

Harmonizing social and ecological sustainability through human rights and weak anthropocentrism

A case study of green urban spaces and education in Malmö

Gloria-Karin López

Master Thesis Series in Environmental Studies and Sustainability Science,
No 2019:031

A thesis submitted in partial fulfillment of the requirements of Lund University
International Master's Programme in Environmental Studies and Sustainability Science
(30hp/credits)



LUCSUS

Lund University Centre for
Sustainability Studies



LUND
UNIVERSITY

**Harmonizing social and ecological sustainability through
human rights and weak anthropocentrism**

A case study of green urban spaces and education in Malmö

Gloria-Karin López

A thesis submitted in partial fulfillment of the requirements of Lund University International Master's
Programme in Environmental Studies and Sustainability Science

Submitted May 14, 2019

Supervisor: Genesis T. Yengoh, LUCSUS, Lund University

Abstract

Social and ecological sustainability are recognized pillars of sustainable development. However, it is not always clear how they are supposed to be achieved jointly. This unclarity can lead to major tradeoffs between social and ecological sustainability which ultimately endangers our prospects for sustainable development. In Malmö, Sweden, the tension of social and ecological sustainability can be found in the challenge of both protecting green urban spaces as well as increasing the number of schools. This study will explore the linkages between ensuring education and protecting green urban spaces for the school children in Malmö.

The linkages will be explored using systems analysis (cause-effect relationships), supported by data retrieved from the Swedish National Agency for Education. The analysis shows that one can achieve harmonizing interlinkages between education and green urban spaces through the adoption of green schoolyards. This result is discussed through the framework of weak anthropocentrism and human rights based on Kate Raworth's doughnut-model. The discussion identifies that green schoolyards ensures education to the full extent according to the human rights principle on states – and municipalities – to respect, protect and fulfill human rights. It furthermore identifies that the preconditions for green schoolyards should be adopted by Malmö municipality.

Keywords: ecological sustainability, social sustainability, human rights, causal loop diagram, education, green urban spaces.

Word count: 13 024

Acknowledgements

This thesis would not have been completed if it wasn't for the support by my sambo, my parents and sister. Thank you for being so supportive and encouraging!

I would furthermore like to thank my great supervisor Genesis as well as the peers in my thesis-group with whom I have shared my anxieties and stepwise feats. Thank you all for giving me a context and structure in this thesis writing process!

Table of Contents

1 Introduction	1
1.1 Research aim and research questions	6
1.2 Drawing on sustainability science.....	6
1.3 Thesis outline	7
2 Background	7
2.1 Malmö municipality's governance of education	7
2.2 Malmö municipality's governance of green urban spaces	9
3 Methodology.....	10
3.1 Conceptual framework: Human rights and weak anthropocentrism.....	10
3.1.1 <i>Conceptualizing the harmonization of education and green urban spaces through the human rights obligation to respect protect and fulfill human rights</i>	<i>12</i>
3.1.2 <i>Conceptualizing the harmonization between education and green urban spaces through weak anthropocentrism</i>	<i>12</i>
3.2 Methods.....	14
3.2.1 <i>Exploring education and green urban spaces using cause-effect relationships ..</i>	<i>14</i>
3.2.2 <i>Conceptual literature review.....</i>	<i>16</i>
3.2.2.1 <i>Materials</i>	<i>17</i>
3.2.3 <i>Statistical analysis.....</i>	<i>18</i>
3.3 Limitations	19
4. Results	19
4.1 Achieving secondary-competence for all school-children of Malmö	19

4.1.1	<i>The problem with unequal education in Malmö</i>	<i>20</i>
4.1.2	<i>The solutions adopted to achieve secondary competence for all</i>	<i>21</i>
4.2	The system behind the protection of green urban spaces for school children in Malmö	23
4.2.1	<i>The problem of decreasing green urban spaces for school children in Malmö</i>	<i>23</i>
4.2.2	<i>The solutions adopted to protect green urban spaces for the school children of Malmö.....</i>	<i>24</i>
4.3	The meta-system of achieving secondary competence and the protection of green urban spaces for all school children in Malmö.....	26
5.	Discussion: harmonization between education and green urban spaces....	28
5.1	Green schoolyards respect, protect and fulfill the human right to education	28
5.2	Weak anthropocentrism implicates the municipality's responsibility to create and maintain green schoolyards.....	29
5.3	Contribution to sustainability science.....	31
5.4	Further Research.....	31
6.	Conclusion.....	32
	References	34
	Appendix A	42
	Appendix B.....	43
	Appendix C.....	44
	Appendix D	45

1 Introduction

Social and ecological¹ sustainability are known pillars of sustainable development (J. D. Sachs, 2015). However, it is not always clear how they are supposed to be achieved jointly. A study by O’Neill et al. (2018) compared countries’ fulfillment of social and ecological sustainability and found that no country is currently meeting both (see Figure 1). The countries that succeed in reaching most of the social thresholds, such as, e.g. Sweden, are exacerbating the biophysical boundaries of the planet (O’Neill et al., 2018). Moreover, the countries that succeed with staying within the planetary boundaries only reach a few of the social thresholds. This could be interpreted as if social development always comes at a cost of the environment, which is detrimental for attaining overall sustainable development.

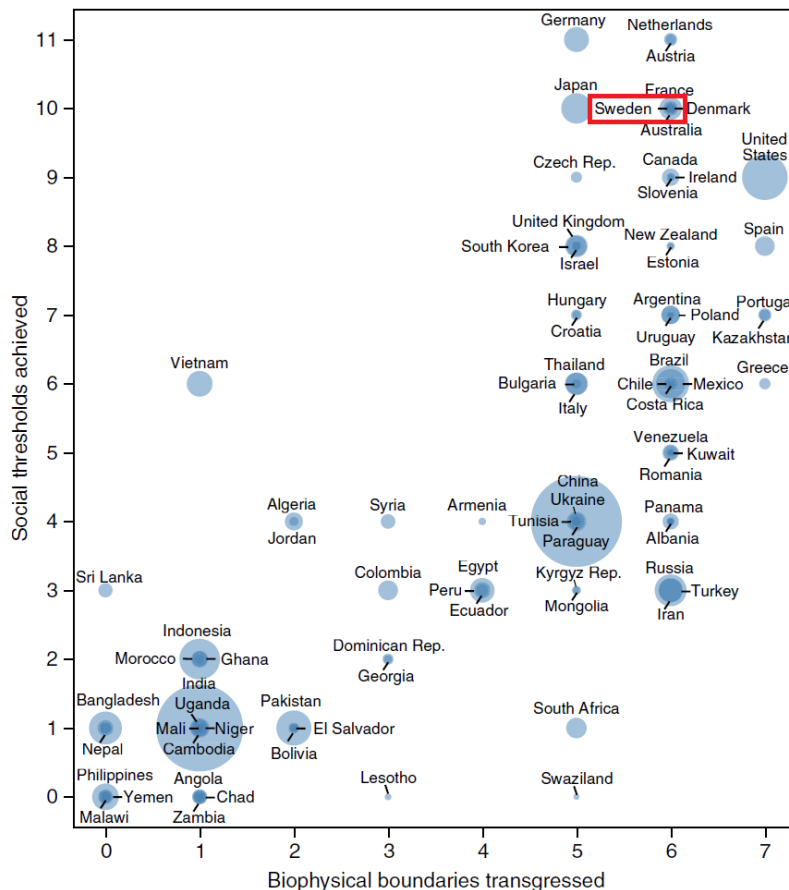


Figure 1. Countries placed according to their fulfillment of social and ecological parameters. The desired result would be to have all countries in the upper left corner, where all the social thresholds are met without exceeding any planetary boundaries. Sweden, that reach 10 out of 11 social thresholds but that transgress 6 out of 7 biophysical boundaries, has been marked with a red square by me. Source: O’Neill, Fanning, Lamb, and Steinberger (2018, p. 90).

Vita, Hertwich, Stadler, and Wood (2019), on the other hand, found that there isn’t a definitive relationship between increased satisfaction of human needs (social sustainability) and increased greenhouse gas emissions (breach of ecological sustainability). Taken together, these two recent studies show that the relationship between social and ecological sustainability is unclear and it makes one wonder what type of conceptualization of social and ecological sustainability that would help to leverage a harmonious achievement of both.

¹ The word ‘ecological’ will be used interchangeably with ‘environmental’.

Looking further into the study by O’Neill et al. (2018), one finds which aspects (thresholds) of social development that at a global level are in conflict with ecological sustainability (Fanning, 2018). One of these is the relationship between a high share of people attending secondary education (the threshold was 66% enrolment into secondary education) and a breach of several environmental variables such as high emissions of CO2, phosphorous and nitrogen (see Figure 2). This is certainly a

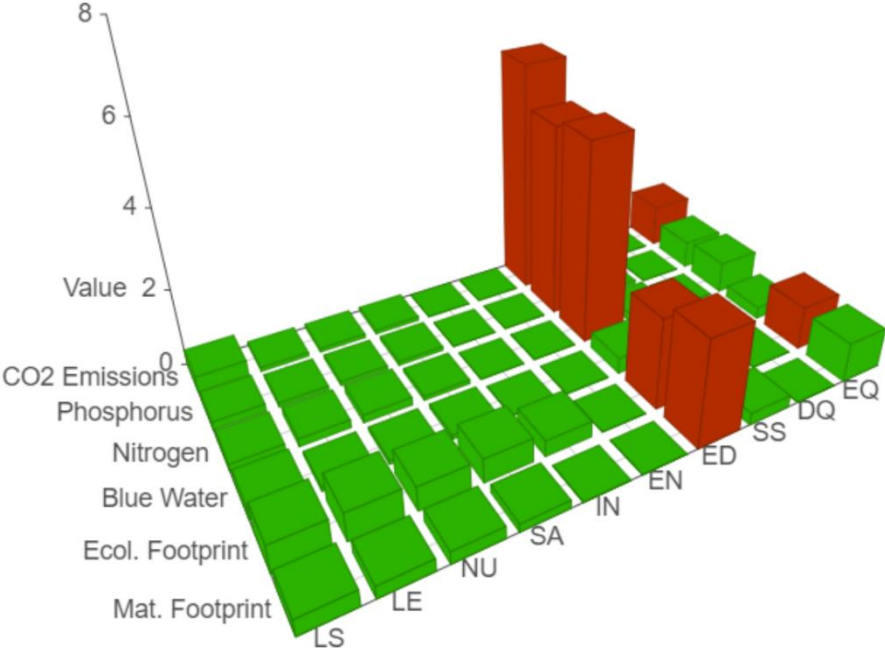


Figure 2. A chart demonstrating the relationships between social thresholds (aspects of social sustainability) and biophysical boundaries (aspects of ecological sustainability) at a global level. The variable of education (ED) has here been set to a 100% enrollment in secondary education whereas all other social thresholds have been set to their lowest degree. It shows that if 100 % of the population had been enrolled in secondary education, then this is connected to CO2 emissions that are 5.9 times the biophysical boundary (bio-boundary), a phosphorous footprint that is 4.9 times the bio-boundary, a nitrogen footprint that is 5.1 times the bio-boundary, a blue water footprint that is 0.4 times the bio-boundary (the only ED-bar that is green), an ecological footprint that is 2.3 times the bio-boundary and a material footprint that is 2.7 times the bio-boundary. Source: University of Leeds (2019).

devastating result since education for all is essential for sustainable development (J. D. Sachs, 2015) (and has as such been made into the Sustainable Development Goal 4 (UNGA, 2015)), both as a goal in itself and as a mean for poverty reduction and the attainment of better health (OECD, 2001; Coomans, 2010; OECD & WHO, 2015). An example of this is given by Seeberg, Ross, Liu, and Tan (2007) that share how education is equal to empowerment² for girls in rural China. Furthermore, Vo (2016) argues that education is crucial for girls and women in Cambodia to increase their opportunities in life, which results in a decreased risk of involuntarily working as sex workers and an

² To be empowered is to be able to define who oneself is and the limits of what oneself can do (Mosedale, 2005); to be able to make active life choices for oneself.

increased chance for employment in jobs with better sexual and reproductive health and a better salary.

Obstacles that hinder education for all differ depending on the context, e.g. most of the children out of school are those living in conflict areas and there are also those who, when the government hasn't a sufficient budget for making education free of charge, cannot afford school (UNESCO, 2015). Much attention has been given to the problems in the Global South, especially through the efforts of achieving Millennium Development Goals 2 and 3 that focused on increasing the number of girls in school and the overall enrollment in primary education (Seeberg et al., 2007; UN, 2015; UIS & Unicef, 2015). But there are also issues with education for all in the Global North.

In Sweden, several factors are linked to the pupils' school performance (see Figure 3)(Skolverket, 2018a; Yang Hansen & Gustafsson, 2019). Out of these factors, the one with the biggest influence is the parents' educational level. The second factor, that is currently growing in importance, is the income level of the parents. A third factor is whether the pupils have done all their primary education or not within Sweden. These factors influence grades but, perhaps most importantly, also which students that will attain secondary competence and thus qualify for secondary education. In 2018, the share of students that did not achieve secondary competence was 15,6% (Skolverket, 2018c), and in the Swedish context, where schools are supposed to adapt the education so that it levels out the differences between pupils' abilities to attain the education (SFS 2010:800), these 15,6%³ that are linked to factors of the school children's background is a testament to that the state hasn't secured education for all.

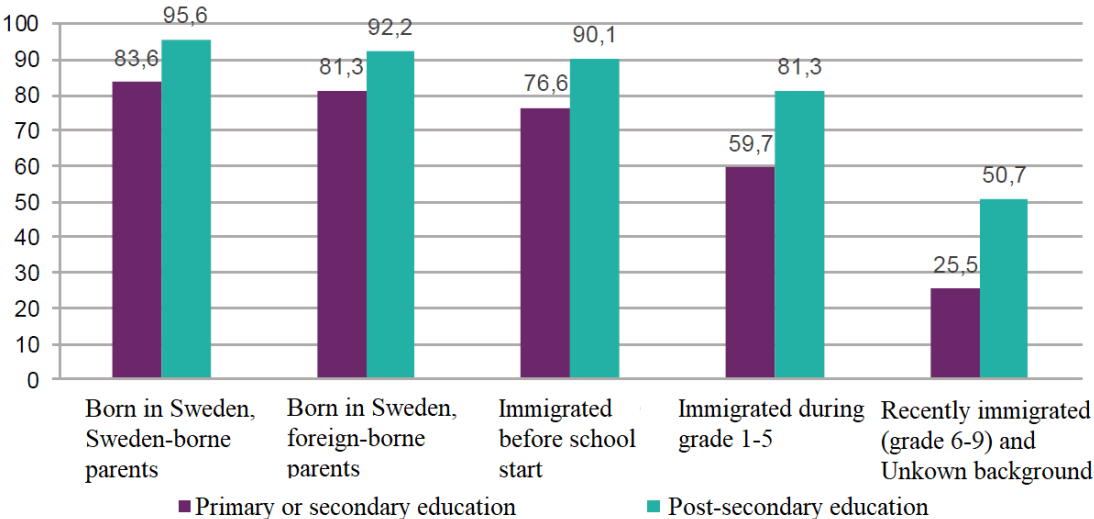


Figure 3. Share (%) of pupils with secondary competence based on Swedish or foreign background and the parent's educational level, spring term of 2018. The pupil's whose parents completed post-secondary education are attaining a higher share of secondary competence no matter whether they have Swedish or foreign background and no matter when they began school in Sweden. However, the time of immigration in relation to school start in Sweden certainly also has an impact. Adapted from Swedish to English by me. Source: Skolverket (2018c, p. 11).

Relating to the study by O’Neill et al. (2018), one is left wondering why and how education causes negative environmental impacts and thus how to develop the education in Sweden further⁴ without causing the negative impacts on the environment. Previous research that have looked at the environmental impact of schools focus on the sustainability of the school building (Emami, Marteinson, & Heinonen, 2016; Ji et al., 2016) and the school lunches with its resulting food waste (Benvenuti, De Santis, Santesarti, & Tocca, 2016; Boschini, Falasconi, Giordano, & Alboni, 2018). These environmental impacts are not in conflict with the social development of education. However, the tension of social and ecological sustainability can be found in the challenge of both protecting green urban spaces as well as increasing the number of schools in Malmö, Sweden (see Box 1).

Box 1. Conflict between environmental and social sustainability in Malmö concerning schools and green urban spaces

In a previous study that aimed to analyze how environmental sustainability could be prioritized even more by the Malmö municipality, Carlos Cordova, Milla Susi, Asger Mindegaard, Mari Peltola and myself from the Lund University Master for Environmental Studies and Sustainability Science found that the priority of protecting the environment sometimes clashed with the priority of providing social services for the inhabitants (Employee at the municipality of Malmö, personal communication, March 6, 2018). This was exemplified with a conflict in city planning between either building a pre-school, or to keep a green urban space unbuilt for biodiversity protection.

According to Malmö municipality’s environmental assessment (Miljöförvaltningen, 2019), the green urban spaces are declining whereas the growing population, that is projected to reach half a million by 2050, will require more school buildings to ensure education for all (Malmö stad, 2018b). Schools are in fact the most land-demanding social service provided by the municipality (Malmö stad, 2016a). The struggle of protecting green urban spaces is not unique to Malmö – although it might be most

⁴ Previous research (see e.g. Berhanu, 2010; Yang Hansen & Gustafsson, 2016) indicate that the educational reforms towards a more marketized educational system since 1989 are driving the increased segregation between schools along the factors previously explained to have an impact on the pupils’ attainment of secondary education (parents’ level of fulfilled education, parents’ level of income and if the pupils have lived in Sweden throughout the whole schooling or not) in Sweden. As these reforms were implemented by the government, these will not be included in the scope of this study but they are not likely to be reversed (Alexiadou et al., 2016).

prevalent in Malmö (see Figure 4) – but a priority for all the cities of Sweden⁵. The green urban spaces are important for e.g. production of clean air, infiltration of storm water and cooling of temperature and thus minimizing the risk for heat-related illnesses (Wolch, Byrne, & Newell, 2014). To make cities green is thus part of the Sustainable Development Goal 11 (UNGA, 2015) and the Swedish government has adopted a national strategy in 2018 for sustainable urban development (Naturvårdsverket, 2019; Skr., 2017/18:230). To harmonize the currently conflicting situation of securing education for all while protecting green urban spaces is thus of relevance for all of Sweden, and it might give guidance on how to harmonize social and ecological sustainability overall.

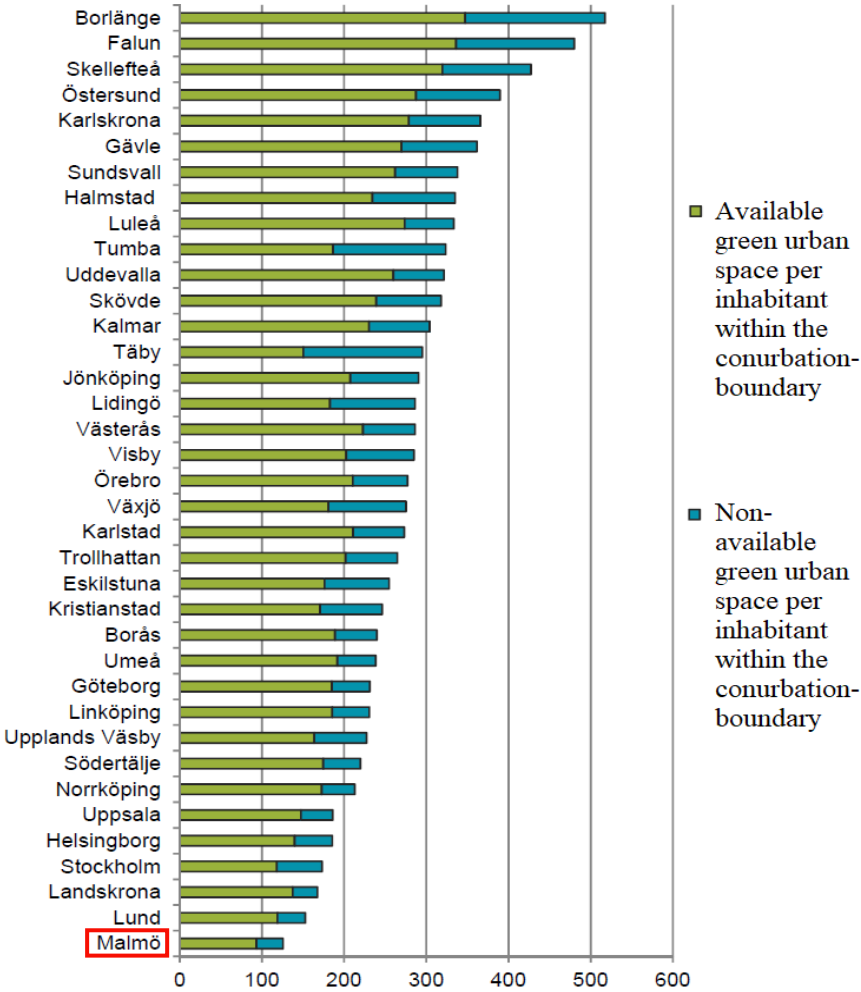


Figure 4. Available and non-available green urban space per inhabitant in square meters per the cities with at least 30 000 inhabitants and the city of Visby, in 2010. Malmö (seen in the red rectangle) was the city with the least amount of available green urban space with 126 square meters per inhabitant out of which 93 square meters were publicly available. Adapted from Swedish to English by me. Source: SCB (2010, p. 10).

⁵ Protecting green urban spaces is also of importance for other countries since the global population is growing which is coupled with increased urbanization (Alina, 2015) and that in turn puts pressure on the green urban spaces worldwide (Dahlberg & Borgström, 2017).

1.1 Research aim and research questions

This thesis aims to examine if there are linkages between ensuring education and the protection of green urban spaces for school-aged children in Malmö.

The guiding research question for reaching the aim is: *to what extent can education and the protection of green urban spaces for school-aged children in Malmö be harmonized?* This main research question is divided into the following sub-questions:

1. What are the linkages between education and green urban spaces for school-aged children in Malmö?
2. To what extent do the linkages harmonize the development of education and the protection of green urban spaces for school-aged children in Malmö?

1.2 Drawing on sustainability science

This thesis has sustainability science as its research field and is such focusing on the interlinkages of an issue – the competing claims for land in Malmö to either ensure education or to protect green urban spaces for the school children – that has both social and environmental aspects to it (Kates et al., 2001). The study is furthermore positioned “at the nexus of problem-solving and critical research” which Mahmoud, Jerneck, Kronsell, and Steen (2018) named their article. It does this since it both seeks to explore the current linkages of the issue, if there are any, and to understand if these linkages can harmonize each other.

The study thus analyzes the issue based on the world as it is, but it also seeks to understand what could be added or changed in the world (in this case Malmö) for the linkages to be addressed – harmonized. This so that the all school children of Malmö both have their education ensured as well as protected green urban spaces. The study thus addresses two sub-problems simultaneously (see Figure

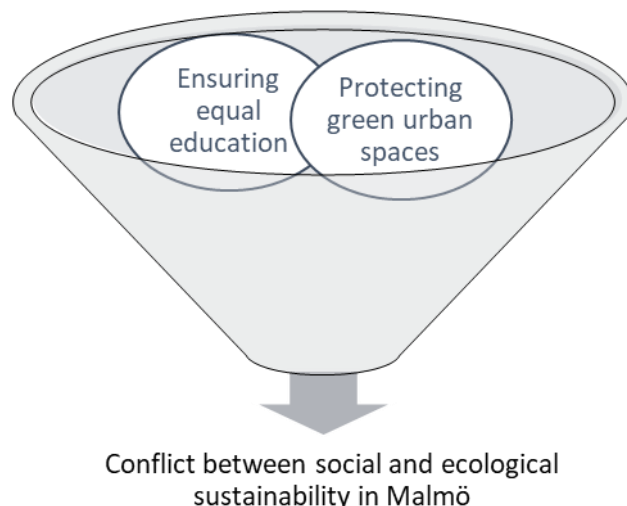


Figure 5. The conflict of social and ecological sustainability in Malmö consisting of demands on land to ensure equal education and the protection of green urban spaces for school children.

5) that can be characterized as one “old social problem” (to create equal education) and one “new sustainability challenge” (to protect green urban spaces) (Jerneck et al., 2011, p. 71; Mahmoud et al., 2018, p. 6). These two sub-problems are together part of a larger system – issue – which

sustainability science can suggest transformational change to (Wiek, Ness, Schweizer-Ries, Brand, & Farioli, 2012), when the issue is studied based on systems thinking such as through Causal Loop Diagrams.

In summary, this thesis draws on sustainability science to understand the interlinkages between social and ecological sustainability in Malmö and to provide knowledge on how they relate that hopefully can guide solutions to the conflict.

1.3 Thesis outline

This thesis consists of six chapters that together answer the research questions and thus ultimately fulfil the research aim. Chapter 1 introduced the research problem, aim, and research questions. Chapter 2 will, in order to focus this case study of conflicting needs for land to either schools to ensure education or for the protection of green urban spaces⁶, provide a background on what mandate Malmö municipality has for ensuring education and the protection of green urban spaces for all school children in Malmö. Chapter 3 outlines the methodology used (a case-study approach), presents the systems thinking-tool of Causal Loop Diagrams (CLDs) and the conceptual framework consisting of human rights as well as weak anthropocentrism and how these will be used in order to answer the research questions. Chapter 4 present the results from the case study in the format of three CLDs. These showcase the interlinkages within the two sub-problems of education and green urban spaces respectively as well as the interlinkages between the two for school-aged children in Malmö. This chapter thus contains the answer to the thesis' first research question. Chapter 5 discusses the results based on the conceptual framework in order to answer the second research question. That is, the discussion will, based on the human rights principle of respect, protect and fulfil, as well as weak anthropocentrism, explore to what extent the green urban spaces and the education can be harmonized. Chapter 6 concludes with the answer to the thesis' overarching research question.

2 Background

2.1 Malmö municipality's governance of education

Equal access to education in Sweden is provided for all by law (SFS, 2010:800). The law gives responsibilities both to the state and the managers of schools but also to students; they have an

⁶ To for example improve air quality, maintain space for plants, animals and recreation (Daniels et al., 2018).

obligation and a right to attend nursery class and elementary education – completely free of charge. The state is also responsible for the training of the teachers as well as the curriculum, the inspection of schools and to make sure that children with special needs get the support they need to attain the education (SFS, 2010:800). The obligation to manage the elementary schools does however not belong to the government but to the municipality (and can also, after approval, be managed by private actors).

Malmö is the third largest city in Sweden with 339 313 inhabitants (Malmö stad, 2019a), and is one of Sweden's 290 self-governing⁷ municipalities (SKL, 2019). This means that all municipalities have the mandate to make decisions about issues that relate to the needs and opinions of its inhabitants. The needs and opinions of Malmö's inhabitants have a lot to do with the city's development. Back in the 1800s, Malmö was the economic center of the South of Sweden and the industries in the city were a strong part of the city's identity until the 1970s when there was an oil crisis. The city lost many of its inhabitants and had to evolve into a post-industrial city and so the city established what is now known as Malmö university in 1998 (Malmö stad, 2016b). Today, Malmö is the fastest growing city of Sweden and known for its work with sustainability (T. Anderson, 2014), which can be exemplified with the fact that the municipality in 2018 decided to structure its budget according to Agenda 2030 and the Sustainable Development Goals (SDGs) from 2020 (Kommunstyrelsen, 2018). However, the city is unfortunately also known for its *need* to develop sustainably. Examples of this is that Malmö has the highest level of relative child-poverty⁸ in Sweden (Salonen, 2018), it is the city in Sweden that scored the worst on air-pollution⁹ in an international review (IQAir AirVisual, 2018), and lastly, the city struggles with high health-inequalities between different city areas¹⁰ (Stigendal & Östergren, 2013).

The differences in life-quality between city areas – the segregation – is known to the municipality and, as explained in the introduction, related to the school children's attainment of secondary competence. A study by Salonen, Grander and Rasmusson (2019) explored how people and housing were distributed across the city and found that people are highly divided along socioeconomic backgrounds. This knowledge led to the restructuring of the municipality's organizational body

⁷ Sweden has, like all other Europe Member States, ratified the European Charter of Local Self-Government (Council of Europe, 1985) but Sweden also has a longer tradition of self-governing municipalities since 1863 (SKL, 2013).

⁸ About 25% of the children in Malmö live in economically disadvantaged households.

⁹ Malmö was the only city in Sweden, out of those that were tested, that didn't have 'good' air quality as its average. It was instead of 'average' quality.

¹⁰ The final report that was published in 2013 showed, among other things, that individuals' lifespans could differ with around five years depending on in which city area of Malmö they lived.

already in 2013. Before then, and since 1996, Malmö had city area-boards that used to have the responsibility for the education for their respective city area, but since 2013, these city are-boards were exchanged to departments divided per sector instead of divided per city area. Thus, Malmö municipality, since 2013, have three departments for education and one of them – Grundskoleförvaltningen – is dedicated to ensuring primary education for all children in the municipality (Malmö stad, 2018; SKL, 2018) .

2.2 Malmö municipality's governance of green urban spaces

“Green urban spaces are everything green within the conurbation-boundaries, such as parks and open grass-areas as well as other spaces covered by trees or grass.” (SCB, 2019-05-05).

As mentioned in the introduction, the governance of green urban spaces as part of sustainable urban development is encouraged from the national level, especially through the new strategy (Skr., 2017/18:230). There are two goals set in the national strategy related to the green urban spaces: (1) that all municipalities should have access, by 2020, to a method for integrating green urban spaces and ecosystem services in their city planning, building and management, and (2) that a majority of the municipalities, by 2025, are using the method to integrate green urban spaces and ecosystem services in their city planning, building, and management. National agencies¹¹ have been given the task to provide guidelines and goals for the municipal work with green urban spaces, and it is also possible for the municipalities to seek funding for projects from a budget of 1,15 million SEK that is in place for 2018-2020 (Skr., 2017/18:230). In 2018, Malmö municipality received 8 415 000 SEK for two projects (Boverket, 2019). The first project was planting of trees in the central city area called Möllevången. This was needed due to the Dutch elm disease that killed all elms in Malmö (and the rest of Skåne) in the 1970s and due to that other diseases have combated the replanting of the trees ever since (Berlin & Niss, 2019). The other project was climate adaption of a park called Fosietorpsparken so that it will be able to withstand more severe rainfalls and planting will also be made to increase its recreational values (Boverket, 2019).

Besides the goals, guidelines, and funding from the national level, Malmö has its own goals and budget. There are several strategies guiding the management of green urban spaces in Malmö (Malmö stad, 2015) such as the *Environmental Programme for the City of Malmö 2009-2020* (Malmö stad, 2009), *Översiktsplan för Malmö - Planstrategi* (Malmö stad, 2018b), *Nature conservation plan*

¹¹ The National Board of Housing, Building and Planning (Boverket), the Swedish Environmental Protection Agency (Naturvårdsverket) and the counties (Länsstyrelserna).

(Malmö stadsbyggnadskontor, 2012), *Plan for the societal services' need for land* (Malmö stad, 2016a) and the soon to be adopted *Plan for Malmö's Blue and Green Urban Spaces* (Malmö stad, 2019b). In summary, these strategies tell us that Malmö, as a city in Skåne with Sweden's most valuable agricultural land, has decided to densify rather than expand to house its growing population. The densification of the city is seen as an opportunity for increasing the proximity to green urban spaces for the inhabitants, especially for the children and the elders – in line with the Sustainable Development Goal (SDG) number 11.7¹². As the number of strategies indicate, there are several departments responsible for the development and use of the urban spaces in Malmö. There are thus several boards and committees¹³ with the responsibility to create and maintain green urban spaces such as the Committee for Recreation, the Committee for Primary Education, the Committee for the Environment and the Committee for City Building (Malmö stad, 2015).

3 Methodology

This study will adopt a case study approach in order to fulfill the aim examining the possible linkages between ensuring education and the protection of green urban spaces for school-aged children in Malmö. This is because my aim requires the exploration of the relationships between education and green urban spaces in one specific setting (Denscombe, 2010): Malmö. Furthermore, the case study will allow me to use both an inductive logic: to find the information on how education and green urban spaces relate with each other in Malmö for the school-children, as well as an inductive logic: to see what kind of added variable would make the education and green urban spaces harmonize for the school-children in Malmö (Denscombe, 2010).

The research method chosen for conducting the case study is system analysis, using Causal Loop Diagrams. The analysis will be made based on the conceptual framework of human rights and weak anthropocentrism.

3.1 Conceptual framework: Human rights and weak anthropocentrism

As hinted by my aim and research question (Imenda, 2014), this thesis is based on a conceptual framework where ecological and social sustainability have been conceptualized and interrelated harmoniously. The starting point for the framework is Kate Raworth's (2018) definition for

¹² The SDG number 11.7 states that: "By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities" (UNGA, 2015).

¹³ 'Nämnder' in Swedish.

sustainable development given through her doughnut economics: that all human beings should have their human rights fulfilled while remaining within the planetary boundaries (see Figure 6). Social sustainability is here defined as fulfilled human rights, based on universally agreed upon minimum social standards such as the SDGs (Raworth, 2018; UNGA, 2015), and ecological sustainability is defined as planetary boundaries (Raworth, 2018; Rockström et al., 2009). The relationship is harmonized by making ecological sustainability into the ceiling and social sustainability into the foundation of one safe and just space for human life: a sweet spot for both social and ecological sustainability.

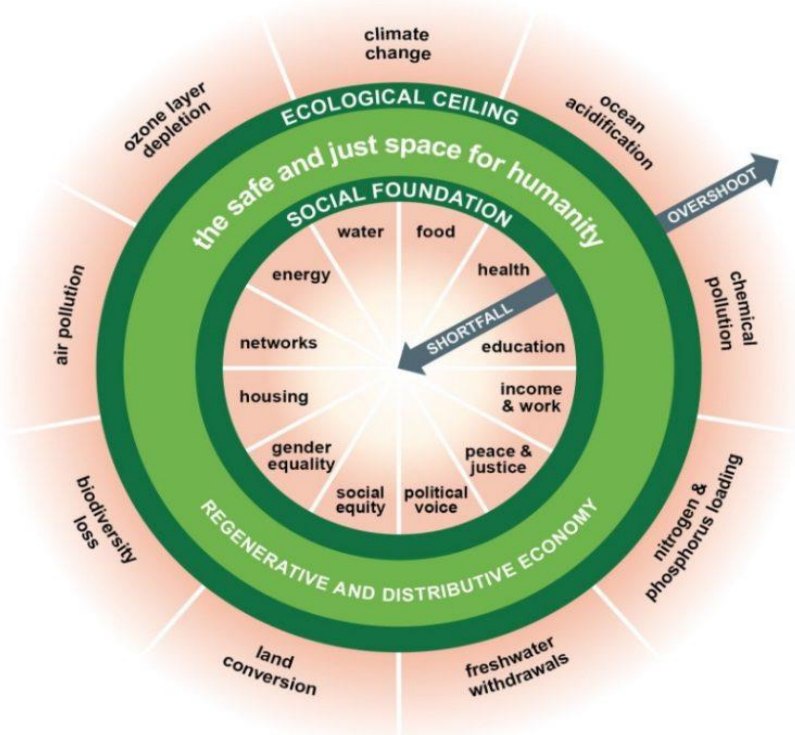


Figure 6. The Doughnut of social and planetary boundaries. This doughnut – the green space in the figure – is a safe and just space for humanity to thrive in and it consist of the creation and upholding of a social foundation as well as an ecological ceiling that limit all human actions. The social foundation is the fulfillment of human rights, here presented as 12 societal dimensions inside the green ring in accordance with the SDGs (UNGA, 2015). The ecological ceiling is the earth’s 9 planetary boundaries (the ones outside of the ring) as defined by Rockström et al. (2009). Source: Raworth (2017).

In order to understand this harmonizing relationship in more detail, I have turned to the literature on human rights and sustainability as well as the literature about the Sustainable Development Goals (SDGs). Within this literature, I have chosen two concepts to constitute this thesis’ conceptual framework: (1) the human rights-principle of states’ obligation to respect, protect and fulfill human rights, and (2) weak anthropocentrism. This framework has been created to answer the second research question: To what extent do the linkages harmonize the development of education and the protection of green urban spaces for school-aged children in Malmö?

3.1.1 Conceptualizing the harmonization of education and green urban spaces through the human rights obligation to respect protect and fulfill human rights

The obligation for all states to respect, protect and fulfill human rights is found within international human rights law. It dictates what type of actions a state – or its agents such as municipalities – need to perform in order for human rights to be considered realized (Mégret, 2018). The reason for why I chose this concept is because it makes the social foundation of Kate Raworth's doughnut more concrete, and it furthermore explains what it means when it within the preamble of Agenda 2030 says that "The 17 Sustainable Development Goals [...] seek to realize the human rights of all [...]" (UNGA, 2015).

The obligation for all states to respect, protect and fulfill the human right to education. This means that the state must not actively violate – hinder – the right through its procedures, the results from its institutions or through the people employed by them (this is the obligation to respect)(Mégret, 2018). An example of this is that the state may not adopt a law that denies people their right to attend school based on e.g. their gender or ethnicity (Coomans, 2010). The obligation to protect mean that states must protect individuals from actions performed by other individuals that hinder their right to education (Mégret, 2018), which e.g. means that states must take preemptive measures to ensure that the teachers have been trained to treat all students without discrimination and to make sure that education is free of charge (Coomans, 2010). The obligation to fulfill entails that states must implement those measures that are preconditions for the individuals' possibility of exerting their human right to education (Mégret, 2018). This means that the state, e.g. must create the educational environment; the schools and provide transportation to the schools so that all children, no matter where they live, can attend the schools (Coomans, 2010).

In summary, the obligation to respect, protect, and fulfill human rights explain what the social foundation in the doughnut entails. For the purposes of this study, the concept defines how the human right to education (social sustainability) can be supported through the functioning of green urban spaces (ecological sustainability) as one or several of the obligations to realize the human right to education.

3.1.2 Conceptualizing the harmonization between education and green urban spaces through weak anthropocentrism

Weak anthropocentrism as a base for sustainable development was found in literature about human rights and sustainable development (Bos & Düwell, 2016) and it asserts that human actions need to be restricted in order to not violate other people's human rights – including the rights of future

generations¹⁴. Inherent in this line of thought is the recognition that actions by humans have led to environmental harms which in turn have violated present people's human rights (A. Sachs, 1995; UN Special Rapporteur on human rights and the environment, 2018b; Woods, 2010). Furthermore, the science about climate change and the other transgressions of the doughnut's ecological ceiling demonstrate that people's actions already will impact future people's rights and this limitation – violation – will only increase unless we adapt our actions today (Raworth, 2018; Rockström & Klum, 2015; Rockström et al., 2009). It is a recognition that a just and safe space for humanity only can be reached and maintained if we protect nature¹⁵. The implication of this, for the relationship between social and ecological sustainability, is that the protection of social sustainability (the realization of human rights) can only be achieved through ecological sustainability (adapting our actions so that it does not breach the ecological ceiling). This is what one could call weak anthropocentrism; it recognizes that humans have the power to change the conditions of the earth and legitimizes ecological sustainability based on its instrumental value as an enabler of – the necessary prerequisite for – social sustainability.

For the purpose of this study, we can summarize anthropocentrism as an obligation to protect green urban spaces in order to not violate the Holocene-like conditions for the right of future generations¹⁶. We will use weak anthropocentrism as a lens on the results with the question of whether the human actions of education in Malmö should be adapted in order to protect the green urban spaces to ultimately ensure education for future generations.

In summary, the conceptual framework consists of Kate Raworth's doughnut as its base which is combined with states' obligation to respect, protect and fulfill human rights as well as the approach of weak anthropocentrism. This framework will be used in the discussion to answer the second research question, that is, to analyze to what extent the linkages identified in the CLDs harmonize education and green urban spaces for school-aged children in Malmö.

¹⁴ This intergenerational principle can be traced back to the Brundtland Report's definition of sustainable development: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987).

¹⁵ The logic is like the one made by Thomas Pogge for obliging states to not only conduct negative obligations (to refrain from violating actions; to respect) but to also conduct positive obligations (protect and fulfil) since the refrain from such positive actions is to actively allow violations (Pogge, 2001). Thus, to not conduct the positive obligation to protect the environment would be to actively violate the human rights of future generations.

¹⁶ The human right to a healthy environment was articulated during the UN's Conference on the Human Environment in Stockholm 1972 and has since been incorporated in at least 99 countries' constitutions (Boyd, 2015). Today, this right is likely to be incorporated in international law as well (UN Special Rapporteur on human rights and the environment, 2018a, 2019).

3.2 Methods

3.2.1 Exploring education and green urban spaces using cause-effect relationships

The use of Causal Loop Diagrams (CLDs) is a method found within systems thinking. Systems thinking conceptualizes the world and other phenomena as systems and systems are understood as several parts that interrelate with each other, which in turn creates a function. An example of this is the human body (V. Anderson & Johnson, 1997); its boundary is the skin of the body; the parts are all the organs, and one can continue onto a more fine-tuned analysis where the organs themselves are seen as subsystems (see Figure 7). Some systems can be quite complex, meaning that the different parts affect each other in a way that results in a whole that is “greater than the sum of its parts” (Haraldsson, 2004, p. 4).

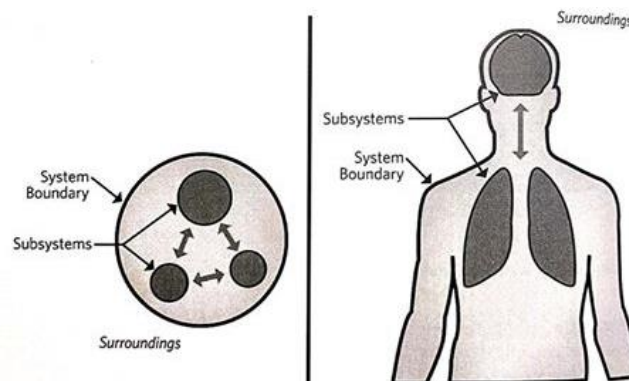


Figure 7. The human body is an example of a system which is easily distinguished from its surroundings through its boundary. We furthermore know that the body contains several parts that together create the function of being able to live through the function. Source: Robèrt et al. (2015), p. 4.

The tool of a CLD aims to identify the causal relationships between the parts of a system and, perhaps most importantly, to demonstrate where there are interactions, in a way that is easy to communicate, namely visually (Bala, Arshad, & Noh, 2017). These interactions can in other terms be recognized as synergies if the parts interact in a mutually beneficial way. These interactions can also be recognized as conflicts when some parts benefit at the expense of another part. Thus, the reason for why I chose the research method of CLDs is because they have the capacity to show the way that education and green urban spaces interrelate within the system boundary of Malmö and its school-children, and furthermore which ones of these interlinkages are creating a mutually reinforcing interaction – which will be the answer to research question one.

The full steps of a CLD can be found in books about systems thinking, and systems dynamic (V. Anderson & Johnson, 1997; Bala et al., 2017; Haraldsson, 2004) but can, in short, be described in four steps. The first step is to define the system of the problem that one wants to explore, including the system boundary. The second step is to formulate the question that one would like to get an answer

to through conducting the CLD; meaning to set the goal. The third step is to list all possible variables that could relate to the system of the problem and research them. The fourth step is to draw the diagrams. This is the way that I have applied the research method:

1. The problem was defined as an existing conflict between green urban spaces and education for all in which neither is developing sustainably. The system boundary was the boundary of Malmö municipality's potential capacity of governance and the school-children of Malmö.
2. The goal was to find interlinkages between education and green urban spaces that harmonized them – that made both of them develop sustainably. Thus, the main-question of the model was: what are the variables needed to create a harmonious relationship between education and green urban spaces? To answer this question, I used the following three sub-questions:
 - i. What variables are necessary for the school-children of Malmö to achieve secondary competence?
 - ii. What variables are necessary for the protection of green urban spaces for the school-aged children in Malmö?
 - iii. What are the overlapping variables, if there are any, between achieving secondary competence and the protection of green urban spaces for all school children in Malmö?

The objective was to create three CLDs in order to show causal interactions related to each sub-question and thus also the main-question. One CLD is of the meta-system for how education and green urban spaces interrelate in Malmö. The other two CLDs that were the base for the meta-CLD are of the subsystems 'education for all' and 'protection of green urban spaces' for school-aged children in Malmö.

3. The potential variables that could relate to the problem of green urban spaces and education in Malmö, which also would answer the sub-questions, can be found in Table 1.
4. The software used for drawing the CLDs was the program Vensim PLE 7.3 (Vensim® Personal Learning Edition. Retrieved from <https://vensim.com/vensim-personal-learning-edition/>).

Lastly, before moving on to the next section, I want to emphasize that the CLDs doesn't have a normative interpretation built into them, they just show how different variables affect each other. This has the implication that the normative interpretation of the CLDs must be brought from some other source like the conceptual framework that was outlined in the previous section.

Table 1. Variables listed for constructing the Causal Loop Diagrams (CLDs)*

<u>Variables for education</u>	<u>Variables for green urban spaces</u>
Education in Malmö	Green urban spaces in Malmö
Schools in Malmö	Spaces for children in Malmö
Education for sustainable development	Just access to green urban spaces
Health of the school children	Health of the school children
Teachers	Ecosystem services
Parents	Developing green urban spaces
Education for all	Sustainable governance
Sustainable governance	Green schoolyards
Physical activity among school children	Pupil-nature relationship
School environment	Green values
Poverty	Urban planning
Stress	Biodiversity
Money	Green cities
Attendance of pupils	Green aesthetics
Expectations on pupils	Participation of pupils

*Note that this table include all the variables tested for the CLDs. These are thus not the final variables chosen, they can rather be found in Figure 11, Figure 13 and Figure 14. Finally, these variables are both the ones listed before commencing the gathering of data, as well as the variables found through the snowball effect while gathering data (see section 3.2.2. below).

3.2.2 Conceptual literature review

The method chosen for collecting data to the CLDs was a literature review based on the three sub-questions to create the CLDs (see point 2 in the previous section). As a literature review conducted primarily to gather data on a real case, that furthermore stretches over two sub-problems, I decided to conduct a conceptual literature review (Jesson, Matheson, & Lacey, 2011). This allowed me to acquire knowledge about the specific phenomena that are part of the sub-systems of the research problem.

The concepts, or variables, that I listed before commencing the literature review guided it both as search-terms and as codes for categorizing the data into coupled variables (Layder, 2013). Meaning that I looked for connections between variables such as ‘Health of the school children’ and ‘Green Schoolyards’ to find segments of causal relationships that could be inserted in the CLDs. The

literature sometimes described linkages to concepts that I had not included among the original ones and so I decided to extend the review to explore them as well. This was the case even when the literature did not concern Malmö. The rule guiding this was that the variables had to be possible to link back to the characteristics of Malmö. This was based on the assumption that previous research about the variables chosen – if connected with the Malmö-variables – could be explanatory also for the case of Malmö.

3.2.2.1 Materials

The databases used were EBSCOhost¹⁷, Google Scholar¹⁸, the database for Malmö municipality's protocols and records¹⁹, the search engine of Malmö municipality's website²⁰, the search engine on the Swedish National Agency for Education's website²¹, the search engine at the webpage of Statistics Sweden (SCB)²² and as a last resort, when I was looking for a specific text, I used Google Search²³. These search engines and databases provided me with reports, statistics, protocols and academic papers. The main literature out of these, that was specifically connected to the case of Malmö and which guided the construction of my CLDs were: *The knowledge results in Malmö's schools 2018* (Liljeberg & Grundström, 2018), *Quality-report 2018* (Liljeberg & Rauer, 2018), *Appendix to calculations of resource allocations 2019 to Malmö's municipal and private schools* (Grundskoleförvaltningen, 2019), *Green Schoolyards final report 2010-2013* (Bengtsson & Bengtsson, 2014), *Education for sustainable development – Green Schoolyards 2010* (Pålsson, 2010) and three academic papers written by Fredrika Mårtensson and Märit Jansson et al. (Jansson, Gunnarsson, Mårtensson, & Andersson, 2014; Jansson, Mårtensson, & Gunnarsson, 2018; Mårtensson et al., 2014).

The knowledge results in Malmö's schools 2018 is a report by Malmö municipality's Department for primary education and it is the most recent report about trends in the school children's attainment of education and trends about explaining factors that indicate why not all pupils reach the goals of the education. *Quality-report 2018* has further data about how well the primary schools ensure education for the school children and areas for improvement. *Appendix to calculations of resource allocations 2019 to Malmö's municipal and private schools* is a protocol by the Malmö's Department

¹⁷ <http://search.ebscohost.com/>.

¹⁸ <https://scholar.google.se/>.

¹⁹ <https://motenmedborgarportal.malmo.se/>.

²⁰ <https://sok.malmo.se/?q=&utf8=%E2%9C%93>.

²¹ <https://www.skolverket.se/sok>.

²² <https://www.scb.se/hitta-statistik/sok/?query=&lang=sv>.

²³ <https://www.google.se/>.

for primary education and it contains the primary data on how the socioeconomic resource-compensation is structured in Malmö. *Green Schoolyards final report 2010-2013* is a report by the Department for service management and it provided data on prerequisites for creating green schoolyards in Malmö. *Education for sustainable development – Green Schoolyards 2010* is a report by the coordinator of the first year of greening schoolyards in Malmö that provided data on effects from and challenges of the green schoolyards. The academic papers evaluated the greening of a few selected schools in Malmö and they provided data on the processes set in motion in a longer time-perspective from greening the schoolyards. Adding to this, they also considered how boys respectively girls used the green schoolyard as well as older respectively younger school children’s use of it.

3.2.3 Statistical analysis

This study not only reviewed literature but it also analyzed data found in the Swedish National Agency for Education’s database. I retrieved two datasets: one focusing on the share of pupils attaining secondary competence at the respective school in Malmö (Skolverket, 2018b) and the other focused on the grade point average at each school in Malmö (Skolverket, 2019b). The variables included in each dataset can be seen in Table 2. I used these datasets to find out how unequal the education was between schools in Malmö, that is, what the share of secondary competence was at each school and how it related to socioeconomic factors.

Table 2. The variables included in the two datasets by the Swedish National Agency for Education	
<u>Dataset 1/SIRIS: Secondary competence in Malmö in total and per school the schoolyear of 2017/2018</u>	<u>Dataset 2/SALSA: Grade point average in Malmö per school the schoolyear of 2017/2018</u>
Number of pupils in grade 9	Responsible authority of the school
Share of pupils attaining secondary competence*	The average of the parents’ level of fulfilled education
Number of girls	Share of pupils that recently immigrated
Share of girls with secondary competence	Share of boys
Number of boys	The actual share of pupils that reached the knowledge goals
Share of boys with secondary competence	The estimated share of pupils that would reach the knowledge goals
Share of students without secondary competence	The residual between the estimated and actual share
Share of teachers with a pedagogical university degree	The actual grade point average
Share of teachers with competence in special pedagogy	The estimated grade point average (GPA)
Pupils per full-time employed teacher	The residual between the estimated and actual GPA
*Note: Secondary competence can in Sweden have differing meanings but the minimum threshold for students to attain it – and that is the definition I am using – is the secondary competence to enter the secondary education in which one learns a trade. To attain this competence, pupils must pass Swedish or Swedish as a second language, English, math, and five other subjects (Skolverket, 2019a). This variable does not account for the pupils attaining secondary competence through attendance at summer school after finishing grade 9. These pupils usually raise the share of pupils with secondary competence by 1-3 percent (Liljeberg & Grundström, 2018).	

3.3 Limitations

The method for collecting data has been restricted to a literature review and statistical analysis due to the thesis' time-limit. As a first study on the specific case of education and green urban spaces in Malmö, this is a fair starting point but it would, of course, have been desirable to create a transdisciplinary group for the CLDs with employees at the different relevant departments at Malmö municipality as well as people from the schools in Malmö at all levels from pupils to principals. Before arriving at the final formulation of the research question, personalized e-mails were sent out to 14 primary schools out of which only one school replied wishing me best of luck but that they could not collaborate with me due to their own time constraints and workload. Thus, I deemed it too time-consuming to continue with reaching out to the schools. I furthermore contacted departments with questions about finding material and realized that I would not, as someone with no previous knowledge on the specific situation about the education and green urban spaces in Malmö, be able to lead a transdisciplinary group. Hopefully, further research can build on the knowledge produced by this thesis and focus on an even more localized scale with individual schools and with the knowledge from a transdisciplinary group from the different departments at the municipality and perhaps even experts in the respective fields of education and green urban spaces from other organizations.

4. Results

The results will be presented according to the method of the three CLDs that were outlined in the methodology, that is, they set out to answer the following questions in the following order: What variables are necessary for the school-children of Malmö to achieve secondary competence? What variables are necessary for the protection of green urban spaces in Malmö? What are the overlapping variables, if there are any, between achieving secondary competence for all school children in Malmö and the protection of green urban spaces in Malmö?

4.1 Achieving secondary-competence for all school-children of Malmö

The first out of three CLDs is the one of how to achieve secondary competence for all school children of Malmö. This CLD, like all others, start by defining the system of the problem and you will thus find it below. This is followed by an outline of the linkages in the system to achieve secondary competence for all school-children of Malmö.

4.1.1 The problem with unequal education in Malmö

The data from The National Agency for Education (Skolverket, 2018b, 2019b) is given at the level of each school in Malmö and we can see in Figure 8 that there are high discrepancies in the attainment of secondary competence depending on which school the pupils go to (see also Appendix A). These

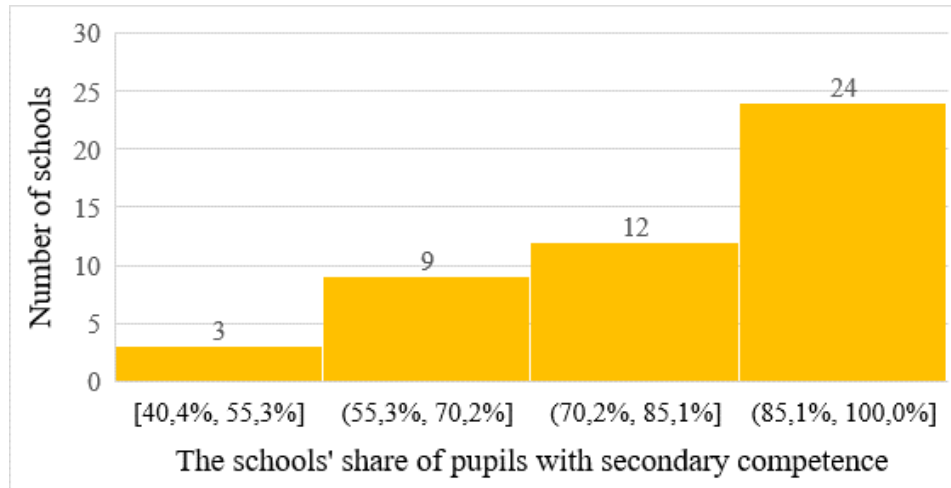


Figure 8. Groups of primary schools in Malmö related to their pupils' share of secondary attainment in the schoolyear of 2017/2018. All 48 schools included in the dataset have been incorporated. The figure shows that the school-children's attainment of secondary competence differs greatly from 40,4% up to 100% between the primary schools in Malmö. Source of data: Skolverket (2018b).

differences are linked with the pupils' share of absence see Figure 9, the parents' educational level (see Appendix B), the share of recently immigrated pupils (see Appendix C), and the gender of the pupils (see Appendix D). Thus, pupils' socioeconomic background has an influence on the pupils' attainment of secondary competence.

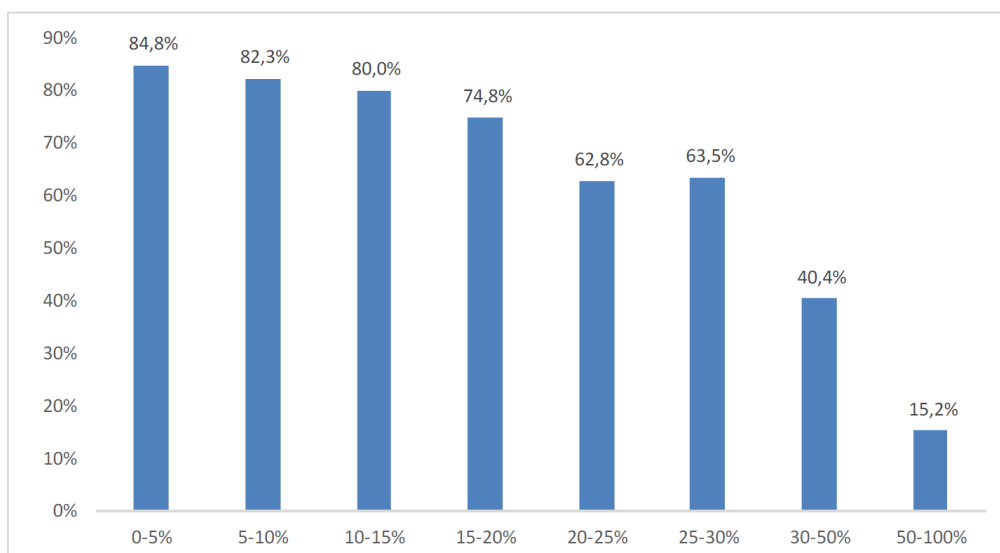
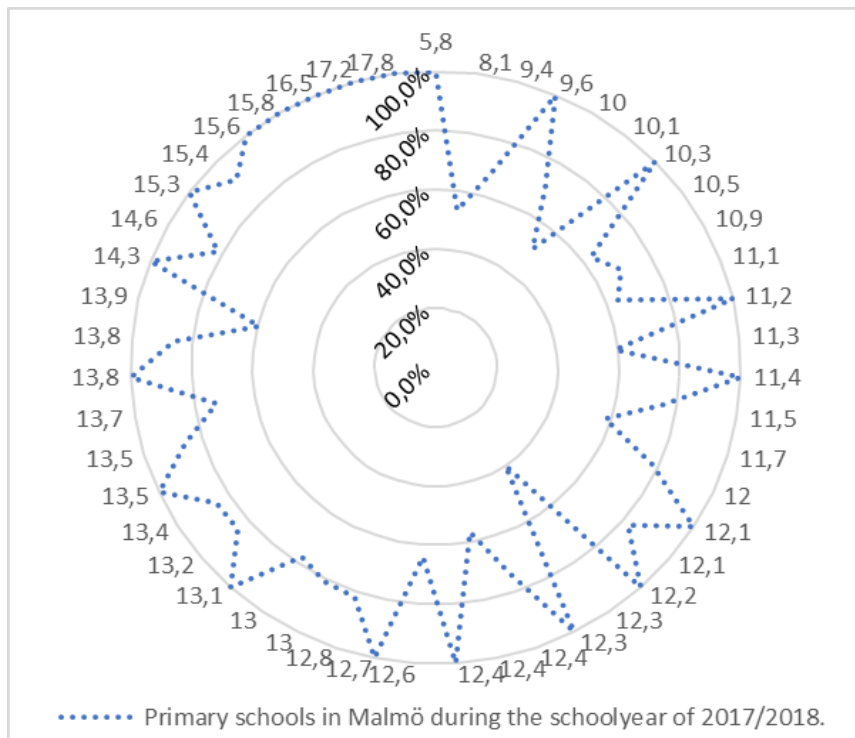


Figure 9. The share of pupils with secondary competence (the y-axis) and the groups of differing shares of absence from school (the x-axis) in grade 9, Malmö, during 2018. The trend is that the higher the absence, the lower the share of secondary competence. Source: Liljeberg and Grundström (2018, p. 21).

4.1.2 The solutions adopted to achieve secondary competence for all

To combat the influence of the socioeconomic background on the pupils' attainment of secondary competence, Malmö municipality has adopted two compensatory resource allocations to the schools²⁴ (which in Figure 11 is referred to as 'Socioeconomic compensation to schools'). Both of them complement the basic compensation that all schools in the municipality get (SKL, 2018). One is given per number of pupils that immigrated recently based on the grade in which they began their studies in Sweden and also on the Human Development Index of the country that the pupils migrated from (Grundskoleförvaltningen, 2019). The other one is a model for resource allocation to the schools since 2013 and its index is built upon the variables of: "gender, year of immigration, parents' level of fulfilled education, the prevalence of economic aid, number of caregivers, residential area and the grade point average of each school" (Grundskoleförvaltningen, 2019, p. 2). This model has resulted in the increase of the number of teachers at the schools ranking high on the index²⁵, which



schools that have pupils with disadvantaging socioeconomic influences (SKL, 2018). The higher number of teachers have however not been able to counter the socioeconomic factors putting pupils at risk (see Figure 11) which is seen in Figure 10; the trend is that the schools with a lower share of secondary

Figure 10. Primary schools in Malmö during the schoolyear of 2017/2018. In the outer ring, each number represent the number of pupils per teacher at that school: the teacher-density. The teacher-density stretches from 5,8 to 17,8 pupils. Along the axis labeled in percentage, stretching from 0,0% to 100,0%, the pupils' share of secondary competence at each of the schools is shown. The trend is that the schools with a lower share of secondary competence has a higher teacher-density; that is, fewer pupils per teacher. However, there are outliers such as the school with 5,8 pupils per teacher while the pupils also attain 100% percent of secondary competence. All 48 schools in the dataset have been included. Source of data: Skolverket (2018b).

²⁴ A compensating resource allocation to schools ranking high on an index of socioeconomic factors is adopted by at least 157 municipalities in Sweden (SKL, 2018). This number is likely to increase due an ordinance that was adopted by the government in 2018 which budget further money to the municipalities in order to counter the pupils' socioeconomic backgrounds (SFS, 2018:49).

²⁵ The model has resulted in small improvements in the pupils' school performance at the schools ranking high on the socioeconomic index but not to the extent that the desired extent (SKL, 2018).

competence has a higher teacher-density, that is, fewer pupils per teacher (Skolverket, 2018b).

Previous research indicates that the differing school performance due to gender (and ethnicity) – what together with the previously outlined factors are referred to as ‘Socioeconomic factors putting pupils at risk’ in Figure 11 – can be explained by teachers’ expectations on the pupils based on stereotyping (Glock & Klapproth, 2017; Pansu et al., 2016; Peterson, Rubie-Davies, Osborne, & Sibley, 2016). This impact is the biggest during primary school due to the pupils being related to fewer number of teachers there than in other educational systems (Irrizary, 2015). Thus, the higher the number of teachers (referred to as ‘Teachers’ in Figure 11), the lower the impact of the teachers’ negative expectations (referred to as ‘Negative beliefs about pupils at risk’ in Figure 11). It can thus be assumed that there is a delay in the decrease of the influence of the pupils’ socioeconomic background in schools with more teachers. However, training of the teachers to make them into qualitative teachers that treat their students in a non-discriminatory way would solve this impact directly. Furthermore, the teachers’ treatment of their pupils, that is, the teacher-pupil relationship has been shown to be able to counteract the influence of the parents’ low level of fulfilled education (which is referred to in Figure 11 as ‘Close teacher-pupil relationships’) (McCormick, O’Connor, & Parham Horn, 2017). The delay is marked in Figure 11 with two lines crossing the arrow from ‘Teachers’ to ‘Close teach-pupil relationships’.

That the increased number of teachers at the schools have not led to a countering of the influence of socioeconomic factors on the pupils’ attainment of secondary competence could be due to the struggle to retain teachers at schools ranking high on socioeconomic factors (Liljeberg & Rauer, 2018; Lärarnas Riksförbund, 2017). This is due to the problem of a stressful working environment for the teachers with too big of a workload outside of teaching such as administration (Läraryrbundet & Sveriges Elevkårer, 2017). The importance of creating a healthy working environment would thus increase the retainment of teachers.

The variable of the pupils’ absence can according to previous research be dealt with through measures that increase the pupils’ sense of security at the school as well as improvements to the school-buildings to make sure that they provide a healthy school-environment (Berman et al., 2018). In Malmö, there are staff at the schools with the title “Pupil coordinator” (included in Figure 11 as ‘Teachers’) that have proven to be valuable in creating a safer school environment as well as better relationships with the pupils and their parents (Liljeberg & Rauer, 2018). Another contributing factor to absence is pupils’ health-issues and today, in Malmö, the children’s mental health is at its worst since 20 years ago (Malmö stad, 2017), thus a healthy school-environment is of even greater importance even though it isn’t going to solve the health-issues completely. A major problem with

ensuring a healthy school-environment can be found in the negative perceptions that the teachers and peers have about some pupils which allows violence and other unhealthy behavior (Lärarnas Riksförbund, 2017). The healthy environment for teachers and pupils alike is referred to as ‘Healthy-school environment in Figure 11. All interconnections of the system can be viewed in the Causal Loop Diagram below in Figure 11.

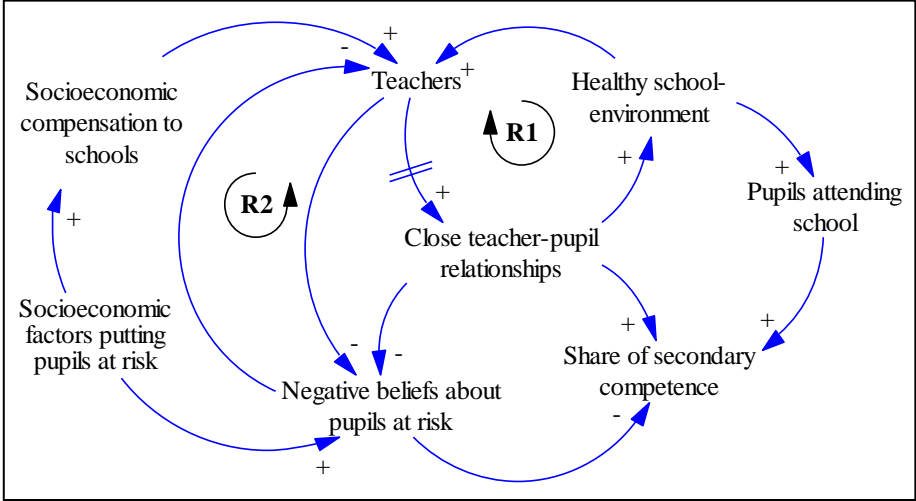


Figure 11. A Causal Loop Diagram of achieving secondary competence for all school-children in Malmö. It summarizes the factors of gender, parents’ level of education and to be newly arrived in Sweden into Socioeconomic factors putting pupils at risk. Effects from the knowledge about this variable increases Malmö municipality to allocate Socio-economic compensation to schools. This has led to the increase of Teachers at schools but that does not translate directly into a higher Share of secondary competence. There is a delay between them, and the causal relationship furthermore requires the establishment of Close teacher-pupil relationships. This is essential for a Healthy school-environment which will increase both Pupils attending school (and thus the Share of secondary competence) but also the Teachers. This closes the first reinforcing causal loop (R1). Teachers furthermore decreases the influence of Negative beliefs about pupils at risk which protects the Share of secondary competence. On the other hand, the Socioeconomic factors putting pupils at risk also increases the Negative beliefs about pupils at risk which makes it difficult to recruit Teachers. This is the reinforcing loop number 2 (R2).

4.2 The system behind the protection of green urban spaces for school children in Malmö

The second out of three CLDs is the one of how to protect green urban spaces for all school children of Malmö. This CLD, as the first one, start by defining the system of the problem and you will thus find it below. This is followed by an outline of the linkages in the system to protect green urban spaces for all school children of Malmö.

4.2.1 The problem of decreasing green urban spaces for school children in Malmö

The planned developments of buildings and new parks/nature in Malmö can be seen in Figure 12. It shows that the areas in which school are to be extended or built (the new developments marked in red) are in proximity of existing or new parks and nature (green urban areas), which is of great importance for ensuring that the school-aged children of Malmö, that live in very different city areas

have access to the city's green urban spaces. However, with the increasing population demanding more and more land for housing and schools, and due to the fact that children spend less time in parks once they have started school (af Segerstad, Stroh, Östergren, & Jakosson, 2014), it would be wise to convert the urban areas in which they do spend their time into green urban spaces.

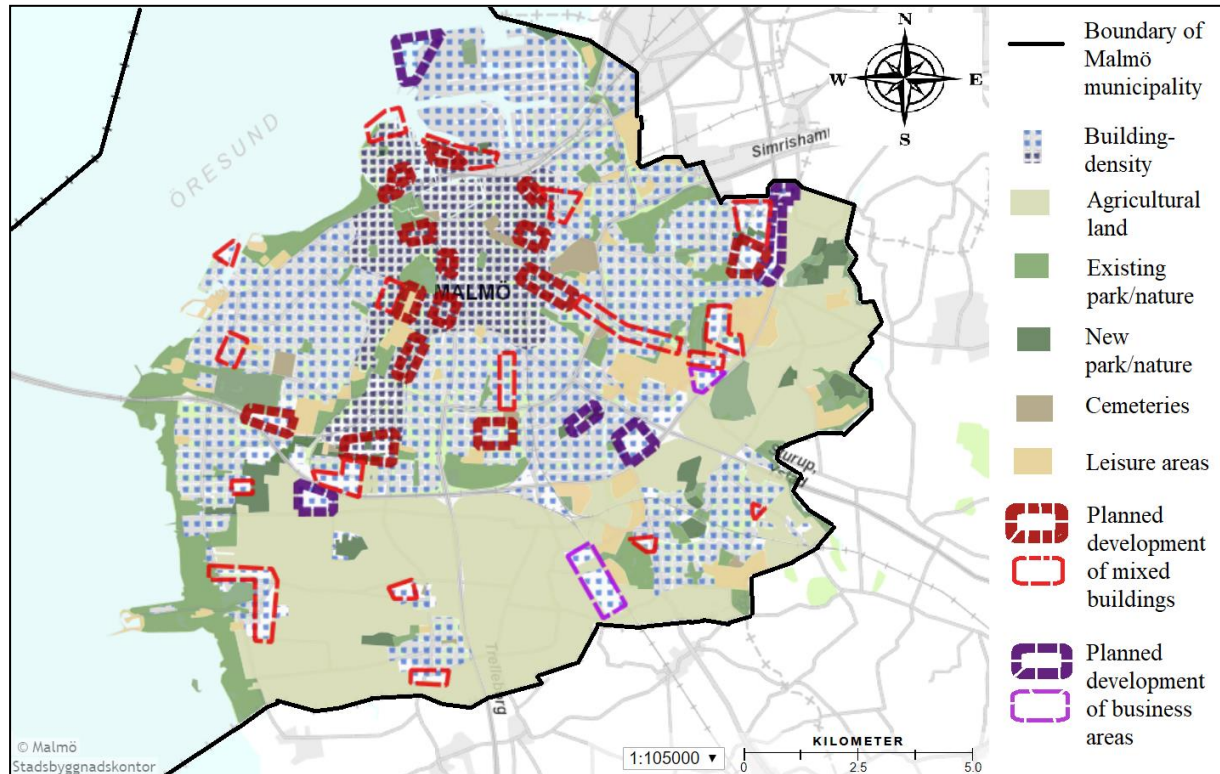


Figure 12. Map of Malmö demonstrating its different types of built and unbuilt land. Source: Malmö stadsbyggnadskontoret (2018).

4.2.2 The solutions adopted to protect green urban spaces for the school children of Malmö

The obvious space for where they spend most of their time, and that is publicly owned, is the school. The solution to make the schoolyards green was somewhat adopted by the municipality during a project between the years 2010-2013 called “Green Schoolyards” (Bengtsson & Bengtsson, 2014). A budget was set aside for the project (referred to as ‘Budget’ in Figure 13) in which 27 elementary schools and 4 preschools participated. The project had varying results. One school got rid of an area with asphalt and created a green space with small hills, bushes and trees (Pålsson, 2010), other schools planted fruit yards and bushes with berries and they also introduced logs and stones for sitting and playing. The management of the schoolyards was done by different groundskeeper-services in cooperation with the teachers and the pupils. This sometimes proved to be difficult due to limitations in their budgets, time-constraints and differing opinions on the goals which were to be achieved. For example, the aesthetic preferences differed between the school children and the teachers (Bengtsson & Bengtsson, 2014). A side-effect through the project was, according to the

previous research, the discovery that school-staff had not previously known that they were the ones whom could initiate changes to the schoolyards themselves. Thus, the establishment and maintenance of green schoolyards are dependent on good cooperation between the school-staff and the groundskeepers (referred to as 'Cooperation between caretakers' in Figure 13), and perhaps even through the establishment of a new position with the sole purpose of maintaining the schoolyards green; a school-gardener so to say. Indeed, this position is in fact already established in some countries, and it used to exist here in Sweden as well (Bengtsson & Bengtsson, 2014).

Another lesson learned about having green schoolyards in Malmö is that they do serve the purpose of becoming a space for play and education, which is often highlighted in previous research (see e.g. Akoumianaki-loannidou, Paraskevopoulou, & Tachou, 2016). However, in the case of having the green schoolyards serving as spaces for play and education, it is imperative that the vegetation used is durable enough for play, so as not to be worn down. With regards to play, green spaces also stimulate movement and socializing among the pupils since it gives them a "cozy" area to interact upon (Mårtensson et al., 2014, p. 109). This demonstrate that green schoolyards encourage physical activity among both young as well as elder pupils; bushes and hills are fun to hide in and run on whereas lawns and trees provide elder pupils with spaces to socialize (referred to as 'Play & Other social activities' in Figure 13).

Green schoolyards may develop pupils' relationships to nature into a caring one (referred to as 'Pupil-nature relationship' in Figure 13) if they can be part of planting, which establishes the relationships and opens up interest for learning more about nature (referred to as 'Desire to learn' in Figure 13) (Almeida, Bombaugh, & Mal, 2006; Jansson et al., 2014). However, the long time for the greenery to become established and fully-grown hindered the development of a caring relationship between pupils and nature. It might thus be wise to develop only sections of the schoolyard at a time. This would furthermore be good for allowing the rules of the relationship between the pupils and nature to crystalize, e.g. whether the edible plants, fruits and berries are to be eaten whenever by whomever or only at certain events. The forming of a relationship between pupils and nature brings up to the surface that this is an opportunity for the school children to exert influence on their surroundings (referred to as 'Pupils' participation) which in turn will reinforce the caring relationship towards nature (Jansson et al., 2014). A recent study that followed-up the impact of the greenery concludes that the pupils' participation must be incorporated into every step of creating and maintaining the green schoolyard for it to be used and appreciated by the pupils. Furthermore, a well-managed inclusion of the pupils in the greening of the schoolyard will create positive expectations among the pupils to be heard and included in further matters (Jansson et al., 2018).

Last but not least, the protection of green urban spaces for school children through the creation of green schoolyards also has a positive impact on health. A study by Li and Sullivan (2016) found that if pupils could view green landscapes from their classroom, then their attention and stress relief improved. These health-benefits are what causes the previously noted link between green schoolyards and an improvement in pupils' 'School performance'. Thus, green schoolyards are an important ingredient in increasing 'Health' as seen in Figure 13.

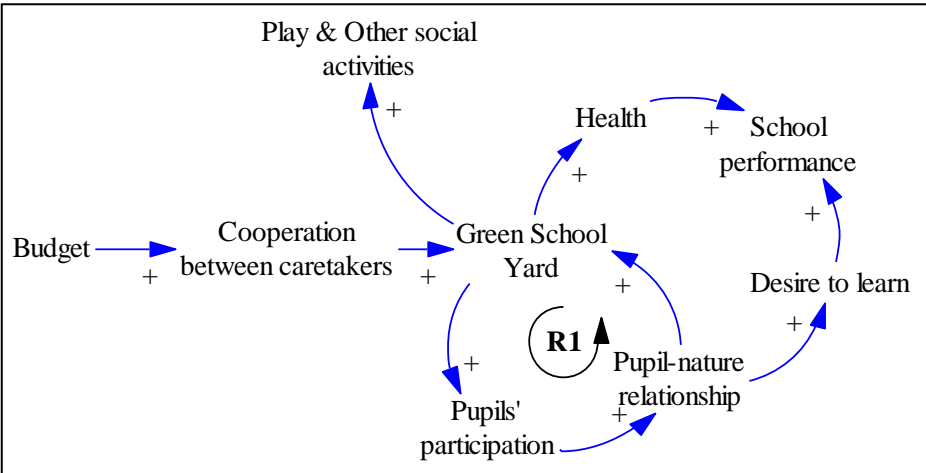


Figure 13. A Causal Loop Diagram of the protection of green urban spaces (green schoolyards) for school children in Malmö. It demonstrates that a Budget for creating and maintaining the Green schoolyard is a prerequisite and furthermore to have good Cooperation between caretakers of the green schoolyard so that efforts contribute to the same vision. The protection of the green schoolyard by the pupils (R1) requires the enabling of Pupils' participation in envisioning, planting and taking care of the greenery. This will establish the foundation for a Pupil-nature relationship contributing to the pupils protecting the Green schoolyard. The Pupil-nature relationship will furthermore also be a learning opportunity for the pupils in which they increase their Desire to learn that in turn is likely to increase their School performance. Lastly, the Green schoolyard is a space for Play & Other social activities for children of all ages.

4.3 The meta-system of achieving secondary competence and the protection of green urban spaces for all school children in Malmö

The third CLD was created as an answer to question iii in the CLD-method: What are the overlapping variables, if there are any, between achieving secondary competence and the protection of green urban spaces for all school children in Malmö? I thus compared the variables in the two subsystems outlined in the first and second CLD. This comparison led to the combination of the sub-CLDs into one meta-CLD as seen in Figure 14.

The comparison followed this reasoning; both have an input of 'Financial resources' which enables more 'School staff' (including teachers, pupil coordinators and perhaps even school gardeners) that furthermore can have 'Cooperation between school staff' in greening the schoolyard. The 'Green Schoolyard' increases opportunities for children to participate in impacting their surroundings ('Participation of pupils') through e.g. planting and this establishes a 'Pupil-nature relationship' that

increases the pupils' respect towards and thus protection of the 'Green Schoolyard'. This is the first reinforcing loop (R1) as seen in Figure 14.

The 'Green Schoolyard' furthermore contributes to a 'Healthy school environment' which first of all retain the number 'School Staff' that can take part in the 'Cooperation between school staff' in making creating and maintaining the 'Green Schoolyard' (which is the second reinforcing loop R2). Secondly, the 'Healthy school environment' increases the 'School performance' and thus likely the share of 'Secondary competence'. The increase in 'School Staff' counters the influence of the 'Negative beliefs about pupils at risk', and the negative beliefs in turn decreases the number of 'School Staff' (which is the third reinforcing loop R3). However, the increase in number of 'School Staff' will increase the 'Pupil-teacher relationships' that in turn contributes to a 'Healthy school environment' so that the 'School Staff' will stay (this is the fourth reinforcing loop R4 as seen in Figure 14). Furthermore, the 'Pupil-teacher relationships' will decrease the 'Negative beliefs about pupils at risk' so that the 'School staff' won't decrease. This in turn contributes, as stated above, to the 'Cooperation between school staff' in creating a 'Green school yard' which enables 'Participation of pupils'. What is now possible to see in this CLD, and that hasn't been found in the previous research, is that the 'Participation of pupils' in the creation and maintenance of the 'Green Schoolyard' isn't only contributing to the 'Pupil-nature relationship', but it is also likely that it contributes to furthering the 'Pupil-teacher relationships' which we recall was important to combat the 'Negative beliefs about pupils at risk' (this is the fifth reinforcing loop R5 and the new interlinkage is shown with a thick arrow in Figure 14).

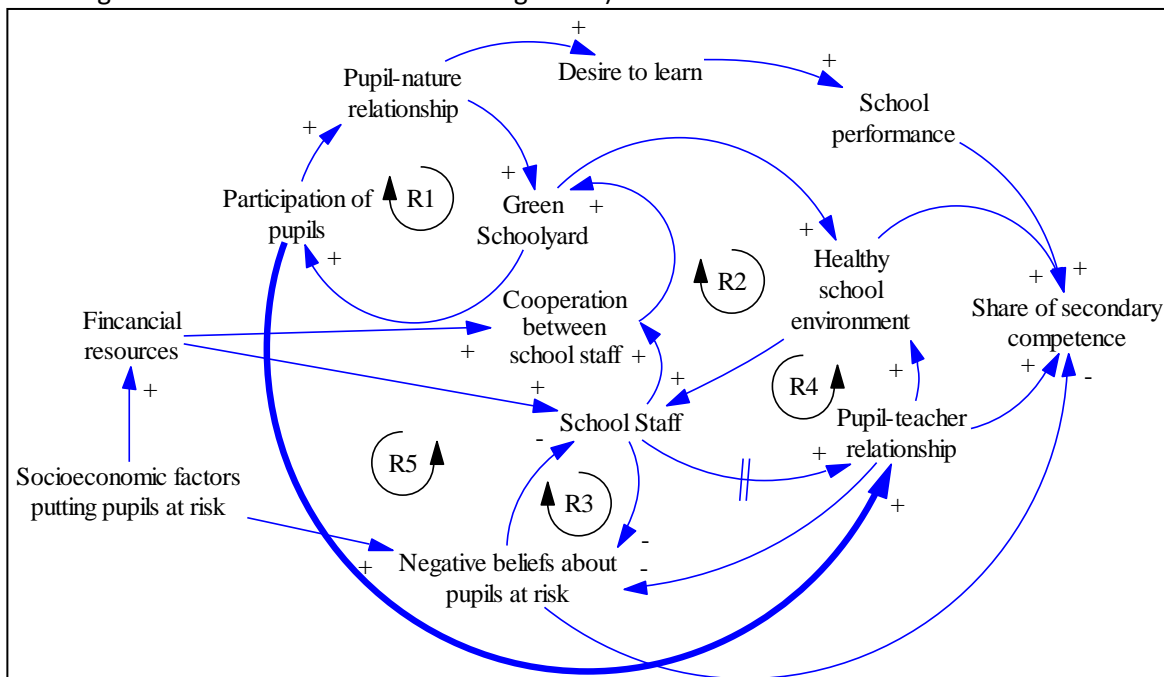


Figure 14. A Causal Loop Diagram of ensuring education and protecting green urban spaces for the school children of Malmö through greening the schoolyard. The green schoolyard contributes to many causalities that in the end lead to an increase in the share of secondary competence.

5. Discussion: harmonization between education and green urban spaces

The results, that is, the three CLDs that explored the interlinkages between ensuring education and protecting green urban spaces for the school children of Malmö, answered the first research question of this thesis. However, it remains to explore to what extent these linkages harmonize each other's development. As written in section 3.1, this exploration will be carried out here in the discussion based on a conceptual framework. This framework is founded on Kate Raworth's model for a safe and just operating space for humanity – the doughnut – and furthermore extended through a human rights principle on states to respect, protect and fulfill human rights as well as the approach of weak anthropocentrism.

5.1 Green schoolyards respect, protect and fulfill the human right to education

The human rights obligation on states to respect, protect and fulfill human rights would ask if the interlinkages explored in the CLDs has contributed to the realization of the right to education. We already found that transforming the schoolyard into a green urban space – a green schoolyard – does contribute. But does it do so in a way that the right to education has been respected, protected or fulfilled? Or does it do so to the extent that all of the obligations have been met?

For the green schoolyard to be considered as meeting the obligation of *respecting* the right to education, it can't hinder anyone from taking part in the education. The time for the greenery to manifest – to fully grow – does limit the children from moving in those areas. Furthermore, the fencing that demonstrates to the children that they aren't supposed to move in those areas might decrease and even nullify the contribution of the green schoolyard to a healthy school-environment. In the worst case scenario, this could lead to an increase in the pupils' absence from school and thus the green schoolyard would have actively contributed as an obstacle to take part in education. However, all of these effects from the green schoolyard can be dealt with through planning; to only change certain areas of the schoolyard at a time, preferably based on a joint decision with the pupils on which part of the schoolyard that will be transformed and when. Thus, if planned and executed in a participatory way, then the greening of the schoolyard will not actively hinder the pupils' right to education. This means that the green schoolyards – the ecological sustainability – at minimum harmonizes with education – the social sustainability – through the obligation to respect.

For the green schoolyard to be considered as meeting the obligation to *protect* the right to education, it has to hinder third parties from hindering the pupils to take part in education. As explained in the results, the teachers were sometimes impacted by negative beliefs about the pupils at risk and thus they did not perform their teaching task fully which in other terms is to hinder the

pupils' right to education. What we learned from the CLDs was that the greening of the schoolyard was an opportunity for children to participate and this in turn opened up for the furthering of pupil-teacher relationships which counters the negative beliefs. The green schoolyard thus function as the obligation to protect the school children's right to education from the teachers' decreased quality in their teaching.

Finally, for the green schoolyard to meet the criteria of *fulfilling* the right to education, it has to actively contribute as a precondition to the education. This is certainly done; it contributes to a healthy school environment through stress-relief and better attentions when being viewed from the classroom window and it furthermore spur interest in learning more about the environment through the establishment of pupil-nature relationship. This interest in learning is definitely contributing to ensuring the right to education and as such, the green schoolyard succeeds in fulfilling the right to education.

In summary, the extent to which the green school yard harmonizes the relationship between protection of green urban spaces – ecological sustainability – and ensuring education – social sustainability – is according to the human rights obligation to its full extent possible. An implication of this is that green schoolyards should be a requirement for all schools if one wants to realize the right to education for all the school children of Malmö.

5.2 Weak anthropocentrism implicates the municipality's responsibility to create and maintain green schoolyards

The concept of weak anthropocentrism states that we must restrain our actions in order to keep the preconditions necessary for future generations to be able to have their human rights realized. With this in mind, as stated in section 3.2.1, the question to be answered now is whether the human actions of education in Malmö should be adapted in order to protect the green urban spaces to ultimately ensure education for future generations?

From this lens, the green schoolyards become even more important. They do not only realize the human right to education for the school children in Malmö of today. But they also hold the capacity to ensure the right for the generations to come. Thus, what variables in the CLDs were necessary for the greening of the schoolyards and what further actions or restrains on actions need to be conducted to create and maintain green schoolyards? Firstly, the participation of the pupils in the creation and maintenance of the green schoolyards was essential for them to be protected by the pupils themselves. Thus, the participation of pupils is not only important for establishing pupil-nature relationships and pupil-teacher relationships, but it is an action that need to be implemented at all

schools for the protection of green urban spaces for generations to come. Secondly, the green schoolyards were dependent on an external financial input from the municipality and thus the budget for this should in the future not be project-based but a standing point in the municipal budget. This is actually not too farfetched since the municipality, as explained in the background-section, have decided to restructure their budget according to the UN's 17 Sustainable Development Goals (SDGs) starting next year – year 2020²⁶. This paper has explored the linkages between education and protection of green urban spaces for school children in Malmö and it shows that green schoolyards is a tool for achieving both; that is, SDG4.1 and SDG 11.7 respectively. Thirdly, the green schoolyards also require people; school staff or other employees that can keep the pupil's involved in a meaningful way and that can coordinate efforts with the groundskeepers. Thus, this paper iterates the recommendation by Bengtsson and Bengtsson (2014) that it would be logical to explore the alternative of hiring school-gardeners that have both maintenance of the schoolyard and pedagogical task in their job assignment. The likelihood of this to have the desired outcome can to some part be informed by a quote in Pålsson (2010) which state an interest from groundkeepers to continue their work that they did during the first year of the Green Schoolyards-project wherein they involved the children in the greening of the schoolyards:

"I have become interested in pedagogy and want to learn more about it. I have applied to a distance course for 2011: school garden-planting as a pedagogical tool. The project has given me insights in some problems that can arise during installation work and how they can be resolved. I have acquired and initiated many new contacts with people that are very inspiring. I have discovered the joy of working with children around a subject I am very interested in" (Pålsson, 2010, p. 14).

This fits in with previous research (see e.g. A. Sachs, 1995) which claim that the way that ecological and social sustainability relate isn't only through the environment as the precondition for human life. Rather, the interlinkages are also harmonized through the realization of human rights which empowers people to protect the environment. A. Sachs (1995) tell us how the realization of civic and political human rights such as the right to freedom of speech contributes to gathering people behind objectives such as stopping deforestation and the like. Thus, in the effort to realize equal education for the school children of today and of future generations, we can identify a responsibility to create and maintain green urban spaces (ecological sustainability).

²⁶ The SDGs have, as many know, been adopted globally but that they have been adopted so widely in Sweden is perhaps not as well known. According to at least in Sweden, at all levels ranging from state authorities and municipalities, to non-governmental organizations and private companies (Swedish Government, 2016, 2017).

5.3 Contribution to sustainability science

Bos and Düwell (2016) writes that the efforts conducted today in the name of achieving sustainable development “is hampered by a dilemma” in the sense that sustainable development as a governance-approach based on three equally valued pillars “loses its ability to guide us” (Bos & Düwell, 2016, p. 12). As a thesis looking into a conflict between social and environmental sustainability, it participated in this discussion by applying a framework that drew upon a principle from human rights and the approach of human anthropocentrism. In doing this, I did not value the three pillars, or even just the two of ecological and social, equally. Rather I used social sustainability as the overriding principle to harmonize with ecological sustainability. This is by no means intending to claim that this approach was the best one for harmonizing the conflict and thus providing guidance on how to solve the sustainability issue of competing demands for land for education and green urban spaces. But it contributes to the sustainability field by testing at least this approach as a reply in the debate about whether sustainable development should be based on an equal valuation of ecological, social and economic sustainability.

Since the conceptual framework was founded on Kate Raworth’s doughnut-model in which human rights explicitly are included, and since the SDG’s, according to the preamble of Agenda 2030 should lead to the realization of human rights for all. I believe that the field of sustainability science would benefit from exploring how the human rights field and weak anthropocentrism can enrich the critical thinking and problem-solving of sustainability science. In this thesis, the human rights principle showed how ecological sustainability can contribute to the realization of the human right to education – it acted in a problem-solving way based on how society already is structured. The approach of weak anthropocentrism on the other hand, which soon will be crystalized in the human right to a healthy environment, contributed with a critical approach on what needed to change in the responsibilities of the municipality to ensure both ecological and social sustainability.

5.4 Further Research

This thesis, as stated in the limitations of the methodology, conducted a literature review and statistical analysis of data to find causal relationships – interlinkages – between the subsystems of ensuring education and protecting green urban spaces for school children in Malmö. It defined interlinkages based on solutions already adopted by the municipality and the variables found in literature that were likely to be of relevance also for the case of Malmö. However, further research on these interlinkages based on other methods would complement this exploration of the

interlinkages so that measures for attaining both equal education and the protection of green urban spaces can be designed as effective as possible.

Furthermore, this study that found interlinkages between subsystems that at first seemed to be indefinitely in conflict, implicate that the same might hold true for other subsystems; if explored further, they might prove to support each other in some sense. Following this, I believe further research is also needed on how to create lasting cooperation between staff from different departments of municipalities that at first don't seem to have common goals. This would hopefully leverage plenty of problem-solving of sustainability issues. For example, through demonstrating the logic of setting aside a budget for the projects under someone else's responsibility due to those projects contributing to the areas under your own responsibility. Another entry-point would be to study the metasystem of ensuring education and protecting green urban spaces as a socioecological system based on Ostrom's Socio-ecological systems framework (McGinnis & Ostrom, 2014; Ostrom, 2009). This framework, I believe, would fit well with the adoption of a transdisciplinary expert-group since its aim to contribute with a common language that will enable cooperation.

Last but not least, the approach of weak anthropocentrism to sustain the Holocene-like conditions of the Earth system in order to enable the realization of human rights for future generations, would benefit from further research. The contributors to the book of Bos and Düwell (2016) explored on what grounds an institution could be founded with the sole purpose of protecting the interests of future generations. In legal terms, there are a few cases that indicate that for example organizations could speak for the ones without a voice – as they were locked up in institutions – and this could be applied on future generations. But perhaps most likely is that this type of organization could be based on the human right to a healthy environment. This intergenerational aspect of sustainability could open up to transdisciplinary research between human rights scientist and sustainability scientists.

6. Conclusion

The guiding research question for this thesis was: *to what extent can education and the protection of green urban spaces for school-aged children in Malmö be harmonized?*

This study thus set out to explore the interlinkages between social sustainability (education for all) and environmental sustainability (green urban spaces) in primary schools in Sweden. It found that green schoolyards harmonized the two by functioning as the state's – and thus the municipality's – obligation to respect, protect and fulfill the school children's human right to education. The green

schoolyards, furthermore, as important parts of realizing the right to education for the generations to come, were found to put an explicit responsibility on the municipality to create and protect the green schoolyards. The prerequisites needed, that likely can be generalized to other growing cities in Sweden, is to set aside a budget for the green schoolyards, to appoint school-gardeners that would work both with maintaining the greenery of the schoolyards as well as the pedagogical involvement of the school children. The participation of the pupils in the greening of the schoolyard was found to be essential for developing both teacher-pupil relationships – that would counteract the socioeconomic factors' influence on the school children's attainment of secondary competence – and pupil-nature relationships so that they would themselves act protective of the green schoolyard and furthermore spur interest in further education about the environment. The opportunity to adopt these recommendations can be found in Malmö municipality's restructuring of its budget according to the UN's 17 Sustainable Development Goals since both equal education and protection as green urban spaces constitute goal 4.1 and 11.7 respectively. This reallocation of a municipality's budget is likely to happen in basically all of Sweden since the Swedish Government has adopted a strategy for achieving Agenda 2030.

References

- af Segerstad, L. H., Stroh, E., Östergren, P.-O., & Jakosson, K. (2014). *Barn, miljö och hälsa - En rapport från Skåne, Blekinge och Kronobergs län 2013* (Rapport 2014:1). Retrieved from https://www.lansstyrelsen.se/download/18.2887c5dd16488fe880d4b318/1536828210723/Barnh%C3%A4lsorapport_L%C3%A5gupp%C3%B6st_ratt_FINAL.pdf.
- Akoumianaki-Ioannidou, A., Paraskevopoulou, A. T., & Tachou, V. (2016). School grounds as a resource of green space to increase child-plant contact. *Urban Forestry & Urban Greening*, 20, 375-386. doi: <http://dx.doi.org/10.1016/j.ufug.2016.10.009>.
- Alexiadou, N., Dovemark, M., Erixon-Arreman, I., Holm, A.-S., Lundahl, L., & Lundström, U. (2016). Managing inclusion in competitive school systems: The cases of Sweden and England. *Research in Comparative and International Education*, 11(1), 13-33. doi: 10.1177/1745499916631065.
- Alina, V. (2015). Increasing global population - An actual issue of world countries. *Ovidius University Annals, Series Economic Sciences*, 15(1), 418-421.
- Almeida, S., Bombaugh, R., & Mal, T. K. (2006). Involving School Children in the Establishment of an Urban Green Space. *The American Biology Teacher*, 68(4), 213-220.
- Anderson, T. (2014). Malmö: A city in transition. *Cities*, 39, 10-20. doi: <http://dx.doi.org/10.1016/j.cities.2014.01.005>.
- Anderson, V., & Johnson, L. (1997). *Systems thinking basics: from concepts to causal loops*. Cambridge: Pegasus Communications.
- Bala, B. K., Arshad, F. M., & Noh, K. M. (2017). *System dynamics: modelling and simulation*. Singapore: Springer.
- Bengtsson, J., & Bengtsson, P. (2014). *Gröna skolgårdar slutrapport 2010-2013*. Malmö stad: Serviceförvaltningen.
- Benvenuti, L., De Santis, A., Santesarti, F., & Tocca, L. (2016). An optimal plan for food consumption with minimal environmental impact: the case of school lunch menus. *Journal of Cleaner Production*, 129, 704-713. doi: <https://doi.org/10.1016/j.jclepro.2016.03.051>.
- Berhanu, G. (2010). Even in Sweden? Excluding the included: some reflections on the consequences of new policies on educational processes and outcomes, and equity in education. *International Journal of Special Education*, 25(3), 148-159.
- Berlin, G., & Niss, J. (2019). *Handlingsplan för grön infrastruktur - insatsområden för grön infrastruktur 2019-2030, aktuell period 2019-2011*. (2019:3). Malmö: Länsstyrelsen Skåne Retrieved from <https://www.lansstyrelsen.se/skane/stat-och-kommun/natur/gron-infrastruktur.html#0>.
- Berman, J. D., McCormack, M. C., Koehler, K. A., Connolly, F., Clemons-Erby, D., Davis, M. F., . . . Curriero, F. C. (2018). School environmental conditions and links to academic performance and absenteeism in urban, mid-Atlantic public schools. *International Journal of Hygiene and Environmental Health*, 221, 800-808. doi: <https://doi.org/10.1016/j.ijheh.2018.04.015>.

- Bos, G., & Düwell, M. (Eds.). (2016). *Human rights and sustainability: moral responsibilities for the future*. London: Routledge.
- Boschini, M., Falasconi, L., Giordano, C., & Alboni, F. (2018). Food waste in school canteens: A reference methodology for large-scale studies. *Journal of Cleaner Production*, 182, 1024-1032. doi: <https://doi.org/10.1016/j.jclepro.2018.02.040>.
- Boverket. (2019). *Uppföljning av bidrag för grönare städer 2018* (2019:5). Retrieved from <https://www.boverket.se/sv/om-boverket/publicerat-av-boverket/publikationer/2019/uppfoljning-av-bidrag-for-gronare-stader-2018/>.
- Boyd, D. R. (2015). Constitutions, human rights, and the environment: national approaches. In A. Grear & L. J. Kotzé (Eds.), *Research Handbook on Human Rights and the Environment* (pp. 170-199). Cheltenham, UK: Edward Elgar Publishing.
- Coomans, F. (2010). Education and Work. In D. Moeckli, S. Shah, S. Sivakumaran, & D. Harris (Eds.), *International human rights law* (1st ed., pp. 280-303). Oxford: Oxford University Press.
- Council of Europe. (1985). *European Charter of Local Self-Government* (European Treaty Series No. 122). Retrieved from <https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/122>.
- Dahlberg, A., & Borgström, S. (2017). Urbana gröna allmänningar för alla - eller inte? Tillgänglighet och mångfunktionalitet i en föränderlig stad. In T. Borén (Ed.), *Urban utveckling och interaktion* (pp. 165-188). Stockholm: Svenska Sällskapet för Antropologi och Geografi.
- Daniels, B., Zaunbrecher, B. S., Paas, B., Ottermanns, R., Ziefle, M., & Nickoll, M. R. (2018). Assessment of urban green space structures and their quality from a multidimensional perspective. *Science of the Total Environment*, 615, 1364-1378. doi: <https://doi.org/10.1016/j.scitotenv.2017.09.167>.
- De Laurentiis, V., Hunt, D. V. L., & Rogers, C. D. F. (2017). Contribution of school meals to climate change and water use in England. *Energy Procedia*, 123, 204-211. doi: 10.1016/j.egypro.2017.07.241.
- Denscombe, M. (2010). *The good research guide: for small-scale social research projects* (4th ed.). Maidenhead: Open University Press.
- Emami, N., Marteinsson, B., & Heinonen, J. (2016). Environmental Impact Assessment of a School Building in Iceland Using LCA-Including the Effect of Long Distance Transport of Materials. *Buildings*, 6(46). doi: 10.3390/buildings6040046.
- Fanning, A. L. (2018). If everyone lived sustainably, what would their lives be like? Retrieved from <https://oxfamblogs.org/fp2p/if-everyone-lived-sustainably-what-would-their-lives-be-like/>.
- Glock, S., & Klapproth, F. (2017). Bad boys, good girls? Implicit and explicit attitudes toward ethnic minority students among elementary and secondary school teachers. *Studies in Educational Evaluation*, 53, 77-86. doi: <http://dx.doi.org/10.1016/j.stueduc.2017.04.002>.
- Grundskoleförvaltningen. (2019). *Bilaga till beräkningar av ersättningar 2019 till Malmös kommunala och fristående skolor*. Retrieved from <https://motenmedborgarportal.malmo.se/committees/grundskolenamnden/mote-2019-02-20>.

- Haraldsson, H. V. (2004). *Introduction to System Thinking and Causal Loop Diagrams*. Lund: Lund University.
- Imenda, S. (2014). Is there a conceptual difference between theoretical and conceptual frameworks? *Sosyal Bilimler Dergisi/Journal of Social Sciences*, 38(2), 185-195.
- IQAir AirVisual. (2018). *2018 World air quality report: Region and city PM 2.5 ranking*. Retrieved from <https://www.airvisual.com/world-most-polluted-cities?continent=59af92ac3e70001c1bd78e52&country=2mJ5c9QWudqKnZpQz&state=&page=1&perPage=50&cities=>.
- Irrizarry, Y. (2015). Selling students short: Racial differences in teachers' evaluations of high, average, and low performing students. *Social Science Research*, 52, 522-538. doi: <http://dx.doi.org/10.1016/j.ssresearch.2015.04.002>.
- Jansson, M., Gunnarsson, A., Mårtensson, F., & Andersson, S. (2014). Children's perspectives on vegetation establishment: Implications for school ground greening. *Urban Forestry & Urban Greening*, 13, 166-174. doi: <http://dx.doi.org/10.1016/j.ufug.2013.09.003>.
- Jansson, M., Mårtensson, F., & Gunnarsson, A. (2018). The meaning of participation in school ground greening: a study from project to everyday setting. *Landscape Research*, 43(1), 163-179. doi: 10.1080/01426397.2017.1306623.
- Jerneck, A., Olsson, L., Ness, B., Anderberg, S., Baier, M., Clark, E., . . . Persson, J. (2011). Structuring sustainability science. *Sustainability Science*, 6(1), 69-82. doi: 10.1007/s11625-010-0117-x.
- Jesson, J. K., Matheson, L., & Lacey, F. M. (2011). *Doing your literature review : traditional and systematic techniques*. Los Angeles, Calif London, SAGE.
- Ji, C., Hong, T., Jeong, J., Kim, J., Lee, M., & Jeong, K. (2016). Establishing environmental benchmarks to determine the environmental performance of elementary school buildings using LCA. *Energy and Buildings*, 127, 818-829. doi: <http://dx.doi.org/10.1016/j.enbuild.2016.06.042>.
- Kates, R. W., Clark, W., C., Corell, R., Hall, J. M., Jaeger, C. C., Lowe, I., . . . Svedin, U. (2001). Sustainability Science. *Science*, 292(5517), 641-642.
- Kommunstyrelsen. (2018). *Strategi 2018: Malmö stads långsiktiga arbete med Agenda 2030*. Retrieved from <https://malmo.se/Service/Om-Malmo-stad/Sa-arbetar-vi-med.../Hallbar-Utveckling/Malmos-arbete/Strategi-2018-for-att-omsatta-malen-till-lokal-niva.html>.
- Layder, D. (2013). *Doing Excellent Small-Scale Research* (C. Rojek Ed.). Los Angeles: SAGE Publications Ltd.
- Li, D., & Sullivan, W. C. (2016). Impact of views to school landscapes on recovery from stress and mental fatigue. *Landscape and Urban Planning*, 148, 149-158. doi: <http://dx.doi.org/10.1016/j.landurbplan.2015.12.015>.
- Liljeberg, M., & Grundström, E. (2018). *Kunskapsresultaten i Malmö skolor 2018*. Retrieved from <https://malmo.se/Service/Utbildning-och-forskola/Grundskola/Kvalitet-i-grundskolan/Kunskapsresultat-i-kommunala-grundskolan-och-grundsarskolan.html>.
- Liljeberg, M., & Rauer, O. (2018). *Kvalitetsrapport 2018*. Retrieved from Grundskoleförvaltningen: <https://malmo.se/Service/Utbildning-och-forskola/Grundskola/Kvalitet-i-grundskolan/Systematiskt-kvalitetsarbete.html>.

- Lärarförbundet, & Sveriges Elevkårer. (2017). *Arbetsmiljö i skolan*. Retrieved from <https://sverigeselevkarer.se/rapporter-och-remissvar>.
- Lärarnas Riksförbund. (2017). *Mer resurser till utsatta skolor - En granskning av situationen på 128 skolor med särskilda utmaningar*. Retrieved from Stockholm: <https://www.lr.se/opinionpaverkan/undersokningar/arkiv/merresursertillutsattaskolor.5.61bd55a815f30f33c241741f.html>.
- Mahmoud, Y., Jerneck, A., Kronsell, A., & Steen, K. (2018). At the nexus of problem-solving and critical research. *Ecology and Society*, 23(4). doi: <https://doi.org/10.5751/ES-10458-230440>.
- Malmö stad. (2009). *Environmental Programme for the City of Malmö 2009-2020*. Retrieved from <https://malmo.se/Service/Om-Malmo-stad/Sa-arbetar-vi-med.../Malmo-stads-miljoarbete/Miljoprogram-for-Malmo-stad.html>.
- Malmö stad. (2015). *Handlingsplan för miljöprogrammet - prioriterat arbete i Malmö stad 2015-2018*. Retrieved from <https://malmo.se/Service/Om-Malmo-stad/Sa-arbetar-vi-med.../Malmo-stads-miljoarbete/Miljoprogram-for-Malmo-stad/Handlingsplan-for-miljoprogrammet.html>.
- Malmö stad. (2016a). *Plan för samhällsservicens markbehov i Malmö*. Retrieved from <https://malmo.se/Service/Var-stad-och-var-omgivning/Stadsplanering--strategier/Antagna-strategiska-planer/Plan-for-samhallsservicens-markbehov-i-Malmo.html>.
- Malmö stad. (2016b). *Stadens historia*. Retrieved from <https://malmo.se/Uppleva-och-gora/Arkitektur-och-kulturarv/Kulturarv-Malmo/P-S/Stadens-historia.html>.
- Malmö stad. (2017). *Hållbarhetsrapport 2017 - Tema: barns och ungas psykiska hälsa*. Retrieved from <https://malmo.se/Redovisningar/Hallbarhetsrapport.html>.
- Malmö stad. (2018a). *Om grundskoleförvaltningen*. Retrieved from <https://malmo.se/Service/Om-Malmo-stad/Var-organisation/Forvaltningar/Grundskoleforvaltningen/Om-grundskoleforvaltningen.html>.
- Malmö stad. (2018b). *Översiktsplan för Malmö - Planstrategi*. Retrieved from <https://malmo.se/op>.
- Malmö stad. (2019a). *Befolkningsprognos*. Retrieved from <https://malmo.se/Service/Om-Malmo-stad/Demokrati-beslut-och-paverkan/Fakta-och-statistik/Befolkning/Befolkningsprognos.html>.
- Malmö stad. (2019b). *Plan för Malmös gröna och blå miljöer (Antagandehandling mars 2019)*. Retrieved from <https://motenmedborgarportal.malmo.se/committees/stadsbyggnadsnamnden/mote-2019-03-14>.
- Malmö stadsbyggnadskontor. (2012). *Naturvårdsplan för Malmö*. Retrieved from <https://malmo.se/Service/Var-stad-och-var-omgivning/Stadsplanering--strategier/Antagna-strategiska-planer/Naturvardsplan-for-Malmo.html>.
- Malmö stadsbyggnadskontor. (2018). *Kartverktyg för Malmös översiktsplan*. Retrieved from http://kartor.malmo.se/rest/ol/2.1/?center=116526.9632855,6160865.3552618&zoom=0&ol=pr_tathet_tathet_op_pr_bebyggelse_utbyggnadsstrategi,pr_natur_park,pr_fitidsomraden,pr_begravningsplatser,pr_jordbruksmark,hoga_byggnadsobjekt&bl=malmo_karta_sv&config=../configs-2.1/config_op.js.

- McCormick, M. P., O'Connor, E. E., & Parham Horn, E. (2017). Can teacher-child relationships alter the effects of early socioeconomic status on achievement in middle childhood? *Journal of School Psychology, 64*, 76-92. doi: <http://dx.doi.org/10.1016/j.jsp.2017.05.001>.
- McGinnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. *Ecology and Society, 19*(2). doi:<http://dx.doi.org/10.5751/ES-06387-190230>.
- Mégret, F. (2018). Nature of obligations. In D. Moeckli, S. Shah, S. Sivakumaran, & D. J. Harris (Eds.), *International human rights law* (3rd ed., pp. 86-109). Oxford: Oxford University Press.
- Miljöförvaltningen. (2019). *Miljöredovisning 2018: Uppföljning av Miljöprogram för Malmö stad 2009-2020*. Retrieved from <https://malmo.se/miljoredoavisning>.
- Mosedale, S. (2005). Assessing women's empowerment: towards a conceptual framework. *Journal of International Development, 17*(2), 243-257. doi: 10.1002/jid.1212.
- Mårtensson, F., Jansson, M., Johansson, M., Raustorp, A., Kylin, M., & Boldermann, C. (2014). The role of greenery for physical activity play at school grounds. *Urban Forestry & Urban Greening, 13*, 103-113. doi: <http://dx.doi.org/10.1016/j.ufug.2013.10.003>.
- O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature Sustainability, 1*(2), 88-95. doi: <https://doi.org/10.1038/s41893-018-0021-4>.
- OECD. (2001). *Poverty Reduction*. In *The DAC Guidelines*. Retrieved from <https://www.oecd-ilibrary.org/content/publication/9789264194779-en> doi: <https://doi.org/10.1787/19900864>.
- OECD, & WHO. (2015). *Promoting Health, Preventing Disease: The Economic Case*. In. Retrieved from <https://www.oecd-ilibrary.org/content/publication/9780335262274-en> doi: <https://doi.org/10.1787/9780335262274-en>.
- Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science of the Total Environment, 325*(5939), 419-422. doi:10.1126/science.1172133
- Pansu, P., Régner, I., Max, S., Colé, P., Nezlek, J. B., & Huguet, P. (2016). A burden for the boys: Evidence of stereotype threat in boys' reading performance. *Journal of Experimental Social Psychology, 65*, 26-30. doi: <http://dx.doi.org/10.1016/j.jesp.2016.02.008>.
- Peterson, E. R., Rubie-Davies, C., Osborne, D., & Sibley, C. (2016). Teachers' explicit expectations and implicit prejudiced attitudes to educational achievement: Relations with student achievement and the ethnic achievement gap. *Learning and Instruction, 42*, 123-140. doi: <http://dx.doi.org/10.1016/j.learninstruc.2016.01.010>.
- Pogge, T. W. (2001). How Should Human Rights Be Conceived? In P. Hayden (Ed.), *The philosophy of human rights* (1st ed., pp. 187-211). St. Paul, Minn: Paragon House.
- Pålsson, E. (2010). *Lärande för Hållbar Utveckling - Gröna skolgårdar 2010*. Retrieved from <http://docplayer.se/23401479-Larande-for-hallbar-utveckling-grona-skolgardar-emma-palsson-malmo-naturskola.html>.
- Raworth, K. (2017). What on Earth is the Doughnut?... Retrieved from <https://www.kateraworth.com/doughnut/>.

- Raworth, K. (2018). *Donutekonomi: sju principer för en framtida ekonomi* (L. Kollberg, Trans.). Göteborg: Daidalos.
- Robèrt, K.-H., Broman, G., Waldron, D., Ny, H., Byggeth, S., Cook, D., . . . Johnson, P. (2015). *Strategic Leadership towards Sustainability* (9th ed.). Karlskrona: Blekinge Institute of Technology.
- Rockström, J., & Klum, M. (2015). *Big world small planet: abundance within planetary boundaries* (P. Miller Ed.). Stockholm: Max Ström.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S. I., Lambin, E., . . . Foley, J. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society*, 14(2). doi: 10.5751/ES-03180-140232.
- Sachs, A. (1995). *Eco-justice : linking human rights and the environment* (J. A. Peterson Ed.). Washington, D.C.: Worldwatch Institute.
- Sachs, J. D. (2015). *The age of sustainable development*. New York: Columbia University Press.
- Salonen, T. (2018). *Barnfattigdom i Sverige. Rapport 2018*. Retrieved from Stockholm: <https://resourcecentre.savethechildren.net/library/barnfattigdom-i-sverige-arsrapport-2018>.
- Salonen, T., Grander, M., & Rasmusson, M. (2019). *Segregation och segmentering i Malmö*. Retrieved from <https://muep.mau.se/handle/2043/28210>.
- SCB. (2010). *Grönytor och grönområden i tätorter 2010*. Retrieved from <https://www.scb.se/sv/Hitta-statistik/Publiceringskalender/Visa-detaljrad-information/?publobjid=24930>.
- SCB. (2019-05-05). Beskrivning av Grönytor i och omkring tätorter. Retrieved from <https://www.scb.se/hitta-statistik/statistik-efter-amne/miljo/markanvandning/gronytor-i-och-omkring-tatorter/produktrelaterat/Fordjupad-information/beskrivning-av-gronytor-i-och-omkring-tatorter/>.
- Seeberg, V., Ross, H., Liu, J., & Tan, G. (2007). Grounds for Prioritizing Education for Girls: The Telling Case of Left-Behind Rural China. In D. P. Baker & A. W. Wiseman (Eds.), *Education for All* (Vol. 8, pp. 109-154). Bingley: Emerald Group Publishing Limited.
- SFS. (2010:800). *Skollag*. Stockholm: Utbildningsdepartementet Retrieved from <http://rkrattsbaser.gov.se/sfst?bet=2010:800>.
- SFS. (2018:49). *Förordning om statsbidrag för stärkt likvärdighet och kunskapsutveckling*. Stockholm: Utbildningsdepartementet Retrieved from https://www.lagboken.se/Lagboken/sfs/sfs/2018/0-99/d_3174309-sfs-2018_49-forordning-om-statsbidrag-for-starkt-likvardighet-och-kunskapsutveckling.
- SKL. (2013). *150 år av självstyrelse - kommuner och landsting i förändring*. Retrieved from Stockholm: <https://webbutik.skl.se/sv/artiklar/150-ar-av-sjalvstyrelse.html>.
- SKL. (2018). *Socioekonomisk resursfördelning i skola och förskola*. Retrieved from <https://webbutik.skl.se/sv/artiklar/socioekonomisk-resursfordelning-i-skola-och-forskola.html>.
- SKL. (2019). *Kommuner och regioner*. Retrieved from <https://skl.se/tjanster/kommunerochregioner.431.html>.

- Skolverket. (2018a). *Analys av familjebakgrundens betydelse för skolresultaten och skillnader mellan skolor: En kvantitativ studie av utvecklingen över tid i slutet av grundskolan* (Rapport 467). Retrieved from <https://www.skolverket.se/publikationer?id=3927>.
- Skolverket. (2018b). *Grundskolan - Behörighet till gymnasiet*. Retrieved from: https://siris.skolverket.se/reports/rwservlet?cmdkey=common&geo=1&report=gr_betyg_beh&p_sub=1&p_ar=2018&p_lankod=12&p_kommunkod=1280&p_skolkod=&p_hmantyp=&hmankod=&p_flik=G&p_kon=A.
- Skolverket. (2018c). *PM - Slutbetyg i grundskolan, våren 2018*. (2018:1513). Retrieved from <https://www.skolverket.se/publikationer?id=3983>.
- Skolverket. (2019a). *Antagning till gymnasieskolan*. Retrieved from <https://www.skolverket.se/regler-och-ansvar/ansvar-i-skolfragor/antagning-till-gymnasieskolan>.
- Skolverket. (2019b). *SALSA - Skolenheters resultat av slutbetygen i årskurs 9 med hänsyn till elevsammansättningen*. Retrieved from: <https://siris.skolverket.se/siris/f?p=101:165:0::NO:RIR::>
- Skr. (2017/18:230). *Strategi för Levande städer - politik för en hållbar stadsutveckling*. Stockholm Retrieved from <https://www.regeringen.se/4971fa/contentassets/b5640fd317d04929990610e1a20a5383/171823000webb.pdf>.
- Stigendal, M., & Östergren, P.-O. (Eds.). (2013). *Malmös väg mot en hållbar framtid : hälsa, välfärd och rättvisa* (2nd ed.). Malmö: Kommissionen för ett socialt hållbart Malmö.
- Swedish Government. (2016). *Uppdrag till statliga myndigheter att bidra med underlag för Sveriges genomförande av Agenda 2030*. Retrieved from <https://www.regeringen.se/regeringsuppdrag/2016/04/uppdrag-till-statliga-myndigheter-att-bidra-med-underlag-for-sveriges-genomforande-av-agenda-2030/>.
- Swedish Government. (2017). *Sweden and the Agenda 2030 - Collection of examples*. Retrieved from <https://www.regeringen.se/49f007/contentassets/309173a5a3314a8eb2c19f35f942ce28/sweden-and-the-2030-agenda--collection-of-examples.pdf>.
- UIS, & Unicef. (2015). *Fixing the broken promise of Education for All: findings from the global initiative on out-of-school children*. Montreal: UNESCO Institute for Statistics.
- UN. (2015). *The Millennium Development Goals Report 2015*. Retrieved from <https://www.un.org/millenniumgoals/news.shtml>
- UN Special Rapporteur on human rights and the environment. (2018a). *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment* (A/HRC/37/59). Retrieved from http://ap.ohchr.org/documents/dpage_e.aspx?si=A/HRC/37/59.
- UN Special Rapporteur on human rights and the environment. (2018b). *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment - Note by the Secretariat* (A/HRC/37/58). Retrieved from http://ap.ohchr.org/documents/dpage_e.aspx?si=A/HRC/37/58.
- UN Special Rapporteur on human rights and the environment. (2019). *Issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*

- (A/HRC/40/55). Retrieved from http://ap.ohchr.org/documents/dpage_e.aspx?si=A/HRC/40/55.
- UNESCO. (2015). *Education for all 2000-2015: Achievements and challenges*. In *EFA Global Monitoring Report*. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000232205>.
- UNGA. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development* (A/RES/70/1). Retrieved from <https://sustainabledevelopment.un.org/post2015/transformingourworld>.
- University of Leeds. (2019). Explore scenarios. Retrieved from <https://goodlife.leeds.ac.uk/explore-scenarios/>.
- WCED. (1987). *Report of the World Commission on Environment and Development: Our Common Future* (Annex to A/42/427). Retrieved from <https://sustainabledevelopment.un.org/milestones/wced>.
- Wiek, A., Ness, B., Schweizer-Ries, P., Brand, F. S., & Farioli, F. (2012). From complex systems analysis to transformational change: a comparative appraisal of sustainability science projects. *Sustainability Science*, 7(Supplement 1), 5-24. doi: 10.1007/s11625-011-0148-y.
- Vita, G., Hertwich, E. G., Stadler, K., & Wood, R. (2019). Connecting global emissions to fundamental human needs and their satisfaction. *Environmental Research Letters*, 14(1). doi: <https://doi.org/10.1088/1748-9326/aae6e0>.
- Vo, J. (2016). Breaking the Cycle: Shifting towards Effective Education Reform to Overcome Poverty and Abate Cambodia's Sex Industry. *Suffolk Transnational Law Review*, 39(2), 455-506.
- Wolch, J. R., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and Urban Planning*, 125, 234-244. doi: <http://dx.doi.org/10.1016/j.landurbplan.2014.01.017>.
- Woods, K. (2010). *Human rights and environmental sustainability*. Cheltenham: Edward Elgar.
- Yang Hansen, K., & Gustafsson, J.-E. (2016). Causes of educational segregation in Sweden – school choice or residential segregation. *Educational Research and Evaluation*, 22(1-2), 23-44. doi: <http://dx.doi.org/10.1080/13803611.2016.1178589>.
- Yang Hansen, K., & Gustafsson, J.-E. (2019). Identifying the key source of deteriorating educational equity in Sweden between 1998 and 2014. *International Journal of Educational Research*, 93, 79-90. doi: <https://doi.org/10.1016/j.ijer.2018.09.012>.

Appendix A

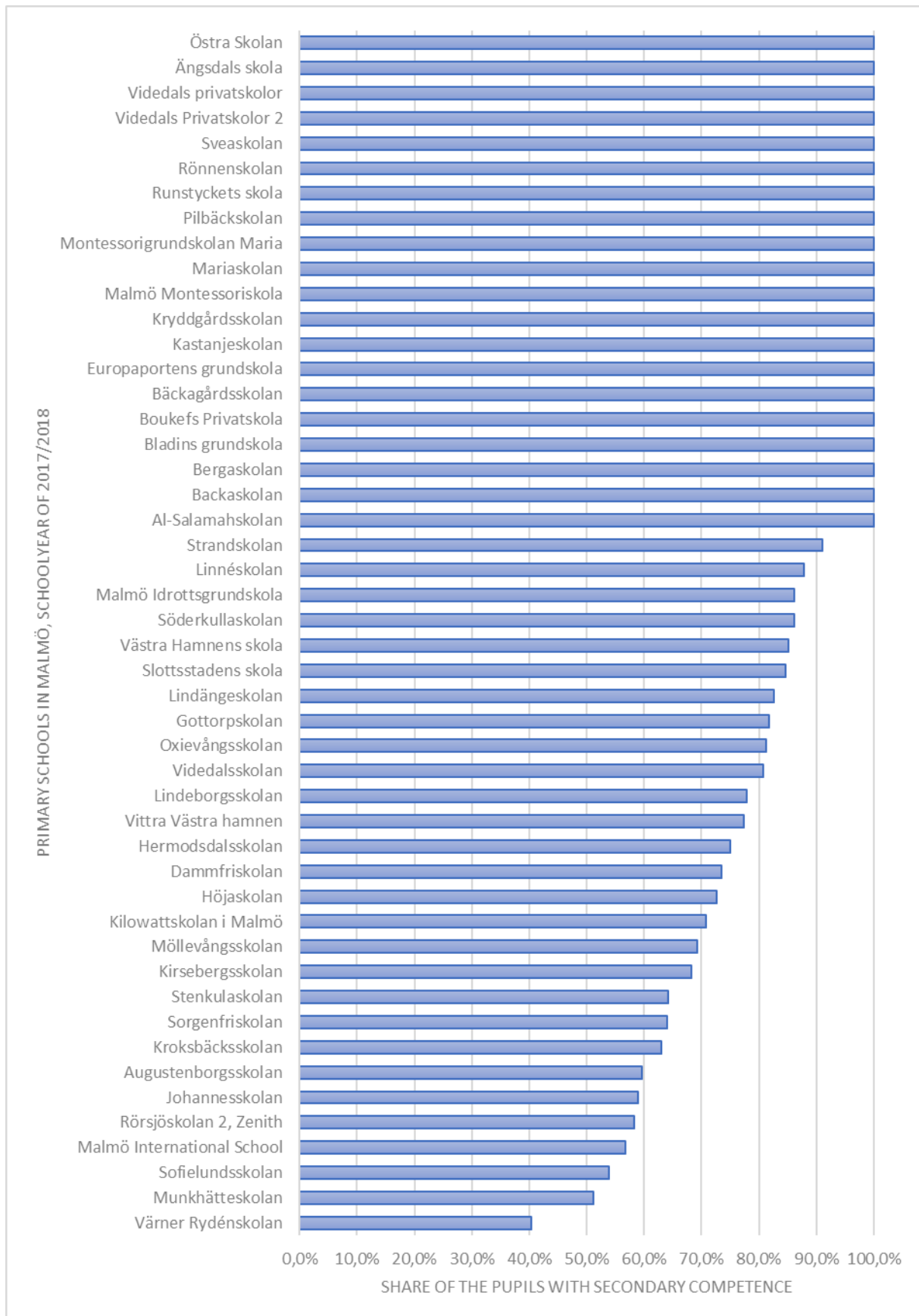


Figure 15. The pupils' share of secondary competence per primary school in Malmö with grade 9, the schoolyear 2017/2018.

Appendix B

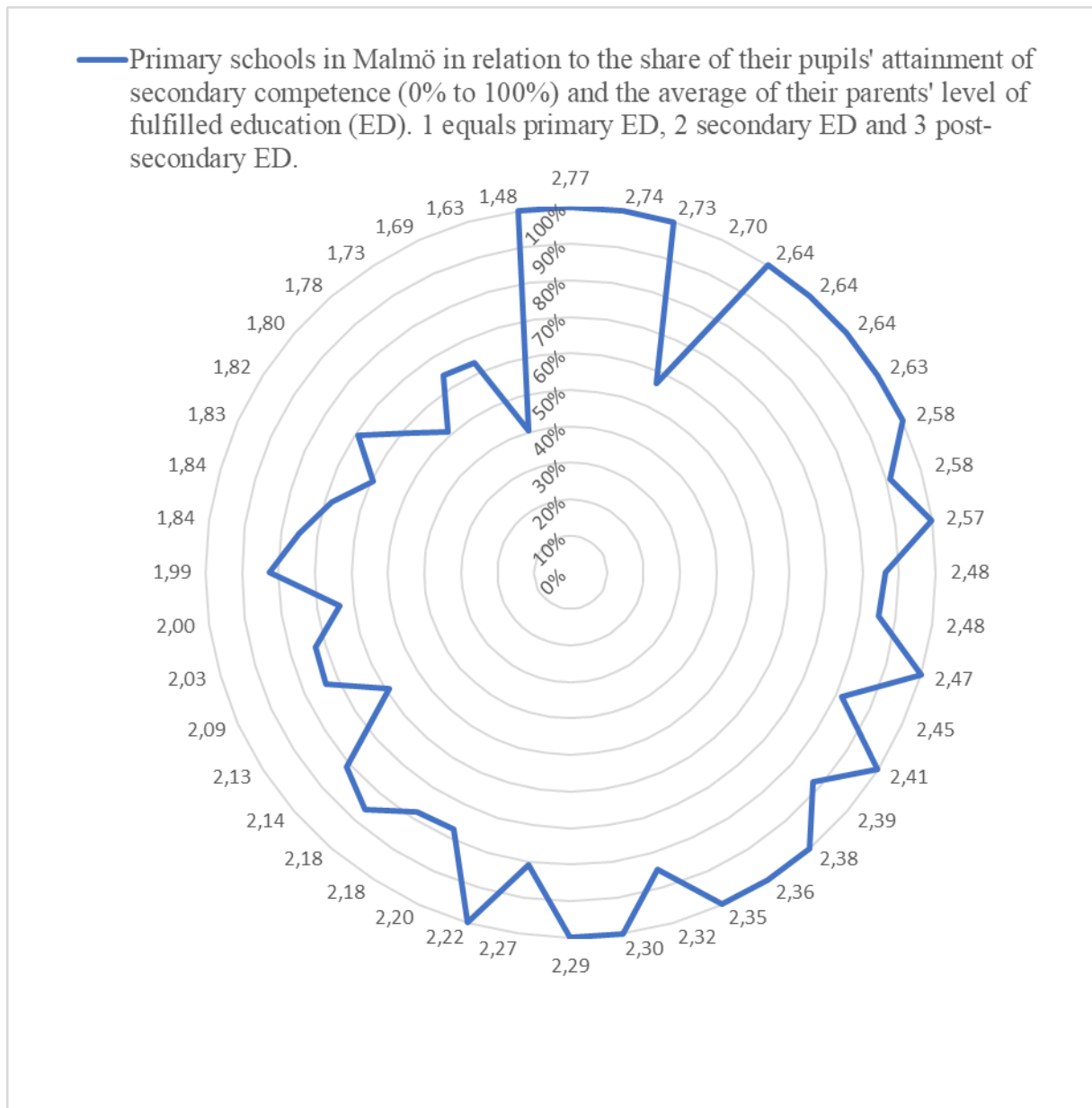


Figure 16. The primary schools in Malmö during the schoolyear of 2017/2018 placed in the graph according to the share of their pupils' attainment of secondary competence (0% to 100%) and the average of their parents' educational level. It demonstrates that, besides the first outlier where the average of the parents' educational level is 1,48 and the share of the pupils' secondary competence is 100%, that the higher the level of the parents' fulfilled education, the higher the share of the pupils' attainment of secondary competence. The schools with data available in both datasets have been incorporated (44 schools). Source of data for the parents' educational level per school in Malmö: Skolverket (2019b). Source of data for the share of pupils with secondary competence per school in Malmö: Skolverket (2018b).

Appendix C

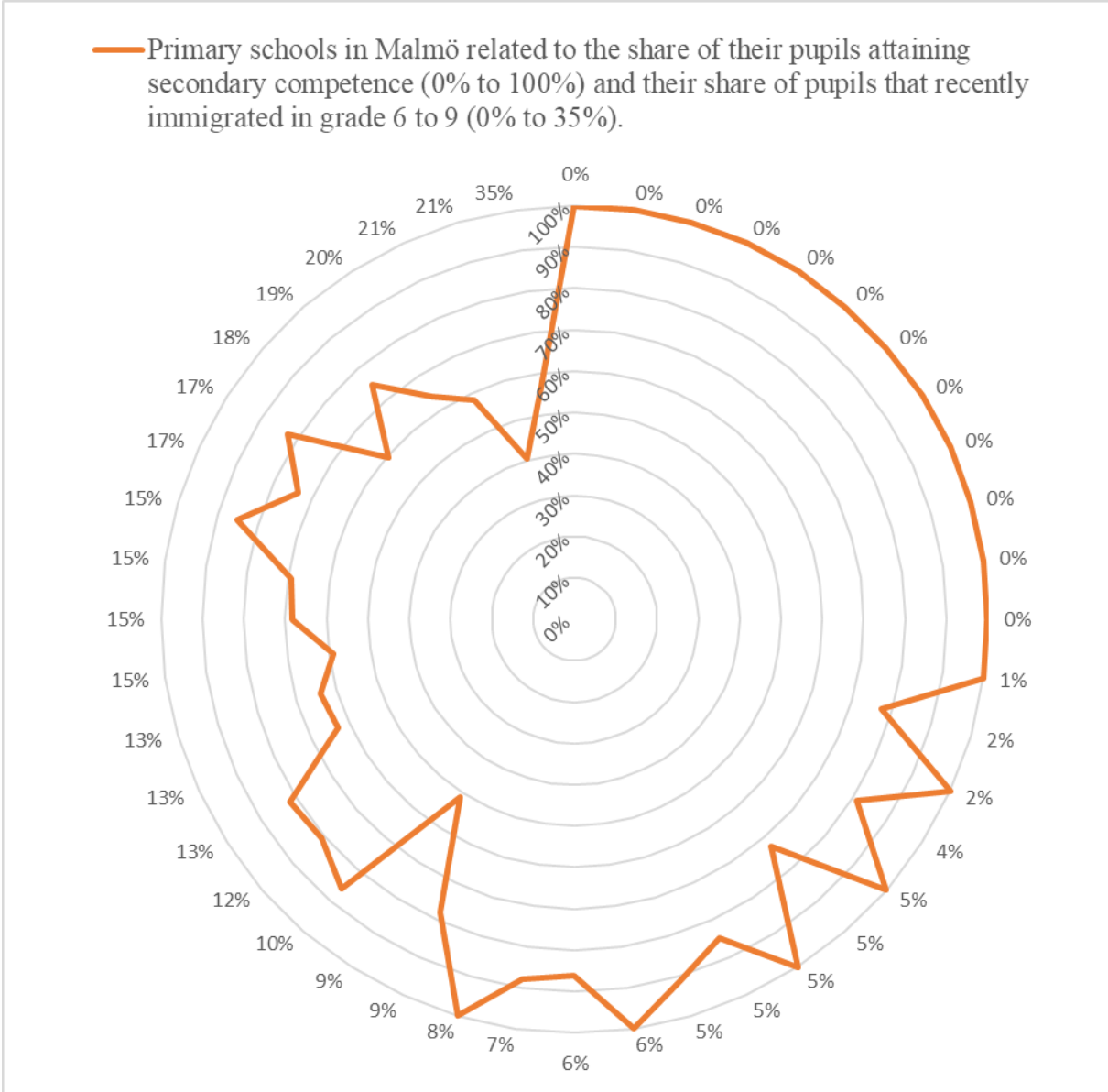


Figure 17. Primary schools in Malmö during the schoolyear 2017/2018 placed in relation to their share of students that immigrated during grade 6-9 which ranged between 0% to 35% and the schools' share of pupils with secondary competence on the scale of 0% to 100%. The trend is that the lower the share of recently immigrated pupils, the higher the share of pupils with secondary competence. The schools with data available in both datasets have been incorporated (44 schools). Source of data for the schools' share of recently immigrated pupils per school in Malmö: Skolverket (2019b). Source of data for the share of pupils with secondary competence per school in Malmö: Skolverket (2018b).

Appendix D

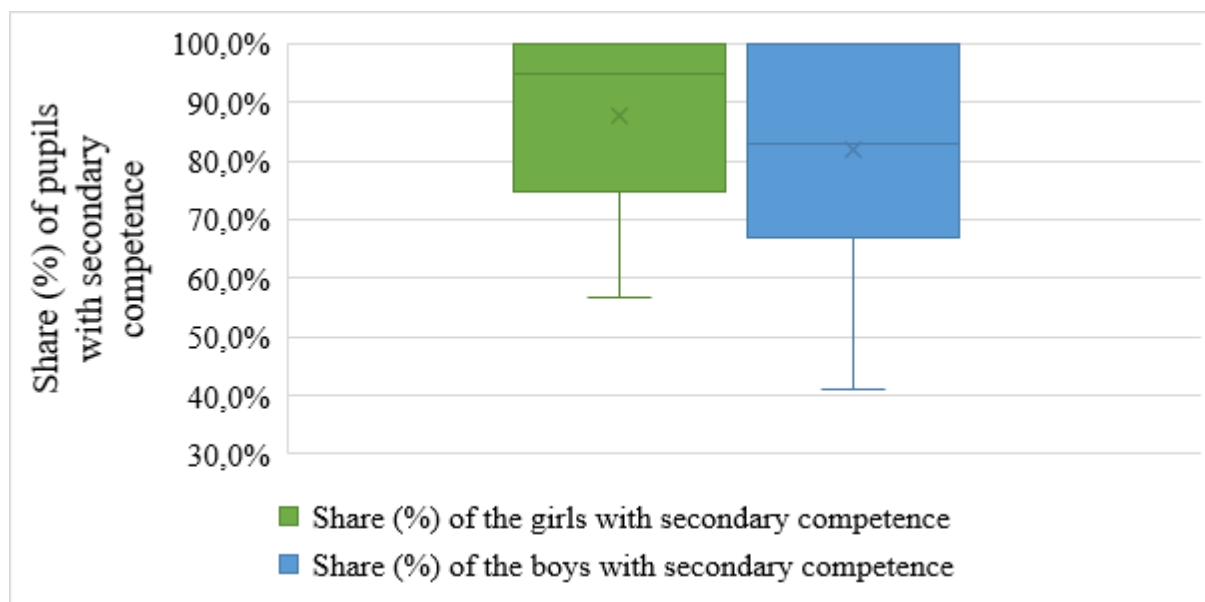


Figure 8. The share of pupils in Malmö during the schoolyear 2017/2018 with secondary attainment in relation to gender. It shows that girls are more likely to attain secondary competence than the boys. The schools with data for both girls and boys in their 9th grade at the end of schoolyear 2017/2018 were included (34 schools). Source of data: Skolverket (2018b).