

Lessons Learned from the Katrina disaster for the Western Scheldt Estuary – part 2



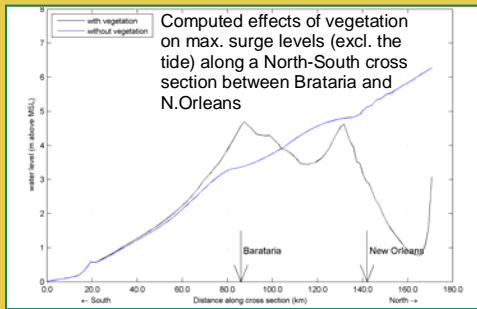
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Project Findings

Knowledge gaps

The study found out that some knowledge and capability gaps yet exist for reliable short- and long term prediction of the effects of human intervention on natural processes and on risk of flooding. For further improvement of the Dutch flood prevention measures these knowledge gaps should be adequately addressed.



(Re-) construction of wetlands / marshes

Will coastal restoration measures have immediate and long-term benefits to coastal flood protection. Can it be reliably quantified and is it possible to identify optimal locations and configurations for sustainable wetlands?

Effect of storm parameters on flood protection

A study to assess the effect of failure of the dykes under the design conditions indicates that relatively small changes in water level can significantly alter flood patterns and flood depths (Jeuken et al., 2007). Since Katrina, the significance of storm parameter variation on flood frequency has been studied quite well in the US (performed by USACE and FEMA).

Reduction of storm surge using storage buffers

Provision of storage buffers by selective lowering of dykes to reduce peak storm surge levels is consistent with strategies for storage and attenuation of riverine floods. In rivers the water volume in the storage basins is relatively large compared to the water volume contained in the discharge peaks. It is not currently known whether such a surge reduction strategy is feasible in an estuary for wind-generated (as opposed to precipitation-induced) flood waves.

Funneling effect on surge amplification

It is recognized that the funneling effect, in all likelihood, amplified the surge in New Orleans. Similar phenomenon could likewise affect the Scheldt Estuary, with different storm parameters producing different impacts.

Integrated 2D modelling approach for the Netherlands

The studies that have been carried out to investigate the impacts of Katrina in New Orleans have been performed using advanced, high resolution two-dimensional models (ADCIRC+STWAVE, Delft2D-FLOW + WAVE + Vegetation). The models incorporate multiple important parameters that can interact with one another in a single model: flood wave propagation, wind-driven waves, astronomical tides, storm surge hydrodynamics, bathymetry, topography and hydraulic resistance.

In the Netherlands this fully integrated type of modeling approach has never been applied, explained by the fact here the approach is geared towards prevention rather than post-facto simulation of flood events. It can be argued that, if flooding is to be allowed under certain conditions or when a dyke breach occurs, the interaction between these parameters are important and need to be properly considered. Increased understanding of these effects combined, through integrated 2D modeling approach, could yield new insights to the prospective effectiveness of flood protection alternatives in this area.

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Recommendations

To carry out further studies / investigations on:

- The effects of (re-) construction of wetlands on flood protection
- The effects of variation of storm parameters on flood protection design criteria
- The effects of storage buffers and funneling effect on storm surge in the Western Scheldt estuary.
- A similar study for the Dutch flood protection design conditions on a similar line as the US approach is recommended.

