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BioDiv-Support: scenario-based decision support tool for policy planning and adaptation to future challenges in biodiversity and ecosystem services

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Biodiversity includes any type of living variation, from the ecosystem level to genetic variation within organisms. The greatest threats to biodiversity is climate change, destruction of habitats and other human activities. High-altitude mountain regions are pristine environments, with historically small impacts from air pollution, but at risk of being disproportionately impacted by climate change. We focus on three mountainous regions: the Scandinavian Mountains, the Guadarrama Mountains in Spain, and the Pyrenees in France, Andorra and Spain. We study the impact of drivers of change of biodiversity such as future climate change, increased incidences of wild fires, emissions from new shipping routes in the Arctic as ice sheets are melting, human impacts on land use and management practices (such as reindeer grazing) and air pollution.

We simulate future climate change using WRF and a convective permitting climate model, HARMONIE-Climate, with a spatial resolution of 3km. The high resolution strongly improves the representation of precipitation compared to coarser scale simulations (Lind et al., 2020). We use these simulations to develop future scenarios of air pollution load, using two well established chemistry transport models (MATCH and CHIMERE; Marécal et al., 2015). These climate and air pollution scenarios are subsequently used, together with management scenarios, to develop scenarios for biodiversity and ecosystem services. These scenarios are developed applying a process-based dynamic vegetation and biogeochemistry model, LPJ-GUESS (Smith et al., 2014).

The scenarios, representing mid-21st century, will be made available through a web-based planning tool, where local stakeholders in each region can explore the project results to understand how scenarios of climate change, air pollution and policy development will affect these ecosystems. Local stakeholders are involved throughout the project, such as reindeer herder communities, regional county boards and national authorities, and in a time of changing climate and a global pandemic we have learned the necessity for flexibility in such interactions.

References

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