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TRANSNATIONAL PARKS: INTERNATIONAL PUBLIC GOODS?

Abstract

The paper looks at the problem of protected areas that are divided by state borders. To the extent that these habitats are of value for the two neighbouring countries, they have to be considered public goods from the point of view of the two constituencies. Hence, like all public goods, they can be affected by free riding. We state two hypotheses. One asserts that citizens of a country involved may reveal a lower WTP for extending a national park anticipating that extension will be carried out at the other side of the border. The second asserts that – subject to certain conditions outlined in scenarios presented – WTP for extending a "domestic" part of the protected area is the same as WTP for extending a "foreign" part. We test these hypotheses using the results of choice experiments dealing with Fulufjellet – a border area protected by national parks in Sweden and Norway. It turns out that respondents do appreciate non-use benefits provided by the park located at the other side of the border. Nevertheless WTP patterns do not allow for treating the area as an international public good. The conclusions are fairly robust with respect to various econometric models extending the Random Utility Models. In particular, we used the Hybrid Mixed Logit (HXML) which combines the standard Mixed Logit with a Multiple Indicators and Multiple Causes (MIMIC) model. In this way, we are able to consider psychological factors – respondents' attitudes and beliefs towards different transboundary aspects of spatial conservation of natural forest ecosystems – as latent variables which influence stated preferences.

1. Introduction

With the establishment of the Yellowstone National Park in 1872, a new era of nature protection started. Almost every country demonstrates efforts aimed at conserving its biological resources. Yet nature does not recognize political borders and often calls for concerted actions undertaken by more than one country. There are a number of binational parks protecting precious ecosystems located near country borders. One of the well known examples is the *Friendship Park* along the United States-Mexico border in San Diego-Tijuana. Strictly speaking, however, its status is somewhat lower, as it is located within the Border Field State Park. Another attempt at creating an American-Mexican collaboration has been in the Rio Grande area, but for the time being there is only the American Big Bend National Park without a matching organization at the Mexican side. Perhaps the best example of a formalized transnational cooperation in nature conservation is the *Kgalagadi Transfrontier Park* where three countries are involved: Botswana, Namibia and South Africa. But there are a number of other projects of that sort, including *El Condor* (Peru and Equador), *La Amistad* (Costa Rica and Panama) and so on.

Sometimes the projects are undertaken with a specific objective to bring peace into a war-torn area. The Red Sea Bi-national Marine Peace Park – administered by the governments of Jordan and Israel

– serves as an example of this kind. On the border of Albania, Montenegro, and Kosovo there are three adjacent national parks. An idea emerged to establish the *Balkan Peace Park* out of them.

There have been several projects designed to establish transnational parks in Europe. *Natura 2000* is the most celebrated initiative undertaken in order to coordinate protection activities in the European Union, but it does not call for creating national parks. In addition there are many regional initiatives aimed at international cooperation, such as protection of the Wadden Sea (undertaken by the Netherlands, Denmark, and Germany), and the Danube River (undertaken by the riparian countries). On top of that there are a number of national parks, some of which protect adjacent areas in two or more countries, especially in the mountains (Pyrenees: Spain/France; the Alps: France/Italy, Switzerland/Italy; Tatra: Poland/Slovakia; etc.). Overall there are dozens of such cases in Europe.

Two specific cases were brought under closer scrutiny within the framework of the TRANPAREA project (http://tranparea.wne.uw.edu.pl): Fulufjellet in Sweden and Norway and Białowieza in Poland and Belarus. They are both binational and located at the outer borders of the European Union. But these are almost only similarities shared by the two study sites. Fulufjellet is a montane ecosystem not very well known in either of the countries. On the contrary, Bialowieza is one of the largest near-natural lowland forest of the European continent and very well known in Belarus and Poland. Both areas are mostly covered with forest. 73% of the Swedish park area is withdrawn from any logging activities, while 50% of the Norwegian part enjoys such a status. In the case of Białowieża, only 1/3 of the area is fully protected (specific numbers for Poland and Belarus are almost the same).

While economic investigations of national parks are fairly abundant, they are largely focused on benefits accruing to local populations due to increased tourism. To the best of our knowledge there have been no empirical studies addressing free riding problems caused by the circumstance that transnational parks may be underfunded due to the fact that one country expects the other one to contribute more. Environmental protection as a public good is analysed by economists routinely [see e.g. Zylicz 2000, Tisdell 2010, and Grunewald and Bastian 2015], but the free riding problem is understood mainly as a risk of inadequate supply of effort in general.

Economic literature scrutinising upon transboundary nature protected areas is rather scarce. As an example of the latter we should mention the work of Busch [2007] who applied game theoretical approach for the problem of optimal spatial allocation of the transboundary protected areas. Unlike other typical international public goods, which do not recognise borders, the matter whether the terrestrial transboundary nature protected areas qualify for international public goods is far from trivial, since unlike the sea or air quality, the area of a transnational park might be considered a combination of two national public goods – i.e. the area of a park considered "domestic" and the area of a park established by the neighbouring country. Looking at transboundary nature protected areas in the context of international public goods, we state two hypotheses:

H1: *Consumers in two countries consider the entire area as a public good, i.e. they care for either part equally.*

H2: *Consumers "free ride", i.e. they care for the transboundary site (including their "domestic" area) less, if they expect the neighbour to "compensate" by financing the area at the other side of the border.*

Additionally, inspired by Carson and Groves [2007], we consider a hypothesis stating that WTP (*Willingness To Pay*) for expanding the area of a park depends on the number of options respondents are faced with since choice tasks with different number of alternatives may exhibit a different level of incentive compatibility. In the current paper we fully scrutinise upon the testing of H1, whilst separate contributions planned will be dedicated to the remaining two considerations.

2. The data

In order to verify the hypotheses eight surveys have been planned to be carried out, four of which are pilot instruments, and four are the main ones. Respondents in all four countries (Sweden, Norway, Poland and Belarus) are to be surveyed twice: first they are confronted with pilot questionnaires, and then – with the main ones. The questionnaires were prepared in English, and then translated into Swedish, Norwegian Bokmål, Polish, and Russian (the English original of the questionnaire is included as Annex I).

Respondents are asked questions regarding their preferences with respect to improved conservation of the ecosystem protected by two spatially adjacent national parks: one located in their country and the other one located in the neighbouring country. Two national parks in every case have been designated in order to protect the national share of the transboundary natural site. In each case choice problems were phrased as a trade off between higher taxes and number of square kilometres put under more rigorous (professionally called "passive") protection. The latter, however, could be accomplished either by expanding the domestic park (implying higher taxes) or by expanding the neighbouring park (implying higher taxes and international money transfers).

Not all the surveys are ready for analyses at the beginning of the 2016. In this paper we rely on the data for the Swedish/Norwegian parks[1]. When the data on the Polish/Belarusian parks are ready, a comparison of the two areas will be made. For the time being, the data set allows for verifying the hypotheses H1 for the first two countries only. Hence we report the results of the Scandinavian case study alone, which included four surveys (two pilot plus two main ones) carried out in Sweden and Norway during autumn months of 2015.

Study site. The slopes of Fulufjellet mountain plateau, located on the border between Norway and Sweden – in Trysil/Hedmark and Älvdalen/Dalarna is one of the places in Scandinavia where fragments of the natural forest still remain. The total surface of the transboundary Fulufjellet area is around 700 square kilometres. About one fourth of this area is on the Norwegian side and about three fourths on the Swedish side of the border (see illustration in the body of the questionnaire in Annex I). The core part of the transboundary Fulufjellet mountain plateau is formed by open-space boreal

[1] For simplicity we use the Norwegian transliteration of the site's name – 'Fulufjellet' – by default, either meaning its Norwegian segment or the entire transboundary site. The latter case is often referred to in the paper as 'transboundary Fulufjellet'. However in cases where the Swedish segment is meant exclusively, we stick to the Swedish transliteration 'Fulufjället'

ecosystems, dominated by lichens vegetation. The forests in Fulufjellet are located primarily on the peripheries of the mountain plateau, on the steep slopes and in some of the cirques.

The elevation – a natural factor – limits the area's afforestation. In this climate zone, forest ecosystems disappear and change for the naked space at the altitude about 1000 m high. Stands' characteristics like diameter, height and timber stock decrease as altitude increases. Clearly, a conflict of natural versus production forest concepts – typical for many woodland regions – is also characteristic for Fulufjellet, where the majority of the surrounding forests have been transformed into a production monoculture. Therefore, the remaining natural forests of the site function as a sort of island of intact and semi-intact ecosystems, surrounded by the human-transformed areas. Since survival and intactness of the natural forests depend on space of their contiguous distribution, the matter of passive protection of the core area and its spatial extension on some adjacent forest areas comes into consideration. If human transformation is stopped under the passive protection, even the previously transformed forests will restore their natural processes and gain the semi-intact character in the long-term perspective, thus increasing the chances of survival for the natural forests in the entire Fulufjellet area. However, recent studies of the people's preferences concerning the desirable character and 'look' of forests – whether they should retain their intactness or be somehow adjusted to fulfil human visions and demand – produced rather mixed evidence (Giergiczny et al., 2015). Ideas of restoration of semi-natural character with once human-transformed forests give rise to controversy amongst both analysts and policymakers. Besides, some sort of tension exists between conservation and forestry interests around the site under consideration, which is nowadays under the legal protection in its core part only.

Both Swedish and Norwegian segments of the transboundary Fulufjellet were designated as National Parks fairly recently: in 2002 in Sweden, and in 2012 in Norway. Protection regime in the Scandinavian NPs seems tougher as compared with many of the European mainland analogues – first of all in terms of forestry management regulations. Thus, possibility of logging trees there is limited to safety reasons only. Other possible human activities (moose hunting, fishing, hiking, snow-scooter riding etc.) are well managed in accordance with the NP zoning and therefore have much less effect on the protected ecosystems, so they can be neglected in the current study context.

Both Swedish and Norwegian parts of the site have got "satellite" nature protected areas of less rigorous protection regime, like natural reserves (NR) Lillådalens (Sweden) and Fregn (Norway). The possibility of reasonable spatial enlargement of the passive protection regime might imply inclusion of those areas and/or expanding of the protection regime by the Fulan river in the North-East. Then natural connectivity would have been improved by means of protection regime unification and secondary forest would have been re-naturalised in some long-term perspective. The major forest areas currently not included in National Parks, on both sides of the border, are mapped on an illustration in the body of the questionnaire in Annex I as striped areas. However, whilst Lilladållens NR is bounded by the NP, Fregn NR is separated from the Fulufjellet NP by the afforested Bergåa river valley, which lacks any conservation status.

The survey questionnaire consisted of five parts, namely (1) introductory questions, (2) scenario, (3) discrete choice experiment itself, (4) debriefing block of attitudinal questions, and (5) a block of questions on respondent's socioeconomic characteristics.

Introductory questions have been asked in order to clarify the topic of the questionnaire to the respondent and investigate her profile as a forest visitor and ecosystem service consumer.

The scenario part explained in informative and neutral manner the essence of natural vs. production forest problem; passive protection concept in general, and its particular application to the study site. In this part of the questionnaire the proposed programme alternatives, attributes and their levels are presented together with other necessary elements of the subsequent choice experiment such as payment vehicle. The latter has been designed as a compulsory tax paid by each tax-payer in Norway and Sweden during a five-year period to a bilateral Fund, established exclusively in order to finance the common programme of spatial extension of the National Park regime regardless the particular side of the state border. It has been stated that financial means were necessary for the implementation of the new Fulufjellet protection programme, including payments to compensate the current owners of the new protected areas. Since both Swedish and Norwegian governments indeed provide monetary compensation to owners of forests, where economic activities are banned or limited as a result of the protection regime, such an element of the scenario has been supposed to be credible.

With the purpose of testing the H1, it has been explicitly communicated to the respondents that *"all the forest areas that are considered, from 20 to 60 square kilometres, and on both sides of the border, have the same protection potential in terms of providing future natural forest habitat for rare and endangered species"*, so the respondents did not have strictly conservationist reasons for systematically picking additional areas for conservation on one or the other side of the border.

Programme attributes and their levels are presented in the Table 1 in Annex II. Bid levels have been adjusted after the pilot results analyses within of the re-designing procedures, so they appeared different in the main version as compared to the pilot version of the questionnaire. While the initial set of bid levels for the two countries was calculated to ensure the equality of real values (taking PPP factor into consideration), the bid levels in the main survey design were determined also by the design efficiency.

The scenario has been verbalised in simple wording, information has been grouped into thematic sub-blocks, explained with graphic material, and several times interrupted with additional questions in order to facilitate respondents' correct understanding and keep them attentive. The respondents have explicitly been informed about their opportunity to pick the *status quo* (SQ) option in as many choice tasks as they want as well as about the possibility of policy consequences of the survey results.

The efficient experimental design with zero priors has been generated for the pilot survey. Three types with a different number of programme alternatives (one, two or three) plus SQ option, have been prepared with sixteen choice-cards for each modification. The efficient experimental design for the main survey has been generated using priors obtained from the pilot experiment. Three types (the same as in the pilot study) times four blocks in each type yield twelve modifications of the experimental design, so a particular respondent faced one set of sixteen choice-cards being chosen randomly out of the twelve possible sets. The web-based software tool, constructed for the survey administration has also provided the possibility of random rotation of the choice-cards sequence in order to avoid the order effects.

Debriefing block of attitudinal questions followed the choice experimental part of the questionnaire. A set of eleven questions has been prepared, which might explain individual perceptions and beliefs (e.g. patriotism, free-riding, plans to visit the site, etc.) underpinning specific aspects of the choice decisions made be the respondents. Some of the attitudinal questions have been country-specific while others – totally identical for both countries. The list of the attitudinal questions in both country specific versions is available in Table 2 in Annex II. All the attitudinal questions were of the identical closed type, implying the answer to be picked out of the ordered Likert scale.

Since representative panels of the Norwegian and Swedish citizens have been employed for the survey, some positions of socioeconomic profiles of the respondents were available automatically as they served as the recruitment criteria, such as respondent's age, gender, place of residence type, postal code, and education. Therefore the socioeconomic block of questions has been limited to few questions on the respondent's household structure, income and wealth.

The questionnaire has been translated into respectively Norwegian Bokmål and Swedish, developed in the form of software tool on the web-platform, and administered as a series of computer-assisted web interviews (CAWI) to the samples of Swedish and Norwegian panellists. Pilot sample included 458 Swedish and 282 Norwegian complete interviews, while the main sample included 889 and 902 complete interviews, respectively. Since the pilot interviews data has been included into the dataset, the total sample therefore counts 1347 Swedish and 1184 Norwegian interviews.

3. The econometric modelling

The Hybrid Mixed Logit model. Hybrid choice models allow analysts to incorporate perceptions and cognitive processes into a Random Utility Model (RUM) framework. In this study we develop a Hybrid Mixed Logit (HMXL) model which combines the framework widely adopted for analyzing DCE data, the Mixed Logit (Revelt and Train, 1998), with the Multiple Indicators and Multiple Causes (MIMIC) model (Jöreskog and Goldberger, 1975). Connecting discrete choice models with a MIMIC model is an emerging approach for incorporating psychological factors in the RUM framework. Most of the applications to date appear in the transportation literature (e.g., Vredin Johansson, Heldt and Johansson, 2006; Daly et al., 2012; Daziano and Bolduc, 2013). Applications in the environmental literature include Hess and Beharry-Borg (2012), Dekker et al. (2012), Czajkowski et al. (forthcoming), and Czajkowski, Hanley and Nyborg (forthcoming).

In the context of our application, we consider psychological factors – respondents' attitudes and beliefs towards different transboundary aspects of spatial conservation of natural forest ecosystems – as latent variables which influence stated preferences. Our hybrid choice model consists of two parts: a discrete choice component and measurement equations component. Below we describe each part in turn.

Discrete choice component. The theoretical foundation for the discrete choice model is random utility theory, which assumes that the utility a person derives depends on observed characteristics and unobserved idiosyncrasies, represented by a stochastic component (McFadden, 1974). As a result, individual i's utility resulting from choosing alternative j in choice set t can be expressed as:

$$V_{ijt} = a_i c_{ijt} + \boldsymbol{b}_i' \boldsymbol{X}_{ijt} + e_{ijt}\,, \qquad (1)$$

where the utility expression is assumed additively separable in the cost of the alternative, c_{ijt}, and other attributes, $\boldsymbol{X}_{ijt}$; a_i and $\boldsymbol{b}_i$ denote estimable parameters; and e_{ijt} is a stochastic component allowing for factors not observed by the econometrician to affect individuals' utility and choices. It should be emphasized that a_i and $\boldsymbol{b}_i$ are *individual*-specific, thus allowing for heterogeneous preferences amongst respondents and leading to a mixed logit model (MXL).[2] Assuming instead that parameters are the same for all respondents implies homogenous preferences and leads to the multinomial logit model (MNL) as a special case. We have estimated both ordinary MNL and MXL models within our study prior, and in addition to, HMXL model. Normalisation of the variance of the stochastic component of the utility function (e_{ijt}) leads to the following specification:

$$U_{ijt} = \sigma_i a_i c_{ijt} + \sigma_i \boldsymbol{b}_i' \boldsymbol{X}_{ijt} + \varepsilon_{ijt}. \quad (2)$$

Note that due to the ordinal nature of utility, this specification still represents the same preferences as (1) does. The estimates $\sigma_i a_i$ and $\sigma_i \boldsymbol{b}_i$ do not have direct interpretation, but if interpreted in relation to each other, the scale coefficient ($\sigma_i = \pi / \sqrt{6} s_i$) cancels out.

Given the interest in establishing estimates of WTP for the non-monetary attributes $\boldsymbol{X}_{ijt}$, it is convenient to introduce the following modification which is equivalent to using a money-metric utility function (also known as estimating the parameters in the WTP space; Train and Weeks, 2005):

$$U_{ijt} = \sigma_i a_i \left(c_{ijt} + \frac{\boldsymbol{b}_i'}{a_i} \boldsymbol{X}_{ijt} \right) + \varepsilon_{ijt} = \lambda_i \left(c_{ijt} + \boldsymbol{\beta}_i' \boldsymbol{X}_{ijt} \right) + \varepsilon_{ijt}. \quad (3)$$

Note that under this specification the vector of parameters $\boldsymbol{\beta}_i$ is now scale-free and can be directly interpreted as a vector of implicit values for the attributes, $\boldsymbol{X}_{ijt}$. All our discrete choice models have been estimated in the WTP space in tens of 2015 Euros adjusted by relevant PPP factors. In our HMXL model we also assume that the random parameters $\boldsymbol{\beta}_i$ and λ_i depend on individual-specific latent variables, denoted by $\mathbf{LV}_i$. The functional form of this dependence may vary due to distributional assumptions. In the analysis we use two distributions, normal (for all non-monetary attributes) and log-normal (for the cost attribute). For a normally distributed $\boldsymbol{\beta}_i$, this dependence is of the form:

$$\boldsymbol{\beta}_i = \Gamma' \mathbf{LV}_i + \boldsymbol{\beta}_i^*, \quad (4)$$

where Γ is a matrix of estimable coefficients and $\boldsymbol{\beta}_i^*$ has a multivariate normal distribution with a vector of means and a covariance matrix to be estimated. [3] Similarly, we assume that the cost coefficient follows a log-normal distribution:

$$\lambda_i = \exp\left(\phi' \mathbf{LV}_i + \lambda_i^* \right), \quad (5)$$

[2] It is typically assumed that individual parameters follow a particular distribution (possibly a multivariate distribution allowing for non-zero correlation of model parameters), rather than being separately estimated for each individual.

[3] The number of columns in Λ is equal to the number of latent variables and the number of rows is equal to the number of non-monetary attributes.

where $\boldsymbol{\phi}$ is a vector of estimable coefficients and λ_i^* follows a normal distribution with the parameters describing its mean and standard deviation to be estimated.[4] As a result, the conditional probability of individual i's choices in choice set t is given by:

$$P(y_i \mid X_i, \boldsymbol{\varepsilon}_i^*, \lambda_i^*, LV_i, \Lambda, \boldsymbol{\phi}, \boldsymbol{\theta}) = \prod_{t=1}^{T_i} \frac{\exp\left(\lambda_i \left(c_{ijt} + \boldsymbol{\beta}_i' \mathbf{X}_{ijt}\right)\right)}{\sum_{k=1}^{C} \exp\left(\lambda_i \left(c_{ikt} + \boldsymbol{\beta}_i' \mathbf{X}_{ikt}\right)\right)}, \tag{6}$$

where $\boldsymbol{\theta}$ is a vector of parameters on which λ_i^* and $\boldsymbol{\varepsilon}_i^*$ depend.

Measurement equations. The main purpose of including latent variables in the models is that they are describing some psychological factors. These factors usually cannot be measured in a direct way, unlike other individual characteristics such as age and gender. Instead a researcher must use various indicator questions in a survey, responses to which could be expected to be determined by the latent variables.

The model choice for the indicator equations depends on a particular application.[5] In this study we include one indicator of the latent belief over policy consequentiality of a survey, which was measured on a five-point Likert scale. The measurement equation is therefore modelled using ordered probit (OP). In the general case with more latent variables and more (ordered) indicator variables $\mathbf{I}_i$, the measurement component of the hybrid choice model can be specified as follows:

$$\mathbf{I}_i^* = \boldsymbol{\Gamma}' \mathbf{LV}_i + \boldsymbol{\zeta}_i, \tag{7}$$

where $\boldsymbol{\Gamma}$ is a matrix of coefficients and $\boldsymbol{\zeta}_i$ denotes a vector of error terms assumed to come from a multivariate normal distribution with zero means and an identity covariance matrix.[6] Under this specification, the relationship between I_{il} and I_{il}^* (for the l-th indicator variable which takes J possible, ordered values) becomes:

$$\begin{array}{lll} I_{il} = 1, & \text{if} & I_{il}^* < \alpha_{1l} \\ \vdots & \vdots & \vdots \\ I_{il} = k, & \text{if} & \alpha_{k-1l} \le I_{il}^* < \alpha_{kl}, \\ \vdots & \vdots & \vdots \\ I_{il} = J, & \text{if} & \alpha_{J-1l} \le I_{il}^* \end{array} \tag{8}$$

where the α's are the threshold parameters to be estimated for each indicator. This specification leads to the well-known ordered probit likelihood form for I_i:

$$P\left(I_i \mid \mathbf{LV}_i, \boldsymbol{\Gamma}, \boldsymbol{\delta}\right) = \prod_{l=1}^{L} P\left(I_{il} \mid \mathbf{LV}_i, \boldsymbol{\Gamma}_l, \alpha_l\right) = \prod_{l=1}^{L} \Phi\left(\alpha_{kl} - \boldsymbol{\Gamma}_l' \mathbf{LV}_i\right) - \Phi\left(\alpha_{k-1l} - \boldsymbol{\Gamma}_l' \mathbf{LV}_i\right), \tag{9}$$

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[4] λ_i^* can also be correlated with $\boldsymbol{\varepsilon}_i^*$.

[5] Many early hybrid choice model applications used a simple, linear regression even in cases where the dependent variable was clearly ordered (Daly *et al.*, 2012).

[6] It is important to note that the number of measurement equations need not equal the number of latent variables. For instance, cases may arise where more than one indicator for a latent variable may be available (e.g., there may be two survey questions targeting beliefs over policy consequentiality). This framework can accommodate such a setting by specifying multiple measurement equations for a single latent variable.

where $\Phi \cdot$ denotes the normal cdf, Γ_l and α_l are the l-th row of the $\mathbf{\Gamma}$ matrix and the vector of the threshold parameters for the *l*-th indicator variable, respectively.[7]

Finally, after combining equations, we obtain the full-information likelihood function for our HMXL model, where for ease of exposition we stack the parameter vectors $\mathbf{Л}, \mathbf{ф}_{\mathbf{и}}, \mathbf{Г}, \mathbf{б}$ into the single vector $\mathbf{Ш}$:

$$L_i = \int P\ \mathbf{y}_i \mid \mathbf{X}_i, \mathbf{в}_i^*, \lambda_i^*, \mathbf{Ш}\ P\ \mathbf{I}_i \mid \mathbf{Ш}\ f\ \mathbf{в}_i^*, \lambda_i^* \mid \mathbf{и}\ d\ \mathbf{в}_i^*, \lambda_i^* \quad . \tag{10}$$

As random disturbances of $\mathbf{в}_i^*, \lambda_i^*$ are not directly observed, they must be integrated out of the conditional likelihood. This multidimensional integral can be approximated using a simulated maximum likelihood approach.[8]

In order to make identification of hybrid choice models possible, the scale of every latent variable needs to be normalized (Daly *et al.*, 2012). We followed Bollen and Davis (2009) to ensure that the necessary condition for identification of structural equation models holds; in particular, the specification satisfies the "2+ emitted paths rule" (the LV has exactly one unique indicator in the measurement equation and is linked with six preference parameters in the discrete choice component).

4. The results

The modelling results are presented in the Table 3 in Annex II. The experimental model parameters in all the three model specifications are consistent with *a priori* expectations; the statistically significant standard deviations of random parameters in MXL model confirm the heterogeneity of preferences. MNL models, where the results obtained are treated as if a representative consumer was making a long series of independent choices, have been estimated for both countries. It turns out that despite respondents' positive preferences towards additional spatial extension of the passive protection regime on the adjacent forest areas in general, they have stated positive preferences for retaining the current situation. Both in the case of Norway and Sweden, WTP for retaining the *status quo* (SQ) is positive and statistically significant in MNL models.

However, MXL models which are based on somewhat weaker assumptions than MNL models (since they account for heterogeneity of preferences) have indicated that preferences of both Swedes and Norwegians concerning the SQ are different. Appropriate parameters for either country are statistically insignificant, but parameters with different programme alternatives considered are all positive and highly significant, thus indicating the general willingness to depart from the existing level of the site's passive protection towards spatial extension of the protection regime. Both Swedes and Norwegians are on average willing to pay positive amounts of money for any of the contemplated programmes of the National Park extension on the both sides of the border.

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[7] Note that this likelihood is a factor of likelihoods of each indicator separately. It is so due to the earlier assumption that $\mathbf{з}_i$ has an identity covariance matrix. This assumption is equivalent to assuming that whole correlation between indicator variables is explained by the latent variables used. However, this assumption can be relaxed, as in Bhat, Varin and Ferdous (2010).

[8] Our model assumes no correlations between the measurement, structural and choice components error terms. This is an issue which could potentially be pursued in the future to investigate if explicitly allowing for some of these correlations could improve the model performance or address the endogeneity issue better.

All the three models demonstrate the preference for an increase in the adjacent forest area to be covered by the protection regime in accordance with the appropriate programme alternative. However in none of the models does WTP increase linearly with the area supposed to be protected[9] (Table 4 in Annex II). What can be noticed is the general tendency for a decreasing marginal WTP per square kilometre when the conservation programme implies a greater magnitude of spatial protection.

In order to test of the main research hypothesis of the study (H1) which states that *the transboundary nature protection area considered is an international public good according to people's preferences,* restrictions have been imposed on appropriate parameters pairwise. The assumption has been made that WTP extension of the passive protection by additional 20 square kilometres on the Swedish side does not statistically differ from the WTP for conservation of the same additional area on the Norwegian side, and the same applied to the conservation of additional 40 square kilometres, and 60 square kilometres. Likelihood-ratio (LR) test has been performed in order to test the following hypothesis: *Value of the log-likelihood (LL) function in the case of the models with restrictions does not statistically differ from the same characteristics of the appropriate initial unrestricted models*.

As a result of the LR test, the hypothesis should be rejected for all model specifications estimated for both Sweden and Norway (appropriate p-value <0.0001). Therefore, all the models' parameters, in pairs representing marginal WTP for conservation of the same area in Swedish and Norwegian part of the Fulufjellet statistically differ from each other. Therefore, the main research hypothesis H1 implying that *passive protection of the transboundary Fulufjellet qualifies as an international public good in accordance with preferences of Norwegians and/or Swedes* has been rejected for all the considered model specifications at any considerable level of p-value.

Respondents' evaluation of the domestic part of the transboundary nature protected area was higher than that of its foreign part. This general tendency was noticeable in any of the models considered. Coupled with the positive and statistically significant WTP stated by both Norwegians and Swedes for protection of respective 'foreign' parts of the Fulufjellet, our results can be interpreted as follows. According to the preferences revealed in the representative sample of the two Scandinavian countries, two distinct national public goods exist rather than a single international public good. Citizens of a particular country – be it Sweden or Norway – on average have positive WTP for protection of the foreign national public good, but their WTP appears to be statistically lower than for the protection of the domestic national public good.

Determinants of such preferences could be examined with the help of a model with hybrid specification, which accounts for interrelationships between people's preferences for the good considered with their attitudes and visions. Such a modelling is based on the assumption that latent variables exist which absorb some unobserved characteristics influencing the preferences of respondents who thus fall into some particular classes. The sign of an appropriate (statistically

[9] Assuming non-linearity of the models in the area to be protected, the appropriate programme attributes instead of two continuous variables, have entered the empirical utility function as six dummy-coded variables: NO+20, NO+40, NO+60, SE+20, SE+40, SE+60. For instance, a programme of expanding passive protection by additional 40 sq.km in the Norwegian part of Fulufjellet has been coded as a dummy variable NO+40 which took a value 1 if such an extension was contemplated under appropriate programme alternative and 0 otherwise. At the same time bid has been coded and entered the models as a continuous variable.

significant) parameter with latent variable shows whether people in some group on average tend to agree or disagree with a given statement. Parameters found to be statistically insignificant are interpreted as a lack of a firm attitude. Parameters with interactions of a latent variable with the experimental programme variables indicate whether the fact of falling into some group in accordance with relatively higher or lower value of the individual latent variable increases or decreases individuals' WTP for the appropriate programme attribute.

We have estimated two identical hybrid models – one on the Norwegian and another one on the Swedish data – where the set of three latent variables has been employed. Two latent variables (LV1 and LV2) have been used in order to provide explanation of people's different WTP for the domestic and foreign parts of Fulufjellet, whilst the third latent variable LV3 has been reserved for the questions about respondents' intention to visit the Norwegian and Swedish parts of Fulufjellet within the five coming years. An OP model has been estimated in order to explain the respondents' answers to the attitudinal questions with the impact of the latent variables. The interrelationships found are presented in Table 5 in Annex II.

5. Discussion

Negative and significant parameters with variable LV3 in all measurement equations both in the case of Sweden and Norway can be interpreted that, on average, respondents do not intend to visit Fulufjellet within the five coming years. Parameters with interactions of the LV3 with the discrete choice model variables indicate that LV3 decreases WTP for all the programme attributes and increases their WTP for the SQ option. The interpretation of the latter seems to be straightforward: WTP for protection of Fulufjellet is negatively affected by the site's weak reputation as a visiting destination. National Parks on both sides were established fairly recently: in 2002 on the Swedish side, and in 2012 on the Norwegian side. It seems that by now the site implies low use value due to its low popularity both in Sweden and Norway.

Both in the case of Sweden and Norway, introduction of the two latent variables LV1 and LV2 into the model clearly separates the two tendencies with respondents' preferences and attitudes. The main consequence of such a division is a striking difference in preferences towards additional spatial protection of Fulufjellet. Greater individual LV1 makes the respondents both in Norway and Sweden state (on average) a lower WTP for retaining the current state and, on the contrary, to state (on average) a higher WTP for all the programme attributes connected with the spatial extension of the protection regime in adjacent forests. Since such behaviour is fully consistent with our *a priori* expectations about a 'conservationist' respondent profile, for the purposes of greater simplicity, below we refer to the 'conservationist variable' in order to identify and denote LV1.

However, consequences of having greater individual LV2 are less straightforward and to a large extent they are country-specific. Respondents having higher LV2 in Sweden exhibit a consistent 'non-conservationist' tendency in their preferences – they tend to state higher WTP for keeping the SQ option and (on average) they state lower WTP for any level of protection regime spatial extension. However, a group of respondents with higher individual LV2 in Norway apart from stating on average higher WTP for the SQ and lower WTP for spatial enlargement of the passive protection in their homeland, state on average a higher WTP for extension of the National Park on

the Swedish side of the border. Therefore, we did not dare to apply any clear-cut definition of this variable and we refer to it as the ‘other variable’.

Both parameters with latent variables LV1 and LV2 in measurement equations demonstrate respondents’ negative answers to attitudinal questions in most cases. The exceptions are mostly country-specific but the fact that in both countries, respondents having higher ‘conservationist variable’ have expressed their higher consent with the statement that the neighbouring country in their opinion will enlarge the spatial protection of Fulufjellet on its side anyway, regardless of the success of the conservation programme contemplated in the questionnaire. At the same time, the opposite is true for the respondents, having higher ‘other variable’ who (on average) seem to disagree with this statement.

The appropriate statement was included into the questionnaire in order to examine whether transboundary NPAs considered are subject to sort of ‘international free-riding’. The latter is defined by us as a respondents’ tendency to understate their WTP for the international public good because of their expectations that the neighbouring country will protect it anyway and it will finance appropriate activities. Empirically, it means that respondents trust in unconditional unilateral conservation action of the neighbouring country, i.e. that somebody else will pay, has a negative impact on her decision to enter the market (Voltaire et al., Working Paper). However, this attitudinal difference between those who have higher individual ‘conservationist variable’ and those having higher ‘other variable’ seems to be of little explanatory power for the phenomenon of different WTP for the unit of domestic and foreign part of the transboundary Fulufjellet.

On the contrary to their Swedish counterparts, Norwegian respondents belonging to the group with higher individual ‘conservationist variable’ seem to be driven by 'patriotic' values which underpin their preferences to some considerable extent. Positive and statistically significant parameter of measurement equation in case of the statement *I prefer better to protect the Norwegian side of Fulufjellet because it belongs to Norway* provides a straightforward explanation of the phenomenon of difference in WTP for the National Park extension in Norway and Sweden. Therefore, 'patriotic' values in the case of Norwegian respondents with higher individual LV1 collide with the very essence of the international public goods. At the same time, statistically different WTP is being assigned to Norwegian and Swedish parts of the transboundary Fulufjellet by the Norwegian respondents belonging to the group with higher ‘conservationist variable’. It means that from the perspective of their preferences two public goods of national significance exist in this case, and despite the fact that both goods are appreciated by the Norwegian ‘conservationist’ respondents, a relatively greater value is assigned by them to their domestic public good rather than to the foreign one. The tendency of deriving ‘patriotic premium’ is consistent with findings of e.g. Dallimer et al. [2015] concerning the case of other (not transboundary) international public goods.

Besides the 'patriotic' visions of the Norwegian ‘conservationist’ respondents, their opinion that Norway will behave in a more credible way then Sweden, when it comes to compliance with a bilateral agreement seems to be another logical explanation for their preferences. The appropriate parameter of measurement equation is positive and statistically significant, so (on average) it drives stated WTP of the Norwegian ‘conservationists’ in the same direction as their 'patriotic' considerations do.

Contrary to the Norwegian ‘conservationist’ respondents, the Norwegian respondents with higher ‘other variable’ do not seem to be driven by the same considerations. Moreover, Norwegian respondents with the higher individual ‘other variable’ state almost a reverse preference relation, as they (on average) assign a higher WTP for an extended protection of the Swedish part of the Fulufjellet and a lower WTP for their domestic part. In accordance with the OP model, the respondents of this profile (on average) do not reveal any 'patriotic' attitude towards the transboundary Fulufjellet, neither do they suspect poorer international credibility of Sweden as compared to Norway.

One possible explanation of these preferences could be respondents' desire to retain the possibility of timber logging in the Norwegian part of Fulufjellet combined with its extended protection on the Swedish side. In such a case their WTP could have been interpreted as a sort of transboundary environmental 'offset' offer. Since, according to the hybrid modelling results, the Norwegian respondents with the higher individual ‘other variable’ are rather sceptical about the possibility of Sweden’s unilateral conservation action for Fulufjellet, they seem to offer a sort of compensation for conservation of a larger forest area on the Swedish side instead of doing it on the Norwegian side. Underpinning reasons for such an 'offset' offer could vary greatly, from the efficiency improvement to solidarity and altruism towards the local Norwegian forest owners and/or loggers in Fulufjellet. Nevertheless actual reasons cannot be identified unambiguously given information available in our survey. The tendency of the Norwegian ‘other’ respondents to increase (on average) their WTP for conservation of the foreign part of Fulufjellet at the expense of their WTP for its domestic part is fairly obvious, assuming that they understand the Fulufjellet as an international public good.

Both groups of the Norwegian respondents were rather sceptical about the idea that *the participation of Norway in the programme funding should be higher than the participation of Sweden because Norwegians are wealthier*. Therefore it would be legitimate to assume that both groups of Norwegian respondents differ from each other by looking at specific attributes of the bilateral conservation programme rather than by looking at the very essence of the participation principle. Whereas the Norwegian ‘conservationists’ i.e. respondents with higher individual LV1 are willing to participate by paying more for conservation of the additional Norwegian area, the Norwegian ‘others’ who, in turn have higher individual LV2 rather prefer to pay more for conservation of additional Swedish area instead.

Contrary to their Norwegian counterparts, representatives of the Swedish ‘conservationist’ group do not exhibit positive interrelationship between their support of 'patriotic' values on the one hand and conservationist preferences on the other. Moreover, Swedish respondents both having ‘conservationist’ and ‘other’ preference profile exhibit almost the same pattern in their answers to the attitudinal questions. The only clear exception is their attitude to the question *I expect Norway to extend the National Park of Fulufjellet on its side of the border whether or not the bilateral programme discussed in the questionnaire is implemented* which is positive with the Swedish ‘conservationist’ group and negative with the Swedish ‘others’. However, though this difference mimics the difference which is observed between the impact of two latent individual variables on respondents’ attitudes in the Norwegian case, it can hardly explain the totally reverse preference profiles of the two groups concerning the extension of the passive protection in the Fulufjellet.

Besides, Swedish ‘conservationists’ seem to be not sure if Sweden should contribute to the bilateral protection programme for the Fulufjellet to a greater extent than Norway or not (because of the spatial disproportion), while the respondents from the Swedish ‘others’ are (on average) negative to it. However, since neither group of Swedish respondents demonstrates a clearly positive attitude to the idea that Sweden should contribute to the bilateral protection programme to a larger extent as a country owning and governing the bigger share of Fulufjellet, the difference between negative and ambiguous (or neutral) attitude to it does not seem to be crucial.

Therefore, contrary to the case of Norwegian respondents, there is no obvious explanation based on the modelling results why Swedish respondents (on average) state larger marginal WTP for passive protection of an additional spatial unit of forests in their domestic part of the Fulufjellet than in the Norwegian part. It seems that in the case of Swedish respondents a principal division between the impact of the two latent variables lies in the fact that while the ‘conservationists’, i.e. those with higher individual LV1 state higher WTP for protection of the transboundary Fulufjellet in principle, the ‘others’, i.e. those having higher individual LV2 do not. However, neither group fully accepts for the idea of the Fulufjellet as an international public good: while the former do not really consider it *international*, the latter do not even treat it as a *public good*.

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Annex I

You are kindly asked to fill in the attached questionnaire prepared at the order of the University of Warsaw and the Institute of Transport Economics, Oslo. It will take you about 20 minutes.

While answering the questions please remember to express your own opinion exclusively. There are no good or bad answers to the questions contained in the questionnaire, all answers are valuable to us.

The questionnaire is anonymous, which means that no individual person can be identified from the responses to our survey. All results will be presented as sums or averages.

I. Recreation in the forest

1. How often have you been to the forest in the last 12 months?

1.1. At least three times a week
1.2. Once or twice a week
1.3. Several times a month
1.4. About once a month
1.5. One or several times a year
1.6. I haven't been to the forest in the last 12 months -> Go to question 5.

2. Please think about your typical visit to the forest in the last 12 months. How far was the forest from the place of your residence?

2.1. Less than 1 km
2.2. 1 -3 km
2.3. 4 -6 km
2.4. 7-10 km
2.5. 11-20 km
2.6. 21-50 km
2.7. 51-100 km
2.8. 101-200 km
2.9. More than 200 km

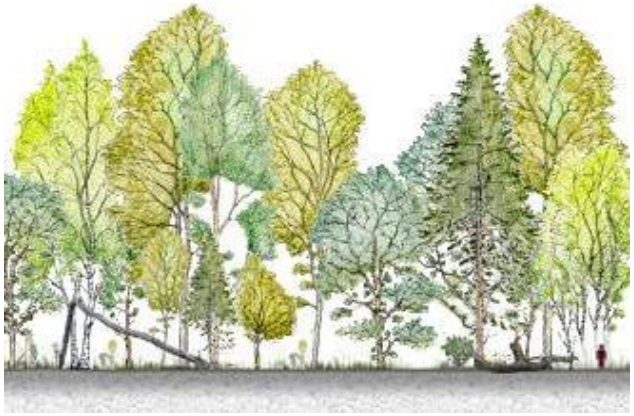
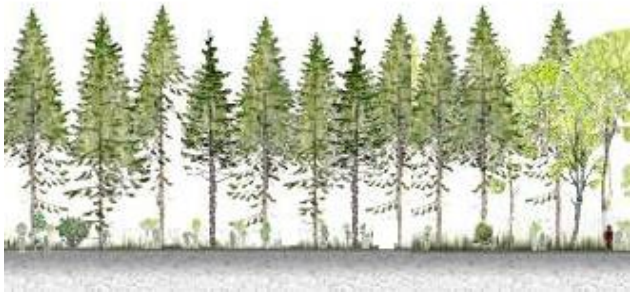
3. What did you do in the forest that you usually visited during the last 12 months? (you can choose more than one answer)

3.1. I walked
3.2. I watched the nature
3.3. I played sports, exercised, jogged
3.4. I picked mushrooms/berries
3.5. I hunted
3.6. Other activities (specify) _____

II. Production forest and natural forest

Forests cover nearly 40% of Norway's surface. Forests fulfil various functions: they are used for wood and energy production, for relaxation, and they are the place of living of many species of plants, animals and fungi. Forests also protect the soil against erosion, regulate hydrographic conditions and the local climate.

Dependent on the level of human interference into forest development processes, **natural** and **production** forests can be distinguished.

Natural forest	**Production forest**
	
	
In the natural forest 1) Trees are not cut down. They are left in the forest until they get old, fall and decay. 2) Trees seed and grow naturally. 3) Trees of various age are growing next to one another. 4) There are usually many species of trees. 5) There is a lot of dead wood (ca. 100 m^3/ha). 6) Greater diversity of species of plants, animals and fungi. Many **rare** (endangered) species grow only in natural forests.	**In the production forest** 1) After attaining a certain age the forest is logged. There are hardly any single old trees. 2) The majority of trees are being human-planted on the former cuts. 3) Trees are mostly of the same age. 4) One tree species is dominant (in Norway it is usually the spruce or pine tree). 5) There is a small volume of dead wood (ca. 6 m^3/ha). 6) Relatively small diversity of species of plants, animals and fungi. Rare (endangered) species do

	not have good conditions in production forests.
Natural forests cover an area of ca. 6000 km^2 in Norway, which constitutes about 5% of the forest area.	Around 95% of Norway's forests can be described as production forests.

QUESTION? Please check your understanding of natural forests and production forests:

	Difficult to understand	Neither easy nor difficult	Easy to understand
Production forests are used for production of wood, usually with one dominant tree species and trees of similar age.	☐	☐	☐
Natural forests fulfil protective functions, with several tree species of various ages, providing living areas for many rare and endangered species.	☐	☐	☐

Production forest areas that border with natural forests will, under **protection**, after a long time period start resembling natural forests.

III. Fulufjellet

Please get familiar with the basic facts about the forest on the slopes of Fulufjellet.

One of the places in Scandinavia where fragments of the **natural forest** remain is on the slopes of Fulufjellet mountain plateau, located on the border between Norway and Sweden – in Trysil/Hedmark and Älvdalen/Dalarna.

4. Have you ever been to the Fulufjellet?

4.1. Yes, on the Norwegian side (how many times?)_____

4.2. Yes, on the Swedish side (how many times?)_____

4.3. No, never -> go to Part IV

5. When were you last in the Fulufjellet?

5.1. In the last 12 months

5.2. More than 12 months ago but less than 5 years ago

5.3. 5 years ago or more

6. What was the <u>main</u> reason for your visit to the Fulufjellet?

6.1. To watch the Njupeskär waterfalls

6.2. To watch animals and plants / wildlife
6.3. To rest close to nature
6.4. With business purposes/being on mission
6.5. I have family/friends in the immediate neighbourhood
6.6. Other reasons (specify) _____

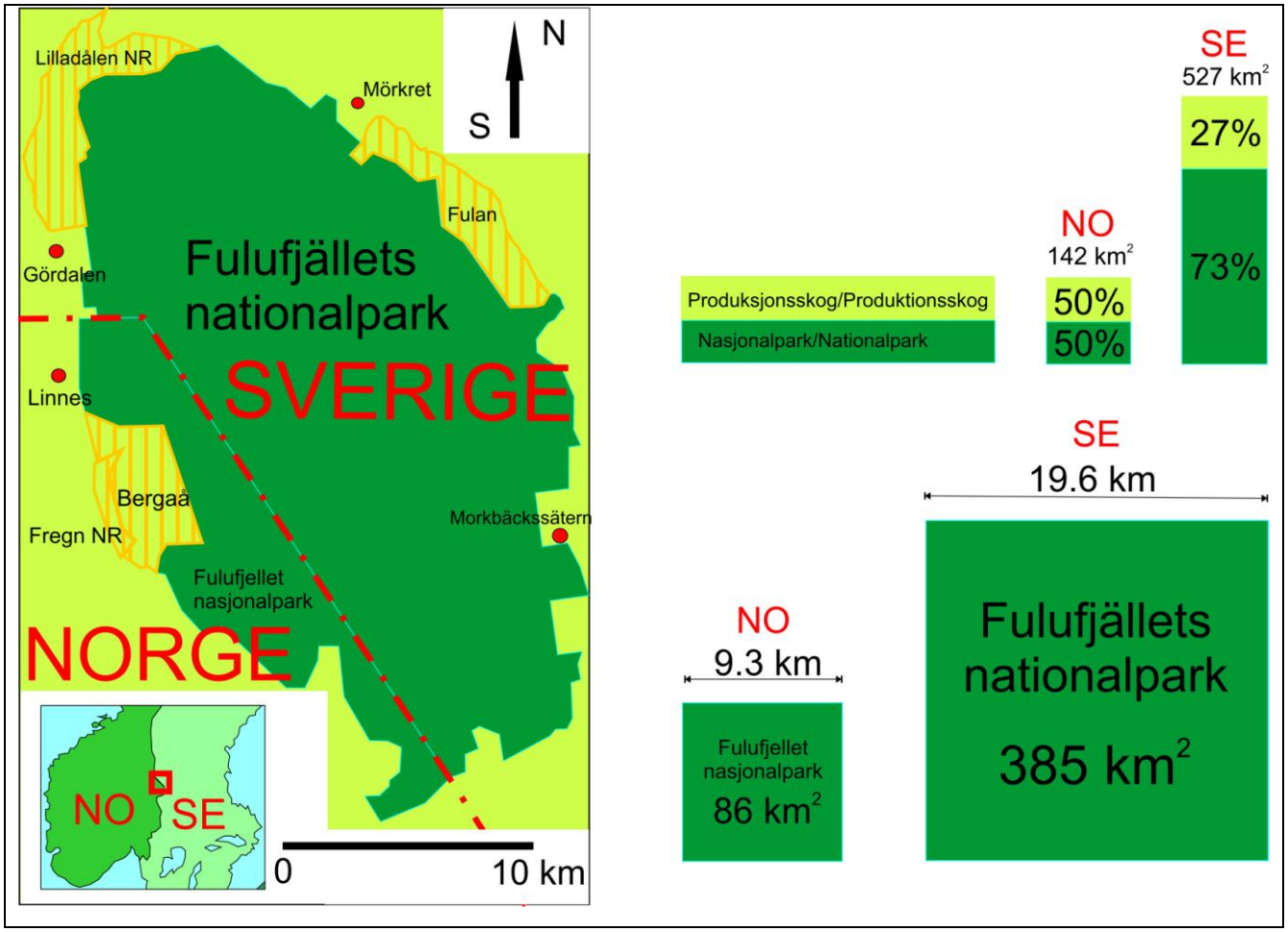
7. Did you visit any of the following places while in the Fulufjellet? (you can choose more than one answer)

7.1. Njupeskär waterfalls trail
7.2. The National Park in general
7.3. The National Park's Visitor Centre
7.4. The forest
7.5. The naked rocks

IV. The forest within and outside Fulufjellet National Park

The total surface of the Fulufjell/Fulufjäll area is about 700 square kilometres (km^2). About one fourth of this area is on the Norwegian side and about three fourths on the Swedish side of the border.

The forests in Fulufjellet are located primarily on the peripheries of the mountain plateau, on the steep slopes and in some of the cirques. Some major forest areas currently not included in Fulufjellet National Park, on both sides of the Norwegian-Swedish border, are mapped below (as yellow-striped areas).



QUESTION? Please check your understanding of the map and the meaning of the areas and colours:

	Difficult to understand	Neither easy nor difficult	Easy to understand
The red line marks the border between Norway (NO) and Sweden (SE).	☐	☐	☐
A larger share of Fulufjellet is on the Swedish side (ca 527 km^2, vs ca 142 km^2 in Norway), and a larger share on the Swedish side is currently a national park (ca 73%, vs ca 50% in Norway).	☐	☐	☐
The dark green area is the transboundary national park, that consists primarily of naked rock and some natural forest.	☐	☐	☐
The Swedish national park area would equal a square where all sides are about 19.6 km of length; while the Norwegian national park area would equal a square where all sides are about 9.3 km of length.	☐	☐	☐
The yellow-striped areas are forest areas outside the national park.	☐	☐	☐

The three yellow-striped areas and other forest areas outside the national park are now mostly closer to production forests than natural forest. However, because these areas border with natural forests in the national park, if **protection based on natural development** was also introduced in these areas, after **about 200 years** these forests would be close to natural forests, both as regards more large and old trees, more deadwood, and more species of animals, plants and fungi.

Increasing the size of the protected natural forest area in Fulufjellet would provide a larger living area for many rare and endangered species, thus increasing the probability for their survival.

However, increasing the national park area would imply restrictions on human activity. In addition to a ban on logging and use of motor vehicles, hunting and fishing might also be

One of the three yellow-striped forest areas in Sweden, Lillådalen (to the north), already has some level of protection. The yellow-striped forest area on the Norwegian side, Bergådalen (to the west) has been subjected to tree logging in recent years, but, if protected, it could serve as a link between Fulufjellet national park and the small, protected area, Fregn.

restricted.

8. **What would be your initial reaction to a proposal of extending the national park area in Fulufjellet, including more forest that over time can develop towards natural forest?**
   I would have supported the proposal of extending the national park

   I would not have supported the proposal of extending the national park

   I don't know

V. V. The Fulufjellet protection programme

It is currently being considered if the programme aimed at increasing the protection of selected forest areas of Fulufjellet can be implemented in Sweden and Norway.

Three alternative levels of national park extension are considered, on each side of the border, that would cover forest areas that over time would resemble natural forest:

20 km^2

4.5 km

40 km^2

6.3 km

60 km^2

7.7 km

You can assume that all the forest areas that are considered, from 20 to 60 km^2, and on both sides of the border, **have the same protection potential in terms of providing future natural forest habitat for rare and endangered species**.

These three alternative levels of national park extension could comprise part of the three yellow-striped areas that you saw on the map of Fulufjellet (Lillådalen, the Fulan river area, and Bergådalen), or they could comprise even more forest areas.

20 km^2 is an area of smaller size than one of the yellow-striped forest areas, while 60 km^2 is an area of a size that is somewhat larger than two of the yellow-striped forest areas.

QUESTION? Please check your understanding of the alternative forest areas:

	Difficult to understand	Neither easy nor difficult	Easy to understand
A forest area of 40 km^2 has the same size as a square where all sides are about 6.3 km of length.	☐	☐	☐
Size matters. Increasing the area of protected forests will increase the probability for the survival of rare and endangered species.	☐	☐	☐

PLEASE, NOTE THE FOLLOWING:

- Financial means are necessary for the implementation of the new Fulufjellet protection programme, including for payments to compensate the current owners of the new protected areas.
- Suppose that the Norwegian and Swedish governments are expected to establish a common Fund responsible for coordination of the forest protection programme and the Fund would have at its disposal means from **taxes** paid by **each tax-payer** in Norway and Sweden during a **five-year period**.

QUESTION? Please check your understanding of the need for financing national park extensions:

	Difficult to understand	Neither easy nor difficult	Easy to understand
You could have to incur costs as a result of each option of additional forest area protection.	☐	☐	☐
The increased income tax could be spent on other governmental tasks, or you could spend the money on other purposes, if the protection programme is not launched.	☐	☐	☐

9. You will be presented with 16 comparisons of different options of the extension of the protection of forest areas on the slopes of Fulufjellet. Each option in a comparison is described by

- **the national park extension on the Norwegian side,**
- **the national park extension on the Swedish side, and**
- **the cost for yourself.**

NOTE:

- In some comparisons you may find that one option implies more forest protection for a lower cost compared to the other option. Please, just indicate for each comparison the best option **from your point of view**.

- One of the options available in each comparison is "no change" at zero cost.
- Your answers could be considered in the decision-making.

Protection programme	**No change**	**Option 1**	**Option 2**
National park extension on the Norwegian side of Fulufjellet (share of the area protected on the Norwegian side)	**+ 0 km^2** (50%)	**+ 20 km^2** (61%)	**+ 40 km^2** (72%)
National park extension on the Swedish side of Fulufjellet (share of the area protected on the Swedish side)	**+ 0 km^2** (73%)	**+ 60 km^2** (85%)	**+ 20 km^2** (77%)
Additional amount of income tax, which you would have to pay annually during five years	**0 kroner**	**500 kroner**	**750 kroner**
Your choice	☐	☐	☐

+15 choice-sets

10. How important were the three aspects of the forest protection in your choices between alternatives.

	I have taken it into account – it is very important	I have taken it into account – it is less important	I have payed no attention to it at all
National park extension on the Norwegian side of Fulufjellet	☐	☐	☐
National park extension on the Swedish side of Fulufjellet	☐	☐	☐
Additional amount of income tax you would have to pay annually during five years	☐	☐	☐

11. (For those who have consequently chosen no change option). **Please tick the statement below that best represents your position:**

1)	Understanding the alternatives was difficult. Picking **No change** was the easiest choice.	☐
2)	I would not like my money to be spent on conservation of forest in Fulufjellet.	☐
3)	I do not care about the future of the forest in Fulufjellet.	☐
4)	All the option but **No change** were too expensive.	☐
5)	Financing of nature conservation programs is a duty of government, not mine.	☐
6)	Other. Please, specify_____ _____	☐

Protection of nature that is shared between two or more countries is an issue in many areas of the world, including many European countries. There will of course be different opinions about a proposal of extending the binational Fulufjellet National Park and about the financing, as it will be for the protection of other transboundary nature areas. We have collected a set of such reactions to the proposal. You may find some of the following statements strange in a Scandinavian context, but please indicate if you agree or disagree.

12. Do you agree or disagree with the following statement:

	I definitely do not agree	I quite don't agree	I neither agree nor disagree	I quite agree	I definitely agree	It is hard to say
I expect Sweden to extend the National Park of Fulufjellet on its side of the border whether or not the bilateral programme discussed in the questionnaire is implemented.	☐	☐	☐	☐	☐	☐
I expect Norway to comply with the international agreement to a larger extent than Sweden.	☐	☐	☐	☐	☐	☐
I am afraid that money spent on the protection on the Swedish side of Fulufjellet could be misused.	☐	☐	☐	☐	☐	☐
I believe that the participation of Sweden in the programme funding should be higher than the participation of Norway because the area of Fulufjellet on the Swedish side is greater than on the Norwegian side.	☐	☐	☐	☐	☐	☐
I believe that the participation	☐	☐	☐	☐	☐	☐

of Sweden in the programme funding should be higher than the participation of Norway because the Swedish population is greater than the Norwegian population.						
I believe that the participation of Norway in the programme funding should be higher than the participation of Sweden because Norwegians are wealthier.	☐	☐	☐	☐	☐	☐

Here are some further statements. Please indicate if you agree or disagree.

14. Do you agree or disagree with the following statements:

	I definitely do not agree	I quite don't agree	I neither agree nor disagree	I quite agree	I definitely agree	It is hard to say
I prefer better to protect the Norwegian side of Fulufjellet because it belongs to Norway.	☐	☐	☐	☐	☐	☐
I believe that the tax values presented in the questionnaire, connected with different options of Fulufjellet protection programme are real tax rates that may be introduced.	☐	☐	☐	☐	☐	☐
I expect the results of this survey to be used for the selection of the new protection programme for Fulufjellet.	☐	☐	☐	☐	☐	☐
I expect to visit the Norwegian side of Fulufjellet in the next five years.	☐	☐	☐	☐	☐	☐
I expect to visit the Swedish side of Fulufjellet in the next five years.	☐	☐	☐	☐	☐	☐

The remaining part of the questionnaire relates to you sociodemographic characteristics. We remind that the survey is anonymous, the obtained data serves to statistical purposes exclusively.

M1. Please, specify your sex

☐ Male ☐ Female

M1a. Please indicate your postal code

M1b. Please specify your location

M2. Please specify the type of your settlement

Rural area (sparsely populated area)	☐
A town with 200 – 1000 inhabitants	☐
A town with 1000 – 5000 inhabitants	☐
A town with 5 – 25 thousand inhabitants	☐
A town with 25 – 100 thousand inhabitants	☐
A city with over than 100 thousand inhabitants	☐

M3. Please, specify the year of your birth

19

M4. What is your education? Please, choose from the following options

primary	☐
secondary	☐
secondary-technical	☐
higher	☐
difficult to answer	☐

M5. Have you got children?

☐ Yes ☐ No

M6. What is the structure of your household (including yourself)?

Under 'household' we here understand the people who live in the same house/apartment and have the common family budget

Number of adult persons	

Number of currently employed persons	
Number of children below 18 years old	

M7. Please, specify those positions from the listed below which reflect best your average monthly net individual income as well as the average monthly net income of your household (that is the income after tax paying). Please, account for all the sources of income including salaries, pension, capital income (like deposit interest, dividends etc.).

Kr	Average monthly net individual income	Average monthly net income of the household
0 - 10 000	☐	☐
10 001 - 20 000	☐	☐
20 001 - 30 000	☐	☐
30 001 - 40 000	☐	☐
40 001 - 50 000	☐	☐
50 001 - 60 000	☐	☐
60 001 - 70 000	☐	☐
80 001 - 90 000	☐	☐
90 001 - 100 000	☐	☐
100 000 - 120 000	☐	☐
Over 120 000	☐	☐
Difficult to answer	☐	☐

M8. Please pick from the list below the option which is the best to describe the financial state of your household

We are short of funds even to cover the primary demand	☐
We have to deny ourselves many things in order to sustain our living	☐
We cover everyday needs however we are lack of money on substantial goods	☐
We have enough money and are able to save a part of them to purchase substantial goods	☐
We have enough money and do not have to save on substantial goods	☐

It is difficult to answer	☐

Thank you for your participation!

If you like, you may leave your comment about this survey.

Annex II

Table 1 – Programme attributes and their levels

Programme attribute	Levels in the pilot survey		Levels in the main survey	
National park extension on the Norwegian side of Fulufjellet	+0 sq.km +20 sq.km +40 sq.km +60 sq.km SQ=+0		+0 sq.km +20 sq.km +40 sq.km +60 sq.km SQ=+0	
National park extension on the Swedish side of Fulufjellet	+0 sq.km +20 sq.km +40 sq.km +60 sq.km SQ=+0		+0 sq.km +20 sq.km +40 sq.km +60 sq.km SQ=+0	
Additional amount of income tax, which you would have to pay annually during five years	Norway	Sweden	Norway	Sweden
	135 NOK 270 NOK 405 NOK 540 NOK SQ=0	130 SEK 260 SEK 390 SEK 520 SEK SQ=0	125 NOK 250 NOK 375 NOK 500 NOK SQ=0	100 SEK 200 SEK 300 SEK 400 SEK SQ=0

Table 2 – Attitudinal questions

Attitudinal questions For the Norwegian respondents	
I expect Sweden to extend the National Park of Fulufjellet on its side of the border whether or not the bilateral programme discussed in the questionnaire is implemented	1=definitely disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=definitely agree, 6=difficult to say[10]
I expect Norway to comply with the international agreement to a larger extent than Sweden	
I am afraid that money spent on the protection on the Swedish side of Fulufjellet could be misused	
I believe that the participation of Sweden in the programme funding should be higher than the participation of Norway because the area of Fulufjellet on the Swedish side is greater than on the Norwegian side	
I believe that the participation of Sweden in the programme funding should be higher than the participation of Norway because the Swedish population is greater than the Norwegian population.	
I believe that the participation of Norway in the programme funding should be higher than the participation of Sweden because Norwegians are wealthier	
I prefer better to protect the Norwegian side of Fulufjellet because it belongs to	

[10] Options 3=neither agree nor disagree and 6=difficult to say have been treated the same way when analysing the data

Norway	
I believe that the tax values presented in the questionnaire, connected with different options of Fulufjellet protection programme are real tax rates that may be introduced	
I expect the results of this survey to be used for the selection of the new protection programme for Fulufjellet	
I expect to visit the Norwegian side of Fulufjellet in the next five years	
I expect to visit the Swedish side of Fulufjellet in the next five years	
For the Swedish respondents	
I expect Norway to extend the National Park of Fulufjellet on its side of the border whether or not the bilateral programme discussed in the questionnaire is implemented	1=definitely disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=definitely agree, 6=difficult to say
I expect Sweden to comply with the international agreement to a larger extent than Norway	
I am afraid that money spent on the protection on the Norwegian side of Fulufjellet could be misused	
I believe that the participation of Sweden in the programme funding should be higher than the participation of Norway because the area of Fulufjellet on the Swedish side is greater than on the Norwegian side	
I believe that the participation of Sweden in the programme funding should be higher than the participation of Norway because the Swedish population is greater than the Norwegian population	
I believe that the participation of Norway in the programme funding should be higher than the participation of Sweden because Norwegians are wealthier	
I prefer better to protect the Swedish side of Fulufjellet because it belongs to Sweden	
I believe that the tax values presented in the questionnaire, connected with different options of Fulufjellet protection programme are real tax rates that may be introduced	
I expect the results of this survey to be used for the selection of the new protection programme for Fulufjellet	
I expect to visit the Swedish side of Fulufjellet in the next five years	
I expect to visit the Norwegian side of Fulufjellet in the next five years	

Table 3 – Modelling results

Model specification: MNL	**Norway**			**Sweden**		
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	1.1934	0.1241	0.0000	1.6727	0.1568	0.0000
NO +20 sq.km	1.5284	0.0960	0.0000	0.8399	0.0965	0.0000
NO +40 sq.km	2.4723	0.1013	0.0000	0.8701	0.1031	0.0000
NO +60 sq.km	2.8476	0.1042	0.0000	1.1934	0.0974	0.0000
SE +20 sq.km	0.5773	0.0813	0.0000	1.7512	0.1165	0.0000

SE +40 sq.km	0.7911	0.0856	0.0000	2.5682	0.1216	0.0000
SE +60 sq.km	0.8983	0.0812	0.0000	2.9194	0.1256	0.0000
COST (10 EUR PPP)	0.4144	0.0125	0.0000	0.3243	0.0101	0.0000
	Model characteristics					
LL0	-19793.91			-22501.55		
LL	-18897.89			-21682.43		
McFadden R2	0.0453			0.0364		
Ben-Akiva R2	0.3809			0.3813		
AIC/n	2.0135			2.0132		
n	18779			21548		
k	8			8		
Model specification:	**Norway**			**Sweden**		
MXL	Means					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	0.1501	0.1432	0.2948	-0.1120	0.1002	0.2634
NO +20 sq.km	1.3169	0.0619	0.0000	0.6183	0.0469	0.0000
NO +40 sq.km	2.0238	0.0739	0.0000	0.6786	0.0588	0.0000
NO +60 sq.km	2.3867	0.0829	0.0000	0.9196	0.0552	0.0000
SE +20 sq.km	0.3979	0.0473	0.0000	1.1979	0.0540	0.0000
SE +40 sq.km	0.6548	0.0556	0.0000	1.7036	0.0589	0.0000
SE +60 sq.km	0.6864	0.0559	0.0000	1.9722	0.0693	0.0000
COST (10 EUR PPP)	-0.0206	0.0446	0.6446	-0.0234	0.0439	0.5931
	Standard Deviations					
	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	9.5693	0.5953	0.0000	10.2323	0.4223	0.0000
NO +20 sq.km	0.3012	0.0588	0.0000	0.3577	0.0580	0.0000
NO +40 sq.km	0.6457	0.0642	0.0000	0.6823	0.0705	0.0000
NO +60 sq.km	1.4242	0.0782	0.0000	0.7857	0.0664	0.0000
SE +20 sq.km	0.0000	0.0000	1.0000	0.0000	0.0000	1.0000
SE +40 sq.km	0.3104	0.0818	0.0001	0.0000	0.0000	1.0000
SE +60 sq.km	0.5662	0.0674	0.0000	0.9616	0.0571	0.0000
COST (10 EUR PPP)	0.9128	0.0453	0.0000	1.0650	0.0421	0.0000
	Model characteristics					
LL0	-19793.91			-22501.55		
LL	-10706.46			-12191.06		
McFadden R2	0.4591			0.4582		
Ben-Akiva R2	0.6138			0.6174		
AIC/n	1.1420			1.1330		
n	18779			21548		
k	16			16		
Model specification:	**Norway**			**Sweden**		
HMXL	Means					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	-2.1625	0.0816	0.0000	-2.1837	0.0630	0.0000
NO +20 sq.km	1.3067	0.0494	0.0000	0.4486	0.0381	0.0000

NO +40 sq.km	1.9129	0.0585	0.0000	0.5528	0.0418	0.0000
NO +60 sq.km	2.2179	0.0672	0.0000	0.6313	0.0426	0.0000
SE +20 sq.km	0.3435	0.0413	0.0000	0.9842	0.0414	0.0000
SE +40 sq.km	0.5988	0.0426	0.0000	1.3888	0.0441	0.0000
SE +60 sq.km	0.6101	0.0463	0.0000	1.5500	0.0491	0.0000
COST (10 EUR PPP)	0.3051	0.0354	0.0000	0.4240	0.0332	0.0000
	Standard Deviations					
	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	2.4099	0.0754	0.0000	2.1890	0.0548	0.0000
NO +20 sq.km	0.2038	0.0415	0.0000	0.0782	0.0412	0.0577
NO +40 sq.km	0.0000	0.0429	1.0000	0.0669	0.0457	0.1432
NO +60 sq.km	0.0000	0.0498	1.0000	0.1308	0.0478	0.0062
SE +20 sq.km	0.0000	0.0433	1.0000	0.0000	0.0344	1.0000
SE +40 sq.km	0.0092	0.0578	0.8729	0.0000	0.0448	1.0000
SE +60 sq.km	0.3318	0.0421	0.0000	0.1829	0.0377	0.0000
COST (10 EUR PPP)	0.8383	0.0325	0.0000	0.9870	0.0328	0.0000
	Interactions of experimental variables with latent variables					
LV 1	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	-3.4374	0.2175	0.0000	-3.3830	0.1680	0.0000
NO +20 sq.km	2.3128	0.1153	0.0000	1.4945	0.0790	0.0000
NO +40 sq.km	3.7083	0.1454	0.0000	2.0953	0.0849	0.0000
NO +60 sq.km	4.8464	0.1657	0.0000	2.3907	0.0856	0.0000
SE +20 sq.km	1.0937	0.0976	0.0000	1.6323	0.0914	0.0000
SE +40 sq.km	1.5150	0.1022	0.0000	2.8056	0.1012	0.0000
SE +60 sq.km	1.7957	0.0965	0.0000	3.4951	0.1118	0.0000
COST (10 EUR PPP)	-0.8661	0.0469	0.0000	-0.7124	0.0379	0.0000
LV 2	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	0.7869	0.0694	0.0000	3.1138	0.1263	0.0000
NO +20 sq.km	-0.4180	0.0487	0.0000	-0.4414	0.0638	0.0000
NO +40 sq.km	-0.8249	0.0649	0.0000	-0.4747	0.0705	0.0000
NO +60 sq.km	-1.0619	0.0684	0.0000	-0.6156	0.0764	0.0000
SE +20 sq.km	0.0982	0.0565	0.0822	-1.0057	0.0792	0.0000
SE +40 sq.km	0.1174	0.0554	0.0342	-1.7006	0.0862	0.0000
SE +60 sq.km	0.2947	0.0561	0.0000	-2.1950	0.0943	0.0000
COST (10 EUR PPP)	0.4050	0.0335	0.0000	0.7930	0.0358	0.0000
LV 3	coef.	st.err.	p-value	coef.	st.err.	p-value
SQ	0.8647	0.0728	0.0000	1.1550	0.0728	0.0000
NO +20 sq.km	-0.5388	0.0548	0.0000	-0.4945	0.0508	0.0000
NO +40 sq.km	-0.7071	0.0630	0.0000	-0.6602	0.0547	0.0000
NO +60 sq.km	-0.8917	0.0674	0.0000	-0.8328	0.0469	0.0000
SE +20 sq.km	-0.1499	0.0428	0.0005	-0.5431	0.0496	0.0000
SE +40 sq.km	-0.3096	0.0476	0.0000	-0.9664	0.0543	0.0000
SE +60 sq.km	-0.3932	0.0471	0.0000	-1.1417	0.0630	0.0000
COST (10 EUR PPP)	0.4226	0.0329	0.0000	0.4757	0.0325	0.0000
	Measurement equation for SE/NO unilateral action – estimated using OP					

var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	0.3624	0.0435	0.0000	0.1340	0.0403	0.0009
LV 2	-0.3808	0.0471	0.0000	-0.4327	0.0440	0.0000
Cutoff 1	-2.3346	0.1008	0.0000	-2.3075	0.0931	0.0000
Cutoff 2	-1.9315	0.1152	0.0000	-1.8498	0.0860	0.0000
Cutoff 3	0.5550	0.1367	0.0000	0.6556	0.1211	0.0000
Cutoff 4	1.1437	0.1414	0.0000	1.2952	0.1356	0.0000
	Measurement equation for NO/SE complies more – estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	0.1884	0.0411	0.0000	-0.2233	0.0449	0.0000
LV 2	-0.4557	0.0470	0.0000	-0.6666	0.0489	0.0000
Cutoff 1	-1.7705	0.0738	0.0000	-2.1322	0.0813	0.0000
Cutoff 2	-1.2127	0.0500	0.0000	-1.3836	0.0680	0.0000
Cutoff 3	0.6791	3205.4091	0.9998	0.8438	0.2120	0.0001
Cutoff 4	1.3097	4366.0154	0.9998	1.7256	0.2257	0.0000
	Measurement equation for SE/NO misuses money – Estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	-0.4008	0.0466	0.0000	-0.3820	0.0460	0.0000
LV 2	-0.4228	0.0471	0.0000	-0.2910	0.0387	0.0000
Cutoff 1	-1.2626	0.0596	0.0000	-1.4597	0.0619	0.0000
Cutoff 2	-0.6319	0.0468	0.0000	-0.7344	0.0646	0.0000
Cutoff 3	1.1688	0.3874	0.0026	1.2691	0.3379	0.0002
Cutoff 4	1.8756	0.4179	0.0000	1.8963	0.3550	0.0000
	Measurement equation for SE must do more (area) – estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	-0.1110	0.0489	0.0230	0.0669	0.0430	0.1195
LV 2	-0.7291	0.0570	0.0000	-0.6036	0.0453	0.0000
Cutoff 1	-2.2847	0.1210	0.0000	-1.9506	0.0829	0.0000
Cutoff 2	-1.5958	0.1983	0.0000	-1.3892	0.1426	0.0000
Cutoff 3	-0.1143	0.1995	0.5665	0.1187	0.1362	0.3833
Cutoff 4	0.8063	0.2021	0.0001	1.2261	0.1327	0.0000
	Measurement equation for SE must do more (population) – estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	-0.1865	0.0449	0.0000	-0.1492	0.0394	0.0002
LV 2	-0.6635	0.0568	0.0000	-0.5828	0.0478	0.0000
Cutoff 1	-1.6357	0.0739	0.0000	-1.3522	0.0615	0.0000
Cutoff 2	-1.0448	0.0794	0.0000	-0.7739	0.0771	0.0000
Cutoff 3	0.4502	0.1025	0.0000	0.8169	0.1369	0.0000
Cutoff 4	1.2981	0.1212	0.0000	1.6926	0.1885	0.0000
	Measurement equation for NO must do more (wealth) – estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	0.0513	0.0378	0.1740	-0.2833	0.0433	0.0000
LV 2	0.0235	0.0437	0.5904	-0.2929	0.0365	0.0000
Cutoff 1	-0.4206	0.0480	0.0000	-0.9984	0.0508	0.0000

Cutoff 2	0.0187	0.0282	0.5080	-0.4419	0.0667	0.0000
Cutoff 3	1.2257	0.0820	0.0000	1.0134	0.0919	0.0000
Cutoff 4	1.8959	0.1208	0.0000	1.6381	0.1061	0.0000
	Measurement equation for NO/SE patriotism – Estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 1	0.1143	0.0381	0.0027	-0.1553	0.0397	0.0001
LV 2	-0.4081	0.0434	0.0000	-0.5533	0.0434	0.0000
Cutoff 1	-1.5319	0.0620	0.0000	-1.7796	0.0694	0.0000
Cutoff 2	-1.0850	0.0747	0.0000	-1.2032	0.1172	0.0000
Cutoff 3	0.1406	0.0923	0.1276	0.1826	0.1307	0.1626
Cutoff 4	0.9878	0.0978	0.0000	1.1521	0.1344	0.0000
	Measurement equation for Willing to visit NO part – estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 3	-2.5208	0.1841	0.0000	-2.6119	0.2587	0.0000
Cutoff 1	-1.3564	0.1371	0.0000	-1.4945	0.1520	0.0000
Cutoff 2	-0.4336	0.2601	0.0955	-0.5060	0.2554	0.0476
Cutoff 3	2.9015	0.3653	0.0000	3.1236	0.3567	0.0000
Cutoff 4	4.3051	0.3671	0.0000	4.4117	0.3606	0.0000
	Measurement equation for Willing to visit SE part – estimated using OP					
var.	coef.	st.err.	p-value	coef.	st.err.	p-value
LV 3	-3.6388	0.4379	0.0000	-2.3229	0.1825	0.0000
Cutoff 1	-1.0419	0.1556	0.0000	-1.9487	0.1656	0.0000
Cutoff 2	0.0067	0.1718	0.9688	-0.9004	0.2373	0.0001
Cutoff 3	4.9273	0.2652	0.0000	2.2187	0.2805	0.0000
Cutoff 4	6.6081	0.2926	0.0000	3.5140	0.2965	0.0000
	Model characteristics					
LL0	-33385.13			-37714.59		
LL	-22527.26			-25456.93		
McFadden R2	0.3252			0.3250		
Ben-Akiva R2	0.6351			0.6381		
AIC/n	2.4090			2.3714		
n	18779			21548		
k	92			92		

Table 4 – Stated WTP per unit of additional passively protected area

	WTP, 10 EUR PPP per sq.km of					
	Norwegians in the model			Swedes in the model		
Attribute	MNL	MXL	HMXL	MNL	MXL	HMXL
NO+20 sq.km	0.0764	0.0658	0.0653	0.0420	0.0309	0.0224
NO+40 sq.km	0.0618	0.0506	0.0478	0.0218	0.0170	0.0138
NO+60 sq.km	0.0475	0.0398	0.0370	0.0199	0.0153	0.0105
SE+20 sq.km	0.0289	0.0199	0.0172	0.0876	0.0599	0.0492
SE+40 sq.km	0.0144	0.0164	0.0150	0.0642	0.0426	0.0347
SE+60 sq.km	0.0150	0.0114	0.0102	0.0487	0.0329	0.0258

Table 5 – Interrelationships of respondents' preferences and attitudes via the latent variables

Model for the country	Norway			Sweden		
Latent variables	LV1	LV2	LV3	LV1	LV2	LV3
Attitudinal questions, OP	Sign of the appropriate parameter (0=statistically insignificant)					
SE/NO unilateral action	+	-		+	-	
NO/SE complies more	+	-		-	-	
SE/NO misuses money	-	-		-	-	
SE must do more (area)	-	-		0	-	
SE must do more (population)	-	-		-	-	
NO must do more (wealth)	0	0		-	-	
NO/SE patriotism	+	-		-	-	
Willing to visit NO part			-			-
Willing to visit SE part			-			-
Interactions with variables of discrete choice model (MXL)	Sign of the appropriate parameter					
SQ	-	+	+	-	+	+
NO +20 sq.km	+	-	-	+	-	-
NO +40 sq.km	+	-	-	+	-	-
NO +60 sq.km	+	-	-	+	-	-
SE +20 sq.km	+	+	-	+	-	-
SE +40 sq.km	+	+	-	+	-	-
SE +60 sq.km	+	+	-	+	-	-
AIC/n	2.409			2.3714		