The problem of spatial fit: Comparing social and ecological connectivity using a spatially explicit network approach

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Abstract

This presentation is a suggested contribution in the proposed session: Social-Ecological Networks – an emerging transdisciplinary approach to study social-ecological systems. We present a new network-centric approach to identify and quantify potential spatial mismatches between patterns of ecological connectivity and how landscapes are being managed in a multi-actor setting. The problem of institutional fit in social-ecological systems has been discussed for decades, yet there is a shortage of approaches to systematically and quantitatively examine the level of fit. In particular, spatial land use heterogeneity in human dominated landscapes often conditions both human activities and species population dynamics. Detrimental effects on species and ecosystem functioning can occur if the land use is planned without regards to spatial ecological processes.

Our approach maps patterns of collaborations between actors who manage different parts of a landscape, and then relates these patterns to ecological processes in the landscape. We demonstrate our approach by comparing a social network of collaborative wetland management with the ecologically defined network of interconnected wetlands in the greater Stockholm Metropolitan Area in Sweden. Many wetlands in this system are either intersected by the boundary between two or more municipalities, or located close to such boundaries, which implies a degree of ecological interconnectedness and a potential need for dialogue and coordination of activities related to wetland management across boundaries. Improved coordination might be needed for example if a wetland in municipality A is highly dependent on its links to wetlands in municipality B, but the city officials have no dialogue or collaboration of their respective wetland-related activities. We use our approach to first estimate the level of ecological connectivity between wetlands in abutting municipalities, and then use that estimate to elaborate the level of social-ecological fit vis-à-vis inter-municipal collaboration. Our analysis and results are graphically illustrated using maps, which facilitates the potential application of this method in land-use planning practice.

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