

# Climate change and reindeer herding – a bioeconomic model on the economic implications for Saami reindeer herders in Sweden and Norway

## Abstract

The Arctic is warming three times faster than the global average. Rising temperatures could reduce the snow-covered season and increase plant productivity in the spring, fall and summer. While this may increase carrying capacity and growth of semi-domesticated reindeer, rising temperatures could also lead to an increase the frequency of ice-locked pastures, negatively affecting reindeer body mass, survival and reproductive success. We create a stage-structured bioeconomic model of reindeer herding that incorporates two counteracting effects of climate change on reindeer growth, reproduction, and survival. The model is calibrated using historical data on reindeer numbers and slaughter weights, in combination with weather data. We find that one more day with ice-locked pastures has a greater negative impact than the benefit of earlier spring. Then the model is used to simulate the economic impact of three climate change scenarios, and four areas in Norway and Sweden. All areas experience an improvement in herding profits in the Paris Agreement scenario. In the BAU scenario, the impact of climate change is negative for all areas. We also find that the potential loss in pasture related to certain emission mitigating policies may be more detrimental to reindeer husbandry than climate change itself.

**Key words:** reindeer husbandry, climate change, commons, livestock, food limitation

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