ARE BILATERAL CONSERVATION POLICIES FOR THE BIAŁOWIEŻA FOREST UNATTAINABLE? ANALYSIS OF STATED PREFERENCES OF POLISH AND BELARUSIAN PUBLIC

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Abstract

Transboundary nature protected areas constitute a considerable proportion of all the existing spatial forms of biodiversity protection. One prominent example is the Białowieża Forest, shared by Poland and Belarus. There is a considerable literature on allocation of funds to preserving nature shared by several countries. Some of this literature assess the funding schemes and the impacts on biodiversity within the EU. A particular challenge for the Białowieża Forest is that the larger part of it is outside the EU border. There has been less research on the economic benefits that citizens attach to protected transboundary land nature on the other side of the border. We are trying to fill the gap by finding out and comparing preferences towards increased protection of domestic and foreign segments of the transboundary Białowieża Forest, stated by samples of Polish and Belarusian citizens. The results of a discrete choice experiment show an almost unilateral preference for nature conservation, passive protection of forest land, on the domestic side. Whilst Polish respondents on average are willing to pay for an increased area under protection, on their side of the border, most Belarusians seem to be satisfied with the status quo. Taken at face value, there is even an apparent mutual disutility derived from the perspective of co-financing bilateral passive protection programmes in the Białowieża Forest. By use of latent class analyses of responses, a group of the Polish sample willing to contribute to the transboundary conservation is identified and described, and compared against the non-cooperative groups on both sides of the border. The results can to some extent be explained by a strict border division with a high fence, by differences in welfare or by behavioural reasons. However, it cannot be ruled out that the affected populations simply do not perceive the Białowieża Forest as a binational public good.

Keywords: transboundary nature protected areas, passive protection, discrete choice experiment, willingness-to-pay, latent class model

INTRODUCTION

There are many cross-border nature areas around the World, and several have gained some transboundary protective status during the last decades (Deguignet et al., 2014). In Europe, national protected nature areas are mostly small and scattered, and transboundary cooperation has been considered a necessity (European Commission, 2013). Effective cross-border cooperation in protecting nature might be easier to obtain within a common political community, like the EU, than across borders that represent larger divides (Donald et al. 2007, Bode et al. 2008). The Białowieża Forest is shared between the EU country Poland and Belarus; thus there is no common EU-based regulatory policy directing the conservation policy on both sides of the border.

Economic literature scrutinising transboundary protected areas explicitly is rather scarce. The economic problems of transboundary protected areas should be analysed in a wider context of economics of the natural goods, which are generated and enjoyed internationally. Busch (2008) applied a game theory approach to the problem of optimal spatial allocation of transboundary protected areas. Donald et al. (2007) found an indication of relative improvement for species and habitats targeted by specific EU policies compared to areas outside the EU. For naturally contiguous areas shared by countries with substantially different cost levels, Bode et al. (2008) argued that more nature conservation could be obtained by investing most in the lower-cost country. Bladt et al. (2009) followed a similar argumentation for the allocation of nature conservation between EU member states, and their results yield an argument for co-operative action. Semmens et al. (2011) analysed the situation where the provision of ecosystem services partly takes place in another location than where the humans benefitting from it are living.

The valuation of international public goods of transboundary nature in Europe has been formerly applied primarily to the marine environment, e.g., the Baltic Sea (Markowska and Żylicz, 1999, Ahtiainen et al., 2013; 2014). Ahtiainen et al. (2013) found that the richer countries had "the most positive attitudes towards contributing financially to improving the state of the Baltic Sea". However, unlike international public goods that do not recognise country borders, like sea or air quality, the matter whether a terrestrial transboundary nature protected area qualifies to be an international public good is far from trivial. 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. Following the results from a three-country valuation study by Dallimer et al. (2015), we might expect that individuals will be most concerned about policies affecting their domestic part of a nature area. However, Dallimer et al. did not value a transboundary nature area. We therefore carried out a discrete-choice experiment (DCE) of extending the strictly preserved areas within Białowieża, on both sides of the Polish-Belarusian border in order to find out and compare preferences towards protection of domestic and foreign segments thereof, stated by samples of Polish and Belarusian citizens.

STUDY AREA

The Białowieża[1] Forest lying in between Poland and Belarus is considered one of the last intact lowland forests in Europe (Blavascunas, 2014) as well as one of the best known nature protected areas in Europe. Approximately one third of the area has never been logged. Due to its relative intactness, the natural forests in Białowieża retain natural composition of forest ecosystems, functions and processes as well as typical forest flora and fauna (Wesołowski et al., 2016). Inter alia, the Białowieża Forest supports the unique semi-wild population of the European bison (*Bison bonasus*), the species once extinct and then restored following an international conservationists' effort. Due to the (Belarusian) border fencing (since 1980), however, the two adjacent national park areas constitute two separated bison habitats (Krasińska et al., 2000; Daleszczyk et al., 2007).

A natural reserve was established by Poland in 1921, when the whole of the Białowieża Forest was under its territory, and a national park was established in 1932. Since 1946 the Białowieża Forest has been divided by the new state border into the Polish (about one third) and the (Soviet) Belarusian (the remaining two thirds) segments. In the Polish part a total ban on human interference with the natural ecosystems and processes applies to the Białowieża National Park and twenty-four nature reserves, amounting to 225 km^2 or approximately 35% of total surface of its afforested area. In the Belarusian part passive protection regime applies to the strict conservation zone of the Biełavieskaja Pušča National Park and makes up a total of 570 km^2 or about 37% of the Belarusian segment[2]. These protected areas correspond to IUCN category Ia – Strict Nature Reserve – where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values (Dudley, 2008). While the strict protection zones of the two National Parks constitute a contiguous transboundary plot, natural reserves of the Polish part of the site are located piecewise among the production forests mostly to the West and South-West of the main passively protected plot (see Fig.1).

Most visitors to the Białowieża Forest go to the bison fencing near the visitor centres and use the paths in the forests outside the strictly protected areas. Development of international and transboundary recreation in the Białowieża Forest is limited with the low site's accessibility arising from the border policies and regulations in use. While the Belarusian part of the Białowieża Forest recently has become more accessible for Poles and foreign visitors in general (on certain conditions, EU countries' citizens can visit the National Park "Biełavieskaja Pušča" for maximum three days without producing valid visa), the Belarusians still have limited opportunities to visit the Polish part of the site. There are established paths also within the strictly protected areas; and being allowed to hiking in the strictly protected areas of Białowieża may be considered a unique and highly-valued non-consumptive use for a segment of national as well as international visitors (Pearce, 2001). Due to their considerable

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[1]   The Belarusian name of the study area is Biełavieskaja Pušča. For simplicity in the text we use the internationally better known Polish name thereof – Białowieża Forest

[2]   The strict conservation zone of the NP "Biełavieskaja Pušča" has recently been extended up to the current 583 km^2, but our study is based on earlier numbers. For a comparative assessment of the management of NP Biełavieskaja Pušča versus the Polish Białowieża, see Vasilevich (2009).

surface as well as complex spatial configuration and logistics, uncontrolled visits to the nature reserves, in both countries, cannot be completely avoided.

The fragments of the Białowieża Forest, on both sides of the border outside the strict reserve zones of the National Parks and natural reserves, are subject to active management including logging to a different extent – from partial protection to commercial forestry. A Polish ministerial regulation was adopted in 2012 to limit logging in the part of the Białowieża Forest administered by the Polish State Forestry to 63.4 thousand m^3 for the next ten years. However, a new regulation adopted in 2016 almost tripled the allowable harvest volume, thus proving the vulnerability of the site in the absence of a formal spatial protection regime[3]. The Biełavieskaja Pušča National Park, where even the area outside the strict conservation zone is classified as IUCN category II – National Park, has its particular governance challenges, of which past drainage of surrounding and inner wetlands as well as overpopulation by ungulates still have substantial impact over the site including its core forest ecosystems (see, e.g., Vasilevich, 2009 for more details).

Taking into account the strong relationship between age, size and completeness of intact ecosystems on the one hand, and increased biodiversity and survival of species on the other hand (Schultze et al., 2014), both a strengthened transboundary regulation and an increase of the strictly protected area have been proposed for the Białowieża Forest. In a situation where the areas of passive protection may be considered not sufficient to provide biodiversity preservation in the long run, there exists an option of initiating a reverse process towards natural forest dynamic on land that is currently under a different land use (Chazdon, 2008). Managed/industrial forest areas can be transformed back to some semi-natural and, eventually, natural state too by launching of the passive protection for the long-term perspective (Rey Benayas et al., 2008). Extension of the passive protection regime would mean cancellation of any human intervention into natural processes in the appropriate area, including forestry management (viz. logging, removal and planting of trees, paving access roads, use of chemical pesticides etc.) as well as the mass recreation activities.

In this connection, the main idea to be assessed economically by samples of the two populations was formulated in a scenario of spatial expansion of the passive protection on adjacent areas.[4] This extension was presented as implying re-naturalisation of timber-producing forests in a time-span of about two hundred years, to improve the connectivity of intact ecosystems and wildlife, as well as to ensure survival of the natural "islands" in a longer perspective.

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[3] In 2016 the Polish Minister of Environment announced a project to "improve" the ecological predicament of the forest by removing trees infested by insects. The project met with resistance of many professionals as it contradicts passive protection of this valuable place. Our study does not refer to this project as it was carried out before the controversy.

[4] An economic valuation study based on the DCE format has been applied before to the Polish part of the Białowieża Forest (Czajkowski et al. 2009) which proved that extension of the National Park (being a spatial protection form potentially compatible with the concept of passive protection) was preferred to other forms of conservation. However, the latter study did not emphasise the transboundary specific of the site under consideration or valued its Belarusian part, neither made it account for the preferences of Belarusian citizens.

DATA AND METHODS

The samples

The questionnaire was elaborated in English (please, see in Appendix) and then translated into Polish and Russian, developed in the form of software tool, and administered as a series of computer-assisted personal interviews (CAPI) to samples of Belarusian and Polish respondents, interviewed at their homes. The both national survey samples followed multi-stage stratified random national-wide sampling with quotas on gender, age and education of respondents, while the sample structure and sampling quotas were based on the official statistical information. Both the Belarusian and Polish final samples were calculated with the same sample error of no more than 3.1% at the confidence probability of 95%; the rejection rate was about 7% of the Belarusian sample while it was about 20% of the Polish sample.

The survey was administered during July-December 2015 in Belarus, while during December 2015 – February 2016 in Poland. The pilot sample included 100 Belarusian and 100 Polish complete interviews, while the main sample included 900 and 901 complete interviews, respectively. Due to only minor changes from the pilot to the main survey (in the choice design, as explained below), the pilot interviews data were included into the dataset, and the total sample therefore counts 1000 for Belarusian and 1001 for Polish interviews.

The questionnaire

The survey questionnaire consisted of five parts: (1) introductory questions, (2) survey 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 were asked to clarify the topic of the questionnaire to the respondents and to investigate their profiles as forest visitors and/or ecosystem service consumers. The scenario part explained the essence of natural forest dynamics vs. sustained yield timber production conflict; the passive area protection concept in general, and its particular application to the case study area. Then the proposed programme alternatives, attributes and their levels were presented together with other necessary elements of the subsequent choice experiment such as payment vehicle. The payment vehicle was designed as a compulsory tax paid by each tax-payer in Poland and Belarus during a five-year period to a bilateral fund, established exclusively in order to finance the common programme of spatial extension of the passive protection regime regardless the particular side of the state border. It was stated that financial means were necessary for the implementation of the passive protection regime, including payments to compensate the current owners of the new protected areas.
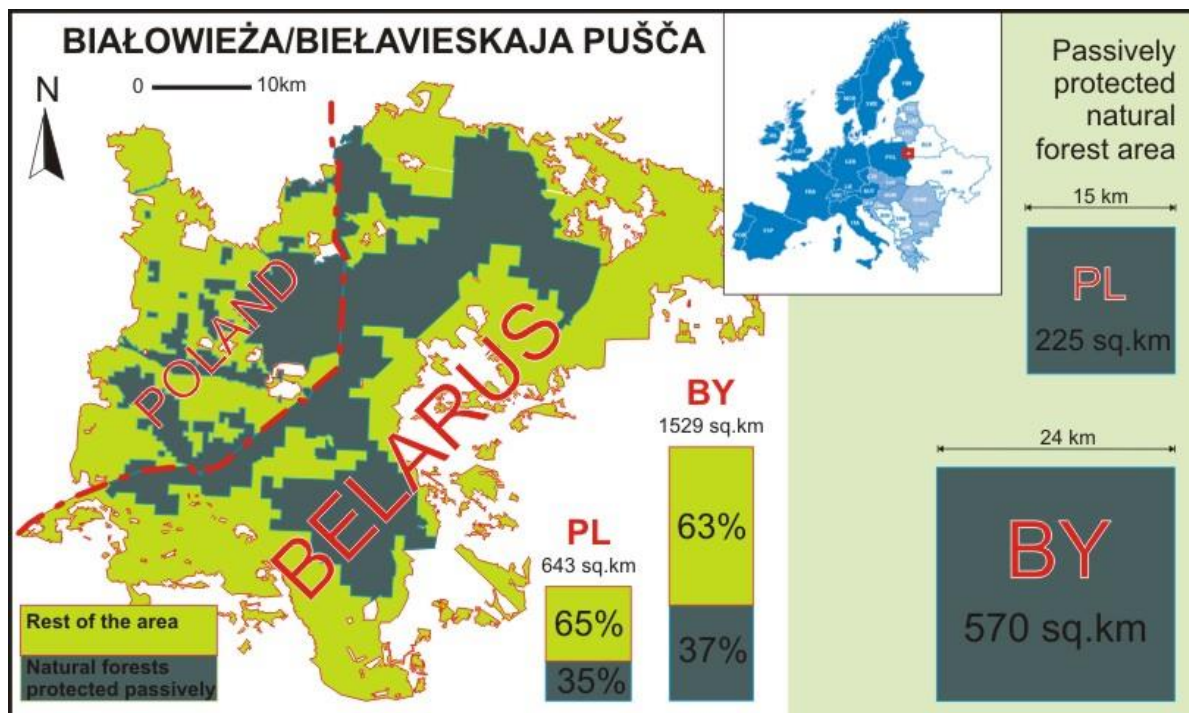
Fig.1. Map of the transboundary Białowieża Forest.

To answer the research question, it was explicitly communicated to the respondents that "scientific research demonstrates that there is absolutely no difference from the perspective of the nature conservation if protection regime would be extended on additional areas in the Polish or in the Belarusian part of the Białowieża Forest; what really matters is that the area of extension is as large as possible", so the survey text did not give the respondents 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 Table 1. The scenario was verbalised in simple wording, information was grouped into thematic sub-blocks and explained with graphic material. The respondents were explicitly informed about the possibility to choose the status quo (SQ) option in as many choice tasks as they want. In addition, they were informed about a possibility of policy consequences of the survey results.

The choice tasks included the status quo (no change) and one to three other alternatives[5], representing potential protection scenarios with an associated cost. Each respondent was presented with 16 choice tasks. The combinations of attribute levels presented in each choice task were prepared in a way which maximizes the amount of information revealed by respondents, conditional on our expectations regarding their preferences. These expectations (priors) were obtained through the pilot study conducted in each country and updated after collecting about one third of the main wave responses. Specifically, each design was

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[5] The number of alternatives was varied in treatments and remained constant for the same respondent.

optimized for median Bayesian D-error of the MNL model (Scarpa and Rose, 2008).[6] D-efficient designs have also recently been found to result in lower attribute non-attendance (Yao et al., 2015). The designs used Bayesian priors to account for the uncertainty associated with our imperfect knowledge of the true parameters (Bliemer, Rose and Hess, 2008).[7] We randomized the order of choice tasks presented to each respondent to counter-balance possible ordering effects. For the spatial extension attributes, besides the absolute change in attribute levels the respondents were provided with the indications of relative changes. An example of a choice card is provided in Fig. 2.

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[6] Even though we used the RPL and LC models for data analysis there is some evidence indicating that the loss of efficiency when designing discrete choice experiments for the MNL model is relatively low (Bliemer and Rose 2010). In addition,

[7] Experimental design used in this study was prepared using the NGENE software and is available as an online supplement to this paper, available from the authors upon request.

Table 1

Programme attributes and their levels.

Programme attribute	Poland	Belarus
Passive protection extension on the Polish side of the Białowieża Forest	+0 km^2 +35 km^2 +70 km^2 +105 km^2 SQ=+0	+0 km^2 +35 km^2 +70 km^2 +105 km^2 SQ=+0
Passive protection extension on the Belarusian side of the Białowieża Forest	+0 km^2 +35 km^2 +70 km^2 +105 km^2 SQ=+0	+0 km^2 +35 km^2 +70 km^2 +105 km^2 SQ=+0
Additional amount of income tax, which you would have to pay annually during five years	25 PLN 50 PLN 75 PLN 100 PLN SQ=0	3 USD [5 USD] 6 USD [10 USD] 9 USD [15 USD] 12 USD [20 USD] SQ=0

Bid levels used for the pilot survey in Belarus are given in brackets

A debriefing block of attitudinal questions followed the choice experimental part of the questionnaire. Eleven questions were prepared, which aimed at explaining individual perceptions and beliefs (e.g. patriotism, free-riding, plans to visit the site, etc.) underpinning specific aspects of the choice decisions made by the respondents. Some of the attitudinal questions were country-specific while others were identical for both countries. All the attitudinal questions were of an identical closed type, implying the answer to be picked out of the ordered Likert scale. The socioeconomic block of questions comprised questions on the respondent's age, gender, education, place of residence, household structure, income and wealth.

Variants comparison 1	Status quo	Variant 1	Variant 2	Variant 3
Additional area in the Polish part of the Białowieża Forest covered by passive protection regime (Total proportion of passive protection zone in the Polish part of the Białowieża Forest)	+ 0 km² (35%)	+ 105 km² (51%)	+ 70 km² (46%)	+ 0 km² (35%)
Additional area in the Belarusian part of the Białowieża Forest covered by passive protection regime (Total proportion of passive protection zone in the Belarusian part of the Białowieża Forest)	+ 0 km² (37%)	+ 105 km² (44%)	+ 0 km² (37%)	+ 35 km² (40%)
Additional sum of taxes, imposed on your income annually during the five next years	None	100 PLN	50 PLN	75 PLN
Please, pick your best variant	☐	☐	☐	☐

Fig.2. Example of the choice card from the Polish questionnaire.

Econometric modelling

Choice experiments draw on theories of economic value (Lancaster, 1966) and the application of random utility theory to choice (McFadden, 1974). The methodology involves presenting participants with a number of choice sets that consist of two or more alternatives, each described by various levels of a set of attributes. Usually a cost attribute is included to later make it possible to calculate marginal rates of substitution of each non-monetary attribute for money (willingness to pay).

In a choice experiment, individuals are asked to indicate their preferred alternative *j* among a given set of *K* alternatives. The data analysis is typically based on the Random Utility Model (McFadden, 1974). Individual *i*'s choice reveals the alternative resulting with the highest utility U_{ij}, which can be decomposed into a systematic part, V_{ij}, and a stochastic part, ε_{ij}, allowing for other factors than those observed by an econometrician to affect individuals' utility and choices. Assuming that ε_{ij} follows extreme value distribution leads to convenient expression of the probability of the observed choice:

$$P_{ij} = P\left(\underset{k \neq j}{\forall} V_{ij} + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik} \right) = \frac{\exp\left(\mathbf{X}_{ij}\boldsymbol{\beta}\right)}{\sum_{k=1}^{K} \exp\left(\mathbf{X}_{ik}\boldsymbol{\beta}\right)} \, , \tag{1}$$

where $\mathbf{X}_{ij}$ represents a vector of choice attributes and $\boldsymbol{\beta}$ is a vector of the associated parameters.

In the above formulation, consumers' preferences are assumed homogenous across the entire sample (the parameters are the same for all respondents). This results in a multinomial logit model (MNL). One way of relaxing these assumptions, i.e. allowing for some level of (unobserved) preference heterogeneity and possibly correlations between the alternatives and choice tasks, is to make the parameters consumer-specific $\boldsymbol{\beta}_i$, which leads to a mixed logit model.

Two commonly used approaches are to make mixing distributions continuous or discrete. If individual parameters are assumed continuously distributed following a parametric distribution specified a priori by a modeller: $\boldsymbol{\beta}_i \square f(\mathbf{b}+\boldsymbol{\Delta}'\mathbf{z}_i, \boldsymbol{\Sigma}+\boldsymbol{\Gamma}'\mathbf{z}_i)$, with means $\mathbf{b}$ and variance-covariance matrix $\boldsymbol{\Sigma}$, the Random Parameters Logit model is formed (RPL, McFadden and Train 2000; Greene and Hensher 2003). If, on the other hand, individual parameters are assumed to follow a discrete distribution (belong to one of C sets of parameters) the so-called latent class (LC) model is formed (Train 2003). In other words, the model assumes there is a finite set of classes of respondents of particular preferences, so that $\boldsymbol{\beta}_c$ is the vector of parameters describing the preference of class c from among C of the possible classes. Inside the classes, the probability of choosing a given alternative is described in the same way as for the MNL model, presented in equation (1). The respondent's belonging to a given class is not observable. The probability of belonging to a given class is described by an additional logit formula:

$$\mathrm{P}(class = c) = \frac{\exp(\mathbf{z}_i\boldsymbol{\theta}_c)}{1 + \sum_{n=1}^{C-1}\exp(\mathbf{z}_i\boldsymbol{\theta}_n)}, \tag{2}$$

where $\mathbf{z}_i$ is the vector of constants for $C-1$ classes and variables characterising respondent i, which may have an impact on the probability of his or her belonging to a given class (for the sake of normalisation it is assumed that $\boldsymbol{\theta}_C = 0$).

The models can be estimated using the maximum likelihood method. In the case of RPL model, since there is no closed form solution to the choice probability unconditional on many of the commonly used parametric distributions, simulation-based optimization methods are used.

RESULTS

About 40% for the Polish respondents and 34% of the Belarusians picked the status quo option in all the sixteen choice tasks they faced. A majority of these respondents (respectively, 59% and 64%, of Polish and Belarusian), consequently choosing status quo in all 16 choice tasks, picked the response alternative "it is the government who must finance

conservation programmes, not me". Such a tendency seems to imply a substantial share of protesters amongst both samples of respondents, which may bias estimation of the true WTP for the programme under consideration. Therefore, the subsequent results are based on the analyses of the protesters-free samples, comprising choices data of 763 Belarusian and 753 Polish respondents.

The modelling results of the RPL are presented in Table 2. The model was estimated in NLOGIT with 1000 Halton draws. Since we did not detect significant non-linearity in the extension on the Belarusian side for the Polish respondents and close to linear relationship for the extension on the Polish side for Belarusians, to keep our models parsimonious, the neighbours' extension area was coded as a continuous variable, whereas the domestic extension was coded as a dummy variable. The results of the RPL model demonstrate significant preference heterogeneity for all the programme attributes in the Polish sample as well as for some attributes in the Belarusian sample.

Table 2 Random parameter logit (RPL) modelling results

	Poland		Belarus	
	Coefficient	Standard Error	Coefficient	Standard Error
Belarus +35 km^2	-	-	0.10848**	0.04963
Belarus +70 km^2	-	-	0.22197***	0.04954
Belarus +105 km^2	-	-	0.06424	0.05636
Poland +35 km^2	.92894***	0.06552	-	-
Poland +70 km^2	1.26690***	0.07128	-	-
Poland +105 km^2	1.45282***	0.09212	-	-
Belarus (continuous)	-0.00333***	0.00081	-	-
Poland (continuous)	-	-	-0.00283***	0.00047
Bid	-0.04043***	0.00095	-0.02098***	0.00458
Status Quo	-0.49312***	0.14494	0.56112***	0.11539
Standard deviations				
Belarus +35 km^2	-	-	0.07733	0.13398
Belarus +70 km^2	-	-	0.06182	0.14461
Belarus +105 km^2	-	-	0.49127***	0.07119
Poland +35 km^2	0.25084**	0.12543	-	-
Poland +70 km^2	0.60809***	0.07866	-	-
Poland +105 km^2	1.37414***	0.08464	-	-
Belarus (continuous)	0.01340***	0.00083	-	-
Poland (continuous)	-	-	0.00304***	0.00112
Status Quo	3.54739***	0.14680	2.56446***	0.10043

***, **, * significance at 1%, 5%, 10% level.

Both Belarusians and Poles are price-sensitive as they prefer, ceteris paribus, to pay as little as possible, which is determined by the negative parameter with the cost attribute (BID). Comparison of the results across the samples demonstrates the principle difference in preferences. While Poles, on average, would like to depart from the current level of protection of the Białowieża Forest (the estimate of SQ is negative and highly significant), their Belarusian counterparts' preferences are dominated with the positive utility they derive from the status quo option, which outweighs the preference for the two lower levels of passive protection extension in their domestic part of the transboundary site.

The unit value per square kilometre is decreasing in increasing area extension, in the Polish sample. Among the Belarusian respondents, preferences exhibit a strong tendency to non-linearity as they seem to be of bell-shaped character. The utility increases, in total as well as per unit, when moving from programme of extension by additional 35 km^2 to that of additional 70 km^2, and then it does not differ from zero to that of 105 km^2.

Table 3
Estimated Willingness-to-Pay.

| | WTP, calculated out from RPL model | | | |
| | Poland | | Belarus | |
	WTP, EUR 2015 PPP	Standard Error	WTP, EUR 2015 PPP	Standard Error
Belarus +35 km2	-	-	10.7622*	1.0819
Belarus +70 km2	-	-	22.0223***	1.3645
Belarus +105 km2	-	-	6.3736	1.1118
Poland +35 km2	9.2714***	0.6534	-	-
Poland +70 km2	12.6446***	0.6886	-	-
Poland +105 km2	14.5003***	0.8866	-	-
Belarus (continuous)	-0.0333***	0.0082	-	-
Poland (continuous)	-	-	-0.2803***	0.0146
Status Quo	4.9217***	1.4257	-55.6694***	3.7225
	Standard deviations			
Belarus +35 km2	-	-	7,6720	2,6023
Belarus +70 km2	-	-	6,1332	2,7930
Belarus +105 km2	-	-	48,7392***	2,4133
Poland +35 km2	2.5035**	1.2607	-	-
Poland +70 km2	6.0693***	0.8228	-	-
Poland +105 km2	13.7150***	0.9658	-	-
Belarus (continuous)	0.1338***	0.0095	-	-
Poland (continuous)	-	-	0.3013**	0.0245
Status Quo	35.4058***	1.7895	-254.4229***	10.9468

***, **, * significance at 1%, 5%, 10% level.

WTP for the different protection programmes as well as money-metric utility from maintaining status quo has been calculated out of RPL models as negative ratios[8] of parameters with appropriate programme attributes over the parameter with the cost attribute. Since all non-monetary attributes were assumed to follow a normal distribution and cost was assumed to be fixed the values reported in Table 3 WTP have normal distributions. While the WTP of Belarusian respondents for none of the contemplated programmes exceeds the money-metric utility arising from maintaining status quo, the Polish respondents state in general positive and significant WTP for all the conservation programmes, contemplated for their domestic segment of the transboundary Białowieża Forest. For instance, the Polish citizens (on average) are willing to pay EUR 19.42 annually during the five years for the programme comprising extension of the passive protection of the domestic part of the Białowieża Forest by additional 105 km^2. At the same time, in both countries the mean WTP

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[8] Money-metric utility associated with SQ has been calculated as a ratio of appropriate parameter over the parameter with the cost attribute, so that negative preferences towards the SQ attribute correspond with the positive WTP for departure from the current state of protection.

for the protection programmes contemplated for the foreign segment of the transboundary Białowieża Forest is negative. However, since the absolute value of the coefficient of variation[9] for Polish respondents for the extension on the Belarusian side is 4.0, this implies that approximately 40% of Polish respondents have some positive WTP for the Belarusian side, the respective share for Belarusians for Polish side is 17%.

Taking into account the unobserved heterogeneity across the attributes manifested in the RPL model, as well as the apparent mutual disutility from spending the bilateral fund on passive protection extension on the foreign part of the Białowieża Forest, a further investigation was deemed appropriate with the help of Latent Class Modelling (LCM), aimed at clarification of the pattern of heterogeneity across latent classes and finding out if the mutual disutility is a common feature across the different respondents' preferences profiles. With this purpose, models with various numbers of latent classes have been estimated.

The model with five latent classes have been estimated for the Polish sample (with the following class probabilities: 21.6%, 19.0%, 18.3%, 21.5%, and 19.6%), and the model with four latent classes has been estimated for the Belarusian sample (respectively, 22.0%, 26.6%, 22.1%, and 29.3%). Some of the latent classes are similar across the border, in terms of preference patterns, but several are country specific (see Table 4).

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[7] The coefficient of variation (CV) is defined as the ratio of the standard deviation to the mean. It shows the extent of variability in relation to the mean of the population.

Table 4 Latent class modelling (LCM) results

	Poland		Belarus	
	Coefficient	Standard Error	Coefficient	Standard Error
LCM, latent class 1				
Belarus +35 km2	-	-	0.17649	0.62985
Belarus +70 km2	-	-	-0.54061	0.71553
Belarus +105 km2	-	-	-0.08836	0.65188
Poland +35 km2	-0.43506	0.51637	-	-
Poland +70 km2	0.40415	0.41179	-	-
Poland +105 km2	-0.23573	0.46971	-	-
Belarus (continuous)	-0.00923**	0.00454	-	-
Poland (continuous)	-	-	-0.00805	0.00585
Bid	-0.03246***	0.00782	-0.06494	0.06262
Status Quo	2.58170***	0.49619	3.72753***	0.71373
Class probability model				
Constant	1.89707**	0.94805	-0.33993	0.62876
Male	1.05675**	0.48924	0.58050	0.40200
Visit Polish Part	-0.57727**	0.27523	-0.17604	0.21245
Visit Belarusian Part	0.13510	0.54408	-0.00284	0.18355
Supports Extension	-1.52345	1.11022	-0.92642**	0.41774
LCM, latent class 2				
Belarus +35 km2	-	-	0.20618***	0.07849
Belarus +70 km2	-	-	0.30485***	0.07910
Belarus +105 km2	-	-	0.18544**	0.08981
Poland +35 km2	0.71108***	0.18240	-	-
Poland +70 km2	0.50151***	0.18894	-	-
Poland +105 km2	0.77661***	0.22077	-	-
Belarus (continuous)	0.00160	0.00153	-	-
Poland (continuous)	-	-	-0.00110	0.00070
Bid	-0.07560***	0.00482	-0.00417	0.00722
Status Quo	-4.36447***	0.27498	-3.07066***	0.22272
Class probability model				
Constant	-1.95624*	1.14739	-3.12037***	0.72375
Male	0.08588	0.58941	0.12686	0.35963
Visit Polish Part	0.14656	0.30560	0.50268***	0.19215
Visit Belarusian Part	0.32288	0.52183	0.14109	0.18464
Supports Extension	0.70802	1.30913	1.45040***	0.40974
LCM, latent class 3				
Belarus +35 km2	-	-	0.02648	0.10265
Belarus +70 km2	-	-	0.01048	0.10225
Belarus +105 km2	-	-	-0.06474	0.11956
Poland +35 km2	0.59570*	0.35602	-	-
Poland +70 km2	0.92777**	0.45238	-	-
Poland +105 km2	1.10412**	0.51332	-	-
Belarus (continuous)	0.00242**	0.00117	-	-
Poland (continuous)	-	-	-0.00238**	0.00095
Bid	-0.00799***	0.00225	-0.00187	0.01117
Status Quo	-2.97622***	0.32969	-0.07606	0.14944
Class probability model				
Constant	-0.91913	1.40557	-5.35426***	1.32080
Male	0.65183	0.78315	1.02646**	0.49110
Visit Polish Part	-0.30847	0.59208	-0.24930	0.24319
Visit Belarusian Part	0.37277	0.82048	0.90667***	0.27072
Supports Extension	0.65786	2.17427	1.72370***	0.58266
LCM, latent class 4				
Belarus +35 km2	-	-	0.03590	0.10315
Belarus +70 km2	-	-	0.29727***	0.09954
Belarus +105 km2	-	-	0.09642	0.10687
Poland +35 km2	1.32397***	0.17270	-	-

Poland +70 km2	1.87225***	0.21495	-	-
Poland +105 km2	2.60222***	0.25918	-	-
Belarus (continuous)	-0.00294*	0.00171	-	-
Poland (continuous)	-	-	-0.00462***	0.00091
Bid	-0.13194***	0.01080	-0.05089***	0.00873
Status Quo	-2.74079***	0.35946	1.01643***	0.12608
Class probability model				
Constant	1.62669*	0.96829	0.0	Fixed parameter
Male	0.81151	0.56233	0.0	Fixed parameter
Visit Polish Part	-0.40095	0.28005	0.0	Fixed parameter
Visit Belarusian Part	-0.27776	0.53567	0.0	Fixed parameter
Supports Extension	.13939	1.16076	0.0	Fixed parameter
LCM, latent class 5				
Belarus +35 km2	-	-	-	-
Belarus +70 km2	-	-	-	-
Belarus +105 km2	-	-	-	-
Poland +35 km2	1.40073***	0.38711	-	-
Poland +70 km2	1.90106***	0.48033	-	-
Poland +105 km2	2.35593***	0.52852	-	-
Belarus (continuous)	-0.00590**	0.00256	-	-
Poland (continuous)	-	-	-	-
Bid	-0.02200***	.00274	-	-
Status Quo	-0.04092	0.15974	-	-
Class probability model				
Constant	0.0	Fixed parameter	-	-
Male	0.0	Fixed parameter	-	-
Visit Polish Part	0.0	Fixed parameter	-	-
Visit Belarusian Part	0.0	Fixed parameter	-	-
Supports Extension	0.0	Fixed parameter	-	-

***, **, * significance at 1%, 5%, 10% level.

The third latent class (LC3) in the Polish sample is the only latent class in the both samples that shows a preference for spatial extension of the passive protection on both sides of the border. However, even respondents belonging to this class state significantly different preferences towards domestic and foreign protection with the clear dominance of the former. The Polish LC2 is characterised by preference for increased domestic forest protection and indifference towards extension abroad; LC4 and LC5 in the Polish sample show preference for greater domestic protection, but negative preferences for passive protection extension abroad. The Polish LC1 clearly prefers status quo and has strong negative preferences for the extension on the Belarusian side.

The Belarusian LC4 and LC1 have similar preference structure as the Polish LC1, strongly preferring status quo and also deriving some disutility from any extension of the protection of the Białowieża Forest on either side of the border. It indicates that any positive programme implying departure from the current state of protection on any side of the border would yield net disutility to the Belarusian respondents belonging to those latent classes. Unlike them, LC3 in the Belarusian sample shows indifference to increased domestic protection, and is clearly negative towards extension abroad. The Belarusian LC2, like LC2 in the Polish sample, is significantly positive to domestic extension and indifferent to extension abroad.

All the Polish latent classes obtain significantly negative cost parameters. However, for the Belarusians this is only the case for LC4; the three remaining latent classes do not appear

price sensitive in their choices, in contrast to the findings from the RPL model. The only latent class of the Belarusian sample stating preference towards increased protection (LC2), obtains highest parameter size for the medium extension level – the bell-shaped pattern of preferences for domestic extension of passive protection is manifested again by the Belarusian respondents falling into the LC2. At the same time, "inverse bell shape" of parameter values (yet, without statistically significant differences between the parameters with the three programme attribute levels) is found in the Polish LC2, while the other three latent classes preferring extension exhibit parameters that increase monotonically in size of extension. The preferences of the Polish respondents seem somewhat more heterogeneous as compared to those of their Belarusian counterparts, based on LCM as well as the RPL model. For the Polish sample the LCM comprise at least three clearly different preference patterns, while for the Belarusian sample the LCM comprise four classes with mainly two clearly different preference patterns.

Four individual characteristics and attitudinal statements co-varied, to some extent, with the probability of falling into a particular latent class: being a male; stating intention of visiting the domestic part of the transboundary Białowieża Forest within the five next years, stating intention of visiting the foreign part within the five next years; and declaring support for extension of the passive protection in the transboundary Białowieża Forest (the question was asked before the choice experiment).

In the Polish sample, the increased probability of LC1 belonging for males and for those not agreeing to visit the domestic side were the only two statistically significant co-variances; the LC1 being the latent class preferring status quo. In the Belarusian sample, more than one latent class belonging co-varied with individual characteristics and attitudinal statements. Being male, intension of visiting the domestic (viz. Belarusian) part of the site as well as the general consent to extension of the protection increase probability of belonging to LC3 – the class though negative to extension of the foreign part of the Białowieża Forest, however, still less negative to the extended domestic protection than the baseline LC4. Not stating yes to the general (pre-choice) question about support for passive protection extension in the transboundary Białowieża Forest increases probability of being in the latent class stating the most profound preferences towards status quo (LC1); while intention to visit the foreign side within the next five years increases probability of being in the latent class that was not negative to the extension of the strictly protected area on the foreign side (LC2).

DISCUSSION

In the Polish sample, there is overall a significant sensitivity to the scale of the increased preservation, although with decreasing unit value; which is a well-known feature from former valuation studies (Carson and Mitchell, 1993; Rollins and Lyke, 1998; Veisten et al., 2004). Regarding the bell-shaped preference structure manifested in the Belarusian sample, it might not be surprising, as the entire part of the Belarusian Bialowieza Forest is designated as a National Park and 37% is currently under passive protection. Moreover, bell-shaped preferences for preserving nature can be found in the literature, also for countable attributes

(scales) similar to those we applied; for instance, Lutzenhiser and Netusil, (2001) found bell-shaped patterns for the valuation of urban parks and natural areas. In a DCE with latent class analysis, applied to biodiversity projects in Denmark, Jacobsen et al. (2012) found that the two largest classes indicated stronger preference for a medium (25%) increase of wildlife than for a higher (50%) increase. Thiene et al. (2012), applying latent class analysis to DCE of a biodiversity-focussed forest management conversion in Lower Saxony, Germany, found that one of the classes indicated stronger preference for a modest change to more diverse forest stands than for a higher change.

Thus, seemingly, some natural goods might be highly valued up to a certain provision level, but then the valuation of further increase might turn negative. One of the possible explanations in our case could be limited access, implied by increasing the strictly protected area. Tendency of negative preferences for the limited access has been detected by de Valck et al. (2014) with one of the latent classes of respondents; preferences for a trade-off between the natural and managed forest in the area can be another explanation. Anyway, Belarusians' significant parameters with dummies denoting positive domestic programme alternatives amount only to 18-39% of their positive and significant parameter with status quo.

Both the Belarusians and the Poles (on average) state negative and significant preferences towards the contemplated passive protection of the foreign segment of the site under consideration. Taken at face value, neither of the nationality samples involved (on average) derives any positive utility from additional protection of the foreign segment of the transboundary Białowieża Forest.

The common pattern on both sides of the border is that an intention of future use of the forest area is concurrent with increased probability of belonging to at least one of the latent classes showing preference for extending the strictly protected area, or not belonging to a latent class that prefers status quo. Czajkowski et al. (2014) found, in a DCE of protecting the most ecologically valuable forest ecosystems in Poland, that increasing number of visits to forests in general co-variated with higher WTP for extending the area of passive protection. Brahic and Rambonilaza (2015), applying latent class analysis to a DCE involving forest biodiversity preservation on public lands in France, also found that the latent class with higher visitation rates to forests also was more positive to more natural, mixed forests with more dead wood left in the forest. In the meta-analytic WTP model of Richardson and Loomis (2009), studies comprising predominantly non-use values obtained a negative coefficient compared to those comprising both use and non-use values. Although the good under consideration would be fully available in a rather remote perspective, natural forest restoration seems to be a continuous process starting to generate some positive use values from its very beginning.

Possibly, the most striking result of the modelling are the mirror and significant negative preferences of the both nations towards the additional protection of the neighbour's part of the Białowieża Forest. Indeed, assuming rationality of preferences, one could rather expect indifference from the part of those unwilling to pay for the passive protection abroad, instead of their clearly negative preferences. Thus, an institutionally-related explanation of the mutual disutility phenomenon might be suggested. The Białowieża Forest is subjected to such a

strong level of separation between the two national segments, as few other transboundary NPAs in Europe are. Besides the contextually different conservation and management regimes, they are separated physically with the border protection fence-like installations which are almost not penetrable for the big ungulates like European bison or elk. Moreover, the difference in national regulations between Poland (an EU member country with market economy and democratic institutions) and neighbouring Belarus (a country which retained much of the former Soviet socioeconomic and institutional descent) is substantial and comprises symmetric visa regime. Taking the above into account, we might assess that mutually negative preferences revealed by our study are underpinned by the perception of the two parts of the same natural site as being completely separate from each other. In addition to the strong institutional divide, there is also a substantial wealth difference. In a parallel Scandinavian study, on extended strict protection of a transboundary area between Sweden and Norway (Valasiuk et al., forthcoming), no such sign of the mutual disutility was found. One of the Polish latent classes did indicate preference for increased passive protection on the Belarusian side (Polish LC3). For the Belarusian sample, no latent class indicates preference for increased passive protection on the Polish side, according to LCM estimations with up to seven latent classes assumed. However, individual and/or household welfare did not prove to be a driver of belonging to any particular latent class with either greater or lesser tendency to co-operate.

In both nationality samples, latent classes that do not have significantly negative coefficient signs for the extension of the passive protection abroad, have positive preferences for the passive protection to be extended domestically. Therefore, willingness to increase passive protection in the domestic part of the transboundary natural site seems a necessary condition of the lack of "national egoism". Yet, this condition is not sufficient, as in two of the Polish latent classes (LC4 and LC5) preference for domestic protection is combined with clear negativity towards extension of the passive protection on the Belarusian side.

Finally, another explanation for the mutual disutility phenomenon may be suggested as the general setting our study including the payment vehicle employed, might lead to some behavioural reasons for mutual disutility. Namely, some respondents might rather maximise *the difference* in between the national and foreign shares of additional protection financed from their taxes payed in accordance with some fixed tax rate, than maximise the national share of the passive protection alone. The behavioural logic here seems to be as follows: "the less of foreign part protection would be funded from my fixed taxes – the more of my taxes will be spent on the domestic protection".

CONCLUSIONS

Positive WTP for extended passive protection in Poland indicates that the current state of nature conservation for the Polish segment of the Białowieża Forest might not be consistent with the citizens' preferences. Spatial extension of passive protection regime in accordance with any of the contemplated programmes is a socially desirable strategy in Polish Białowieża. On the contrary, other preferences dominate for respondents in Belarus. For Belarusians, the current state of protection of the Białowieża Forest seems to be sufficient, which implies no additional spatial protection ("status quo").

The preferences towards protection of the Białowieża Forest seem to be dominated with mutual disutility derived from contemplated co-operation. Beyond preferences for extended passive protection of forest, our results may also to some extent reflect the fenced border division of the forest. Differently from other transboundary NPAs, some of the fauna might not easily reach the area on the other side of the high fence. Some respondents might also have perceived possibly inadaptable institutional settings for raising a compulsory tax to financing a common bilateral Fund or they might be having behavioural reasons to maximise the difference in between the additional spatial protection domestically and abroad instead of stating indifference to the former. Clearly, there is also a matter of wealth difference; in the Polish sample there is a small proportion of respondents willing to co-operate with the economically poorer neighbour, while the Belarusians do not seem to be willing to participate in the programme aimed at additional protection in the richer country. Besides, stated care about the domestic part of the Białowieża Forest seems necessary but insufficient condition of non-negativity of preferences concerning its additional spatial protection abroad.

In any case, transboundary co-operation is currently not a socially desirable strategy in the case of Białowieża Forest, a conclusion most profound in the case of Belarusian respondents. If transboundary co-operation in protection of the Białowieża Forest remains desirable as voiced by conservationists, a greater effort should be made in terms of information and promotion of this idea among both Poles and Belarusians.

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Appendix

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

While answering the questions please remember to express your own opinion only - do not present the opinion of other people or the whole society. There are no good or bad answers to the questions contained in the questionnaire, all answers are valuable to us.

The questionnaire is anonymous.

I.   Recreation in the forest

1.   How often have you been to the forest with recreational purposes in the last 12 months?
   1.1. Several times a week or more often
   1.2. About once a week
   1.3. Several times a month
   1.4. About once a month
   1.5. Several times a year
   1.6. I haven't been to the forest in the last 12 months -> Go to part II.

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. Over 200 km

3.   What did you do in the forest in 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
   3.4.   I picked mushrooms/berries
   3.5.   I hunted
   3.6.   Other   activities
        (specify)_____
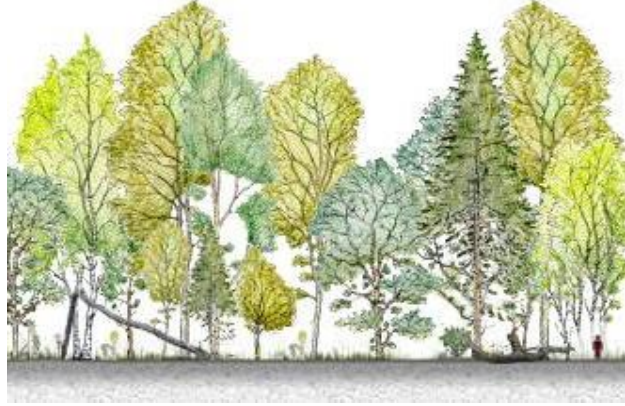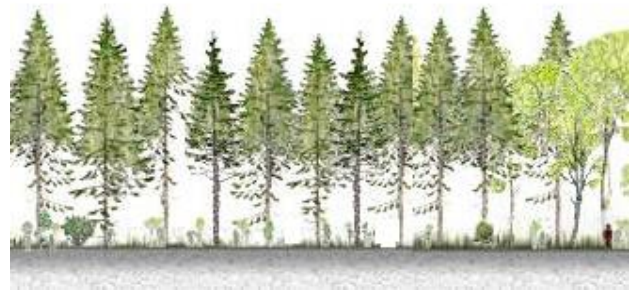
II.   Production forest and natural forest

Before starting the next part of the survey, please read about the difference between a production forest and a natural forest.

Forests cover almost 30 per cent of the area of Poland, they serve as a source of timber and firewood, recreation and leasure, as well as they fulfil protective functions, i.e. they are the place of living of many species of plants, animals and fungi, they protect the soil against erosion, regulate hydrographic conditions and the local climate. Dependent on the extent of human intervention into forest development processes, there are **natural** and **production** forests.

The following photos, ilustrations and descriptions represent the difference between the typical production forest vs. natural forest

Natural forest	Production forest

1) trees are not cut down. They are left in the forest until they get old, fall and decay.	1) after attaining a certain age the forest is logged. Old trees a met rarely.
2) trees are sown and grow naturally	2) the majority of trees are being planted artificially on the clearcuts.

3) trees of various ages are growing next to one another 4) there are usually many species of trees in such a forest. 5) there are a lot of dead and rotting trees (ca. 100 m³/ha). 6) there is a greater diversity of species of plants, animals and fungi. Many rare species live only in the forests with a large quantity of old rotting trees.	3) trees are at the same age. 4) one species of trees is dominant (in Poland it is usually the pine tree). 5) There is a small volume of dead wood (ca. 6 m³/ha). 6) there is a much smaller diversity of species of plants, animals and fungi. Rare species do not have good conditions to live here.
Semi-natural forests cover about 550 sq.km I Poland which makes up 0,6% of all the country's forests	About 99% of forests in Poland are production forests

III.   The Białowieża/Biełavieskaja Pušča Forest

Please get familiar with the basic facts about the Białowieża/Biełavieskaja Pušča Forest.

The total area of the Białowieża/Biełavieskaja Pušča Forest is over 2 160 km^2, which similar to the square with the side about 46 km long. About 1/3 of the Białowieża/Biełavieskaja Pušča Forest lies on Polish whilst 2/3 – on the Belarusian side.

4.   Have you ever been to the Białowieża/Biełavieskaja Pušča?
    4.1.   Yes, on the Polish side (how many times?)_____
    4.2.   Yes, on the Belarusian side (how many times?)_____
    4.3.   No, never -> go to the point IV

5.   When were you last in the Białowieża/Biełavieskaja Pušča?
    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 Białowieża/Biełavieskaja Pušča?
    6.1.   To watch the European bison
    6.2.   To watch other animals and plants / wildlife
    6.3.   To rest close to nature
    6.4.   To visit the Białowieża/Biełavieskaja Pušča Forest as one of the most famous tourist attractions in Poland
    6.5.   I was in the vicinity, so I decided to go to the Forest
    6.6.   I was there on mission
    6.7.   I have family/friends in the immediate neighbourhood
    6.8.   Other reasons (specify)
    _____

7.   Did you visit any of the following places while in the Białowieża/Biełavieskaja Pušča Forest? (you can choose more than one answer)
    7.1.   European Bison Show Reserve
    7.2.   Strict Protection zone (guided tour)
    7.3.   Museum of Nature and Forest of the Białowieża/Biełavieskaja Pušča National Park
    7.4.   Landmarks on the Polish side

IV. Infromation on the Białowieża/Biełavieskaja Pušča Forest

What distinguishes the Białowieża/Biełavieskaja Pušča Forest from all other forests in Poland and Europe are preserved large fragments of the natural forest. At 1/3 of its area, the Białowieża/Biełavieskaja Pušča Forest has never been logged – this part of the the Białowieża/Biełavieskaja Pušča Forest is covered by natural

These areas, located on both sides of the border, are marked on the below map. The Białowieża/Biełavieskaja Pušča Forest is the only place in Poland where natural forests have been preserved on such a big area.
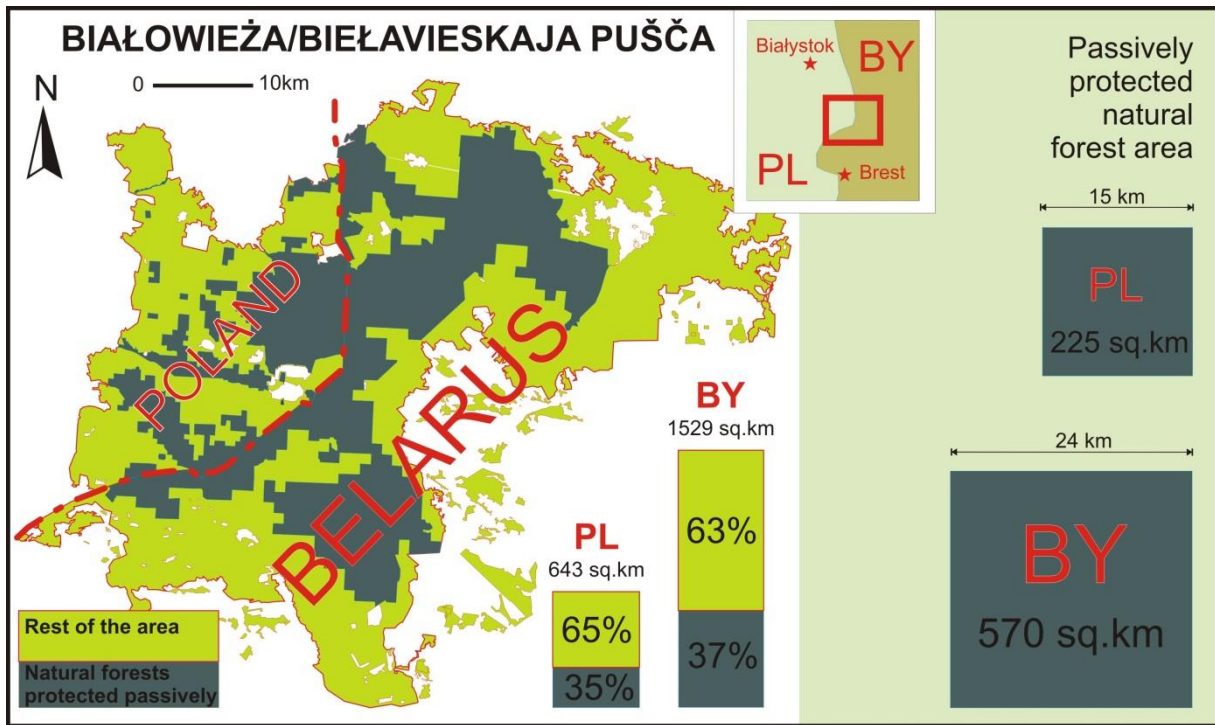
The best preserved forests, 35% of the Polish part and 37% of the Belarusian part respectively are covered by the **passive protection regime** which exludes any kind of human intervention into the natural processes.

The other fragments of the Forest, currently neighbouring with passive protection zones, are forests that have been used for production purposes in the last 100 years. As a result, the forests in Białowieża/Biełavieskaja Pušča are currently diverse as regards the naturalness degree, as it can be seen on the satellite images presented below.

The Białowieża/Biełavieskaja Pušča Forest beyond the borders of the **passive protection zone**. Lighter spots present the places of timber production.	Thick **natural forest** stand of the areas of the Białowieża/Biełavieskaja Pušča Forest subject to **passive protection**

IV.   **Programme of extention of the <u>passive protection</u> in Białowieża/Biełavieskaja Pušča Forest**
<u>We would now like to present you possible ways of changing conservation of the Białowieża/Biełavieskaja Pušča Forest area</u>

The programme of additional protection of the Białowieża/Biełavieskaja Pušča Forest is being considered currently. It is intended to extend the **passive protection** regime on the currently production forests of Białowieża/Biełavieskaja Pušča. Extention of the passive protection regime would mean cancellation of any human intervention into natural processes (logging and removal of trees, access roads paving, use of chemical pesticides etc).

Production forests of the Białowieża/Biełavieskaja Pušča are currently human-transformed to different extent. However, because they border with natural forests, if **passive protection** was also introduced in these areas, after **about 200 years** these forests would be close to **natural forests**, both as regards the look and the species of animals, plants and fungi.

The photos below represent the current look of production forests as well as how they have looked in about 200 years after their coverage by the **passive protection** regime.

Present time

In 200 years

8. Should, in your opinion, the passive protection zone be extended in the Białowieża/Biełavieskaja Pušča Forest?

Yes

No

I don't know

In this survey we would like to learn your opinion on which part of extension should be on the Polish and which part on the Belarusian side. Scientific researches indicate that it does not matter for the nature of the Białowieża/Biełavieskaja Pušča Forest, if the new areas will be granted protection in its Polish or Belarusian part; what really matters is that the total **passively protected** area in it is as large as possible.

NOTE:

− financial means are necessary for the implementation of the new Białowieża/Biełavieskaja Pušča Forest protection programme, for example for payment of compensation for the new areas covered by **passive protection**.

− to assure effectiveness of the activities related to the **passive protection** of the additional areas of the Białowieża/Biełavieskaja Pušča Forest, it is planned to establish the Polish-Belarusian Fund responsible for coordination of the **passive protection** activities on both sides of the Białowieża/Biełavieskaja Pušča Forest;

− to guarantee full reliability and transparency of the activities the Fund would function under the supervision of one of the most reputable international organisations, for example UNESCO;

− the Fund would have at its disposal means from **higher taxes** paid **proportionnaly to income** by **each** tax-payer in Poland and Belarus;

– implementation of the programme would have meant **increase of taxes** for the citizens of the both countries.

9. In a moment we will present you 16 comparisons of variants of passive protection extension in the Białowieża/Biełavieskaja Pušča Forest. Different variants emphasise different scope of passive protection area spatial extension, different proportion of its distribution between Polsh and Belarusian sides and they incurre different costs. We ask to treat every comparison independently of the others – for every comparison we ask you to pick a variant which is the best <u>from your point of view</u> out of all presented variants.

WHEN MAKING YOUR CHOICES, PLEASE REMEMBER THAT:

- your answers may influence the decision about how the Białowieża/Biełavieskaja Pušča Forest region would be governed;

- every option of additional protection would have incurrance of additional costs for you. Though increase of taxes would have depended of the income level, the tables contain sums **in zlotys for the person with as high income as yours;**

- in every household the money are necesary for other needs, therefore when choosing variants of programmes, please remember that funds they require could have been spent on other purposes;

- if you consider some of the variants or all of them too expensive – so that you would not choose to pay for them – please, do not pick them. Every comparison always contains a „status quo" option, that is **no changes**, which **does not imply any additional cost incurrance for you.**

Variants comparison 1	Status quo	Variant 1	Variant 2	Variant 3
Additional area in the Polish part of the Białowieża Forest covered by passive protection regime (Total proportion of passive protection zone in the Polish part of the Białowieża Forest)	+ 0 km^2 (35%)	+ 105 km^2 (51%)	+ 70 km^2 (46%)	+ 0 km^2 (35%)
Additional area in the Belarusian part of the Białowieża Forest covered by passive protection regime (Total proportion of passive protection zone in the Belarusian part of the Białowieża Forest)	+ 0 km^2 (37%)	+ 105 km^2 (44%)	+ 0 km^2 (37%)	+ 35 km^2 (40%)
Additional sum of taxes, imposed on your income annually during the five next years	None	100 PLN	50 PLN	75 PLN
Please, pick your best variant	☐	☐	☐	☐

10. When assessing particular programmes you have taken into account the following things: additional passive protection area in Poland or in Belarus, and additional cost. In the table below, please mark which of those things was the most important for you, and which was less important?

	I have taken it into account – it is very important	I have taken it into account – it is less important	I did not pay any attention to it at all
Dodatkowe obszary w polskiej części Puszczy Białowieskiej objęte **ochroną bierną**	☐	☐	☐
Dodatkowe obszary w białoruskiej części Puszczy Białowieskiej objęte **ochroną bierną**	☐	☐	☐
Dodatkowa kwota podatków od Pana/Pani dochodów pobierana raz do roku przez pięć lat	☐	☐	☐

11. (For those who picked status quo in all the choice-tasks). **You have consequently picked the**
<u>Status quo</u> **option. Please, choose your main reason for it:**

1)	I had a problem with understanding of the presented programmes. Picking **Status quo** option has been the easiest possible choice.	☐
2)	I would not like that my money are spent on the Białowieża/Biełavieskaja Pušča Forest protection.	☐
3)	I do not care what will happen with the Białowieża/Biełavieskaja Pušča Forest in future.	☐
4)	Variants other than **Status quo** were too expensive.	☐
5)	It is the government who must finance protection programmes, not me.	☐
6)	Other. Please specify _____	☐

12. Do you agree with the below statements?

	Definitely disagree	Rather disagree	Neither agree, nor disagree	Rather agree	Rather disagree	Do not know/ difficult to say
I am afraid that the money spent on the protection on the Polish side of the Białowieża/Biełavieskaja Pušča Forest could be embezzled (stolen)	☐	☐	☐	☐	☐	☐
I expect that Poland will comply with the international agreement to a larger extent than Belarus	☐	☐	☐	☐	☐	☐
I prefer to pay more for **passive protection** of the Polish side of the Białowieża/Biełavieskaja Pušča Forest because it belongs to Poland	☐	☐	☐	☐	☐	☐
I expect that Belarus will extend the **passive protection** zone of the Białowieża/Biełavieskaja Pušča Forest on its side of the border whether or not the bilateral programme	☐	☐	☐	☐	☐	☐

	Definitely disagree	Rather disagree	Neither agree, nor disagree	Rather agree	Rather disagree	Do not know/ difficult to say
discussed in the questionnaire is implemented						
I believe that the participation of Belarus in the funding of **passive protection** extension programme should be higher than the participation of Poland because the area of the Białowieża/Biełavieskaja Pušča Forest on the Belarusian side is greater than on the Polish side	☐	☐	☐	☐	☐	☐
I believe that participation of Poland in the funding of **passive protection** extension programme should be higher than the participation of Belarus because Poles are wealthier	☐	☐	☐	☐	☐	☐
I believe that results of this survey will be used for the selection of the new protection programme for the Białowieża /Biełavieskaja Pušča Forest	☐	☐	☐	☐	☐	☐
I do believe that in the event of the implementation of the new Białowieża/Biełavieskaja Pušča Forest protection programme I will be charged its costs (in the form of higher taxes)	☐	☐	☐	☐	☐	☐

	Definitely disagree	Rather disagree	Neither agree, nor disagree	Rather agree	Rather disagree	Do not know/ difficult to say
I believe that tax values presented in the questionnaire, connected with different options of the Białowieża/Biełavieskaja Pušča Forest protection programme are real tax rates that can be introduced	☐	☐	☐	☐	☐	☐
I expect to visit the Polish side of the Białowieża/Biełavieskaja Pušča Forest in the next 5 years	☐	☐	☐	☐	☐	☐
I expect to visit the Belarusian side of the Białowieża/Biełavieskaja Pušča Forest in the next 5 years	☐	☐	☐	☐	☐	☐

The next part of the questionnaire serves for learning your sociodemographic characteristics. We remind that the survey is anonymous, the obtained data will be used exclusively for statistical purpose.

M1. Please, specify your sex

☐ Male   ☐ Female

M2. Please specify the type of your settlement

Rural area	☐
A town with less than 25 thousand inhabitants	☐

A town with less than 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	☐
vocational	☐
higher (bachelor)	☐
higher (magister)	☐
other	☐

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. By this study we want to estimate the dependence between the answers to the previous questions and respondents' income level. Please, remember that the survey is anonymous and your personal data is not subjected to separate publishing. 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.)

PLN	Average monthly net individual income	Average monthly net income of the household
0 – 1 000 zł	☐	☐
1 001 zł - 2 000 zł	☐	☐
2 001 zł - 3 000 zł	☐	☐
3 001 zł - 4 000 zł	☐	☐
4 001 zł - 5 000 zł	☐	☐
5 001 zł - 6 000 zł	☐	☐
6 001 zł - 7 000 zł	☐	☐
7 001 zł - 8 000 zł	☐	☐
8 001 zł - 9 000 zł	☐	☐
9 001 zł - 10 000 zł	☐	☐
Ponad 10 000 zł	☐	☐
Difficult to say	☐	☐

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 filling in the questionnaire!