Networks of small habitat patches can preserve urban biodiversity

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Sets of small and seemingly insignificant habitat patches that are within reach for mobile species may under certain circumstances, as a group, provide an acceptable alternative to larger and contiguous habitats. This finding can make preservation of important ecological functions possible even in urban and other heavily exploited areas.

The study by Dr. Erik Andersson and Dr. Örjan Bodin at the Department of Systems Ecology, and Stockholm Resilience Centre, both at Stockholm University, is unique in the sense that they empirically test and verify an often used modelling approach where habitat fragments are seen as individual nodes in larger networks of interconnected habitat patches.

According to the study, published yesterday in *Ecography*, sets of small habitat patches can host species that require much larger habitat patches for their daily needs than what each patch itself can provide. Many species are actually capable of moving back and forth between neighbouring patches, given that they are not perceived as being too far apart. Thus, many species are able to make use of the total of the habitat fragments in the network instead of relying on the individual habitat patches for their persistence.

"By defining the habitat patches as parts of a larger network, spatially explicit analyses of how the sum of the patches contributes to species dynamics on the level of landscapes are possible" said Dr. Andersson.

In human dominated areas, such as cities or intensively cultivated landscapes, it is often impossible to set aside large contiguous areas of natural vegetation. Instead, when multiple users compete for a limited area of land, only smaller pockets of natural vegetation (or just green areas) can realistically be preserved.

"Land managers need comprehensive and reliable tools that could help them to direct their conservation efforts to habitat patches where they get as much biodiversity as possible given a limited budget. Our study empirically shows that the network modeling approach is a good candidate for developing such a tool" said Dr. Bodin.

The study combines empirical field studies of birds with theoretical and statistical modelling. A range of bird species were surveyed in various green areas of different size and type in the urban area of Stockholm, Sweden. Geographical Information System (GIS) techniques were deployed to model the urban landscape as a network of individual habitat fragments. The field data were then used to test and verify the assumptions behind the network model.

Modelling a landscape as a network provides for many new analytical possibilities. However, the network modelling approach as such has, until now, rarely been tested empirically.

"Our study gives strength to the network perspective of landscapes, and thus supports further development of new and exiting network-based analyses that could help managers to preserve valuable ecological functions even in very fragmented landscapes" said Dr. Andersson.

The study also showed that it is important to differentiate between different types of green areas when constructing a habitat network since many species have quite different habitat preferences. In addition, the effect of movement barriers and the existence of stepping stones should

be included in the analysis, a fact which is particularly relevant in urban areas.

Source: Wiley