

# Methods for forecasting recreational use of natural environment

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## Introduction

Almost 70% of Finns live in urbanised areas nowadays. Compared to previous decades, the population is ageing, and income levels, the status of education and the amount of leisure time are increasing. The supply of recreation opportunities is very much an issue related to natural resources policy. In Finland, easy access to nature is guaranteed through everyman's right as well as the provision of green areas: 50 per cent of Finns live within 200 m of the forest. The foresight of recreation demand is essential for providing a vision to decision-makers in terms of how patterns of recreation behaviour may change, reflecting changes in demography, socio-economic structure, and the environment such as climate change. There is an increasing need for monitoring changes in recreational behaviour and tracking recreation trends. Therefore, forecasting information used for management and the planning of recreation resources is essential for seeing the overall picture of outdoor recreation in the future. This presentation will introduce different methods for forecasting demand for outdoor recreation and nature-based tourism.

## Methods

These methods include extrapolation of past trends in outdoor recreation, regression methods using cross-sectional data, and panel-data estimation techniques. The qualitative scenario work and Delphi application creates the framework for discussion. This study applies data from Finnish outdoor recreation demand inventories (LVVI) from 1999-2000 and 2009-2010 (Metla), outdoor recreation studies in 1970s and 1980s, and panel data from visits to national parks and hiking areas in 2000-2008 (Metsähallitus). Population projections and scenarios for environmental change, such as climate change, are compiled from various sources, such as the Finnish Environment Institute and Statistics Finland.

## Results

### *Using cross-sectional data to explain and predict participation in different outdoor activities*

**Regression methods:** Participation in outdoor activities can be measured using two types of measures: first, with a dichotomous variable that expresses whether an individual participates or not, and second, with a count variable that expresses the number of occasions or days of participating in a particular activity (Fig.1). Statistical models applied here that predict participation and the frequency of participation are the binary logistic regression and the negative binomial regression (Cameron and Trivedi 1998).

We have tested a set of socio-economic factors that we

expect to have an influence on participation and participation frequencies in our models. These factors are respondents' gender, age, educational level, household income, socio-economic status, employed (yes/no), size of municipality of residence, environment of residence (rural/urban) or region (Southern/Northern Finland), and access to a recreational home.

These models explaining the behaviour are extrapolated beyond the present by including population or climate scenarios. Changes in demography and in socio-economic variables are rather moderate in Finland. This reflects minor changes in the participation in outdoor activities. Changes in resources and conditions, such as the amount of snow for skiing (e.g. Pouta et al. 2009), seem to have a much higher impact on behaviour. This approach is criticised for making a strong assumption of the stability of behaviour patterns.

**Time series analysis:** We have information on participation in some traditional outdoor activities over a period of 30 years. These four national-level surveys or equivalent form time series of outdoor recreation trends in Finland. Our participation trends are partly fragmentary and short. This suggests the use of very robust methods for forecasting including naïve1 (no-change), naïve2 (constant growth rate with corresponding previous period), and exponential smoothing, which is an analysis tool that gives more weight to recent observations and less to past observations.

### *Using on-site data to model outdoor recreation demand*

Demand for recreation can be measured in terms of visits, days, trips, or facilities consumed. Recent research by Nerg et al. (2012) combines regional-level socio-demographic and economic data of demand factors to examine the consumption of outdoor recreation trips and the recreational resources and facilities available in order to determine visits to nature parks and hiking areas. Panel data estimation techniques were applied to visitor monitoring data from 46 national parks and hiking areas in Finland collected between 2000 and 2008. The results indicate that park size, number of services and number of inhabitants in the demand region increased the number of visits. Neuvonen and al. (2009) found that location near the population centers in Southern Finland, developed services in terms of trails and possibilities for outdoor activities explained the higher number of visits.

The travel cost model is often applied to estimate recreation demand. As a revealed preference method, the travel cost method relies on actual choices that people have made. The travel cost method (TCM) involves estimating a recreation demand function based on the number of trips taken as the quantity variable and the travel cost as the price vari-

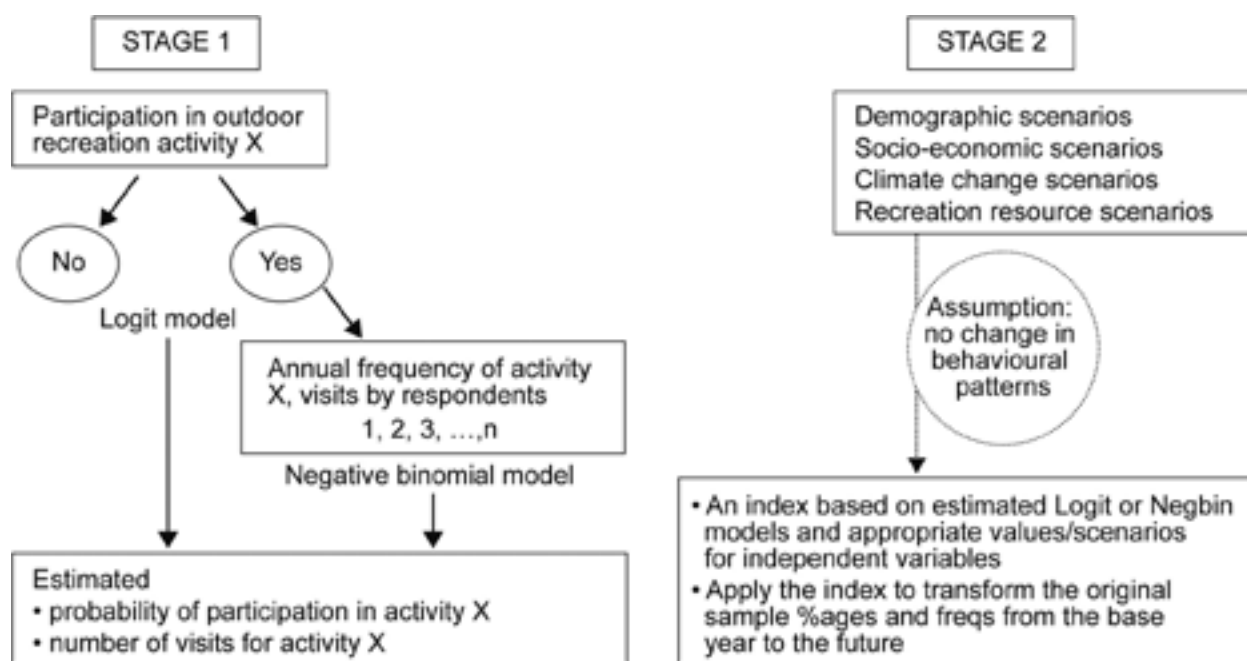


Figure 1. Stages of modeling and predicting outdoor recreation participation with cross-sectional data.

able. Ovaskainen et al. (2012) stated that the cost of travel time was related to visitor and trip characteristics and had an effect on benefit estimates.

#### Other methods

**Delphi method:** An expert panel was consulted to construct the future of nature-based tourism in Finland, including both domestic and foreign visitors (Koivula and Saastamoinen 2005, 44–46). The panel of 32 experts contributed to the research to create the scenarios for 42 different activities. An estimate for procentual change by the year 2014 was compared to situation in 2004. The assessment indicated increase (on average 20–25%) in most of the activities. Compared to the results of recent LVVI-study, the small increase in domestic participation rates can be empirically

supported. On the other hand, a recent national survey shows that traditional activities like berry picking were increasing and fishing was experiencing a slight decrease, contrary to expert expectations.

**Scenario method:** A qualitative foresight method uses expert assessment of megatrends and scenarios of other sectors in society, including trends related to the environment, business, livelihoods, and people's values and attitudes indicating different ways of living, which can all be merged into scenarios of future recreational behaviour and its implications for recreation resources management, but also future prospects for nature tourism.

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