



Building with Nature: experiences in the Netherlands and Singapore

H. J. de Vriend

Deltares / Delft University of Technology / EcoShape

The Dutch have a long history of protecting their country against storm surges, initially just confronting nature (dikes, barriers, revetments), later on gradually more compliant with nature (open storm surge barriers, nourished sandy coasts). A next step would be to build with nature, i.e. utilising the forces present in the natural system to help realise flood protection and at the same time create room for new nature.

The Eastern Scheldt storm surge barrier, completed in 1986, an attempt to take nature into consideration in a flood protection measure, had a number of unexpected negative environmental effects. Measures to mitigate this impact, or even to give it a positive turn, are now being considered.

Since 1990, the sandy Holland coast is kept in place by sand nourishments, a nature-friendly approach which is robust against sea level rise. The Netherlands government is now considering whether the dune area can be extended seaward by over-nourishment. This would increase the buffer against dune erosion, the area of dune habitat and the freshwater storage reservoir below the dunes. The Sand Engine is a first experiment on how this can be done while making optimum uses of natural forces.

A long-term option that is being investigated for developing a strategic freshwater reserve is to gradually raise the level of Lake IJssel. One of the issues this entails concerns the fate of the nature reserves on the Frisian coast. They are likely to be unable to follow the lake level, unless extra sediment is supplied from elsewhere. The question is how this can be done while maintaining or even enriching the quality of these areas.

Living vegetation placed in front of a flood defence structure, e.g. a dike, can help reducing the wave attack during extreme conditions. This can make a large difference in the design conditions for such a structure. In the Netherlands there are several examples this way of utilising living nature, abroad mangrove coasts are natural examples. In collaboration with the Singapore government, the Dutch are investigating to what extent combinations of coral reefs, sea grass and mangrove can help protect coasts in tropical areas.

In order to enable this kind of innovative approaches, research is needed at the interface of natural sciences, technology and social sciences. The 30 M€ Building with Nature programme in the Netherlands is one of the environments where this research takes places and is turned into practical design and execution methods.