NERIS CASE STUDY

LITHUANIA

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06 March 2009

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1. Introduction

The main objective of the Neris case study is the same as that of the other nine representative European river basins, in particular to test the guidelines, methods and procedures developed for assessing the WFD resource and environmental costs and benefits of water services.

Testing of practical guidelines, developed during the Aquamoney project in ten case studies, allow to reflect geographical, economic, political-institutional and cultural variability and diversity. Furthermore, the case studies differ in terms of available data and information. The variety of such circumstances is considered representative and relevant for the implementation of the WFD.

The Neris river sub-basin is a part of the Nemunas River Basin District in Lithuania.

2. Description of the case study

2.1. Location of the case study area

The transboundary Neris river basin, a sub-basin of the Nemunas River Basin District (hereinafter RBD), is situated in the eastern part of Lithuania. A part of the basin lies in the territory of Belarus and a very small part is in the territory of Latvia.

Figure 1. Location of the Neris River Basin

The source of this river is situated in Belarus and the upper part of the Neris, measuring 234.5 km in length, flows via the territory of Belarus. The catchment area in Belarus makes up 11,005 km^2. A 6.5-km section of the river coincides with the Lithuanian-Belarusian border, with the remaining part or 228 km flowing in Lithuania. The largest part of the river basin or 13,850 km^2 is situated in Lithuania.[1] The Neris River basin is asymmetric – 70% of the catchment's total area lies on its right side of the river where most of the lakes of the basin are situated[2].

2.2 Water system characteristics

The climate in the Nemunas RBD, where the Neris sub-basin is situated, is transitional between maritime and continental. Lithuania is in a zone of surplus humidity and its water resources are quite large. Average precipitation varies from 600 to 700 mm, with higher precipitation levels in the Neris basin (from 650 to 800 mm per year). Rainfall contains about 75% of precipitation; evaporation contains 65% and surface runoff has about 32%.[3]

The Neris river water feeding system is mixed, of which about 30-40% comes from melting snow, some 25% from rainfall and about 35% from groundwater.

Forests occupy about 28% of the Neris river basin area, wetlands make up 10% and lakes account for 2.5%. The agricultural sector is not widely developed in this area, with farming land occupying about 134,000 hectares. National and regional parks cover an area of about 24,000 ha.

Various important ecosystems can be found across the Neris river basin. The Neris is a unique river because practically all the bed in the territory of Lithuania is natural, except for a segment of several kilometres in the centre of Vilnius where the banks of the river are fortified.

The hydrological system in the Neris river basin is comprised of longer and smaller tributaries; the density of the hydrographical network is high, as the number of lakes and rivers in the basin is quite large. The total number of small tributaries is 870, with a total length of 1,970 km, and 214 rivers longer than 3 km have a total length of 1,855 km[4].

Seven hydrographical reserves established in the Neris river basin and aimed at preserving distinctive stretches of rivers with typical hydrographical-landscape elements (rifts, meanders, islands, etc.) are important from the point of view of water hydrology. These reserves fall under the category of Territories of Conservational Preservation Priority

A number of lakes (about 11) in the Vilnius county, as well as certain sites in the Neris river in Vilnius and Jonava, are designated as official bathing sites where water monitoring points are established.

2.3. Short characterization of water use and water users

The main water users in the Neris river sub-basin are households, industries and fisheries. Water needs in agriculture are not very high, since Lithuania is in a zone of surplus humidity where precipitation levels are quite high. However, diffused pollution from agricultural sources makes up a fairly large share in the overall pollution of surface water bodies. Water use for recreation is gaining increased importance in general in Lithuania; in the Neris sub-basin it has a very high potential due to a variety of landscapes and attractive water sites.

[1] *Gailiušis, B. Jablonskis, J. Kovalenkovienė M., Rivers of Lithuania.Hydrografy and flow(lit) (2001) Lithuanian Energy Institute. Monography*

[2] *Gailiušis, B. Jablonskis, J. Kovalenkovienė M., Rivers of Lithuania.Hydrografy and flow(lit) (2001) Lithuanian Energy Institute. Monography*

[3] *Nemunas River Basin District. Article 5 report. http://aaa.am.lt*

[4] *Gailiušis, B. Jablonskis, J. Kovalenkovienė M., Rivers of Lithuania.Hydrografy and flow(lit) (2001) Lithuanian Energy Institute. Monography*

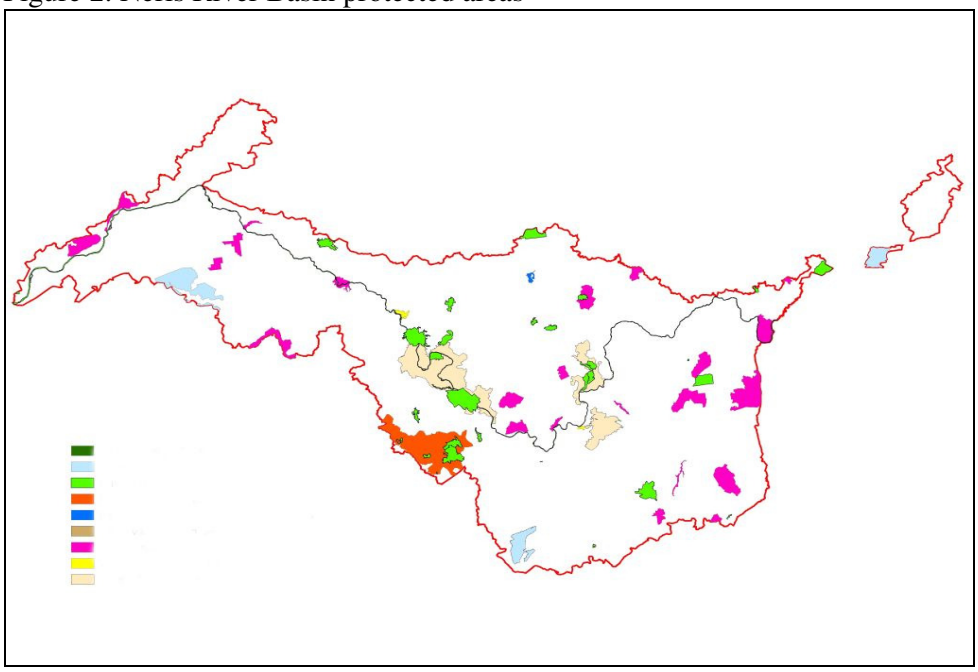
Although the Neris River stretch of 165 km (from the mouth) is an inland waterway of national significance, practically there is no navigation there.

Commercial fishing has been banned on the Neris river since 1970[5], licensed fishing is very limited, with the number of licences for catching salmon, sea trout and other valuable fish restricted to 50-300 per year. There are four pond farms in the Neris River basin where commercial fishing is allowed.

The scale of hydro energy production in the Neris River basin is not very broad. There are no hydropower plants on the Neris River itself, since construction of such plants on the river is prohibited by law. Three small-scale hydropower plants have been constructed on the Neris' tributaries. Annual energy production capacity of the three power plants is 3.5 million kWh, while the total energy production in small hydropower plants in Lithuania in 2007 was 96.4 GWh[6].

A number of cultural and historical sites, valuable landscapes and meandering rivers can be found in the basin; therefore several protected areas exist in the region. There are four protected areas in the Neris River sub-basin, which fall under the category of complex protected areas, where preservation, protective, recreational and economic areas are interconnected following a general programme of protection, regulation and use. After 2004, the network of protected areas has been complemented with 41 Natura 2000 sites, established for the protection of important areas under the Birds and the Habitats Directives. The location of protected areas is mapped out in Figure 2 below.

Figure 2. Neris River Basin protected areas



Source: State Service for Protected Areas

Legend: Dark green – Restoration sites; blue – Biosphere polygons; light green - Habitats Directive areas; red – National parks; dark blue – Birds Directive areas; brown – Reserve areas; pink – State reserves; yellow – Strict state reserves; light pink – Regional parks.

[5] *Kilkus, k. (1998) Lietuvos vandenų geografija. Vilnius*

[6] *Annual report of the State Pricing and Energy Control Commission 2007.*

Water use for recreational purpose has gradually increased over the last years. Protected areas are especially attractive for tourism and recreational activities. Especially rapid expansion is observed in the countryside tourism sector, which is mostly developed in areas abounding in water bodies.

Annual water consumption in the Neris river slightly exceeds 60 million m^3, of which 54% (~34 mln m^3) comes from groundwater. As in the whole country, only groundwater is used for drinking purposes in the case study area.

Currently, the population of the Neris river basin is about 700,000 inhabitants, of which 76% live in the capital Vilnius, and about 16% reside in 17 towns with more than 2,000 inhabitants. According to statistics, the rate of water consumption in the household sector in the Neris River sub-basin amounts to approximately 47% of total water consumption.

The Neris sub-basin region has well developed industrial infrastructure and can attract more investments than less developed regions. Industrial entities use both groundwater and surface waters for their needs; water consumption in the sector accounts for 25% of all water consumed, of which groundwater comprises 23%. Currently, there are 43 IPPC sites in the sub-basin, and this number is expected to increase until 2015; therefore, the industry sector will remain a significant driver for pressures in the Neris sub-basin.

In most urban areas in Lithuania, industrial wastewater and wastewater from households is collected and treated in the same wastewater treatment facilities.

Agricultural users and fishpond farms mainly use the surface waters. Consumption of water in the pond farms in the Neris sub-basin is substantially higher than in agriculture. Annual water consumption in fishponds is about 13 million m^3 (~20% of total water consumption in the basin), whereas the water amount used in agriculture makes up less than one percent of the total water use in the basin.

Agricultural land in the basin occupies about 134,000 hectares, 58% of which is arable land, 38% is meadows and pastures and the remaining 4% is fruit and berry plantations. The number of livestock farms in the basin amounts to about 300, where the majority of them (275) have 10 - 199 livestock units (LU), 13 farms have 100 -200 LU and 18 farms have more than 300 LU.

2.4. Main water management and policy issues in the context of the WFD

The Water Framework Directive implementation system in Lithuania is fairly centralised: a single body, the Lithuanian Environmental Protection Agency (EPA), is assigned as a Water Basin Management Authority responsible for the implementation of the Water Framework Directive. Some tasks, however, are transferred to other central-level institutions: Marine Research Centre, State Geological Survey, State Hydro-Meteorological Service and Marine Research Centre. Only information collection is more dispersed: among other institutions, eight Regional Environmental Protection Departments are involved here. In addition, the Regional Departments will be involved in control of the implementation of river basin district management plans. Supporting bodies, or Coordination Boards, have been established in each river basin district in order to ensure co-ordination and collaboration among different institutions. Their main task is to coordinate and harmonize stakeholders' interests in the preparation and implementation of RBD management plans.

As already described, the main issues in the Neris sub-basin are related to water pollution by BOD, nutrients and dangerous substances. River modification, alteration, as well as resource overexploitation issues are not so acute.

The Ministry of Environment, as the main developer of water policy in Lithuania, has set the following priority tasks for the water sector in its Water Resources Management Strategy for 2002-2016:

- Prevent deterioration of, protect and improve the conditions of water ecosystems
- Reduce the anthropogenic impact on water resources
- Ensure availability of drinking water of appropriate quality for all Lithuanian residents and preserve it for future generations
- Improve water resources use and management

More specific objectives include:

1. Improvement of water quality of surface water bodies by cleaning up of water bodies damaged by past pollution.
2. Renovation and extension of water supply and wastewater treatment systems (Development and modernisation of water supply and wastewater collection and treatment infrastructure; development of sludge treatment infrastructure; construction of storm water treatment plants).

The said objectives and tasks are directly related to the implementation of the WFD in Lithuania. The Nemunas is the largest river basin in Lithuania, covering 80% of its territory. The river basin district programme of measures is firstly developed for this basin district.

Another important policy issue is implementation of the cost recovery principle imposed by the WFD. Currently, environmental costs (though not reflecting real environmental damage or benefit values), as a necessary element of the water price, are included in the water price in Lithuania through natural resources abstraction taxes and water pollution charges. Valuation of environmental costs/benefits will certainly improve the understanding of policy makers about the structure and full cost recovery elements of the water price.

The average price for water supply and wastewater treatment in 2007 ranged from 3.5 LTL/m^3 to 10.2 LTL/m^3. The average price made up 5 LTL/ m^3, accounting for approximately 0.6% of the average disposable household income (while the existing average level of consumption equalled 61 l/inh/day in 2007) in the Nemunas river basin area. The tariffs in different Lithuanian municipalities are quite varied, reflecting their respective different situations. On average, the existing tariff is not sufficient to cover all costs. Cost recovery analysis carried out for whole Lithuania shows that the approximate cost recovery level has equalled 85-88% in recent years. The main reasons for the delay in tariff increases are social and political. The delay hinders implementation of cost recovery related targets.

It must be noted that the largest water utility, Vilnius Water Company, is located in the Neris river basin district area. Economies of scale are quite obvious in the area covered by this company.

Water prices levels are expected to be increased to offset existing losses in the next years. Additional tariff increases would be required to implement the proposed capital investment programmes and to take polluter and user pays principles into account. However, the inclusion of environmental costs and, especially, the application of valuation studies for setting environmental costs' levels will require more political discussions and a better understanding of the WFD principles.

3. Set up of the survey

The contingent valuation method for the Neris basin study was selected as a method suitable for assessing both use and non-use values provided by the water ecosystem. The majority of rivers in the Neris basin can be classified as of medium water quality. With the improvement of water quality a number of benefits can be achieved. The water quality improvement and river re-meandering as two goods to value were chosen for the study.

3.1. Questionnaire design

The questionnaire for the Lithuanian case study combined two valuation studies. The so-called national scenario was devoted to assessing the willingness to pay (WTP) for the improvement of river water quality and ecological status in the Neris river basin, while the other study, the common design part, was aimed at assessing the WTP for the improvement of water quality in one and in two lakes. The latter design was used across the partners of the Aquamoney project. In the present report we analyse only the national part.

The questionnaire, together with the common design part, contains 47 questions, most of which are close-ended. The average time of the interview was 33 minutes.

In order to reflect sensitivity to scope, a two-step scenario assessment was performed, and the questionnaire consisted of two major parts – one related to the clarification of the respondent's willingness to pay for water quality improvement and the other one related to the respondent's willingness to pay for water quality improvement and the achievement of good ecological status, i.e. river re-meandering.

The scenarios included:

1) Biodiversity value (plant, animal species)
2) Landscape value (aesthetical view)
3) Recreational value (swimming, boating, fishing opportunities)
4) Quality level increase from yellow to blue (two levels)

In order to assure consistency, the questionnaire was divided into seven sections. The first part included a short introduction about the study. The second part aimed at revealing the general respondents' perceptions about the environmental issues and the study area.

After these general questions the respondents were introduced to the scope of the study, a map of the Neris basin was provided and the boundaries of the basin were explained to them. Then the respondents were asked how often they visited water bodies, including the Neris river or its tributaries. The following questions were related to the purpose of visits to rivers and visits to substitute water bodies outside the Neris river basin. This section also included several questions aimed at clarifying the respondents' perception about the current water quality. It was done by asking them to rate the current water quality and to name the source of information or knowledge about the water quality.

The next section included a description of the water quality improvement scenario. It began with a short description of the current situation where pictograms reflecting four types of water quality were presented. After this introduction the respondents had to answer whether they thought the situation described was realistic or not, and if not, they had to explain why. Later the respondents were provided with information about the water quality improvement.

At the end of the section the respondents were asked whether they believed that it was possible to improve water status up to good quality until 2015. In cases when the respondents stated that they did not believe in the scenario, they were asked to explain the reason.

The second part of the scenario included a description of the water ecological status improvement scenario, adding re-meandering to water quality improvement. Moreover, the order of the above-mentioned two scenarios were changed for half of the respondents who first of all listened to and assessed the scenario with both water and ecological status improvements and only then the scenario with only water quality improvement.

The next section included the willingness to pay questions and a payment vehicle. It started with a general question on whether the respondents in principle agreed to contribute financially to restoring water quality / and good ecological status in the Neris river and its tributaries. Depending on the answer, the respondents were later asked why they agreed or refused to pay. The respondents were provided with options of answers; in the case they refused to contribute financially, they had to indicate two reasons – the first priority reason and the second priority reason.

All respondents that in principle agreed to pay for water quality improvement were asked to state the amount they would be willing to pay per year. The question related to the payment vehicle was included in the section as well and respondents were asked to choose the best way for the collection of payment. Options included payments via the water bill, together with income tax, or as a special fee dedicated to river and lake restoration. In the Neris case study the WTP question was elicited using a payment card.

In order to indicate the validity of their answers, the respondents were asked about ways of determining the amount they agreed to pay and about their certainty with respect to the amount.

The fifth section of the questionnaire included questions related to the profile of the respondents, among which there were questions about their age, sex, education, income, etc. In total the section consisted of 11 questions.

The next section aimed at clarifying any difficulties the respondents may have experienced in answering the questionnaire, and the final seventh part was reserved for the interviewers where they made notes about any events or obstacles that occurred during the interview, which might have influenced the interview quality.

3.2. Sampling procedure and response rate

The pre-testing exercise took place in February 2008. It was organised in the case study area in Vilnius city and district, as well as in several other districts. During the three rounds, a total of 21 interviews were taken.

The survey for the Neris river basin case study was carried out in March 2008 by the professional research company TNS-Gallup. The respondents were selected on the random selection basis from Vilnius city and district, Elektrenai district, Jonava district, Kaisiadorys district, Sirvintai district and Trakai district municipalities. The primary sample selection (which was prepared referring to the proportions of inhabitants between different municipalities) was slightly modified, replacing some urban respondents with respondents from rural areas aimed to better represent both groups.

During the survey period, 1,249 households were visited. In total 502 people were interviewed in 26 settlements. The overall response rate of the survey was 55% and the co-operation rate was 95%. The response rate of the survey, contrary to the co-operation rate, is low and comprises

only 55 percent. The main cause for the low response rate is the households' refusal to communicate with the interviewers. This category includes all households where inhabitants refused to open the door and therefore it was not possible to determine whether any family members of 18-74 years were present. In these cases the interviewers were not able to find out the reasons for refusing to participate in the survey. Another important reason for the low response rate was that the interviewers were not able to find household members suitable for an interview at home.

Further data analysis was performed by the project team in the Center For Environmental Policy in Lithuania (national scenario – river case) and the international Aquamoney project team (common valuation study – case of two lakes).

As described later, the social, economic and demographic situation in the river basin was well represented by the sample, which enables further transfer of the study results to the general public.

Out of the total of 502 cases, two cases were removed from the database due to visible inconsistencies in the answers. The following case study analysis is based on the sample of 500.

At the end of each interview, the enumerators had to evaluate the attitude of the respondent towards the questionnaire. It turned out that 66 percent of the respondents were very interested and active in answering the questions, while 8.4% were described as totally uninterested. In most cases (93.4%) the respondents answered on their own, without consulting other household members.

4. Valuation results

4.1. Respondent characteristics and sample representativeness

4.1.1. Demographic characteristics

The respondents of the survey were selected from both urban and rural areas of the Neris river basin where people from Vilnius and Jonava represent the urban population and the respondents living in smaller settlements represent the rural population. Some 50.6% of all respondents live in Vilnius. The urban – rural population proportion in the sample is 63.4/36.6, which corresponds very well to the actual proportion in the basin (66.82/33.18) (Table 1).

Table 1. Comparison of the demographic characteristics in Lithuania and survey sample

		Lithuania, 2007	Vilnius city municipality, 2007	Survey sample
No of inhabitants	%, urban (>3000)	66.82	99.98	63.4
	%, rural	33.18	0.02	36.6
Gender	%, male	46.57	45.35	50.6
	%, female	53.43	54.65	49.4
Age	%, 0 – 14 years	15.9	17.6	
	%, 15-59 years	63.7	66.0	(%, 18-59)70.6
	%, 60 and over	20.4	16.4	(%, 60+) 29.4

The proportion of women and men in the study is almost 1:1. Although statistically Lithuania has slightly more women than men, the priority for responding was given to the youngest (above 18 years) man present in the household.

The mean age of the respondents in the sample is 47.57; the median is 59 years. Proportionally, there are more elderly people in the sample to compare to the situation in Lithuania. The reason for this is because a large part of the survey was done on week days when younger persons could have been at work.

The size of a household in the study sample varies from one to nine, but nearly 90% of the sample consists of households with up to four members, which is similar to national statistics (according to statistics, 2.44 in Lithuania in 2007). The average household size of the sample is 2.68.

4.1.2. Socio-economic characteristics

The sample consisted of 56.2% of employed persons, 5.8% of students, 29.8% of retired and 8.2% of unemployed persons. Official statistics show that in the beginning of 2007, 45.32% of Lithuanian citizens were employed.

The chi-square test indicated that the social status (employment) is statistically significantly dependent on the type of settlement.

Table 2. Distribution of the respondents according to their social status

		Employed	Students	Retired	Unemployed	Total
Urban area	% within type of settlement	61.2%	7.6%	28.1%	3.2%	100.0%
	% within social status groups (employment)	69.0%	82.8%	59.7%	24.4%	63.4%
Rural area	% within type of settlement	47.5%	2.7%	32.8%	16.9%	100.0%
	% within social status groups (employment)	31.0%	17.2%	40.3%	75.6%	36.6%
Total	% within type of settlement	56.2%	5.8%	29.8%	8.2%	100.0%
	% within social status groups (employment)	100.0%	100.0%	100.0%	100.0%	100.0%

Education of the respondents varies from primary school (5.2% of the respondents) to a university degree (26.4% of the respondents).

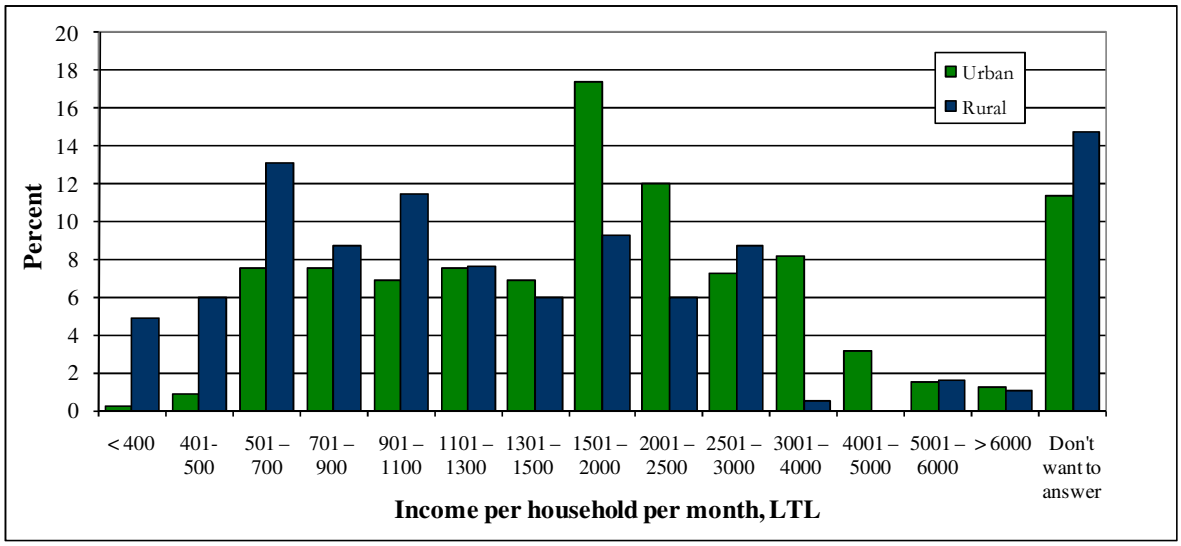
Table 3. Education level of the sample population

Education level	Lithuania (15 years and older), %	Vilnius[7], %	Sample (18 years and older), %
Primary school	13.7	13.8	5.2
Basic school	17.7	9.7	9.0
Secondary school	47.9	30.1	36.2
College	3.9	19.6	22.4
University	16.2	23.3	26.4
Other	0.6		0.8
Total	100		100

[7] *2005, http://www.stat.gov.lt/lt/pages/view/?id=310&PHPSESSID=b240be7452096cffe2600ebd5de94d0*

The money-related issues appeared to be quite sensitive to the respondents. Nevertheless, the majority of them (87.4%) revealed their income. The distribution of the respondents across the income classes is presented in Figure 3.

Figure 3. Distribution of respondents' income



Average monthly income of a household that participated in the survey was LTL 1,777 (or EUR 515), although 50% of the households had an income of up to LTL 1,400 (EUR 405) per month. Average income per capita for the surveyed urban and rural areas is LTL 914 and LTL 565 per month respectively8.

Table 4. Income data for the sample

	Income per household per month[9] LTL and (EUR)	Income per person per month, LTL and (EUR)
Valid	437	437
Missing	63	63
Mean	1,777 (515)	789 (229)
Std. Error of Mean	60.9 (17.6)	30.3 (8.8)
Median	1,400 (405)	600 (174)
Mode	1,750 (507)	600 (174)
Std. Deviation	1,272 (368)	634 (184)

The difference of the above mentioned numbers from average statistical Lithuanian values appears to be relatively small: a single person in Lithuania in average reports LTL 691 (rural areas) – 1,038 (largest cities), when this number for a couple with children under 18 is LTL 805 per capita per month (2007).

The majority of the households (86.8%) that participated in the survey use centralised water services and pay water bills. The average bill for water services for the sample household was LTL 47 per month. The level of connectivity in Lithuania is slightly smaller to compare to the sample and is around 73% of the total population (for centralized water supply). The gap can be

[8] *Obtained by dividing income by the number of people of the household.*

[9] *As a mid point of the interval.*

explained by the fact that a large part of the sample was from Vilnius city. The average bill for water services, provided by the main 47 water companies in Lithuania, is smaller compared to the sample data. It constitutes LTL 10.19 for one household member per month or LTL 25 for a household per month (if multiplied by the average household size), which is almost two times less than in the sample. The reason for this is the economy of scale, i.e. the latter number represents payments by households served by the largest water companies while the sample include rural population served by small and not so efficient companies.

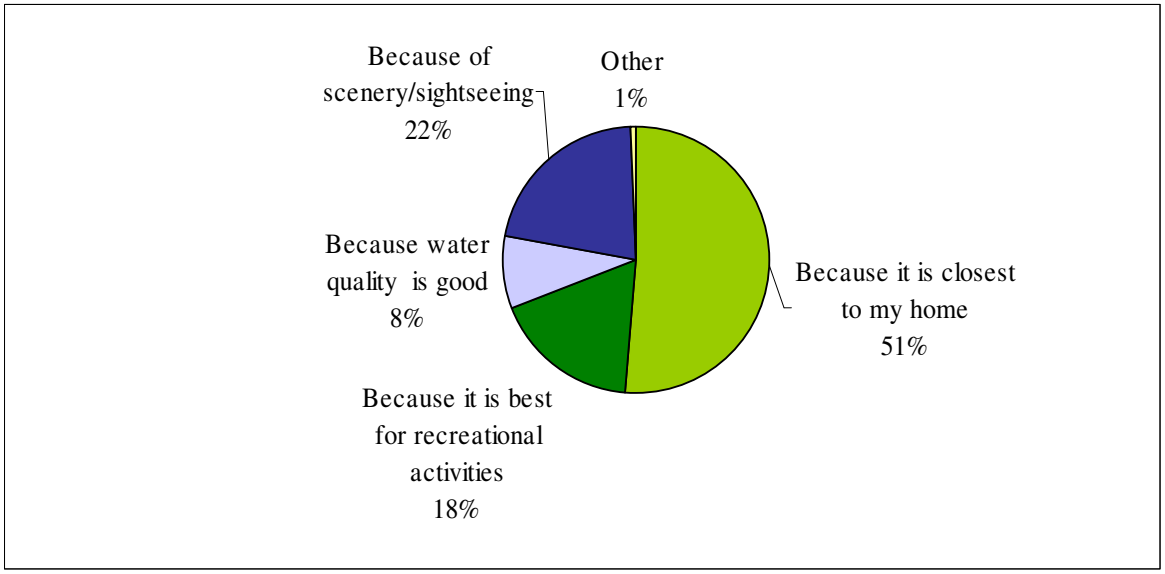
The comparison of the socio-economic characteristics with the characteristics of the sample population shows that the sample represents the population of the area quite well. This means that the results of the study reflect the opinions from all of the social and demographic categories across the basin. This is especially important for the value aggregation task.

4.1.3. Water use characteristics

Most people in Lithuania spend at least some time at outdoor sites, although there are 27% who do not. Out of 100 people, 55 persons choose sites close to the water.

Many people cannot indicate some particular water body that they visit the most. It turned out that half of the respondents who indicated their preferred water body have chosen water bodies closest to their homes. Other reasons why people chose some particular water bodies at which to spend their time are presented in Figure 4.

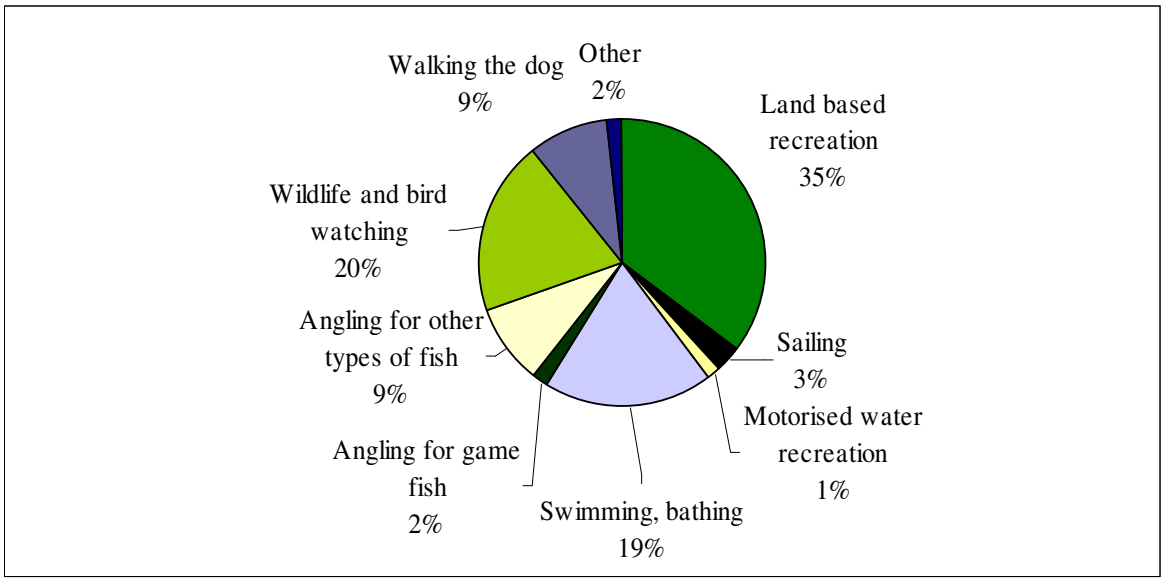
Figure 4. Reasons for visiting particular water bodies



It should be noted that at least 30 percent of the respondents make their choices based on the nature quality criteria: water quality (9%) and the scenery (22%).

If one would be watching 100 people staying at some water body, he/she would notice that 35 people are walking or running or are involved in a similar activity. Another 20 would be watching wildlife and birds; 19 would be swimming or bathing. Activities of the other 24 people can be seen in Figure 5.

Figure 5. Most common activities when visiting water bodies



In summary, people involved in land based recreation and walking the dog comprise 44% and can be classified as the ones obtaining non-use value. The rest of the activities represent use values that include fishing as direct use (11%) and other (43%) as indirect use.

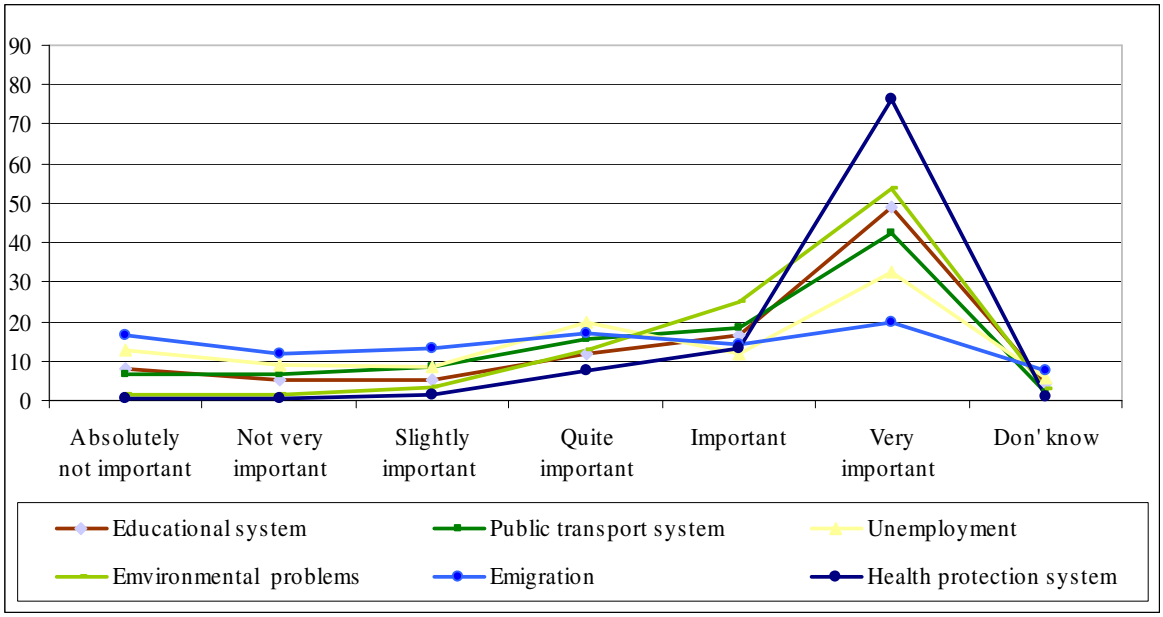
4.2. Public perception of water management problems

The study has shown that majority of people are interested in environmental issues. Moreover, they are much concerned about the environmental problems. When asked to rank the importance of various issues on a scale of 6, ranging from absolutely not important to very important, the majority of the respondents said environmental problems were important or very important for them.

In general*10* it appeared that problems related to the health care system are the most important ones and environmental problems are second in importance.

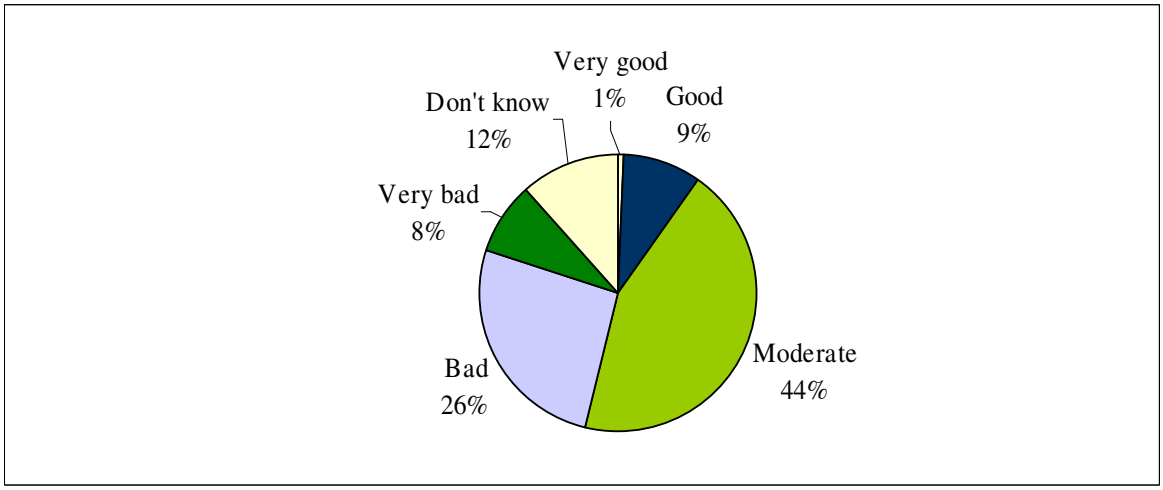
[10] *Weighting was applied. Absolutely not important, got the weight 0 and very important – 5.*

Figure 6. Respondents' perception of the importance of various problems



The study has revealed that inhabitants of the basin are quite aware of the current water quality in the basin – nearly half of inhabitants think that water quality is moderate, which is actually true.

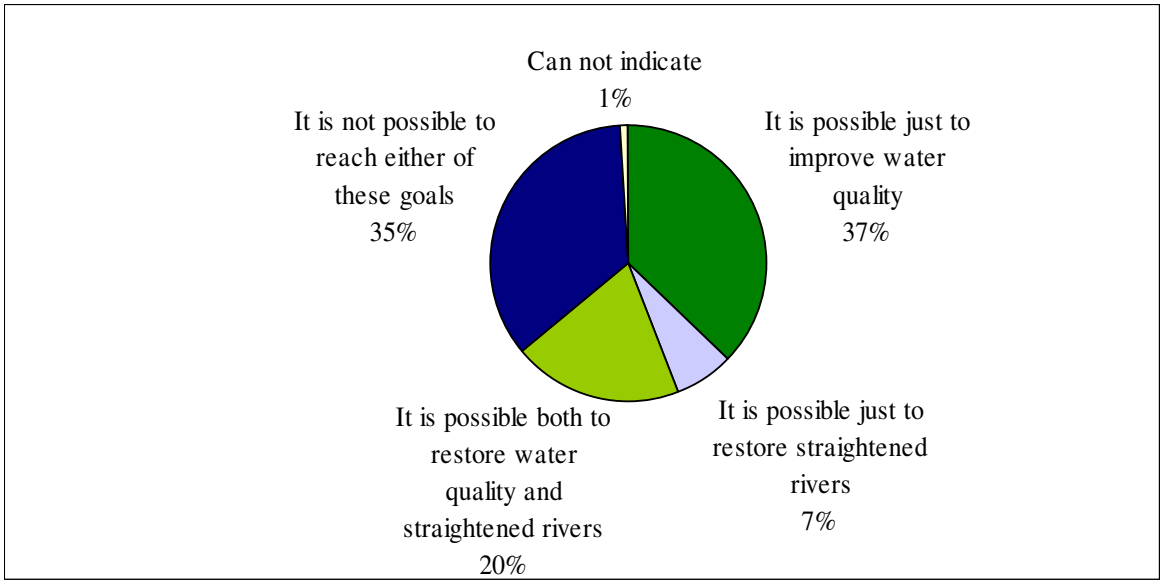
Figure 7. Respondents' opinion on surface water quality in the Neris river basin



Most respondents judge about water quality from their own experience (47%) or other familiar people (18%) and just 27% receive information through the media. Moreover, just 10 percent of the respondents thought they had been getting enough information about water quality of the water bodies in the neighbourhood.

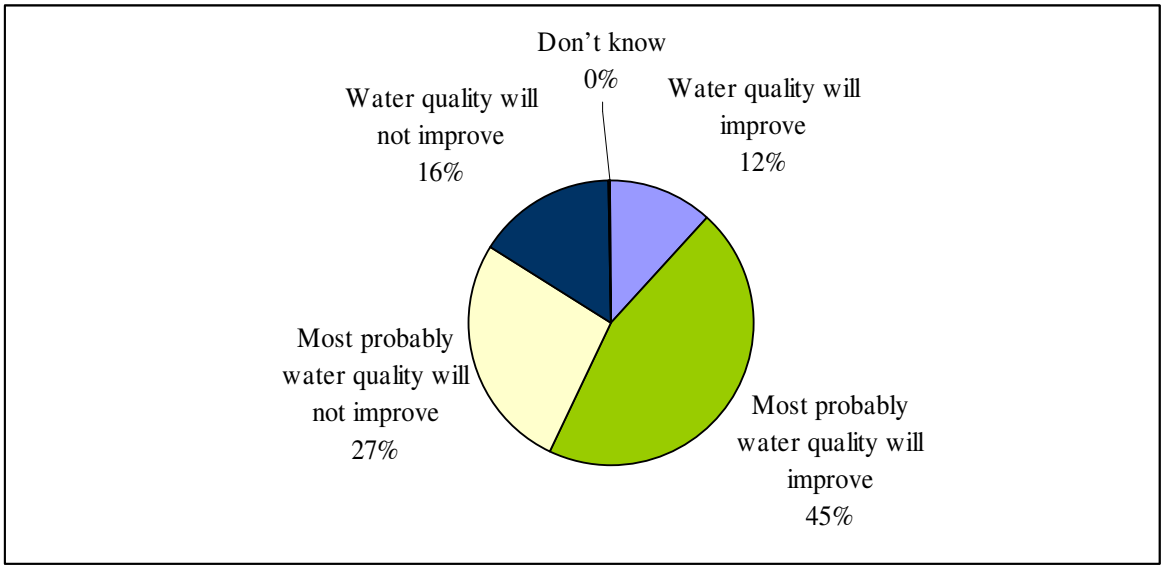
Once the maps were presented and the actual water quality situation explained, the respondents were asked to tell if they found the situation described realistic. The majority of the respondents (87%) believed the situation described in the scenario was realistic or at least partially realistic, 4 % of the respondents did not agree with the description and 7% could not answer this question. Afterwards the respondents were inquired if they thought it was realistic to improve water quality up to a very good status by 2015. The answers were those as shown in Figure 9.

Figure 8. Respondents' belief in likelihood of improving water quality up to a good status by 2015.



Finally, the respondents were asked if they thought that changes described above were going to be real. Only 12% were sure that water quality would improve. Nevertheless, 45% said water quality was likely to improve. Still there were 27% who thought water quality would not improve and 16% were sure that no changes would take place.

Figure 9. Do people find changes in water quality to be realistic?

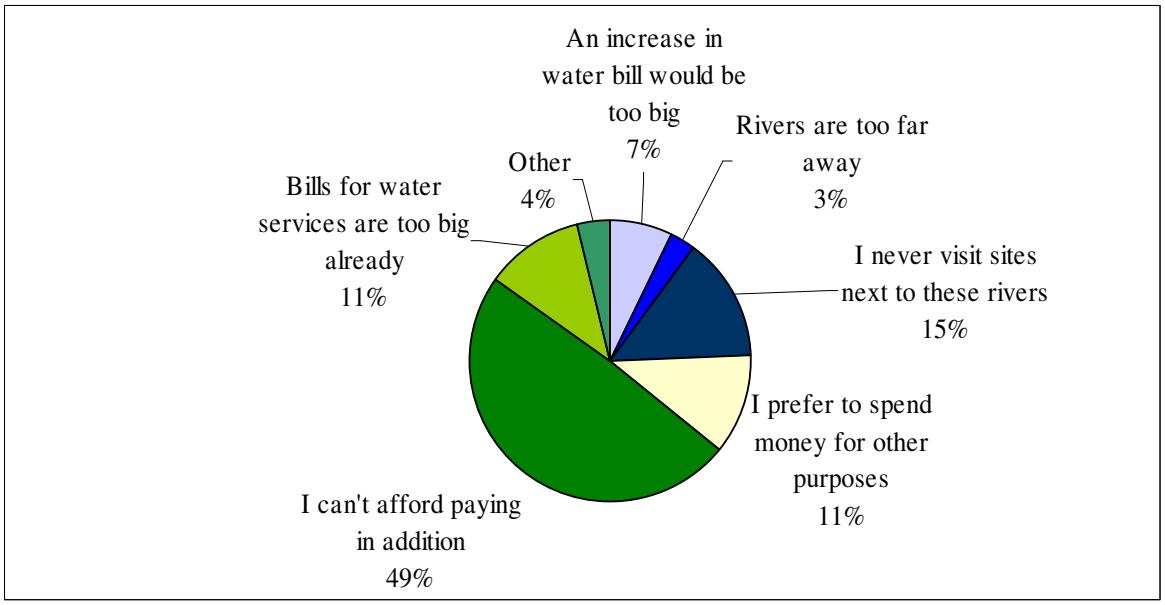


4.3. Estimated economic values for water resource management

From 500 respondents, 248 stated that they would not contribute to the improvement of water quality of the rivers in the Neris river basin, and 259 said they would not contribute to both water quality and re-meandering. Thirty percent of those who pay zero are the so-called zero bidders

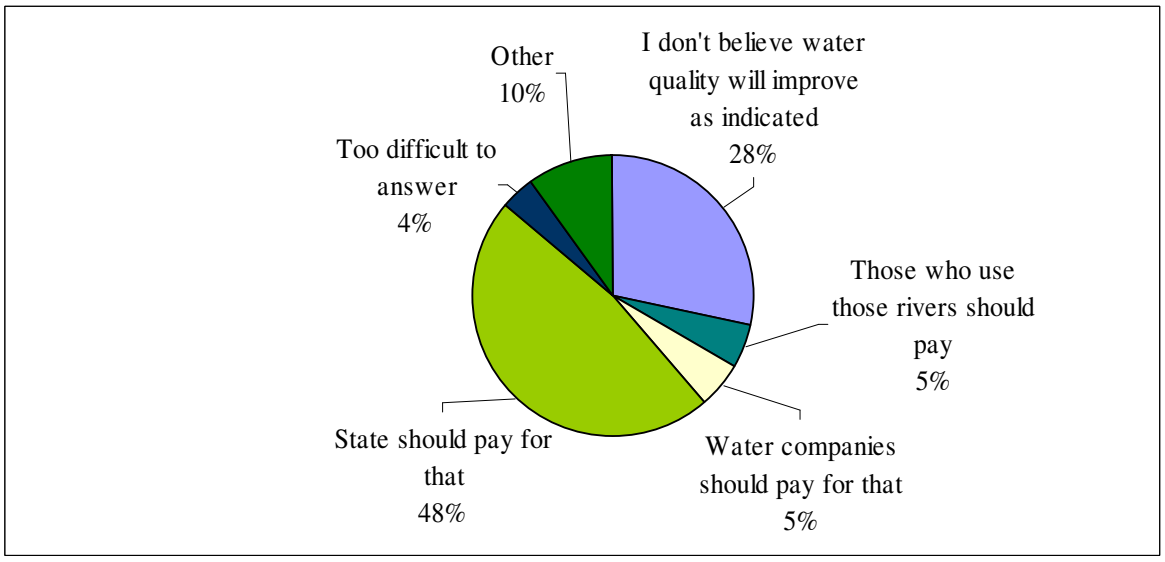
and therefore could be still considered as potential payers. The main issue in this group is affordability. Other reasons for not paying are those as shown in Figure 10.

Figure 10. Reasons for zero bidders not to pay



The rest of those who refuse to pay are classified as protest bidders. The most common arguments of protest bidders were: "the State has to take care of water quality issues" and "money would not be used for water quality improvement".

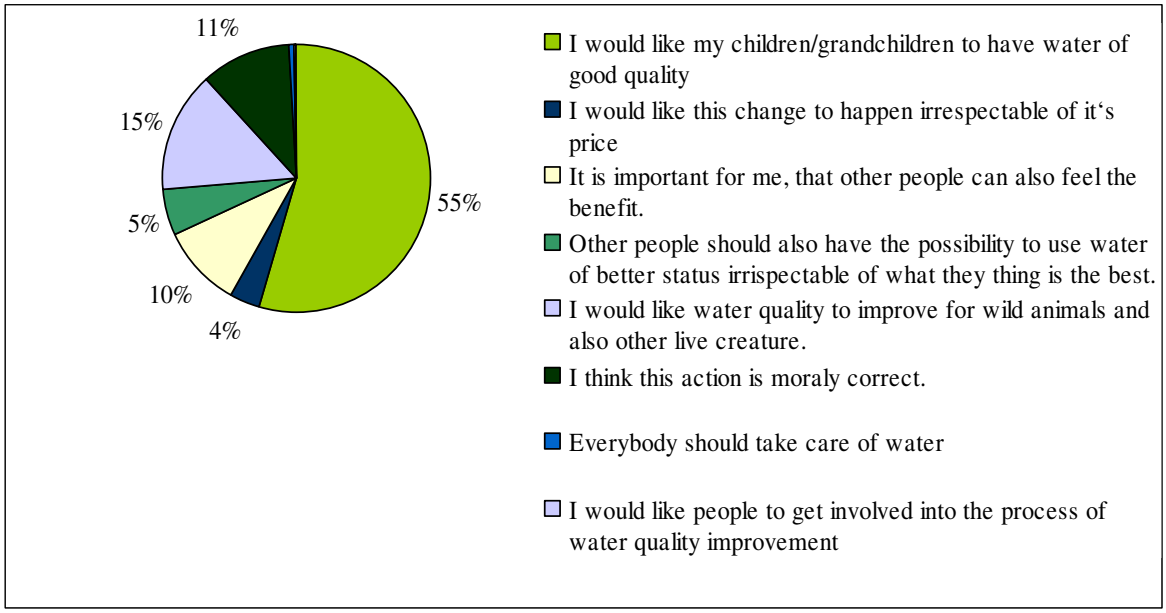
Figure 11. Reasons for protest bidders not to pay



In general, such a high percent of protest bidders suggests a lack of self-responsibility of the respondents and the existence of mistrust in the government. The latter is also confirmed by the results of public opinion pools. The protest level is higher among men and younger and employed people, while the retired and the unemployed make a larger share of zero bidders. Average income of protest bidders is 33% higher in comparison to zero bidders.

55% of those who indicated positive amounts of contribution towards the improvement of water quality and re-meandering stated that they would be ready to pay for water quality change because they would like children and grandchildren to have better quality water. Another 15% would like water quality to improve for wild animals and other live creatures. 11% think that it would be morally correct and 10% are willing to do it for other people to feel the benefit. Figure 13 outlines other arguments and their importance.

Figure 12. Reasons to pay for water quality improvement and re-meandering



WTP amounts can be calculated in several ways, depending on assumptions made. For the following analysis, it was assumed that protest bidders are those whose first reason for not paying is a protest (leaving second reason aside). In this case, mean WTP per household per year (when protest bidders according to the reason 1 were removed) was LTL 48.2 (EUR 14) (median LTL 10 (EUR 2.9)). This makes LTL 21.7 (EUR 6.3) per person per year (median LTL 3.8 (EUR 1.1)).

If one would assume that protest bidders are those whose at least one reason for not paying is a protest one (either the reason 1 or the reason 2), the number of protesters would nearly double and WTP amount for quality improvement and re-meandering per household per year would be LTL 57.4 (EUR 16.6) (median LTL 10 (EUR 2.9). In such a case, WTP amount per person per year would be LTL 25.9 (EUR 7.5) per person per year (median LTL 5 (EUR 1.45)).

Once all zero bids are excluded (both protest and non-protest ones), mean WTP would increase up to LTL 78.4 (EUR 22.7) (median LTL 35 (EUR 10)) per household per year and LTL 35.4 (EUR 10.2) per person per year (median LTL 13 or EUR 3.8)

Average WTP amount for river water quality improvement and re-meandering makes on average 0.36% of income and around 17.7% of bills for water services (340 cases analyzed, which included positive and zero bidders, except those who could not state the amount paid for water services). For comparison, mean share of the water bill just of those who indicated bids above zero, is 31,8% (sample of 189).

It should also be noted that in order to test ordering effect, i.e. how the respondents perceive and assess two goods A and AB, presented in two different ways – firstly, as A and then AB, and

secondly, as AB and then A, two scenarios were changed for half of the respondents who first of all listened and assessed scenario with both water and ecological status improvements and only then the scenario with only water quality improvement. The result is presented in Table 5.

Table 5. WTP for water quality improvement and river re-meandering, assessed in two different alternatives, LTL, per household per year (only protesters of reason 1 excluded)

Version of the questionnaire	Mean	Median
Version A – respondents first of all state WTP for water quality improvement and then – for both water quality improvement and river re-meandering	50.31	10.0
Version B – respondents first of all state WTP for both water quality improvement and river re-meandering and then – for water quality improvement	45.75	10.0
Both versions in total	48.18	10.0

4.4. Factors explaining economic values for water resource management

For analysis of the reasons of people's willingness to pay and for the validation of these responses, a logistic regression has been carried out. First of all, a binary logistic regression was employed in order to reveal which variables best explain why people in principle agree to pay for water quality improvement and why they do not. Secondly, a linear regression was run for the assessment of the most significant determinants for the stated WTP amount.

The following analysis of the factors explaining economic values (WTP amounts) is based on WTP amount for larger improvement (water quality and re-meandering) of the rivers in the Neris river basin. It has a very strong correlation (Pearsons correlation 0.815) with WTP amount for a smaller improvement (just water quality). Therefore, separate analysis for the latter is not needed and the regression results of the first one can be applied to explain it.

Below are presented correlations between major parameters assuming level of significance in statistical inference to be 0.05.

Income (scale)

WTP amount	Pearsons Correlation	.311
principle WTP	T-test, Sig. (2-tailed)	.000
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000

A correlation of WTP amount with income of the household per year (sample of 352) is significant (weak to medium strong). The bigger the income, the greater a person's willingness to pay.

Size of water bills (scale)

WTP amount	Pearsons Correlation	.078
principle WTP	T-test, Sig. (2-tailed)	.301
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.118

A correlation of WTP amount with a size of water bills (sample of 293) is not significant. This variable should be used carefully because many values are missing. A re-grouped variable into those who pay for water services and those who do not could be used for analysis, but just 53 out of 392 respondents do not pay for water services. Those who do pay for water services are slightly more likely to agree to pay for water quality improvement.

Relative importance of environmental problems (scale)

WTP amount	Pearsons Correlation	.045
principle WTP	T-test, Sig. (2-tailed)	.887
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.978

This variable shows relative importance of environmental problems as to compare to the importance of other problems. It was recalculated from several variables, which showed the importance of various problems. Correlation of WTP amount with an indicator of relative importance of environmental problems is not significant (sample of 392).

Number of visits to water sites (scale)

WTP amount	Pearsons Correlation	.045
principle WTP	T-test, Sig. (2-tailed)	.081
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000

A correlation of WTP amount with a number of visits to the water sites is not significant (sample of 392). The Student test also indicates that average number of visits to the water sites of those who in principle do agree to contribute and of those who do not is not significantly different. Still, the Mann-Whitney test recognises significant difference between the two groups.

Age (scale)

WTP amount	Pearsons Correlation	-.198
principle WTP	T-test, Sig. (2-tailed)	.000
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000

A correlation of WTP amount with age appeared to be weak but statistically significant (r=-0.198) (sample of 392). The younger the person, the more he/she is willing to pay. However, this tendency is a weak one. Mean age of those who agree to pay is 43.2 and of those, who do not - 54.2, which statistically is significantly different (the Student test). Significant difference between the two groups is also indicated by the Mann-Whitney test.

Distances (scale)

Distance to the river, quality of which will improve

with WTP amount	Pearsons Correlation	-.109
with principle WTP	T-test, Sig. (2-tailed)	.000
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.002

A correlation (distance decay test) of WTP amount with the distance to the river, the quality of which will improve is not significant (sample of 392). It does not become stronger even when respondents living further than 1 km from the river the quality of which will improve are removed. Interestingly, both the Student test and the Man-Whitney test show that distances to the river, the quality of which will improve are statistically significantly different and those who do agree to contribute live further away.

Distance to the nearest water body

WTP amount	Pearsons Correlation	-.009
principle WTP	T-test, Sig. (2-tailed)	.160
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.160

A correlation (distance decay test) of WTP amount with the distance to the nearest water body is not significant. The situation does not change even when those who live more than 500m away

from any water body are excluded from the test. Neither the Student test nor the Mann-Whitney indicates significant difference in the distance to the nearest water body between those who do agree and those who do not agree to contribute.

Distance to the favourite water body

WTP amount	Pearsons Correlation	.050
principle WTP	T-test, Sig. (2-tailed)	.390
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.988

A correlation (distance decay test) of WTP amount with the distance to the favourite water body is not significant. Neither the Student test nor the Mann-Whitney indicates significant difference in the distance to the favourite water body between those who do agree and those who do not agree to contribute.

Living close to the river, the quality of which will improve (up to 1 km/more than 1 km)

WTP amount	T-test, Sig. (2-tailed)	.769
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.162
principle WTP	Chi-square, Asymp. Sig. (2-sided	.321

Mean WTP amounts are different in groups living close (up to 1 km) and living further away from the river the quality of which will improve – LTL 65 and LTL 38 per household per year accordingly, although the Student test shows no significant difference between these two groups. The Chi-square test also shows that those living closer do not tend to be willing to contribute more often than those who live further away.

Distance from water (up to 500m/more than 500m)

WTP amount	T-test, Sig. (2-tailed)	.062
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.064
principle WTP	Chi-square, Asymp. Sig. (2-sided	.039

According to the Student test there is no significant difference between mean WTP amount of those living up to 500 meters and those, more than 500 meters away from any water body. On the other hand, the Chi-square test shows that those living closer to the water tend to be willing to contribute more often than those who live further away.

Believing that the changes described will be real (regrouped into believers/those do not believe)

WTP amount	T-test, Sig. (2-tailed)	.003
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000
principle WTP	Chi-square, Asymp. Sig. (2-sided	.000

For those who think the situation will improve, mean WTP is LTL 61.2 and for those who do not believe it is LTL 35.2 per household per year. 75.6% of those who think that the situation will improve agree to pay and 73.7% of those who do not believe the improvements will take place refuse to pay (sample of 392). This indicates significance of the variable ('believing that the changes described will be real').

Interest in environmental issues (regrouped into: interested/not interested)

WTP amount	T-test, Sig. (2-tailed)	.008
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000

Those who are more interested in environmental issues tend to pay more (the Student test) and are willing to contribute more often in comparison to those who are not interested in environmental issues (the Chi-square test). Nevertheless, this variable should be used carefully because those who are not interested make less than 20%.

Visiting outdoor sites next to water (regrouped into: does visit/does not visit)

WTP amount	T-test, Sig. (2-tailed)	.000
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.000

Those who visit sites next to water are willing to pay LTL 59.26 and those who do not visit them are willing to pay LTL 17.51 per household per year, which is statistically significantly different according to the Student test. The chance of willingness to contribute in principle is also much higher within the group of those who are visiting outdoor sites next to water (Chi-square test).

Presence of children in the household (children present/not present)

WTP amount	T-test, Sig. (2-tailed)	.063
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.001

Those who have children are willing to pay more, but the difference of mean WTP amount statistically is not very significant (significance according to the Student test is 0.063, which is slightly higher than 0.05). Still the Mann-Whitney test shows the difference to be significant. There is a significant relationship between principle WTP and presence of children in the household according to the Chi-square test.

Type of settlement (urban/rural)

WTP amount	T-test, Sig. (2-tailed)	.018
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.000
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.001

For those who live in urban areas, mean WTP is LTL 57.50 and for those living in rural areas it is LTL 31.8 per household per year, which statistically is significantly different. There is also a significant relationship between principle WTP and type of settlement according to the Chi-square test.

Gender (men/woman)

WTP amount	T-test, Sig. (2-tailed)	.355
	Mann-Whitney Test, Asymp. Sig. (2-tailed)	.495
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.878

Mean WTP of women is LTL 42.94 and of men is LTL 54.05 per household per year which, according to the Student test, is not significantly different. Gender appeared not to be influential on principle decision to contribute or not to the improvement of water quality.

Education (regrouped into four groups)

WTP amount	ANOVA, Significance	.118
	Kruskal-Wallis Test, Asymp. Sig.	.000
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.000

Mean WTP amounts according to ANOVA tests are not very different between the groups, but the Kruskal-Wallis test shows that people with different education tend to contribute significantly

different amounts. People with higher education are willing to pay more. Moreover, the Chi-square test indicates that education has also a significant influence on principle decision to contribute. This variable was regrouped into binary for binary logistic regression (college and university / lower education).

Perceived quality of water in Neris river basin (re-grouped into three groups)

WTP amount	ANOVA, Significance	.658
	Kruskal-Wallis Test, Asymp. Sig.	.060
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.000

Although ANOVA and the Kruskal-Wallis tests show that the perception of current water quality does not have significant influence on how much people are willing to contribute, but according to the Chi-square test, this factor is still important when predicting if a person is willing to contribute in principle or not.

Employment (regrouped into four groups: employed, students, retired, unemployed)

WTP amount	ANOVA, Significance	.007
	Kruskal-Wallis Test, Asymp. Sig.	.000
principle WTP	Chi-square, Asymp. Sig. (2-sided)	.000

Mean WTP of the employed is LTL 62.1, of students LTL 84.2, of the retired LTL 21.0 and of the unemployed LTL 30.5 per household per year, which is statistically significantly different. Social status (employment) also has a significant influence on principle decision to contribute or not. This variable was regrouped into binary for binary logistic regression (employed/other).

Determinants of the principle WTP (results of binary logistic regression analysis)

A backward stepwise selection method including automatic and manual removal of variables, mainly based on the outcome of the Wald test statistic, was used to find out the main reasons why people agree or disagree to contribute financially to the water quality improvement in the Neris river basin. The above mentioned method is based on the omission of the least significant factors at each step of analysis until the model cannot be improved any more according to the investigated variables and only significant variables remain.

Before logistic analysis, a number of chi-square and other tests were carried out in order to see if there were any significant dependencies between principle WTP and other variables. The final list of variables (significant, enough of observations) included in the regression is as follows:

Categorical

- Re-grouped into 4 categories: The kind of changes that are perceived as realistic

Binary

- Children in the household (yes/no)
- Type of settlement (rural/urban)
- Re-grouped: Believing that improvement of water status is realistic (realistic/no)
- Re-grouped: Importance of environmental problems
- Activity by a water body: Fishing (yes/no)
- Activity by a water body: Bathing or swimming (yes/no)
- Activity by a water body: Walking, jogging, picnics, walking the dog (etc) (yes/no)
- Activity by a water body: Water based activities using motorized or not motorized means of transport (yes/no)
- Activity by a water body: Watching wildlife (yes/no)
- Distance from the closest water body (closer than 500m/further)

- Education (college and university/lower)
- Employment (employed/other)

Scale

- Age of the respondent
- Income level

A correlation between employment status and age; and two kind of activities - walking and watching wildlife - was found. Therefore variables 'employment status' and 'walking' were not included into the final regression model, as leaving other variables in ensured the best predicting possibility.

The Model log likelihood of this regression was 338.490. In total, 352 observations were included in analysis after excluding protest bidders as well as the respondents who did not indicate their income. This number is slightly low and therefore the results of the model should be interpreted with caution. The next table contains determinants that remain significant at the last step of regression analysis.

Table 6. Variables in the equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Income	.001	.000	12.871	1	.000	1.001
Age	-1.223	.271	20.292	1	.000	.294
Activity by a water body: watching wildlife	1.168	.278	17.642	1	.000	3.215
Believing that changes in water quality status are realistic	-.045	.009	25.167	1	.000	.956
Constant	3.212	.685	21.978	1	.000	24.821

The chosen model correctly predicts 77.6% of all cases. All variables of the model are statistically significant (significance level α=0.05). Nagelkerke R Square for this model equals 0.378 and the significance according to the Hosmer-Lemeshow Goodness of fit test is 0.955.

It can be concluded that:

- people who believe in the possibility of improving water quality are more willing to pay in principle than those who do not;
- possible willingness to contribute to a better water quality is higher for people who are used to go watching wildlife by water bodies;
- income of the respondents influences their desire to contribute to a better water quality in a positive way;
- younger people are more willing to contribute.

The majority of the explanatory variables, significant in determining principle WTP, were expected to have importance in explaining WTP already during primary data analysis. However, there still were some unexpected observations; for example, the probability of principle WTP is not higher among those who actively use water resources (like fishermen) in comparison to those who are not active users (e.g. jogging).

Another unexpected outcome of analysis is that distance decay is found neither from the water body the quality of which will improve nor from any other water body in general. Therefore, knowing a respondent's place of residence does not help in predicting if he or she is willing to pay and how much.

The influence of the average income on the decision to pay or not to pay for some hypothetical good confirms the reliability and validity of the research, because it means that the respondents answered WTP question bearing in mind their real financial situation and took the survey seriously.

Although data analysis seems rather reliable, data preparation and the results of statistical analysis revealed that the respondents perhaps were thinking more about water quality or even nature quality improvement in general than about the rivers of the Neris basin. For instance, the tests show that people going to outdoor sites not necessary close to any water bodies have similar WTP tendencies to those who spend their time next to a water body.

Linear regression

In order to define determinants of the respondents' stated willingness to pay for a better water quality in the Neris river basin, Ordinary Least Squares*11*(OLS) linear regression analysis has been carried out. The main purpose of such analysis was to find out the mean willingness to pay value for the proposed water quality improvement.

Referring to the results of various tests, an assumption was made that the main predictable variables might be: income, age, family status (presence of children in a household), involvement in various activities when visiting water sites, perception of the importance of environmental problems, believing that changes in quality can be real, perception of current water quality, number of visits to the water sites and type of settlement. Other possible explanatory variables were analyzed in regression models as well, but most of them became insignificant under the regression model conditions and so were excluded from the analysis.

However, none of the combinations were good enough to predict WTP amount. The highest value of R2 never reached the level of 0.2, which shows that the regression model is not completely adequate for the available data.

The most influential variables appeared to be: income, age, perception of the importance of environmental issues, believing that changes in water quality are realistic and fishing, as an activity at outdoor sites. As expected, an assumption about the importance of income in determining WTP value was confirmed. Analysis of the respondents' average income showed that all (500) respondents stated their WTP value within theoretically acceptable limits (<=5% of the average income rate). Younger people, fishermen, those who believe that changes in water quality are realistic and those who find environmental problems to be important tend to contribute more.

The following tables show the best regression model for the declared WTP value.

Table 7. Model summary

Number of valid observations	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.396[a]	0.157	0.145	114.982

a. Predictors: (Constant), q32, Fishing, q3.4, PajMid, q38Age

All variables of the model are statistically significant (significance level α=0.05) except 'Believing that changes in water quality status are realistic' which is kept in the model, since without it the model's predicting power decreases.

[11] *OLS assumes a linear distribution of the dependent variable, in this case WTP. Regarding the high number of zero-bidders, this assumption is violated. Therefore, results should only be used with much consideration.*

As mentioned before, a very low R square index shows that ability of the model to describe the dependent variable (WTP amount) is quite poor although the t-test shows the variables to be important.

Table 8. Coefficients(a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	34.625	34.891		0.992	0.322		
Income	.024	.005	.260	4.898	.000	.885	1.129
Age	-.812	.400	-.109	-2.029	.043	.875	1.142
Activity by a water body: fishing	45.189	17.589	.129	2.569	.011	.990	1.010
Believing that changes in water quality status are realistic	-20.528	13.296	-.079	-1.544	.124	.964	1.038

a. Dependent Variable: Lognormal WTP amount

Variables income and age correlate. However, VIF index shows that there is no multicolinearity problem, that is, this correlation does not affect the model. Moreover, removing one of the two results in a poorer model. Therefore both variables are left in the final list.

The residuals of the model are close to normal distribution.

Table 9. Model fit (ANOVA[b])

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	850681.712	5	170136.342	12.869	.000[a]
Residual	4574444.899	346	13220.939		
Total	5425126.611	351			

a. Predictors: (Constant), Do you find changes realistic, Fishing, Income, Age
b. Dependent Variable: WTP amount

The linear regression function according to this model would look as follows:

WTP amount (for water quality improvement and re-meandering) = 34.625 + 0.024*Income – 0.812*Age + 42.189*Fishing (1 or 0) – 20.528* Believing that changes in the water quality status are realistic (1 or 0).

The stated WTP amounts were not normally distributed, therefore, for more accurate results of the regression analysis, the stated willingness to pay was logarithmically transformed. Just 241 valid cases were left, which is a relatively small sample for the analysis. The final model is similar to the one when analysis is run without logarithm. Income, age and fishing remain in the model, while believing that changes are realistic is replaced by education[12]. Nevertheless, R square index is still very low (0.135) showing that the ability of the model to describe the dependent variable (WTP amount) is very low.

5. Conclusions and recommendations

There are a few general aspects of the benefit, which the Neris river basin willingness to pay for improved water quality and achieving good ecological status survey has brought:

[12] *Binary variable used – those who have college or university education and those will lower one.*

Methodological. A very limited number of WTP surveys are carried out in Lithuania. Currently four studies (including this one – the Neris river basin water improvement study) can be counted in total, which were addressed at finding out people's willingness to pay for environmental goods. There is a lack of experience of such kind of study preparation and implementation in Lithuania; therefore, the common preparation process was very useful for those who had participated in the Aquamoney case study common design, as well as for policy makers who were informed and who were interested in the implementation and results of the study. Each study brings valuable experience and numerical results, which are highly important for policy makers especially in view of the WFD goals.

Practical. In the Nemunas RBD, which makes up 80% of Lithuania's territory, this is only the second WTP study. The previous study, which assessed WTP for improved water quality in the Nevezis river basin, was quite similar to the Neris study. It is promising, encouraging and assuring that the Neris river basin WTP study brought up the results, which not only in principle, but also numerically are similar and correspond to the results of the Nevezis river basin.

In general, it is important that stated preference surveys provide additional non-monetary information (attitudes and preferences). For example, the Neris survey showed that:

- people who believe in the possibility of improving water quality are more willing to pay in principle than those who do not;
- possible willingness to contribute to a better water quality is higher for people who are used to go watching wildlife by water bodies;
- income of the respondents influences their desire to contribute to a better water quality in a positive way;
- younger people are more willing to contribute;
- though data analysis seems rather reliable, data preparation and the results of statistical analysis have revealed that the respondents were probably thinking more about water quality or even nature quality improvement in general than about the rivers of the Neris basin. For instance, the tests show that people going to outdoor sites not necessary close to any water bodies have similar WTP tendencies to those who spend their time next to a water body.

Also, stated preference surveys communicate what achieving "good ecological status" means for different people in terms of practical use and other amenities and what their attitudes to good ecological status are. It was very useful that the survey provided an opportunity to consult the public directly on their spending priorities. This is very much in line with what the WFD is aimed at.

More concrete remarks, conclusions and recommendations for the policy makers and future "performers" of similar studies are the following:

A priori knowledge on water quality. On one hand, it is important that responsible authorities have enough data on water quality in water bodies under assessment. On the other hand, it is interesting and useful to find out what the respondents' perception of water status is.

In the Neris study, quite a realistic perception of water quality was found. The majority of the respondents have indicated that the water quality in the Neris river basin is medium, which is what the monitoring results show.

Water bodies monitoring data should be sufficient for making the scenario in the survey realistic. In Lithuania, for example, which is abundant in lakes and rivers of quite good water quality, not

all lakes are monitored; therefore, if such lakes are chosen it would be difficult to describe the scenario correctly, including the possible water quality evolution. .

Moreover, as there are many substitution sites in Lithuania, it is more likely that people would hardly put some specific value on a water body that he or she probably has never been to.

Distance decay. The study in the Neris river basin has found (non)-existence of or only weak distance-decay. Sampling is quite important for such kind of studies. We think that one of the reasons why distance decay was not found in the common valuation part of the survey was that there were too few respondents living close to lakes under assessment.

Ordering effect. The mean WTP results of the ordering test show that the respondents prefer the "logical" presentation of two goods: first of all, the smaller change and then the bigger improvement of the rivers, to the reverse presentation of the two scenario parts. Mean willingness to pay in the first case is higher than in the second one.

Time stability. The timing of both studies carried out in the Neris river basin was not the best for this kind of study: the Neris river basin willingness to pay study was carried out in March, while the previous study (the Nevezis river basin, which belongs to the same Nemunas river basin district as the Neris study) was performed in January. It is recommended to perform such studies during the season when potential respondents are "closer" to use and non-use values of water resources.

Zero and protest bidders. Due to the known reasons, there are usually many zero and protest bidders in Lithuania. It is not always clear how to classify and treat them; therefore, qualitative information on protests and a priori knowledge of the population is very useful. It is recommended to hold further discussions and analyses on this issue.

Decision-support role of WTP and the Survey as a basis for communication strategy.

Disproportionality is first of all a political judgment informed by economic information. If the ability to pay is an issue, special analysis is needed, which may very well be supported by the WTP studies. Lithuanian policy makers' preferred application of the WTP studies is specifically for potential derogations. Therefore, a very logical and useful next step would be to perform cost-benefit analysis in order to justify, based on disproportional costs, any possible derogations.

Another purpose of using assessed values is a direct input for cost recovery under Art. 9 WFD, for their application as environmental resource costs for water services. Currently, environmental costs (though not reflecting real environmental damage or benefit values), as a necessary element of the water price, are included in the water price in Lithuania through the natural resources abstraction taxes and water pollution charges. Valuation of environmental costs and benefits will certainly improve the understanding of the policy makers about the structure and full cost recovery elements of the water price.

In both cases, the use of monetary values has to be cautious and correct. For example, when attempting a benefit transfer, either through unit value adjustment or by incorporating them into a meta-function, the comparability of sites (areas) assessed, attributes, the service in the on-going and already made study and the demographic situation should be assured. In any case, the inclusion of environmental costs and, especially, the application of valuation studies for setting environmental costs' levels require more political discussions and a better understanding of the WFD principles.

We would also point out that it would be interesting to perform the choice experiment and not only the CV, as was the case in Lithuania.