AQUAMONEY CASE STUDY REPORT

INTERNATIONAL SCHELDT BASIN

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Policy summary

The WFD requirements for the Scheldt river basin

The Scheldt river basin district extends from North West France, via the western half of Belgium to the Netherlands. The total area of the district of the Scheldt is 36 416 km²: it is one of the smaller international River basin districts in Europe. The Water Framework Directive's objective of improving surface water to 'good ecological status' in the Scheldt will require considerable additional investments.

The international Scheldt Commission has identified some important water management issues (ISC, 2005). The chemical quality is overall insufficient and a number of pollutants and parameters prevent some water bodies from achieving good status. Furthermore, the contaminants embedded in the sediments are one of the major challenges. The initial results on the biological quality according to the WFD are negative for most water bodies. Achieving GES will most probably impose large extra costs upon society.

One of the main policy issues is therefore to what extent the water quality improvement will, in addition to these costs, generate societal benefits in terms of use- and non-use values of nature and recreation amenities. The main objective of the case study is to estimate the monetary value that households attach to the benefits of improvements of water quality for these use and non-use values. The study focuses – in light of developing guidelines for AquaMoney - on substitution and distance effects underlying choices among water bodies. As the study area is highly urbanized and the waterway network is very dense, substitution possibilities are large. It is unclear what changes in recreation and nature appreciation of water bodies will be take place when quality improvements occur.

Two case studies where performed: one in the Dutch part of the Scheldt RBD and one in the Flemish part of the Scheldt RBD. A stated preference method is employed enabling us to estimate non-use values. For the Dutch CE study, three sites in the lower Scheldt subbasin were chosen: the beaches near Breskens, Braakman-creek, and the "Verdronken Land van Saeftinghe" (see Figure 2); well-known sites among the local population and providing typical water body services. The Flemish study selected three sites at the river Dender, which differ in context: a site in an urban/industrial environment, Aalst, in a rural area, Liedekerke, and a nature reserve, Kapellemeersen (see figure 3).

Survey design

In both countries, a choice experiment (CE) with a labelled design was developed, in which the site names served as labels. Both case studies followed a similar design and analysis. The CE choice cards used four attributes which reflected the main WFD policy foci (see table 1): walking (hydromorphological changes); in-water sports (water quality changes) and nature (ecological quality changes) and a monetary attribute. The respondents were shown choice cards with different future quality improvements at each of the three sites and asked to choose the preferred scenario for which they were willing to pay the denoted increase in their water bill (BE) or water board taxes (NL).

The estimation of distance-decay effects on WTP for sites with different functions was one of the major objectives in the study design. In order to estimate such effects, the sampling strategy was aimed at maximising the variety in distance while at the same time reflecting the population distribution in the area. Also, attention to representativeness of the sample regarding socio-demographic characteristics was paid.

The two case studies used different sampling techniques: in the Netherlands a face-to-face survey was held, whereas in Belgium the survey was web-based.

Results

The results show that a large number of respondents is willing to pay for improvements under the WFD. People are willing to pay more for achieving good ecological quality, compared to a moderate quality. That is, we find our WTP estimates to be sensitive to the scope of the improvement, which supports the validity of our findings. The implicit prices of both studies show that people attach on average higher values to biodiversity and nature than to recreation, especially when improvements are only to moderate levels in terms of WFD objectives.

An important finding is the site-specificness of WTP values for some of the quality changes. In the Dutch case, for example, improving nature quality to good levels at Saeftinghe generates more social welfare than at Braakman or Breskens. In the Belgian study, some attributes were found to be insignificant for specific sites. For instance, walking at moderate levels is not significant for Liedekerke and kayaking at moderate level is not significant for Kapellemeersen. The site-specific values furthermore limit the possibilities for unadjusted benefits transfer across sites. Whereas values for good walking quality in the Dutch case are generic, i.e. do not differ across sites, WTP for improvement from bad to good bathing water and nature quality are dependent on where they take place.

The welfare estimates of different policy scenarios (see

Table 5) show that in the Dutch case, achieving improved ecological quality generates the highest welfare at Braakman (€54 per household per year), compared to Saeftinghe and Breskens. This is due to the increase in bathing water quality combined with the nature amenities that the creek can provide under improved conditions. Values for Saeftinghe are lowest, because this site does not generate consumer surplus for bathing water quality. However, there is no significant difference in WTP with Breskens due to the high values that respondents attach to nature at Saeftinghe.

In Belgium, the policy scenario of achieving overall moderate quality generates the highest welfare at Aalst (€103 per household per year). For this site, all the attributes are significant at moderate quality levels, meaning that respondents were willing to pay for achieving moderate quality in all attributes, whereas for the other sites this was not the case. For an overall good quality, there is no difference in WTP between the three locations.

In both case studies, general socio-demographic characteristics influence respondents' WTP. Income, visiting the study sites and distance from the respondents' residences to the sites affect the choices and subsequent values. The significance of these factors supports the validity of our results. Some differences can be found between the cases: there was no significant impact of gender in the Dutch case, clearly found in the Belgian case, and some variables are survey-specific.

Our main recommendation in the light of benefits transfer is therefore to test if sites are perceived similarly by the general public or control for perceived differences. Transferring without testing if sites are perceived as generic may significantly bias transfer results.

1. Introduction

The Water Framework Directive (WFD) asked to develop a program of measures to reach the good ecological status in all water bodies. For the Scheldt International River Basin District (IRBD), policies on heavy metals, manure, pesticides and sustainable management are needed to obtain good chemical quality. Good ecological quality is mostly constrained by eutrophication and unnatural hydromorphological conditions.

The main water quality issues in the Scheldt basin regarding national open (surface) waters are transboundary pollution, effluents from industry and waste water treatment plants and shipping. In regional waters, the main issues are agricultural and urban pollution. With the current policies a standstill and possibly even improvements may be achieved by 2015, but good ecological quality will not be achieved.

A large number of measures must be taken to achieve the goals of the WFD. In the light of the water quality improvements, one of the main policy issues is the question how the water quality improvement will, in addition to the costs, generate societal benefits. As the study area is highly urbanized and the waterway network is very dense, substitution possibilities are large. It is unclear what changes in recreation and nature appreciation of water bodies will be take place when quality improvements occur.

The goal of the case study is to estimate the monetary value that households attach to the benefits of improvements of water quality for recreational use and non-uses. Therefore, a stated preference method is employed. The theoretical focus – in light of developing guidelines for AquaMoney - is on substitution and distance effects underlying choices among water bodies.

2. Description of the case study area

For a complete description of the case study area and the water characteristics, we refer to the previous AquaMoney case study Report Scheldt (Gilbert et al. 2007). We will give a short summary here.

2.1. Location

The Scheldt river basin district extends from North West France, via the western half of Belgium to the Netherlands. The total area of the district of the Scheldt is 36 416 km²: it is one of the smaller international River basin districts in Europe. The main river Scheldt with a river basin of 22 116 km² is the largest part of the district. Other important river subbasins included in the district are the Somme river basin (6 548 km²) and the Ijzer subbasin (1 750 km²). The major part of the area of the Scheldt district lies in France and in the Flemish region (50% respectively. 33%). The Walloon Region and the Netherlands cover 10% and 6%. The Brussels Capital Region comprises 0.44% of the Scheldt district. (ISC, 2005)

Two different case study areas were selected for the AquaMoney project: a Flemish and a Dutch survey were held.

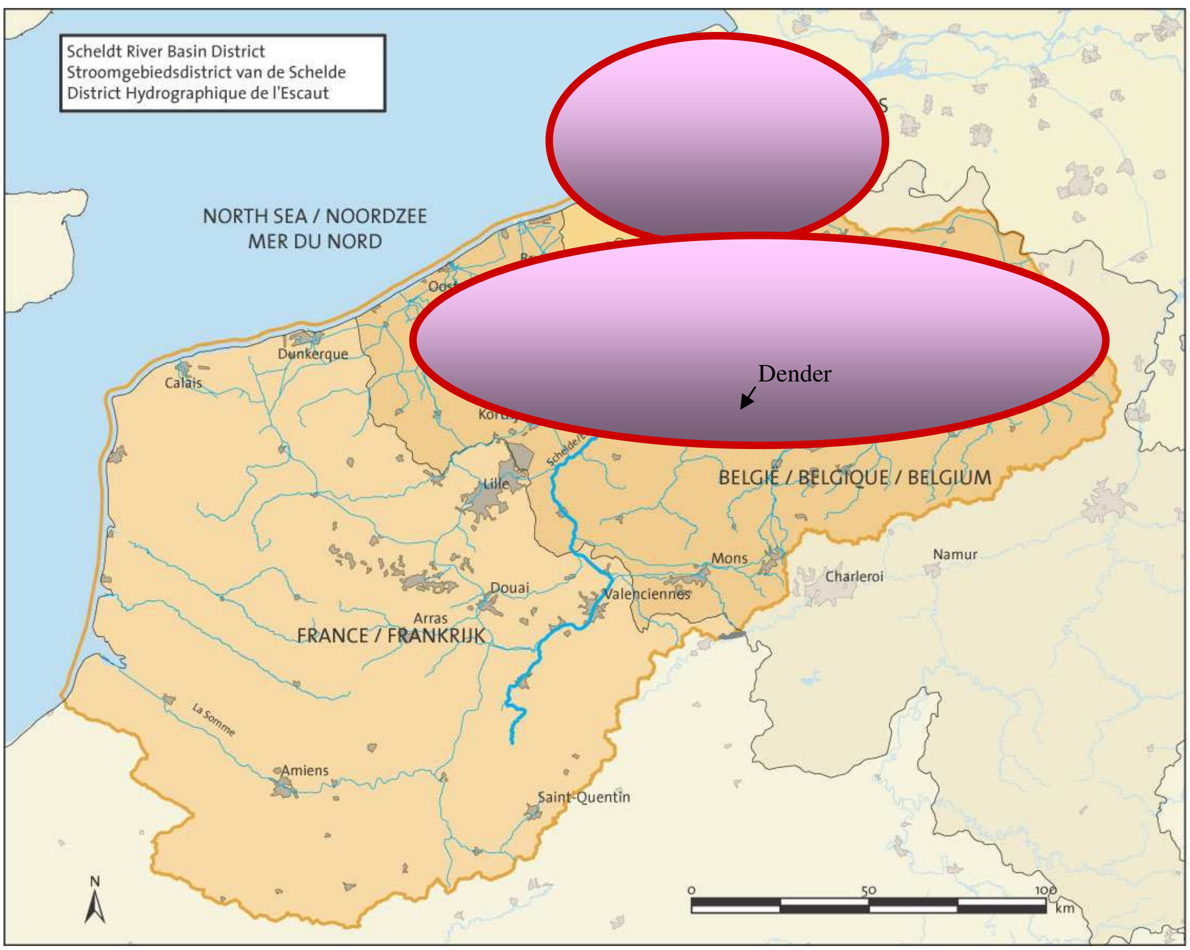


Figure 1 International Scheldt river basin district (ISC, 2005)

For the Dutch CE study, three sites in the lower Scheldt subbasin were chosen: the beaches near Breskens, Braakman-creek, and the "Verdronken Land van Saeftinghe" (see Figure 1). These sites are well-known among the local population and provide typical water body services. The beaches near Breskens are popular among local and international tourists; Braakman is most suitable for family recreation; Saeftinghe is a typical nature site, with high biodiversity values.

Figure 2: Location of the three selected sites in the Dutch part

The Flemish case study focused on the Dender subbasin. Dender is a modified water body, so the WFD requirement is to achieve good ecological potential. We choose this subbasin because a lot of information on ecological quality was available about this area compared to other subbasins. Ten years ago the water quality of the Dender was bad. The quality has recently improved, but in the three selected sites the ecological quality is still bad, based on indicators for water quality, biological quality, fish and hydromorphology from the Flemish Environmental Agency. It is mainly used for shipping and recreational activities. For the CE study three sites were chosen: an urban/industrial site, Aalst, a rural site, Liedekerke and a nature development site, Kapellemeersen (see figure 2)

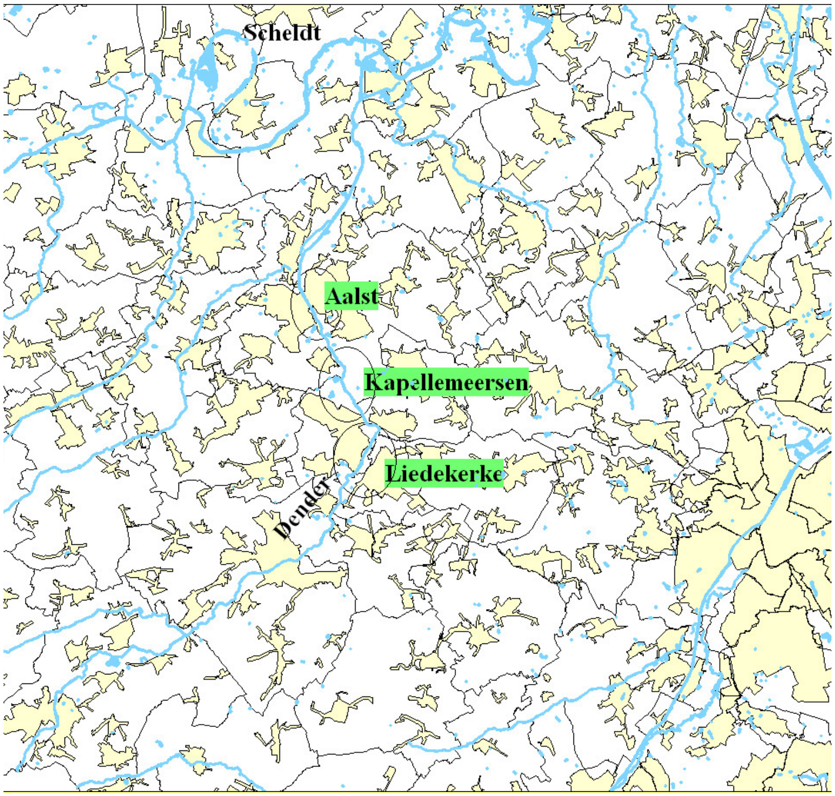


Figure 3: Location of the river Dender and the three selected sites in the Belgian part

2.2. Water system characteristics

2.2.1 Climate

The climate in the Scheldt basin is temperate maritime, characterized by relatively fresh summers and mild winters. January is the coldest month (2.5°C), July the hottest (17.2°C). In coastal areas, the proximity of the sea causes lower temperatures in the summer and higher temperatures in the winter. Within this small basin, the climate varies very little. In the period over 1990-2001, the average annual rainfall was 820 mm, distributed quite homogenously over the different seasons.

2.2.2 Hydrography and hydrology

The Scheldt district is a highly urbanised and heavily built-up area. On average, 13% of the Scheldt district is covered by urban area. It has a total population of 12.8 million inhabitants and a population density of 353 inhabitants/km^2. The Flemish region houses 40% and the Dutch part only 4% of the respective country's populations. The largest cities are Brussels, Lille, Antwerp and Ghent.

There are a number of major industrial areas and ports. The ports of Zeebrugge, Ghent, Antwerp, Vlissingen, Terneuzen, Calais and Dunkerque are all located within the Scheldt district.

Agriculture covers 61% of the area. Livestock farming is the main activity in the northern part. The Flemish and Dutch polders, characterised by narrow strips of wet clay, are difficult to work but very fertile and therefore mainly used for crop farming.

The whole coastal strip of the Scheldt district is important for tourism. The Flemish coastal part has changed considerably due to the construction of tourist facilities. In the Netherlands, the natural character of the coastal area has been somewhat better preserved.

The Scheldt and a number of its tributaries are subject to tides. Tides have an influence up until 160 kilometres from the mouth of the river (the city of Ghent). The tidal range reaches a maximum of 5 metres at Antwerp. The tides cause seawater to enter the estuary. As a result, the Scheldt has areas with briny, brackish and fresh water, which leads to a high biodiversity. The Scheldt estuary is one of the most important estuaries along the NW-European migration route for water birds, maximum numbers reaching up to 230,000 individuals. For 21 water bird species, the Scheldt has international importance. Charismatic mammal species such as the seal and the porpoise can be found in the Ooster- and Westerscheldt. Bad water quality severely impacted benthic invertebrates and fish. Different phytoplankton communities can be distinguished in the estuary.

The tides also cause important flood risks. A lot of effort has been paid to reduce flood risks. In the Netherlands, the Delta-plan, with a storm barrier and dykes, was introduced from the 1960s on. In the Flemish part, the Sigmaplan exists of dykes and controlled inundation areas.

2.2.3 Water quality and ecological quality

Although the status of the water quality has improved over the last 20 years, but the WFD "good ecological status" has not been achieved in the majority of the surface water bodies in the Scheldt basin. Environmental damage categories include eutrophication and high metal content of surface water, especially zinc, copper and lead. Bathing water quality is bad in some coastal areas.

Man-made modifications to the water system range from drainage regulation and management of water levels to flood mitigation, to water supply, to shipping. Barriers, dykes and artificially managed water levels have led to extreme hydromorphological changes. Physical disturbance by shipping, fisheries, recreation and tourism, cooling water discharges and sand extraction also affect the ecological state of surface waters.

2.3. Short characterization of water use and water users

Recreation and tourism.

The open water in the basin is used for many economic activities, including agriculture, industry and shipping. However, in this case study we focus on recreation and nature amenities.

The three Dutch sites are all relatively well known among local residents, but also by the wider community. Breskens is a popular beach site, attracting local and even international visitors. Braakman is a creek with brackish water, best known for family recreation and suitable for swimming, fishing and sailing. Saeftinghe is a tidal mud plain that can only be accessed accompanied by a guide. The three sites therefore differ in the recreational functions they fulfill. Whereas Braakman and Breskens attract frequent water recreationists, Saeftinghe appeals more to nature lovers who typically visit the area only once or twice. Plans for a so-called nature compensation project are currently being developed for all three sites.

The Flemish site is the river Dender. It is a river with local importance but with the potential of getting more regional importance, especially for boating. There is a hiking and biking path along the total length. The three locations differ in land-use. Aalst is an urban-industrial environment, Liedekerke is a rural area and Kapellemeersen is a very small nature reserve area.

Water recreation differs between the countries. In the Netherlands, many open water sites are used for swimming and bathing. In Belgium, canoeing and kayaking are the most important in-water sports. Bathing is not common practice, possible due to a long history with relatively poor water quality in rivers and streams in urbanized areas. Angling is also important for the Dender, although only 5% of the recreants fish.

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

The international Scheldt Commission has identified some important water management issues. Only the ones concerning surface water quality, hydro-morphological alterations and sediments are cited here (out their report, ISC 2005)

The physico-chemical quality is overall insufficient. A number of pollutants and parameters prevent some water bodies from achieving good status, be it on district level or on regional level: nutrients, copper, cadmium, mercury, lead, zinc, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organotin compounds, and lindane.

A more in-depth study of the quality of sediments and the long-term decontamination of sediments in order to improve the situation, taking into account the costs involved, represents one of the major challenges for the coming years.

The biological quality requires further investigation, taking into account the methods prescribed by the WFD. However, initial results are not very encouraging.

Over the years, demographic expansion and industrial development have gradually introduced numerous hydro-morphological alterations in the water system of the whole Scheldt IRBD. The coherence between aquatic ecosystems within the IRBD, including the preservation of wetlands, is part of the ecological challenges at Scheldt district level.

2.5. Focus of the case studies

In the light of water quality improvements, one of the main issues is the (economic) value that households and (inter)national tourists attach to good water quality for recreational use and non-uses. Hanley et al. (2006) show that water bodies may provide a wide variety of use and non-use values. As the area is highly urbanised and the waterway network is very dense, substitution possibilities are large. So far, it is unclear how water bodies are being used and to what extent recreation behaviour and nature appreciation will change when quality improvements occur under the implementation of the WFD. Distance decay of attached values is expected to be large, which is one of the main foci of this study. Which people attach which value to which water body will be a very difficult, yet important question to answer, as this determines the boundaries of the market area over which individual WTP can be aggregated in order to determine the benefits of implementing the WFD at the case study site at a population level.

3. General outline of the case studies

3.1. Set up of the survey

The questionnaire consisted in 5 (6 for the Belgian case) parts divided as follows: (a) general water recreation information, (b) water recreation at the three CE sites and possible substitute sites (c) the choice experiment, (d) socio-demographic characteristics, and (e) control questions about credibility and difficulty of the CE. Part b included questions on familiarity, frequency of visitation, perceived water quality, most important recreational activities and characteristics of the sites. In addition to the CE, the Flemish questionnaire also included a CV question with a payment card (common water quality CV design) prior to the CE part. The CV question asked for the amount people would be willing to pay for reaching good ecological status in a small and a large stretch of the river Dender (see common design report water quality AquaMoney).

In both countries, a site-selection CE with a labelled design and site-specific attribute descriptions was developed. The site names served as labels. People were asked to choose the site they prefer to be improved from ecological quality improvement scenarios for the three different sites. This site-selection CE enabled us to estimate the substitution patterns between the sites. In labelled models, the constant reflects the value of site-characteristics that are not included as attributes in the CE. Labelling furthermore enables the indication of the sites on a map and the calculation of distances from sites to respondents. There are some differences between the two countries in chosen attributes, which will be described in the next paragraphs.

The questionnaire design involved literature research on WFD and tourism, and discussions with ecologists and regional policy makers. Achieving "good" ecological quality will improve the chemical water quality, bring more natural banks and dunes and better protection of water related biodiversity and nature. The underlying policy objective was to estimate the relative importance of the hydromorphological, water quality and ecological objectives of the WFD for the valuation of achieving GES. The objectives of the WFD were therefore translated into three attributes in terms of use and non-use effects. These attributes were expected to be most important to respondents and generate significant benefits following from the WFD implementation. The attributes reflected the most important recreational activities at the sites: walking, in water sports (NL: bathing, BE: kayaking) and nature appreciation. They were explained by using text, pictures and illustrations, as previous research has shown that bio-physical water quality indicators may be hard to understand for the general public and result in insignificant parameter estimates (Hanley *et al.*, 2006).

Table 1 gives an overview of the attributes and their levels and explanation. Although the same attributes were used for the three locations, the photographs and texts to explain the attributes were site-specific, for instance using different bird and fish species. Thereby, we aimed to test the impact of "context" and site-specific characteristics. The fourth attribute in the CE was a monetary attribute, which was expressed as an increase in yearly water board taxes paid by local residents, ranging from 5 Euro up to 80 Euro per year. For Flanders, a similar payment vehicle was used, adapted to the local context. The improvements as proposed by the levels of the attributes required different measures and are therefore not necessarily correlated. The pre-test results showed that respondents did not regard the attributes as being correlated and accepted simultaneous increase and decreases of different attributes.

Table 1 Overview of attributes and levels

WFD	(Non)-use	Levels	Explanation NL
Hydro-Morphology	Walking	Good	NL: Area expansion & natural dikes/dunes; BE: Natural banks
		Moderate	NL: Natural banks (dikes or dunes); BE: Banks with hard defence but with natural techniques
		Bad	Current situation: hard water banks
Water Quality	NL: Swimming BE: Kayaking	Good	High clarity, no algae occurrence or odour
		Moderate	Medium clarity, occasional algae and odour
		Bad	Current situation: Low clarity, frequent algae and odour problems
Ecology	Nature	Good	High number and diversity of fish and birds, including rare species
			Medium number and diversity of fish and birds, few rare species
		Moderate	Current situation: low number and diversity, hardly any rare species
		Bad	

The final choice experiment was preceded by an explanation of the choice exercise, an overview of all attributes and levels and the current situation at each of the sites, and an example choice task. Each respondent was then asked to answer the different choice tasks. Figure 4 and Figure 5 include examples of the choice cards of both countries. Each time, the choice was among four labelled alternatives: the three sites improving in at least one attribute and the price, and the 'opt-out' defined in terms of the current bad quality levels for all attributes at all sites at zero price. In the Dutch case, restrictions were needed in the experimental design to increase the realism in reflecting the sites. There are no swimming possibilities at Saeftinghe, so this attribute was not included in this alternative. Furthermore, the current bathing water quality at Breskens is already at 'moderate', not 'bad' level.

The WTP question asked respondents to state their maximum WTP for their preferred improvement scenario at one of the sites (so not which site they would prefer to visit under the proposed scenario). It was explained that choosing the preferred improvement implied that other sites would remain at current bad levels. Whenever respondents chose the opt-out, they were asked to motivate their answer in a follow-up question to identify protest and zero-bidders.

The final experimental D-efficiency design was generated by Sawtooth Software and consisted in the Dutch case of 24 different choice sets of five choice tasks each and in the Flemish study 100 choice sets of four choice tasks. The different sampling strategy in Flanders allowed for a larger experimental design.

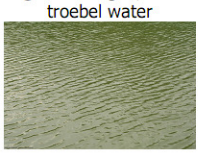
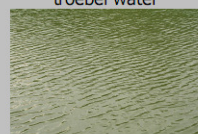
VOORBEELD	Stranden bij Breskens	Braakman	Land van Saeftinghe	
Wandelen	**Matig:** Natuurlijke duinen met begroeiing 	**Slecht:** Harde dijk zonder begroeiing 	**Goed:** 300 ha extra natuur EN Natuurlijke dijk met begroeiing 	
Zwemmen	**Matig:** Soms algen, stank en troebel water 	**Matig:** Soms algen, stank en troebel water 	Niet van toepassing: zwemmen bijna niet mogelijk	
Natuur	**Slecht:** Alleen gewone soorten vogels en vissen: meeuwen 	**Slecht:** Alleen gewone soorten vogels en vissen: scholeksters en karpers 	**Goed:** Veel bijzondere soorten. Groot aantal vissen en vogels: lepelaars 	
Extra waterschaps-belasting	€ 20 per jaar	€ 20 per jaar	€ 10 per jaar	
Welke situatie heeft uw voorkeur?	❑ A	❑ B	❑ C	❑ Geen

Figure 4: Example of choice card for Dutch study

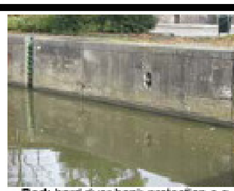
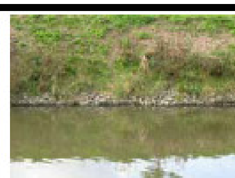
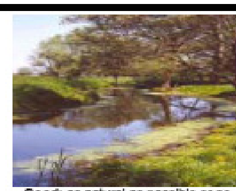
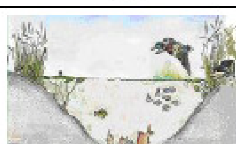
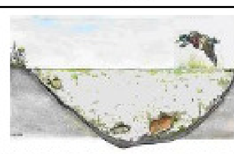
Attribute	A. Dender in Aalst (city)	B. Dender in Liedekerke (rural)	C. Dender in Kapellemeersen (nature area)	D.
Walking/biking	 Bad: hard river bank protection e.g. concrete	 Moderate: use of environmental friendly techniques for bank protection	 Good: as natural as possible or no protection	None of them
In water sports	 Good: no foam on the water and no smell	 Moderate: once in a while foam and/or smell	 Bad: foam and/or smell on regular basis	
Nature	 Moderate: a dozen of species of common fish. A small number of bird and insect species. Some water plants.	 Bad: only few very common fish species	 Good: a large number of fish, birds and waterplants amongst very rare species and possible game fish	
Extra water tax	10€	10€	20€	

Figure 5: example of a choice card in the Belgian study

3.2. Sampling strategy

The estimation of distance-decay effects on WTP for sites with different functions was one of the major objectives in the study design. To be able to estimate such effects, the sampling strategy was aimed at maximising the variety in distance while at the same time reflecting the population distribution in the area. Also, both studies paid a lot of attention to representativeness of the sample regarding socio-demographic characteristics.

The two case studies used different sampling techniques: in the Netherlands a face-to- face survey was held, whereas in Belgium the survey was webbased.

The final Dutch sampling area included 46 towns and villages in the area around the Westerscheldt. Residents in this area were expected to be sufficiently familiar with the specific sites to include them in the choice set and make informed choices among them. The final door-to-door survey was implemented from July-September 2007. Interviewers read the questions out to respondents, using show cards for several questions, the CE explanations and choice cards, during the face-to-face interview.

The final Dutch sample included 798 households; 1524 respondents refused participation, mostly because they did not have time or did not want to participate in surveys in general. The total response rate was therefore 34%. After checking for missing values, the final analysis was based on 780 completed questionnaires.

In Flanders, sampling was done by an internet-based survey. A random mailing list was bought containing 5000 addresses in the subbasin of the river Dender, containing 80 towns and villages in an area of 40 km around the Dender. People were asked by letter to fill out the internet-survey, using their personal log-in key. As internet use is widely spread in Belgium, it was believed that this tool would not create additional bias. The survey was implemented from February till June 2008 and resulted in a response rate of 12 %. In addition, an internet mail was send to colleagues and friends asking to distribute and fill out the questionnaire. This was done as a back up to get a good response number. Both groups were analysed separately and combined. This sampling strategy ensured that a good geographical coverage was reached. The respondents of the internet mail were often living further away from the river Dender, whereby the distance decay effect could be tested even better (**Error! Reference source not found.**)

In total, 861 persons filled out the questionnaire. After checking for missing values, the final analysis of the CE was based on 690 questionnaires. 69 % responded after receiving the letter, 31% was reached through the internet. Data presented further refer to the analysis of the full sample.

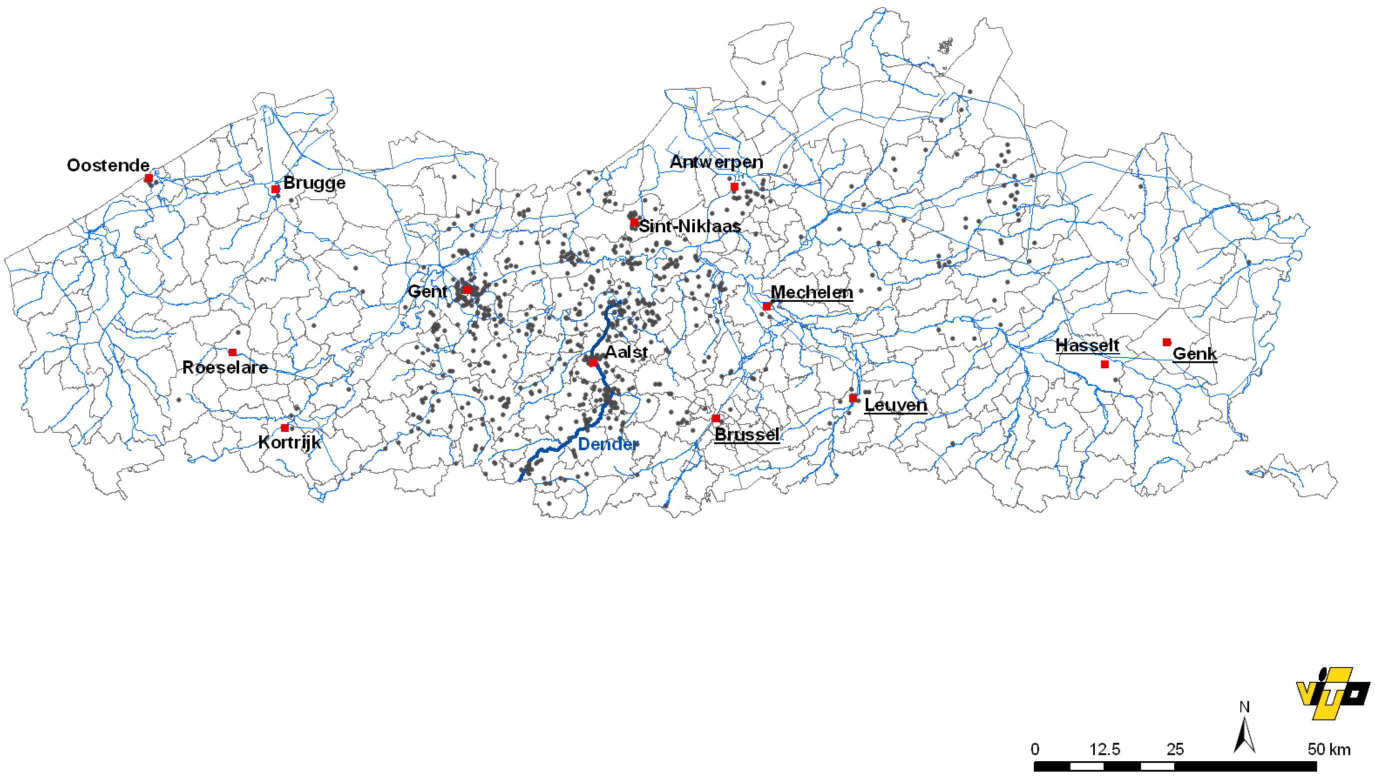


Figure 6: Location of the respondents

3.3. Results

3.3.1 Respondent characteristics and sample representativeness

Table 2 presents the descriptive statistics of the sample. In the Dutch sample, the respondents had an average education level: intermediate vocational education (MBO) or higher level secondary education (HAVO, VWO, HBS) were most frequently stated. The average age of the sample was 51 and the average household size was 2.7, which is slightly higher than the Dutch average of 2.3. Average net income of the sample was €2117 per month, which falls between disposable and standardized income statistics for this province (CBS, 2007).

In the Belgian sample, the average age is 48 years, which is slightly higher than the average age in Flanders, being 41 years. Men (69%) are more represented then women (31%) while in Flemish society it is more equally divided. The respondents have an average education, although all sections of the population are represented well. (FOD, 2008) Respondents indicated their net monthly income in classes, and average net household income of the sample – based on the mean of the classes- was € 2611 per month; which is close to the Flemish average.

Water recreation characteristics

In both countries, a large majority of respondents (92-94%) visit open water. Walking and swimming are the main recreational activities near open water in Zeeland, followed by cycling. Activities such as fishing, boating, and nature appreciation per se are not very important. This picture coincides with general Zeeland tourism statistics: 68% go walking, 75% go to beaches, 50% go swimming and 22% specifically go to a nature area (Kenniscentrum Toerisme en Recreatie, 2006). In the Dender region, a majority (76%) of users are informal recreants, involved in walking and biking, followed by a smaller group who indicates that nature appreciation is the most important activity (14%). Activities, such as fishing, boating, and swimming, are not very important in Flanders (respectively 3%, 3% and 4%). These results are consistent with a study on water recreation in Flanders (WES, 2006). 25% recreates every two weeks or more along or on the water.

In total, 62 % of the Dutch respondents have visited Breskens, followed by Braakman (45 %) and Saeftinghe (42 %). The most popular activities at the beaches near Breskens are walking and swimming. Half of Braakman's visitors come to go walking. At the nature area Saeftinghe, walking and enjoying nature are most popular. Users appreciate all three sites mostly for their nature and tranquillity. For the Dender, the use-rates are much lower. Specific for the three locations in the CE, respectively 39%, 17% and 11% uses the urban/industrial site Aalst, rural site and nature site. Again most of them walk or cycle.

Distances for the Dutch respondents were calculated based on the road network, from the 4 digit postal code of the respondent's residence to the access points of the sites. Considering the natural barriers that the Westerscheldt poses on travel routes, straight line distances were not considered to approximate travel distances accurately enough. For the Dender area, there are few natural barriers and therefore distances were calculated in GIS based on the straight line from the respondents' home addresses (street and number) to the closest point of the river in the three locations. The average distance to Braakman is 34 kilometres, to Breskens 43 kilometres and to Saeftinghe 46 kilometres. The average distance to the river Dender in general is 22 kilometres. The average distance to the three Belgian locations is 24 kilometres for Aalst, 26 kilometres to Liedekerke and 28 kilometres to Kapellemeersen.

The Dutch survey included an additional question which asked respondents to draw the region they feel personally most attached to on a map. The a priori expectation was that whenever a site is included in someone's region, this site has a higher preference. A quarter of the respondents indicated a region that included Saeftinghe. This proportion was higher for Breskens and highest for the centrally located Braakman.

Table 2 Descriptive statistics of general sample Dutch case

Variable	Explanation	NL	BE
Demographic characteristics			
Age (years)		51	48
Gender (% female)	Dummy=1 if female	61%	34%
Membership envir. organisation	Dummy=1 if member		33%
Household size	Number of persons	2.7	
Income	Net household income in €/month)	2117	2611
Education (mode)	NL: 1=primary schooling; 4=intermediate vocational training; 5=higher vocational training, 7=university BE: 1= primary school; 2= secondary school; 3= bachelor; 4= master (not university); 5= university master	5	2-5
Water recreation characteristics			
Visitor open water (%)	Dummy=1 if respondent visits open water	94%	92%
Main activity (mode)	1=walking, 2=cycling, 3=bathing, 4=angling, 5=boating, 6=nature watching.	1	1
User (%)	Dummy=1 if respondent visits the site	Breskens: 62 % Braakman: 44% Saeftinghe: 42%	Aalst: 39% Liedekerke: 17% Kapellemeersen:11%
Visitor other locations (%)	NL: Dummy=1if respondent visits other water bodies in the area BE: Dummy= 1 if respondent visits different river stretches of the Dender	75 %	35%
Personal region (%)	NL: Dummy=1if location falls into region that person is asked to draw on a map and that reflects the region for which he/she feels a sense of belonging to.	Breskens: 35% Braakman: 38% Saeftinghe: 25%	
Distance (km)	One way distance from respondents' residence to site, NL: based on road network, BE: based on straight line	Breskens: 43 Braakman: 34 Saeftinghe: 46	Aalst: 24 Liedekerke: 26 Kapellemeersen: 28
Water quality perception characteristics			
Perception water quality at site	1=good, 2=moderate, 3=bad, 4=don't know, reported modes exclude don't know-answers.	Breskens: 1 Braakman: 2 Saeftinghe: 2	General: 2

Public perception of water management problems

In general, half of the Dutch respondents thought the current water quality was good in the Scheldt area, but found it important to further improve quality in the coming years. Another 40% stated that current water quality in the Scheldt was not good enough and required improvement. Also in Belgium, all respondents wanted the government to take action in order to improve the water quality in their neighbourhood. Only 6% was neutral about that statement. All Belgian respondents found water quality a (very) important environmental issue.

Respondents perceived water quality at Breskens, on average, as good. For Saeftinghe and Braakman, respondents perceived quality on average as being moderate, but many respondents felt unable to judge the quality. In the Dender area, the perception of the respondents was very much in line with the evaluation by the Flemish Environment agency: 60% of the respondents perceived the water quality of the nearby river correctly. 20% thought that the nearby water body has a better quality then in reality – according to monitoring data, and a same percentage considered the quality to be worse than official statistics.

3.3.2 Models

We estimate two different choice models, rooted in random utility theory and Lancaster's attribute based utility theory (Lancaster, 1991). Here, we model the choices among sites as a function of site characteristics that improve under the WFD. Both models are so-called Multinomial Logit (MNL) models, which are restricted the Independence of Irrelevant Alternatives (IIA) property (McFadden, 1974). The IIA property states that the relative probabilities of two options are unaffected by other alternatives (Kanninen, 2007), and thereby poses proportional substitution rates on alternatives. In case two alternatives are more alike than a third, this property is often too restrictive to capture the underlying substitution pattern in the model.

The first model I is a general MNL model, with generic parameters for the three sites. This model only accounts for differences between sites in the alternative specific constant (ASC), and assumes that changes in the site-attributes will be valued equally at all sites. The constant controls for the location characteristics not covered by the attributes.

The second model II estimates site specific utility functions. . Since the alternative sites included in the CE are rather different in the ecosystem services they provide, we had the a priori expectation that the WTP for the recreation and nature amenities would differ across sites. Site-specific effects may lead to different substitution patterns than generic parameters would suggest. In model II, the proportional rate of substitution is circumvented by including site-specific coefficients for those variables that take a different value across sites; a change in the price of alternative A has an effect on the probability of choosing A which *differs* from the effect of the same change in the price of alternative B on the probability of choosing B. However, a price-change of alternative A will still have proportionally the same effect on alternative B and C.Significant site-specific values for attributes will also imply that the values cannot be transferred across sites.

To explain heterogeneity in preferences across respondents, respondent characteristics, such as income, dummies for gender, users, membership of environmental organisations, "personal region", substitute-visitation, and distance, are included in the models.

The results of both models are presented in

Table 3. Considering the improvement of the Log Likelihood, model II outperforms model I and is better capable of predicting choices.

The model I results show that all attributes are significant and have the expected sign. Probabilities of choosing an alternative increase if the quality for walking, bathing/kayaking water or nature improves. More expensive alternatives are less likely to be chosen, as the price coefficient is negative.

We find some common sources of preference heterogeneity for the two countries. As household income goes up, respondents are more likely to choose one of the sites. Users are more likely to choose a site than non-users. Heterogeneity is different regarding gender, membership of environmental organisations, using other sites, and the "personal" region drawn. The first two explain differences in preferences across Belgian respondents, whereas the latter two effects are present in the Dutch sample.

In the Dutch case, respondents that also visit other sites are more likely to choose one of the sites in the CE. This result does not prove that substitution effects between the CE sites and other sites exist. On the contrary, respondents that use other sites may be more aware of the problem at stake and attach higher values to ecological quality improvement in general. Secondly, whenever a site falls into the personal region that the respondent was asked to draw on a map, the probability that a site is chosen increases.

In the Dender study, we find that men are more likely to choose one of the sites than women. One of the reasons may be that women have a better insight in daily budget because they do the shopping, take care of the kids etc.. People who are member of an environmental organization value the improvements higher than non-members.

Last but not least, we find a significant distance-decay (DD) effect. The further away from the site the respondent lives, the less likely it is that the site is chosen. In model I, the DD-effect is linear for the Dutch Westerscheldt locations, which implies that the value decreases at a constant level per kilometre. In the Dender locations, however, the DD-effect gives the best statistical fit if included in the natural logarithm. This means that the willingness to pay rapidly decreases close by the site, but stabilizes as distance increases.

In the next step, we compare model I and II results to account for site-specific effects. The model II results show that there are several site-specific coefficient values. For the Dutch sites, we find significant differences across sites in attribute values for nature and bathing water at good quality levels. Improving bathing water quality to a good level is higher valued at Braakman than at Breskens. Good nature quality has the highest value at Saeftinghe, followed by Braakman and Breskens.

In the Dender study, some of the attributes are not significant for all sites. For instance, walking at moderate level at Liedekerke and kayaking at moderate level at Kapellemeersen are not significant. This shows that people are not willing to pay for such an increase. A possible explanation is that people think that at these locations a moderate change is too small for the presented increase in water taxes.

In both countries, the interactions with respondents' characteristics variables have site-specific effects. In the Dutch case, the effects of income, using the sites and distance are also different across sites. As income increases, the probability that Breskens is chosen increases most, whereas the effect on Saeftinghe is lowest. The probability of choosing Braakman and Breskens increases more if a respondent visits the site than the probability of choosing Saeftinghe. Also in the Dender, there are some differences between the sites concerning users. Especially for the more rural site (Liedekerke) the difference between users and non users is larger than for the other two sites. Furthermore, gender-effects are not found for Liedekerke:

there are no differences between men and women in their preferences for this site. We find a significant difference in the coefficients for the membership dummy at Liedekerke and Kapellemeersen, with the effect membership larger at Kapellemeersen than at Liedekerke. This is as expected, because Kapellemeersen is a nature reserve area. There is no significant effect of the membership of environmental organisations on the choice for Aalst.

Finally, the DD-effect results of model II are interesting. Model II shows that the DD-function for Breskens has a quadratic form, meaning that the WTP for Breskens slowly decreases close to the site, but exponentially decays the further away a respondent lives. This is contrary to the DD-effect of Saeftinghe. Here, the DD-function has a logarithmic form, which means that WTP rapidly decreases in the close range to the site, but stabilizes as distance increases. For Braakman, we don't find any significant distance-decay effect. It is likely that for the latter site, the user-dummy variable explains most of the preference heterogeneity regarding visiting the site.

In the Dender study, we only find a significant distance decay effect for Aalst and Liedekerke, which is again with distance transformed to its natural logarithm. For the natural area Kappellemeersen, the DD-effect is not statistically significant. This might be explained by the fact that at the nature area non-use values are more important. A quadratic function, meaning that the willingness to pay slowly decreases near the site, but exponentially decays further away, gives the best fit for this latter site – but remains insignificant.

One important conclusion that can be drawn from the results of the second model, is that we cannot transfer a general value function from one site to another without causing some transfer errors.

Table 3 Choice model results

	NL	NL		BE	BE
	MODEL I	MODEL II		MODEL I	MODEL II
Explanatory factor	General MNL model	Site specific utility functions		General MNL model	Site specific utility functions
ASC Breskens	-5.5502 (-7.009)	-6.6749 (-7.112)	**ASC Aalst**	-0.5011* (-2.2875)	-0.1155*** (-0.5279)
ASC Braakman	-5.9330 (-7.487)	-6.3400 (-6.278)	**ASC Liedekerke**	-0.4465* (-2.034)	-0.1266*** (-1.5797)
ASC Saeftinghe	-5.5331 (-6.985)	-2.6513 (-2.572)	**ASC Kapellemeersen**	-0.2181*** (-0.9911)	-0.4948 (-2.9464)
Attributes					
Walking – moderate	0.3227 (4.985)	0.3387 (5.170)	**Walking – moderate**	0.3263 (5.2179)	
			Aalst walking - moderate Aalst		0.4408 (0.5959)
			Kapellemeersen walking - moderate		0.4408 (0.5959)
Walking – good	0.8606 (13.63)	0.8919 (13.89)		0.7152 (11.8338)	0.6918 (12.2838)
Bathing – moderate (Braakman)	0.2086* (2.027)	0.5064 (4.249)	**Kayaking - moderate**	0.1643 (2.6664)	
			Aalst kayaking - moderate		0.2644 (3.6320)
			Liedekerke kayaking - moderate		0.2644 (3.6320)
Bathing – good	0.7778 (11.77)	-	**Kayaking – good**	0.5422 (9.0227)	0.5503 (9.3550)
Breskens bathing – good	-	0.5146 (6.348)			
Braakman bathing – good	-	1.2835 (11.280)			
Nature – moderate	0.3524 (5.398)	0.3526 (5.358)		0.6097 (9.4853)	0.5989 (9.3312)
Nature- good	0.8687 (13.57)	-		1.1158 (17.8075)	1.0872 (17.3719)
Breskens nature – good	-	0.7187 (7.807)			
Braakman nature – good	-	0.8659 (8.626)			
Saeftinghe nature – good	-	1.0590 (10.594)			
Price	-0.0162 (-16.25)	-0.0161 (-16.083)		-0.0125 (-12.201)	-0.0127 (-12.325)
Preference heterogeneity					
Income (logarithmic)	0.6727 (6.382)	-	**Income (linear)**	0.00025 (4.5570)	0.00026 (4.7438)
Breskens income (logarithmic)	-	0.8262 (6.610)			
Braakman income (logarithmic)	-	0.6635 (5.002)			
Saeftinghe income	-	0.4851			

(logarithmic)		(3.701)			
			Gender	-0.2906 (-2.6054)	
			Aalst – gender		-0.2553 (-3.1845)
			Kapellemeersen - gender		-0.2553 (-3.1845)
User (dummy)	0.6811 (10.85)	-	**User (dummy)**	0.5906 (5.8926)	
Breskens user (dummy)	-	0.7750 (8.157)	***Aalst user (dummy)***		0.4019 (3.3758)
Braakman user (dummy)	-	0.7871 (7.441)	***Liedekerke user (dummy)***		0.7613 (4.6092)
Saeftinghe user (dummy)	-	0.4869 (4.950)	***Kapellemeersen user (dummy)***		0.4087 (2.0559)*
Location in "personal" region (dummy)	0.4499 (6.600)	(0.4368 (6.363)			
			Membership of envir. org (dummy)	0.428112 (3.46518)	4)
			Liedekerke - membership		*0.2206* (2.1554)*
			Kapellemeersen-membership		*0.4517 (5.0003)*
Visitor of substitutes (dummy)	0.2765 (2.448)	0.2959 (2.609)			
Distance (km)	-0.00426 (-3.055)	-	**Distance (logarithmic)**	-0.0958 (-2.0722)	
Breskens distance (quadratic)	-	-0.00004782 (-2.677)	***Aalst distance (logarithmic)***		-0.1981 (-4.1607)
Braakman distance (linear)	-	-0.00089*** (-0.309)	***Liedekerke distance (logarithmic)***		-0.1981 (-4.1607)
Saeftinghe distance (logarithmic)	-	-0.4533 (-5.564)	***Kapellemeersen distance (quadratic)***		-0.00003*** (-1.1724)
No. of observations	3188	3188		3249	3249
Log Likelihood	-3738.409	-3698.421		-3872.875	-3843.877

Explanatory notes: Models are estimated using Limdep 8.0. T-values are given in brackets. All parameters are significant at 1%, except if marked by stars: *significant at 5%, or *** not significant.

3.4. Estimated economic values for water resource management

3.5. Estimated economic values for water resource management

The next step in the analysis is the calculation of implicit prices. We estimate these by the marginal rate of substitution of the attribute coefficient and the price coefficient. The confidence intervals for these implicit prices are based on the Delta method (Greene, 2003).

Table 4 focuses on the implicit prices which differ between models I and II. Compared to model II, model I underestimates the WTP for moderate and good bathing water quality at Braakman, whereas the WTP for good bathing water quality at Breskens is largely overestimated. Similarly, model I underestimates the value of good nature quality at Saeftinghe and overestimates the same attribute level for Breskens.

For the Dender, model I gives lower values for the WTP for moderate walking and kayak quality and higher values for the other attributes than model II. However, both models give overall the same conclusions: people value improvements in the biodiversity higher followed by improvements at the river banks (walking) and kayaking quality.

Table 4 Attribute implicit prices (€ per household per year) for different model specifications with and without contextual changes

	NL		BE	
	MODEL I	MODEL II	MODEL I	MODEL II
Attributes	General MNL model	Site specific utility functions	General MNL model	Site specific utility functions
Walking – moderate			26.19	34.85
Walking – good			57.42	54.70
Bathing – mod. (NL: Braakman)	12.87	31.32	13.19	20.91
Kayaking – moderate (BE)	(6.43)	(7.70)		
Bathing – good (NL)	47.97	-	43.53	43.52
Kayaking – good (BE)	(4.87)			
Breskens bathing – good	-	31.84		
		(5.30)		
Braakman bathing – good	-	79.40		
		(8.43)		
Nature – moderate			48.95	47.35
Nature- good	53.58	-	89.55	85.96
	(5.00)			
Breskens nature – good	-	44.46		
		(6.17)		
Braakman nature – good	-	53.56		
		(7.01)		
Saeftinghe nature – good	-	65.51		
		(7.32)		

Explanatory notes: Values expressed in 2007-Euros per household per year. The standard errors in brackets are estimated based on the Delta method (Greene, 2003). Parametric bootstrapping procedures were also applied (Krinsky and Robb, 1986), but generated similar results.

3.6. Economic value of WFD policy scenarios

The final step of the analysis involves the calculation of changes in consumer surplus resulting from different policy scenarios. The value of each scenario is compared to the value of the baseline scenario (in which all attributes have a bad quality).

From the results, as presented in

Table 5, we can see that in both models of the Dutch sample, achieving overall moderate ecological quality generates the highest welfare at Braakman (€54 per household per year). This is due to the increase in bathing water quality from bad to moderate level. Model I results suggest that achieving good ecological quality is valued similarly at Braakman and Breskens. However, the results of model II – which is preferred over model I – show that society would benefit most if improvements to good ecological quality would take place at Braakman. Values for Saeftinghe are lowest, because this site does not generate consumer surplus for bathing water quality, but the difference with Breskens is not significant. This is due to the high values that respondents attach to nature at Saeftinghe.

From the results of the Belgian sample, we can see that the policy achieving overall moderate quality generates the highest welfare at Aalst (€103 per householdper year). For this site all the attributes with moderate quality where significant, where for the other sites this was not the case. For an overall good quality, there is no difference find between the three locations. It is clear that the more general model would overestimate the values for both Liedekerke and Kapellemeersen in the moderate scenario.

Overall, these values of the Dender are of the same order of magnitude compared to literature for similar types of rivers (e.g. NERA 2007, Brouwer 2004). They are higher compared to the values from the written questionnaire by Brouwer (2007). It has to be noted that the respondents from the questionnaire of Brouwer had on average a less intensive use of the river (60 %).

It should be noted that these results reflect the value that local residents expect to gain from achieving WFD objectives. The total economic value of the objectives may be higher, since we do not take into account for instance, the WTP of foreign tourists or other visitors from outside the sampling area. Therefore, the values presented here should not be considered as the Total Economic Value of implementing the WFD at these sites.

Table 5 Consumer surplus (€ per household per year) for different policy scenarios

NL			BE		
	MODEL I	**MODEL II**		**MODEL I**	**MODEL II**
Policy scenario	General MNL model	Site specific utility functions	**Policy scenario**	General MNL model	Site specific utility functions
1) Breskens: all attributes moderate	41.64 (9.01)	42.76 (6.64)	**1) Aalst: all attributes moderate**	88.33	103.11
2) Braakman: all attributes moderate	54.51 (9.25)	74.09 (10.46)	**2) Liedekerke: all attributes moderate**	88.33	68.26
3) Saeftinghe: all attributes moderate	41.64 (9.01)	42.76 (6.64)	**3) Kapellemeersen: all attributes mod.**	88.33	82.20
4) Breskens: all attributes good	154.64 (11.57)	131.47 (12.55)	**4) Aalst: all attributes good**	190.50	184.18
5) Braakman: all attributes good	154.64 (11.57)	188.14 (16.16)	**5) Liedekerke: all attributes good**	190.50	184.18
6) Saeftinghe: all attributes good	106.67 (9.13)	120.68 (11.11)	**6) Kapellemeersen: all attributes good**	190.50	184.18

Explanatory notes: Values expressed in 2007-Euros per household per year. The standard errors in brackets are estimated based on the Delta method (Greene, 2003).

4. Valuation results: comparison between the two case studies

As the two cases use similar questionnaires and find similar models to estimate the willingness to pay we may compare the results.

In general the models of both case studies have an overlap in some of the socio-demographic characteristics. Both cases find an impact of income, use and distance on the choices. However in the Dutch case, there was no significant impact of gender which was clearly found in the Belgian case. Some variables are survey-specific such as the drawing of the "personal region" in the Dutch case.

The implicit prices of both studies show that people put more weight on the attribute biodiversity/nature than on the other two, especially when there are only moderate changes.

Comparing the willingness to pay results for scenarios with all the attributes at the good level, we see similar results although the Belgian case generates higher WTP results. This is partly due to the fact that the changes in quality levels are larger compared to the Dutch sites. Another reason might be the dominance of men (69%) in the sample as the results indicate that they are willing to pay more. The model was not corrected for that. It should be noted, however, that values can not be compared without correcting for differences in the scale parameters of the country's models, which has not been done so far.

A much larger difference though, lays in the fact that the Dutch case finds more site-specific parameters than in the Belgian case. In the Belgian study, some attributes were found to be insignificant for a specific site, but no site specific parameters for attributes were found.

5. Conclusions

The results of both case studies show that achieving the WFD 2015 objectives – as translated into different attributes – will generate different, site-specific values. Water managers in the Dutch Scheldt area could generate most consumer surplus among local residents if they improved the ecological quality at Braakman up to good levels. For improvements up to moderate levels, Aalst would generate the highest benefits for society in Belgium (103 Euro per household per year).

The higher quality the attributes have, the higher the implicit prices for the attributes are, which implies sensitivity to scope. These results suggest that achieving higher objectives of the WFD will also improve welfare of the population.

Regarding the methodological contribution of this study, we show that CE offers the possibility to calculate site specific values by labelling the alternative sites. The case study design explicitly accounts for substitution effects by asking people to choose among sites. Furthermore, by showing a map with all water bodies in the area and asking various questions about other sites they visit, we have made respondents think actively about the possible substitutes.

In the site-specific models, we showed that values may differ across sites. Whereas values for good walking quality in the Dutch case are generic, i.e., do not differ across sites, WTP for improvement from bad to good bathing water and nature quality are dependent on where the improvements take place. Disregarding site-specific values may result in an underestimation of implicit prices of individual attributes of almost 140%.

In the Belgian study, achieving moderate levels of walking and kayaking do not significantly improve the value people are willing to pay for Liedekerke and Kapellemeersen. The more general model would overestimate the values for both sites in the moderate scenario.

The site-specific values furthermore limit the possibilities for unadjusted benefits transfer across sites. For an overall good quality, there is no difference find between the three Belgian locations – only in this scenario values would be transferable across all three sites.

The spatial distribution of water bodies and their users and non-users is expected to affect the economic value attached to the different water bodies and the river basin as a whole in a number of ways. An important objective of AquaMoney is to test and demonstrate how and why this is the case. Distance decay was found for all, except one, of the sites. The distance-decay effects have different functions. For the Flemish nature reserve (Kapellemeersen), we do not find distance-decay within the range we have sampled (40 km), as relatively more non-use values are present. For the other sites, however, distance-decay are present even after controlling for user-effects.

6. Best practice recommendations

6.1. Design of the economic valuation scenarios: information supply burden

Guidelines: "Scientific knowledge and information and the uncertainties surrounding this knowledge and information have to be translated into easy understandable terms in the valuation scenarios. The quality and quantity of information supplied in social survey research has important consequences for the outcome."

An important recommendation is to put enough effort and time in this translation, because by thinking through the design and the questions of the survey a lot of useful information can be gathered and biases can be prevented. Test the comprehension and perception of the text and pictures in the survey. Make them as realistic as possible. Photos can be used but to explain complex items such as ecological status, biodiversity … it may be more comprehensible to use pictograms or drawings.

Regarding the chosen attributes and levels, this case study split the WFD objective into several components of good ecological status. Although respondents accepted/believed that these components could have opposite quality levels (good vs. bad) at the same time, it might not have been realistic in ecological terms. Here, we considered the perception of respondents as leading argument in our choice for survey development.

To make the results as transferable as possible, you have to choose sites that are relatively generic. In the Dutch case study very specific sites were chosen, what makes it very difficult to transfer WTP values to other sites. Transferring without testing if sites are perceived as generic may however significantly bias transfer results.

Regarding the use of maps in portraying the water quality, a trade off between wide geographical area and the visual quality on the computer screen need to be made in online surveys. A wide geographical scope should include a number of small substitute sites, which were impractical to include because of the overview of the area on the screen.

To make the experimental design, use a program as Sawtooth. The various design generation methods included in the program are able to generate a D-efficiency design which allows for the estimation of cross-effects (interactions between alternatives).

6.2. Spatial dimensions underlying water valuation

Guidelines: "Space may play various roles in economic valuation studies. "

Both case studies focus on the spatial distribution of the population of beneficiaries or polluters inside and outside the river basin and their specific characteristics relevant for economic valuation (e.g. income levels, perception of quality, distance and accessibility etc.) by choosing the sampling area large enough and sample throughout the area, reflecting the population distribution.

Note that WTP for environmental goods and benefits may vary significantly across sites in the same catchment. The changes in goods and services provided depend on the ecosystem of the sites, which can change at short differences: different type of water bodies may therefore ask for different valuation exercises.

Collect data on users and non-users. In the analysis some of these characteristics have a significant effect on the WTP for GES, and may also explain or impact distance-decay effects. So these characteristics need to be included in the value function in order to make a better benefit transfer.

In order to get a good geographical distribution of the sample population, an 'effective' way is to do a door-to–door survey. This allows for maximum control of the geographical distribution of the sample over the study area. If an online survey is used, a way in getting detailed information on people's living location is to invite them to participate with a coded letter so every code is linked to an address. This easily put in to GIS.

6.3. Sampling mode and strategy

The Dutch case study used geographical sampling, door-to-door survey

Advantages:

- interviewers can explain the choice tasks, experiment, scenarios etc.
- geographical distribution of sample is easily controllable
- all steps in the implementation can be monitored and quickly corrected, no dependence on third parties

Disadvantages:

- interviewer bias
- logistic organisation needed to sample over a wide area takes much effort
- recruitment of interviewers is time-consuming
- non-response takes interviewer-time
- paper based surveys reduce the number of versions that can be used, for practicality (in the experimental design of the CE).

The Belgian case study used web-based sampling but potential respondents were randomly contacted by coded letter.

Advantages:

- good geographical coverage;
- large number of choice cards
- relatively cheap way of contacting people

Disadvantages

- time consuming gathering addresses or buying them from companies is not easy
- sample representativeness is not guaranteed (but seems to work)

The survey took the respondents 30 minutes to answer, especially. Two methods were used (CVM and CE). This made the survey long, and some of them ended the survey earlier.

Face-to-face interviews ensure that all information is presented and read out loud to respondents, offer respondents the possibility to ask questions if parts of the survey text need clarification, etc. However, considering the constantly improving databases of survey companies, the higher ownership of PCs and internet connection rates of households, and households' experience with online surveys, the time, money and effort that organising a door-to-door (face-to-face) survey in a relatively remote area cost may be higher than the advantages.

6.4. Analysis

LIMDEP 7.0 was used. For MNL models, the Hensher book gives clear documentation. The new version of LIMDEP includes more advanced models, including latent class, mixed logit models. The program is not very user-friendly compared to other statistical software programs – according to some.

It is useful to compare the WTP for different levels of the quality attributes (is also internal validity test).

Test the theoretical validity: the sign and significance of socio-economic indicators, such as income and distance.

Test the convergent validity (comparison with prior WTP surveys) is very useful.

Differences between welfare estimates were not only tested by Wald and LR-test, but also by Poe-test (simulation-based). Confidence intervals of welfare estimates of scenarios were calculate based on the Delta Method (Greene, 2003); the Krinsky and Robb procedures (1986) generated similar results.

More clarification/study may be needed of the effects of different methods of coding attributes and levels.

6.5. Reporting

Give enough information about socio-demographic characteristics of the respondents, geographical coverage and detailed information on the characteristics of the site and the change in attributes so it facilitates a better benefit transfer.

Disseminate the results to the policy makers working with the WFD, allowing them to build a stronger file comparing costs and benefits of WFD-implementation.

Disseminate results to the public. This will make them less reluctant to fill out another survey.

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