

Re-opening a dam for nature, energy and recreation, Lake Grevelingen - NL

1. Policy Objective & Theme

- SUSTAINABLE USE OF RESOURCES: Preserving coastal environment (its functioning and integrity) to share space
- SUSTAINABLE ECONOMIC GROWTH: Balancing economic, social, cultural development whilst enhancing environment

2. Key Approaches

- Integration
- Ecosystems based approach
- Technical

3. Experiences that can be exchanged

The central and two regional governments (Zeeland and Zuid Holland) have produced a plan which determines how the 8km long Brouwersdam can be partially opened in order to restore the water quality of Lake Grevelingen. The opening of the dam will be used for the generation of sustainable tidal energy and coupled to improved natural areas, increased safety and enhanced socio-economic benefits.

4. Overview of the case

The waters of Lake Grevelingen have deteriorated since they were cut off from the North Sea. This has negatively affected the tourist attraction of the lake and its biodiversity. The dam will be breached to allow salt-water intrusion and better connectivity between the lake and the shallow waters of the seawards delta area.. A tidal energy generator will be built into the opening as well as a lock to enhance social aspects.

5. Context and Objectives

a) Context

Decades ago, the Grevelingen and other inlets in the southwest of the Netherlands, together formed the outlets of the Rhine, Meuse, Waal and Scheldt rivers into the North Sea. The difference between low and high tide was around 2.5 metres. On 1 February 1953, the dykes burst during a heavy storm with the loss of over 1500 lives. The Delta Plan was developed to prevent a similar disaster from occurring in the future. This plan included building the Grevelingen Dam (completed in 1965) and the Brouwers Dam (in May 1971) to create Lake Grevelingen, the largest saltwater lake in Western Europe. It has a total surface area of 11,000 ha. water of which 4,000 ha. are less than 1.50 metres deep. The elimination of the tide created an area of ca. 3,000 ha. which permanently became dry ground, most of it turned into a nature reserve. Around 300 ha. land, mostly along the two dams, was developed as a recreation area. However, closing off Lake Grevelingen meant that there was no more tide with the present-day water level fixed at 0.20 metres below Normal Amsterdam Water Level. In 1978, Lake Grevelingen was again connected with the North Sea when a lock was built in the Brouwers Dam allowing water in the Grevelingen to be continually refreshed with salt water from the North Sea. Despite this change, the water quality of the lake has continued to deteriorate effecting the biodiversity negatively.

In 2005, under the initiative of the Coastal & Marine Union (EUCC), Staatsbosbeheer, Natuur- en Recreatieschap de Grevelingen en Groenservice Zuid-Holland (G.Z-H) a debate was organised about the future of the Lake. Government,

industry, NGOs and stakeholders contributed to the development of a plan for the socio-economic and ecological future of the area.

b) Objectives

The primary objective is to improve the waters of the Lake in order to meet the requirements of the Water Framework Directive. An integrated approach will allow tidal energy to be generated and other socio-economic impulses to be realised.

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

a) Management

The plan for the reconstruction of the Brouwersdam has been made by the Grevelingen water board and the Government (Rijkswaterstaat) with involvement of the Provincial governments of Zeeland and Zuid-Holland as well as the local councils of Schouwen-Duiveland, Goedereede, Middelharnis, Dirksland en Oostflakkee. Other stakeholders have also been represented.

b) ICZM tools

The main plan is to make an opening in about 200 meter of the dam. At the same time, an energy generator will be built-in to make use of the water streaming in and out of the North Sea. This generator will require innovative technology since electricity will be generated with only a small tidal difference. The difference between the highest and lowest water levels will be 50 à 70 cm. During storms, it will be possible to close the opening. Furthermore, when the rivers Rhine and Maas begin to rise to flood level, generators will be able to pump the excess water to the North Sea, increasing safety. It is expected that the renewable, tidal energy will generate up to 150 MW, sufficient for 50-150,000 households, depending upon the number of turbines eventually installed. The plan also includes the creation of 1400 ha. of wetland with an accompanying increase in water quality. Water quality will increase as there will be greater oxygen exchange. A lock, with possibly an accompanying marina, is also planned in the southern part of the Brouwersdam which will positively influence the recreational value of the area. The lake will be more directly linked to the North Sea which will benefit the ten marinas in the lake. Ecologically, the waters of the Lake will be better connected to the shallow waters of the seawards delta area. The combination of sustainable energy production, economic impulse and improved natural areas will all contribute to a more sustainable regional economy.

The Plan takes into account both the Water Framework Directive and Natura 2000 objectives as well as National laws.

7. Cost and resources

The re-construction of the Brouwersdam alone is expected to cost €500 million. This will be through public-private partnerships. The cost of the tidal energy system is already costed at €1,500 million which could be recovered within 20 years.

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

The Plans have been approved as being achievable.

9. Success and Fail factors

The broad platform of discussion has been key to having the idea of breaching the sea defences in this way reaching acceptance by a sometimes more than sceptical public.

10. Unforeseen outcomes

The Plan is beneficial to the targets of the Water Framework Directive.

11. Prepared by

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12. Verified by

It has not been possible to verify this case.


13. Sources

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- Verkenning Grevelingen water en getij (2009) Projectteam Verkenning Water en Getij
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Attelier Grevelingen (6.03 MB) 



Herstel en ontwikkeling ecologie en economie Grevelingen (2.49 MB) 



Herstel van estuariene dynamiek Grevelingen (646.01 KB) 



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