# Nature-based tourism, protected areas and mining in Finnish Lapland

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## Introduction

Tourism is growing industry and an important livelihood in northern Finland (Lapin matkailustrategia 2015 - 2018). Simultaneously, nature has an essential role in tourism. Many tourism resorts are located very close to protected areas and tourism in protected areas play an important role in the local economy (Huhtala 2007, Lapin matkailustrategia 2015 - 2018). While tourism has increased, the role of traditional livelihoods, like forestry and agriculture has decreased (Saarinen 2003, 2005). Simultaneously with tourism growth the metal mining industry and mineral exploration activities have increased notably in Finland(Kivinen et al. 2014). Although the growing mining industryhas potential to bring positive socio-economicdevelopment in northern peripheral areas, the ungovernable growth of mining may adversely affect tourism and nature protection, and have raised some concerns among local people. As competing land use interests related to mining, tourism, forestry and environmental protection are likely to increase in the future,there is a need for tools for reconciling different land use needs.Our aim is to develop a new GIS-basedapproach that simultaneously considers ecological, social and economic values. Method can be used in classifying sites by their suitability for different land uses and locating areas with possibly conflicting land uses.

## Methods

The study area is 14380 km$^2$ and located in Finnish Lapland. Study area covers three municipalities, which all have either operating mines or proposed mining projects in their area. Some of the proposed mining projects have raised concerns among local people. Tourism is important industry in the area and there are two popular ski resorts Levi and Ylläs. Other important livelihoods in the whole study area are forestry and reindeer herding.

To calculate the ecological value we compiled existing spatial ecological datafrom the study area. We assessed the ecological value based on the conservation value of the habitats and species in the areaand identified biodiversity hotspots. For calculations we divided the study area to 1ha size cells. Secondly, to calculate the social value we collectedspatial social data through internet-based Public participation GIS (PPGIS) –survey (e.g. Brown &Kyttä 2014). In the survey respondents wereasked to mark on the map places with different values e.g. recreation, gathering, hunting and fishing, beautiful landscape, biodiversity values. Respondents could also mark their development preferences regarding land uses (e.g. mining, tourism, forestry, nature conservation) in different sites of the study area. Thirdly, we assessed the economic value concerning timber production and mining industry. Geological Sur-

vey of Finlandprovides the in-situ monetary value of mineral resources. Data from the Finnish National Forest Inventory (NFI) and the multi-source Finnish National Forest Inventory (MS-NFI) wereused to calculate the value of timber production in each cell (Tomppo 2006). Finally, the spatial datasets compiled and collected are integrated in GIS to evaluate the location and possible overlap of valuable sites.

## Expected results

Through spatial data analysis we can pinpoint areas that have high ecological, social and/or economic values. The simultaneous assessment of economic, ecological, and social values of target sites allows for their categorization into different classes according to their suitability for land uses such as mining, tourism and recreation, forestry and nature protection. The assessment further gives information on the location of sites with small or high risks of conflict between land-use alternativesand on the location of possible substitute sites.

## Discussion

Sustainable land use planningshould ensure conservation of biodiversity and the social acceptability of land management actions as well as the use of nature resources in an economically sustainable way.To be able to minimize the trade-offs between biodiversity losses and economic benefitsland use planners would benefit from method that can be used for locating biodiversity and ecosystem service targets as well as socio-economically important areas in relation to each other. The developed new GIS-based approachconsiders simultaneously ecological, social and economic values of the landscape, and can thus promotesustainable land use planning in regional and local scale. The spatial overlay of different values can reveal potential synergies and conflicts between land uses, which is important information for the coordination and reconciliation of land uses.

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