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„LUCKILY, A NEIGHBOUR'S COW IS DEAD". MUTUAL DISUTILITY FROM BILATERAL CONSERVATION PROSPECTS FOR THE TRANSBOUNDARY PROTECTED AREA IN THE CASE OF THE BIAŁOWIEŻA FOREST

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„LEPIEJ, ŻEBY SĄSIADOWI ZDECHŁA KROWA, NIŻ ŻEBYŚMY MY MIELI DRUGĄ". NIECHĘĆ UCZESTNICZENIA W HIPOTETYCZNYCH POLSKO-BIAŁORUSKICH PROJEKTACH WZMOCNIENIA OCHRONY PRZYRODY W PUSZCZY BIAŁOWIESKIEJ

SUMMARY: Transnarodowe obszary ochrony przyrody, których ważnym przykładem jest Puszcza Białowieska, stanowią znaczną część wszystkich aktualnych form obszarowej ochrony bioróżnorodności. Według naszego rozeznania nie było dotąd prac empirycznych dotyczących związanej z tym problematyki międzynarodowych dóbr publicznych. Staramy się wypełnić tę lukę, badając społeczne preferencje – zarówno w Polsce, jak i na Białorusi – odnośnie ochrony krajowych i zagranicznych fragmentów ekologicznego systemu puszczańskiego przedzielonego granicą państwową. Wyniki naszych eksperymentów z wyborem wskazują, że skala obecnej współpracy jest efektywna ekonomicznie, oraz pożądana społecznie. W artykule badamy zjawisko wzajemnej niechęci finansowania rozszerzenia obszarów ochrony biernej w Puszczy Białowieskiej. Tylko wśród polskich respondentów udało się zidentyfikować nieliczne osoby, które gotowe byłyby partycypować finansowo w hipotetycznym projekcie zlokalizowanym w kraju sąsiada. Ponadto, by polscy respondenci są przeciętnie gotowi podjąć się bardziej skutecznej ochrony (przynajmniej w kraju). Natomiast respondenci białoruscy wydają się być zazwyczaj usatysfakcjonowani dotychczasowymi rozwiązaniami.
KEYWORDS: transnarodowe obszary ochrony przyrody, ochrona bierna, eksperymenty z wyborem, gotowość do zapłacenia, model zmiennych ukrytych

Introduction

Transboundary nature protected areas (NPAs) comprise 4.6 million km^2, accounting for 14% of the protected areas, that altogether cover 32 million km^2 of the terrestrial and marine global surface[1]. In Europe, transboundary NPAs cover 188.153 km^2 [2], with 1.12 million km^2 of land is protected, either under Natura 2000 or national designations, or some combination of the two.

The preference for nature preservation, or extension of protected areas including those of transboundary nature, may only to a limited extent be signalled by actual behaviour[3]. Those visiting a protected area may only constitute a minor share of the individuals attaching value to the area; thus, the main economic value component might consist of non-use (passive use) values[4]. An amenity, which provision individuals are willing to pay for without actively using it, is a pure public good; there is complete non-rivalry and non-excludability in "consumption". For instance, in Scandinavia most of the recreational use of nature areas also qualifies as a public good; there is non-excludability due to the everyman's right to enter the area[5], whereas internationally there are several protected areas that base much of the management financing on entrance fees[6]; thus representing a mix of public and private goods, as entrance fees imply excludability.

Measuring non-use values is not straightforward, as economists cannot base such value measurement on peoples' actual choices. The widely used method for valuing public goods, particularly those that people value without the need of direct use (e.g., visits), is the contingent valuation. The method is survey-based; a sample of an affected population faces a scenario for some possible change in a public good, e.g. a change in some land-use, e.g. a natural forest. Then they are asked if they accept a new policy in which everyone has to pay some amount for preserving the natural forest (or extending the

1 M. Deguignet, et al., *United Nations List of Protected Areas*, Cambridge 2014.

2 *State of the world's protected areas: an annual review of global conservation progress*, Cambridge 2008.

3 D.M. Larson, *On measuring existence value,* "Land Economics" 1993 nr 69(4), p. 377-388.

4 J.V. Krutilla, *Conservation reconsidered,* "American Economic Review" 1967 nr 57(4), p. 777-786.

5 K.T. Colby, *Public access to private land-Allemansrätt in Sweden*, "Landscape and Urban Planning" 1988 nr 15(3-4), p. 253-264.

6 L. Emerton, J. Bishop, L. Thomas, *Sustainable Financing of Protected Areas: A global review of challenges and options*, Gland, Switzerland and Cambridge 2010.

preserved area), or to choose among policy options that may include different levels of protection (or protection extension) and a cost for the individual/household. The latter elicitation format is known as *Discrete Choice Experiment*, DCE[7]. DCE have gained much popularity in recent years, as they allow the respondents to trade-off elements in a policy choice involving pristine nature or other public goods[8].

Our study aims at finding out and comparing preferences towards protection of domestic and foreign segments of the transboundary Białowieża Forest, stated by the Polish and Belarusian citizens. To the best of our knowledge there have been no empirical studies addressing specific international public good problems caused by the circumstance that cross-border national parks may be insufficiently managed, with poor connectivity, and may be underfunded due to the fact that one country expects the other one to contribute more.

The Białowieża Forest lying in between Poland and Belarus is considered one of the last intact lowland forests in Europe[9] as well as one of the best known nature protected areas, which benefits from a high international reputation. For centuries it used to be hunting grounds for the privileged social strata. Approximately one third of the area has never been logged. Hence, the Białowieża Forest is one of the few forests in Europe governed by the natural rules to a large extent. Due to its relative intactness, the Białowieża Forest retains natural composition of forest ecosystems, functions and processes as well as typical forest flora and fauna[10].

The site has become one of the first nature protected areas of Central Europe in the modern sense. First, a nature protected area called Naturschutzpark has been established there by German military administration during World War I. A natural reserve (in 1921) and National Park (in 1932) have been established by the government of Poland. Since the ancient times and until the middle of the 20th century the Białowieża Forest was managed as a contiguous forest. However, 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, which were governed in a different manner. Whilst the Belarusian part was always governed as

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7 R.T. Carson, M. Czajkowski, *The discrete choice experiment approach to environmental contingent valuation*, w: S. Hess, A. Daly (eds.), *Handbook of choice modelling*, Northampton, MA 2014, p. 202-235.

8 R.T. Carson, *Contingent Valuation: A Comprehensive Bibliography and History*, Cheltenham 2012.

9 E. Blavascunas, *When foresters reterritorialize the periphery: post-socialist forest politics in Białowieża, Poland,* "Journal of Political Ecology" 2014 nr 21, p. 475-492.

10 T. Wesołowski, et al., Dis*pute over the future of the Białowieża Forest: myths and facts. A voice in the debate,* www.forestbiology.org 2016, Article 2: 1-19; [15-09-2016].

a whole (subsequently as a strict reserve, state game reserve and, finally – the National Park); the Polish part of the Białowieża Forest has always been divided in terms of its management regime and such a division still persists. While a smaller part of the Polish segment of the Białowieża Forest is protected as the Białoweski National Park and a system of natural reserves, a bigger part of it is still managed as a production forest.

The idea of passive protection (which implies a total ban on human interference with the natural ecosystems and processes) has been implemented in both national parts of the Białowieża Forest, however to the different extent. In the Polish part passive protection applies to the Białowieski National Park and twenty-four nature reserves which amounts to 225 km^2 or approximately 35% of its total surface. At the same time, in the Belarusian part passive protection regime applies to the strict conservation zone of the National Park; the former corresponds with the IUCN category Ia[11] and makes up a total of 570,5 km^2 or about 37% of the Belarusian segment[12]. Therefore, the forest fragments covered by the passive protection in the both segments of the site constitute very similar proportions, though they differ more than twice in their absolute surface. Passively protected fragments of the transboundary Białowieża Forest which mostly overlap with its intact core are painted dark-grey on the site map in figure 1.

Industrial forest areas can be transformed to some semi-natural state too, but it takes time. The main idea of the survey scenario was a spatial expansion of the passive protection on adjacent areas, in order to re-naturalise forest ecosystems in a time-span of 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.

Data and methods

The survey questionnaire consisted of five parts: (1) introductory questions, (2) survey scenario, (3) DCE itself, (4) debriefing questions, and (5) a block of questions on respondent's socioeconomic characteristics. The present paper addresses the results of the DCE only, while separate forthcoming contributions will involve the analyses of the remaining data.

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11 N. Dudley (ed.), *Guidelines for Applying Protected Area Management Categories, Gland*, Switzerland 2008.

12 The strict conservation zone of the NP „Biełavieskaja Pušča" has been extended up to the current 583 km^2, but our study is based on earlier numbers.

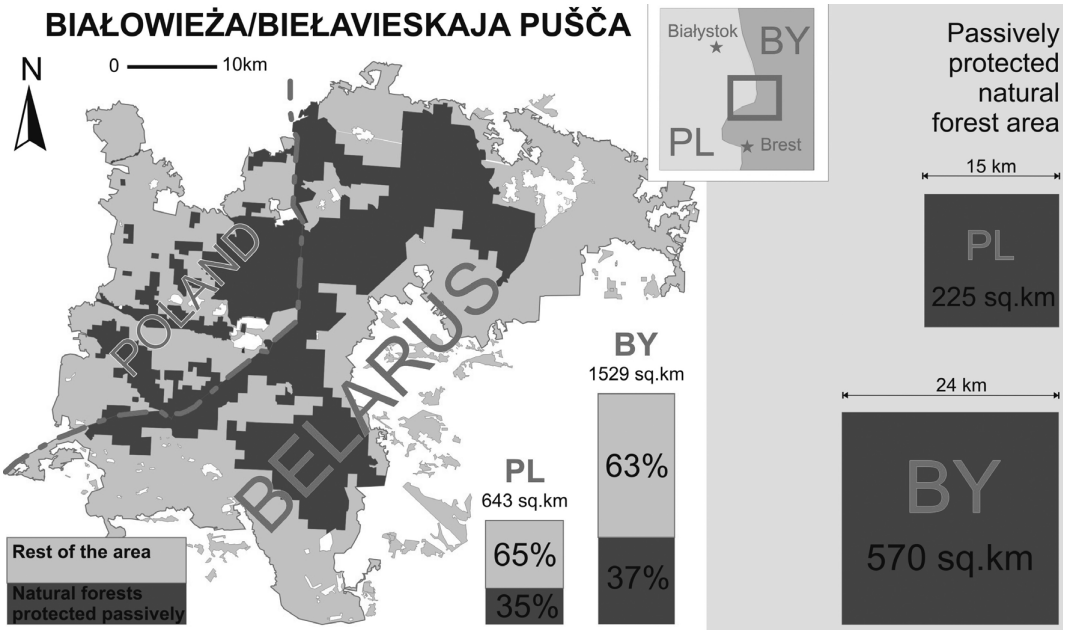

Figure 1 Map of the transboundary Białowieża Forest

The scenario part explained in an informative and neutral manner 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. In this part of the questionnaire proposed programme alternatives, attributes and their levels were presented together with other necessary elements of the subsequent DCE such as payment vehicle, which 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.

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 Belarussian part of the Białowieża Forest; what really matters is that the area of extension is as large as possible", 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 table 1. The respondents were explicitly informed about their opportunity to pick the *status quo* (*SQ*) option in as many choice tasks as they want.

Table 1 Programme attributes and their levels

Programme attribute	Levels in the main survey	
Passive protection extension on the Polish side of Białowieża Forest	+0 sq.km +35 sq.km +70 sq.km +105 sq.km SQ = +0	
Passive protection extension on the Belarusian side of Białowieża Forest	+0 sq.km +35 sq.km +70 sq.km +105 sq.km SQ = +0	
Additional amount of income tax, which you would have to pay annually during five years	Poland	Belarus
	25 PLN	3 USD
	50 PLN	6 USD
	75 PLN	9 USD
	100 PLN	12 USD
	SQ = 0	SQ=0

The efficient experimental design was generated for the survey. A respondent faced one set of sixteen choice-cards being chosen randomly out of the twelve possible sets. The questionnaire has been translated into respectively Polish and Russian, developed in the form of software tool, and administered as a series of computer-assisted personal interviews to the total sample of 1000 Belarusians and 1001 Poles at their homes. An example of the choice card is presented in the figure 2.

In about 60% of particular choice tasks the *SQ* option was picked as the respondents' best choice, while in the methodologically similar survey conducted by us in Scandinavia, *SQ* has been picked as the best option in about 45% of choice tasks[13]. The rates can be confronted with a Swiss study about public attitudes towards rewilding which estimated an approximately 50-50 division of wilderness proponents and wilderness opponents[14]. The subse-

13 S. Valasiuk, et al., *Is Landscape Restoration Economically Feasible and Socially Desirable?* A Discrete Choice Experiment in the Transboundary Fulufjället National Park – forthcoming.

14 N. Bauer, A. Wallner, M. Hunziker, *The change of European landscapes: human-nature relationships, public attitudes towards rewilding, and the implications for landscape management in Switzerland*, "Journal of Environmental Management" 2009 nr 90(9), p. 2910-2920.

quent econometric analyses followed the random utility modelling[15]. The rest of the paper presents results of the multinomial logit model (MNL) together with the latent class model (LCM)[16].

Wybór wariantów 1	Stan obecny	Wariant 1	Wariant 2	Wariant 3
Dodatkowe obszary w polskiej części Puszczy Białowieskiej, objęte ochroną bierną	+ 0 ha	+ 105 km^2	+ 0 km^2	+ 35 km^2
(Łączny procent ochrony biernej w polskiej części Puszczy Białowieskiej)	(35%)	(51%)	(35%)	(40%)
Dodatkowe obszary w białoruskiej części Puszczy Białowieskiej, objęte ochroną bierną	+ 0 ha	+ 105 km^2	+ 70 km^2	+ 0 km^2
(Łączny procent ochrony biernej w białoruskiej części Puszczy Białowieskiej)	(37%)	(44%)	(42%)	(37%)
Dodatkowa kwota podatków od Pana/Pani dochodów pobierana raz do roku przez pięć lat	Brak	100 PLN	50 PLN	75 PLN
Proszę wybrać najlepszy wariant	☐	☐	☐	☐

Figure 2 Example of the choice card from the Polish questionnaire

Results and discussion

The modelling results are presented in table 2. In general, they are consistent with economic theory as well as with some of the *a priori* expectations. Thus, both Belarusians and Poles prefer *ceteris paribus* to pay as little as possible, which is determined by the negative parameter with the BID attribute. Both nations state positive preferences for the greater passive protection of their domestic segment of the Białowieża Forest since the parameters with appropriate dummies are positive and statistically significant. At the same time, preferences of neither nation exhibit strict linearity. An important feature is that utility increases when the area of the enhanced

15 D. McFadden, *Conditional Logit Analysis of Qualititative Choice Behaviour*, w: P. Zarembka (ed.), *Frontiers in Econometrics*, New York 1974, p. 105-142.

16 K. Train, *Discrete Choice Methods with Simulation*, Cambridge, New York 2003.

protection increases – this is consistent with theoretical expectations[17]. Indeed, the program alternatives which contemplated bigger extension of passively protected area on domestic segment of the transboundary site were systematically assigned higher utility by Polish respondents. Their decreasing marginal utility when increasing the scope of protection is well known from former valuation studies[18].

However, preferences of Belarusian respondents seem to be of bell-shaped character. The utility they derive from extension of the passive protection by additional 70 km^2 exceeds both the utility associated with the extension by 35 km^2 and by 105 km^2; their utility per unit of extension follows the same pattern.

At the same time, both nations also stated some positive preferences towards the current level of protection since the parameter with *SQ* option in both country-specific models is positive and significant. However, if preferences for *SQ* are compared against preferences for positive conservation programmes, then a fundamental difference emerges in between Polish and Belarusian respondents. While parameters with the programme alternative dummies exceed parameters with *SQ* 1.74-2.6 times for Polish respondents, the pattern for Belarusian respondents is reverse and their parameters with dummies denoting positive programme alternatives amount only to 7-15% of their parameter with *SQ*. Therefore, implementation of any positive conservation programme would imply the net utility loss for the Belarusian respondents, which is not the case for the Polish ones. While, Poles, on average, would like to depart from the current level of protection of the Białowieża Forest, their Belarusian counterparts' preferences are dominated with the positive utility they derive from the *SQ* option.

Possibly, the most striking result of the modelling are the mirror and significant preferences of both nations towards the additional protection of the neighbour's part of the Białowieża Forest, which range from indifference to highly negative preferences. Therefore, neither of the nations involved (on average) derives any positive utility from additional protection of the foreign segment of the Białowieża Forest. Moreover, those of the contemplated bilateral conservation programmes which imply spatially more extensive additional protection of the foreign segment lead to substantial mutual disutility with both the Belarusians and the Poles.

The latter phenomenon was scrutinised with the help of LCM. Models with various numbers of latent classes (LC) have been estimated. The LCM

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17 R.T. Carson, R.C. Mitchell, *The issue of scope in contingent valuation studies,* "American Journal of Agricultural Economics" 1993 nr 75, p. 1263-1267.

18 K. Rollins, A. Lyke, *The case for diminishing marginal existence values*, "Journal of Environmental Economics and Management" 1998 nr 36, p. 324-344.

Table 2 Modelling results

	Poland	Belarus
MNL		
BY35	-0.06261	0.07714*
BY70	-0.09239**	0.16685***
BY105	-0.19782***	0.07735*
PL35	0.60935***	0.05275
PL70	0.72656***	-0.23200***
PL105	0.90871***	-0.15147***
BID	-0.02398***	-0.02087***
SQ	0.34894***	1.07675***
LCM		
Random utility parameters in LC I		
BY35	-0.54453***	0.01483
BY70	-0.53965***	0.19835*
BY105	-0.62251***	0.05109
PL35	0.80110***	0.04343
PL70	1.32194***	-0.32619***
PL105	1.14424***	-0.38189***
BID	-0.08302***	-0.04108***
SQ	0.91528***	2.42990***
Random utility parameters in LC II		
BY35	0.02711	0.14458***
BY70	-0.02472	0.22035***
BY105	-0.09362*	0.10736*
PL35	0.75602***	0.05956
PL70	0.97015***	-0.27631***
PL105	1.25957***	-0.12822**
BID	-0.02893***	0.00121
SQ	-1.33271***	-0.44470***
Estimated LC probabilities		
PrbLCI	0.51120***	0.57373***
PrbLCII	0.48880***	0.42627***

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

with two LC gave the best fit into the data with R^2=0.5÷0.6; therefore most of the discussion is based on their results.

For the Poles, the probability ratio of falling into LC I / LC II is 51/49. The main difference in between the two LC in the case of Poles is encapsulated in their reverse preferences towards the *SQ* option. The respondents belonging to the LC I state positive and significant preferences towards the current state of protection. Moreover, their preferences for *SQ* exceed their preferences towards the spatially least extensive protection programme contemplated for the Polish side. Besides, Polish respondents from the LC I state negative preferences towards spatial extension of the passive protection of the Belarusian segment.

On the contrary, the Poles falling into the LC II reveal reverse preference order toward the current state of protection of the site under consideration – parameter with the SQ is negative and highly significant for them. At the same time, their preferences towards additional protection of the domestic segment of the Białowieża Forest are positive and highly significant at all the contemplated levels; therefore, any of them would yield a net utility gain. Preferences towards additional protection of the Belarusian segment of the transboundary site under consideration for respondents belonging to the LC II are less negative as compared with their LC I counterparts. Therefore, the Polish LC II is more pro-conservationist and more transboundary co-operative as compared with the LC I.

The probability ratio of falling into the appropriate LC for the Belarusians is 57/43. Like with the Polish LC I, respondents from the Belarusian LC I state very high preferences towards *SQ* option. Therefore, every positive programme implying departure from the current state of protection on any side of the border yields net disutility to the Belarusians belonging to the LC I (despite their insignificant or even positive and significant parameters with some contemplated programmes).

Unlike them, respondents falling into the LC II state their willingness to depart from the *SQ*. Instead, they are willing to expand passive protection in the domestic segment of the Białowieża Forest, and they are neutral towards the minimal extension of the passive protection in its foreign segment. At the same time, they state negative and significant preferences towards the remaining two foreign conservation programmes. What is interesting about the Belarusians, belonging to LC II – is their stated indifference towards the monetary attribute. They seem to be willing to protect more of the domestic segment of the Białowieża Forest at any cost, which is not fully consistent with the economic theory. Besides, this implies that WTP for the programme attributes are also statistically insignificant for the LC II.

Assuming the number of LC bigger than two provides some interesting insights into how the respondents view the protection of foreign segment of the Białowieża Forest. Thus, for the Poles, an LCM assuming five LC yields one LC with positive preferences for both domestic and foreign extension of the passive protection regime. Polish respondents fall into such a class with the probability of 12%. However, even they state significantly different preferences towards domestic and foreign protection with the clear dominance of the former. On the contrary, for the Belarusians, similar "co-operative" class does not exist according to LCM estimations with up to seven LC assumed. It seems that such a class of willing to co-operate with the richer country does not exist in the poorer one at all.

Conclusions

Positive preferences for rewilding in Poland determine the current state of nature conservation for the Polish segment of the Białowieża Forest to be economically suboptimal. Clearly, spatial extension of passive protection regime in accordance with any of the contemplated programmes is a socially desirable strategy. On the contrary, for Belarusians, the current state of protection of the Białowieża Forest seems to be economically optimal, which implies no additional spatial protection.

Both nations demonstrate a very small tendency to co-operation as compared with the parallel Scandinavian study. Moreover, their preferences seem to be dominated with the mutual disutility they derive from contemplated co-operation. Therefore, transboundary co-operation is currently not an economically optimal and socially desirable strategy in the case of Białowieża Forest, especially for Belarusians, who are not willing to pay for protection in the richer country. At the same time, in Poland the proportion of respondents willing to co-operate with the economically poorer neighbour definitely exists, yet it is not very high.

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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Literature

Bauer N., Wallner A., Hunziker M., *The change of European landscapes: human-nature relationships, public attitudes towards rewilding, and the implications for landscape management in Switzerland*, "Journal of Environmental Management" 2009 nr 90(9)

Blavascunas E., *When foresters reterritorialize the periphery: post-socialist forest politics in Białowieża, Poland*, "Journal of Political Ecology" 2014 nr 21

Carson R.T., *Contingent Valuation: A Comprehensive Bibliography and History*, Cheltenham 2012

Carson R.T., Czajkowski M., *The discrete choice experiment approach to environmental contingent valuation,* w: S. Hess, A. Daly (ed.), *Handbook of choice modelling*, Northampton, MA 2014

Carson R.T., Mitchell R.C., *The issue of scope in contingent valuation studies*, "American Journal of Agricultural Economics" 1993 nr 75

Colby K.T., *Public access to private land-Allemansrätt in Sweden,* "Landscape and Urban Planning" 1988 nr 15(3-4)

Deguignet M., et al., *United Nations List of Protected Areas*, Cambridge 2014

Dudley N. (ed.), *Guidelines for Applying Protected Area Management Categories*, Gland, Switzerland 2008

Emerton L., Bishop J., Thomas L., *Sustainable Financing of Protected Areas: A global review of challenges and options,* Gland, Switzerland and Cambridge 2010

Krutilla J.V., *Conservation reconsidered,* "American Economic Review" 1967 nr 57(4)

Larson D.M., *On measuring existence value*, "Land Economics" 1993 nr 69(4)

McFadden D., *Conditional Logit Analysis of Qualititative Choice Behaviour,* w: P. Zarembka (ed.), *Frontiers in Econometrics*, New York 1974

Rollins K., Lyke A., *The case for diminishing marginal existence values*, "Journal of Environmental Economics and Management" 1998 nr 36

State of the world's protected areas: an annual review of global conservation progress, Cambridge 2008

Train K., *Discrete Choice Methods with Simulation*, Cambridge, New York 2003

Wesołowski T., et al., *Dispute over the future of the Białowieża Forest: myths and facts. A voice in the debate*, www.forestbiology.org 2016, Article 2

Valasiuk S., et al., *Is Landscape Restoration Economically Feasible and Socially Desirable?* A Discrete Choice Experiment in the Transboundary Fulufjället National Park – forthcoming