

Summary of the case study on valuation of the forest ecosystem services

Title of the valuation study: Multiple-use management of forest recreation sites: a spatially explicit choice experiment

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Objectives of the study

Municipal recreation forests in the Nordic countries face a variety of demands including recreational use, nature conservation, and extensive timber harvesting. Since the goal of forest management at outdoor recreation sites is to fulfil the recreational needs of different visitors, information on the preferences of recreationists is needed by forest managers.

Therefore, the authors presented an empirical example applying spatially explicit choice experiments in order to support forest management decision making processes. The application considered trade-offs between non-use and use-valued recreational goods.

Scope of the study

The ecosystem services valued in the study were habitat services (biodiversity) and cultural services (recreation, scenic beauty). The geographical scope covered was local.

The study area consisted of five outdoor recreation sites (Luukkaa, Pirttimäki, Vaakkoi, Salmi and Karjakaivo) owned by the city of Helsinki. The forests' management goal was to provide pleasant recreation environments and to conserve the special features of the local forests. All recreational sites were located in the Nuuksio Lake uplands (608120N; 248550E), about 20–40 km northwest of Helsinki. Annual visitor numbers varied from 20,000 - 200,000 visits per site. There was no entrance fee to access any of the sites in the study area. Silvicultural management was very extensive, done at a small scale with long rotation periods. Trees were harvested to facilitate regeneration of some species, while harvests were planned to explicitly provide greater access for recreational users. But there were also patches of forest left for nature conservation within the recreation forest areas.

Valuation method(s) applied

The study design accounted for use values (scenery at the preferred recreation site) and non-use values (species richness).

The survey instrument contained the **choice experiment** (CE) questions, as well as the socioeconomic characteristics of the respondent. In addition, information was collected regarding the scenic preferences in relation to forest management intensity. This involved choosing one of three pairs of pictures of a pine stand, which differed in terms of the intensity of forest management and the scenery. In 431 personal interviews, representative respondents were asked to choose their preferred management option from alternative management regimes for the sites.

The choice sets consisted of three alternative forest management regimes for the five recreation sites including always a status quo (SQ) option. The number of choice sets was minimized using **main effects design**. The options were characterized by different levels of attributes, which included site-specific species richness levels and forest scenery, costs of management, and indicators of species richness levels over the system of recreation sites. The payment vehicle was a change in annual municipal taxes per household.

The analysis of multi-attribute choices was carried out by a **conditional logit model approach**. Information about the most frequently visited site of each respondent was combined with the choice of the favourite scenery. Hence, the connections of the different attribute levels to monetary changes derived measures of economic welfare.

Three choice models were estimated, two using site-specific attributes for species richness and one using the average measure of species richness over the recreation system. In each model all species richness variables were converted to natural logarithms. To account for status quo affects, an **alternative specific constant** (ASC) was included in each estimation.

Then, forest management strategies were applied over a system of independent spatial units. Forest managers therefore faced options of varying levels of management intensity and goals among the recreational sites. The welfare impact of the new management scenario on visitors was finally calculated using the **Hicksian compensating variation** measure.

Key results

- Visitors showed a strong preference for the preservation of species richness and for scenic beauty. When there was a trade-off between preservation of species richness and scenic beauty, visitors chose their favourite scenery at their favourite recreation site and preferred management options, which preserve biodiversity at the other sites in the recreation system.
- Changing management to enhance species richness over the sites provided increasingly more economic benefits to visitors. Nevertheless, respondents preferred variability in species richness across the system suggesting that management should differ among the recreation sites.
- A model using the average measure of species richness across the system was statistically more efficient and provided more detailed information on the preferences concerning the management.
- Rising biodiversity levels through a change in forest management would lead to a change in the scenery. This might change the recreation experience and has therefore a welfare effect. Estimated by site-specific models, this effect was -21.14 €/p.p.*year to -33.92 €/p.p.*year (20,000 - 200,000 visits per site). Calculations with the Hicksian compensating variation measure led to an average value of -10.36 €/p.p.*year (-50.11 to +34.27 €/year*p.p.).