LAND USE/COVER CHANGES AND THEIR EFFECTS ON REINDEER HUSBANDRY IN NORTHERN FINLAND OVER THE PAST FOUR TO SIX DECADES

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Background

Forestry, tourism, nature conservation, reindeer herding, and recently also mining are major drivers of land use/cover changes in northern Finland. There have been conflicts between the reindeer husbandry and other land use types because of resource utilization for different purposes and subsequent adverse effects on each other.

The aims of this study were to examine land use/cover changes in the northern boreal forests and fell areas in eastern Lapland over the past four to six decades and to estimate their effect on reindeer husbandry.

Materials and methods

A time series of Landsat MSS, TM and ETM+ images (1972, 1987, 1993, 2005, 2011) and Corona images (1977) were used to detect land cover changes in the study area, the Lappi reindeer herding district (4553 km^2, Fig. 1.a). More detailed analyses of land cover changes were carried out in four locations within the study area using a series of aerial photography from 1950's to 2000's. Information on reindeer herding system and its changes were derived from old maps and interviews with reindeer herders.

Results

The results highlight various changes in land cover/use resulting from clear-cutting, road construction, use of herbicides, and the construction of artificial lakes (Fig. 1.b & c). The area of young forests had significantly increased in the landscape. Old-growth forests were mainly found in protected areas (national and nature parks, wilderness areas). Further, the density of the road network had noticeably increased as a result of the construction of forestry roads and tourism (Fig. 2).

From the reindeer husbandry viewpoint the number and the extent of disturbances in the landscape have increased during the past decades (Fig. 3). Forestry has mainly negative effects on reindeer husbandry through the reduced amount of ground-growing and arboreal lichens. Artificial lakes have reduced the area of suitable pastures and disturbed pasture rotation system. Further, increased tourism in Urho Kekkonen National park have disturbed reindeer herding in fell areas.

Conclusions

Cumulative impacts of land use/cover changes are reflected to the spatio-temporal land use of reindeer husbandry as reindeer herding system tries to adapt to new conditions and shrinking pasture land.

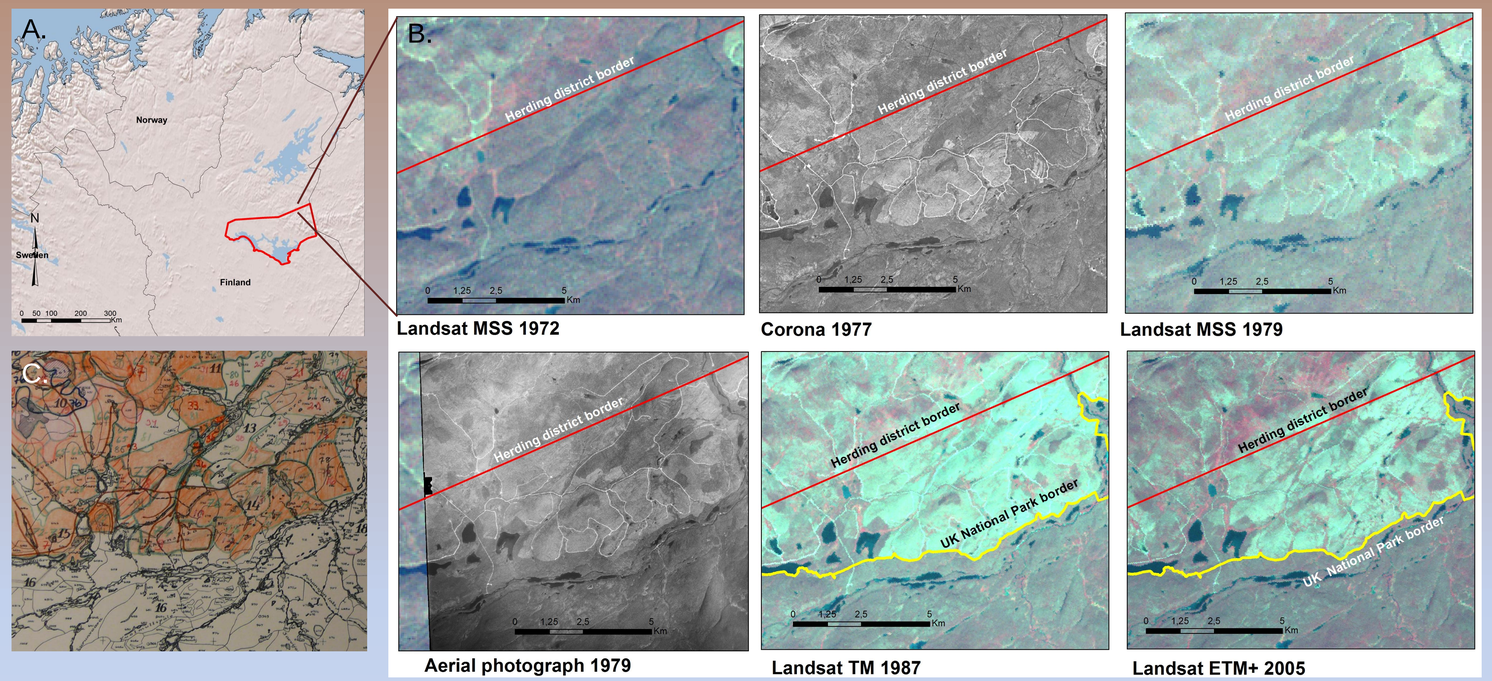

Figure 1. A) The location of the Lappi reindeer herding district in northern Finland. B) Land cover change in the Ahvenselät region between 1972 and 2005. Clear-cutting has been carried out at the boundary of Urho Kekkonen National park established in 1983. Regeneration of forest in these latitudes is very slow. Seedlings have been destroyed and regeneration of forest has been unsuccessful. C) A forest management planning map from the year 1956 including updates until 1987. Green numbers indicate when stands have been clear-cut (Metsähallitus - Finnish Forest and Park Service, Oulu Regional Archive).

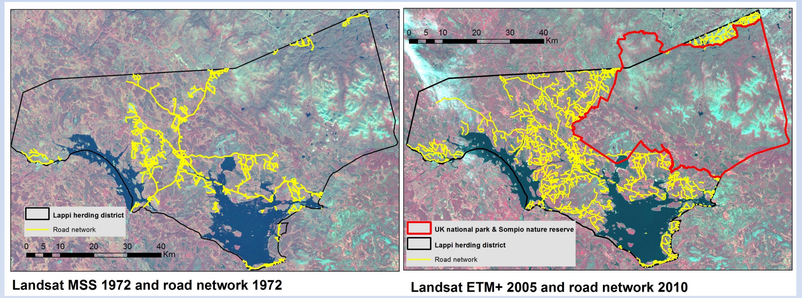

Figure 2. The development of the road network in the Lappi reindeer herding district. The total length of the road network increased from 835 km in 1972 to 1855 km in 2010. Urho Kekkonen National Park, Sompio Nature Reserve and old-growth forests in Peurakaira region located in the western part of the herding district are surrounded by a dense network of forestry roads. These less disturbed areas contain important resources for reindeer husbandry

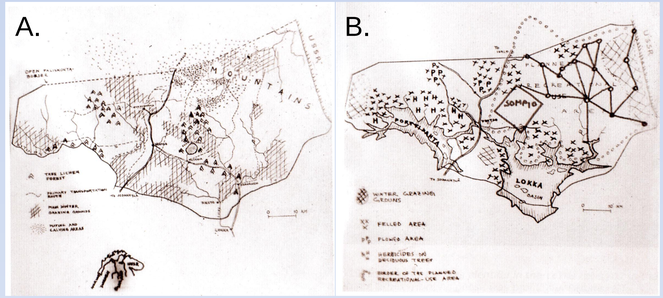

Figure 3. Hand drawn maps of the study region in the 1960s indicating the herding system A) prior to the reservoirs, and B) after the reservoirs (Pekka Aikio in ”Mustonen K & T Mustonen 2011: Drowning Reindeer, Drowning homes”). In addition to the construction of reservoirs, forest felling, plowing, and the use of herbicides disturbed reindeer herding in the end of 1960s.

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