Saltmarsh restoration by a controlled, reduced tide at Hamme, Lippenbroek - BE

1. Policy Objective & Theme

- ADAPTATION TO RISK: Managing impacts of climate change and safeguarding resilience of coasts/coastal systems
- ADAPTATION TO RISK: Preventing and managing natural hazards and technological (human-made) hazards

2. Key Approaches

- Integration
- Technical

3. Experiences that can be exchanged

The design of a mud-flat & salt marsh area by inducing a controlled, reduced tide resulting in a flood-water storage area. Lippenbroek is serving as a pilot area (8 ha.) for a much larger (580 ha) flood control area, further upstream at Kruibeke. This way of controlling flood-water is so new that it could not be applied on a large scale without such testing. The method is suitable for freshwater, tidal areas of highly developed estuaries liable to flood. It is useful for habitat compensation, especially where land is scarce, but it is more expensive than the more natural ways of opening dykes.

4. Overview of the case

Mud flats and marsh land have been created by the innovative use of a controlled, reduced tide scheme which is used to produce a flood water storage area. It was developed to help protect the hinterland from flooding.

5. Context and Objectives

a) Context

The Lippensbroek area lies along the river Scheldt in Hamme (Belgium). The area is flat with a small depression in the centre. Several dykes surrounded the area before the works started: a north-eastern river dyke, a north western dyke and a southern dyke. The Lippenbroek Plan is part of the larger, national Sigmaplan designed to protect the Scheldt basin against storm surges from the North Sea. The area that can be flooded when Scheldt water rises will be a mud-flat/salt marsh. This will be created by means of a controlled, reduced tide in the Lippenbroek area. Without the construction of the flood control area, the Lippenbroek area would have remained agricultural land without any additional value to nature.

b) Objectives

The main objective was to serve as a pilot project for the realisation of the northern part of the flood control area in Kruibeke-Bazel-Rupelmonde; the area itself at Lippenbroek has no, or negligible, influence on the reduction of inundations in the Scheldt estuary because of its small area. However, it was designed as an area that will be used as a reduced tidal area, to create a mudflat/salt marshland ecosystem. It will also act as a recreational area as there is easy access on top of the dyke surrounding the reduced tidal area. It is seen as an alternative to traditional heightening of the dyke.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The construction of Hamme Lippenbroek was a joint venture of the Seascheldt Department of Waterways and Sea Channel NV (Waterwegen en Zeekanaal NV) and the Agency for Nature and Forest (Agentschap voor Natuur en Bos). The management of the future flood area will be in hands of several actors concerned. All monitoring and management aspects concerning flood prevention security will be in hands of the initiator of the project, W&Z It concerns the management of the dykes, dyke trenches, in and outlet sluices. The monitoring programme metering all the parameters influencing the nature development is run by the University of Antwerp.

b) ICZM Tools

Before a reduced tidal area could be allowed, the dykes surrounding the area were raised and broadened. One uniform profile was obtained. The building of an inlet sluice (12.75m long with three culverts) was finalized in the summer of 2005. This was completed behind a sheet pile wall securing the construction site from the river Scheldt. An artificial creek directs the inflowing water. The outlet sluice, situated 10m apart from the inlet sluice, had been built in the late eighties. It consists of a square shaft (2m x 2m) with a length of 40m. It has an opening on the riverside and is closed by a one-way valve. In the middle of the shaft, the sluice can be closed by a spindle slide. Over a length of approx. 80 m the river dyke has been lowered to create an overflow dyke. This work was done after the completion of the surrounding dykes and the inlet sluice. The construction of the flood control area behind the river dyke did not include any safety risk. Accessibility is good: an asphalt maintenance road runs across the Scheldt river dyke. The other dykes are also accessible along the crest maintenance roads.

This means that, in case of a storm surge, the storm tide of the Sea-Scheldt is truncated and flows over the overflow dyke into the polder area in a controlled manner. A high ring dyke around the flood control area ensures that the Scheldt water remains in the inundation area. At low tide, the area is emptied as the water flows back to the river through outlet locks. Because of this truncation, the water level in the Sea-Scheldt and the tributaries upstream is less high and the villages are better protected. The sluices are set in such a way that the area within the dyke boundaries follows a natural rhythm of low and high tide. At low water, there is no water flowing in. Twice a day, at high tide, the flood control area is inundated. The higher the tide, the more water will flow through the sluice. Spring tide is when the water is at its highest, at slack water there is little water entering. Each time the water level of the Scheldt drops, the water flows out via the discharging sluice. As a result, the polder is alternately inundated and drained.

7. Cost and resources

No costs are available.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

The system has been working since March 2006 with water entering, and leaving, the area daily.The area is now filled with reed, willow, creeks and typical wetland plants. It has become a popular feeding and nesting place for birds and fish now spawn in the Lippenbroek water. The impact on the water quality is even more spectacular. The incoming water of the Scheldt often has extremely low oxygen levels. After the inlet, the level increases by at least 60%. In the time between high and low tide, not only the oxygen level continues to rise but the sand particles sink to the bottom to give clear, still water. The mud flats and marshes also heighten the amount of silica in the water, thus preventing overgrowth of algae.

Monitoring indicates that nearly all fish species observed in the estuary are also observed in the flooded area, frequently in high numbers. Interestingly, the fish seem to be entering through the oxygen-rich waters of the outlet sluice i.e. swimming against the prevailing water flow.

9. Success and Fail factors

The public participation and communication started too late in the process. By engaging stakeholders only in a later phase, a part of their trust was already lost. The problem was solved by appointing a fixed spokesperson (the project engineer) and building an information centre where people could meet up on-site to discuss the matters at hand. Through time and discussion, the trust was rebuilt. Giving stakeholders the opportunity to think and decide along constituted a major step forward in mutual relations. A flood protection zone near houses always causes fear. It is important to provide enough information and a single contact person that can reassure the public involved. The results of a social cost-benefit analysis also helped public-sector bodies in taking the relevant decisions.

10. Unforeseen outcomes

Sensitivity to vandalism has proven to be a problem to the site and the monitoring programme in particular since the area is easily accessible and opponents of the scheme remain long after completion of the project.

One area of concern for the longer term is the rather high sedimentation rate in the flooded polder. Fresh sediment is required in tidal marshes to advance typical marsh vegetation and fauna. However, excessive sedimentation is to be avoided in a semi-enclosed system as it will lead to decreased water storage capacity.

11. Prepared by

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12. Verified by

It was not possible to verify this case.

13. Sources

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Comcoast Flood risk managment schemes (9.04 MB)

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