

## **Human land use, wildlife, and changing environmental conditions – applications of spatial analyses to support decision-making in wildlife management and context-specific landscape planning**

Human land use shape landscapes by changing the spatial arrangement of land cover as well as the quantity and quality of habitats. For wildlife, these human activities modify forage availability, alter possibilities for movement and space use, and affect their mortality risk. Using spatial analyses, we can identify how and where different interests in land use overlap and where land use interact with wildlife.

Co-occurrence of different land-use interests can generate synergies and conflicts. In multi-functional landscapes, understanding the spatial relationship among interests provides important knowledge to mitigate co-existence. In Northern Sweden, all interests in land use combined claim more than twice of the terrestrial areal available. In particular, many interests claim forests to produce different values and services. For example, wind power establishment occurs predominately on forestland and future expansion of wind power will demand both productive forestland as well as forestland with high conservational values. A departure point in my research is the identification of hot- and cold-spots in overlapping land-use interests and recognition of areas that are prone for conflicts. Planning of land use, however, can take place on different scales. Such spatial mismatches emphasize the need for context-specific land-use planning and decisions on common goals on scales that are relevant to facilitate possibilities for synergies and to mitigate conflicts.

Movement enable animals to move to favourable places and avoid unfavourable ones. In human-modified landscapes, different types of wildlife data highlight where and when wildlife interact with different land use. We thus can utilize wildlife data as a tool for landscape assessment, being a proxy for both habitat suitability and herbivory pressure within a given area over time. Harvest data tells us where different species and taxonomic groups occur next to other land use. For example, this information helps us to identify areas where harvest intensities may not be in balance with intensities of agriculture or forestry. Wildlife-collision data not only tell about where and when risk for collisions are high, they also inform on species' distribution and provide a proxy for the trends in species' abundance across space. Animal position data provide precise knowledge on how, when, and where GPS-marked animals move, how they utilize space and navigate through the landscape, and which areas they avoid.

Linking animal movement data with spatial information on land use and environmental indices help us understanding *why* animals move as they move, *which and how* they utilize habitats as well as *where and when* they avoid or interact with other land use. Environmental indices are scale-specific in both space and time, and their application can address different questions within spatial ecology. For many large herbivores such as ungulates, human land use generate forage-rich landscapes whereas it hampers access to forage for others. In animals, human-induced stimuli can cause similar responses as the risk of predation, particular in harvested populations. This can alter how animals like ungulates utilize space over time. Importantly, it emphasizes the need of understanding the impact of human footprint on species' spatial ecology for estimating habitat suitability across human-modified landscapes, including both human land use and infrastructure. Landscapes are dynamic and environmental conditions are changing with human land use and climate change being the driving factors, making it important to assess both.

For me, spatial interactions among different land use and with wildlife in various environmental settings generate an exciting pool of research questions relevant for both science and society. Understanding the ecological implications of these interactions provides important knowledge for supporting sustainable co-existence of different interests in multi-functional landscapes as ours. I place my research within the interface of spatial and behavioral ecology, human-wildlife interactions, and landscape ecology of human-modified landscapes under changing environmental conditions. With my lecture, I am looking forward to take you on a short tour through my research. Welcome!