

Odense River Basin Case Study Fact Sheet

AquaMoney Policy Brief No. 4-1

August 2009

The heart of AquaMoney ([see Policy Brief No. 1](#)) are 11 case studies from different European countries. Based on these case studies, AquaMoney developed guidelines for benefit transfer. This policy brief will present the main results of the Odense River Basin Case study. The idea is to give policy makers an overview of the range of values that can appear and how the perception of environmental problems in the different countries differs.

The Danish Case Study

An internet survey was conducted on 750 households at Funen in the middle of Denmark and in the municipalities of the Southern Danish region in the summer of 2008. The survey focused on households' recreational use of water bodies and their willingness to pay for improvements of the ecological status of the Odense River, which is the main river in the Odense River basin at Funen. As part of a wider Danish study the benefits of similar improvements of the 10 largest lakes at Funen, Odense Fjord and the whole river catchment are also considered, using the same questionnaire and valuation design as in the Odense River case study. A similar survey has also been made in the Roskilde fjord-area at Zealand, and benefit transfers have been tested between Odense and Roskilde. The valuation of changes in the Odense River is the Danish case in AquaMoney.

We will describe the current water quality status of the river, the response to the survey, the willingness to pay per household per year, the sensitivity of the willingness to pay to the scope of improvements, distance decay and the spatial extent of the willingness to pay and finally the total willingness to pay.

The water quality status of the river

In the Odense river basin, eutrophication is the main environmental problem. Agriculture is the main contributor to pollution of both the river and the river basin.

96% of the rivers in Odense river basin are classified as being at risk of not obtaining the Water Framework Directive's objective of good ecological status in 2015. 86% of the lakes are at risk (15% because they are not monitored), and 100% of the coastal areas, including the fjord, are at risk. The status of the environmental quality is monitored by the Environmental centre of Odense. The indicator for the environmental status of the river is the river's hydrological conditions. Some smaller parts of the Odense River are in poor or good condition, but the main stretches of the river are classified as moderate.

AquaMoney is a research project funded under the 6th EU Framework Programme.





The respondents of the survey were therefore told that the status quo of the Odense River is moderate. One fourth of the respondents of the survey found that this status quo description conforms to their own perception, while one fourth perceived the river water quality as being in a better state than the status quo description indicates. Approximately 8 percent perceived the quality to be worse, while the rest did not know how the quality is or did not know what to answer. This dissimilarity between laymen-perception and the expert knowledge (monitoring results) being used for the description of the water quality has to be considered when analysing and using the results.

The water quality ladder invented for the Common Valuation design in AquaMoney was used to characterise the levels of environmental quality in the Odense River. Three levels were used for the valuation: yellow (moderate), green (good) and blue (very good). Red (poor ecological status) is also part of the ladder, but not of the valuation design in the Odense River, as the river is classified as being of moderate environmental quality (yellow), and we did not allow for decreasing quality. The information provided by the water quality ladder was appreciated in the focus group and in pilot testing of the questionnaire.

Survey response

In all, 754 respondents answered the questionnaires sent out by internet to 2100 persons in the survey institute TNS GALLUP's internet panel. The response rate of the study was 36%, and the sampling was done during July and August 2008, which is holiday season. About 8% of the sample protested to the valuation by stating a reason for not willing to pay classified as a protest bid (answering that others should pay (the water works or the state), that they don't believe in the scenario or that they find the question too hard to answer). On average the respondents made trips to a river 32 times a year (2.7 times a month), and 92 trips to a lake (7.7 times a month). When visiting a river or a water stream, more than 50% of the respondents usually go for a walk

along the river banks and experiences nature, and approximately 20% walk the dog. Angling is practised more rarely, and bathing and sailing on the river are seldom or never being practiced.

Willingness to pay per household per year

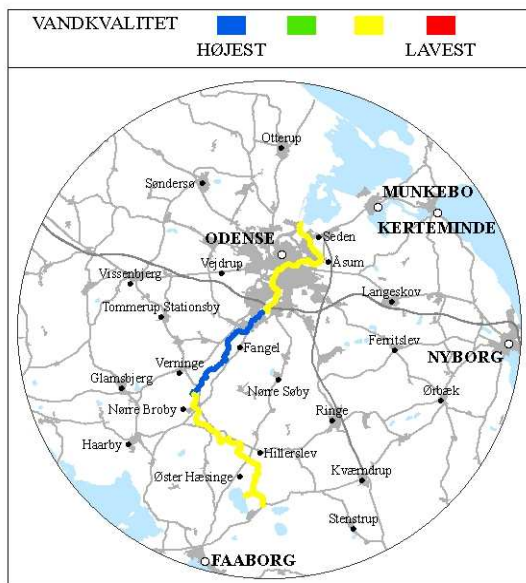
The willingness to pay for an improvement of the Odense River to "good ecological status" and "very good ecological status" is estimated for the whole river as well as to three stretches of the river. The Willingness to pay has been estimated using two different stated preference methods as well; Contingent valuation and Choice experiments. For the valuation the river was divided into three stretches, and the valuation results can therefore be estimated for the different parts of the river as well for the whole river. The mean willingness to pay for an improvement from moderate to very good for the whole river is approximately 480 DKK for a household per year.

Sensitivity of willingness to pay to the scope of improvements

More detailed results such as sensitivity to scope are obtained by asking of the WTP for improvements of the whole river versus one stretch of the river. With the contingent valuation method the mean willingness to pay for an improvement in the Odense River to very good ecological status is estimated for a short improvement (15 km of the Odense River which is approx. 60 km long) to be 323 DKK (43 EURO) per household per year. This short stretch of the river is located outside Odense city (see map).

For the large improvement (the whole river) the equivalent is estimated to be 479 DKK (64 EURO) per household per year. Hence, households' willingness to pay is sensitive to the magnitude of the improvement, i.e. whether the whole river is improved or only a minor part.





Map of Odense River Basin in Denmark (colours indicate water quality levels from blue for very good to red for poor)

With the Choice experiment method, the WTP for obtaining “good” valuing the river in three stretches is estimated to be 1053 DKK (141 EURO) per household per year for the whole river (329 + 467 + 257DKK). To obtain “very good” quality of the water the WTP is estimated to be 1430 DKK (192 EURO) per household per year (582 + 545 +303 DKK). Valuing the whole river at once by the choice experiment method gives a WTP for “good” status at 430 DKK (58 EURO) per household per year. Households in Denmark currently pay on average DKK 4000/yr (533 Euro) per household for water and sanitation.

Distance decay and spatial extent of willingness to pay

Estimated with the contingent valuation method, the willingness to pay drops by 1.53 DKK/kilometre for the short improvement and 2.31 DKK/kilometre for the large improvement. This means that for the short improvement the radius of households affected by the improvement is 144 km, while it is 212 km for the large improvement. The larger distance for the large improvement despite the faster drop, is caused by the higher mean WTP.

Total Economic Value

The total economic value (TEV) is calculated using the estimated distance decay function. Alternatively, aggregation could have been done within the administrative/political region. For the CV, the TEV for the short improvement to obtain a good quality, is estimated to be between 138-150 million DKK per year (18-20 million EURO). For the large improvement the TEV is estimated to be between 200-223 million DKK per year (27-30 million EURO). For the CE, the TEV is more than 3times as large as for the CV to obtain a good quality, 489 million DKK per year (66million EURO). To obtain a very good quality (using CE) the TEV is 664 million DKK per year (89 million EURO).

Summary

A water quality ladder was used to inform the respondents about the water quality in status quo, as well as for the improvements of the river. These water quality improvements due to improvements in water clarity, fish species and flora conform to the objectives of the water framework directive, and at the same time this use of pictures, texts and colours were understandable for the respondents. The survey therefore conforms closely to the WFD requirements and objectives, and the willingness to pay is estimated at a detailed spatial level (for the river, the lakes and the fjord as well as with emphasis on distance decay). The survey design as well as the results of the case study has proven to yield low transfer errors in benefit transfers between the AquaMoney case studies as well as between water bodies in the Danish case study. Hopefully the results can be useful for the coming assessments of the benefits of the WFD as the results can be used as inputs to the water pricing as well as for the exemptions testing.

Further information can be found in the Case Study Reports and in further Policy Briefs on:

www.AquaMoney.org

