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SHOULD WE PAY, AND TO WHOM, FOR BIODIVERSITY ENHANCEMENT IN PRIVATE FORESTS? AN EMPIRICAL STUDY OF ATTITUDES TOWARDS PAYMENTS FOR FOREST ECOSYSTEM SERVICES IN POLAND

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Should we pay, and to whom, for biodiversity enhancement in private forests? An empirical study of attitudes towards payments for forest ecosystem services in Poland

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Abstract

This paper investigates the possibility of forest policy changes in Poland. The main objective is to investigate whether, and to whom, the society would be willing to pay for providing biodiversity enhancement in private forests. The empirical evidence is derived from a stated preference survey conducted on the national level and analyzed using a multinomial logit model (MNL). Our findings show a rather strong potential for the implementation of payments for ecosystem services (PES) in private forests, even though historical and institutional conditions are not favorable. The results also indicate a significant role of environmental attitudes in viewing the national and local governments as those responsible for financing the implementation of changes in private forests. They allow to provide recommendations for planning authorities and decision-makers not only in Poland but also in the other Central and Eastern European countries, where payments for ecosystem services have no long tradition.

Keywords:
biodiversity, environmental attitudes, forest policy, payments for ecosystem services, private forests

JEL:
D01, H4, Q23, Q51

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Introduction

The design and evaluation of payment for ecosystem services (PES) schemes have recently become the focus of intensified research by economists, in particular in the field of environmental economics and ecological economics. According to these studies, better knowledge of forest ecosystem services (ES) and to whom the society would be willing to pay for their provision can improve forest management and increase social welfare. More and more countries are now acknowledging the importance of a full range of ES from forests. Furthermore, PES have become an increasingly popular approach to dealing with problems of environment management and conservation around the world (Kemkes et al., 2010). Such programs, differing in their scope and adopted solutions, have been implemented in several countries on different continents, e.g. Costa Rica, Mexico, United Kingdom or the United States. Usually, PES are used for nature conservation measures on private land to compensate the landowners for income losses or opportunity costs experienced. Nature conservation can either be government-financed, which is the most typical case in the OECD, or it can be user-financed i.e. users or local beneficiaries pay the landowners directly for providing the demanded ES (Zandersen et al., 2009).

The topic of introducing and designing forest-related PES schemes in countries of Central and Eastern Europe has not yet been covered well by the economic literature. Due to their socialist past – dominating state ownership of resources and centrally-planned economies – any analysis of forest land governance in these countries must be conducted with account for the broad scale institutional change that they experienced after 1989 (see, e.g., Bouriaud et al., 2013). Studies of PES must in particular focus on these societies' perceptions e.g. regarding the role of the state in forest management, as well as trust between members of the society who could be ES users or ES providers.

In this paper we focus our analysis on the case of Poland and biodiversity ES. Almost 30% of the land area of Poland is covered by forest. Some of the last remaining old-growth forests of Europe and much of their biodiversity is also located in Poland. At the same time the country has a population, which is keen to use forests for resources and recreation. For many years in Poland, like in other countries, the traditional focus of forest management has been on timber harvesting. Poland has neither implemented PES schemes in practice, nor has its forest management been analyzed thoroughly from the point of view of the potential for implementation of PES schemes. Such assessment requires focusing in particular on the institutional framework for PES, both in terms of formal institutions (the legal framework), as well as informal ones (social relations, perceptions and historical legacies).

In particular, in this paper we investigate whether, and to whom, the society would be willing to pay for providing biodiversity enhancement in private forests in Poland. We use the findings of a stated preference survey conducted on the national scale sample of Polish respondents and analyze the data using a multinomial logit model (MNL). In our analysis we include information on respondents' environmental attitudes and examine their role for decisions concerning the choice of the PES scheme in private forests. Environmental attitudes are defined as a psychological tendency expressed by evaluating the natural environment with some degree of favor or disfavor, and are a crucial construct in the field of environmental psychology (Hawcroft and Milfont, 2010). Understanding people's underlying motives such as their environmental attitudes is an important aspect of promoting ecological policy. Internal

motives determine behavioral intentions and this can be expressed in individuals' willingness to pay (WTP) for changes in environmental quality (see, e.g., Bateman et al., 2002).

Our results shed more light on Polish society's attitudes towards PES and may provide recommendations for planning authorities and decision makers not only in Poland but also in other countries, where social conditions for introducing PES seem unfavorable and such schemes do not have a long tradition. Although, as we will demonstrate further in the paper, Polish society is hardly familiar to PES, the results obtained in this study show that Poles' attitudes towards payment for such services, in particular biodiversity, are in line with the expectations developed on the basis of theoretical approaches and practical experiences of economists working in the field of PES during the recent years (e.g. Farley et al., 2010; Kemkes et al., 2010) relating, in particular, to the choice between voluntary and coerced PES.

The paper is organized as follows. In Section 2 we present an overview of approaches to PES developed in the economic literature to-date emphasizing their theoretical basis and implications. Basic facts concerning the ownership structure and use of private forests in Poland, as well as the legal framework for their operation and socio-historical context are discussed in Section 3. Section 4 presents the survey design and employed methods, while Section 5 contains the empirical study and the discussion of its results. Recommendations and future outlook are presented in the last section, together with the conclusions.

1. PES – overview of different approaches

Ecosystem services (ES), broadly defined by the Millenium Ecosystem Assessment as "the benefits people obtain from ecosystems" (MEA 2005, p. V), have been the subject of study by economists for several years now, both within the field of environmental economics as well as the ecological economics. While representing a significant contribution to sustainable human well-being, larger than the contribution of marketed goods and services, ES are being threatened and degraded by human activity (Farley and Constanza, 2010). From an economic point of view these services give rise to market failures which include, in particular, the presence of externalities, the public good nature of many ES, imperfect property rights, as well as incomplete knowledge and information (Tietenberg, 2006).[1]

PES have attracted particular interest as potential mechanisms allowing to translate non-market values of ecosystems into financial incentives for their providers to supply them. Other government policy tools to encourage such internalization mentioned in the literature are prescriptions (regulation), penalties (taxes), property rights (e.g. land use moratorium, tradable permits), and persuasion (public information) (Engel et al., 2008; Salzman, 2005; Kemkes et al., 2010). During the last nearly 10 years economic literature has come up with several definitions and approaches to PES. Wunder (2005, p. 3) defines PES as a voluntary transaction, where a well-defined environmental service (or a land use likely to secure that service) is being "bought" by (minimum one) service buyer from (minimum one) service provider, if and only if the service provider secures service provision (conditionality). Engel et al. (2008) further explain that as land uses alternative to conservation are usually more

[1] For a more detailed discussion of the definition of ES see Farley and Constanza (2010), who also argue that ES can be regarded as fund services (as opposed to ecosystem goods which are stock-flow resources).

beneficial for ES providers, the latter will have incentives to opt for such uses although they often cause externalities (negative effects on third parties, e.g., in a classical example, on downstream users of a water resource). The buyers (consumers) of the ES could however pay the ES providers to induce them to provide the service instead of changing their land use. Such payment would need to be at least equal to the benefits forgone by the ES providers (including any opportunity costs and transaction costs connected with the PES agreement) and at the same time equal or less than the value of the ES to the buyers. Engel et al. (2008) further distinguish between user-financed PES programs (where the ES buyers are the actual users of the service), which are most likely to be efficient, and government-financed PES programs (where the buyers are a third party acting on behalf of service users, usually a government agency, but possibly also another entity such as an NGO or international organization), which are less likely to be efficient. They note however that government-financed PES programs may be more cost-effective than user-financed programs thanks to economies of scale in transaction costs (Engel et al., 2008). The economic theory behind such an approach to PES, advocated in particular by the environmental economists, relates to market failures (in particular externalities and public goods), as well as the Coase theorem. As a consequence, it emphasizes the reduction of transaction costs, clear allocation of property rights and inducing bargaining processes between ES providers and ES buyers (Gomez-Baggethun et al., 2010). The case in which the ES buyers contract directly with the ES providers is closest to the pure Coasian case (Engel et al., 2008).

Several criticisms have however been raised with regard to the above Coasian approach to PES. An important practical one relates to the fact that PES can rarely be considered as purely voluntary transactions, since usually the state or local communities are engaged in their establishment (Vatn, 2010). More generally, such approach fails to take into account the complexities related to uncertainty, distributional issues, social embeddedness and power relations (Muradian et al., 2010).

A more general definition of PES has been proposed by the ecological economics approach. Acknowledging the public-good nature of ES, Muradian et al. (2010) emphasize the collective action problem that arises when coordination of various actors' actions is needed to avoid outcomes undesirable from the social point of view. According to this approach the main goal of PES is creating incentives for the provision of such services, i.e. changing individual or collective behavior so that it does not lead to ecosystems deterioration. PES are then viewed as "a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources" (Muradian et al., 2010, p. 1205). Such transfers, whether monetary or not, are embedded in their social context, including social perceptions of the relationship between land use and the provision of ES, which may be particularly significant factors in determining the feasibility of PES under incomplete information. According to Muradian et al. (2010) PES transfers may take place both through the market, as well as through other mechanisms such as public subsidies and regulation[2].

[2] Muradian et al. (2010) further propose three criteria to cluster multiple schemes falling under this broad definition of PES: the importance of the economic incentive, the directness of the transfer, and the degree of the ES commodification.

Tacconi (2012) provides a critical overview of both approaches to PES – the environmental economics and ecological economics one[3]. He alleges that the former overemphasizes the role of Coasian transactions for PES, while the latter overemphasizes the reliance of the environmental economics approach on the Coase theorem. According to Tacconi's (2012) revised definition of PES, which one could place in-between the environmental economics and ecological economics approach, such scheme is "a transparent system for the additional provision of environmental services through conditional payments to voluntary providers" (Tacconi 2012, p. 35).

Although, as explained above, there exists no common agreement on the definition of PES among economists, they would typically agree that understanding how ES are provided by different ecosystems, as well as the characteristics and magnitude of the benefits that they bring is essential for designing the adequate supportive measures. Among others Kemkes et al. (2010) emphasize that these ecosystem characteristics determine whether or not payments are an adequate instrument for providing them. In particular, it is the combination of rivalry and excludability that determine the type of a good that the ES is and whether payments will induce that it is provided at a socially desirable level. The marginal value of a rival good is the maximum amount that each consumer of it is willing to pay for it, while the marginal value of a non-rival good is the sum of the willingness to pay by all of its users. The marginal cost of use for a non-rival ES is zero, therefore a one-time payment by a monopsonist with no payments for use is the most efficient method for providing a non-rival service (Kemkes et al., 2010). This holds in particular if the ES also has the feature of non-excludability, rendering it a public good type, such as for example biodiversity enhancement. On the other extreme, market goods, being both rival and excludable, require individual payments by their users. For intermediate categories of goods Kemkes et al. (2010, tab. 3) suggest the following: for common pool resources (e.g. ocean fisheries) – making them excludable through property rights, introducing tradeable permits; for toll or club goods (e.g. recreational services) – treating them as public goods and requiring one-time payment by individuals when they become congestible; for inefficient market goods (non-rival/anti-rival and excludable) – treating them as public goods and providing additional incentives for use.

Drawing on the ecological economics argumentation presented above (Muradian et al., 2010), in our paper we approach PES from a broad perspective devoting attention to the institutional framework (formal and informal), as well as political aspects of its design and implementation. This however does not mean that we entirely neglect the Coasian logic. Taking the market-based approach as a starting point and bearing in mind the nature and characteristics of the ES under investigation we consider the legal (institutional) and social context in which they occur. We therefore devote the following section of the paper to the presentation of forest use, its regulation and social background in Poland.

[3] Next to those two main approaches there also exists a third (rather extreme) approach to PES, which generally rejects both the notion of PES and ES as such, alleging that they involve unacceptable commodification of nature (see, e.g., McCauley, 2006).

2. Forest ownership and use in Poland

With about 9.4 million hectares of evenly distributed forests Poland is a country with an average share of forest cover for Europe (GUS, 2013). While several transition countries in Central and Eastern Europe have chosen to privatize forests (e.g. Hungary), Poland still has ca. 80% state owned forests. In 2012 public forests in Poland accounted for 7.4 million hectares, of which 95% were managed by the State Forests National Forest Holding (SFNFH) (GUS, 2013). As economic literature concerning PES, as well as most PES schemes implemented in practice, concern private forests around the world, in this paper we also concentrate on the situation of Polish private forests constituting ca. 20% of all forest land in this country. This land is highly fragmented, i.e. distributed between many private owners who usually own very small pieces of land (73% of private forests being below 6 hectares, EC, 2011). It is typical for Poland that such small privately-owned forests are pieces of land located on the outskirts of state-owned forests and attached to them[4].

Forest use and management in Poland, both as regards public and private forests, is regulated by the Forest Act of 1991. This act defines the rules for the maintenance, conservation and enhancement of forest resources, as well as the working principles of the forest economy in connection with other elements of the natural environment and the national economy. It also defines the sustainable forest economy as activity aimed at establishing the structure of forests and their use in a way and pace allowing for maintaining the durability of their biological richness, high productivity, as well as potential to regenerate, resilience and capability to fulfill (now and in the future) all important protective, economic and social functions on the local, national and global levels, with no harm caused to other ecosystems. Forests are to be used and managed according to the forest management plan, taking into account the goals of the sustainable forest economy and several other provisions. The Forest Act further constrains the discretion of private owners' decisions regarding the use and management of their forests in various ways. Although for such forests a simplified version of the forest management plan is sufficient, decisions regarding the content of this plan are made by the local government (at the second administrative level, i.e. NUTS 4, by the respective governor – *starosta*). *Starosta* also acts as the controlling body for private owners of forests and this competence may be delegated (and in practice often is delegated) to the SFNFH. Forest owners are however entitled to forbid access to their forests by placing an appropriate sign.

Due to the specific ownership structure of Polish forests presented above the vast majority of forests are accessible to the public free of charge. According to the Environment Protection Act of 2004 entrance fees can be introduced in national parks, but such practice has only been taken up in a few parks to date (Bartczak et al., 2008). Although the owners of private forests may restrict access to them, even in such forests charging entrance fees is, just as in Europe generally, a very rare practice. Easily accessible and free of charge forests are

[4] Such configuration of private forest ownership is regarded as an important reason for problems with their management, in particular in the context of the private owners' position vis-à-vis the SFNFH. See, e.g., the Forest Policy of the State (1997) advocating the need to enhance the possibilities for private forest owners to establish associations and other forms of cooperation.

popular places for outdoor recreation for Poles, who in the vast majority visit them at least once a year (Bartczak et al., 2008).

From an economic point of view an important difference between public and private forests is obviously the distribution of benefits from the use of this land, both for production and other purposes. Since benefits from private forests accrue to their owners, most of Polish private forests are used for timber production, mainly for the needs of the owners' farms. Most owners of private forests in Poland are primarily farmers and the share of their income coming from timber sales oscillates only around 1.7% (Gołos, 2004). This fact, together with the aging of the population of private forest owners, which is emphasized by many studies, are crucial reasons why many Polish private forests are poorly managed, often unused and left without appropriate care and investment.

According to the Polish Forest Policy (an official government document adopted in 1997) sustainable forest policy requires that forests fulfill not only productive but also ecological and social functions, including establishing the conditions for conserving the biological potential of ecosystems, as well as ensuring the conditions for various forms of use by local communities (e.g. recreation). However, currently such action is undertaken to a further extent by the SFNFH than by private forest owners. One could argue that profit-oriented private owners do not undertake such efforts as they do not expect this activity to be in their private interest (profitable), neither in the short, nor in the long run. If we want the sustainable forest policy goals to be fulfilled, simple regulation, as described above (in the Forest Act), is not sufficient to guarantee appropriate incentives for private forest owners. An effectively implemented PES scheme could provide them with such incentives by ensuring that they receive monetary benefits from providing such ES.

The introduction of a PES scheme in the Polish context however bears several risks. Firstly, with the current ownership structure (described above) and given that most private owners do not exercise their right to forbid other users' access to their forest, on average, Poles have little experience in visiting private forests and even if they recreate in a private forest often they are not aware of that fact. Because of that, payments for ecosystem services in a private forest are a rather unfamiliar issue for the Polish society. Secondly, the lack of experience in payment for environmental services and, more generally, with any market-based mechanisms has a much longer history, as private ownership of resources in Poland, including forests, was virtually non-existent during the socialist period until 1989. Thirdly, as noted by Muradian et al. (2010, p. 1205), PES schemes constitute "a mechanism for reconnecting decisions about land use management across different actors through cooperation" conditional on existing institutions, which include not only property rights and legal frameworks but also social perceptions and values. These authors also stress the crucial role of social capital for successful operation of PES, since lack of trust between stakeholders may prevent its successful functioning. Several studies reveal a relatively low level of social capital in post-socialist countries, including Poland (see, e.g., Paldam and Svendsen, 2000; Fidrmuc and Gerxhani, 2008). Assessments of trust between members of the society (e.g. by the World Value Surveys or the European Social Survey) also produce a lower number for Poland than the European average. Given such conditions we expect that development of PES schemes in Poland may face considerable difficulty.

A crucial question that one should therefore ask before engaging in the drafting and implementation of PES schemes in Poland concerns the social perception of who should pay

for ES and, in case there is positive willingness to pay for PES, whether such payments should come from the actual users of the service or the entire society (government subsidies). In the following section we undertake an empirical study aimed at answering these questions.

3. Survey design and methods

We base our empirical study on the results of a stated preference survey developed as part of the New Ways to Value and Market Forest Externalities (NEWFOREX) project, financed under the 7th Framework Programme by the European Commission. The main objective of the project was to contribute to the increase of societies' welfare by developing new ways to enhance the provision of non-market forest goods and services. The work was based on a set of five carefully selected European case studies in Denmark, Finland, Italy, Poland and Spain, representing a range of variation in forest types, landscapes in which forests are situated, degree of urbanisation, importance of forest goods and services, and socioeconomic context.

The survey employed in this paper deals with non-market forest ES in Poland. It originally consisted of six parts. Part 1 presented general information concerning forests in Poland and questions about respondents' forest-recreation patterns. Part 2 was a choice experiment aimed to elicit a monetary valuation of changes in the management regime of the Białowieża forest – the most recognized and ecologically valuable state-owned forest in Poland[5]. Part 3 was designed to investigate respondents' opinions concerning the financing of nature conservation in Polish private forests (by public bodies, directly by its users, or, by the forest owners). In part 4, respondents' environmental concerns were measured using the New Ecological Paradigm (NEP) scale (Dunlap and Van Liere 1978; Dunlap et al., 2000). The NEP scale is one of the most widely applied environmental attitude measures, the validity and reliability of which have been frequently assessed in the literature. . The last part of the survey consisted of standard socio-economic questions.

The survey was carried out by a professional polling agency in December 2011. The data were collected through a national online survey of the Polish population. The final sample was quota-controlled for sex, age, region and agglomeration size. A total of 1,000 interviews were gathered.

In this paper we use part 3 of the above survey and focus on whether and to whom Poles would be willing to pay for providing biodiversity enhancement in private forests. To investigate differences in the respondents' opinions in this respect we apply a multinomial logit model (MNL) (McFadden, 1974) with background variables relating to respondents' socio-demographic characteristics, forest visitation patterns and environmental concerns[6].

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[5] Investigation based on the data obtained from part 2 of the survey is a subject of separate studies (see, e.g., Bartczak, 2015).

[6] Some researchers point out that direct incorporation of responses to attitudinal questions in stated choice models might create the problem of endogeneity. To address this problem Hybrid Choice Models (HCMs) have been developed (e.g. Ben-Akiva et al., 2002). Recent studies, however, demonstrate that employment of HCMs often does not lead to results significantly different from those of the standard MNL models. For example, Kløjgaard and Hess (2014), as well as Lundhede et al. (2015) show that willingness to pay estimates do not change significantly when HCM models are used to account for endogeneity. Chorous and Kroesen (2014) point out that, as compared to conventional choice models, the value added by HCMs is often rather limited. With these recent

4. Results

4.1. Descriptive statistics of the sample

Table 1 reports the socio-demographics of the analyzed sample. 52% of the respondents were women and the average age of a respondent was 40 years. Around 48% had higher education and the median of net monthly individual income was 1,500 Polish *zloty* (ca. 364€). 23% of respondents reported that they visited a forest on a weekly basis during the last 12 months prior to the interview. Another 33% went to a forest one to three times a month and 44% stated that they visited a forest less than once a month or not at all during that time period.

Table 1. Descriptive statistics of the analyzed sample.

	%	Mean	Median	Min	Max
Women	52				
Age		40	45	20	59
Education					
- Primary	10				
- Secondary	42				
- Higher	48				
Net monthly individual income in *złoty*			1500	500	>10,500
Forest visits in the last 12 months					
- More than 3 times a week	8				
- 1 to 2 times a week	15				
- 1 to 3 times a month	33				
- Less than once a month	38				
- Not visited	6				

Note: Number of respondents, N=1,000. Nominal exchange rate 1€ = 4.12 *zloty*.

4.2. Respondents' environmental attitudes

Environmental attitudes of respondents were elicited by the NEP scale, which concentrates on measuring the overall relationship between humans and the environment. As Hawcroft and Milfont (2010) point out, the universal nature of the NEP scale can explain why it has become the most widely used measure to investigate various environmental issues, including those concerning environmental decision-making and individuals' willingness to pay. The predictive, content, and construct validity of the NEP scale has been confirmed by numerous studies (see, e.g., Ebreo et al., 1999; Kempton et al., 1995; Stern et al., 1995; or Widegren, 1998). It assesses the basic environmental belief system based on the strength of

findings in mind, we base our study on conventional MNL models with the environmental attitudes indicator as an explanatory variable. Similar approaches have been undertaken by, inter alia, Choi and Fielding (2013), as well as Ito et al. (2012).

an individual's ecocentric system of beliefs (i.e. the agreement with that humans are considered as just one component of nature) as opposed to an anthropocentric system of beliefs (where human beings are conceived as superior and independent from the rest of the organisms on Earth). The NEP scale consists of 15 items presenting different environmental attitudes, however, to reduce the length of the survey instrument, in our study we only use groups of items which, in our opinion, were most relevant to the topic of the valuation survey (see Table 2). We asked respondents to indicate their level of agreement with three groups of environmental attitudes on the Likert scale, i.e., beliefs in the severity of an eco-crisis, anti-anthropocentrism, fragility of nature's balance (9 items in total, including 5 pro-NEP and 4 anti-NEP statements). Based on the results we calculated the NEP scores.

In most cases responses were coded with higher numbers corresponding to a higher level of agreement. However, agreement with items 2, 4, 6, and 8 indicated anti-NEP responses and then an inverse scale was applied. In the analyzed sample the mean and median of the NEP score equaled 28 and was higher than the mean of the NEP scale which is 27, suggesting that the majority of respondents reveal a rather high level of environmental concerns.Table 2 presents all of the NEP attitudinal statements used, together with estimates of the reliability of this psychometric scale. The result of Cronbach's alpha for the NEP scale indicates that the scale passes the test for internal consistency and the used items can be combined into a cumulative NEP score.

Table 2. Mean item scores, item-total correlations and Cronbach's alpha for the NEP scale.

NEP items	**Mean score**	**Correlation**
The severity of an eco-crisis		
1. Humans are severely abusing the environment.	3.41	0.59
2. The so–called ''ecological crisis'' facing humankind has been greatly exaggerated.	2.75	0.65
3. If things continue on their present course, we will soon experience a major ecological crisis.	3.06	0.62
Anti-anthropocentrism		
4. Humans have the right to modify the natural environment to suit their needs.	2.85	0.63
5. Plants and animals have as much right as humans to exist.	3.48	0.55
6. Humans were meant to rule over the rest of nature.	2.84	0.61
Fragility of nature's balance		
7. When humans interfere with nature, it often produces disastrous consequences.	3.30	0.61
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	2.86	0.60
9. The balance of nature is very delicate and easily upset.	3.41	0.59
Cronbach's alpha		0.78

4.3. Public support for PES in private forests

The results obtained in the presented survey indicate that only a minority of the Polish population (23%) supports the view that private forests owners, i.e. ES (biodiversity) suppliers, should bear the costs of supplying (enhancing) those services. The preferences of the remaining majority of the population in this respect demonstrate potential for introducing a scheme which allows the forest owners (ES suppliers) to be compensated for supplying the service. A small share in this group of the population would support a user-financed scheme with direct payment by users to the service providers (8% of the total number of respondents), while a vast majority would support public-financed programs (at the central or local level). The latter involve payment both by users and non-users to the government at the central or local level through some form of tax. For incentives for the forest owners to supply the services to materialize the government would later have to transfer the payments collected from the population to the owners (indirect payment)[7]. With this in mind we undertake a more refined study in the next section.

4.4. Estimation results

To explain the differences in respondents' opinions on to whom the society should pay for ES we use MNL models with background variables relating to socio-demographics, forest visitation patterns and the respondents' NEP profile. The sample used for these estimations is reduced from 1000 observations to 741 because some of the respondents chose the option "I do not have an opinion" answering the NEP questions. The variables included in the MNL models are listed and described in Table 3.

[7] To be specific, in order to provide incentives for the forest owners to supply the ES the sum of the willingness to pay of the ES users would have to exceed the owners' willingness to accept (studies of the latter are beyond the scope of this paper). Social efficiency would additionally require including transaction costs in the calculation.

Table 3. Variables used in the MNL models

Variable	Description
Dependent	
Who should pay?	Discrete: local governments or the national government = 1 (reference) Forest user = 2 Forest owners = 3
Independent	
Women	Dummy: 1 = women, 0 = men
Age_30	Dummy: 1 = younger than 30 years old, 0 = 30 years old or older
Age_50	Dummy: 1 = 50 years old or older, 0 = younger than 50 years old
Primary education	Dummy: 1 = primary education only, 0 = education level higher than primary
Higher education	Dummy: 1 = Bachelor's degree or higher, 0 = education level lower than a Bachelor's degree
Net individual income	Continuous: Net individual income per month in *zloty*
High freq. of forest visits	Dummy: 1 = forest visits at least once a month in the last year, 0 = frequency of forest visits lower than once a month in the last year
NEP	Continuous: the cumulative NEP score

Table 4 presents the estimation results for two models: Model 1 explains the choice "users should pay for the biodiversity enhancement in private forests", while Model 2 concerns the choice "forest owners should pay" for such changes, both as opposed to "local governments or the national government should pay" (the reference category). Therefore interpretation of the estimated coefficients in both models will be performed with respect to the latter group. Such choice of the reference category is justified by the fact that this most numerous group in the sample represents members of the society whose preference regarding payment for ES corresponds to the *status quo* position with regard to the methods of public goods financing applied during the pre-1989 period. In our study we are particularly interested in Model 1, which will deliver answers regarding the underlying reasons for differences in respondents' opinions regarding the type of PES scheme to be implemented (direct or indirect). Model 2 allows to compare the conclusions with the characteristics of those respondents who oppose to any type of PES (i.e. arguing that forest owners should finance the ES provision).

Table 4. MNL results for biodiversity enhancement in private forests (reference category: "local governments or the national government should pay").

	Parameter	Coef.	Std. Err.	Z	P>z
USERS	Intercept	0.8191	1.0518	0.78	0.436
	Women	**0.6194**	**0.2982**	**2.08**	**0.038**
	Age below 30	-0.5372	0.3577	-1.50	0.133
	Age above 50	**-1.1867**	**0.4102**	**-2.89**	**0.004**
	Primary education	0.1934	0.4297	0.45	0.653
	High education	**-0.6411**	**0.3147**	**-2.04**	**0.042**
	Net individual income	0.0000	0.0001	0.16	0.876
	High freq. of forest visits	0.0119	0.2887	0.04	0.967
	NEP	**-0.1005**	**0.0343**	**-2.93**	**0.003**
OWNERS	Intercept	-0.0275	0.1873	-0.57	0.569
	Women	-0.2777	0.2453	-0.15	0.883
	Age below 30	0.2261	0.2037	-1.13	0.258
	Age above 50	0.0030	0.3113	1.11	0.267
	Primary education	-0.0778	0.1944	0.01	0.992
	High education	0,0000	0.0001	-0.40	0.689
	Net individual income	0.0348	0.1831	-0.64	0.519
	High freq. of forest visits	-0.0229	0.0207	0.19	0.849
	NEP	-03736	0.6564	-1.11	0.269
N		741			
LR	p-value	0.0042			

Note: Bolded variables are significant at least at a 5% level.

Intercepts in both models suggest that the respondents prefer that changes in the biodiversity level in private forests are financed from local governments' budgets or the central budget (i.e. indirect payment by the entire society). Women are likely to be in favor of the "users should pay" option instead of the national government or local government subsidy for this purpose financed from taxes imposed on the entire society, whereas those who are older than 50, with higher education, or with more concern for the environment according to the NEP scale reveal the opposite preferences. Interestingly, we find no significant determinants for the choice "owners should pay" (lower part of Table 4) relating to the non-acceptance of PES.

4.5 Discussion of the results

The obtained results suggest that in the respondents' opinion the provision of a non-use service – biodiversity enhancement in private forests – should be financed by the entire community or society through local governments or the national government (public-financed scheme). Similar findings concerning the question who should pay for biodiversity enhancement in private forests were obtained from other case studies analyzed within the NEWFOREX project, which revealed that in all countries but one (Finland) respondents preferred government-financing of the costs associated with providing this ES (Prokofieva et al., 2011). This can be explained by the fact that biodiversity is considered a (purely) public good type. It is impossible to exclude anyone from benefiting from the existence of a given species, nor does any one person's enjoyment of its existence diminish or preclude benefitting

in this way by others. Because benefits from biodiversity ES are diffuse, the government, acting as a monopsony (single buyer) pooling funds from multiple buyers, can allow to reduce transaction costs of the payment scheme and eliminate free-riding behavior.

The above argumentation relating to the ES characteristics is additionally strengthened by the characteristics of the Polish post-socialist society. As mentioned earlier, the level of trust between members of the Polish society has been low during the transition period and recent years. Trust between the "sellers" (providers) and the "buyers" (users) of the ES is, however, a fundamental aspect for the well-functioning of user-financed PES schemes. For the ES providers it is important to have the confidence that the "buyer" is not attempting to take away the provider's rights, while for the ES users it is crucial to have the confidence that the "sellers" have a genuine interest in providing the service, as monetary payment alone may not ensure the provision of the ES (Zandersen et al., 2009). Involving the government (at the central or local level) in the PES scheme allows to avoid problems resulting from relatively low trust levels. Additionally, studies of the Polish society's attitudes reveal an active role attributed by its members to the state in shaping social relations (e.g. GAP, 2009, which finds that more than 70% of Polish respondents view that it is more important "that the state plays an active role in society so as to guarantee that nobody is in need" than "that everyone be free to pursue their life's goals without interference from the state").

The MNL model estimation allows to search for more specific socio-economic characteristics of groups within the Polish society that selected the various possible ways of financing the ES provision in the studied context. We were expecting that higher income, higher education and stronger pro-environmental attitudes would result in increasing willingness to pay for environmental changes. In the case of our study this would translate into choosing the "local or national government should pay" option envisaging that all adult Polish citizens participate in financing the enhancement of forest biodiversity in the form of additional taxes. The positive correlation between income level and willingness to pay is based on demand theory, whereas our remaining expectations are linked with a higher probability that better educated individuals and those with stronger pro-environmental attitudes are more aware of the non-use value of biodiversity and, therefore, would be against shifting the financial responsibility for introducing such enhancements only on a limited group in the society. In additional to that, one could also expect those respondents to view the two remaining PES schemes (i.e. user-financed and owner-financed) as insufficient to secure the provision of biodiversity at an optimal level due to a much lower potential as regards collecting funds.

The obtained results partially confirm our expectations. As far as model 1 is concerned, they indeed reveal a tendency according to which respondents with a higher education level and those who reveal more environmental concerns are more likely to choose that the entire society should pay for biodiversity enhancement, as compared to the user-financed scheme. Income, however, does not affect individuals' preferences in this respect. The insignificant income parameter does not raise particular concern as empirical evidence concerning the

relationship between income and demand for biodiversity is mixed (see e.g. Jacobsen and Hanley, 2009)[8].

Another characteristic of respondents relatively strongly against a user-financed scheme and in favor of a public-financed one is age 50+. Such attitude to PES of this group is likely to be explained by the fact that those relatively older persons spent a longer part of their life under the pre-1989 socialist regime and the obligation of the government to supply various services remains a common feature of their socialist mentality (with no regard for the fact that public financing actually requires the society to bear the costs).Only in case of one group of respondents there is significant preference towards a user-financed scheme. This concerns women included in the sample. This relationship is difficult to explain without further investigation. However, potential explanations might relate to a greater role of women in managing everyday household spending and their opposition to a payment mechanism which involves an increase in (local) tax, constituting a permanent burden on the budget. No significant influence of the high frequency of forest visits could indicate that respondents considered biodiversity enhancement as having only an existence (non-use) dimension.

Our estimation results also indicate that those, who are in favor of local or the national government paying for biodiversity enhancement in private forests do not differ in terms of socio-economic characteristics from the respondents, who prefer that such changes are financed by forest owners (model 2). Regarding higher education and environmental concerns of respondents, the insignificance of variables representing these characteristics can be attributed to the particular circumstances of private forests in Poland. Since owners of private forests in Poland are, as discussed in the paper, primarily farmers, the effect of higher education on willingness to pay could be offset by the higher educated population's awareness of the fact that such farmer-owners can benefit from public (mostly EU) funds directed at afforestation and related activities. With this in mind they would refrain from double-subsidizing those farmers. The offsetting effect operating with regard to the relatively more environment-concerned population (with higher NEP score) could originate from a belief, which is in Poland not uncommon, that the forest policy implemented by the state is not effective and goals relating to e.g. biodiversity enhancement in private forests would be achieved more effectively based on owners' own efforts (we would particularly expect such result for those with both higher education and more concern for the environment). Regarding income, the explanation relates to the conclusions of Jacobsen and Hanley (2012), as discussed earlier in this section.

5. Conclusions

In the study presented in this paper we achieved two main objectives. Firstly, we came up with convincing empirical evidence that Polish society demonstrates a rather strong potential for the implementation of PES, even though historical-political and institutional conditions (concerning in particular the ownership structure) are not favorable. The situation when forests are mainly publicly owned and managed by one state enterprise facilitate the

[8] Jacobsen and Hanley (2009) analyzed 46 contingent valuation studies concerning biodiversity conservation and report that only in 39% of them correlation between income and willingness to pay was found positive and significant, while no negative significant relationships were reported.

implementation and the correction of the objectives of sustainable forest development in a way to achieve efficient distribution, as opposed to privately owned forests which are largely focused on extracting profits from timber harvesting (Bartczak et al., 2012). Nevertheless, one of the main objectives of the Polish forest policy is an improvement of forest management in private forests (the Forest Policy of the State, 1997 points 13 and 14). The results of our empirical study of attitudes of the Polish society towards PES in private forests confirmed, in general, the support for such a solution aimed at providing financial incentives for owners to supply ES generated by their forests. This conclusion may also be of value for other countries, where private forests are a minority in terms of ownership structure and societies are rather unfamiliar with PES[9]. It may be relevant, in particular, to other post-socialist countries in Central and Eastern Europe with a similar socio-political legacy and dominating state forest ownership (e.g. Bulgaria, Russia), as well as those that have recently conducted post-socialist property restitution (e.g. Hungary, Slovenia, and to a lesser extent the Czech Republic).

Secondly, the obtained empirical results are to a large extent in line with economic theory underlying the choice between voluntary and coerced character of PES. There is a rather broad understanding among economists that whether payments should (and can) be voluntary or coerced through taxation (at the central or local level) should be determined by the type of resource services (Farley et al., 2010; Kemkes et al., 2010). Services with private good characteristics should (and can) be financed with voluntary payments, while public-good type services require coerced payments. According to our results biodiversity ES should be financed through public-financed PES schemes employing coercion (i.e. taxation by the central government or local governments). These conclusions are supplemented and strengthened given the particular informal institutional framework present in Poland, with relatively low levels of social capital (trust) within the society and the anticipation of an active role of the state in shaping social relations, here between ES users and ES providers.

Based on the result according to which an indirect (government-financed) PES scheme would be a more favorable solution for providing biodiversity ES by owners of Polish private forests, one could conclude that the current legislative framework according to which private owners are not fully autonomous in managing their forests, does not pose an obstacle for the implementation of biodiversity-related PES in Poland. In particular this concerns the provisions according to which decisions regarding the forest management plans are taken by the local government representative – *starosta*, as well as *starosta*'s controlling authority over management of these forests and the possibility to delegate it to the SFNFH.

The recommendations formulated on the basis of this study with regard to designing PES in Poland can, however, only be seen as very general preliminary prescriptions. This paper aimed to study the society's preferences in relation to PES, given the historical-political legacy and institutional framework, and a detailed discussion of the best way to design and implement such schemes in Poland is beyond its scope. In particular, PES should be designed as part of a broader rural development program (Muradian et al., 2010) with special attention paid to social embeddedness of PES and framing it as a multiple-goal instrument, as rural

[9] PES schemes have mostly targeted private land owners (the excludability feature being a prerequisite for market-like PES) but economic literature on PES is also aware of the fact that communities which have common property rights over resources, as well as the state (which owns land) can be ES providers (Engel et al. 2008). For some discussion of the possible solutions see Tacconi (2012).

development is not just focusing of economic efficiency. Muradian et al. (2010) propose this argumentation in particular with regard to developing countries. Also in the case of Poland, where private owners of forests are mainly farmers, such approach seems highly recommended.

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