in smaller geographical spaces, (ii) improved public transport and infrastructure efficiency and concentrated development in condensed areas, therefore reducing the cost of roads and maintenance, (iii) the optimization of space and the access to different amenities such as schools, healthcare facilities and cultural centers, (iv) reducing travel distances that can at times be done by foot or bike, (v) reducing the need for

private cars and therefore parking spaces (vi) mitigating traffic congestion, (vii) decreasing the amount of carbon emissions per person associated with transportation (Pont et al., 2020).

The focus on the benefits of densification has often overlooked its potential negative effects such as (i) the loss of access to public amenities due to crowded spaces, (ii) lack of privacy, (iii) increased land and housing costs resulting in gentrification (iv) concentrated traffic and air pollution, (v) physical and mental health implications due to exposure to noise and reduced green spaces, (vi) exacerbate urban heat island effect (Pelczynski & Tomkiewicz, 2019).

Densification means higher pressure in public spaces and an increased need for public and commercial services. It also means that the urban green spaces and their corresponding ecosystems, often used for recreation and climate adaptation, are subjected to higher wear as the number of people using these spaces increases. The wear and tear of green areas in cities is increasing at different rates in every place. For example, vegetation availability is not the same in arid places like Amman, Jordan or in tropical environments like Jakarta, Indonesia. The value for preserving green areas can be perceived higher in places where it is more needed therefore, densification applications must be tailored for the conditions and context present in each city around the globe.

1.2 URBAN SPRAWL AS THE OPPOSING CURRENT

Urban sprawl is the spread and expansion of built-up urban areas into low-density areas. Though, it is generally understood to have negative socio-economic effects, it is also frequently critiqued for its destructive impact on the environment, as it encourages the deterioration of wildlife habitat, the fragmentation of natural areas and the degradation of agricultural land. The increased built environment also increases pollution and congestion in rural-urban fringe areas and generates high infrastructure costs. (Libretexts, 2021)

While the harmful implications of urban sprawl provide a compelling argument for the importance of establishing urban growth boundaries, on a more global perspective, urban sprawl can also bring economic development opportunities. The expansion of urban areas which results in attracting businesses and industries into less competitive areas, can work to create job opportunities and boost local economies in peripheral regions. Furthermore, and perhaps in direct opposition to the assertions for densification, already dense cities often come with constrained housing supply with limited opportunities making housing unaffordable. As a result of the lack of affordable housing in cities, individuals and families with limited financial resources can feel more attracted cheaper options that are further from the city or even outside the city limits. This urban sprawl can set off a snowball effect of negative consequences beginning with

dependencies on single transportation modes (i.e. cars -in the best of the cases) and lead to increased cost of infrastructure for public transport, construction of roads, disturbance and deterioration of forest and agriculture land (Montejano et al., 2019).

1.3 URBAN GREEN SPACES

Urban Green (and blue) Spaces (UGS) are essential components of cities. They serve as an instrument to embellish buildings and streets in the form of parks, bodies of water, gardens, green corridors, tree alleys, heathers, and bushes. They can also be found on green roofs, green walls, and vertical gardens. All these different forms of vegetation enhance people's quality of life in urban settings in addition to providing basic living conditions for animals, and plants. The different ways greenery act to benefit us humans is through Ecosystem Services (ES). Benefits like noise reduction, stormwater retention, flooding prevention, and amelioration of climate by thermal insulation, among others (Heidt & Neef, 2007).

UGSs can be simple to create once there is an area purposed for greenery. Lawns and plants are easily settled and grow quickly, whereas trees, especially mature trees, take time to establish and grow. Trees are perhaps the most important element of the UGS. "Trees prove to be the most efficient in heat mitigation due to their shading potential" (Chatzidimitriou & Yannas, 2016). Tree canopies maintain radiant heat during the night, retaining day-time heat (Bowler et al., 2010). Densified environments with poor tree canopy cover are hotter during daytime and cooler during night-time as open spaces cool down faster overnight as heat dissipation is not hindered by obstacles (Erell et al., 2011).

1.4 ENVIRONMENTAL JUSTICE

Urban densification processes represent a continuous challenge to accommodate people within compacted areas while at the same time offering facilities and amenities that fulfil the needs of everybody. However, the unique challenge is not in physically raising apartment buildings, housing developers are equipped to build a myriad of apartment units, the real challenge lies in offering housing and workspaces that can also provide the conditions for a livable life in which everyone, regardless of race, color, nationality, or income is included and have access to clean water and air, green areas and nature. Building an environment where people are not at risk of being harmed by pollutants, traffic, chemicals, or landfills and where people can have access to meaningful participation in environmental decision-making processes in their homes and communities. This is what environmental justice movements advocate for in the context of urban development (Rutt & Gulsrud, 2016).

1.5 GREEN GENTRIFICATION

Urban greening projects are a keystone to human health. They are pivotal elements in urban planning, but while UGS changes the image of the city, it risks creating green gentrification. Environmental or green gentrification refers to the unintended consequences of incorporating green amenities in the city that ultimately intensify gentrification processes (Anguelovski et al., 2018).

“Malmö’s sustainable urban planning demonstrates how governance can be influenced by broader structural forces and that without addressing the profit-making structures behind urban planning, the continuation of market-orientated sustainability will further exacerbate inequalities and alienate some urban inhabitants from the benefits of urban greening” (Jepson, 2019).

A sustainable agenda addresses issues concerning biodiversity, sense of belonging to a community, and Urban Heat Island Effect (UHIE), thus, urban greening is a benefit for the built environment and subsequently for human health. However, due to the lack of consideration for equity in urban planning, fueled by economic incentives, some equity seeking groups and residents find themselves impeded from benefiting from improvements in the public space around their homes and instead risk being displaced (Anguelovski, 2016). In this sense, environmental gentrification explains how the changes in the built environment, more precisely changes in the greenery, increases property values (Ibid.).

Over the last two decades, areas of Malmö like Västra Hamnen, which was once an old shipyard in the city, has been completely transformed. The current Västra Hamnen is no longer an industrial port but now home of the Turning Torso, a private exclusive apartment complex, a landmark for the city, and one of the tallest buildings of Scandinavia. Västra Hamnen serves as a showcase of environmental sustainability in Malmö (Holgersen & Malm, 2015), the neighborhood has received affluent investment and praise for energy efficient buildings that offers great access to urban greenery, however it is also an area with one of the highest rents in Malmö. The presence of UGS in Västra Hamnen are indicative of high quality of life, yet they are also indicative of a privilege that is not equally available to all (Rutt & Gulsrud, 2016).

A related case that exemplifies green gentrification is the High line park in New York city. The park was built on an unused section of the city’s railroad. *“The High Line is not just a park, but a re-branding effort on the part of the city that has inadvertently led to inequality” (Darren, 2011).* The same author attributes this to the city’s neoliberalist policies because the creation of an appealing, livable urban space project has brought disparity in the city. It boosted the number of visitors to the area making it more attractive to investors and for whoever pays the best price.

1.6 NEOLIBERAL IDEAS AND APPROACHES

Environmentally sustainable projects are by default also economic projects, they need funding to be conceived, planned, applied, managed, and maintained. There have been several projects throughout the city that serve as an example of this. For instance, the already mentioned Västra Hamnen is one. Other projects have taken place in other neighborhoods like the case of Augustenborg. The applications here as well as the one in Västra Hamnen are used to promote products that sell in other countries. The environmental sustainability policies under the neoliberal ideals are designed to attract investment, companies such as E.ON and other private developers based in the city use environmentally sustainable projects as part of their portfolio. That is the case of developers in charge of the Eco-city in Augustenborg and Västra Hamnen that use these projects to sell their services in other countries such as China and India (Baeten et al., 2016).

Environmentally sustainable approaches create a dichotomy between its own practices (which involves the application of greenery to seek investment and to further be funded for future sustainable projects) and the policies for affordable housing supply commitment (which advocates to achieve social justice by addressing the housing crisis)

The inequities in social justice can be understood through the proclivity to take advantage of green infrastructure, and to the neoliberalist values that influence decision-making in the post-industrial increasing affluence era of Malmö which uses environmental sustainability as a marketing tool. Therefore, to enhance environmental justice in the city, future decision-making policies must bridge the environmentally sustainable planning with social justice.

2. Malmö as a case study

2.1 METHODOLOGICAL APPROACH

The methodology used for this thesis project was divided into two parts. (i) An extensive review of the literature in order to collate extensive academic and primary source documents on densification and other above-mentioned terms related to urban planning, in particular reviewing documents related to the specific densification processes in Malmö, and (ii) a set of three semi structured interviews with professionals working for the city planning department in Malmö.

2.1.1 Study area

The selection of Malmö as a case study was chosen because of its unique position as a neoliberal post-industrial city located in the welfare state of Sweden. The city has transitioned from an industrial to an entrepreneurial focus and through that transition, the city has become an attractive spot for investment. Malmö hosts several businesses and companies that have established their headquarters in the city attracted among other things for its sustainable efforts. The environmental implications visible during this transition are portrayed in different studies carried out over the last twenty years. These are presented in the following section.

2.1.2 Literature review

This literature review is a compile of several scientific papers, journal articles, websites and books that have been retrieved through internet search engines like Google or Google Scholar. Among the array of documents collected, one paper was used to describe direct consequences related to health issues in two neighborhoods (Lorensborg and Bellevuegården), and another paper describing the outcome of neoliberal policies and the exclusion of social justice during the construction of buildings in Hyllie. All three neighborhoods belong to the municipality of Malmö.

2.1.3 Interviews

Three interviews were carried out throughout April and May 2024 in order to enrich the findings about densification and new paradigms and discourses of urban planning in the city. Two of the interviews were semi-structured and carried out through Microsoft teams meet. For the sake of anonymity, the interviewees are referred with numbers. Interviewee 1 is a landscape planner who works with densification applications in different areas of the city. Interviewee 2 works for the environmental department strategically on urban greening and climate adaptation in Malmö. Both interviews were recorded upon consent from the interviewees. The third interview was structured, sent as a questionnaire through email. Interviewee 3 is project manager for the comprehensive plan at the city planning office. The interview questions were about the urban projects in the city, how different aspects of environmental justice are taken into consideration when building or renewing areas, and how much the green infrastructure of the city has changed under densification. The three professionals were notified via email about the usage of information from the interviews to complement this thesis project.

2.1.4 Limitations

Urban densification can be dismantled through a handful of areas and professions that target distinct aspects of the urban setting such as sociology, ecology, real estate management, or economics, all of them with valuable observations (Teller, 2020). This thesis project focuses on aspects related to UGS and Environmental justice. The time designated for this project was ten weeks and so it was used to do a literature review from a landscape architecture perspective, and the interviews were arranged with professionals in urban planning only. A deeper analysis of the implications of densification in people's wellbeing can be achieved if the literature included scientific work from various disciplines other than urbanism.

From an urbanism perspective it would have been valuable to gain perspectives from professionals in varying segments of the planning process, such as planners and managers but also from the people in charge of execution and maintenance.

Reaching to professionals working in urbanism may answer some of the questions regarding liveable conditions in the city. Though, another factor that could enrich the observation of environmental justice and wellbeing in the city would be to reach out to the people that live in the neighborhoods of the case study. Getting to know their perspective firsthand is a valuable resource that must be included in further research in environmental justice. All these are aspects that might limit a more meticulous observation.

2.2 BACKGROUND – from industrial to post-industrial city

The closing of Malmö's shipyard in 1986, among other industries, and therefore the transition from an industrial to a post-industrial city, brought a novel path for a development strategy. This development plan aimed to attract individuals and new investments in the city (Jepson, 2019). The transition has included sustainability-focused projects that have shown to exclude certain populations, mostly the less affluent, from the planning processes (Gutierrez, 2015). Instead, policymakers appealed to wealthier residents to take advantage of the new development projects (Scarpa, 2016) gradually widening the gap among the socio-economic groups. Baeten (2011) mentions that the type of development plans adopted by the city from the late 90's early 2000's are part of a neoliberal planning; aspects based on market mechanisms that directly impacted housing and services. The policies focused primarily on changing the image of the city by "building away" the history of impoverishment working towards a goal of deindustrialization. The transformation from an industrial city to a modern one was an idea that would erase social divide, and stimulate open-minded, cosmopolitan creative, and educated liberals to inhabit the city. However, in reality this led to further polarization and class differences (Sandberg, 2014). Malmö's particular historical circumstances compelled the city to become increasingly market-dependent and tag the application of new infrastructure under the name of environmental

sustainability. The city has undergone a post-industrial urban regeneration strategy that focused on environmental sustainability and in the process of using the city as a showcase for sustainability, the city has appeal to the idea of using environmental solutions to attract investment and businesses (Mihailova, 2017).

3. Implications of Densification in Malmö

Malmö's city government's understanding of densification is that; "As Malmö expands, it attempts to balance growth with preservation of open areas for nature appreciation and food cultivation. The city aims to densify by constructing new building sites located within the central vicinity or on former industrial sites in order to avoid over-exploitation of surrounding arable lands and urban sprawl" (Malmö Stad, 2023). In Malmö the priority is to have a "mixed-function dense, green and close city". The city wants to reduce its environmental footprint while increasing its attractiveness, through the promotion of sustainable means of transportation such as walking, cycling and public transport. The priority of "mixed-function" refers to the city's economic aspects, creating more employment, services, shops, and leisure activities (Mihailova, 2017). In Lorensborg, a neighborhood in Malmö, the city has proposed the construction of new buildings, adding floors to already existing buildings, paving new roads and establishing additional green areas. The average floor spaces per residential unit that the city has planned for new buildings is 43.3 m² and it will support a population of 12,190 corresponding to an increase of 42%. The area covered by vegetation is currently about 39% in the entire neighborhood (Flanagan et al., 2023).

The way different values of nature are represented in planning is of vital importance in urban spaces, particularly in marginalized areas where people often struggle to be heard (Fors et al. 2021). Densification in Sweden is increasingly targeted at neighborhoods that belong to the "Million Housing Program": housing properties built between 1965 and 1974 (Hall & Vidén, 2005). These areas are commonly large residential estates with generous green spaces many of them located on the outskirts of cities and that often struggle with stigmatization and segregation (Grundström & Molina, 2016).

3.1 BELLEVUEGÅRDEN & LORENSBORG

Bellevuegården and Lorensborg are two neighborhoods in Malmö that "struggle with stigmatization, segregation, and crime, and are perceived as socially problematic areas"

(Grundström & Molina, 2016). As much as safekeeping greenery is the intention of local level planning in both areas, the preservation and application of green structure function more as guidelines rather than mandatory policies. Almost all the 269 large trees assessed within the planning program will be felled or affected somehow (figure 1) as well as parts of the courtyards in Bellevuegården are planned to be repurposed for new housing facilities. Green structures will be vastly affected, and the number of trees affected by the development was of great concern for the ecology department of the city. Despite a proper assessment of ES, the trees were not considered relevant enough to protect due to other “planning priorities” (Haaland et al., 2021). Although the master plan states that “existing trees must be protected, and that the total number of trees should increase sharply” (Comprehensive Plan for Malmö Summary in English., 2018) it is rather a guideline for best practice and outcome and not part of a legally binding plan.



Figure 1. Mature trees on Lorensborgsgatan, Malmö. These trees are part of the trees that will be felled to give space to densification applications in Lorensborg and Bellevuegården. (Photo by author, 2024)

Another paper assessed the levels of noise exposure in the proposed densification plan in Lorensborg. The results show that 80% of the population aged 18 years or older is affected by road traffic noise above the recommended value advised by the World Health Organization, WHO (53 dB) and that currently, one out of ten people were exposed to noise above the Swedish guideline of 60 dB. For the municipal densification planned scenario the number increases to more than one out of four (Flanagan et al., 2023). The same paper proposes a health-focused scenario in which the annual proportion of highly annoyed and highly sleep disturbed people is considerably lower than the present-day scenario and the one proposed by the municipality. Following this health-focused strategy would also reduce the adverse health effects in Ischemic Heart Disease IHD, and the incident mortality caused by it.

Bellevuegården and Lorensborg are already marginalized neighborhoods and will continue to face even greater consequences in their green spaces due to the ongoing densification processes. A study made by Stålhammar & Raymond (2024) highlights that the benefits of ES and green structures in general should have a better representation in planning and decision-making as they are subjected to ambiguous interpretation and risk being lessened by individual planners. “The fuzziness, or interpretive flexibility, also prevented efficient communication of the multiple and diverse benefits of urban nature between residents and planning and decision-making” (Stålhammar & Raymond, 2024, p18.). The significance and impact of trees and ES in densified scenarios are not systematically incorporated in planning, but instead are added or dismissed according to the city’s strategic goals and priorities. The preservation of green structures represents a conundrum for densification goals and might be overrun by the need for more pressing matters such as housing and mobility (Personal communication, interviewee 2, Malmö’s environmental department, April 2024). Some of the existing trees along Lorensborgsgatan will have to be removed and replaced with new vegetation to make room for the new section of the street and buildings. This entails a large loss of ecosystem services and an economic cost. The city of Malmö’s goal is to replace all trees that need to be taken down and aims to achieve a greater degree of crown coverage than the trees that are taken down have today. A large part of the trees can be replaced within the plan area, but some of the trees may be replaced in nearby areas. Preservation or relocation of existing trees must also be investigated.

Malmö’s urban planning department is conscious about the benefits of ES. “*ES must be valued, taken into consideration and reinforced in urban planning, maintenance and management so that their values and functions do not deteriorate*” (Green City - Malmö Stad 2023). Higher population density together with land use changes can affect inhabitant’s health. The risk is particularly high for residents living closer to roads with an increase in traffic. The addition of buildings and the increase in size of existing buildings exacerbates the scarcity of green space (Haaland & Konijnendijk, 2015) and as a result, this can then disfavor UGSs. Densification combined with impervious surfaces like asphalt alter the temperatures in the streets contributing

to and creating a more pronounced UHIE (Oke,1982) that has shown to have detrimental effects on human health (Erlwein & Pauleit, 2021).

3.2 HYLLIE

The development of Hyllie has been conducted to attract new residents and investment to the area, thus following the neoliberal agenda. Located only twelve minutes from Copenhagen airport, and half an hour from Copenhagen city, developers in Hyllie have intended the construction of housing projects as an attractive option for people that work in Denmark to pursue more affordable housing in Sweden (Baeten, 2011). Hyllie has thus become part of a greater network in the Øresund region that stimulates businesses and contributes to a flow of culture (*Översiktsplan För Malmö 2014, 2024b*). Baeten (2011) argues that urban development projects such as Hyllie, did not account for matters or social inequities and other societal considerations during development and as a result issues related to segregation and income disparity were not fully addressed.

4. Analysis & discussion

4.1 DENSIFICATION INSIGHTS FROM INTERVIEWEES

Interviewee 1, from the city planning department in Malmö, says that densification was a new word sixteen years ago. The city comprehensive plan did not include the inward growth of the city. *“The early stages of densification in the city targeted on building on green areas. That practice is no longer done. Building on green areas is now avoided. But if it’s done, is only done on private green grounds. But when it comes to parks or public areas this is avoided as much as possible”*.

Interviewee 2, says that the development plan of the city is a guide and not a legally binding policy, therefore exceptions can be made along the process and modifications happen whenever needed. He says that *“The city is not expanding for housing, but it can be for mobility infrastructure like train and bus garages that for logistical reasons are better suited to be not in the city”*.

According to interviewee 3, densification strategies in Malmö in present day are not meant to drastically change the structure of the city. *“In the 60s and 70s the strategy was to demolish big*

areas and create new ones with a completely new structure. Present densification strategy is meant to primarily complement existing structure”.

Interviewee 2 also points out that two main pillars are the driving force of contemporary development in Malmö. (i) To provide housing to fulfill the growing demand as more people move to the city, and (ii) to provide mobility. How people can travel from point A to point B within or between urban areas, either by motorized vehicles, bicycles or by foot. The city has a strong focus on maintaining and improving the public transport infrastructure. The decision to expand the public transport is supported by the national government who offered to finance half of the development as long as the municipality builds housing that connects to bus and train stations. He adds that because this is an important deal for the city, trees can be in the way and may need to be removed.

Preestablished UGS and future urban greenery projects are subject to decisions made firstly for housing and mobility. All three interviewees agreed that some models that have worked well for the last twenty years such as the 3-30-300 green space rule, are now shifting, and becoming increasingly challenging. The 3-30-300 rule of thumb used in urban forestry, indicates that everybody should be able to see at least three trees from their home, have a thirty percent tree canopy cover in their neighborhood, and have access to a green space within three hundred meters from their homes (Nieuwenhuijsen et al., 2022). The same study says that it is the thirty percent tree canopy coverage factor that is most significantly associated with better health. This is also the most difficult factor to implement today according to interviewee 2 and 3.

“It is part of the planning. But we can see that it is hard to reach 30% crown coverage in most part of the existing city. Instead, we focus on increasing the crown coverage according to the premises for the area of focus”. Says interviewee 3.

4.2 CONSEQUENCES OF DENSIFICATION

4.2.1 Environmental justice

While analyzing urban densification from a multidimensional perspective that includes socio-economic, and environmental factors that impact at different scales, environmental justice movements defy densification by defending the rights of existing communities to maintain low-density to preserve affordable housing and workplaces, and by protecting green infrastructure already included in dense areas. Mishandling socio-economic and environmental considerations such as these may introduce new fragilities that reduce urban resilience. The benefits of urban greenery require a more systematically conceptualized foundation that is nourished by an

extensive multidisciplinary knowledge in order to provide a more diverse estimation and representation of issues (Raymond et al., 2023). City Planners alone are at risk of misjudging ecological and palpable social values in UGS (Muhar et al., 2017).

“The issue of densification is a boundary object necessitating an interdisciplinary approach. It involves diverse disciplines such as human geography, urban and transport planning, economics and real estate management, landscape architecture, architecture, sociology, environmental psychology, energy, meteorology, health, and wellbeing” (Teller, 2020).

The representation of professionals from different backgrounds companioned by the inhabitants and residents of the community at large, and the remaining partaking entities responsible, such as project overseers and other stakeholders, boosts and empowers a sensical stewardship in achieving spatial justice. The inclusion of a broader spectrum of stakeholders, i.e., residents and future residents, people who uses the spaces on a daily basis, pays off to keep a community together.

“The revitalization efforts also included a social sustainability component as the urban managers in this case engaged with the district’s residents, asking for their participation in community discourses. This prompted increased pride in the community leading to a reduction of 20% in emigration from the community” (Neighbourhood Case Study: Augustenborg, Sweden., 2013).

Environmental justice seeks to address disparities that affect certain parts of the society, particularly minority and low-income populations that often inhabit segregated areas of the city, often with low or non-existent green infrastructure, close to industrial facilities and waste disposal sites where pollution and UHIE is more pronounced (Gould & Lewis, 2012). Since densification has the potential to threaten environmental justice, the participation and cooperation of the concerned stakeholders helps to balance the individual/collective costs and benefits of densification in the city.

4.2.2 Advocacy for trees

Trees are crucial elements for the health and wellbeing of cities, their relevance must be contemplated with even more attention in dense cities. Adding green infrastructure can help mitigate harmful effects of increasing temperatures, especially during the summer (Lee et al., 2016). Another study stresses that *“preservation of fully grown and high-quality green infrastructure elements like trees in urban redevelopment sites is equally important as adding new green structure”* (Erlwein & Pauleit, 2021). New planting of trees and other greenery gives the opportunity to create even greater values in the long term. A diversity of vegetation, a mixture of herbaceous plants, shrubs and trees, provides better conditions for a higher

biodiversity. A greater variety of tree species also contributes to a higher degree of robustness as there are diseases that can wipe out an entire stand of a certain tree species (Malmö stad, 2024). Though newly planted trees are unlikely to reach their full size. Growing conditions for urban trees are rough due to limited growth volumes, reduced water availability and compacted soils. As a result, urban trees planted in denser environments are even less likely to reach their normal size and rather grow as small trees with limited crown volumes (Moser, Rötzer, Pauleit, & Pretzsch, 2015). Malmö's city planners are conscious of the time-consuming nature and high costs of replanting of trees and understand that the loss of old shade-giving trees cannot be easily compensated in the short or medium term (*Frågor Och Svar Om Planprogram 6050 För Bellevuegården Och Lorensborg*, 024b).

Malmö has been referred to as “the city of parks”, though it has among the least area of green space in major urban areas in Sweden (Barboza et al., 2021). The city is also situated in the southern flatlands of Sweden, an area with an extensive agriculture land but poor in tree coverage. Malmö would greatly benefit from extending its tree canopy cover, currently the number of trees is very poor (figure 2), and this is only bound to remain the same or get worse with densification processes in the city. The presence of trees in cities represents benefits unlike any other. As mentioned earlier, trees are the most efficient way to mitigate heat stress in urban settings while providing shelter and food for a plethora of organisms that depend on them. Densification strategies in the city will cause many of the existing trees to be felled or modified to some extent. Therefore, the promotion and application of UGS and trees need to be systematically incorporated in the planning process in the form of compulsory procedures.

The city is not a place only for humans. Innovative urban planning is needed to design sustainable cities that address densification challenges with both human health and the environment in focus, including the health of also non-human species. Strategies like green corridors in which a continuous line of vegetation is established and extended through streets, avenues, and highways, and across neighborhoods, boroughs, and municipalities, will allow many species of vegetation and animals to thrive and boost biodiversity (Heidt & Neef, 2007).

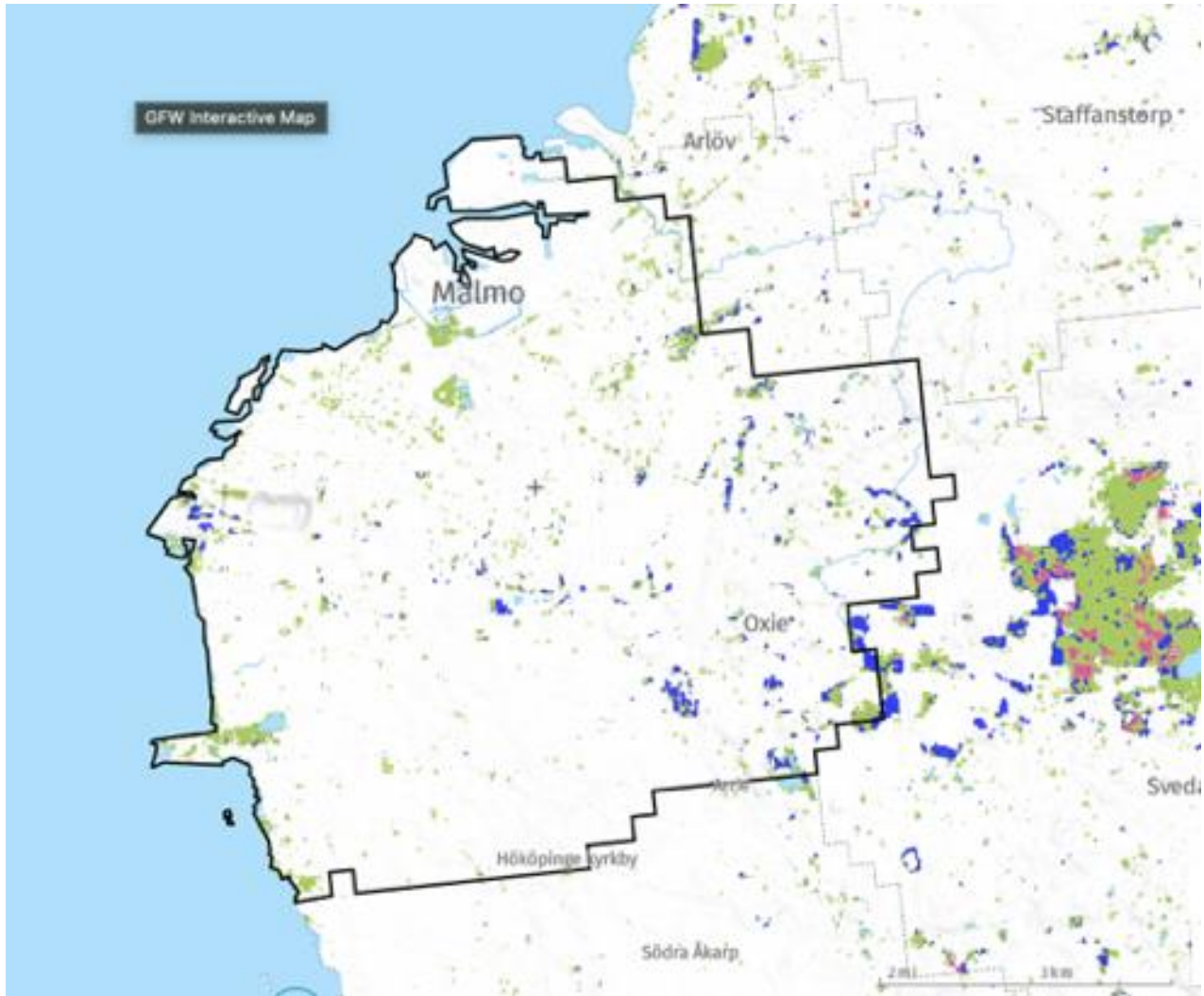


Figure 2. Shows the city of Malmö. The blue area represents water bodies, and the green color represents the tree canopy coverage in the city and surrounding areas. (images retrieved from the Global Forest Watch, 2024) <https://www.globalforestwatch.org/>

5. Conclusion

To enhance environmental justice in the city, future decision-making for projects must bridge environmentally sustainable planning with social justice thus allowing the city residents to benefit from carefully planned infrastructure that includes sufficient green amenities and only when economic priorities are not the dominant structure. Projects that benefit the entire community need the participation of the entire community to achieve a sensical stewardship of common spaces.

Trees and UGSs provide unmatched benefits for an adequate functioning of the city. They are at risk to be lost and therefore it is needed to systematically incorporate the protection and implementation of them in the policies, regulations and practices. This will be especially important for Malmö due to the lack of trees in the city.

While densification strategies are the current development strategy in Malmö, it is yet to be accounted the repercussions of the novel approaches in infrastructure. The preservation of greenery represents a conundrum for densification goals and might be overrun by more pressing matters such as housing and mobility infrastructure. The trade-offs between densification and UGSs will be harder with a growing population and will result in detriment of vegetation and ultimately reduce the resilience of the environment in the long term.

<https://www.sciencedirect.com/science/article/abs/pii/S1462901119310883>

REFERENCES

- Anguelovski, I., (2016). From Toxic Sites to Parks as (Green) LULUs? New Challenges of Inequity, Privilege, Gentrification, and Exclusion for Urban Environmental Justice. *Journal of Planning Literature*, 31(1), 23-26. *Journal of Planning Literature*.
- Anguelovski, I., Connolly, J. J., García-Lamarca, M., Cole, H., & Pearsall, H. (2018). New scholarly pathways on green gentrification: What does the urban ‘green turn’ mean and where is it going? *Progress in Human Geography*, 43(6), 1064–1086.
<https://doi.org/10.1177/0309132518803799>
- Baeten, G. (2011). Normalising neoliberal planning: The case of Malmö, Sweden. In ~ *The α Geojournal library* (pp. 21–42). https://doi.org/10.1007/978-90-481-8924-3_2
- Baeten, G., Westin, S., Pull, E., & Molina, I. (2016). Pressure and violence: Housing renovation and displacement in Sweden. *Environment & Planning. A*, 49(3), 631–651.
<https://doi.org/10.1177/0308518x16676271>
- Barboza, E. P., Cirach, M., Khomenko, S., Iungman, T., Mueller, N., Barrera-Gómez, J., Rojas-Rueda, D., Kondo, M. C., & Nieuwenhuijsen, M. (2021). Green space and mortality in European cities: a health impact assessment study. ~ *the α Lancet. Planetary Health*, 5(10), e718–e730. [https://doi.org/10.1016/s2542-5196\(21\)00229-1](https://doi.org/10.1016/s2542-5196(21)00229-1)
- Beenackers, M. A., Kruize, H., Barsties, L., Acda, A., Bakker, I., Droomers, M., Kamphuis, C. B., Koomen, E., Nijkamp, J. E., Vaandrager, L., Völker, B., Luijben, G., & Ruijsbroek, A. (2024). Urban densification in the Netherlands and its impact on mental health: An

- expert-based causal loop diagram. *Health and Place/Health & Place (Online)*, 87, 103218. <https://doi.org/10.1016/j.healthplace.2024.103218>
- Bowler, D. E., Buyung-Ali, L. M., Knight, T. A., & Pullin, A. S. (2010). Urban greening to cool towns and cities: A systematic review of the empirical evidence. *Landscape and Urban Planning*, 97(3), 147–155. <https://doi.org/10.1016/j.landurbplan.2010.05.006>
- Chatzidimitriou, A., & Yannas, S. (2016). Microclimate design for open spaces: Ranking urban design effects on pedestrian thermal comfort in summer. *Sustainable Cities and Society*, 26, 27–47. <https://doi.org/10.1016/j.scs.2016.05.004>
- Comprehensive Plan for Malmo Summary in English*. (2018). https://malmo.se/download/18.4f363e7d1766a784af162c8/1610100360559/OP_english_summary_lores.webb.pdf
- Darren, P (2011). *The Politics of Urban Sustainability: Preservation, Redevelopment and Landscape on the High Line (M.A. thesis)*. <http://www.etd.ceu.hu>. https://www.etd.ceu.hu/2011/patrick_darren.pdf
- Ekosystemtjänster i den byggda miljön*. (2023, September 6). [.boverket.se/](https://www.boverket.se/). <https://www.boverket.se/sv/byggande/hallbart-byggande-och-forvaltning/ekosystemtjanster/#>
- Erlwein, S., & Pauleit, S. (2021). Trade-Offs between Urban Green Space and Densification: Balancing Outdoor Thermal Comfort, Mobility, and Housing Demand. *Urban Planning*, 6(1), 5–19. <https://doi.org/10.17645/up.v6i1.3481>
- Evyatar, E., & Pearlmutter, D. (2011). Urban Microclimate Designing the Spaces Between Buildings. www.researchgate.net

Flanagan, E., Malmqvist, E., Oudin, A., Persson, K. S., Ohlsson, J. A., & Mattisson, K. (2023).

Health impact assessment of road traffic noise exposure based on different densification scenarios in Malmö, Sweden. *Environment International*, 174, 107867.

<https://doi.org/10.1016/j.envint.2023.107867>

Zischg, A. P. (2023). Flood risk change. A Complexity Perspective *Elsevier eBooks*.

<https://doi.org/10.1016/c2019-0-04683-3>

Fors, H., Hagemann, F. A., Sang, Å. O., & Randrup, T. B. (2021). Striving for Inclusion—A systematic review of Long-Term participation in strategic management of urban green spaces. *Frontiers in Sustainable Cities*, 3. <https://doi.org/10.3389/frsc.2021.572423>

Foster, J., & Sandberg, L. (2014). Post-industrial urban greenspace: justice, quality of life and environmental aesthetics in rapidly changing urban environments. *Local Environment*, 19(10), 1043–1048. <https://doi.org/10.1080/13549839.2014.966557>

Frågor och svar om planprogram 6050 för Bellevuegården och Lorensborg. (2024, February 20). Malmö Stad.

<https://malmo.se/Stadsutveckling/Stadsutvecklingsomraden/Lorensborg-och-Bellevuegarden/Fragor-och-svar-om-planprogram-6050-for-Bellevuegarden-och-Lorensborg.html>

Green City - Malmö stad. (2023, July 20). <https://malmo.se/Welcome-to-Malmo/Sustainable-Malmo/Sustainable-Urban-Development/Western-Harbour/Green-City.html>

Grundström, K., & Molina, I. (2016). From Folkhem to lifestyle housing in Sweden: segregation and urban form, 1930s–2010s. *International Journal of Housing Policy*, 16(3), 316–336.

<https://doi.org/10.1080/14616718.2015.1122695>

- Gutierrez, V. P. (2015). *The Malmö Innovation Platform* [Video]. Youtube.
<https://www.youtube.com/watch?v=l-XTSds54ww>
- Gould, K., & Lewis, T. (2012). *The environmental injustice of green gentrification: the case of Brooklyn's Prospect Park*.
- Haaland, C., & Konijnendijk, C. (2015). Challenges and strategies for urban green-space planning in cities undergoing densification: A review. *Urban Forestry & Urban Greening*, 14(4), 760–771. <https://doi.org/10.1016/j.ufug.2015.07.009>
- Haaland, C., Raymond, C., & Kari Stålhammar, S. (2021). Bedömning av sociala och ekologiska värden i Lorensborg och Belleveugården, Malmö och Ronna, Södertälje. *Zenodo*. <https://doi.org/10.5281/zenodo.5136808>
- Hall, T., & Vidén, S. (2005). The Million Homes Programme: a review of the great Swedish planning project. *Planning Perspectives*, 20(3), 301–328.
<https://doi.org/10.1080/02665430500130233>
- Hansen, R., & Pauleit, S. (2014). From Multifunctionality to Multiple Ecosystem services? A Conceptual framework for Multifunctionality in green infrastructure planning for urban areas. *AMBIO: A Journal of the Human Environment*, 43(4), 516–529.
<https://doi.org/10.1007/s13280-014-0510-2>
- Heidt, V., & Neef, M. (2007). Benefits of urban green space for improving urban climate. In *Springer eBooks* (pp. 84–96). https://doi.org/10.1007/978-0-387-71425-7_6
- Holgersen, S., & Malm, A. (2015). “green fix” as crisis management. or, in which world is malmö the world's greenest city? *Geografiska Annaler. Series B, Human Geography/Geografiska Annaler. Series B. Human Geography*, 97(4), 275–290.
<https://doi.org/10.1111/geob.12081>

- Jepson, V. (2019). At what price? Searching for environmentally sustainable and socially just urban greening strategies in Malmö, Sweden. *Master Thesis Series in Environmental Studies and Sustainability Science*.
- Lee, H., Mayer, H., & Liang, C. (2016). Contribution of trees and grasslands to the mitigation of human heat stress in a residential district of Freiburg, Southwest Germany. *Landscape and Urban Planning*, 148, 37–50. <https://doi.org/10.1016/j.landurbplan.2015.12.004>
- Libretexts. (2021, March 9). 17.3: *The Impacts of Urban Sprawl*. Engineering LibreTexts. [https://eng.libretexts.org/Bookshelves/Environmental_Engineering_\(Sustainability_and_Conservation\)/Book%3A_Essentials_of_Environmental_Science_\(CK-12\)/17%3A_Untitled_Chapter_17/17.03%3A_New_Page](https://eng.libretexts.org/Bookshelves/Environmental_Engineering_(Sustainability_and_Conservation)/Book%3A_Essentials_of_Environmental_Science_(CK-12)/17%3A_Untitled_Chapter_17/17.03%3A_New_Page)
- Listerborn, C., Molina, I., & Richard, A. B. (2020). Claiming the right to dignity: New organizations for housing justice in neoliberal Sweden. *Radical Housing Journal*, 2(1), 119–137. <https://doi.org/10.54825/dbx11532>
- Mihailova, D. (2017). *Environmental Justice in the Post-industrial, Entrepreneurial City A Look at Malmö's Built Environment* [Master thesis]. Lund university.
- Montejano, J., Monkkonen, P., Guerra, E., & Caudillo, C. (2019). The Costs and Benefits of Urban Expansion: Evidence from Mexico, 1990–2010. *Lincoln Institute*. <https://www.lincolnst.edu/publications/working-papers/costs-benefits-urban-expansion>
- Moser, A., Rötzer, T., Pauleit, S., & Pretzsch, H. (2015). Structure and ecosystem services of small-leaved lime (*Tilia cordata* Mill.) and black locust (*Robinia pseudoacacia* L.) in urban environments. *Urban Forestry & Urban Greening*, 14(4), 1110–1121. <https://doi.org/10.1016/j.ufug.2015.10.005>

- Muhar, A., Raymond, C. M., Van Den Born, R., Bauer, N., Böck, K., Braitto, M., Buijs, A., Flint, C. G., De Groot, W., Ives, C. D., Mitrofanenko, T., Plieninger, T., Tucker, C. M., & Van Riper, C. J. (2017). A model integrating social-cultural concepts of nature into frameworks of interaction between social and natural systems. *Journal of Environmental Planning and Management*, *61*(5–6), 756–777.
<https://doi.org/10.1080/09640568.2017.1327424>
- Neighbourhood case Study: Augustenborg, Sweden*. (2013). [ecodistricts.org/wp-Content/Uploads/2013/05/Augustenborg.pdf](https://ecodistricts.org/wp-content/uploads/2013/05/Augustenborg.pdf). Retrieved April 20, 2024, from <https://ecodistricts.org/wp-content/uploads/2013/05/Augustenborg.pdf>
- Oke, T. R. (1982). The energetic basis of the urban heat island. *Quarterly Journal of the Royal Meteorological Society*, *108*(455), 1–24. <https://doi.org/10.1002/qj.49710845502>
- Pelczynski, J., & Tomkowicz, B. (2019). Densification of cities as a method of sustainable development. *IOP Conference Series. Earth and Environmental Science*, *362*(1), 012106.
<https://doi.org/10.1088/1755-1315/362/1/012106>
- Pont, M. Y. B., Perg, P. G., Haupt, P. A., & Heyman, A. (2020). A systematic review of the scientifically demonstrated effects of densification. *IOP Conference Series. Earth and Environmental Science*, *588*(5), 052031. <https://doi.org/10.1088/1755-1315/588/5/052031>
- Raymond, C. M., Anderson, C. B., Athayde, S., Vatn, A., Amin, A., Arias-Arévalo, P., Christie, M., Cantú-Fernández, M., Gould, R. K., Himes, A., Kenter, J. O., Lenzi, D., Muraca, B., Murali, R., O'Connor, S., Pascual, U., Sachdeva, S., Samakov, A., & Zent, E. L. (2023). An inclusive typology of values for navigating transformations towards a just and sustainable future. *Current Opinion in Environmental Sustainability*, *64*, 101301.

- Rutt, R. L., & Gulsrud, N. M. (2016). Green justice in the city: A new agenda for urban green space research in Europe. *Urban Forestry & Urban Greening*, *19*, 123–127.
<https://doi.org/10.1016/j.ufug.2016.07.004>
- Rydin, Y., Bleahu, A., Davies, M., Dávila, J. D., Friel, S., De Grandis, G., Groce, N., Hallal, P. C., Hamilton, I., Howden-Chapman, P., Lai, K. M., Lim, C., Martins, J., Osrin, D., Ridley, I., Scott, I., Taylor, M., Wilkinson, P., & Wilson, J. (2012). Shaping cities for health: complexity and the planning of urban environments in the 21st century. *The Lancet*, *379*(9831), 2079–2108. [https://doi.org/10.1016/s0140-6736\(12\)60435-8](https://doi.org/10.1016/s0140-6736(12)60435-8)
- Sandberg, L. (2014). Environmental gentrification in a post-industrial landscape: the case of the Limhamn quarry, Malmö, Sweden. *Local Environment*, *19*(10), 1068–1085.
<https://doi.org/10.1080/13549839.2013.843510>
- Scarpa, S. (2016). Immigration policy regimes, welfare states and urban inequality patterns: A comparison between Malmö and Genoa. *European Urban and Regional Studies*, *23*(4), 862–877. <https://doi.org/10.1177/0969776415578199>
- Sustainable Urban Planning*. (2023, November 27). Malmö Stad. <https://malmo.se/Welcome-to-Malmo/Sustainable-Malmo/Sustainable-Urban-Development/Sustainable-Urban-Planning.html>
- Stevenson, M., Thompson, J., De, T. H., Ewing, R., Mohan, D., McClure, R. J., Roberts, I., Tiwari, G., Giles-Corti, B., Sun, X., Wallace, M., & Woodcock, J. (2016). Land use, transport, and population health: estimating the health benefits of compact cities. *The Lancet*, *388*(10062), 2925–2935. [https://doi.org/10.1016/s0140-6736\(16\)30067-8](https://doi.org/10.1016/s0140-6736(16)30067-8)

Stålhammar, S., & Raymond, C. M. (2024). Contested representations of benefits of urban nature in a densifying marginalised neighbourhood. *Journal of Environmental Planning and Management*, 1–25. <https://doi.org/10.1080/09640568.2024.2311822>

Teller, J. T. (2020, March). *urban densification*. buildingcities.org.

Översiktsplan för Malmö 2014. (2024, February 13). Malmö Stad.

<https://malmo.se/Stadsutveckling/Sa-utvecklar-vi-staden/Stadsplanering-och-bostader/Oversiktsplanering/Historiska-oversiktsplaner/Oversiktsplan-for-Malmo-2014.html>

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