Expanded Ecosystem Services through User-managed, Avian and Invertebrate Species-Inhabited GreenER Roofs: Approaches to the Study of Integrated Social and Ecological Network Connectivity and Modularity in the Stockholm Urban Landscape

Jeff Ranara [a], Steven Handel [b], Henrik Ernstson [a], Thomas Elmqvist [a]

[a] Dept. of Systems Ecology and Stockholm Resilience Center, Stockholm Univ., Stockholm, Sweden

[b] Dept. of Ecology, Evolution, Natural Resources, Rutgers Cook College, Rutgers University, New Brunswick, NJ, USA

Green roofs have become highly-visible, even popular, in major cities such as Berlin and Chicago. Yet often the focus so far has been on the aesthetic value of their plant life and/or their engineering functions such as storm water retention and heat reduction. We argue that by incorporating an understanding of ecological processes involving avian and invertebrate movements in and between fragmented habitats into the design, management, and use of green roofs, an expanded provision of ecosystem services such as pollination, seed dispersal, educational opportunities, in the wider urban landscape is possible. The provision of these expanded greenER roof ecosystem services can be studied by examining the interaction of management and user social networks with the plant, avian, invertebrate ecological networks on which they impinge, and vice-versa, as integrated social-ecological networks. Such work builds upon studies that have begun to use a network perspective in understanding the resilience of social-ecological systems as well as creative ideas sketching a typology of approaches to integrated social-ecological network analysis. Network measurements such as connectivity and modularity can provide a possible framework for cross-site comparison. Viewing the green roofs as ecologically-networked species habitat patches requiring active user management and thus providing educational and aesthetic benefits to networks of users at the same time that they provide other tangible, expanded ecosystem services, provides ample opportunity to advance the understanding of the role of linked social and ecological networks in natural resource management. The potential conversion of six existing roofs at Stockholm University into greenER roofs that are part of both the local-area Stockholm National Urban Park and the larger Greater Stockholm Metropolitan area - and their corresponding user networks - serves as a specific case-study.