Valuation of ecological restoration benefits in the Danube River basin using stated preference methods – Report on the Austrian case study results

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1. Introduction

The project AquaMoney (Economic valuation of environmental and resource costs and benefits in the European Water Framework Directive) is a European research project funded by the European Commission under the 6th EU Framework Programme (contract n° SSPI-022723). AquaMoney is directly linked to the implementation of the Water Framework Directive (WFD). The concept of environmental and resource costs and benefits plays a central role in the economic analysis of the WFD, in particular in relation to the cost recovery of water services (Article 9 WFD) and exemptions based on disproportionate costs (Article 4 WFD).

The main objective of the AquaMoney project is to test practical guidelines aimed at capturing Total Economic Value (‘use’ and ‘non-use’ values) of water resources in real-life conditions in 10 representative European pilot river basins. Furthermore, it also provides a practical illustration of how stated preference methods can be usefully applied in practice. The WFD, in place since 2000, applies a holistic approach to the management of water. The structure and the state of the river (e.g. connectivity of wetlands within the riparian zone) directly influence the biological and hydro-morphological quality elements of “good ecological status (GES)”. Hence, attaining GES is only feasible if parts of the river are transformed back into a more natural state.¹

The Austrian case study is part of the international “Danube group” – consisting of researchers and institutions in Austria, Romania and Hungary – and focuses on the estimation of non-market benefits of ecological restoration of heavily modified river stretches along the Danube River. The main objective of the case study is to assess public perception and value of benefits associated with river restoration measures in terms of flood control and water quality improvements and to test the transferability of such benefits in an international context. A common questionnaire with region-specific information (using the different economic valuation techniques of ‘Choice Experiment’ and ‘Contingent Valuation’) was applied across the three Da-

¹ Some parts of the river, e.g. where the river banks are heavily modified, achieving a good ecological status may not be technically feasible; the same applies for the use of hydropower plants along the Danube River.
nube case studies in order to test the transferability of values derived through comparison and contrast of the case study results.

This report summarizes the main case study results and it is organized as follows: After a short description of the case study areas, chapter 2 briefly presents the general survey and questionnaire design and outlines how the stated preference methods were implemented. Results of the survey then follow in chapter 4. A significant public willingness to pay for the specified restoration measures is revealed and described in detail. Finally, based upon the application of the specific valuation methods utilized, the report concludes with a formulation of best practice recommendations and notes of specific limitations of the methods applied.
2. Description case study area

The Danube River is the second largest river in Europe. It originates in Germany and flows through 10 Central and Eastern European countries before entering the Black Sea. It has a length of 2,850 km and a catchment area of more than 800,000 km². Although some parts of the river are still in a near-natural state, most river stretches have been classified as heavily modified due to factors such as embankment and regulation works, intensive navigation and the construction of hydro power plants. The shape of the river has been drastically changed and large parts of the formerly waterlogged associated areas have been drained for agricultural proposes. Hence, (hydrological) connectivity between the Danube and the surrounding area and its tributaries has been reduced to small patches. The structure and the state of the riparian zones directly influence the biological and hydro morphological quality elements of the river. Management plans to achieve ‘good water status’ can include protection or restoration measures for rivers and their connected wetlands. This report focuses on people’s preferences for ecological river restoration programs in Austria (Danube National Park).

Figure 1: Case Study Area – Danube floodplains (Danube National Park)
The Austrian case study area (Danube National Park) is located east of Vienna. It is a green ribbon with a length of 35 km, linking Vienna and Bratislava and providing protection to a large floodplain area of the Danube. In some parts, it is still ecologically intact to a high degree displaying the characteristics of a large stream. The national park covers an area of 9,300 hectares and is a complex ecosystem with an enormous diversity of habitats, plants and animals. Within and around the existing wetland, the main economic activities include agriculture, forestry and fishing. The water quality can be classified as “good” except for a few sites (due to ingress of waste water, a short stretch downstream of the city of Vienna has been assessed as moderate).

The main pollution source is the waste water treatment system of the City of Vienna which has been improved constantly over the last years (a new additional stage of cleaning facilities has recently been installed). At least some parts the Danube River can be classified as heavily modified water bodies especially since the channelling of the river bed and the construction of the hydro power station of Freudenau (within the city limits of Vienna downstream to the east) further changed the free-flowing character of the river. However, a recent map of the Austrian Institute for Water Quality (2008) shows that the achievement of the WFD aims along the Danube – in particular in Vienna – is rather uncertain. Parameters O2, BOD5, PO4-P, Ptot, NH4-N, NO3-N and heavy metals met national objectives for river water quality. The organic and nutrient loads in the Danube are moderate. While point sources such as the waste water of the City of Vienna can be controlled efficiently, the situation regarding diffuse (non-point) discharges is less favourable. Concentrations are high where agricultural activities take place (e.g. Marchfeld).
3. Set up of the survey

3.1 Questionnaire design

The questionnaire was developed after several meetings, discussions and pre-tests. After each pre-test, minor changes were introduced to the structure and wording of the questionnaire. Special attention was paid each time to the choice experiment (CE) and how understandable the experiment and the design were to lay people. The final questionnaire consisted of 41 questions (see Appendix), of which most are closed-ended (multiple choice), divided over four main parts:

- **Perceptions and attitudes.** The first part of the questionnaire contained questions about respondents’ general perceptions and environmental attitudes. Respondents were asked, for example, about types and frequency of recreational activities in the catchment area and how often they visit the case study area. Moreover, they were asked regarding their perceptions about water quality and about water quality evolution over the last ten years.

- **Choice Experiment.** In the second part, respondents were asked to state their choices using four different choice sets. In the introduction to the choice experiment a map of the location of the river restoration area was show to each respondent. The maps were based on CORINE LANDCOVER 2000 (shape file 1:100000). The major types of ecosystems were derived from Corine classes level 3 and provided information about human settlements, agricultural systems, forests and meadows, wetlands and freshwater ecosystems. The CE was followed up with a debriefing question and respondents who opted out (i.e. chose not to select one of the alternatives) four times were asked why they chose as they did.

- **Contingent Valuation.** The CE was followed up by a CV-question on ecological restoration. Participants were asked to state their maximum willingness to pay in order to help finance (largely unspecified) restoration measures which they were told would change the ecological status and/or recreational potential of the area.

- **Demographic/socio-economic data.** The final part of the questionnaire was focussed on gathering data on respondents’ demographic and socio-economic status (income, age, number of children, current work status, education, etc.).
3.1.1 Design and Implementation of the choice experiment

In order to estimate and justify expenses for river restoration programs that ecologists consider to be beneficial, in the present study a choice experiment (CE) was chosen to value ecological restoration and to estimate the WTP for certain restoration management programmes. The design consists of two exclusive categories of benefits: the impact of river restoration on floodwater storage and the corresponding reduction of flood risk, and the river’s nutrient retention capacity and hence water quality.

The CE was composed of three attributes (flood frequency, water quality and cost of the option) and respondents were asked to choose between the current situation and two alternatives. Respondents were told in the introduction that river restoration measures can positively affect water quality and flood frequency. The degree of restoration of the river (towards a more natural state) is connected to the degree of water quality improvement and flood frequency decrease that can be expected.

![Figure 2: Example choice card](image-url)
Water quality was described in terms of variety of aquatic life and recreational uses such as swimming, booting and fishing. A selection of multi-coloured pictograms was used to assist respondents to visualise different quality levels, starting from moderate to good and very good water quality (Figure 2). The differences between the three levels were explained in detail.

Flood frequency was defined as the probability of floods that will bring damage to communities and agricultural and industrial uses of areas downstream of river restoration and re-naturalisation measures, with the four levels: 5, 25, 50 and 100 years. The lowest level for both attributes, water quality and flood frequency, corresponded to the status quo.

The monetary attribute was specified as an increase in the respondents’ water bill to fund the water management programme (in the form of an annual contribution on top of the water bill). The payment levels used in the choice experiment were 3, 10, 30 and 50 € (in Austria). These values were converted to Hungarian Forint and Romanian Lei to ensure equivalence.

Respondents were asked to choose between the two unlabelled river restoration alternatives compared to the status quo situation. The trade-off here is the price they pay as a private household for the presented public river restoration benefits on top of their current water bill. Hence, the derived welfare measure is individual willingness to pay (WTP) or compensating surplus to secure the river restoration benefits. If they choose the current situation, they obviously forego these benefits and the cost price is zero in that case. In order to combine the levels of the attributes into a number of options a fractional factorial design was used. 32 choice sets were assigned to 8 blocks such that each respondent was confronted with four choice sets.
3.1.2 Design of the contingent valuation scenarios

In the study, the contingent valuation method consisted of asking respondents about their willingness to pay for increasing the size of natural areas along the river – from the actual situation to an enlarged and ecologically enhanced situation. Respondents were told that, with restoration measures, wetlands and forests could be connected to the Danube which would lead to a more natural landscape with water flowing not only through the main channel but also through adjacent creeks and ponds (Box 1). Respondents were told that currently about 25% (a quarter) of the wetlands are currently connected to the Danube.

**Box 1: Introduction of the CV-question**

As described before, the Danube River is heavily modified in many places. Today approximately a quarter of the river is still connected the surrounding floodplains and wetlands and the river banks are still in a natural state (SHOW MAP OF THE CURRENT SITUATION).

Restoration measures would connect the river again to the floodplains and the wetlands as they were originally before the changes made to the river and river banks. As a result of river and floodplain restoration the landscape will look more natural, with water flowing also through adjacent creeks and ponds. This more natural state has a positive effect on nature and the variety of plant and animal species found in the catchment.

Plans exist to restore half (50 percent) (alternatively 90%) of the modified river banks in the Donau-Auen National Park back into their original natural state as shown on the map (SHOW MAP), and connect the river again with the floodplains and wetlands.

In order to increase realism, respondents were shown existing river restoration plans on a map. The maps were based on CORINE LANDCOVER 2000 (shape file 1:100,000). The major types of ecosystems were derived from Corine classes level 3 providing information about human settlements, agricultural systems, forests and meadows, wetlands and freshwater ecosystems (Figure 3).
The respondents were explicitly told that for each scenario they should state the maximum amount they would be willing to pay on top of their annual water bill in order to restore a certain degree of the river bank. We used an open-ended format (a payment card) to elicit individuals’ maximum willingness. The payment card showed 29 values ranging from € 1 to € 250. Additionally, the payment card offered the options “more than € 250, namely …”, “other amount, namely…” and “I don’t know”.

The WTP question was formulated as follows:

“Can you tell me with the help of this card how much you are willing to pay MAXIMUM on top of your yearly water bill over the next 5 years for the restoration of half (alternatively 90 %) of the modified river banks in the Donau-Auen National Park back into their original natural state as shown on the map?”
Those respondents who were not willing to make a financial contribution to restoration measures were asked to state why. In addition, these respondents were confronted with a series of statements (e.g. “It is the task and responsibility of the government to protect the rivers” or “The environment has the right to be protected irrespective of the costs of the society.”) to identify and categorise protest bidders.

3.2 Sampling procedure and response rate

In the Austrian case study, the survey method was a web-based questionnaire. The pre-test and the main survey were carried out by a survey company (Marketagent). The sample for the main survey was segmented between people living in Vienna and Lower Austria. For the pre-test only Vienna residents were randomly selected from the company’s representative household panel. A total of 526 people were recruited for the pre-test of which 109 completed the web-based questionnaire. The response rate is therefore 20.7%. In addition, 15 questionnaires were sent to experts and face-to-face interviews were held with these experts to improve the structure and wording of the questionnaire. The main survey was carried out in November 2007 and 1,977 people were invited to participate. A total of 506 individuals completed the final questionnaire, giving a response rate of 25.6 percent. Table 3-1 shows that about half of respondents live in Vienna, whereas the rest lives in Lower Austria.

Table 3-1: Response Rate

<table>
<thead>
<tr>
<th></th>
<th>Vienna</th>
<th>Lower Austria</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>895</td>
<td>1,082</td>
<td>1,977</td>
</tr>
<tr>
<td>Response</td>
<td>264</td>
<td>242</td>
<td>506</td>
</tr>
<tr>
<td>Response rate (%)</td>
<td>29.49</td>
<td>22.36</td>
<td>25.59</td>
</tr>
</tbody>
</table>
4. **Results**

4.1 **Respondent characteristics and sample representativeness**

Table 4-1 displays the socio-demographics of the sample. Basically, the social and economic characteristics of the sample are similar to those of the population in Vienna and Lower Austria. Gender of respondents is very close to the Austrian average with about 52% of women and 48% men in the sample. The age structure of respondents lies well within the distribution of the population of Vienna and Lower Austria, with the largest share of respondents between 30 and 50 years. Mean age of respondents is 40.54 years (std. deviation 14.73; median value 45 years). The age category “>60” years is proportionally low. An explanation might be that a web-based survey was chosen and elderly people have less access to the web or feel uncertain using an online survey.

<table>
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<tr>
<th>Table 4-1: Socio-demographics of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample (n=506)</td>
</tr>
<tr>
<td>GENDER</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>AGE (%)</td>
</tr>
<tr>
<td>14-19 years</td>
</tr>
<tr>
<td>20-29 years</td>
</tr>
<tr>
<td>30-39 years</td>
</tr>
<tr>
<td>40-49 years</td>
</tr>
<tr>
<td>50-59 years</td>
</tr>
<tr>
<td>&gt;60 years</td>
</tr>
</tbody>
</table>

The distribution of the disposable monthly household income is presented in Table 4-1. Mean annual household income in the sample is € 22,025. The median monthly household income falls in the income category € 1,501-2,000, which is slightly below average household income in Austria (approx. € 2,500 per month). Thus, the income distribution is skewed toward those with lower incomes, and lower income classes are slightly overrepresented in this web based sample.
16.4 percent of the Austrian sample population only went to primary school. 43 percent has a professional training and 29 percent has followed high school. Only 6.52 percent of the sample population went to university. With respect to the education of respondents, the percentage of people with a technical college or a university degree is not full representative for Austria. An explanation might be that a large proportion of respondents are students and has not completed education.

*Figure 4: Education of respondents*

The average household size – i.e. how many people are living in the same household – is 2.88 on average (std. deviation 1.34, median 3). The family size varies between 1 and 10 people, whereas 13.64 percent of the sample population is a one-person household. Hence, single households are slightly under-represented relative to the overall population. More than 47 percent state to have no children. A majority (201 respondents or 40 percent) has one or two children, while 3 percent has three children and only five respondents have more than three children (Figure 5). In summary, with respect to the family size and the number of children living in the household the sample population seems to be highly representative for the Austrian situation.
Figure 5: Family size

Figure 6: Current work status
Figure 6 shows that 43 percent of the respondents work full-time and 10 percent is self-employed. Only a minority of less than 9 percent work part-time, and students comprise a disproportionately large percentage. A relatively low share of the sample population is retired and in total 20 respondents state to be unemployed. Finally, only 5 respondents state to be unable to work and 5 percent are housewives (no housemen counted).

4.2 Flood experiences and public perception of water quality

The perceptions of the respondents for water quality and the public experience with flooding were elicited though a series of questions. Table 4-2 and Table 4-3 display some results. Based on the WFD water quality classification, a majority of all Austrian respondents believe that current water quality is good or very good. On the other hand, about one third of the respondents believe that the water quality is poor or moderate, with slight differences between perceived water quality in Vienna and Lower Austria. In principle, the Austrian respondents are familiar with the current water quality in the Danube River, although water quality is perceived by respondents to be worse than the expert classification of current water quality. The water quality in the Danube River can be classified as good except for a few sites.

<table>
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<th>Table 4-2: Public perception of water quality</th>
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<tr>
<td>Vienna</td>
</tr>
<tr>
<td>poor</td>
</tr>
<tr>
<td>moderate</td>
</tr>
<tr>
<td>good</td>
</tr>
<tr>
<td>very good</td>
</tr>
<tr>
<td>don’t know</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

However, the majority of respondents believe that water quality has improved over the past, while a surprisingly high share of respondents (about a quarter) state that – contrary to the facts – water quality has deteriorated (Figure 7). Hence, a discrepancy exists between the change of water quality in the last years and public perceptions. When respondents were asked how important it is that something is done to improve water quality in the future, more than 80 percent answered that it would be ‘very important’ or ‘important’ to improve the water quality of the Danube River. Less than two percent believe that water quality improvement is not important at all.
In a follow-up question respondents were asked the following question: “Would you engage more often in certain activities (e.g. boating, walking), if the water quality improved?” Less than 15 percent of the sample population indicates to use the Danube area more intensively for leisure activities if water quality would be better in the future. Most of this 15 percent would use the Danube for swimming or boating. Some respondents stated that they would go fishing more regularly.

Generally, respondents do not feel very well informed about water quality issues. A relatively high number of respondents indicated that they feel ‘less well informed’ or ‘not informed’ about water quality issues (nearly 70 % of respondents).

Figure 7: Improvements of water quality of the Danube River

When asking respondents about their personal experience with flooding, more than 84 percent of the sample population indicates to have no experience at all. Less than 16 percent of the sample population ever experienced a flood during his or her lifetime (Table 4-3). The main problems associated with floods are to dry out the flooded basement and that people have to leave their houses and take shelter elsewhere. Consequently, floods cause extensive damage to housing. Single respondents reported that their car was damaged, that they
could not walk around and had to wait for help, and that mud covered their furniture and water run down into the cellar.

**Table 4-3: Public experience with flooding**

<table>
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<th></th>
<th>Austria</th>
<th>%</th>
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</thead>
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<tr>
<td>no</td>
<td>427</td>
<td>84.39</td>
</tr>
<tr>
<td>experienced flood</td>
<td>79</td>
<td>15.61</td>
</tr>
<tr>
<td>once or more than</td>
<td>159</td>
<td>31.03</td>
</tr>
<tr>
<td>more than once</td>
<td>347</td>
<td>68.97</td>
</tr>
<tr>
<td>total</td>
<td>506</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Expectations regarding future frequency of floods were rather optimistic. The majority of respondents expect not to be affected by floods in the future while about 30 percent of respondents expect to be affected once a year or once in five years. Measures against floods are ‘very important’ for 343 respondents (64.5 %), ‘important’ for 136 respondents (25.6 %), while only 16 respondents (3.0 %) consider flood protection to be of low importance.

**Figure 8: Expected future frequency of floods**

Respondents believe that numerous factors affect the Danube, and therefore the potential for flooding. Around 70 percent think that weather extremes due to climate change are the most important factors that cause floods. A majority state that hydrological changes along the river (such as hydro power plants and channels) have an important influence on the quantity of water reaching the stream. Many respondents be-
lieve that floods occur as a result of deforestation, unconsolidated dams or land use change. An efficient intervention of authorities in case of floods may contribute to decreasing damages.

**Table 4-4: Causes of floods**

<table>
<thead>
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<th>Main reasons for floods are…</th>
<th>No. of (multiple) responses</th>
<th>% (n=506)</th>
</tr>
</thead>
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<tr>
<td>Weather extremes due to climate change</td>
<td>350</td>
<td>69.17</td>
</tr>
<tr>
<td>Hydrological changes along the river (e.g. hydro power plants, channeling)</td>
<td>274</td>
<td>54.15</td>
</tr>
<tr>
<td>Deforestation</td>
<td>270</td>
<td>53.36</td>
</tr>
<tr>
<td>Unconsolidated dams</td>
<td>203</td>
<td>40.12</td>
</tr>
<tr>
<td>Land-use change</td>
<td>199</td>
<td>39.33</td>
</tr>
<tr>
<td>Late interventions by the responsible authorities</td>
<td>168</td>
<td>33.20</td>
</tr>
</tbody>
</table>

4.3 Environmental awareness, behavior and individual water use

The first question of the questionnaire concerned respondents’ environmental behaviour in terms of memberships in environmental organizations and donations. 43 respondents (8.1 %) are members of environmental organizations; 210 respondents (39.5 %) donate money to such organizations with a mean of around € 44 per year (std. deviation € 56.65). Less than 10 percent of respondents work in environmental organizations, with a majority of respondents engaging themselves for one or at the most a couple of days.

**Table 4-5: Working for environmental organizations**

<table>
<thead>
<tr>
<th>No. of responses</th>
<th>% (n=532)</th>
</tr>
</thead>
<tbody>
<tr>
<td>about half a day</td>
<td>8</td>
</tr>
<tr>
<td>about one full day</td>
<td>13</td>
</tr>
<tr>
<td>a couple of days</td>
<td>14</td>
</tr>
<tr>
<td>more than a week</td>
<td>7</td>
</tr>
<tr>
<td>no work in environmental organization</td>
<td>464</td>
</tr>
<tr>
<td>n.a.</td>
<td>26</td>
</tr>
<tr>
<td>total</td>
<td>532</td>
</tr>
</tbody>
</table>

The interest in environmental questions and environmental problems, though, is indicated by the majority of respondents (413 respondents, i.e. 77,63 %) to be at least interested while a minority consider themselves to be not much interested in environmental issues (Table 4-6).


Table 4-6: Interest in environmental problems such as water and air pollution, waste management, nature conservation

<table>
<thead>
<tr>
<th>No. of responses</th>
<th>% (n=532)</th>
</tr>
</thead>
<tbody>
<tr>
<td>very interested</td>
<td>166</td>
</tr>
<tr>
<td>interested</td>
<td>247</td>
</tr>
<tr>
<td>mildly interested</td>
<td>68</td>
</tr>
<tr>
<td>not interested</td>
<td>25</td>
</tr>
<tr>
<td>n.a.</td>
<td>26</td>
</tr>
<tr>
<td>total</td>
<td>532</td>
</tr>
</tbody>
</table>

While these questions functioned as “ice-breakers”, the questionnaire then included questions regarding drinking water and waste water management. In general, drinking water supply is commonly organized by communities with about 87 percent of the Austrian population being supplied centrally with spring water or ground water. Basically no chemical water purification is needed to secure the quality and quantity of drinking water.

Among respondents, around 21 percent (111 respondents) have their own well, while water pumped out is generally used for irrigation purposes (e.g. watering the garden plants). Less than 8 percent of respondents use their own well for drinking water supply (see Table 4-7). 6 respondents additionally indicate that they would use their well water for the toilet, 3 respondents fill their swimming pool, and another 2 respondents use the water for their animals.

Table 4-7: Use of water from the household’s well

<table>
<thead>
<tr>
<th>Well water used for …</th>
<th>No. of responses</th>
<th>% (n=293)</th>
</tr>
</thead>
<tbody>
<tr>
<td>drinking</td>
<td>23</td>
<td>7,85</td>
</tr>
<tr>
<td>body care</td>
<td>36</td>
<td>12,29</td>
</tr>
<tr>
<td>cooking</td>
<td>24</td>
<td>8,19</td>
</tr>
<tr>
<td>washing the laundry</td>
<td>36</td>
<td>12,29</td>
</tr>
<tr>
<td>washing the dishes</td>
<td>29</td>
<td>9,90</td>
</tr>
<tr>
<td>washing the car</td>
<td>46</td>
<td>15,70</td>
</tr>
<tr>
<td>watering garden plants</td>
<td>99</td>
<td>33,79</td>
</tr>
<tr>
<td>total</td>
<td>293</td>
<td>100,00</td>
</tr>
</tbody>
</table>

Currently, nearly 90 percent of the Austrian households are connected to a central waste water management system. Within the sample, this high connectivity is mirrored with 88.5 percent of respondents (471 respondents) being connected to a central system. For those not being connected, about 15 percent could do so. For about 50 respondents, a connection to a central waste water system is not possible. However, 32 households operate a septic tank that is emptied once a year in the majority of cases.
Recreational water use characteristics

The next block of questions dealt with respondents’ use of the Danube River and its water quality. Nearly three quarters of respondents visited the Danube floodplains at least once in their life. Table 4-8 shows that about 19 percent of respondents visit the Danube area more regularly, while the frequency of 48 percent of respondents is at the most once per year. Little more than a quarter of respondents has never visited the Danube floodplains. Therefore, it can be assumed that respondents have at least some basic information and individual perception of the Danube River and floodplains – an assumption that is crucial for any valuation exercise.

Table 4-8: Visits to the Danube floodplains

<table>
<thead>
<tr>
<th>No. of responses</th>
<th>% (n=532)</th>
</tr>
</thead>
<tbody>
<tr>
<td>never visited the Danube floodplains</td>
<td>148</td>
</tr>
<tr>
<td>at least once a week</td>
<td>9</td>
</tr>
<tr>
<td>once a month</td>
<td>31</td>
</tr>
<tr>
<td>four times a year</td>
<td>61</td>
</tr>
<tr>
<td>once a year</td>
<td>100</td>
</tr>
<tr>
<td>Less than once a year</td>
<td>157</td>
</tr>
<tr>
<td>n.a.</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>532</td>
</tr>
</tbody>
</table>

Nearly 30 percent of respondents live within a distance of about 15 kilometres from recreation areas of the Danube River; the median is slightly less than 30 kilometres with a mean distance of 47 kilometres (std. deviation: 46 kilometres). A simple correlation analysis between the distance to the river and the frequency of visits reveals a correlation coefficient of -0.536 (significant at the 0.01 level) which is a first (though incomplete) indication of the connection between distance to the Danube River, and therefore opportunity cost of recreation at the Danube, and the frequency of recreational activities.

Table 4-9: Activities along the Danube River

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
<th>Percentage (n=506)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoying the landscape</td>
<td>regular 137</td>
<td>sometimes 276</td>
</tr>
<tr>
<td>Hiking along the river</td>
<td>regular 121</td>
<td>sometimes 292</td>
</tr>
<tr>
<td>Swimming</td>
<td>regular 101</td>
<td>sometimes 245</td>
</tr>
<tr>
<td>Trips with children</td>
<td>regular 69</td>
<td>sometimes 186</td>
</tr>
<tr>
<td>Observing wildlife (e.g. birds)</td>
<td>regular 63</td>
<td>sometimes 208</td>
</tr>
<tr>
<td>Other sporting activities</td>
<td>regular 56</td>
<td>sometimes 212</td>
</tr>
<tr>
<td>Walking the dog</td>
<td>regular 51</td>
<td>sometimes 66</td>
</tr>
<tr>
<td>Enjoying restaurants/cafés</td>
<td>regular 47</td>
<td>sometimes 295</td>
</tr>
<tr>
<td>Picknick at the river shore</td>
<td>regular 15</td>
<td>sometimes 111</td>
</tr>
<tr>
<td>Boating</td>
<td>regular 14</td>
<td>sometimes 204</td>
</tr>
<tr>
<td>Fishing</td>
<td>regular 11</td>
<td>sometimes 34</td>
</tr>
</tbody>
</table>
For certain recreational options, the Danube River is indeed a major area for residents of Vienna and Lower Austria. Around one quarter of respondents name enjoying the landscape and hiking along the river as their favourite recreational activity along the Danube River (Table 4-9). Water quality seems to be suitable also for swimming with nearly 20 percent of respondents (the question was worded in terms of what visitors could do near and at the Danube River; this implies that swimming in the Danube is one option, but there are also many opportunities to swim in adjacent waters or lakes along the Danube). Fishing and boating are the less attractive leisure activities in the Danube area.

4.5 The household’s water bill

In order to be able to qualify respondents’ to questions valuing water quality and management options of river restoration, it is necessary not only to account for respondents’ perceptions regarding recreation, flooding and water quality, but also to explore his/her knowledge regarding expenditures connected with the drinking water bill.

Table 4-10: Respondent’s estimation of the household’s water bill

<table>
<thead>
<tr>
<th>Water bill is …</th>
<th>No. of responses</th>
<th>% (n=123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 4 EUR per month (50 EUR per year)</td>
<td>20</td>
<td>16.26</td>
</tr>
<tr>
<td>up to 8 EUR per month (100 EUR per year)</td>
<td>13</td>
<td>10.57</td>
</tr>
<tr>
<td>up to 13 EUR per month (150 EUR per year)</td>
<td>27</td>
<td>21.95</td>
</tr>
<tr>
<td>up to 17 EUR per month (200 EUR per year)</td>
<td>18</td>
<td>14.63</td>
</tr>
<tr>
<td>up to 21 EUR per month (250 EUR per year)</td>
<td>15</td>
<td>12.20</td>
</tr>
<tr>
<td>up to 25 EUR per month (300 EUR per year)</td>
<td>11</td>
<td>8.94</td>
</tr>
<tr>
<td>up to 29 EUR per month (350 EUR per year)</td>
<td>4</td>
<td>3.25</td>
</tr>
<tr>
<td>up to 33 EUR per month (400 EUR per year)</td>
<td>6</td>
<td>4.88</td>
</tr>
<tr>
<td>more than 33 EUR per month (400 EUR per year)</td>
<td>9</td>
<td>7.32</td>
</tr>
</tbody>
</table>

The first question asked respondents whether they would be able to quantify the household’s water bill. Out of 506 respondents, only 123 (23.1%) could quantify their water bill. The mean value of the monthly water bill is around 17 EUR (std. deviation 9.72 EUR) which is also the median value (cf. Table 4-10). Respondents therefore estimate their water bill to amount to 200 EUR per year (on average). This amount comes close to the actual water bill paid by households (depending on the community of the resident). Water bills are usually paid monthly, every three month or once per year (Table 4-11).
Table 4-11: Respondent’s estimation of the household’s water bill

<table>
<thead>
<tr>
<th>Water bill is paid...</th>
<th>No. of responses</th>
<th>% (n=506)</th>
</tr>
</thead>
<tbody>
<tr>
<td>monthly</td>
<td>129</td>
<td>25.49</td>
</tr>
<tr>
<td>every two months</td>
<td>62</td>
<td>12.25</td>
</tr>
<tr>
<td>every three months</td>
<td>123</td>
<td>24.31</td>
</tr>
<tr>
<td>twice per year</td>
<td>56</td>
<td>11.07</td>
</tr>
<tr>
<td>once per year</td>
<td>106</td>
<td>20.95</td>
</tr>
<tr>
<td>other frequency</td>
<td>30</td>
<td>5.93</td>
</tr>
</tbody>
</table>

4.6 Marginal WTP for water quality and flood protection: choice experiment

The choice model used here has its roots in random utility theory (e.g. Ben-Akiva and Lerman, 1985). The Multinomial Logit Model (MNL) is the most used structure of choice models. The MNL model assumes that the random components of the utility of the alternatives are independently and identically (i.i.d.) Gumbel distributed with a type I extreme value (EV) distribution. Furthermore, the Independence of Irrelevant Alternatives (IIA) property states that the relative probabilities of two options being selected are unaffected by the introduction or removal of other alternatives. IIA follows directly from the i.i.d. EV error terms. This will be tested explicitly using the Hausman test (REF).

In addition, the responsiveness to attributes of different alternatives is assumed to be homogeneous across individuals, i.e. preferences are assumed to be homogeneous. This too will be tested explicitly by introducing interaction terms between attributes and respondent characteristics in the MNL model and the estimation of a random parameters (mixed) logit model. These assumptions lead to a closed-form mathematical model that enables estimation through conventional maximum likelihood (ML) procedures. The standard indirect utility function underlying the MNL is:

\[ U_{ij} = V_{ij} + \varepsilon_{ij} = \beta_k X_{ij} + \varepsilon_{ij} \quad (1) \]

where \( U_{ij} \) refers to utility of individual i obtained from choice alternative j, \( V_{ij} \) is the measurable component of utility, measured through a vector of k utility coefficients \( \beta \) associated with a vector of attribute and individual characteristics \( X_{ij} \), and \( \varepsilon_{ij} \) captures the unobserved influences on an individual’s choice.
The conditional choice probability \( \text{Prob}_{ij} \) that individual \( i \) prefers choice alternative \( j \) (if \( \varepsilon \) is i.i.d. EV distributed) can be expressed in terms of the logistic distribution (McFadden, 1974):

\[
\text{Prob}_{ij} = \frac{e^{\lambda \beta_i X_{ij}}}{\sum_{j \in C} e^{\lambda \beta_i X_{ij}}}
\]

(2)

where \( \lambda \) is a scale parameter, typically assumed to be 1, implying constant error variance, and \( C \) is the choice set. The probability of selecting alternative \( i \) increases as the utility associated with this alternative increases.

**Table 4-12: Overview of attribute levels**

<table>
<thead>
<tr>
<th>Level</th>
<th>Flood return period</th>
<th>Water quality</th>
<th>Cost price (£/household/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Once every 5 year</td>
<td>Moderate</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Once every 25 year</td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Once every 50 year</td>
<td>Very good</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Once every 100 year</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Flood risk is defined as the flood return period. Currently, the study areas face floods once every 5 years. As a result of river restoration, this return period can be reduced to once every 100 year. Water quality is described in categorical terms related to and explained with the help of the water quality ladder introduced by Resources for the Future (RFF) in the United States (Carson and Mitchell, 1993) referring to recreational water use such as swimmable, boatable and fishable on the one hand and biological diversity of aquatic life on the other hand. Multi-coloured pictograms were used to visualise the water quality levels, where red reflected poor water quality conditions, yellow moderate, blue good and green very good water quality conditions (see Figure 2). Based on expert consultation, moderate water quality levels were chosen as the baseline category (current situation). The monetary attribute was specified as an increase in the household water bill. Payment levels varied from 3 to 50 euro per year. Corresponding monthly amounts were shown at the same time between brackets.
The choice design hence results in the following conditional indirect utility form:

\[ V_{ij} = \alpha_i + \beta_{Flood}^{ij}Flood_{ij} + \beta_{Quality}^{ij}Quality_{ij} + \beta_{Price}^{ij}Price_{ij} + \epsilon_{ij} \quad (3) \]

In equation (3) alpha (\( \alpha \)) is the alternative specific constant (ASC) and the betas (\( \beta \)) refer to the vector of coefficients related to the attributes flood return period (Flood), water quality (Quality) and cost price (Price).

Choice behaviour is expected to be negatively related to the flood return variable (the lower the flood return period, the higher the probability of choosing a river restoration alternative resulting in this lower return period), and positively to the water quality variable (the higher the quality level, the higher the probability of choosing a river restoration alternative with a higher water quality). The cost price is expected to have a negative effect on choice behaviour (the higher the price of a river restoration alternative, the lower the probability of choosing the alternative). The inclusion of a monetary attribute allows for the estimation of monetary Hicksian welfare measures for different river restoration policy scenarios and changes in individual components of these scenarios (flood probabilities and water quality levels). The marginal rate of substitution (MRS) for a change in one of the river restoration attributes, for example flood return period, and ignoring country specific attribute values for the sake of simplicity, is estimated as follows (e.g. Hensher et al., 2005):

\[ MRS = -\frac{\partial V}{\partial Price} = -\frac{\hat{\beta}_1}{\hat{\beta}_3} \quad (4) \]

The MRS refers to the rate of substitution between income and the attribute of interest (e.g. flood probability), where the price attribute is interpreted as the marginal utility of income. The MRS in equation (5) equals in this case marginal willingness to pay (WTP) for a reduction in the flood return period.
Out of 6,000 choice occasions in the CE, the opt-out was chosen in 17 percent. Option A was chosen in 37 percent of all the choice occasions and option B in 46 percent of all choice occasions. Table 4.13 gives the estimation results from the MNL model. The “attribute only” model shows results when only the choice experiment attributes are included in the estimation. Dummy coding was used for the categorical water quality levels where water quality is the baseline category. A dummy coding was also used for flood frequency where the lowest flood return period (once every 5 years) is the baseline category. The flood attribute was included as 5, 25, 50 and 100. Hence a positive instead of a negative coefficient estimate is expected between the probability of choosing an alternative and flood frequency. A higher value means a lower flood frequency, resulting in a higher choice probability. A cardinal-linear coding was used for the monetary attribute.

All attributes are highly significant and have a positive sign (except price). The positive sign implies that respondents are willing to pay to reduce flood risk and to improve water quality. Price is negative and highly significant too and therefore also in accord with standard economic theory. The negative sign indicates that respondents prefer lower water bills. One very interesting finding is the lack of sensitivity to scope for different flood return periods. We did not find significant differences when we compared the parameter estimates for different flood return periods (1/25 versus 1/50: chi-square=0.01, sig. level=0.91548; 1/50 versus 1/100: chi-square=0.07, sig. level=0.79667; chi-square=0.02, sig. level=0.89823). Furthermore, respondents were asked to value a water quality improvement. The Wald test result for sensitivity to scope is distributed as chi-square with a value of 66.62 (p<0.001). Therefore we can reject the null hypothesis and conclude that, at the 99 % level of confidence, the slopes of the dummy variable parameters estimates are equal. This finding gives a strong evidence for sensitivity to scope for water quality.
Table 4-13: Multi-nominal model results – Simple Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coeff. (S. error)</th>
<th>p&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASC</td>
<td>-0.051 (0.111)</td>
<td>0.643</td>
</tr>
<tr>
<td>Price</td>
<td>-0.0182 0.003</td>
<td>0.001</td>
</tr>
<tr>
<td>Flood return period once every 25</td>
<td>0.424 (0.093)</td>
<td>0.001</td>
</tr>
<tr>
<td>Flood return period once every 50</td>
<td>0.435 (0.100)</td>
<td>0.001</td>
</tr>
<tr>
<td>Flood return period once every 100</td>
<td>0.407 (0.127)</td>
<td>0.001</td>
</tr>
<tr>
<td>Good water quality</td>
<td>0.952 (0.103)</td>
<td>0.001</td>
</tr>
<tr>
<td>Very good water quality</td>
<td>1.617 (0.103)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Log Likelihood -1907.992  
Adjusted R square 0.130  
N 2000

The estimated model can be used to estimate the willingness to pay for a change in one of the choice attributes. These are the implicit prices or marginal rates of substitution between the attributes (flood frequency, water quality) of interest and the monetary attribute (price). The implicit prices are reported in Table 4-14. These estimates indicate that, for example, respondents are willing to pay around 23 euro on top of their water bill to reduce the probability of floods. Furthermore, respondents are WTP 44.5 euro (75.3 euro) to improve water quality from moderate (status quo) to good (very good) water quality. These values are based on a ceteris paribus assumption, that is, all other parameters are held constant except the attribute for which the implicit price is being calculated.

Table 4-14: Estimates of implicit prices (in €)

<table>
<thead>
<tr>
<th>Mean (S. error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood return period once every 25</td>
</tr>
<tr>
<td>Flood return period once every 50</td>
</tr>
<tr>
<td>Flood return period once every 100</td>
</tr>
<tr>
<td>Good water quality</td>
</tr>
<tr>
<td>Very good water quality</td>
</tr>
</tbody>
</table>
The assumption of homogeneous preferences across attributes is considered too restricted and therefore interactions are introduced between attributes and individual respondent characteristics. Income is theoretically one of the most important variables. Household income is expected to significantly constrain choice behaviour in the case of a higher cost price. Lower income groups are less likely to be able to afford and hence choose a river restoration alternative with a higher price. Of interest here are also public perception of flood risks and water quality, and possible distance-decay effects. Respondent flood perception and experience are expected to increase the probability of choosing a river restoration alternative, which reduces the likelihood of flooding. A similar line of reasoning applies to respondent perception of water quality. Respondents who perceive current water quality as inadequate are expected to be more likely to choose river restoration, which improves water quality, than respondents who perceive current water quality as adequate. Distance-decay refers to the expected negative relationship between where the respondent lives relative to the river. Respondents living closer to the river are expected to attach more value to the benefits of river restoration than respondents living further away.
Table 4-15: Statistical best fit models – Expanded model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Basic MNL-model</th>
<th>MNL-model with interactions</th>
<th>RPL-model with interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean fixed effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASC</td>
<td>0.157 (0.098)</td>
<td>-0.026 (0.133)</td>
<td>0.846 (0.140)</td>
</tr>
<tr>
<td>Flood frequency</td>
<td>0.004 (0.001)</td>
<td>0.004 (0.001)</td>
<td>0.001 (0.001)</td>
</tr>
<tr>
<td>WQG</td>
<td>0.938 (0.103)</td>
<td>1.130 (0.139)</td>
<td>0.001 (0.134)</td>
</tr>
<tr>
<td>WQVG</td>
<td>1.587 (0.103)</td>
<td>1.492 (0.127)</td>
<td>0.001 (0.132)</td>
</tr>
<tr>
<td>Cost price</td>
<td>-0.021 (0.003)</td>
<td>-0.029 (0.005)</td>
<td>0.001 (0.001)</td>
</tr>
<tr>
<td>WQG x Perception</td>
<td>-0.009 (0.003)</td>
<td>0.002 (0.003)</td>
<td>-0.009 (0.003)</td>
</tr>
<tr>
<td>WQVG x Perception</td>
<td>-0.007 (0.002)</td>
<td>0.002 (0.002)</td>
<td>-0.008 (0.002)</td>
</tr>
<tr>
<td>WQG x Future visit</td>
<td>0.571 (0.243)</td>
<td>0.019 (0.245)</td>
<td>0.583 (0.250)</td>
</tr>
<tr>
<td>WQVG x Future visit</td>
<td>0.967 (0.213)</td>
<td>0.001 (0.214)</td>
<td>1.002 (0.224)</td>
</tr>
<tr>
<td>WQG x Distance</td>
<td>-0.004 (0.002)</td>
<td>0.020 (0.002)</td>
<td>-0.004 (0.002)</td>
</tr>
<tr>
<td>WQVG x Distance</td>
<td>0.0008 (0.001)</td>
<td>0.548 (0.001)</td>
<td>0.001 (0.001)</td>
</tr>
<tr>
<td>Cost price x Income</td>
<td>0.001 (0.0007)</td>
<td>0.059 (0.0007)</td>
<td>-0.030 (0.005)</td>
</tr>
<tr>
<td>Visitor</td>
<td>0.240 (0.134)</td>
<td>0.073 (0.138)</td>
<td>0.232 (0.138)</td>
</tr>
<tr>
<td>Education</td>
<td>0.445 (0.246)</td>
<td>0.070 (0.254)</td>
<td>0.469 (0.254)</td>
</tr>
</tbody>
</table>

Mean random effects
Cost price x income
Standard deviation
Cost price x income

Model fit
Log Likelihood
Adjusted R square
N

Preference heterogeneity was accounted for by including interaction terms between respondent characteristics and the attributes or the ASC. Part of the unobserved heterogeneity was picked up through the inclusion
of random variables in the stochastic part of the estimated utility functions. Random effects were detected for the price attribute and household income. Table 4-15 presents the statistically best fit MNL-model and a random parameter mixed Logit.

Respondent perception of current water quality had a significant effect on the value attached to water quality improvements. The same applies for future use, i.e. whether respondents would visit the case study sites more often if water quality would be improved. In the first case, a negative relationship exists, meaning that respondents who perceive water quality as good already value a water quality improvement less. In the latter case a significant positive effect on choice behaviour is found: respondents who said they would visit more often if water quality would be improved are more likely to pay for ecological restoration benefits if water quality improves in one of the CE alternatives than respondents who said the frequency of visiting the study area would not change as a result of water quality changes. A significant distance-decay effect was found if water quality is improved to a goods status, but not for a very good status.

Household income interacts significantly with the cost price. As expected, higher income groups are more likely to choose river restoration as their most preferred option at a higher price than lower income groups. The standard deviation of the interaction term shows that the random effect is statistically significant, implying that choices are clustered in and around the different income categories distinguished in the survey. The random effect explains the variation between these clusters. In other words, income groups behave differently in the CE. The same applies for the cost price. Also here respondents choose differently and are clustered around the four price levels introduced in the CE. Finally, respondents who visited the study area before and higher educated respondents are more likely to favour ecological restoration as their interaction with the ASC shows.

Based on the statistically best fit model, a number of policy scenarios were simulated and their welfare implications estimated, where both flood frequency and water quality are changed simultaneously. The estimated welfare measures for five different policy scenarios are presented in Table 4-16. Two policy scenarios involve the improvement of water quality to a good ecological status, with flood variations of once every 25
and 50 years, while three policy scenarios involve water quality improvements up to a very good ecological status with flood probability reductions varying from once every 25 years to once every 100 years.

Table 4-16: Welfare Measures policy scenarios

<table>
<thead>
<tr>
<th>Policy scenario</th>
<th>CS (€/household/year)</th>
<th>S. error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (flood 1/25; water quality good)</td>
<td>52.60</td>
<td>8.42</td>
</tr>
<tr>
<td>2 (flood 1/50; water quality good)</td>
<td>56.25</td>
<td>8.73</td>
</tr>
<tr>
<td>3 (flood 1/25; water quality very good)</td>
<td>67.01</td>
<td>9.92</td>
</tr>
<tr>
<td>4 (flood 1/50; water quality very good)</td>
<td>70.66</td>
<td>10.26</td>
</tr>
<tr>
<td>5 (flood 1/100; water quality very good)</td>
<td>77.95</td>
<td>11.23</td>
</tr>
</tbody>
</table>

The CS welfare measures for the policy scenarios increase gradually, but significantly based on the two one-sided equivalence test (TOST), using a 5 percent confidence level and 20 percent equivalence bound. This applies to the reduction in flood frequency (keeping water quality constant) (e.g. 56.2 euro versus 52.6 euro), the increase in water quality (keeping flood frequency constant) (e.g. 67.0 euro versus 52.6 euro) and combinations hereof (e.g. 77.9 euro versus 56.2 euro). The standard errors of the CS were estimated using the Delta method (Greene, 2003).

4.7 Public willingness to pay for ecological restoration

After the choice experiment, respondents were asked to additionally value management options for the “Donau-Auen National Park” (the area east of Vienna along the Danube River to the Slovakian-Austrian border). Due to methodological complexities, the choice experiment did not include benefits for nature conservation due to a higher connectivity of the river with adjacent floodplains and forests. One major issue in the national park is to allow for natural processes such as flooding, change of landscapes, new pioneer habitats, also for destruction of habitats. The ecological principle may be described by introducing natural (hydrological) dynamics.
The wording of the questionnaire (see appendix) stressed the extent to which a river restoration program may be able to introduce hydrological dynamics to the wetlands in terms of the percentage of the area connected to the river in a dynamic (i.e. fast changing and direct link) way.

Half of respondents were asked for their willingness-to-pay (WTP) for a program that would transform 50 percent of wetland area to a natural state, while the other half was asked for their WTP for a 90 percent transformation. Figure 9 shows the distribution of respondents’ WTP bids for the two scenarios asked for in the questionnaire. At first sight, the two scenarios are almost equally valued by respondents in terms of their WTP.

Figure 9: WTP bids (EUR) for the two river restoration scenarios

For scenario I (50 percent transformation of wetlands), mean WTP lies around 27.39 euro per person (std. deviation 49.40 euro, median value 8 euro). For scenario II, respondents are willing to pay 28.55 euro on average (std. deviation 52.39 euro; median value 5 euro). For the pooled sample, mean WTP lies around 27.96 euro (std. deviation 50.84 euro; median value 6 euro). A simple independent t-test does not exhibit a significant difference between respondents’ willingness-to-pay for the different scenarios.
Table 4-17: Average WTP for river restoration measures (EUR/year)

<table>
<thead>
<tr>
<th>Scenario I (50 percent)</th>
<th>Scenario II (90 percent)</th>
<th>Pooled sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean WTP</td>
<td>27.39</td>
<td>28.55</td>
</tr>
<tr>
<td>Standard error</td>
<td>3.25</td>
<td>3.51</td>
</tr>
<tr>
<td>95% conf. interval</td>
<td>20.96 / 33.80</td>
<td>21.62 / 35.48</td>
</tr>
<tr>
<td>Median</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>N</td>
<td>230</td>
<td>222</td>
</tr>
</tbody>
</table>

Regarding the respondents’ experience of recreation in the Danube floodplains, a t-test again did not exhibit any significant differences even though mean WTP of visitors (about 31 euro) seems to be higher than that of non-visitors (about 27 euro). However, the standard deviation is too large and the sample size too small to exhibit statistically significant differences between these two groups. (In the econometric estimations, this result is basically corroborated; see section 4.7.2).

4.7.1 Reasons why respondents are not willing to pay

Table 4-18 displays the reasons for respondents to state a WTP of Zero. Among “other reasons”, respondents stated that those responsible and/or who benefit from the Danube’s current shape (shipping, hydro power) should pay. Table 4-19 presents respondents’ preferred payment vehicles for river restoration contributions. Mostly, respondents would prefer to pay via the water bill, while other options such as donations or earmarked contributions receive much less acceptance. Taxes are unpopular and preferred only by a small group of respondents. The number of protest bids in our sample was very low, around 2%.

Table 4-18: Reasons for WTP=0

<table>
<thead>
<tr>
<th>Reason</th>
<th>No. of responses</th>
<th>% (n=506)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not interested in this issue</td>
<td>8</td>
<td>1.58</td>
</tr>
<tr>
<td>The current situation is satisfying for me</td>
<td>7</td>
<td>1.38</td>
</tr>
<tr>
<td>I cannot afford additional expenditure</td>
<td>13</td>
<td>2.57</td>
</tr>
<tr>
<td>Other things are more important</td>
<td>8</td>
<td>1.58</td>
</tr>
<tr>
<td>Other reasons</td>
<td>5</td>
<td>0.99</td>
</tr>
</tbody>
</table>
Table 4-19: Preferred payment vehicles for contributions to river restoration

<table>
<thead>
<tr>
<th>Contributions for river restoration should be paid preferably through</th>
<th>No. of responses</th>
<th>% (n=506)</th>
</tr>
</thead>
<tbody>
<tr>
<td>communal taxes</td>
<td>47</td>
<td>9.29</td>
</tr>
<tr>
<td>income taxes</td>
<td>22</td>
<td>4.35</td>
</tr>
<tr>
<td>donations</td>
<td>62</td>
<td>12.25</td>
</tr>
<tr>
<td>a fee indicated on the water bill</td>
<td>215</td>
<td>42.49</td>
</tr>
<tr>
<td>a one-off donation to an earmarked restoration fund</td>
<td>62</td>
<td>12.25</td>
</tr>
</tbody>
</table>

Table 4-20 presents respondents’ agreement to five statements concerning environmental policies; the highest commitment can be found with a general statement regarding the importance of nature conservation for “our children”, followed by the agreement to the polluter-pays-principle (both around 70 %). The highest rejection rate can be found with the statement that the environment would have to be conserved regardless of the cost for society (rejection rate around 17 %).

Table 4-20: Agreement to or rejection of statements by respondents regarding environmental protection

<table>
<thead>
<tr>
<th></th>
<th>Agree completely</th>
<th>Agree somewhat</th>
<th>Reject somewhat</th>
<th>Reject completely</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polluters of the environment should pay first</td>
<td>352 (69.57%)</td>
<td>115 (22.73%)</td>
<td>20 (3.95%)</td>
<td>4 (0.79%)</td>
<td>15 (2.96%)</td>
</tr>
<tr>
<td>It is the task and responsibility of public policy to care for the protection of rivers</td>
<td>230 (45.45%)</td>
<td>216 (42.69%)</td>
<td>37 (7.31%)</td>
<td>10 (1.98%)</td>
<td>13 (2.57%)</td>
</tr>
<tr>
<td>It is important to conserve and improve river landscapes for our children and future generations</td>
<td>381 (75.30%)</td>
<td>104 (20.55%)</td>
<td>9 (1.78%)</td>
<td>4 (0.79%)</td>
<td>8 (1.58%)</td>
</tr>
<tr>
<td>The environment has the right to be protected regardless of the cost for society</td>
<td>186 (36.76%)</td>
<td>219 (43.28%)</td>
<td>68 (13.44%)</td>
<td>19 (3.75%)</td>
<td>14 (2.77%)</td>
</tr>
<tr>
<td>The environment has to be protected by law, and not only in the case when people are willing to pay for it</td>
<td>297 (58.70%)</td>
<td>155 (30.63%)</td>
<td>32 (6.32%)</td>
<td>8 (1.58%)</td>
<td>14 (2.77%)</td>
</tr>
</tbody>
</table>
4.7.2 Determinants of WTP for river restoration and wetland dynamics: contingent valuation

Question 29 of the questionnaire asked for respondents’ willingness-to-pay for a river restoration project that would connect different areas of the Danube floodplains to the main stream of the Danube river. The question included about half a page of description of the measures and the impact of this river restoration project.

In order to find out whether respondents were sensitive to the scope of the project, respondents were randomly presented with one of two scenarios. Taking the status quo of about 25 percent of wetlands in the Donau-Auen National Park directly connected to the main stream of the Danube River, respondents were asked for their willingness-to-pay (WTP) for one of the following scenarios:

- Connection of 50 percent of wetlands to the Danube River;
- Connection of 90 percent of wetlands to the Danube River.

From an ecological perspective, introducing hydrological dynamics on 50 percent of the area is already a very good state, but 90 percent would underline the characteristics of the national park as wetlands and floodplains park even more.

In order to test for the validity of the survey, as well as explore the determinants of respondents’ WTP, a number of econometric approaches were tested regarding reliability and statistical fit. Based on the kind of question posed, and the elicitation instrument, a Tobit estimation proofed to achieve the most robust results.

For each valuation question there are a number of "zero" responses, i.e. respondents stating a zero WTP. These responses should, without any further information, be treated as "true zeros" since we can not rule out a WTP equal to zero. The Tobit model accounts for censored (truncated data) and can be written as follows (e.g. Maddala, 2003):

\[
WTP_i = \begin{cases} 
  WTP_i^* = \alpha + \beta X_i + \varepsilon_i & \text{if } WTP_i^* > 0 \\
  0 & \text{if } WTP_i^* \leq 0
\end{cases}
\]

\[
\varepsilon_i \sim N(0, \sigma^2)
\]

where \(WTP_i^*\) is the latent variable of individual i’s willingness to pay, \(X_i\) is a vector of explanatory variables and the error term \(\varepsilon_i\) is assumed to be normal distributed with zero mean and variance \(\sigma^2\). The model uses maximum-likelihood estimation for computing the empirical results.
Table 4-21: Results of the multivariate Tobit regression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Est. 1</th>
<th>Est. 2</th>
<th>Est. 3</th>
<th>Est. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.50 1.82*</td>
<td>1.38 1.67*</td>
<td>1.40 1.69*</td>
<td>0.90 1.10</td>
</tr>
<tr>
<td>Income (EUR)</td>
<td>0.19 1.66*</td>
<td>0.19 1.72*</td>
<td>0.20 1.76*</td>
<td>0.23 1.97**</td>
</tr>
<tr>
<td>Age (mean of age group)</td>
<td>-0.03 -4.55***</td>
<td>-0.02 -4.41***</td>
<td>-0.02 -4.44***</td>
<td>-0.02 -4.41***</td>
</tr>
<tr>
<td>Education (=1 for college/university)</td>
<td>0.64 2.43**</td>
<td>0.62 2.35**</td>
<td>0.63 2.39*</td>
<td>0.60 2.27**</td>
</tr>
<tr>
<td>Self reported distance (in km from Danube)</td>
<td>-0.01 -1.97**</td>
<td>-0.01 -1.93*</td>
<td>-0.01 -1.92*</td>
<td>-0.01 -1.92*</td>
</tr>
<tr>
<td>Perceived water quality (=1 for good/very good water quality)</td>
<td>0.31 1.68*</td>
<td>0.30 1.62*</td>
<td>0.32 1.70*</td>
<td>0.28 1.48</td>
</tr>
<tr>
<td>Flood experience (=1 for personal experience with floods)</td>
<td>0.38 1.61*</td>
<td>0.38 1.62*</td>
<td>0.38 1.65*</td>
<td>0.42 1.78*</td>
</tr>
<tr>
<td>Future visit (=1 for plans to visit Danube NP in the future)</td>
<td>0.37 1.63*</td>
<td>0.36 1.56</td>
<td>0.33 1.44</td>
<td></td>
</tr>
<tr>
<td>Scenario (=1 for 90% scenario)</td>
<td></td>
<td></td>
<td>-0.16 -1.01</td>
<td></td>
</tr>
<tr>
<td>Vienna (=1 for Viennese respondents)</td>
<td></td>
<td></td>
<td></td>
<td>0.25 1.53</td>
</tr>
<tr>
<td>Visitor (=1 for current regular visitors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donation (1=yes)</td>
<td>0.25 1.44</td>
<td>0.37 1.94*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.E. of regr.</td>
<td>1.42</td>
<td>1.42</td>
<td>1.42</td>
<td>1.42</td>
</tr>
<tr>
<td>Log likel.</td>
<td>-661.95</td>
<td>-660.62</td>
<td>-660.11</td>
<td>-661.31</td>
</tr>
</tbody>
</table>

Table 4-21 continued:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Est. 5</th>
<th>Est. 6</th>
<th>Est. 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.37 1.65*</td>
<td>1.34 1.63*</td>
<td>1.15 1.40</td>
</tr>
<tr>
<td>Income (EUR)</td>
<td>0.20 1.71*</td>
<td>0.20 1.72*</td>
<td>0.21 1.82*</td>
</tr>
<tr>
<td>Age (mean of age group)</td>
<td>-0.03 -4.60***</td>
<td>-0.03 -4.63***</td>
<td>-0.03 -4.58***</td>
</tr>
<tr>
<td>Education (=1 for college/university)</td>
<td>0.59 2.20**</td>
<td>0.62 2.35**</td>
<td>0.58 2.12**</td>
</tr>
<tr>
<td>Self reported distance (in km from Danube)</td>
<td>-0.01 -1.42</td>
<td>-0.01 -1.91*</td>
<td></td>
</tr>
<tr>
<td>Perceived water quality (=1 for good/very good water quality)</td>
<td>0.28 1.58</td>
<td>0.30 1.60</td>
<td>0.27 1.46</td>
</tr>
<tr>
<td>Flood experience (=1 for personal experience with floods)</td>
<td>0.35 1.53</td>
<td>0.35 1.50</td>
<td>0.35 1.48</td>
</tr>
<tr>
<td>Future visit (=1 for plans to visit Danube NP in the future)</td>
<td>0.35 1.55</td>
<td>0.34 1.50</td>
<td>0.35 1.55</td>
</tr>
<tr>
<td>Scenario (=1 for 90% scenario)</td>
<td></td>
<td></td>
<td>-0.16 -1.01</td>
</tr>
<tr>
<td>Vienna (=1 for Viennese respondents)</td>
<td></td>
<td></td>
<td>0.25 1.53</td>
</tr>
<tr>
<td>Visitor (=1 for current regular visitors)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donation (1=yes)</td>
<td>0.29 1.44</td>
<td>0.37 1.94*</td>
<td></td>
</tr>
<tr>
<td>S.E. of regr.</td>
<td>1.42</td>
<td>1.42</td>
<td>1.42</td>
</tr>
<tr>
<td>Log likel.</td>
<td>-659.59</td>
<td>-659.21</td>
<td>-660.59</td>
</tr>
</tbody>
</table>

Tobit estimation, n=371, ***p<0.01, **p<0.05, *p<0.1
As discussed before in section 4.6, determinants of WTP may depend on respondents’ income, education, distance of the residential area to the Danube River, and perception of the water quality. Table 4-21 presents the results of Tobit estimations which again highlight the importance of income, education and distance. The table includes 7 different estimations that test for a number of potentially influential variables on WTP.

The income variable is significantly correlated with respondents’ WTP bids, with a higher household income leading to an increased WTP bid. Furthermore, higher education (college or university) leads to increased WTP, while the distance-decay effect can be detected with decreasing WTP with a larger distance to the Danube River. The age of respondents (mean of age group, in years) proved to exhibit the largest single explanatory power of WTP, with younger respondents indicating a larger WTP.

Two variables related to water quality and personal experience of floods might as well have some influence on WTP. While the sign of the coefficient can be expected – a higher quality perception and personal flood experience leading to a larger WTP – the significance of these two variables is around 10% and changes slightly to insignificance when other variables are introduced. Respondents living in areas near the Danube River are also those who exhibited a higher WTP. This distance-decay effect is clearly corroborated by the econometric estimations. However, there is some overlap with the dummy variable Vienna (indicating respondents living in Vienna, and therefore close to the Danube River). Including the Vienna variable to the estimation (and leaving out the distance variable) does not improve the estimation. Thus, the “original” estimation (Est. 1) is preferred compared to Est. 4.

While the current estimated model indicates a high validity of the survey (e.g. income sensitivity, distance-decay effect), a problem arises due to insensitivity of scale (scope). Two sub-samples of respondents were asked for their WTP to contribute to a 50% or 90% program, respectively. The scenario variable (Est. 3) has the “right sign” (respondents confronted with the smaller program are willing to pay less), but the coefficient is not statistically significant on a reasonable level. Reasons for this failure to provide evidence of sensitivity to scale may be found in the notion that respondents apparently considered the two programs to be equal. Alternatively, a 50% program might include benefits for recreation as well as for the ecology of the wetlands, while the higher ecological benefits of a 90% program might be offset by a reduction of recreation
benefits. There is also some evidence on respondents who plan to visit the area in the future, or visited the area before, indicating a higher WTP.

We tested for a number of additional variables potentially influential on WTP. In particular, we were unable to detect a significant influence of respondents being members of environmental organizations, donating to environmental causes, respondents with kids, well-informed respondents, and agreement to several statements (such as, that the public should pay for such programs).

4.8 Total economic value for river restoration using a GIS based value map

A final step in the welfare estimation procedure is the aggregation of the estimated CS across the population benefiting from the welfare gains associated with the presented river restoration policy scenarios to arrive at a total economic value (TEV). This step often receives most criticism when using non-market valuation study results in a CBA. The population of beneficiaries over whom the CS values are added up may result in very high values depending on the chosen market size. The market size usually refers to some administrative unit or geographic jurisdiction, and average values are transferred unconditionally and uncorrected across the population living within this geographical unit (e.g. Bateman et al., 2006). In view of the fact that the population from which the samples in this study were drawn and their characteristics such as their income levels are unevenly distributed over space, the aggregation procedure is carried out using a Geographical Information System (GIS).

In GIS, information about land and water cover and population density disaggregated from the 2000 European CORINE Land Cover database (inhabitants per km2 in 100 x 100 m grid cells) was combined with NUTS-3 level information about per capita income. Euclidian distances were calculated per 100 by 100m grid cell to the main Danube river in meters. The spatial data sources used are listed in the annex to this paper. The 100 meter population density grid of the European Environment Agency (EEA) data service was used as the information source for population density, because of its EU-wide extent and high horizontal

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2 The Nomenclature of Territorial Units for Statistics (NUTS) is a breakdown of territorial units to harmonize regional European statistics, consisting of three levels. NUTS-3 is the lowest aggregation level, and usually follows a European member state’s own regional administrative structure (e.g. provinces in Austria).
resolution (100 x 100 meter cells). The downscaling method applied to produce this grid is described in an unpublished paper available on the EEA data service website (Gallego, 2008). The various steps in the aggregation procedure are summarized in Table 4-22.

Table 4-22: Steps in the GIS based aggregation procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conversion CS/household/year to per capita values based on each sample’s average household size</td>
<td>CS/capita/year</td>
</tr>
<tr>
<td>2</td>
<td>Conversion of population density to number of inhabitants per 100x100m grid cell</td>
<td>Number of inhabitants/grid cell</td>
</tr>
<tr>
<td>3</td>
<td>CS/capita/year multiplied with number of inhabitants per 100x100m grid cell</td>
<td>Unadjusted TEV/grid cell</td>
</tr>
<tr>
<td>4</td>
<td>Income factor multiplied with the difference (sample income/capita – NUTS-3 income/capita) per grid cell and multiplied with the number of inhabitants per grid cell</td>
<td>Income adjusted TEV/grid cell</td>
</tr>
</tbody>
</table>
| 5    | a) Distance decay factor multiplied with the distance of each grid cell from the Danube river and multiplied with the number of inhabitants per grid cell  
   b) Subtraction a) from income adjusted TEV/grid cell | Distance adjusted TEV/grid cell |
| 6    | Summation income and distance adjusted TEV/grid cell across all grid cells | TEV/year |

In the first three steps, the average values for reaching good and very good water quality with the help of river restoration were converted to per capita values (based on each sample’s average household size), and multiplied with the number of people in each 100 by 100m grid cell. In a fourth step, for each grid cell average per capita income was determined based on the specific geographical NUTS-3 area to which a grid cell belonged. This average per capita income was subtracted from mean per capita income in the sample and multiplied with the estimated income coefficient for each basin country and the number of people for each specific cell. In this way, the economic value per grid cell was modified downwards or upwards depending on the income difference (in cells where no people live, the value was set equal to zero). In a fifth step, the distance of each grid cell to the Danube river was used to correct the income adjusted total economic value.

The accuracy of this dataset on NUTS 3 level was tested for Austria by calculating the average population density of this grid per NUTS3 area and comparing the result with the 2002 EPSON population density statistics, which are given by NUTS 3 area for EU countries. This comparison showed, on average, a 1.8% population density difference between the two datasets for all NUTS 3 areas in Austria, with a maximum difference of 6.5% for a single NUTS 3 region.
per grid cell from the previous step for the significant distance-decay effects detected in each basin country. The estimated distance-decay factor was multiplied by the calculated distance of each grid cell from the river with the estimated distance-decay factor and multiplied by the number of people and the result subsequently subtracted from the economic value calculated in the previous step (as in the previous step, negative values were set equal to zero). In a sixth and final step, the income and distance adjusted values are added up to estimate the TEV of river restoration to good and very good water quality. The results are presented in Table 4-23.

Table 4-23: Estimated total economic value (TEV) in million Euro per year for good and very good water quality in the Danube river basin based on different aggregation procedures

<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole country</td>
<td>136.3</td>
<td>186.6</td>
</tr>
<tr>
<td>83 km zone (no distance and income correction)</td>
<td>53.9</td>
<td>73.8</td>
</tr>
<tr>
<td>Corrected for distance-decay within 83 km zone</td>
<td>46.3</td>
<td>-</td>
</tr>
<tr>
<td>Distance &amp; income correction</td>
<td>41.9</td>
<td>-</td>
</tr>
<tr>
<td>Market size (km)*</td>
<td>83</td>
<td>-</td>
</tr>
</tbody>
</table>

*Distance where value reduces to € 0.

The TEV is calculated for two policy scenarios: improvement of water quality in the Danube river to good and very good conditions (keeping flood conditions constant). TEV adjusted for the estimated distance and income effects is furthermore compared with unadjusted TEV. Under the assumption that the population sample and the estimated CS per capita represents the population at large, a TEV is calculated for each river basin country as a whole (first row in Table 4-23) and for the area where the economic value reduces to zero due to the estimated distance-decay effects (second row in Table 4-23). Distance-decay was included as an interaction term with good and very good water quality, but only statistically significant for good water quality. For this reason, the TEV for very good water quality has no distance correction. The two values for very good water quality in Table 4-23 refer to the country as a whole. TEV is only adjusted for income differences in this case.

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4 In order to be able to account for income differences, household income was included as an interaction term with the ASC in a reduced functional form of the covariate models presented in Table 4-15, including the attributes, distance-decay and income as the sole explanatory variables.
The boundaries of the ‘market size’ are found by dividing the economic value of a policy scenario by the distance-decay factor, i.e. the decrease in marginal WTP per kilometre. Also for this area an uncorrected and for income and distance adjusted TEV is calculated (third row in Table 4-23) the estimated market size, while in the latter case average CS is adjusted for distance-decay and income differences within the market boundaries. The latter is illustrated for Austria in Figure 10.

*Figure 10: Illustration of the market size and distance-decay effect – Correction per km distance to Danube*

Important observations from Table 4-23 are, first of all, the big differences between the TEV based on the country as a whole and the market sized determined by the estimated distance-decay effects. In Austria the TEV for good water quality reduces by 66 percent. Secondly, accounting for distance-decay and income variation within the boundaries of the market size reduces the TEV by approximately another 3 percent in

*Source: Provided by IVM*
Austria. The combined effect of distance-decay and income variation on the TEV is illustrated in Figure 11. The figure clearly shows the effect of population density on TEV. The aggregated TEV is highest in and around Vienna, where most people live, directly at the Danube river. Note that the northern and eastern boundary of the Austrian market is still defined by the country’s administrative boundary. Given the differences found between Austria, Hungary and Romania, a similar valuation study in the Czech Republic and Slovakia would be needed to test the legitimacy of extending the boundaries.

*Figure 11: Illustration of the TEV for good water quality*

*Source: Provided by IVM*
5. Conclusions and best practice recommendations

The main objective of the work package 4 (WP4) in the AquaMoney project, which this pilot case study report is part of, is to test the practical guidelines for assessing WFD related environmental economic values in representative European river catchments. The Austrian survey was carried out in November 2007 as part of the international “Danube group”- consisting of Austria, Romania and Hungary. All three Danube pilot case study reports focus on the estimation of non-market benefits of ecological restoration of modified river stretches along the Danube. The Austrian case study area is the Donau-Auen National Park located east of Vienna.

In the survey people were asked for their attitudes, expectations, perceptions, preferences and values for ecological river restoration. In order to access peoples perceptions associated with river restoration measures a choice experiment was developed. The choice experiment design was focused on two attributes, namely water quality and flood frequency. It was debated intensely whether one of the main effects of river restoration (e.g. ecological dynamics, biodiversity) should also be integrated into the choice sets. In order to avoid correlations between attributes when including both the river restoration measures (e.g. connecting the floodplains to the main stream of the Danube river) and its effects on flood frequency and water quality in one and the same design respondents were asked not to value river restoration measures per se. Complementarily a contingent valuation was included in the questionnaire asking respondents about their willingness to pay for increasing the size of natural areas along the river - from the actual situation to an enlarged and ecologically enhanced situation. Thus we used a “combined” approach applying two different stated preference methods simultaneously to address several aspects of ecological river restoration in one and the same questionnaire.

The choice experiment results presented in this report show that people display strong preferences toward improving the water quality in the Danube from moderate to good or very good. Furthermore respondents are willing to pay for a reduction of the flood return period. The estimated MNL-model provides strong evidence for sensitivity to scope for water quality but not for flood risk reduction. Furthermore, preference heterogeneity was accounted for by including interaction terms into the RPL-model. We find a significant effect of re-
spondents perception of current water quality and future use attitudes (future visits) on the value attached to water quality improvements. Moreover, distance-decay effects were found for water quality improvements and, as expected, higher income groups are more likely to contribute to ecological river restoration measures.

Basically, the contingent valuation result shows a high public willingness to pay for ecological restoration. More than 90 percent of respondents are willing to contribute to ecological river restoration measures and the share of protest bidders was very low. Average WTP for the different scenarios is between 27.39 for scenario I and 28.55 for scenario II. Contrary to our a-priori expectation we could not find significant sensitivity to scope in the WTP results. Hence, respondents apparently considered the two scenarios to be equal. The multivariate Tobit regression presented here indicated which factors have a significant impact on the stated WTP. As expected, the self reported distance is slightly significant and has the expected negative sign. Thus, people living further away from the Danube are less likely to pay for ecological river restoration.

On the basis of our experiences and results presented in this report we can conclude with some recommendations for best practices:

- In the survey we applied two different stated preference methods simultaneously to address several aspects of ecological river restoration. The estimated non-market values can be used, together with potential market benefits such as the avoided costs of flood damage or water purification, to justify investments in the already existing Danube national park to achieve the environmental and ecological objectives of the WFD based on economic welfare considerations. These projects are expected to provide a double dividend on the necessary investments to transform river stretches in their original natural conditions, as they restore the natural floodwater storage capacity of the river and hence reduce flood risks and improve water quality at the same time.

- The design of the CE (choice experiment) proved to be crucial for the success of the valuation exercise. Regarding this issue, a couple of important aspects were raised:
  - Inclusion of attributes: While the number of attributes (flood frequency, water quality, price) had to be restricted in order to present respondents options which they could handle in a con-
crete survey situation, it is questionable whether all relevant attributes of river restoration projects are included. For instance, one of the main ecological impacts of river restoration is to re-introduce ecological dynamics to the wetlands adjacent to the main stream of the river, such as pioneer habitats, biodiversity (species) conservation, and landscape diversity (changing landscapes). Due to problems in operationalising these attributes and potential correlation between attributes (e.g. water quality and species richness), an important recommendation follows: For designing choice sets, it is crucial to keep the number of attributes low and plausible (reasonable) for respondents in order to minimize protest bids, and increase the reliability of respondents’ choices.

- A critical issue was to use the same experimental design for three different case studies (Austria, Hungary, Romania) while the status quo is not exactly the same in all three countries. The strict Austrian Water Act regulates that pollutant loads to water have to be restricted as much as possible to account for the actual technological state of the art. Therefore, poor water quality was excluded from the design because it was unrealistic for Austria (and Hungary). In the case of Romania it might be possible to argue for poor water quality. In order to implement the same experimental design it was indispensable to compromise and restrict the attribute levels. It was also difficult to define a current (common) level for flood risk and to find maps for flood risk in order to show spatial differentiation in risks.

- When we attempted to assemble the choice sets and cards we realized that there were a lot of unreasonable cards. For example, there are some obvious cases where respondents cannot choose in reality a better option, or there were some options in which there are worse situations with higher prices. Hence, the design of the experiment is a trade off between an “ideal” orthogonal design and “realistic” combinations between attributes and levels. In order to avoid “dominant” choice sets (if certain combinations make no sense) we carefully changed alternatives between choice sets.
• Pictograms together with a short explanatory text were used to illustrate different water related functions and water quality levels. In order to indicate if an environmental function is completely absent/impossible or if the function in question is possible, but at some risk or under less than ideal circumstances, a strong cross and alternatively a lighter grey cross was used. The idea was that, for example, some aquatic life is possible under moderate but far from ideal circumstances and a light grey cross might help to indicate this (e.g. to differentiate between water fish that can be consumed and fish that cannot). In some cases this distinction may be ambiguous and it is important to explain what exactly the difference is between a strong and a light cross. For example, we used a swimming pictogram which indicated how safe it is to swim. Someone might argue that you can either swim in a place or cannot and therefore swimming is not a continuous variable. Thus in the explanatory text we had to explain that it is a sliding scale, because there exist various risk levels (e.g. health problems are to a large extent related to bacteria or algal blooms have a strong correlation with these health effects). Suitable thresholds for certain water functions and activities are associated with the introduction of pictograms. These thresholds are subjective to a certain degree and cultural differences can exist between different countries. Moreover, pictograms can simplify the dimension of the value of water quality.

• In order to increase realism, respondents were shown existing river restoration plans on a map. The same map was used in the three case study applications (Austria, Hungary and Romania), i.e. a 2000 CORINE land cover map at a 1:100,000 scale, displaying the main level 3 ecosystem types (e.g. human settlements, agriculture, forests and meadows, wetlands and freshwater ecosystems). We used already existing CORINE land cover map (files) for the questionnaire and we did not create special river restoration maps showing more detailed environment-related issues. The CV method consisted of asking respondents about their willingness to pay for increasing the size of natural areas along the river - from the actual situation to an enlarged and ecologically enhanced situation. Respondents were told that plans exist for the restoration of half (alternatively 90 %) of the modified river banks. The maps covered a relatively large area and it was difficult for respondents to identify if their village/settlement would be affected by restoration measures.
• CV: In order to account for significant differences in the WTP for the certain dimensions of river restoration measures, we introduced two different scenarios. Respondents were told that plans exist to restore half and alternatively 90 percent of the modified river banks back to a near-natural state. While a 50 percent scenario may be plausible (from a technological and ecological point of view), a 90 percent scenario may have severe impacts on other issues such as reducing recreation possibilities, and substantially reduced ship navigation (which may be contrary to international treaties such as the Danube Navigation Convention). While credibility of a scenario has to be assured through appropriate wording of the scenarios, it should not diverge too much from actual and legal foundations.

• The sample for the main survey was segmented between people living in Vienna and Lower Austria. The sample was divided into two groups and a random sample of each group was selected. Sample representativeness was guaranteed by a survey company with respect to socio-economic characteristics (gender, age etc.) but we could not control spatial distribution. Therefore we were confronted with an asymmetric spatial distribution. In order to ensure a representative (spatially balanced) sample across water bodies (substitutes) and across river basins one option would be to divide a region into zones, randomly select a set of zones, and then survey households within the selected zones.

• Based on the CE results, a total economic value (TEV) for ecological river restoration measures was determined. The aggregation was carried out using a Geographical Information System (GIS). First an unconditional and uncorrected TEV was calculated for two policy scenarios. After that the distance-decay and income effect was included in the aggregation procedure. The results show a big difference between the TEV based on the country as a whole and the adjusted TEV determined by the estimated distance-decay effect. Therefore a conservative TEV can be determined by taking into consideration the distance-decay effect that leads to a considerable reduction of the “market size”.

• The main survey was carried out in November 2007 and 1,977 people were invited to participate. For certain recreation options, the Danube River is indeed a major area for residents of Vienna and
Lower Austria. The most important recreation activities are enjoying the landscape and hiking along the river, swimming or observing wildlife. Hence, the main survey was conducted right after the “hiking season” and many respondents could remember their last visit in the national park. Therefore, it is recommended to survey right after a “use season” to improve recall rates.
6. Appendix: English questionnaire

General Perception/Attitude related questions:

1. Where do you live? Postal code:

2. Are you a member of a nature or environmental organization? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Do you regularly donate money to any nature or environmental organization? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Yes</th>
<th>☐</th>
<th>☐</th>
<th>☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

(please make a best guess if you don’t know the exact amount)

4. How interested are you generally in the environment? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Not interested at all</th>
<th>Not so interested</th>
<th>Interested</th>
<th>Very interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

5. Do you have your own well? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

→ GO TO Q7

6. If yes, what do you use the well water for?

| drinking | ☐ |
| washing  | ☐ |
| cooking  | ☐ |
| doing laundry | ☐ |
| washing dishes | ☐ |
| washing your car | ☐ |
| irrigation | ☐ |
| other (please specify) | ☐ |

| .................................................. | ☐ |
7. Is your household connected to the sewage network?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ → GO TO Q9</td>
<td>☐</td>
</tr>
</tbody>
</table>

8. Do you have the possibility to connect to the sewage network?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

9. Does your household use a cesspool?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐ → GO TO Q11</td>
</tr>
</tbody>
</table>

10. How often is your cesspool drained?

   ONCE EVERY____YEAR

I’m now going to ask you some questions about the Donau-Auen National Park.

11. How often do you visit the Donau-Auen National Park average per year? [PLEASE TICK AS APPROPRIATE]

| I never visit Donau-Auen national park | ☐ |
| I visit it at least once a week | ☐ |
| I visit it at least once a month | ☐ |
| I visit it at least 4 times a year | ☐ |
| I visit it at least once a year | ☐ |
| I visit it less than once a year, namely once every … years | ☐ |

12. How far do you live (km as the crow flies) from the nearest recreational area in the Donau-Auen National Park? Please make a best guess, if you don’t know the exact distance!

   ___ km
13. This card lists a number of possible recreational activities at the Donau-Auen National Park. For each of them, can you please tell me how frequently you do any of these? [PLEASE CIRCLE ANSWER]

<table>
<thead>
<tr>
<th>Activity</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational fishing / Angling</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Swimming / bathing</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Recreational boating / sailing</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Walking along the river banks / hiking</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other sporting activity along the river banks</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Relaxing and enjoying the scenery</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Watching wildlife (e.g. birds)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Picnicking near the river</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Visiting a riverside cafe / restaurant</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Dog walking</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Spending leisure time with children</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

14. Can you tell me what you think about the water quality in the Danube?

<table>
<thead>
<tr>
<th>Quality</th>
<th>poor</th>
<th>moderate</th>
<th>good</th>
<th>Very good</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

15. In your opinion, has water quality of the Danube improved or deteriorated during the last 10 years? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Condition</th>
<th>improved</th>
<th>no change</th>
<th>deteriorated</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

16. How important is it for you that something is done to improve water quality in the Danube? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Importance</th>
<th>not important at all</th>
<th>Not important</th>
<th>Somewhat important</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
17. Would you engage more often in certain activities (e.g., Boating, walking) in the Donau-Auen National Park if the water quality improved?

<table>
<thead>
<tr>
<th>No</th>
<th>Yes</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specify which activities specifically:

…………………………………………………………

18. How well do you feel informed in general about water quality issues? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>not informed at all</th>
<th>Not much informed</th>
<th>Somewhat informed</th>
<th>Very well informed</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

19. Have you ever suffered from flood related problems? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□  → GO TO Q22</td>
</tr>
</tbody>
</table>

20. How many floods have you experienced personally in your life?

___floods

21. Can you specify what kind of problems you suffered due to flooding?

………………………………………………………………

22. How important do you consider flood control along the Danube. [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>not important at all</th>
<th>Not important</th>
<th>Somewhat important</th>
<th>Very important</th>
</tr>
</thead>
</table>
23. What are in your view the most important causes of flooding along the Danube. [PLEASE TICK AS APPROPRIATE; MULTIPLE ANSWERS POSSIBLE]

<table>
<thead>
<tr>
<th>Cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconsolidated dams</td>
<td></td>
</tr>
<tr>
<td>Late interventions from the those responsible for the flood defence program</td>
<td></td>
</tr>
<tr>
<td>Deforestation</td>
<td></td>
</tr>
<tr>
<td>Hydrological works along the river (e.g. channelling)</td>
<td></td>
</tr>
<tr>
<td>Landuse change</td>
<td></td>
</tr>
<tr>
<td>Weather extremes due to climate change</td>
<td></td>
</tr>
<tr>
<td>Other (please indicate):</td>
<td></td>
</tr>
</tbody>
</table>

24. Do you know what you are currently paying for your water bill?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

□ → GO TO Q27

25. If you know the amount of your water bill, could you say how much do you pay per month? (If you do not know the exact sum, please provide an estimate!)

<table>
<thead>
<tr>
<th>Monthly</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than € 4</td>
<td>Less than € 50,-</td>
</tr>
<tr>
<td>About € 8,-</td>
<td>About € 100,-</td>
</tr>
<tr>
<td>About € 13,-</td>
<td>About € 150,-</td>
</tr>
<tr>
<td>About € 17,-</td>
<td>About € 200,-</td>
</tr>
<tr>
<td>About € 21,-</td>
<td>About € 250,-</td>
</tr>
<tr>
<td>About € 25,-</td>
<td>About € 300,-</td>
</tr>
<tr>
<td>About € 29,-</td>
<td>About € 350,-</td>
</tr>
<tr>
<td>About € 33,-</td>
<td>About € 400,-</td>
</tr>
<tr>
<td>More than € 33,-</td>
<td>More than € 400,-</td>
</tr>
<tr>
<td>No answer</td>
<td>No answer</td>
</tr>
</tbody>
</table>

26. In what intervals do you pay your water bill?

<table>
<thead>
<tr>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly</td>
</tr>
<tr>
<td>Every 2 months</td>
</tr>
<tr>
<td>Every 3 months</td>
</tr>
<tr>
<td>Every 6 months</td>
</tr>
<tr>
<td>Yearly</td>
</tr>
<tr>
<td>Other (please specify)....</td>
</tr>
</tbody>
</table>

I would now like to ask you to think about alternative management plans for the Donau-Auen National Park (SHOW AREA MAP). These management plans relate to the improvement of the flood risk and water quality situation in the area.

Most of the rivers in the Danube catchment are heavily modified. The course of the river and the connection of the river to its tributaries have been changed for the economic development of the area and to protect the area from flooding. The river is less connected to its tributaries than say 50 years ago. Large parts of the river are embanked and the floodplain areas behind the river banks have been drained and are now used for economic activities like farming.

These changes to the river over the past decades have introduced new problems. Whereas excess flood water in the river used to be able to flow into the tributaries and floodplains, it now has no place to go anymore because of these modifications while water quality has deteriorated because of the loss of the natural purification function of the floodplains and wetlands.

Currently the area faces flood events every 5 years. Water quality in the area is moderate.

When rivers are connected to their tributaries and the floodplains and wetlands are maintained in their natural state, this reduces the risk of flooding and results in an improvement of animal and plant life in and around the river and as a consequence water quality. River restoration measures have been proposed in the Danube catchment to change the rivers back into their natural state by linking the river to its tributaries and restoring the original floodplains in the catchment. Restoring the river and the floodplains into its natural state will improve water quality and reduce the flood frequency in the area.

I will now present you with a number of possible situations and would like to ask you to tell me which situation you prefer. The situations represent different degrees of river restoration and the effect river restoration measures like linking the river back to its tributaries or restoring original floodplains have on flood frequency and water quality.

The following situations are possible (SHOW ATTRIBUTE OVERVIEW CARD). As a result of river and floodplain restoration flood frequency can be reduced from currently once every 5 years to once every 25 years, once every 50 years and once every 100 years. Once in every 100 years basically means you face a flood event in the area where you live only once (more) in your lifetime. In the three other situations you and the area in which you live will face flood events more frequently than that.
At the same time, water quality can stay as it currently is: moderate, or it can be improved from the current moderate situation to a good or very good situation. The current situation is characterized by limited recreation opportunities and limited nature and wildlife in and around the river and floodplains. Water quality is not good enough for swimming. Fish caught cannot be consumed.

In the good situation all forms of recreation are possible, and fish caught can be eaten. Conditions for nature and wildlife are good and swimming is possible most of the time, except perhaps during some weeks in the summer when there are excessive algal blooms.

Under the very good situation the water is in its natural state and conditions are optimal for nature and wildlife. All forms of recreation are possible under these circumstances.

Note that the flood frequency and water quality levels I just presented to you are completely independent. Each possible situation depends on the exact mixture of restoration measures taken in the specific area. A high water quality level may be possible with a high flood probability, but also a low water quality level with a low flood probability. It is furthermore important to point out that the river and floodplain restoration measures will be taken in areas where no people live, so the measures will not affect the current location of settlements and villages. These measures do however affect flood frequency and water quality in those areas and the areas further downstream, including the area where you live.

On the cards that I am about to show you, each situation also comes at a cost. The restoration measures cost money and everybody will be asked to pay. I will show you an example now first (SHOW EXAMPLE CARD).
EXAMPLE CARD

<table>
<thead>
<tr>
<th>Optional Card</th>
<th>Option A</th>
<th>Option B</th>
<th>Status Quo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood frequency</td>
<td>Once every 50 years</td>
<td>Once every 25 years</td>
<td>Once every 5 years</td>
</tr>
<tr>
<td>Water quality</td>
<td>Good</td>
<td>Very good</td>
<td>Moderate</td>
</tr>
<tr>
<td>Increase in water bill</td>
<td>€ 3 (25 Cent / month)</td>
<td>€ 10 (83 Cent / month)</td>
<td>No additional payment</td>
</tr>
<tr>
<td>I choose: (Please tick as appropriate)</td>
<td>Option A □</td>
<td>Option B □</td>
<td>Neither □</td>
</tr>
</tbody>
</table>

On each card you will be shown two possible future situations that can be reached through river restoration, situation A and situation B. Each situation shows a different flood frequency and a different water quality in the Danube catchment due to river and floodplain restoration. In this example, water quality will become good as it is now in situation A, but the frequency of flooding will be reduced to once every 50 years at an extra cost added to your monthly water bill of € 3 for the next five years. In situation B the frequency of flooding is slightly improved to once every 25 years while water quality becomes very good at an extra cost added to your monthly water bill of € 10 for the next five years. You also have the option to choose none of the two situations. In that case the current situation will stay the same and you don’t pay anything extra on top of your current water bill for the next five years.

Can you tell me which situation you prefer?
Please keep in mind your available income and that you can only spend your money once. I am now going to show you 4 similar cards and would like to ask you to tell me for each card which situation you prefer and why.
Version Choice Card:

Card 1: 1=Option A 2=Option B 3=Current situation

Can you briefly explain why you choose this situation? .........................

Card 2: 1=Option A 2=Option B 3=Current situation

Can you briefly explain why you choose this situation? .........................

Card 3: 1=Option A 2=Option B 3=Current situation

Can you briefly explain why you choose this situation? .........................

Card 4: 1=Option A 2=Option B 3=Current situation

Can you briefly explain why you choose this situation? .........................

28. You chose 4 times the current situation, can you briefly explain why?

<table>
<thead>
<tr>
<th>Reason</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not interested in this issue of river and floodplain restoration and the effects on flood frequency or water quality</td>
<td></td>
</tr>
<tr>
<td>The current situation is good enough</td>
<td></td>
</tr>
<tr>
<td>I cannot afford to pay extra</td>
<td></td>
</tr>
<tr>
<td>I prefer to spend my money on other more important things</td>
<td></td>
</tr>
<tr>
<td>Other, namely...........</td>
<td></td>
</tr>
</tbody>
</table>
29. CV-Question ‘Ecological Restoration’

As described before, the Danube is heavily modified in many places. Today approximately a quarter of the river is still connected the surrounding floodplains and wetlands and the river banks are still in a natural state (SHOW MAP OF THE CURRENT SITUATION).

Restoration measures would connect the river again to the floodplains and the wetlands as they were originally before the changes made to the river and river banks. As a result of river and floodplain restoration the landscape will look more natural, with water flowing also through adjacent creeks and ponds. This more natural state has a positive effect on nature and the variety of plant and animal species found in the Danube catchment.

Plans exist to restore half (50 percent) (alternatively 90 percent) of the modified river banks in the Donau-Auen National Park back into their original natural state as shown on the map (SHOW MAP), and connect the river again with the floodplains and wetlands.

Can you tell me with the help of this card how much you are willing to pay MAXIMUM on top of your yearly water bill over the next 5 years for the restoration of half of the modified river banks in the Donau-Auen National Park back into their original natural state as shown on the map?

SHOW PAYMENT CARD

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>€0</td>
<td>€5</td>
<td>€14</td>
<td>€30</td>
<td>€60</td>
<td>€175</td>
</tr>
<tr>
<td></td>
<td>€1</td>
<td>€6</td>
<td>€16</td>
<td>€35</td>
<td>€80</td>
<td>€200</td>
</tr>
<tr>
<td></td>
<td>€2</td>
<td>€8</td>
<td>€18</td>
<td>€40</td>
<td>€100</td>
<td>€250</td>
</tr>
<tr>
<td></td>
<td>€3</td>
<td>€10</td>
<td>€20</td>
<td>€45</td>
<td>€125</td>
<td>More than € 250, namely € ……</td>
</tr>
<tr>
<td></td>
<td>€4</td>
<td>€12</td>
<td>€25</td>
<td>€50</td>
<td>€150</td>
<td>Other amount, namely € ………..</td>
</tr>
</tbody>
</table>

Please keep in mind your available income and keep in mind that you can only spend your money once!
30. If you are not willing to make a financial contribution to restoration measures, can you tell me why not.

- [ ] I am not interested in this issue of river and floodplain restoration and the effects on flood frequency or water quality
- [ ] The current situation is good enough
- [ ] I cannot afford to pay extra
- [ ] I prefer to spend my money on other more important things
- [ ] Other, namely: …………………………………

31. To what extent do you agree or disagree with the following statements? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Statement</th>
<th>Completely disagree</th>
<th>Disagree</th>
<th>Don’t agree/don’t disagree</th>
<th>Agree</th>
<th>Completely agree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Polluters should pay first for water quality”</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>“It is the task/responsibility of the government to protect the rivers.”</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>“Water quality has to be improved for sake of our children.”</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>“The environment has the right to be protected irrespective of the costs of the society.”</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>“The environment has to be protected by law, not by asking people to pay for.”</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>
32. How would you prefer to pay for the proposed river and floodplain restoration? [PLEASE tick ANSWER]

<table>
<thead>
<tr>
<th>Option</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Via my water bill</td>
<td>☐</td>
</tr>
<tr>
<td>Through local taxes</td>
<td>☐</td>
</tr>
<tr>
<td>Through income tax</td>
<td>☐</td>
</tr>
<tr>
<td>Through a one time off voluntary donation to a designated restoration</td>
<td>☐</td>
</tr>
<tr>
<td>fund</td>
<td></td>
</tr>
<tr>
<td>Other, namely</td>
<td>☐</td>
</tr>
<tr>
<td>I don’t want to pay</td>
<td>☐</td>
</tr>
<tr>
<td>I don’t know</td>
<td>☐</td>
</tr>
</tbody>
</table>

Socioeconomic Characteristics Section

Finally some questions about yourself concerning your own personal situation for statistical purposes. Please note that all information provided will be treated strictly confidential!

33. What is your age? .......... years

34. How many people live in your household including you?

 .......... Persons (including you!!)

35. How many children (under 18 years) live in your household?

 .......... children (under 18 years)

36. What is your current work status? [PLEASE TICK AS APPROPRIATE]

<table>
<thead>
<tr>
<th>Option</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-employed full-time</td>
<td>☐</td>
</tr>
<tr>
<td>Employed full-time (30 hours plus per week)</td>
<td>☐</td>
</tr>
<tr>
<td>Employed part-time (under 30 hours per week)</td>
<td>☐</td>
</tr>
<tr>
<td>Student</td>
<td>☐</td>
</tr>
<tr>
<td>Unemployed</td>
<td>☐</td>
</tr>
<tr>
<td>Looking after the home full-time/housewife</td>
<td>☐</td>
</tr>
<tr>
<td>Retired</td>
<td>☐</td>
</tr>
<tr>
<td>Unable to work due to sickness or disability</td>
<td>☐</td>
</tr>
<tr>
<td>Other, namely</td>
<td>☐</td>
</tr>
</tbody>
</table>
37. Are you involved in any agricultural activities?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□</td>
</tr>
<tr>
<td>□</td>
<td>□  → GO TO Q39</td>
</tr>
</tbody>
</table>

38. How much land do you own?

............................................ ha/m². NOTE : CIRCLE THE APPROPRIATE UNIT!

39. At what level did you complete your education? IF STILL STUDYING: Which best describes the highest level you have obtained up until now? [PLEASE TICK AS APPROPRIATE]

| Primary school | □ |
| Professional education | □ |
| High school or similar | □ |
| (Technical) college | □ |
| University | □ |
| Other, namely: | □ |

40. Can you tell me what your monthly household income is?

| € 0 – € 250 | □ |
| € 251 – € 500 | □ |
| € 501 – € 750 | □ |
| € 751 – € 1,000 | □ |
| € 1,001 – € 1,500 | □ |
| € 1,501 – € 2,000 | □ |
| € 2,001 – € 2,500 | □ |
| € 2,501 – € 3,000 | □ |
| € 3,001 – € 3,500 | □ |
| More than € 3,500 | □ |
| No answer | □ |

41. Gender

| Man | □ |
| Woman | □ |

THANK YOU FOR ANSWERING OUR QUESTIONS!
7. References


