Possibilities to assess economic values of biodiversity in Russian Karelia using Finnish data: A benefit transfer experiment

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Introduction
The need to find a monetary value for a public good, e.g. an environmental resource or a change of its quantity or quality, has been recognised as an important problem in society for a long time. The benefit transfer (BT) is a method that reuses existing results of valuation studies of non-market commodities in a new case or area (Brookshire & Neill 1992, Boyle & Bergström 1992). The use of old results, e.g. willingness to pay (WTP) figures, saves time and money.

The aim of this study is to assess conditions in which Finnish results can be used in valuation of environmental benefits of biologically valuable forests in Russian Karelia. According to BT terminology the valuation study of an original area is a “study site” and the area where the data set is applied, in this case Karelian forests, a “policy site”. The study site in this case is Finland and the data set used here has been compiled in a contingent valuation survey “Public opinion on nature conservation in private forests” (Mäntymaa et al. 2000).

The BT has a great number of problems. On what ground it is permissible to transfer environmental benefits from one site to another? On what conditions BT is a scientifically consistent method? One should remember that BT at best is as valid and reliable as the original study, in the worst case one could speak about bias transfer if the original data set has not been collected in proper way. On the other hand decision situation influences on quality of required information and benefit estimations need not always be equally accurate (Brookshire & Neill 1992). According to Desvousges et al. (1992) and McConnell (1992) the use of BT will increase considerably in the future. Decisions can be made more rationally if the use of old data is sufficient for instead of a new survey.

A BT study can be made whether by transferring a data set or a whole demand function. The oldest form of the data transfer is an estimate based on professional guess (Loomis 1992). In practice, the data transfer uses official tabulated values or average WTP figures calculated especially for each special case.

As experience and knowledge increased the method was started to develop to theoretically more justified direction. Many researchers, e.g. Loomis (1992) and Desvousges et al. (1992), advocate the transfer of a whole demand function. The function transfer uses the demand function of a study site at a policy site so that the original function form is used with a new data set. Using benefit estimates of a travel cost study Loomis (1992) shows that the transfer of a utility function produces less biased estimates than a corresponding data transfer.
This study can even not implement a data transfer while there is not enough information for this kind of experiment. Here instead, starting points and conditions of the BT will be presented. In addition, the study will assess what kind of transformation coefficients are essential in the BT between Finland and Karelia and to what direction Finnish benefit estimates should be changed in order to get corresponding Karelian figures.

**Survey and the data set**

The data for the study was collected by a mail survey, sent out in spring 1999 to a random sample of 800 persons among the Finnish population aged 18-75 years over the whole country. The sample was divided into two sub-samples of 400 individuals to which the conservation projects were stated in slightly different ways, as will be described below. The questionnaire elicited a total of 381 replies, a response rate of 47.6%.

The survey described three separate projects including 155,000, 430,000 and 705,000 hectares of protection in addition to the set-aside area according to the Finnish Forest Legislation (i.e. 120,000 hectares). The first group of people was asked to give the WTP for the first two projects, i.e. 155,000 and 430,000 hectares and the latter group for 430,000 and 705,000 hectare projects. This means that each respondent was asked to answer two contingent valuation questions for two projects. Furthermore, if respondents were uncertain of the WTP they were encouraged to give two sums of money for the both projects the first being the sum that they certainly are willing to pay for the project and the second the sum being the absolute maximum for the project. This format of the question gives upper and lower bounds of the WTP (for more about the survey, see Mäntymaa et al. 2000).

Table 1 shows the mean annual WTP per household of both sub-samples for the three preservation projects. As said above the larger project of sub-sample 1 is the same as the smaller project of sub-sample 2. The third column of the table is the mean WTP at the lower bound, the fifth column at the upper bound and the fourth column the mean WTP calculated using the observations at the both bounds. The sums vary from FIM 159 to FIM 468 depending logically on the volume of conservation, i.e. the larger is the area to be set aside the more people are willing to pay for preservation.

<table>
<thead>
<tr>
<th>Sub-sample</th>
<th>Additional conservation</th>
<th>Mean willingness to pay FIM/household/year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>at the lower bound</td>
<td>at the upper bound</td>
</tr>
<tr>
<td>Sub-sample 1</td>
<td>155,000 ha</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>430,000 ha</td>
<td>194</td>
</tr>
<tr>
<td>Sub-sample 2</td>
<td>430,000 ha</td>
<td>221</td>
</tr>
<tr>
<td></td>
<td>705,000 ha</td>
<td>291</td>
</tr>
</tbody>
</table>

**Benefit transfer criteria**

According to Desvousges et al. (1992) the following conditions should be realized in order to get reliable results with the BT method:

1. The data set of a study site should be of good quality so that proper scientific methods have been used in its collection. The data set by Mäntymaa et al. (2000) fulfills these criteria.

2. The presumed change of quality or quantity should be of the same size both at the study site and policy site. While there is no information of potentially protected areas in Karelia this criteria will be left out of the analysis.
3. The study should include regression results that describe WTP as a function of socio-economic factors. It would be possible to construct a linear regression model using the data set of the study site. The criterion is not used here because corresponding data are not available and function transfer will not be applied in this study.

4. The study site and policy site should physically be similar. This criterion holds true quite well.

5. Markets should be similar. This is not true since markets differ substantially. In applying this criterion in this experiment one should take into account
   a) differences in recreational use of forests,
   b) direct benefits of households from use of forests,
   c) differences in availability of substitutes,
   d) differences in industrial use of forests and
   e) proportion of the available income of households between countries.

Based on the criteria above the BT coefficient will be constructed or the sign of the coefficients will be assessed (Table 2).

**Applying the benefit transfer criteria**

**Income criterion**

In order to take into account differences of available income of households two alternatives will be presented for income coefficients (OECD 1997a, OECD 1997b and Tilastokeskus 1999). As an approximation, although inexact, of difference of income the ratio of the gross national products (GNP) per capita between countries is used.

\[
\frac{\text{GNP per capita in Russia 1996 (USD)}}{\text{GNP per capita in Finland 1996 (USD)}} = \frac{2977}{24235} = 0,12
\]

or

\[
\frac{\text{GNP per capita in Russia Karelia 1996 (USD)}}{\text{GNP per capita in Finland 1996 (USD)}} = \frac{2222,2}{24235} = 0,09
\]

If only this coefficient is used the WTP of the Russian people is 12 % and the Karelian people 9 % of the Finnish figures (see Table 2).

**Quality criterion**

Since more Karelian forests have still been preserved from commercial use their natural state and better biodiversity should be weighted in the BT. For this purpose the coefficient of environmental quality will be created where the numerator is the share of old growth forests of Karelia and the denominator the corresponding figure of Finland. There are several estimates of the former figure, but this study will use the figure by Myllynen & Saastamoinen (1995) (35 – 50 %). According to Finnish Environmental Centre the corresponding Finnish figure is 8,7 %.

\[
\frac{\text{Old growth forests in Karelia ()}}{\text{old growth forests in Finland (}}} = \frac{35}{8,7} = 4
\]

According to this Karelia has four times more old growth forests than Finland. Since old growth forests are an abundant resource in Karelia it should decrease the WTP of consumers for additional protection.
**Criterion of prevailing market**

In order to apply the criterion of the prevailing market in the BT one should take into account differences in recreational use of forests, direct benefits of households from the use of forests, availability of substitutes and industrial use of forests. With respect to this criteria a single coefficient will not be constructed but different factors and the direction of their effect will be analyzed only.

Recreational use of forests and its increase are seen as a possibility of future development since beautiful nature tempts tourists. Better possibilities to recreate in old growth forests increases WTP for protection.

Direct benefits of households from the use of forests include benefits that people get from berry and mushroom picking, fishing and hunting. The non-timber products have traditionally had a great importance in Russia and their high rate of utilization increases WTP for forest preservation.

People’s valuations are also influenced by the fact how easily a commodity can be replaced with a similar or some other commodity. Easy availability of substitutes decreases the uniqueness of commodities and reduces the WTP for its preservation. This factor is partly taken into account with quality criterion.

Forest industry is the most important industry in Karelia and timber is the most common export good being 61 % of the total export in 1995 (Haapanen & Eskelinen 1996). Decrease of logging has increased unemployment and reduced incomes especially in Karelian countryside (Ulkoasiainministeriö 1999). This tends to lower WTP for forest protection. On the other hand, the preservation of old growth forests also gives an advantage in competition in international markets. Thus the effect of forest industry on WTP is both positive and negative.

Table 2 gives a summary on the factors that should be taken into account when Finnish WTP figures are applied for assessing of a preservation value of Karelian forests. The weighting of the criteria depends, of course, on political selection of values.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Direction of the effect of the factor on WTP</th>
<th>Approximation of the coefficient or other effects to be taken into account</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income coefficient</td>
<td>- -</td>
<td>0,09 (Karelia) or 0,12 (Russia)</td>
</tr>
<tr>
<td>Quality coefficient</td>
<td>- -</td>
<td>More than 4</td>
</tr>
</tbody>
</table>

**Table 2. Factors that should be taken into account when Finnish willingness to pay figures are applied for assessing of a preservation value of Karelian forests.**
References


