



## Analysis

## Combining ecological and recreational aspects in national park management: A choice experiment application

Artti Juutinen <sup>a,b,c,\*</sup>, Yohei Mitani <sup>d</sup>, Erkki Mäntymaa <sup>c</sup>, Yasushi Shoji <sup>e</sup>, Pirkko Siikamäki <sup>f,1</sup>, Rauli Svento <sup>a</sup>

<sup>a</sup> Department of Economics and Martti Ahtisaari Institute of Global Business and Economics, P.O. Box 4600, FIN-90014 University of Oulu, Finland

<sup>b</sup> Thule Institute, P.O. Box 7300, FIN-90014, University of Oulu, Finland

<sup>c</sup> Finnish Forest Research Institute, P.O. Box 16, FIN-96301 Rovaniemi, Finland

<sup>d</sup> UMB School of Economics and Business, Norwegian University of Life Sciences P.O. Box 5003, 1432, Ås, Norway

<sup>e</sup> Laboratory of Forest Policy, Research Faculty of Agriculture, Hokkaido University Kita 9 Nishi 9, Kita-ku, Sapporo, 060-8589, Japan

<sup>f</sup> Oulanka Research Station, Thule-institute, University of Oulu, Liikasenvaarantie 134, FIN-93999, Kuusamo, Finland

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## ABSTRACT

Increasing pressure to diversify development of national parks emphasizes the need for new and relevant information for park management decisions. In this paper, we use choice experiment to value different tradeoffs that evolved in park development scenarios. Specifically, we examine which kind of development profiles are worth considering and which paths not to follow. We focus on biodiversity and recreational services provided by Oulanka National Park in Finland, which represents a popular recreation site attracting a large number of visitors. The increase of biodiversity was the most highly valued feature by the respondent national park visitors. Thus, our results show that the protection of biodiversity and recreational and tourism use of national parks can cause conflicting welfare effects if managed in inappropriate ways. Increasing the number of visitors, expanding present resting places, constructing new resting places and an intense increase in information boards, especially if combined with shrinking biodiversity, are welfare reducing managerial actions in national parks.

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### 1. Introduction

In the last decade, there has been increasing interest in evaluating the management effectiveness of protected areas (Damania and Hatch, 2005; Hockings et al., 2000; Prato, 2001; Saterson et al., 2004). Protected areas such as national parks are, in the first place, established to conserve their biological and cultural values, but nowadays they have a much more multifaceted role in society as well. Following the growth of nature-based tourism, national parks have become important tourist attractions worldwide. Consequently, park authorities increasingly have to develop<sup>2</sup> the facilities of parks for recreational services. However, outdoor recreation and tourism are at

the same time considered one of the main threats to the biodiversity of protected areas (Cole and Landres, 1996) and as one of the main contributing factors for species endangerment (Czech et al., 2000; Wilcove et al., 1998).

Finnish protected areas have been rated as well managed and capable of achieving their aims of conserving biodiversity (Gilligan et al., 2005; Hockings et al., 2006). Yet, the current common aim of Finnish national parks is to integrate the socio-economic goals of nature-based tourism with the ecological goals of conservation by implementing the principles of sustainability (Puhakka, 2008). Thus the role and the value of protected areas are seen not only as a tool to protect biodiversity but also as providers of ecosystem services for society more generally. The average number of visits to Finnish national parks doubled during the 1990s with continued growth in the 2000s as indicated by statistics by the state-owned enterprise Metsähallitus (Forest and Park Services), which administers these state owned land and water areas of Finland. In 2007, there were 1.7 million visits to 35 national parks (Metsähallitus, 2008). Managers of protected areas are thus facing a major challenge in balancing between conservation goals, the needs of the tourism business, and the interests of visitors when managing parks.

Effective and successful management of protected areas relies on a complete understanding of the goods and services which they provide

\* Corresponding author at: Department of Economics, P.O. Box 4600, FIN-90014 University of Oulu, Finland. Tel.: +358 8 5532911; fax: +358 8 553 2906.

E-mail addresses: [artti.juutinen@oulu.fi](mailto:artti.juutinen@oulu.fi) (A. Juutinen), [yohei.mitani@umb.no](mailto:yohei.mitani@umb.no)

(Y. Mitani), [erkki.mantymaa@metla.fi](mailto:erkki.mantymaa@metla.fi) (E. Mäntymaa), [yshoji@for.agr.hokudai.ac.jp](mailto:yshoji@for.agr.hokudai.ac.jp)

(Y. Shoji), [pirkko.siikamaki@metsa.fi](mailto:pirkko.siikamaki@metsa.fi) (P. Siikamäki), [rauli.svento@oulu.fi](mailto:rauli.svento@oulu.fi) (R. Svento).

<sup>1</sup> Present address: Metsähallitus, Natural Heritage Services, P.O. Box 26, FIN- 93601 Kuusamo, Finland.

<sup>2</sup> The term “develop” is used in a broad sense in this study to indicate change in the current park management.

to the society. To achieve the goal of effective management, decision makers and managers will need to understand the tradeoff between visitors' preferences for the protection of biodiversity and the recreational and tourism uses. Traditionally respondents are asked to rate the importance of a series of attribute approach in visitor surveys providing managers with useful information on visitor's preferences. However, such approach does not necessarily provide managers with information about the relative importance of the attributes being evaluated and the potential tradeoffs inherent in park management decision-making (Lawson and Manning, 2001; Louviere and Hensher, 1982). When exploring the relative importance of biodiversity protection versus other management goals, the task of identifying tradeoffs among the associated attributes is receiving increasing attention.

We conducted a choice experiment (CE) to explore the visitors' preferences among the potentially conflicting management priorities of Oulanka National Park (hereafter Oulanka NP) in Northern Finland. A set of hypothetical park profiles was created, and respondents were asked to choose their most preferred alternatives. The attributes used to create the park profiles were biodiversity, expected number of visitors, resting places, information boards, and entrance fee. These attributes are typical for many national parks. Thus, although we focus on the management of a special target (Oulanka NP), the issue of protected area management also has a wide global importance.

Our aim is to reveal how the visitors value the considered characteristics of the park, and based on this information draw guidelines for efficient park management. For that purpose, we estimated visitors' marginal willingness-to-pay (WTP) for different characteristics of Oulanka NP. In addition, we calculated the welfare effects of alternative park management scenarios to illustrate the most and least preferred management options. Finally, we examined how the welfare effects differ between designated visitor groups using information on respondents' socio-economic characteristics and activities they conducted during the visit at the park. Using information on various preference groups the park manager may be able to target actions for specific groups of visitors.

Several CE studies to determine visitors' preferences concerning recreation related issues have been carried out (Bullock and Lawson, 2008; Hearne and Salinas, 2002; Lawson and Manning, 2002; Othman et al., 2004). Our work differs from these studies by including both biodiversity and recreation in the CE. Carlsson et al. (2003), Horne et al. (2005), and Jacobsen et al. (2008), for example, have also examined both biodiversity and recreational services of recreation sites. These studies considered recreational facilities or scenic beauty along with biodiversity. In addition, Jacobsen and Thorsen (2010) examined citizens' preferences for site and environmental functions when selecting forthcoming national parks including both protection efforts and recreational values. We contribute to the literature by extending the description of recreational values to include several management attributes and by providing insights into more concrete park management issues than the previous papers did. From this perspective our work is close to Christie et al. (2007) who used CE to value changes in visitor welfare for a range of improvements in recreational facilities in forests.

## 2. Material and Methods

### 2.1. Study Area

Oulanka NP is located in north-eastern Finland (66°22'N, 29°17'E), adjacent to the Russian border and close to the Arctic Circle. The park was established in 1956 to protect unique riparian ecosystems with rich flora and fauna. There were two major expansions to the park in 1982 and 1989, so that currently Oulanka NP covers approximately 28000 ha (Gilligan et al., 2005). It is managed by the Natural Heritage Services of Metsähallitus, whose public administration duties include

the management of protected areas (Heinonen, 2007). Finnish national parks are managed within the Parliamentary legislation, the Ministry of the Environment's guidelines (e.g. 2002), and Metsähallitus' (e.g. 2000) own principles and management and land use plans for each park. Following the IUCN protected area management categories, Oulanka NP is a category II national park (Dudley, 2008; IUCN and UNEP, 2003). Following the growth of nature-based tourism, national parks have become important tourist attractions worldwide. In Finland Oulanka NP is one of the most popular national parks with tripled average annual number of visits since 1992 from 60000 to 185500 visits in 2007 (Metsähallitus, 2008). The number of visitors to the park has increased to the point that the park manager, Metsähallitus, now requires information for fulfilling the needs of the visitors and protecting the nature of the park. There are clear tradeoffs between development of the services and facilities and protection of the biodiversity of the park. Therefore, Oulanka NP is a highly suitable case for a choice experiment exercise.

### 2.2. Survey Design

The process started in cooperation with Metsähallitus by preparing a questionnaire for a small scale pilot study conducted as an onsite visitor survey during five days in October 2007. Based on the pilot study, the final questionnaire was developed and tested using focus groups (the questionnaire is available on request from the authors). The questionnaire of the final survey consisted of four parts. The first part contained questions related to visitors' environmental attitudes and their desire for outdoor recreation. This part was an introduction to the survey, including questions related to the importance of nature and the environment for visitors, activity to spend time in nature, and respondents' attitude to nature protection in Finland. The second and most important part of the questionnaire contained the choice experiment. It gave information about Oulanka NP and choice sets related to management alternatives of the park. It included descriptions of the attributes of the choice experiment, i.e. Biodiversity, Expected number of visitors, Entrance fee, Size and number of resting places, and Information boards, as well as the levels of the attributes as shown in Table 1 (see Appendix). The third part asked facts about this visit to the park, especially places where respondents visited as well as motives and activities during the visit in the park. The final part included questions regarding respondents' socio-economic status, including year of birth, education, and employment.

The number of attributes and levels gave rise to 405 possible profiles ( $3 \times 3 \times 5 \times 3 \times 3 = 405$ ). To develop the profiles presented to respondents in the questionnaire, we applied an orthogonal main effect design (by SPSS orthogonal design procedure), which is frequently used in empirical studies (Louviere et al., 2000). This procedure reduced the number of profiles to a level of 25 alternatives. This number was considered too large a task for a respondent to complete (Louviere et al., 2000). To reach a more manageable level of alternatives, we generated three random numbers for each alternative. Then using one set of random numbers at a time we sorted the alternatives in a descending order and signed the alternatives to 12 choice sets in this order. The total number of choice sets is 36 as the procedure was repeated three times. Each choice set included two signed alternatives and a status quo alternative in which the levels of attributes refers to present situation except the expected number of visitors which was assumed to increase as anticipated (the basic alternative in Table 1). Thus 24 alternatives were used at a time in generating the 12 choice sets, but all the 25 alternatives were used in generating the 36 choice sets. The first four choice sets were then used in the first version of questionnaire and so on resulting in nine versions of the questionnaire. This procedure was used to achieve trustworthy results in estimation due to variation among the choice sets. Dominating alternatives were checked and eliminated from the choice sets. Thus, the respondents faced four choice sets and in each

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