

## Nature conservation patterns in Swedish urban landscapes.

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### *Background*

With increasing human influence on ecosystems world-wide, it is necessary to include human dominated systems, such as cities into biodiversity conservation. The global urbanisation processes means that the distance between cities and protected areas are shrinking (McDonald et al. 2008). Given that urbanisation creates landscapes with different characteristics and prerequisites compared to for example forests and agricultural landscapes (e.g. Grimm et al. 2008) it is a need of knowledge as well as strategies on how to handle this new kind of landscape patterns. Using a social-ecological system perspective cities are described as dominated by human activities resulting in land-use changes that compromise many ecological processes (e.g. Elmqvist et al. 2008). Moreover, a high degree of ecological and social heterogeneity generates a mosaic of different land uses in urban landscapes (e.g. Pickett et al. 2001). These, and other characteristics, force forward a reconsideration of conventional nature conservation planning and management. The presumption of this study is that integration of nature conservation frameworks into the urban setting, requires reconsideration of why, where and how to protect nature in a purposeful way.

### *Study site and methods*

This study was conducted in southern Sweden, a country with high degree of urbanisation (85 per cent) and approximately 11 per cent of the land protected. The majority of the protected areas are nature reserves. Besides celebrating 100 years of nature conservation in 2009, Sweden has a long tradition of highly formalised urban planning, which provides long records of different planning strategies and also their outcomes. Furthermore, there is currently a pronounced political will to increase the protection of urban nature to secure both biological as well as social values. In the Stockholm metropolitan region for example, there is a new urban nature conservation program for creating 71 new nature reserves until 2015. This exemplifies a trend where the two policy realms of nature conservation and urban planning physically meet in Swedish urban landscapes (fig 1). The key question in this study concerned the current and future role of these protected areas in our cities. By examining the current patterns of nature conservation in landscapes with different degree of urbanisation, this study serves as a starting point for a discussion on the challenges of urban nature conservation. The empirical basis was official data on nature conservation from 209 municipalities in southern Sweden. The patterns of the 1869 nature reserves, established in southern Sweden 1909-2006, were statistically evaluated by the number, size, age, land cover patterns and objectives of designation, in relation to the degree of urbanisation in the overall landscape. For a more detailed description of methodology see Borgström (2009) and Borgström et al. (forthcoming).

### *Results*

The analyses revealed that in Swedish cities the nature reserves are significantly fewer, but larger. This is intriguing from a landscape ecology perspective, for example in relation to ecological connectivity and how these few, large urban nature reserves are related to other urban green structures. There was no significant relationship between nature reserve age and degree of urbanisation, but this will probably change due to the current strong Swedish focus on protecting urban nature. Furthermore, the analyses showed that urban nature reserves have

a higher diversity of land covers. The land cover compositions showed no differences between urban and rural nature reserves, but urban nature reserves differ more from their surroundings compared to rural nature reserves. This indicates that many nature reserves in Swedish cities constitute remains of former landscapes and that these islands might become hard to sustain without considerable amounts of management. These results stress the importance of the landscape context of protected areas, an issue that is even more pronounced in urban settings, where the matrix is commonly hostile to many organisms. Urban nature reserves are also founded upon more, and more socially oriented objectives according to the analyses. Furthermore the use of objectives has changed in different ways over time in urban and rural nature reserves, which can be related to certain international and national policy interventions. There is also a surprising lack of urban nature reserves that aim at protecting restoration sites or newly created environments. One reason is probably be the long and strong focus of Swedish nature conservation on protection of existing and threatened values.

### *Conclusions and future outlook*

- There are specific urban nature conservation patterns that can be linked to the urban landscape characteristics of high competition for land and high social-ecological heterogeneity. The next step is to reveal the drivers and processes of these patterns.
- Given the pattern of few and large nature reserves that constitute islands very different to the surrounding landscapes, it is important to develop strategies to recognise the surroundings of the protected area within urban nature conservation policies.
- Since the amount of urban green areas are decreasing, there is a need to prepare for situations where more people are having multiple interests in the few nature reserves, which already is and will become an even tougher challenge in the future
- In urban landscapes, where it might be difficult to find areas fulfilling traditional nature conservation criteria there is a need to incorporate restoration sites and newly created environments especially in areas poor of green structures and hence provision of urban ecosystem services.

Figure 1: Two pictures from a new housing area in Stockholm, Sweden, a spot in the urban landscape where nature conservation and urban planning physically meet. Image courtesy: Kim Koblet



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