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Urban sustainable development from a place-based and a system-based approach: Case study Malmö

Working paper based on a conference presentation at *City Futures'09*, Madrid, June 2009
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Key words
Urban, sustainable development, socio-ecological system, ecological footprint, and city governance

Abstract

This paper discusses urban sustainable development by comparing two approaches: a place-based sustainability approach which focuses the direct and often production based impacts on a region, and a system-based approach which reveals the indirect and consumption based effects of globalised patterns of production, consumption and trade. Malmö, a small/middle-sized city in Sweden, is used as a case study. While many improvements have been made in the local environment the big challenge is the fact that Malmö, as well as other modern urban regions, has a large and globally dispersed Ecological footprint. That is, in the course of modernization and deindustrialisation of many European cities, the ecological (and social) burden from a continued high level of material and energy consumption has changed from a local and contemporaneous problem into a global and complex sustainability challenge.

I. Introduction

More than half of humanity is urban today, and around 5 billion people are expected to live in cities in 2030 (unfpa.org). The challenge of urban sustainable development in the North as well as in the South is hereby huge (see e.g. Marcotullio 2006). This paper discusses urban sustainability in the context of relatively affluent economies in Europe. I will use Malmö, a small/middle-sized city in Sweden, as my case and discuss urban sustainable development from two different perspectives: a direct and *place-based approach* versus an indirect and *system-based approach*. While improvements have been made when it comes to locally situated problems– although there are still important issues to solve – the big challenge is the fact that Malmö, as well as many other urban regions, has a large and globally dispersed Ecological footprint. That is, the socio-ecological impacts from a continued high level of material and energy input have changed from a local and contemporaneous problem into a sustainability challenge with high spatial and temporal complexity.

The paper is divided into six sections. First, a general introduction to historical and present day Malmö is made (section II). Then, in section III, an outline of the place-based sustainability approach is given which shows the direct and often production based effects of a region's economy. As a contrast the system-based sustainability approach in section IV reveals the indirect and consumption based effects of globalised patterns of production, consumption and trade. As my ambition is to stay close to the empirical field, which is Malmö and the sustainability challenges of the present, these sections are illustrated by examples from the Swedish context and especially from Malmö. In section V an interview study is presented to shed light on how local actors view urban sustainability issues from a Malmö perspective. Finally, a concluding discussion is held in section VI.

This paper is written in the initial phase of a research project in the field of *human ecology*.[1] Working as an interdisciplinary researcher, I aim at bridging the typical gap between quantitative and qualitative research approaches by combining some methods and perspectives. Further, my ambition is to apply what can be called a transdisciplinary quality, by which I mean that I as a researcher actively take part in an ongoing stake holder dialogue on urban sustainability issues in Malmö.[2] That also places my project among the participatory and action-oriented research approaches.

Before proceeding, one note on the limitations of this paper. Even though I will discuss urban sustainability from a broad perspective, where ecological as well as economical and social topics are relevant, I will not go into the specific details of the social or economic dimensions of sustainable development. Surely, poverty, public health, employment, education, gender, and so on is all very relevant in the context of urban sustainable development. Even for Malmö, a city safely placed in the affluent cores of the world, many problems in this area are not at all satisfyingly solved. However, I will mainly concentrate on the interactions connected to *ecological* sustainable development even though, as we will see, this inevitably bring us to some critical socio-economic issues.

II. The case of Malmö

Malmö is the third biggest city in Sweden and is located in the region of Scania furthest south of the country close to Denmark (see figures 1-3).[3] The city has 290 000 inhabitants (malmo.se).[4] Counting the region immediately surrounding the municipality it contains around 625 000 people. In the wider *Oresund Region,* where also Copenhagen and other Scanian cities are included, the total population amounts to almost 4 millions. Malmö is growing with around 5000 persons annually and the prognosis for 2020 is 350 000 inhabitants (City of Malmö 2009). Almost one third of its residents have a foreign origin and there are some 150 languages and 171 different nationalities represented. The biggest immigration groups are from Denmark, former Yugoslavia, Iraq, and Poland.

During the 19th century an industrial boom took place that transformed the old merchant and agrarian centre into a modern industrial city. In the middle of the 20th century Malmö was one of Sweden's industrial centres with a world famous shipbuilding yard (*Kockums)*, low unemployment and strong social democratic welfare policies. However, increasing international competition and a global economic restructuring in the post war period put many European cities under pressure (see e.g. Vall 2007). Traditionally important sectors in Malmö such as textile, shoes and leather industry started to decline already in the 1950's followed by closing-downs in the 1960-1970's. During the 1970's the European shipbuilding yards were challenged by newly industrialized countries in for example South East Asia. In 1979 the Swedish government nationalized Kockums, but already in 1986 its civil production was closed down.

[1] See http://www.hek.lu.se
[2] The interdisciplinary and transdisciplinary research approach is discussed in Andrén (2008 a) available at http://www.hek.lu.se/staff/andren-sabina/publications (section 'Unpublished paper').
[3] For general information on Malmö see: http://www.malmo.se/servicemeny/malmostadinenglish
[4] Data from 2008. Local statistics on Malmö from the Strategic division at the City office: http://www.malmo.se/kommunfaktapolitik/statistik.

The Oresund area
Denmark (left) with Zealand and Copenhagen
Sweden (right) with Scania and Malmö

Figure 1-2. Malmö situated in the Oresund region and in the European Union
Sources: 1. City of Malmö; 2. The European Commission, Directorate General for Press and Communication.
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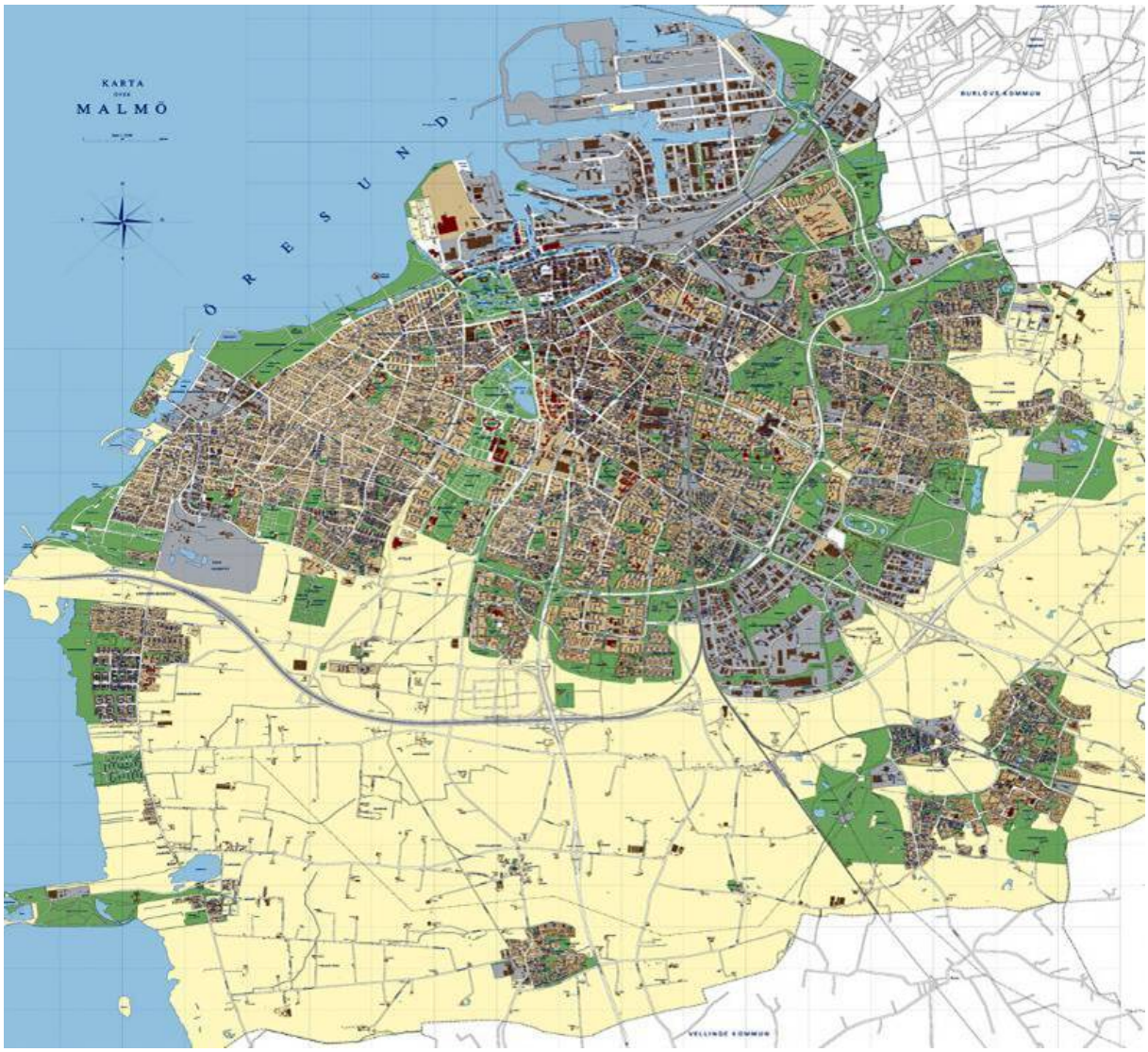

Figure 3. City map of Malmö
Source: City of Malmö

Malmö was now thrown into a rapid deindustrialisation with rising unemployment and growing municipal budgetary deficits. Adding to the industrial crisis, a general population increase and a high level of immigration in the later 1980's and in the 1990's resulted in accelerating social problems and in socio-economic segregation. High public expenditures and decreasing tax incomes deteriorated the municipal finances. All this lead to a rapidly worsening crisis, so bad, that the left wing and right wing political leaders jointly made an appeal in 1995 to the Swedish government claiming that: 'Malmö is threatened by something that can be called an economic meltdown' (Stigendal 1996: 28, my translation).

In the second half of the 1990's Malmö began to experience a phase of economic recovery. Political responses and coordinated efforts were taken on a local as well as a national level to stop the negative spiral. Some strategic decisions and large scale infrastructure projects had an influence, such as the construction of the *Oresund Bridge* and the *City tunnel*, the establishment of the *Malmö University*, and a municipal tax equalization reform at the national level. In the recent years, Malmö has greatly improved its situation and the economy has been strong – even if the effects of the ongoing global economic crisis are not yet clear but will surely affect the region.

What kind of city is Malmö now – and when looking into the future? Actors from public bodies as well as private business are making efforts to brand Malmö as a service- and knowledge based economy. Malmö is to be seen as a 'Knowledge City' or an 'Event City' pulsing with culture, creativity, communication, and people. Environmental concern is high on the agenda and the City has gained international attention for its efforts in urban sustainable development.[5] As in many other West European urban regions, what many see is the restructuring into a 'post-industrial' economy characterised by *decoupling* and *de-materialization*, that is, on production and consumption patterns that do not involve high levels of material input and energy consumption. As this paper will argue, as long as the total ecological footprint of Malmö and other modern urban regions remains at a very high level, one must consider this dematerialized city more of a hope than a reality.

III. Urban sustainable development: A place-based approach

What is the status of Malmö if one is to assess urban sustainable development? Two contrasting views can be found by using a place-based versus a system-based sustainability approach. A *place-based approach* focuses on the actual geographical site and the ecological status of that place caused by for example emissions, resource extraction, landscape exploitation and other human activities. A *production focus* is often implicit, meaning that one takes into consideration the emissions and other effects from the producing sectors of the area in question. The place-based view is frequently used in environmental policy making in for example international negotiations on air pollutions such as sulphur dioxide (SO_2) and carbon dioxide (CO_2). The emissions are thus allocated to certain geographical areas, for example to a nation or a region, as being produced/emitted from this site.

An example of a mainly place-based sustainability approach is the Swedish Environmental quality objectives (EQO) adopted by the Parliament in 1999, which also forms the basis of the environmental accounting of the City of Malmö.[6] The principal aim of the Swedish EQO's is that the major environmental problems should be solved within one generation (Environmental Objectives Council 2008). There are 16 objectives which describe a sustainable and desirable environmental standard that is to be met by 2020 or, for the climate objective, by 2050 (see table 1). Examples are reduced climate impact, zero eutrophication, a non-toxic environment, sustainable forests, good-quality ground water, and a rich diversity of plant and animal life. In addition to these overarching objectives there are some 70 intermediate goals and 100 indicators used to monitor the process. As one can see from the list, albeit with some important exceptions (e.g. 1 and 3-5), the objectives are mainly giving a picture of the desired ecological status in a direct and site-based perspective. Even if there of course are all kinds of connections to the indirect and global level for each of the targets, most objectives are addressed and structured according to a place-based approach. For example, the objective 'A rich diversity of plant and animal life' concerns the status of the nation, not what effects on bio-diversity the consumption patterns of the Swedish population causes. As will be further discussed, of course there are great strengths in the way the Environmental quality objectives are structured. Besides their impressive ambitions, they are efficient in putting a clear focus on local environmental issues and of giving a tool for regional actors in their sustainability policies.

[5] More information at: http://www.malmo.se/servicemeny/malmostadinenglish/sustainablecitydevelopment

[6] The Swedish Environmental quality objectives are at present subject to political discussions and may be revised. More info at http://www.miljomal.nu/Environmental-Objectives-Portal . The City of Malmö is also revising its Environmental program and another structure will likely appear in the coming program of 2009.

The Swedish Environmental quality objectives

1. Reduced Climate Impact
2. Clean Air
3. Natural Acidification Only
4. A Non-Toxic Environment
5. A Protective Ozone Layer
6. A Safe Radiation Environment
7. Zero Eutrophication
8. Flourishing Lakes and Streams
9. Good-Quality Groundwater
10. A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos
11. Thriving Wetlands
12. Sustainable Forests
13. A Varied Agricultural Landscape
14. A Magnificent Mountain Landscape
15. A Good Built Environment
16. A Rich Diversity of Plant and Animal Life

Table 1. The Swedish Environmental quality objectives
(Environmental Objectives Council 2008)

Let's now turn to Malmö and how it can be described by a place-based sustainability approach. The most striking impression, looking at the recent development of say 25-30 years, is the overall environmental improvement resulting from deindustrialization and, also, from sharpened environmental policies at the national level. As we have noted, during the late post-war period the industrial sectors in Malmö met heavy competition from abroad resulting in either their moving out, their modernisation and streamlining – or their closing down. During the late 1960's an increased public awareness and political debate at the national level resulted in the establishment of the Swedish Environmental Protection Agency and an Environmental Protection Act. Higher demands and stricter control was now placed on industry as well as other actors impacting on the environment (i.e. municipalities, farms, households). The oil crisis during the 1970's also created an incentive to decrease the use of fossil fuels. All of these factors which, important to say, were less connected to the municipal environmental ambitions than to external forces, were now shaping a trend of decreasing environmental impacts. As an example, a large improvement was when the city became connected to a district heating system, thereby phasing out many small-scale and relatively inefficient and polluting oil- or coal fired boilers.

As a result, local environmental pollution in Malmö has declined sharply, for some important emissions such as carbon dioxide (CO_2) and nitrogen dioxide (NO_2) with more than 50% since 1980 (City of Malmö 2008). The decline of acidifying substances (SO_2) is even larger, from over 10 000 tonnes/year in 1980 to less than 1 000 tonnes/year in 2007. Pollutions from heavy metals such as cadmium (Cd), lead (Pb) and mercury (Hg) also have decreased sharply, even if one still finds increased levels due to long term accumulation in for example sea sediments. The emissions of volatile organic compounds (VOC) have followed a declining trend from deindustrialisation as well as from cleaner vehicles and the introduction of catalytic converters. The emissions of nitrogen from the sewage plants in the municipality have more than halved since the 1990's although one can now see a small upward trend. According to the Environmental report of City of Malmö, other areas where improvements have been made are in phasing out of atmospheric ozone depleting substances (CFC's) and in the efforts to meet the objectives 'Flourishing lakes and streams' and 'A balanced marine environment'. This said, it should immediately be noted that these examples do not imply that

the problems are by any means solved and the negative impacts totally levelled down. As we will see, many local environmental problems still persist. But in sum, one may say that the general environmental standard has largely improved seen in a local and place-based perspective. In addition, if one takes into consideration ongoing environmental policies and projects in Malmö, one could argue that many of the local environmental problems seem to be on the right track of being solved in line with the EQO's timetable of 2020.

Despite these positive signs there are still important problems threatening the local environment. In Sweden it is the County administrative boards that monitor the state of the regional environment and also play a role in the assessment of regional sustainable development. In the Environmental quality program of Scania (2003: 4) the County administrative board highlights the following regional problems:

- **Agriculture**: The impacts from the intensive and large scale industrial agriculture in the region, for example leakage of pesticides, eutrophication of inland and coastal waters, loss of biodiversity and other types of pressure on the cultural landscape.
- **Traffic**: The negative aspects of the heavy traffic in the region such as emissions to air, water and soil, crowdedness, noise and dangers to health and safety.
- **Chemicals**: The diffusion of hazardous chemicals, or other possibly dangerous compounds, into the environment from all sectors of the society, for example from consumer products, waste, and sludge.
- **Landscape exploitation**: The total impacts on the landscape from human exploitation including urban infrastructure, a relatively dense population (at least in a Swedish comparison), a far-reaching transport network and a large-scale agricultural sector. These impacts consist for example of loss of biodiversity and threats to natural and cultural landscapes including cultural heritage.

In the case of Malmö, the biggest urban area in Scania, these prioritized concerns hold rather well for the city level as well (City of Malmö 2008). The main difference lies in the obvious fact that specific urban issues get a higher weight in the Malmö account than in the regional assessment. While as we have seen the industrially connected problems in many cases have been considerably improved, several and partly new problems connected to modern urban development persist or even increase. The following examples illustrate what is judged as problematic local environmental issues in today's Malmö:

- **Urban air quality**. Even though several polluters have decreased on a general level, national air-quality norms for nitrogen dioxide (NO_2) are exceeded on a regular basis at several sites in Malmö. This is mainly caused by local traffic emissions and contributes to the pollution of air, water, and soil and acts as a hazard to health. Also, low level ozone (O_3) and air particles occasionally show increasing levels but stay within air-quality norms. Even if the times of urban smog are gone one can conclude that the air quality standard for some sites in the city centre does not meet Swedish environmental and health based requirements.
- **Traffic situation**. In the whole region commuting has been increasing not least due to the improved connections to Denmark and its capital Copenhagen via the Oresund bridge (Scania County Adminstrative Board 2007: 66). Heavy goods traffic and other transit traffic also show a steadily growing trend. In Malmö, even if more environmentally friendly alternatives like bike, pedestrian and public transport are increasing their share of total transport, the car is still a dominant mode of conveyance

(City of Malmö 2008). The traffic situation may compared to other world urban centres perhaps look quite harmless, but many residents experience it as a source of pollution, noise, insecurity, and crowdedness.[7] More than 11 000 residents in Malmö have an indoor environment where the environmental quality objective levels of 35 dBA are exceeded. In total, at least 50 000 inhabitants are in some way or another negatively affected by traffic noise in their indoor environment.

- **Contaminated soil and ground water and the use of chemicals**. Even if the levels of several chemicals and heavy metals connected to the industrial era have decreased, many threats are still present as these compounds are accumulating on a long term basis in the ecosystems including in the living organisms. In the city area of Malmö, ground water quality shows increased levels of hazardous chemicals and soil remediation is often necessary when redevelopment projects are planned. In addition, the City Environmental department points at a general knowledge gap when it comes to judge the amounts of, and potential effects of, chemicals and heavy metals accumulated in the urban structures and ecosystems for example PCB in building materials and compounds that may be carcinogenic or act as an endocrine disruptor.
- **Eutrophication and linear flows of phosphorous**. Although sources of nitrogen (N) and phosphorus (P) leakage have diminished due to for example better sewage treatment and fertilising strategies, these emissions are still a problem. Phosphorus demands special attention as it is a non-renewable resource essential to food production and the metabolism of all living organisms including the human body. Eutrophication is a persisting problem in inland water (streams and lakes) and also in some coastal areas. Due to the time lags and accumulation effects in the nutrient chains of the ecosystems, and also because the origin of these emissions comes from many sectors of the society (including non-Swedish sources), no clear improvements in the trends are yet seen.
- **The landscape threats from urban activities**. In the case of Malmö one prime concern is the pressure that a growing population and economy puts on the surrounding landscape. Only in some fifteen years (since 1995) more than 1/6 of the agricultural land areas of Malmö have been exploited for other purposes (City of Malmö 2008: 34). Organic farming is practiced only on around 4% of the total agricultural land in the municipality. Even if the ambitions of nature protection are generally very high, as mirrored in the EQO's, the pressure on the landscape is fundamental. In the area of Malmö many biotopes, including rare species of fauna and flora, are either gone or under threat. Efforts are made to protect and reconstruct wetlands, for example, but one must keep in mind that this is from an extremely impoverished level. Larger areas of forest are on the whole non-existent in Malmö, which is totally dominated by urban structures and agricultural land. The coastal area including the Oresund are subject to ambitious environment monitoring but threats such as oil spills from shipping in transit are permanently present.

[7] In a project called 'The Malmö panel' (*Malmöpanelen*), around 1600 residents are regularly given questions by the City of Malmö on the city development. In the first panel round, air quality was mentioned as one important problem to solve. More info at: http://www.malmo.se/servicemeny/paverka/malmopanelen.4.2ec2683b119e185b0f0800067854.html

IV. Urban sustainable development: A system-based approach

One may argue that for several reasons a place-based approach does not give a comprehensive sustainability assessment. First, many activities connected to the urban metabolism are not easily located within specific geographical borders as for example international flight and shipping. Second, many environmental problems of today are not primarily local in their nature but are connected to global biosphere responses. The typical example is of course climate changes caused by greenhouse gas emissions. Further, the ecological burden of one geographical area may be very – and in some cases extremely – shaped by its production sector, and may not mirror the activities of that area in general. A relevant example for Malmö is that when a new natural gas-fired power plant is now being established in the harbour of the city, the greenhouse gas emissions will increase making the local climate statistics looking worse. But at the same time, the plant will have the ability to replace older and coal-based production units seen on a regional level and thereby lower the total emissions (eon.se). The main argument against the place-based sustainability approach is, however, that our societal metabolism – and by this I mean the total material and energy throughput to cover human needs (and desires one should add) and to produce and reproduce infrastructure – is essentially global in its nature. For example, one can find very clean and healthy environments but where the inhabitants' consumption patterns indirectly cause a heavy ecological footprint. The lifestyle of this population thus relies on material extraction, energy consumption and environmental impacts in other parts of the world, a phenomenon called *environmental load displacement* (see e.g. Hornborg et al. 2007).

As argued by many researchers, as well as NGO's, another way of depicting the socio-ecological system is therefore to pay attention to global production, consumption and trade patterns. We can call this an indirect and *system-based view* or a *consumption based approach*. What is in focus when assessing urban sustainability is then the impact from the total consumption, irrespective of where the different parts of the production chain and the environmental impacts from it are located in time and in space. For example, the energy consumption of a typical urban region is connected to the extraction, refinement, distribution and consumption of fossil fuels, of which the socio-ecological consequences are spread all over the world including as waste molecules into our biggest global common, the atmosphere. The consumption based approach focuses on the total life cycle of goods and services but puts the price tag at the stage of final demand which can be either private or public consumption. The most important difference is that in a system-based approach attention is paid to the consumption patterns and the lifestyles of a given population, rather than to the production sectors or the place-specific characteristics of a certain area.

As the purpose of this paper is to give an overview rather than to examine different methodologies in detail, I will here point to two brief examples illustrating the system-based approach. The first is the methodology of *Ecological Footprinting* (EF), which measures humanity's demand on the biosphere in terms of the biologically productive land and sea areas required to provide the resources used and to absorb the waste generated (WWF 2008).[8] A nation's (or a city's) footprint is the sum of all the cropland, grazing land, forest and fishing grounds required to produce the food, fibre and timber it consumes, to absorb the wastes emitted from energy use, and to provide space for its infrastructure, regardless of where these areas are located on the planet. In 2005 the global EF was *2,7 global hectares per capita*

[8] The EF methodology has been celebrated for its strengths as well as criticised for its weaknesses and is subject to a continued development. For an overview of the concept please visit http://www.footprintnetwork.org/en/index.php/GFN.

(Global Footprint Network 2008).[9] The single largest demand humanity puts on the biosphere, around half of the total EF, is the so called *Carbon Footprint*. This component represents the bio-capacity needed to absorb CO_2 emissions from fossil-fuel use and land disturbance, other than the portion absorbed by the oceans. On the supply side the total productive area, or what is called the global bio-capacity, was *2,1 gha per capita*. Humanity's footprint thus exceeds the Earth's total bio-capacity by around 30% and shows an increasing trend. This overshoot implies an overexploitation of the ecological systems and a depletion of natural resources and may result in impaired bio-capacity and/or irreversible loss of ecosystem services.

There is a clear North-South divide apparent in the EF statistics. High-income countries have an average EF of 6,4 gha per capita, middle-income countries 2,2 gha/cap and low-income countries an average of only 1,0 gha per capita. As an example, the average American citizen has an EF of around 9,4 gha, the average European Union citizen one of 4,7 gha, but an average Chinese and Indian citizen only 2,1 and 0,9 gha respectively. Even if many high-income countries have abundant natural resources and a high bio-capacity, as for example Sweden, it is evident from both the global nature of the Carbon footprint and the typically big proportion of imported goods into their consumption portfolios, that their area requirements and environmental impacts do not stay within their own borders.[10] One may continue by saying that this must thus also be the case for a typical European urban region, such as Malmö. We may expect that a big proportion of the land requirements from such urban economies are not only connected to the exploitation and degradation of its own environment but to a spatial displacement and a temporal diffusion of environmental impacts. As consumption levels have increased, following general GDP growth, the throughput of material and energy and the total environmental burden have reached a level that is by many judged as unsustainable (see e.g. Steffen et al. 2004).

The Ecological footprints of every nation in the world are calculated each year by the Global Footprint Network. In 2005, the Ecological footprint for Sweden was estimated to *5,1 gha per capita*. The exact figure of the EF for Malmö is so far not calculated but is at present subject to investigation.[11] Another city in Sweden, Gothenburg with some 500 000 inhabitants located on the south west coast, has however done such calculations and these may serve as a relevant example. The local EF of Gothenburg was estimated to around *4,2 gha per capita* in 2002 (City of Gothenburg 2007). Two other smaller Swedish municipalities were also estimated, Robertsfors and Luleå, and their EF was 4,7 gha and 4,5 gha per capita respectively. It should be noted, that the Swedish EF figure has recently been subject to a revision when it was decided that nuclear energy should be omitted from the international footprint standard (Global Footprint Network 2008: 30 ff). If nuclear energy would be

[9] All EF data are taken from the Global Footprint Network 2008. A global hectare is a hectare with a world-average ability to produce resources and absorb wastes and is yearly estimated by the global footprint network and used in the standards of the methodology.

[10] Of course, all high-income countries do not have a high bio-capacity or a high import share of their economy. In the case of Sweden it is an import- *and* export-oriented economy. The share of imported goods in private consumption, as well as in public consumption and in investments, is quite high (konj.se). See also Edman 2005 for a discussion on Swedish private consumption in a sustainability perspective.

[11] A software tool called REAP (*Resource and Energy Analysis Programme*), which is able to assess the local Ecological footprint as well as other important consumption based statistics, is currently developed in a Swedish context by the Stockholm Environment Institute (SEI), the World Wide Fund for nature (WWF) and some Swedish cities, e.g. Malmö. More info at: http://www.sei.se/programmes/future-sustainability/sustainability-modelling/reap.html.

included, the Swedish figures would increase with some 20%. In my example I use EF figures with the nuclear energy footprint excluded.[12]

As we can see, Gothenburg had a slightly lower footprint than the two smaller and more rural municipalities, which may be a consequence of the more dense structure of bigger cities allowing for lower average travel distances, more developed public transport systems, relatively efficient district heating systems, etc. However, this higher density also means that such an urban region probably is more dependent on appropriation of spaces outside of its own land area for its consumption of material and energy. We can illustrate this by the following example given only as a brief sketch. Let's make the hypothesis that Malmö had the same Ecological footprint as Gothenburg in 2002, that is 4,2 gha, and add to that the population of that year of around 265 500 inhabitants (malmo.se). This means that the total appropriation of bio-productive land and water areas from the consumption of Malmö amounted to 1,1 million hectares, or 11 000 km^2, including areas needed to absorb carbon dioxide from fossil fuel use (the Carbon footprint). This can be compared to the land area of the whole Scania which is of this size.[13] The total area of the Malmö municipality is around 335 km^2.[14] Coming as no surprise, Malmö is thus extremely dependent on areas outside of its own borders, its own area covering only a few percent (around 3%) of the totals required to match its consumption patterns.[15]

The second example of a system-based approach concerns greenhouse gas emissions caused by average Swedish consumption patterns including, I here assume, the case of Malmö.[16] In a recent report from the Swedish Environmental Protection Agency (2008) a production versus a consumption based approach is discussed for three greenhouse gas emissions: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The result is illustrated in figure 4. As we can see, the production based emissions totalled around *76 million tonnes of CO_2 equivalents*, including international air and sea transport and the production of exports. In a consumption based perspective, the export connected emissions are to be excluded (24 Mtonnes CO_2e) while the emissions from manufacturing and transportation of imports are to be added (43 Mtonnes CO_2e). Swedish consumption in 2003 altogether caused greenhouse gas emissions of *95 Mtonnes CO_2*e. This equals around 10 tonnes CO_2e per capita which is allocated between private consumption (around 80%) and public consumption (20%).[17] The conclusion is that greenhouse gas emissions are at least 25% higher from a consumption based than from a production based perspective. The report underlines that what is described is only orders of magnitude and that there are large uncertainties, especially concerning the consumption related emissions from non-EU trade, which is probably underestimated (Swedish Environmental Protection Agency. 2008: 25f). Thus it is very likely that the consumption based emissions are even higher.

[12] The Gothenburg estimation for 2002 was actually 5,5 gha with a nuclear energy footprint of 1,35 gha included. The EF for Sweden, including nuclear energy, was estimated to 6,7 gha in 2002 by the City of Gotenburg (2007).
[13] The land and inland water area of the region of Scania is 11 368 km^2. If adding sea water the total area reaches 17 123 km^2.
[14] The land and inland water area of the Malmö municipality is around 156, 5 km^2 but I here add the sea water area of 178,7 km^2 as the city is located at the coast line of Oresund which ought to be counted as a bio-productive area (Scania County Adminstrative Board 2007: 67).
[15] One should be aware of that this whole example is of course a very hypothetical one, since a typical European urban area does not have the kind of bio-productive qualities needed for biological production and assimilation in any case.
[16] A detailed analysis of Malmö greenhouse gas emissions using a production and a consumption based approach may be carried out in further studies but here I use the average Swedish figures as a basis for a general reasoning.
[17] As a comparison, it has been estimated that the emissions of an average Swedish consumer need to decrease to half of the present level in 2020 and to a fifth in 2050 if they are not to exceed the desirable trend in global per capita emissions (Swedish Environmental Protection Agency 2008: 13).

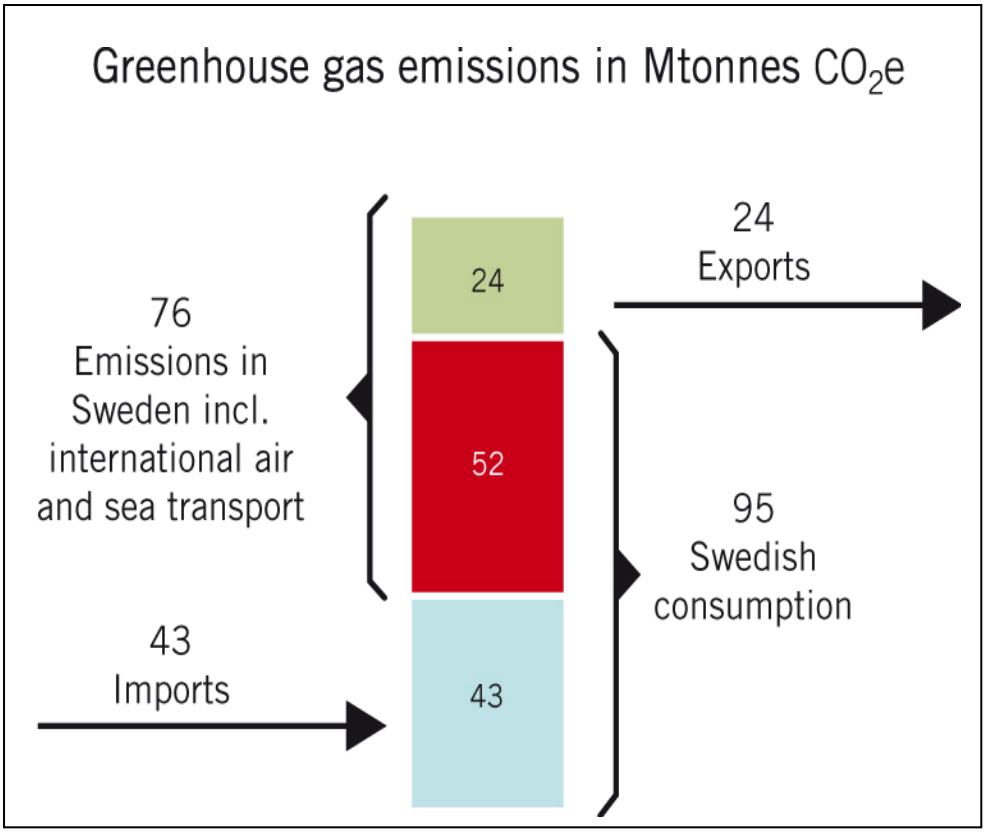

Figure 4. Swedish greenhouse gas emissions in 2003

(Swedish Environmental Protection Agency 2008)

V. Voices from Malmö

As stated in the introduction my ambition is to take a step further from only describing the urban sustainability dilemma, by bringing the research results with me into the social context of different actors in Malmö. By doing this I also see this project as a participatory and action-oriented research approach, trying to bridge the gap between the typical researcher's and practitioner's roles. During the spring of 2009 I have therefore conducted an interview study as an introductory survey of my research field (Mar-June). In total 16 interviews have been made with actors connected to the Malmö sustainability politics in one way or another. The interviews took place at the participants' offices and each lasted around 40 minutes. In addition to some 5 semi-structured questions – or themes rather – I also included a small questionnaire the results of which may be discussed in quantitative terms. It is mainly this part of the study I will discuss here, the empirical material thus being subject to further investigations in the work to come.

The persons interviewed represent the highest political level in the city (City executive board) and relevant positions, often directors, at the city administration level and other public bodies:

- Local Government Commissioners from the Social Democratic Party, the Conservative Party, and the Green Party [18]
- City Office
- City Planning Office
- Environment Board and Environment Department
- Department of Internal Services

[18] Malmö is governed by a left wing majority in cooperation with the Greens. The City Council Election in 2006 gave the Social Democrats 38%, the Conservative Party 25%, and the Green Party around 6% of the votes (malmo.se).

- Trade and Industry Agency
- Street and Parks Department
- City District Departments
- VA SYD (water supply, sewage treatment and waste management)
- Malmö University

As the scope of the survey is quite limited, the results should only be seen as hinting at some directions and perhaps as opening up interesting questions. The results from the questionnaire do not imply any aspirations to make general statements about the opinions in Malmö. Further, the purpose is not to mirror the exact statements of different actors, and therefore I do not name persons when referring or quoting. All interviews were done in Swedish and so the material has been subject to the author's translation. The result from the questionnaire is presented in tables 2-3 with capital letters marking the different questions. These will now serve as a basis for some reflections on Malmö and urban sustainable development with the place-based and the system-based approach in mind.

A dominant discourse

The questionnaire was introduced with some general questions on Malmö and urban sustainable development. I wanted to see if the actors found the concept important and at which stage they considered Malmö to be. As you can see from the tables (2A-B and 3A), there was a strong agreement on that Malmö has become a more sustainable city in the past 20-30 years, that is, since the industrial crisis and the following structural changes. When asked to put a weight between 0-10 on how close Malmö is to something they consider as urban sustainable development the average weight amounted to 6,1. However, one may note that the answers ranged from a maximum of 8 to a minimum of 2, implying that the persons have rather divergent views on how close – or far from – urban sustainable development that Malmö really is. In any case, *all* of the participants agreed on that Malmö is moving in the direction of urban sustainable development right now. As we have seen from the system-based approach, this optimistic view may in some respects be questioned as Malmö, as well as other European urban regions, have typically improved their local environment (more or less) but still cause a large and even growing global footprint.

Further, one can note that all of the participants agreed on that the concept of urban sustainable development is *very* central for the strategic discussion of Malmö's future (3D). The most frequent weight given is the maximum of 10. The consensus about the importance of the concept, even if the policy implications surely differ, is strong all across the study. I interpret this as a sign of that the modern discourse on sustainable development, as put forward in for example the UN agenda,[19] has been successful in establishing a hegemonic position among these Malmö actors. The strength of the discourse can be exemplified by the answer that one of the participants gave to my question: 'What does the concept of urban sustainable development mean to you?'. This person then replied that I should be aware of that her view would inevitably be coloured by, what she called, the 'acclimatization to the Malmö model on what sustainable development means'. This, important to make clear, did not mean that this person felt indoctrinated, rather, she said that it was like a general perception of an acknowledged and common vision.

[19] The Brundtland commission and the following UN conferences in Rio and Johannesburg was part of the successful establishment of a three-dimensional (ecological-social-economic) concept and policy view of a continued but 'sustainable' development. I will here refer to this as the 'modern' or 'mainstream' discourse of sustainable development.

Table 2.
Number of participants answering yes, no or don't know to the following questions

No	Do you agree on the following question (Yes / No / Don't know)	Yes	No	-
A	Do you think that Malmö has become a more sustainable city in the last 20-30 years?	14		2
B	Do you think that Malmö is moving in the direction of urban sustainable development right now?	16		
C	Do you think that the infrastructure and metabolism of Malmö is connected to global sustainability issues?	13		3
D	Should the City of Malmö actively try to influence its citizens to adopt sustainable consumption patterns?	16		
E	Should the City of Malmö actively try to influence its citizens to adopt sustainable lifestyles?	15		1
F	Should the City of Malmö actively try to decrease the throughput of material and energy in the city?	13		3
G	Should the City of Malmö try to radically increase the levels of Fair trade consumption in the city?	14	1	1

Table 3.
Weights between 0-10 given to the following questions or statements

No	Assess a weight between 0-10 to the following questions	Average	Median	Max	Min
A	How close to urban sustainable development would you consider Malmö to be right now?	6,1	6	8	2
B	How worried are you about the local environmental problems such as urban air pollution, traffic volumes, and land use issues?	6,1	6	10	2
C	How worried are you about the global situation concerning sustainable development, for example climate change, poverty, resource conflicts?	8,6	9	10	3
D	How important is the concept of urban sustainable development for the strategic discussion of Malmö's future?	9,5	10	10	8
Distribute the weight 0-10 between the following two statements					
E	Malmö should prioritize to work with local and place-based sustainability issues, such as urban air quality, the traffic situation, the waste system and the social dimension of sustainable development in the city	5,8	6	7	3
F	Malmö should prioritize to work with global and indirectly connected sustainability issues, such as climate change, fair trade, global justice and ecological footprints	4,3	4	7	3

Thus, even if there certainly are divergent opinions on the implications of urban sustainable development, which will be later discussed, there seems to a basic common understanding and commitment among these actors. This on the one hand is encouraging for the many of us concerned with sustainability issues in Malmö. On the other hand, there is of course a danger if a certain view becomes so strong that critical voices, and other ways of perceiving reality, is dismissed or simply seen as non-legitimate. A hegemonic discourse will, as was the message of Foucault's famous writings, inevitably tend to exclude other views, although not explicitly or openly violently, and will always be part of the existing power relations of a society (see e.g. Foucault 1982). A dominant discourse will also risk being blind of its internal conflicts and contradictions and its possible failures in relation to what it says to promise. In this case we see that while the dominant discourse seems confident that we are on the right track, the implications of the systems-based approach challenges the view that modern urban regions are coming to grip with the sustainability challenge.

Worries

I was interested in knowing how worrying different actors find the sustainability situation at a local but also at a global level, as this may (or may not) be reflected in the motivation to pursue different policies. When asked how worrying local environmental problems such as air pollution, traffic volumes, and land use issues are, the average weight in the study is 6,1 out of 10 (3B). When asked instead how worrying global sustainability issues such as climate change, poverty, and resource conflicts are, the average weight is 8,6 with 9 as median (3C). This shows that in general the participants are much more worried about the global situation than about the status of the local environment. However, there is a large distribution of given weights with a maximum/minimum of 10/2 for the local (3B) and 10/3 for the global (3C). It can also be noted from my material, that more than 50% of the participants gave a weight higher than 5 when assessing their worry for the local problems. The local sustainability challenges most often mentioned are:

- *The energy system*

The energy consumption of Malmö is still directly or indirectly quite dependent on fossil fuels and, as one person argued, on large units for energy production which may be sensitive to world market fluctuations and to global geo-politics. Several of the participants mentioned the huge local potential of building a clean and environmentally friendly energy system, based on local and renewable energy sources such as wind, sun, biogas, and geothermal energy.

- *The traffic situation*

The majority of the participants saw a big problem in the current traffic situation which was found to be crowded, polluting, noisy, occupying large surfaces of the city, dangerous to health and safety, and dependent on fossil fuels. To transform the structure into an environmentally sound, efficient, quiet and safe traffic system was mentioned as one of the top-five challenges for Malmö in the years to come.

- *The gap between pilot projects and mainstream solutions*
Malmö is known for its ambitious urban sustainability projects such as the Western Harbour (Bo01) and Augustenborg.[20] The participants meant that such front line projects have been inspiring in visualising that much is possible and that they have enhanced a common understanding among local actors. They have also been valuable in the branding process of putting 'Malmö on the map'. But at the same time, as was highlighted in the interviews, what is lacking is the progression from these single-case good examples to a comprehensive 'whole-city-approach'. This is connected to another and broader issue which brings us to the last but the most frequently mentioned sustainability dilemma.

- *The social dimension*
Malmö, being no unusual case, has a history of uneven distribution of income and welfare between different city districts. Especially during the economic crisis in the 1980-1990's a process of segregation started to take hold of the city development. Today Malmö, as a geo-physical as well as a socio-economic entity, is a very segregated city or, as one participant put it, a 'divided city'. There is a clear socio-economic stratification between the south/east districts and the central and western districts. A relatively high level of unemployment, lacking education, poverty and poor living conditions is the everyday reality in parts of the city. This segregation is also physical in its nature. The huge high-rise areas from the so called Million Homes Programme in the 1960-70's, of which many are in strong need of refurbishing, are located mainly in the south and east parts of Malmö.

Connections

As we have seen in this paper, the infrastructure and metabolism of Malmö is intimately linked to global sustainability issues through production, trade and consumption. Most of the participants agree on this global connectedness, although I also found a slight uncertainty on this subject (2C). Perhaps it is more a matter of how one poses the question as we are often not inclined to apply a system-based view on the infrastructure of our daily lives. When I asked if the City should *actively* try to influence its citizens to adopt sustainable consumption patterns and lifestyles the answer was very positive (2D, E). In retrospect I see that these questions were perhaps too easy to feel obliged to answer with yes, and too incorrect to answer with no, but this also and once again hints at the strong commitment to the mainstream sustainable development discourse. Further, this strong consensus probably also reflects a Swedish tradition of policy making that is directed – and accepted – to interfere with the private sphere of individuals.

Not surprising, there is however divergent opinions on *how* these policies are to look. Several persons stressed that they favour such policies that pull rather than push people toward sustainable choices and habits. The city must offer attractive choices and sustainable urban structures so that individual citizens are facilitated to adapt more sustainable lifestyles but not hindered to. When it comes to practical examples it starts to become more difficult due to the ideological point of departure and to different political programs. One relevant example is the traffic situation. The structure of the city is one very much built for road traffic and the 'car society'. Everyone agrees that urban structures must facilitate a sustainable transport system. But what about habits and lifestyles? For example, should people be encouraged or forced to drive less in the city? Some persons proposed road taxes and physical restrictions on car

[20] More information at:
http://www.malmo.se/servicemeny/malmostadinenglish/sustainablecitydevelopment.4.33aee30d103b8f15916800024628.html; http://www.ekostaden.com/information/ekostaden_tmpl_01.aspx?pageID=104&parentID=146&sectionID=4&introID=146

traffic. Others had a strong reservation against such policies: ‘We do not want a prohibiting city’, one person said, and regarded such restrictions as a risk of ‘killing the city centre’. As Malmö is steadily growing, some did not at all think that the car traffic could be diminished but rather that the level will stay constant or even increase. The task for the municipality, then, should rather be to increase the *share* of public transport out of the total transports. Others had a quite contrasting view that the traffic situation *must* be radically changed with less cars and more cycling, pedestrian, and public transports. Despite these diverging opinions there is now an agreement about the development of a modern tramway system in Malmö, which may be in function some time during the next decade.

Another example of how opinions diverged is on the question if the City should actively try to increase the share of Fair trade labelled consumption (2G). The City of Malmö has actually already taken a step becoming the first *Fair trade City* in Sweden, which of course is an obligation in itself. Most participants were generally positive to Fair trade: it fits in with the social issues of sustainable development with which Malmö itself struggles, one person said. To expand our borders of solidarity is not only an act of altruism but is also a matter of self-interest, this person continued. Another more pragmatic argument was that Fair trade is important in the branding of the city. But, as one critical voice put it, is Fair trade labelled consumption and procurement a cost efficient way to support the poorest people in the world? This person rather saw a risk in labels such as Fair trade, being more expensive and inefficient in comparison to efforts more directly aimed at improving the environment and the living standard in developing countries.

The question that caused most trouble in my survey was 2F: Should the City of Malmö actively try to decrease the throughput of material and energy in the city? Even if 13 out of 16 approved that so should be done, there was a general hesitation and 3 persons chose not to answer. Of course it is difficult to give a quick yes or no to such big question. But I do think that this highlights one potentially difficult paradox in the quest for urban sustainable development: growth versus sustainability. Malmö is a growing city both physically and economically. As has been shown, *absolute decoupling* of material and energy consumption from economic growth is still not the general case in the EU-economies (European Environment Agency 2005). There are positive examples, often related to end-of-pipe solutions bringing environmental pressure from resource and energy use down. But in many cases of decoupling this is rather a sign of an increased import of natural resources and of goods putting their environmental burden from production elsewhere. The total input of material and energy generally remains at a high level. In a context of a growing GDP what we then have is a case of *relative decoupling*, meaning a decline in relative terms but which may still imply a constant or even increasing material and energy consumption in *real* terms. Relative decoupling seems to appear in Malmö in some important cases such as in the total energy consumption (City of Malmö 2008: 40). But as for transport and waste, two other important examples, the volumes continue to follow the growth trends of the EU-economy, also in Malmö.

One obvious reason for the hesitation on this question is that if the population of Malmö grows, the added per capita consumption contributes to the total volumes. But at another level of interpretation, this once again reveals the feature of a hegemonic discourse on sustainable development. What is immanent in the reasoning of most participants is an awareness of the possible conflicts between growth and sustainability, and at the same time a confidence in some basic assumptions about the nature of development and welfare. In short, this can be articulated as a belief that a growing economy and high levels of employment (wage earning)

are necessary requirements for an urban sustainable development. And a high level of economic activity demands material and energy. A business-as-usual scenario – even in a greened version – requires material inputs at the same or perhaps even at increasing levels, although efficiency gains may to some extent outweigh this trend. The task for the City, according to this view, is therefore to monitor growth so that it does not conflict with but rather supports the goals of social and ecologically sustainable development. This reasoning is very close to what has been called *ecological modernization*, an optimistic and reform-oriented view on present society-environment interactions including the potential of the market economy and technological and scientific progress.

Priorities

One interesting discussion emerged from a task that was given to the participants, namely to distribute the total weight of 10 between two policy priorities. Should the City of Malmö prioritize:
- Local and place-based sustainability problems, such as air quality, the traffic situation, the waste system, and the social dimension of sustainable development in the city, or
- Global and indirectly connected sustainability issues, such as climate change, fair trade, and ecological footprints.

Even if these two policy areas should be seen as parallel, as soon will be discussed, I was interested in seeing how the representatives of the City regarded the scope of municipal policy making (3E-F). As we can see the weights given points to the prioritisation of local and place-based issues (average 5,8 – median 6) before global and indirectly connected ones (average 4,3 – median 4). A common view among the participants was that the local issues must always come first, as this is the principal task for every municipality. Here is where we have the responsibility *and* the ability to take action, it was meant. But at the same time there was an awareness of that the global linkages may become increasingly important. 'If global sustainability is an issue for the citizens of Malmö– then it is also our issue', one City official argued. This is a matter of trustworthiness and democratic principles, he continued.

But, as one politician argued, the local policy will in many cases link to the global level. What the municipality achieves at a local scale may seem minor, but it is precisely those small steps that contribute to a transformation on a larger scale, another participant continued. When discussing this subject, it became clear that the two perspectives are often hard to separate in practice. If for example Malmö develop a successful transport policy, this will not only have local but also systemic effects: physical and ecological (improved local environment as well as reduced green house gas emissions), and economic-political (increasing demand on alternative transport solutions and reduced demand on fossil fuels). It will also have social and pedagogical effects in acting as a good example not only for the citizens of Malmö but on an international scale. The place-based and the system-based approaches are therefore not to be seen as mutually excluding, but rather as both necessary and in many cases reinforcing and complementary policies. The new thing, then, is that the *relevance* of a system-based perspective needs to be made more explicit in local policy choices.

VI. Concluding discussion

The place-based sustainability approach can be called the traditional approach and is so far the most used in for example environmental policy making. It suits the normal state of affairs with bodies of authorities at different geographical levels such as municipalities and national governments. One can argue that the place-based approach is advantageous since normally actors in a given geographical area have some sort of control over the activities at their own location (even if this certainly is not always the case), for example emissions from production units or the energy infrastructure. The approach may be helpful with its clear focus providing a tool for local target setting and sustainability assessments.

However, as we have seen it is hard to argue against the relevance of a system-based approach in assessing modern urban regions such as Malmö. Urban economies are typically dependent on the interaction with surrounding socio-ecological systems including distant areas on the globe – and with consequences not only for contemporary but also for future generations. This makes me inclined to say that the system-based sustainability approach necessarily has to complement the place-based approach in modern city governance. There are of course also shortcomings with the system-based approach. As it aims at being comprehensive it is also complex and demands a high quantity and quality data input on a multi-level scale (local, national and international statistics). The consumption-based approach is younger and demands continued local development and training as the methodologies improve. Further, one can argue that one must be aware of that the results from the system-based approach do not automatically correspond to the level of responsibility or mitigation. Even if an urban resident may be assessed by his/her ecological footprint, this is not the same as saying that this person is the one to whom we should locate responsibility or in whom we should find the source of action for change. As individuals, and also as communities, we are inevitably connected to higher-level systems which we can not fully control. Especially at the individual level we may find ourselves structurally locked up in certain aspects. At a community level the possibilities are greater as municipalities, at least in a Swedish context, have quite a strong influence on their development.

A main challenge in city governance is to negotiate on, and to the degree possible decide upon, *what* scope local sustainability policies should have. To what extent are the indirect socio-ecological impacts of trade and consumption a relevant matter? To what degree should for example the City of Malmö try to deal with the global footprints of its citizens' life styles? Traditional municipal environmental policy has often focussed on local and regional problems. To take another standpoint and to develop new strategies is to challenge a tradition. As Malmö is a city seeking a new 'post-industrial' identity, I suggest it could be a possible pilot in developing *integrated sustainability policies*, by which I mean to actively take into consideration both the place-based and the system-based implications from urban development. As so often is the case in life, the key perhaps lies less in the ability to choose but in the ability to manage to do both.

Many sustainability experts argue that the total levels of material and energy throughput must be radically decreased in high-income countries. Relative decoupling will not be enough, taking into consideration a growing global economy with special attention paid to the economies in the South. An absolute decline of total resource use is needed. With the long term and global perspective in mind, my reflection is that the dominant eco-modernist and growth-oriented paradigm must be at the core of a deeper discussion on urban sustainability in already affluent economies. What connections are there – looking closely – between local

growth-oriented policies and global sustainability trends? At the same time as there are great possibilities for local action, including to challenge traditional solutions, there are also restrictions. How are different policy goals interplaying with each other? What is the mandate for action? How do local power relations look like? Which restrictions and opportunities can be identified given present societal structures? And, also, which message do local opinions give?

It is easy to fall into the trap of only seeing problems. But, as one person reasoned, perhaps there is a tendency to view different 'restrictions' as more rigid and definitive than they actually are. May these obstacles often be of a mental and social character rather than of an economic or physical one? I find this line of thinking encouraging, as I myself consider the transformation towards urban sustainable development a process where creative re-thinking on the definitions of the problems as well as the solutions are needed.

At last, even if the global and system-oriented view has here been argued for, the very concrete place in which we live is of an outstanding importance. The physical and down-to-earth quality of our living environment is never negligible. If we cannot envision urban sustainable development at a very local and concrete scale I believe we will fail also on a grander scale. To work with local and place-based issues has double effects: it challenges and reconstructs the structural and physical reality as well as, although slowly, the mental and social reality of our lives. I believe this will also influence our ability – and willingness – to act upon global sustainability challenges.

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