

## LAND USE IN THE SURROUNDINGS OF NATURE RESERVES AND MULTI-SOURCE GEOGRAPHIC INFORMATION

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### ABSTRACT

Land cover and land use classification in Finland has been produced by combining satellite image interpretation, national forest inventory data and map databases to a 25 m by 25 m grid. In this study the dataset was applied to measure how protected areas differ from the surrounding landscape matrix in different boreal vegetation zones.

The national conservation areas and programmes were digitized and 1000 m, and in southern Finland also 300 m, buffers were formed outside the boundaries. The proportion of land use and land cover classes was compared inside the protected areas, in the buffers, and in other parts of the particular vegetation zone.

84% of the total protected land area is situated in northern boreal vegetation zone. The reserves mostly represent lean habitat types. If protected areas have potential economic value, or land use is intensive in general, the landscape structure of the 1000 m buffer is different both from the reserve and the outside vegetation zone. In southern Finland the proportion of classes with human influence would be 22-28 % of the land area in the 300 and 1000 m buffer zones.

Small and vulnerable nature reserves may need zones of less intensive land use around them. These kind of studies would answer in important conservation optimizing questions, but problems with data accuracy limit the possibilities. On the edges of phenomena many error sources accumulate. Many of the accuracy describing attributes, like mean error values, are not valid when the surface is systematically divided into parts measured together.

### 1. INTRODUCTION

Nature reserve network has recently been evaluated with several researches. This study focuses on the relationship between protected areas and the surrounding landscape matrix. Differences in the land cover structure between the reserves and their neighbourhood indicate the special characteristics of the reserves represent. The high proportion of intensive land use classes near the boundaries can mean a threat to small and vulnerable reserves. The quality of the GI material limits so far the possibilities to this kind of analysis.

### 2. MATERIAL AND METHODS

The digitized nature protection area protection programme borders were combined and a buffer of 1000 m was formed outside the combined boundaries. These areas were cross-tabulated with the 3. version of the land use and land cover classification created by the National Board of Survey of Finland. It is based on multi-source techniques, where satellite image interpretation, national forest inventory data and in some cases map databases are combined to a 25m by 25m grid. The nation-wide results were calculated in the boreal borest vegetation zone division from south to north. In southern Finland also a 300 m buffer was formed and the proportions of classes including anthropogenic disturbance, like buildings, roads, arable land, were approximated. Forestry caused openness was tried to be separated using some classes of the soil mask created by the Geological Survey of Finland.

### 3. RESULTS

Most of the total protected land area is situated in the northern boreal vegetation zone. In all zones the reserves represent lean habitat types like open mires, rocky archipelagos and less forested areas. Regionally in the northern and the middle boreal vegetation zones also large forest areas are protected. Here an increase in forestry indicating structures, like lower tree stand volumes and changes in tree species distribution, occur especially in the 1000 m buffer zone. In hemiboreal and southern boreal zones the proportions of built-up areas and roads are highest in the 1000 m buffer. According to the

preliminary results in southern Finland, the proportion of classes with human influence would be 22-28 % of the land area in the 300 m and 1000 m buffers. However, there are problems in separating naturally less wooded areas from forestry results. The peat and rocky classes do not reach all the mosaic variation in Finnish landscape.

#### **4. CONCLUSIONS**

Although the results can generally describe the reserve network and the landscape, multi-source land classification is still insecure used alone for nation-wide land use analysis. When studies are limited to uniform data origin areas, where the error range is alike, the results can be utilized more successfully. In this study direct comparisons of results between different parts of the country can not be made because of the spatial and temporal variation of different classes. Many error sources accumulate when edged areas are measured. A multi-level grid for different error types would be most useful way to express accuracy for this kind of research.