The inventory of reindeer winter pastures in Muotkatunturi co-operative with satellite imageries and colour infrared photographs

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About two thirds of Finnish reindeer live year around in the forest area. In June 1988 the number of reindeer in Finland was about 364.000. The reindeer densities have increased sharply in the whole Finnish reindeer husbandry area (the whole land area is about 115.000 km^2) during the last ten years. At the same time the multipleuse of land has become more efficient. Thus, information about the amount and condition of reindeer pastures at the co-operative level is an essential prerequisite of sustained profitable reindeer herding in the long term. The aim of the present study is to develope new and easily respected methods to evaluate reindeer pastures and to compare the traditional inventory methods of pastures with the use of satellite imageries and colour infrared photographs. The final results of the study may be applied to the whole reindeer herding area in different vegetation zones. The participants of the study (founded in 1987) are Finnish Game and Fisheries Research Institute, Reindeer Research, Institute of Photogrammetry and Remote Sensing of the Helsinki University of Technology and Department of Remote Sensing of the Technical Research Centre of Finland.

The study area was located mainly in Muotkatunturi co-operative and also in Muddusjärvi co-operative. It belongs both to the Forest and the Fell Lapland vegetation zones. The pine forest limit runs through the area. There is the mixed pine and birch forest zone between the coniferous and subalpine deciduous forest areas. The study area was selected in order to gain material on the major reindeer pasture types. Muotkatunturi co-operative is relatively wide area (2.382 km^2) for conducting both field work and data processing. One specific test site, window, was rectified from Landsat-5 TM image (193/D 860715) for the study. Different kinds of reindeer winter pastures, forest site types and forest stands are presented in the sample window (625 km^2). Visual print of the satellite image (1:35.000) was made for the field work. The training areas (n = 75) were selected by using aerial photographs, satellite image and topographical maps 1:50.000. The prerequisites for the training areas were that they must represent the whole spectral variation of the image and all the variables effecting the spectra and the intensities must be concerned. Tree stand and undervegetation was inventoried by 20 quadrats on every training area. Quadrats (0.5 m^2 each) were located systematically along transects 20 meters apart from each others. The training areas were located precisely on topographic maps and satellite image and then on the digital data base of the Landsat frame. The spectral signature for each winter pasture types will be obtained by averaging reflectance values of pixels from training areas (under work). Field checking of the pasture types will allow further refinement and improvement of the classification.

During the summer 1987 and 1988 altogether 75 training areas were inventoried in the sample window. The final interpretation of the satellite imagery will be completed in October 1989. The main lichen-heaths were mostly in barren sites (n = 19, mean coverage of reindeer lichen 7.9 %) and in dry sites (n = 22, mean 4.9 %) mainly in Scots pine forests. The most common reindeer lichens were *Cladina stellaris* (mean 15.1 %) and *Cl. mitis* (mean 8.7 %) in barren sites. The bottom layer in dry sites was dominated by *Cl. rangiferina* (mean 5.9 %). In different forest site types there were significant positive correlation between the mean coverage of lichens and the mean height of the living part of lichens. Interpretation of the colour infrared photographs showed as the results of ground data that the lichen-heaths located mainly in Scots pine forests and in mixed pine and birch forests. With the aid of ground data the coverage of lichens were classified as follow: the mean coverage of lichen being above 6 %, 2 – 6 % and below 2 %. Different lichen species cannot be specified with interpretation of color infrared photographs.