URBAN GREENING STRATEGIES FOR COMPACT AREAS
– CASE STUDY OF MALMÖ, SWEDEN

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Abstract

Planning of compact and green urban areas has become an emerging issue. Thus, there is a need to examine strategies for implementing green infrastructures in compact urban areas. The aim of this paper is to examine how green infrastructure is developed in a compact urban structure in a case study of the city of Malmö. Six examples of urban greening were selected. The selection was made to obtain a variety of types of green spaces that were not public parks and that were developed (or were intended to be developed) in compact urban structures. The findings suggest that there are reasons for analysing and discussing urban greening strategies in new categories, like *building attached*, *grey* and *brown* green infrastructure. The supply and distribution of *cultural ecosystem services* that these strategies offer were assessed by how they offer access for viewing, staying or interacting with the places. In this assessment the green infrastructure was divided in *public*, *private* and *private-personal* structures. The limitations and possibilities of different strategies need to be further explored with respect to the kinds of services supplied as well as how benefits are distributed. Cultural ecosystem services, such as recreation and social cohesion, cannot be taken for granted based on quantitative measures of green space alone. The spaces must be assessed in terms of types of access offered and who has access.

Introduction

The planning of compact urban areas has become an emerging issue in many growing urban environments. Compact urban structures are supposed to make the transportation and public services more efficient as well as improving quality of life (Daniels, 2001). However, there is also a question of how efforts for compact urban structures may affect the green infrastructure.

Green infrastructure is the network of natural and semi-natural areas, features and green spaces (Naumann, et al., 2011). The urban green infrastructure is a comprehensive concept that covers several kinds of vegetated areas, such as public parks, private gardens and green roofs (Walmsley, 1995; Benedict and McMahon, 2002). It is a source of ecosystem services – non-material social and cultural benefits from ecosystems for human wellbeing (MA, 2003). Since urban areas cover just a very small proportion of the earth, it can be argued that cultural ecosystem services are important contributions to human welfare from the urban green infrastructure.

A process that is often expressed as either self-evident or desired is that of urban green space promoting social cohesion (MA, 2003). Although this is a common idea, there seems to be limited evidence of this factor in recent research literature (Konijnendijk, et al., 2013). A reason for this could be that processes of this kind have to take place somewhere and hence place characteristics are important for the outcome. Urban green spaces appear in very different shapes, and therefore different types might be of different importance in the process of promoting social cohesion. For instance, front gardens are often understood as a means to enhance the possibilities for encounters between residents and the public (Gehl, 2006).

The benefits provided by the cultural ecosystem, such as recreation or social cohesion, are social constructs and not inherent in ecosystem features (Daniel, et al., 2012). Thus, there must be comprehensive recognition of the supply of recreational values from the point of view of those benefiting from it. Such recognition may be expressed by the users themselves or by experts. Expert assessments are useful when time or resources do not allow for user assessment or while forecasting recreational values in a planning process.

There are different expert models for assessing recreational values, for instance based on the existence of vegetation (Moore and Hunt, 2012), the amount of green space per inhabitant (Gómez-Baggethun and Barton, 2013; Larondelle and Haase, 2013), the absence of vandalism, litter or other disturbances (Radford and James, 2013) or possibilities for walking/jogging and watching wildlife (Moore and Hunt, 2012).

Although some of these models account for how people gain access to the spaces, none of them consider how these benefits are distributed. There is not only an issue of the supply of values but also of their fair distribution. The concept of environmental justice can also be applied to the provision of public parks (Byrne and Wolch, 2009) as well as the provision of the entire green infrastructure.

There is an inevitable conflict between a high building density and the amount of space allocated for vegetation on the ground (Tian, Jim and Tao, 2012), which may be why many illustrations of development projects show buildings that are covered by green roofs or green walls. This is a new kind of green infrastructure. There is a need to exam different strategies for implementing green infrastructures in compact urban areas (Tian, Jim and Tao, 2012). There is also a need to identify these strategies in terms of where the vegetation is located.

Aim, research questions and limitations

The aim of this paper is to examine how green infrastructure is developed in a case study of a compact urban structure. In order to narrow this broad task, this paper focuses on two kinds of cultural ecosystem services that the green spaces are supposed to supply: recreation and social cohesion. The research is guided by three questions: Where are the green spaces created? How might they supply values of recreation and social cohesion? How is this supply distributed?

The recreational values of green spaces are assessed based on how people gain access to them, and the values of social cohesion are assessed as the possibilities of people having a shared experience by gaining access to the green spaces. Social cohesion is discussed in terms of bonding within groups or bridging between groups (Putnam, 2000). Public parks are not assessed, but are used as a baseline for comparison with other kinds of green spaces. In this comparison, public parks are considered as spaces that are legally set aside as permanent green spaces on the ground for public use.

The research questions in this study are answered from a Swedish spatial planning perspective. In many growing Swedish cities a strategy of planning for compact structures has followed decades of planning of more scattered urban structures. Since Sweden is a sparsely populated country from a European perspective, access to land for development has not been a limiting factor before. The new planning strategy has come almost simultaneously with renewed recognition of the importance of urban nature in the spatial planning discourse. The aim for compact urban structures is no doubt mainly considered in the municipalities where there is population growth. A number of Swedish municipalities are shrinking (SCB, 2012) and in those cases there are probably other

issues on the agenda. Defining structures as compact from a Swedish perspective probably differs from what would be considered compact in many other contexts (Dempsey, 2010).

Materials and methods

The municipality of Malmö was chosen for a case study since it is one of the Swedish cities with an explicit planning strategy designed to achieve a compact green urban structure (Malmö kommun, 2013). Since the 2001 building exhibition B001, the city has been at the forefront of sustainable urban planning in Sweden and has also been recognised internationally as an important example (BSHF, 2009). It is the first Swedish city to use the green space factor[1] as a planning tool (Persson, 2005). The city also has prize-winning housing projects with innovative solutions for green spaces. An equally important reason for choosing Malmö is the BiodiverCity project which aimed to implement innovative solutions for green spaces (see below).

Six examples in the city were selected. The selection was made to obtain a variety of types of green spaces that were not public parks and that were developed (or were intended to be developed) in compact urban structures. Another ambition was to select examples that were the results of both top-down and bottom-up processes. The selection was made by the author through participatory observations during several joint research and development projects involving both Malmö city and the Swedish University of Agricultural Sciences. Data was derived from participatory observations, literature and official documents.

The case: Urban greening efforts in Malmö

The examples were all described and discussed in the same way: First, how the greening was created (or would be created in examples 5 and 6) and the background or reason behind it was explored. Second, the kind of recreational values they supply and how these are distributed to users is outlined. Third, it was considered how greening might contribute to social cohesion in terms of strengthening bonds within groups and creating bridges between groups.

Example 1: Green roofs at the B001 exhibition area

The B001 building exhibition was arranged in the Western Harbour by Malmö City in 2001. It comprised the planning and construction of a new city district on a former brownfield site. The goals included the demonstration of innovative planning, planning processes and buildings. In the planning process for the exhibition, one tool used was the city's green space factor method. The method was inspired by a similar, but not identical planning tool from Berlin, Germany (Persson, 2005). In short, the planning tool was based on achieving at least a prescribed minimum

1   The green space factor is referred to as the green area ratio (GAR) by other authors. See Keeley (2011).

amount (factor) of green space. This could be achieved by having vegetation or open water on the ground, but also by introducing green walls or green roofs. In development projects where developers wanted to build on as much land as possible, the lack of vegetation on the ground could be compensated for by vegetation on the roofs and walls. The ambition to utilise the land for buildings and the prescribed green space factor was the driving force behind the numerous green roofs in the exhibition area. The green roofs covered many of the residential buildings as well as sheds and other constructions in the exhibition area.

With a few exceptions, the green roofs were sedum blankets. These were not constructed to be walked on by humans. Access was limited to visual access. Although some of the sheds had roofs that could be seen from the ground, most could only be observed from taller buildings. Their visual impact was therefore of particular importance for some of the nearby residents and of less interest to the public. There were very few opportunities for a shared experience of gaining visual access to the green roofs.

Example 2: Front gardens

The new city district of Western Harbour was firstly developed at the exhibition area. After the exhibition, most of the land was still covered with brownfields or ongoing industrial activities. When the exhibition ended, a second phase of development started. The green space factor

Figure 1
Green roof with sedum blanket
PHOTOGRAPH BY THE AUTHOR

was used as a planning tool, but the layout was also guided by detailed plans developed by the city planning office. These prescribed the placement of the residential buildings and to some extent the amount of open space. The front gardens were an example of how the layout was prescribed by municipal planners. The front gardens were strips of vegetated land between a building and the pavement. They were situated on private land, but were also part of the streetscape just as the facades were.

Beside the choice of vegetation, developers could choose how to design the front gardens. Some developers chose to design them as semi-public spaces, planted with uniform ornamental shrubs. These were only meant for visual access, not to encourage people to linger. Other developers chose to design the spaces as private gardens. The private front gardens meant visual access for the public. For the residents, they were an opportunity to stay in the garden and arrange it in accordance with their interests or needs and to put their personal touch to it.

It is not unlikely that front gardens in Western Harbour actually did facilitate encounters between residents and passers-by (see Gehl, 2006). Residents might (or might not) be open to conversing with people passing by. It was likely that the front gardens contributed to the shared welfare of those using each garden, but also that the gardens made it easier to

Figure 2
Semi-private front gardens at Western Harbour, Malmö
PHOTOGRAPH BY THE AUTHOR

become acquainted with neighbours nearby. The private front gardens could be assessed as contributing to social cohesion by promoting bonding within the family and with neighbouring residents. They could also be assessed as potentially bridging the divide between residents and the public.

Example 3: The Glass Bubble at Neptuna

Neptuna was another housing project in the second phase of the development of the Western Harbour city district. The developer was the non-profit association Södertorpsgården, which owned two housing units for elderly people. The landscape architect and artist Monica Gora was commissioned to design the yard in a site which she described as «*stormy, extremely barren and exposed*» (Gora Art and Landscape, 2013). She described her design as follows:

The Glass Bubble is a sculpture, organism and a paradise, compounded. At an exposed and extreme place it becomes a transparent bubble of warmth and a membrane against the raw climate outside. In the darkness of winter the bubble is a big illuminated volume. … The only thing that separates the inside from the outside is a partition wall made of thin glass. The function of the glass is like a membrane. The inside becomes a bubble filled with warmth and life. Full of light and space, protected and quiet. (Gora Art and Landscape, 2013)

Figure 3
The Glass Bubble by Monica Gora in Western Harbour, Malmö.
PHOTOGRAPH BY THE AUTHOR

The bubble is a garden in which only residents can stay. In comparison with the private front gardens, it was not a place that extended the personal sphere of the home. It was a space shared between the residents. Although the public did not have access the bubble, they could still see it from the public spaces. As the bubble borders public spaces, it was possible to see the plants and people inside.

The bubble probably did contribute to bonds between residents in the same way as the front gardens, but in contrast to the front gardens, the glass walls prevented any bridging between residents and public.

Example 4: The green balconies at Urban Villas

The Urban Villas housing project was also part of the post-exhibition development of the Western Harbour district. The project was developed by a building community – an association composed by future residents. In this case, some of the future residents were also involved in its planning and design as architects and landscape architects.

From outside the unit, the most striking feature was probably the green balconies. These were constructed as wide pots with soil covered by slabs which can be replaced with plants. Each balcony was connected to an apartment.

Figure 4
Urban Villas in Western Harbour, Malmö
PHOTOGRAPH BY THE AUTHOR
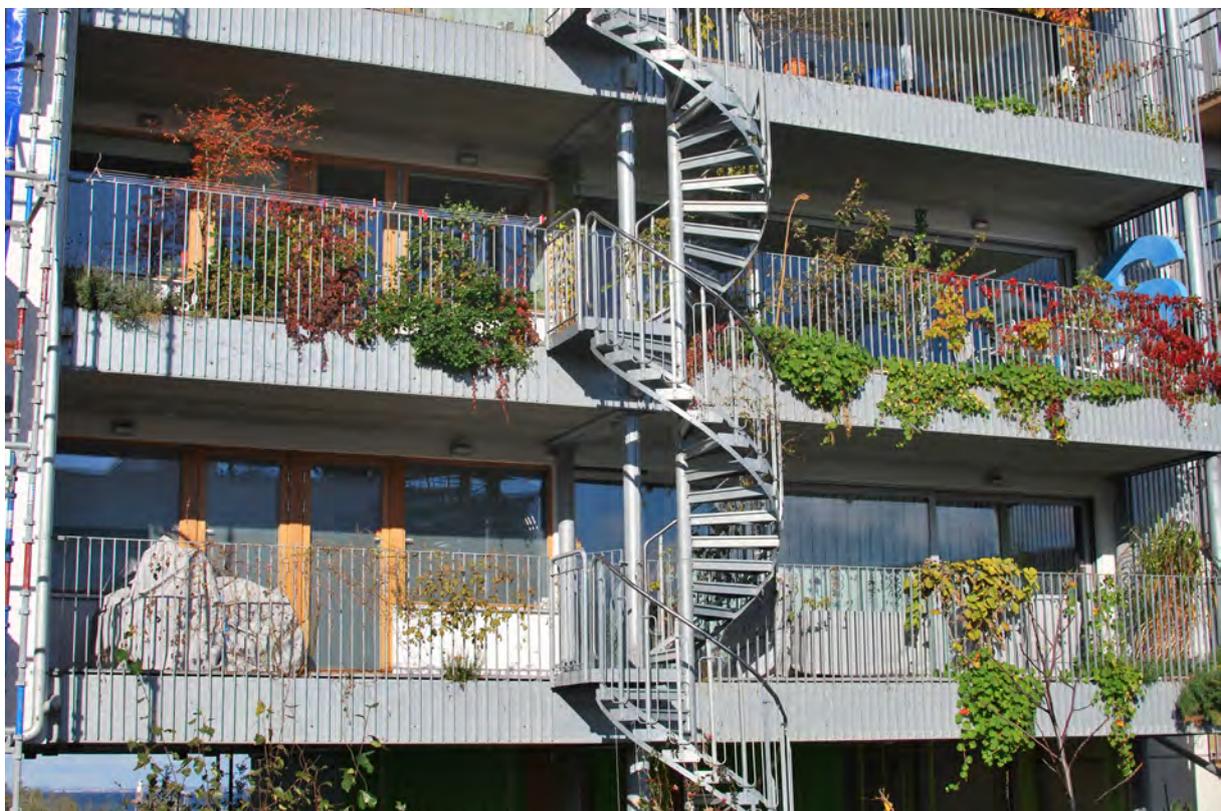
Although the space was limited, the balconies at Urban Villas were designed to allow for residents to do some gardening. They were used largely in the same way as the front gardens. The balconies did not face a street, but they contributed to providing a green view from the interior of the block.

The balconies were likely to contribute to bonding within the families that own each balcony. Residents could choose either to use an inside lift or an outside staircase to reach their apartments or the shared roof gardens. As the outside staircase passed the balconies, they were likely to contribute to bonding between residents in the housing unit. However, as the balconies did not border the common ground interior of the block, there were very few possibilities for social exchange between people on the balconies and people outside the unit.

Example 5: The BiodiverCity project, Vegetation on wire

As part of the ongoing efforts to explore new ways of planning and building a green, compact urban environment, the city of Malmö was running the BiodiverCity project. The project, initiated by the Municipal Environment Department, was being undertaken jointly with other municipal departments, developers, contractors and researchers during the period from 2012 to 2014. The aim was to develop, and in the long run to commercialise, innovative constructions which could be used to build with vegetation and promote biodiversity in dense urban structures. Different concepts were explored and developed in six work packages. Four of the six work packages dealt with concepts that were already in use in the city. Two dealt with concepts that were inspired by cases in other places. One of these work packages was *Vegetation on wire*[2] *(work package 2)*, which was inspired by the MFO-park in Zürich in which a steel construction supported plant climbers on different levels. Another source of inspiration was the city of Freiburg (see photo below), where wires supported climbers that covered streets and other hard surfaces (transport infrastructure) in the inner city. The idea of the work package was to explore the possibility of introducing vegetation in places where it was difficult to incorporate ground-covering vegetation, shrubs or trees.

As none of the projects had been built, it was hard to assess their recreational value. However, streets imbedded in vegetation would definitely have a clear visual impact. They might even be perceived as green environments in which to stay. They could also be managed by involving residents or so called Friends groups, although this possibility applied to the other examples as well. Management aspects and other features of the place where vegetation on wire would be used were assessed to be crucial for its outcome in terms of social cohesion, be it bonding or bridging. However, this type of urban green – vegetation on wire – was without doubt consistent with these outcomes.

2   The Swedish name of the work package is «Tredimensionell grönska».

Example 6: The BiodiverCity project, Temporary vegetation

Another work package in the BiodiverCity project was *Temporary vege-tation*[3] (work package 3). It had several sources of inspiration, such as boxes for urban gardening that had been set up in many cities. The prac-tice of putting out flowers in pots or containers had also inspired the package. The idea of the Mobile vegetation work package was to explore how mobile elements of «ready-made» vegetation could be used in green spaces that needed to be greened quickly and only for a limited time. The concept was fairly open and could be anything from a single pot with only one plant species to a whole environment with a broad range of species. It was targeting different kinds of situations, such as the need to rearrange a place completely with vegetation for a special event. In some places it could be hard to introduce vegetation in the infrastructure for traffic because there are an occasional need for machines to access the spaces, e.g. for snow clearance during winter. It might also include the need for a long-term, if not permanent, addition of vegetation to a place, such as a brownfield site awaiting development or a building site.

As with the example of *Vegetation on wire*, no temporary vegetation was build within the project. The assessment of the outcome was broadly the same. Management aspects and other features of the place would be decisive for the outcome in terms of recreation and social cohesion, be it bonding or bridging. However, this type of urban green – temporary vegetation – was without doubt consistent with those outcomes.

Figure 5
Green streets with vegetation on wires in Freiburg, Germany, inspired the Vegetation on wirework package in the BiodiverCity project.
PHOTOGRAPH BY THE AUTHOR

3   The Swedish name of the work pack-age is «Mobila växtsystem».

Figure 6
Mobile vegetation as a solution for building sites.
DRAWING BY CHRISTEL LINDGREN

Analysis and discussion

As a whole, the six examples suggest that there are reasons for analysing and discussing urban green structures in new categories. The six examples are summarised in table 1.

The use of green infrastructure as a comprehensive concept refer to a broad array of vegetated areas (Walmsley, 1995; Benedict and McMahon, 2002), and it is important to highlight that not only parks but other kinds of areas as well play an important role. However, the concept is currently too blunt to describe a strategy to ensure the supply of cultural ecosystem services for human wellbeing.

A comparison of the six examples shows that it is only the front gardens that are situated in a way that green space is generally perceived: permanent on the ground. The green roofs and green balconies are situated on buildings. The Glass Bubble is vegetation within a building. Vegetation on wire and the mobile vegetation cover infrastructure and brownfields respectively. The six examples can be regarded as different strategies for promoting green infrastructure in spatial planning for compact urban structures. As strategies they can be categorized as urban greening by:

1. Permanent green infrastructure *on the ground*
2. *Building attached* green infrastructure (green roofs, green balconies, glass houses)
3. *Grey* green infrastructure (vegetation on spaces mainly for traffic infrastructure)
4. *Brown* green infrastructure (temporary vegetation on brownfields and building sites).

It is obvious that four complementary strategies offer more possibilities than just one strategy in the planning, construction and management of the urban green infrastructure. However, four different strategies will have to involve more actors than only one strategy and will require new approaches. Permanent green infrastructure on the ground is an established strategy. But it is challenged by demand for space for buildings. The strategy of building-attached green infrastructure will probably have to be dependent on financing, construction or maintenance by developers, house owners and, in some cases, residents. The strategy of grey green infrastructure will be dependent on cooperation between the municipal departments responsible for the green infrastructure and for the traffic infrastructure.

Table 1
An overview of the findings in the six examples

What	Where	Recreational aspects	Aspects of social cohesion
Green sedum roofs	On roof tops	Visual mainly for residents	Will probably have no effect on social cohesion
Front gardens	On private ground and in the personal sphere of the home	Visual for residents and the public; creating a place in which residents can stay and interact with the place	May facilitate bonding between residents and bridging between residents and public
The Glass Bubble	In a private glass house	Visual for residents and the public; creating a place in which residents can stay	May facilitate bonding between residents
The green balconies	On a building and in the personal sphere of the home	Visual for residents and the public, in which residents can stay and interact with the place.	May facilitate bonding between residents
Vegetation on wire	Above streets	Visual for the public; could be designed and managed so that people can stay and interact	May facilitate bonding between residents and bridging between residents and public, but this will be depending on design and management
Temporary vegetation	On pavements, traffic islands or brownfields	Visual for the public; could in some cases be designed and managed so that people can stay and interact	May facilitate bonding between residents and bridging between residents and public, but this will be depending on design and management

The brown green infrastructure will be dependent on landowners and developers. Opening up projects to a wider array of actors and actors with diverse interests may open them up to conflicts, but also to new sources for financing of the green infrastructure and its maintenance. The authorities would have to focus on facilitating cooperation. The limitation and possibilities of each strategy needs to be explored.

Within the perspective of who has access, the examples can be described as different types of green infrastructures. The *public* structure is open to everyone, the *private* is restricted to a certain group and the *private-personal* is just open to a single person or family. The point of distinguishing between public and private is that the private green structure might enhance biodiversity, have a positive effect on the microclimate and support storm water management for the public, but when it comes to cultural ecosystem services it will only benefit those who have access to it. Mapping the extension of both the public and the private green infrastructure is therefore an important step to secure a fair distribution of such ecosystems services. The same line of argument applies to the distinction between private and private-personal green structures, as the latter can be regarded as an expansion of the home and in many ways are more accessible. Private-personal green structures offer even greater access, since they give the users the opportunity to arrange them and change them according to their interests and needs. This emphasises the statement that environmental justice also can be applied to the provision of public parks (Byrne and Wolch, 2009). How the green infrastructure is distributed today as well as tomorrow is an important research question.

The six examples are accessible in different ways and in some cases also to a different extent for different kinds of users. The sedum blankets on the roofs are only accessible as a view. The view is to a large extent limited to people above the roofs. Most of the roofs are not accessible to the public even as a view. It is a green structure that is mainly accessible for private use.

The front gardens, the Glass Bubble and the green balconies at Urban Villas are both private and accessible to the public. They are part of the view that characterises the streetscape or the block. They might even contribute to an environment that is perceived as mostly vegetated. The Glass Bubble is designed for residents as a common private area. The front gardens and balconies are private, but also personal. They are extensions of the home. They are places not only to linger in but also to shape to fit one's personal interests. Vegetation on wire and mobile vegetation are not restricted to a certain kind of user. They are accessible as a view and might also be accessible as a vegetated environment in which to stay.

A comparison of the type of access that occurs in the six examples suggests that there are three different types of access to green spaces: viewing, staying and interacting. Although these types do not give a comprehensive picture of the supply of cultural ecosystem services (MA, 2003), they still give an idea of the limitations in the supply of services. In order to have a better understanding, this has to be combined with generic knowledge of how qualitative aspects of ecosystems affect cultural ecosystem services (Daniel, et al., 2012). A park is not just a park, but generic as well as case-specific aspects will affect the supply of services. Therefore there is a need to search for generic as well as case-specific knowledge of how ecosystems in an urban development supply the residents with cultural ecosystem services.

The analysis of social cohesion focuses on whether there are any possibilities at all for a shared experience of access to the type of green space in question. It also focuses on whether there are possibilities for residents and the public to share the experience of obtaining some kind of benefit from the green space. Although this is a very simplified analysis, it still makes it clear that there are differences. Some types of green spaces offer very few possibilities of a shared experience, i.e. green sedum roofs. Other types offer possibilities of a shared experience for a certain group of people, such as the way the green balconies might strengthen bonds between residents in the example of Urban Villas. Front gardens may, as Gehl (2006) emphasised, facilitate encounters between those in the gardens and passers-by. Green space does not facilitate social cohesion in every case. Not much attention has been given to the question of how urban parks impact social cohesion in scientific literature over the past decade (Konijnendijk, et al., 2013). The reason may be that a generic answer is hard to find and that the answer will depend on the types of green space investigated. There is still a need to explore further the obstacles in urban green spaces for processes that lead to cohesion.

Conclusions

In this case study, besides the traditional permanent green space on the ground, three other strategies for urban greening were identified: building-attached, grey and brown. These offer possibilities for strengthening the urban green infrastructure, even in environments where there is a scarcity of available space on the ground. Cultural ecosystem services, such as recreation and social cohesion, from these cannot be taken for granted based on quantitative measures of green space alone. The spaces must at least be assessed in terms of types of access offered and who has access.

The mapping of who has access to the different kinds of green spaces offers an overview of the distribution in terms of public, private and private-personal green structures. Such mapping might be useful as

a first step in an expert assessment of cultural ecosystem services, for instance in spatial planning. Combined with reliable generic and case-specific knowledge, a reasonable assessment can thereby be performed. This would be useful in cases where (future) users cannot participate in a participatory assessment. An important question for future research is how the green infrastructure is distributed. The categories of residents and public are of course very basic and many other categories should be used to assess (in) justice when it comes to the distribution, layout and design of the green infrastructure.

The three levels of access – viewing, staying and interacting – do not give a comprehensive picture of cultural ecosystem services, but they do give an idea of the possible limitations of the supply of services. It is a simpli-fied way of describing benefits of cultural ecosystem services. However, the point here is not to do an in-depth description of the values, but to highlight that there are differences between different types of green space within the broad category of urban green infrastructure. The pre-sented method could also be an easy way to assess differences. As such it is useful to assess how different groups have different access to the benefits of the urban green infrastructure. The perspective of fair sup-ply of green infrastructure is important to keep in mind in the context of densification as a planning strategy in urban planning. However, an emphasis on quantitative measures will not self-evidently secure quali-tative goals, such as the kinds of benefits that the green infrastructure can supply or how this is distributed to the intended beneficiaries.

Acknowledgement

Literature

Benedict, M.A. and McMahon, E.T., 2002. Green infrastructure: Smart conservation for the 21st century. *Renewable Resources Journal*, 20, pp. 12–17.

BSHF, 2009. *Ekostaden Augustenborg* [Online]. Building and Social Housing Foundation. Available at: http://www.worldhabitatawards.org/winners-and-finalists/project-details.cfm?lang=00&theProjectID=8A312D2B-15C5-F4C0-990FB-F6CBC573B8F [Accessed 20 March 2013].

Byrne, J. and Wolch, J., 2009. Nature, race, and parks: Past research and future directions for geographic research. *Progress in Human Geography*, 33, pp. 743–765.

Daniel, T.C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J.W., Chan, K.M.A., Costanza, R., Elmqvist, T., Flint, C.G., Gobster, P.H., Grêt-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R.G., Schauppenlehners, T., Sikor, T., Soloviy, I., Spierenburg, M., Taczanowskat, K., Tam, J. and von der Dunk, A., 2012. Contributions of cultural services to the ecosystem services agenda. *Proceedings of the National Academy of Sciences of the United States of America*, 109, pp. 8812–8819.

Daniels, T., 2001. Smart growth: A new American approach to regional planning. *Planning Practice and Research*, 16, pp. 271–279.

Dempsey, N., 2010. Revisiting the compact city? *Built Environment*, 36, pp. 5–8.

Gehl, J., 2006. *Life between buildings: using public space*. København: The Danish Architectural Press.

Gómez-Baggetun, E. and Barton, D.N., 2013. Classifying and valuing ecosystem services for urban planning. *Ecological Economics*, 86, pp. 235–245.

Gora Art and Landscape, 2013. *The Glass Bubble* [Online]. Available at: http://www.gora.se/index.php?option=com_content&view=article&id=81:the-glass-bubble&catid=60:2006&Itemid=53 [Accessed 6 March 2013].

Keeley, M., 2011. The Green Area Ratio: an urban site sustainability metric. *Journal of Environmental Planning and Management*, 54, pp. 937–958.

Konijnendik, C.C., Annerstedt, M., Busse Nielsen, A. and Maruthaveeran, S., 2013. *Benefits of urban parks. A systematic review*. Copenhagen and Alnarp: IFPRA.

Larondelle, N. and Haase, D., 2013. Urban ecosystem services assessment along a rural-urban gradient: A cross-analysis of European cities. *Ecological Indicators*, 29, pp. 179–190.

MA (Millennium Ecosystem Assessment), 2003. *Ecosystems and human well-being: A framework for assessment*. Washington: Island Press.

Malmö kommun, 2013. *Utbyggnadsstrategi (Development strategy)* [Online]. www.malmö.se [Accessed 15 March 2013].

Moore, T.L.C. and Hunt, W.F., 2012. Ecosystem service provision by stormwater wetlands and ponds – a means for evaluation? *Water Research*, 46, pp. 6811–6823.

Naumann, S., Davis, M., Kaphengst, T., Pieterse, M. and Rayment, M., 2011. *Design, implementation and cost elements of Green Infrastructure projects. Final report to the Europe-an Commission, DG Environment, Contract no. 070307/2010/577182/ETU/F.1*. Brussels: European Commission.

Persson, B., 2005. Grönytefaktorn – för första gången i Sverige (Green space factor – for the first time in Sweden).In: B. Persson, ed. *B001–Hållbarframtidsstad (B001 – Sustainable City of the Future)*. Stockholm: Formas.

Putnam, R.D., 2000. *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

Radford, K.G. and James, P., 2013. Changes in the value of ecosystem services along a rural-urban gradient: A case study of Greater Manchester, UK. *Landscape and Urban Planning*, 109, pp. 117–127.

SCB, 2012. MI 38 SM 1101, korrigerad version. Tätorter 2010 (MI 38 SM 1101, revised version. Localities 2010).

Tian, Y., Jim, C.Y. and Tao, Y., 2012. Challenges and strategies for greening the compact city of Hong Kong. *Journal of Urban Planning and Development*, 138, pp. 101–109.

Walmsley, A., 1995. Greenways and the making of urban form. *Landscape and Urban Planning*, 33, pp. 81–127.

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