Exploring local knowledge of the flooding risk of the Scheldt Estuary

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Abstract 'The public should be involved in the decision making process' is an oft heard statement, but the practice of public participation remains a worrisome issue for policy makers and planners. In this paper we describe local knowledge of flooding risk in the vicinity of the Scheldt Estuary derived through in-depth, semi-structured interviews with fourteen inhabitants. We compare and contrast this knowledge with that of scientists involved in the assessment of the flooding hazard posed by the tidal Scheldt and with that of Dutch and Flemish policy advisors. We identify areas of common knowledge, confirm the accuracy of much local knowledge and recognize the perspicacity of a number of the questions posed by local inhabitants. This exploratory study serves to confirm that background local knowledge can be a valuable tool in designing responsible policy processes for flood risk management.

Keywords Citizens’ values; coastal flooding; flood risk management; public participation; stakeholder consultation

Introduction

Enhancing public participation in decision making is becoming an ever more important issue in water management internationally. Indeed, the European Water Framework Directive requires that citizens be involved actively in the long term management and monitoring of European water bodies (WFD, 2000). Because flood prevention and amelioration measures influence the quality of the spatial environment, public participation in decision making on such measures in the flood-prone Netherlands would seem natural. However, although such public participation is viewed as important in policy making, it is often rather reactive in character; the public is involved in the latter stages of a project and is asked to react to plans that are already fairly well established (Stolp, 2006). One can view this as information provision rather than two-way communication or interactive planning (HarmoniCOP, 2005). This can generate resistance and distrust and cause participants to ask themselves, how much influence they really have on the plans. Are they not being used to steer (controversial) plans through the planning process? Besides this justifiable concern, involving the public later in the process can be viewed as a missed opportunity to incorporate local knowledge into the planning process at a formative stage. However, involving the public earlier and organizing two-way communication is more easily said than done and much effort has already been directed at the provision of guidance documents for public participation design (WFD CIS, 2005; HarmoniCOP, 2005). More intriguing, is that this view of public participation rests on an underlying premise that accessing local knowledge will necessarily improve the quality of the
decision-making process. In this study we explore the validity of this underlying premise focusing on flood risk management in the vicinity of the Scheldt Estuary.

More specifically, we are interested in the background (explanatory factors) used in defining flood risk management policy options and evaluation criteria and want to know:

- What knowledge do residents in the vicinity of the Scheldt Estuary have regarding flooding?
- What criteria do these citizens use, or would they like used, in the evaluation of the effectiveness of flood prevention and amelioration measures for the Scheldt Estuary?
- To what extent do these criteria differ from those used by scientists involved in improving the determination of flooding hazard?
- How well does this accord with present policy processes?

**Study area**

The Scheldt Estuary meanders from Vlissingen on the North Sea Coast of the Netherlands via the port of Antwerp to Gent in Belgium (Figure 1). The estuary is tidal along its full extent and is the only remaining estuary on the Northwestern continental coast of Europe with a salinity gradient from seawater at the mouth to freshwater at its head (LTV, 2001). It hosts vast tidal marshes, particularly at Saeftinghe near Bath and the Dutch-Flemish border and is home to a wide variety of fauna from macro-invertebrates to fish, seals and waterbirds. The Scheldt Estuary provides shipping access to the port of Antwerp, the Flemish economic centre. In 1999 to 2001, breaking with a 300 year tradition of conflict over the Scheldt, the Dutch and Flemish developed a joint Long Term Vision for the Scheldt Estuary (Zanting et al., 2002). In this broad policy document (LTV, 2001) the triple functions of shipping, safety from flooding and the ecosystem are emphasized. Since then many activities have been undertaken under the auspices of the joint Dutch-Flemish project bureau ProSes (and then ProSes 2010 (2006)) aimed at the implementation of the developments necessary to achieve this long term vision. However, although the flood hazard estimates for the Belgian sections of the Scheldt Estuary are being updated (Marchand et al., 2006), there are no such activities planned for the Dutch sections, nor plans to undertake this jointly. Similarly, we are unaware of attempts to involve citizens actively in planning for flood prevention or amelioration measures.

**Figure 1** The Scheldt Estuary extends from the Dutch town of Vlissingen on the North Sea Coast via Bath over the border with Belgium to the Flemish harbour of Antwerp and on to Gent. The tidal marshes of Saeftinghe are demarcated as the tinted area near Bath (Nauw van Bath)
Method

The EU-funded FLOODSITE research programme aims to develop and test an integrated European methodology for flood risk analysis and management (FLOODsite, 2005). This includes improving the flood risk assessment of the Scheldt Estuary, in particular (Marchand et al., 2006). Instead of assuming that only improved scientific assessment (e.g. via hydrodynamic model simulations and flood hazard mapping) can accomplish this, we designed the study to explore whether active involvement of citizens could contribute to such knowledge development.

Consequently, the major participants in the study are citizens living in the vicinity of the Scheldt Estuary and a small number of scientists attempting to bring new knowledge into the policy debate on the Scheldt Estuary. In selecting these participants, we needed to find people living in the vicinity of the Scheldt Estuary who normally do not participate in research or policy processes dealing with flood risk management. To find these people we used a method called snowballing. First we generated a list of preferred stakeholders on the basis of their professional or recreational activities and their rural and urban living environments. In addition we strove for equal numbers of Dutch and Flemish participants with sufficient variation in age, gender and nativeness to the area. Then, starting with a few general information sources, namely websites (e.g. recreational fishing in the Delta), the yellow pages and a distant acquaintance of one of the project team members, who is a representative on the municipal council of a town in the province of Zeeuws-Vlaanderen, we initiated email or telephonic contact with the people suggested to us via these sources. By being very candid about the scope and purpose of our research we were able, often via yet another contact person, to track down potential respondents. A record of the search for respondents was kept to ensure that the primary search criteria were adhered to and the eventual composition of the respondents group (Table 1) could be explained.

Semi-structured, in-depth interviews with each of the respondents were held in the period September to November 2005. The interviews lasted approximately 1.5 hours or longer and were conducted either at the homes of the respondents or at their places of work. Each interview began with the interviewers explaining the role of the study within the EU FLOODsite project and the independence of the study from current policy processes. Thereafter, the personal and contact details gathered during the first telephonic contact were checked. Then respondents were asked questions regarding their relationship

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with the area, their affinity with water, whether (and what) they thought about flooding and the risk of flooding, their or their family’s experience of flooding (if any), their knowledge of evacuation plans, their ideas regarding evacuation and the recovery process after a flood. They were also asked specifically what they knew of measures to prevent or ameliorate flooding and factors they considered important in determining the efficacy of these measures. The respondents were encouraged to answer based on their life experience and provide their opinions, not those representing any particular group of people. The recorded interviews were subsequently written up and sent to the respondents for correction and comment. An undertaking was made regarding anonymity, the storage of the information obtained via the interviews and communication regarding any future use of the information.

The scientists interviewed (Table 1) were selected on the basis of their involvement in the broader FLOODsite project and the relevance of their fields of expertise to improved flood hazard estimation. They were interviewed in late October and November. The interviews followed the same format as those of the local inhabitants, although we replaced the first question with a question regarding their bond with their field of study and then their bond with the Scheldt Estuary in particular.

A consultative workshop with five policy makers and advisors (2 Dutch, 3 Belgian) on the Scheldt Estuary and environs was held on 5 December 2005. The aim of the workshop was to communicate the goals of the FLOODSITE project in general and the Scheldt Pilot Study in particular. Communication of the findings from the interviews with local inhabitants occurred and questions regarding the present policy initiatives in the area were asked. Comments from the policy makers and advisors on the findings of the study were requested and recorded for comparison with those of the respondents and scientists.

Following the generation of new flood hazard maps for areas of the Scheldt Estuary, a workshop was arranged on 26 January 2007 in which scientists involved in the broader FLOODsite project were present to communicate their (improved) understanding of flood risk management and the flooding hazard in the vicinity of the Scheldt Estuary, in particular. Attendance by the respondents was on a voluntary basis. The effects of new knowledge on the priorities placed by inhabitants and scientists on various flood risk management measures were explored, but will not be addressed specifically in this paper.

Results
The results of the interviews with local inhabitants are summarized below.

Bond with the area
This varied greatly amongst the respondents. Some associated very strongly only with the village (or house) where they lived, others the island (e.g. Zuid Beverland) or province (Zeeuws-Vlaanderen, Oost Vlaanderen) where they lived and still others viewed themselves as a world citizen. Identification of the perspective of each respondent proved helpful in understanding and interpreting their subsequent responses.

Affinity with water
There were strong differences between respondents in regard to their affinity with water. Some were afraid of water and had little or no bond with the water of the Scheldt Estuary. All those who worked on the water or who spent leisure time on or near water, had a deep appreciation of aspects of the Scheldt Estuary, e.g. fish, peace and beauty, shipping, ecosystem.
Perception of flooding risk

Every one of the respondents had thought about flooding at some stage or another, but all except one respondent felt safe. This respondent (a wheelman) was the only one who had personal experience of flooding, albeit in another land. Five other respondents had some experience of high water or had heard stories of flooding from family members. No one knew of evacuation plans for the area, but all except one respondent (the wheelman) trusted that they existed and would be communicated to them when required. Despite this faith, each person had made a personal evacuation plan. No one hesitated a moment in responding to this question. Some had gone so far as to plan where they would go (an inland town) should they be separated and not be able to find one another after a flood event.

All the Flemish people questioned were convinced that they had a lower standard of flood protection than the Dutch. However, when questioned regarding the recovery following a flood event, the Flemish were universally convinced that the state would do as much as it could to help the recovery and were relatively secure in this trust. The Dutch respondents were less convinced. They thought that the Dutch government would do its best, but that this would be insufficient and the recovery would have to come from the people themselves. There was concern about the effects of poisonous substances and environmental pollutants following flooding of the industrial areas. Percipient questions about precautionary planning on the part of the government were asked. For instance, are there measures in place to encourage flooded international companies to remain in the Netherlands and Belgium following a flood event, or not. This relates to a concern regarding employment opportunities during such a recovery period and stems from knowledge of the hardships following the floods that occurred in the winter of 1953.

Measures for flood risk management

When asked about their knowledge of flood defence and amelioration measures all Dutch respondents mentioned dyke strengthening and maintenance measures with approval. Sixty percent of the Flemish respondents said that the Flemish authorities should strengthen and maintain their dykes to match those of the Dutch. Every Flemish respondent knew about the return of reclaimed areas to the estuary (de-poldering) to increase retention and so reduce flooding. Not all agreed with these measures. The farmers were of the opinion that the area of the Hedwige-Proper Polder, adjacent to the tidal marshes of Saeftinghe, was insufficiently large to be effective and did not favour the return of farmland to nature. Even environmentalists were sceptical of the efficacy of the measures, but approved them. All, but one, of the Dutch respondents viewed de-poldering measures as controversial and probably unnecessary. The environmentalist favoured de-poldering. Whereas the reasoning behind such measures was understood in Flanders, there was little understanding amongst the Dutch. There was concern regarding the indirect effects of expropriated farmers driving the price of farming land up in the area and much stress associated with the uncertainty of whether they would be able to continue farming or would also have their land expropriated.

Weak points in the flood defences were also mentioned to us. For instance, the disparity in the height of the dyke at the transition point on the east bank of the Scheldt Estuary at the Dutch-Belgian border was mentioned by two respondents. The potential overflow at the sluices of Antwerp were also mentioned. Local areas of increased vulnerability to industrial and shipping accidents were mentioned as serious concerns on a par with the flood hazard. There was concern that this does not receive the attention it deserves.
In response to the question about what they would consider the worst effects of a flood, twelve of the fourteen respondents replied loss of life and suffering of the people. One respondent considered the environmental damage from pollution etc. to be the worst effect because of its long term effects and one respondent viewed property damage as the worst effect.

The results of the interviews with scientists are summarized below.

**Bond with the field of study and the area**
Both of the scientists interviewed are involved in other sub-projects of the broader FLOODsite study and will contribute to the design of a European approach to flood risk management. Neither has a strong bond with the Scheldt Estuary.

**Affinity with water**
One of the scientists has a strong affinity with water and this led indirectly to the choice of career in hydrology and specialization in riverine flood management. The other has an affinity with statistics and applies his statistical knowledge to flood risk management.

**Perception of flooding risk**
Neither has direct experience of flooding and neither is afraid of flooding. Both don’t have knowledge of evacuation plans for the areas in which they live. Both scientists considered (potential) loss of life to be the worst effect of a flood followed by environmental damage. For the Scheldt area, a major concern would be the environmental damage if industrial areas were to flood and the fact that in the Dutch areas the water can rise to 3 m and above very quickly. However, on the positive side houses are now much stronger than in 1953, when many collapsed. On the negative side, there are also many more people living in Zeeland than in 1953. If people all try to evacuate by car and get into a traffic jam on the low-lying highway, this would form a major problem.

**Measures for flood risk management**
Flood management and amelioration measures should include maintenance of the dykes otherwise they pose a hazard in themselves. Present knowledge indicates that it would flood first in Flanders, but they would like to know where precisely so as to be able to evaluate measures effectively using hydrodynamic simulation models. They place a value on incorporating the fullest possible range of alternative measures in the calculations so as to be able to establish a representative picture of their effectiveness in flood prevention and amelioration. The Flemish base their evaluation of flood risk on a cost-benefit analysis. The Dutch scientists questioned whether this is an appropriate instrument for evaluation in the Netherlands. How do you account for loss of life and environmental damage using such a method? Improved information on land use and land use trends is critical to decision making on flood risk management. They consider it essential that the flood hazard presented by the Scheldt Estuary should be calculated based on present and future land-use and present day knowledge of potential high water levels.

Neither of the scientists knows or has had any contact with policy makers dealing with flood risk management on the Scheldt Estuary.

During the workshop with policy makers and advisors, the set-up and results of the interviews with local inhabitants were presented. The workshop participants were asked to supply information on local policy initiatives such as de-poldering and dyke strengthening, because these had been mentioned during some of the interviews. This information
was used as a check of the accuracy of some of the interview information. They were also asked to give their opinions on the FLOODsite initiative.

The policy advisors endorsed the detailed information supplied by the respondents. For instance, they agreed that the Hedwige-Proser Polder was too small to effectively attenuate flooding levels and that it was therefore to be viewed as a nature development rather than a flood amelioration measure. They confirmed that the sluices of Antwerp are a low point in flood defences, but explained that the industrial area in the vicinity is on elevated ground. In general, they were surprised at the accuracy of the knowledge acquired through the interviews with local inhabitants.

The findings regarding the peoples’ perception of safety were received favourably. No one was surprised that the Flemish had less faith in their dykes than the Dutch, but the higher level of trust of the Flemish in their government following a flood event did come as a surprise. The lack of knowledge of evacuation plans did not surprise them. Additionally, they recognized the implications of questions regarding precautionary planning and admitted that to their knowledge there were no plans regarding clean-up actions following a flood or undertakings made with international organizations to continue operations in the Netherlands or Belgium following such a flood event. The length of time taken for expropriation of farming land and the indirect effects of this on farming communities and individual citizens were acknowledged as justifiable concerns.

In contrast to the opinions of the scientists, the policy makers and advisors didn’t view knowledge of future land-use as essential to effective flood risk management.

Discussion and conclusion

Despite the exploratory nature of this research, some valuable conclusions can be drawn. Where we were concerned prior to the study as to whether we would even be able to identify relevant local knowledge regarding flooding and the danger of flooding amongst the citizens selected for the study, we found a depth of understanding of their living environment amongst the people of the Scheldt that astonished us. Only those with professions providing them with primary contact with the water showed an understanding of flooding comparable with that of the scientists. However, peoples’ insights regarding the consequences of flooding and the recovery thereafter went deeper than scientific understanding and their comments regarding the (lack of) utility of some of the planned policy measures to promote safety from flooding were confirmed as valid by policy makers. In fact, the policy advisors were also surprised by the high quality of the information derived from the study and felt challenged by the request for precautionary post-flood planning measures.

Where we expected differences between the views of Dutch and Belgian respondents regarding flood risk management there were more differences between people with an affinity for water and those without, than between the Dutch and Belgians. Those who work or spend leisure time on, or near, the water (e.g. fisherman) had a deeper appreciation for the dangers of flooding than did the respondents with no affinity for water. In this, those with an affinity for water had an understanding more comparable with that of the scientists.

The criteria that the respondents use in evaluating flood risk management measures do indeed differ from those of the scientists who are looking to establish the utility of a particular measure. Local inhabitants are more concerned about the process of designing all of these potential measures and not of evaluating only one. In essence, the respondents provided criteria for the planning process itself rather than for the detailed measures therein. For instance, when it comes to the expropriation of farming land for nature development or to protect the city of Antwerp from flooding, some view this as
necessary, but ask that the process be organized so as to limit the secondary effects of increasing the price of farming land or disinvestment because the expropriation does not happen speedily enough. Such concerns are presently not considered explicitly in a policy process because the public are not involved in the design of the process itself. This study indicates that it is public involvement in its design that could potentially lead to improvements in the quality of the planning process.

Acknowledgements

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References