

95. Review of system behaviour components for flood risk analyses, focusing on river deltas.

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ABSTRACT

Introduction

For historical reasons, the majority of the economic and societal risk on large river systems is located near the delta or in the lower-region floodplains, giving rise to large-scale flood defence structures. This is especially true in countries like the Netherlands and Germany, where flood defences are vital to the national economy and safety.

In flood risk analyses, a common simplification is to assume that the expected loads for a precipitation event will be routed downstream to an area of interest without any interaction with the floodplain. The possibility of upstream breaches is thus not considered in the assessment of downstream loads and flood risks. This interaction is termed 'system behaviour' and as the return period of an event increases, this phenomenon becomes more likely.

This project aims to investigate and improve various components of flood risk analyses that include system behaviour, and to apply the updates to an analysis for the lower Rhine region. As part of the project a qualitative review and categorisation of system behaviour analysis methods and components is being undertaken, which is to be presented here.

Methodology

The presented research will give a brief explanation of the general concept of system behaviour as well as conceptual frameworks as suggested by Courage et al., (2013) and De Bruijn, et al. (2014). It is assumed that a more detailed explanation will be provided in other presentations at the conference.

The various components of system behaviour will be discussed under the following headings;

- Boundary Conditions to system behaviour model.
This includes sampling methods, weather generation and the inclusion of other variables such as downstream sea-level conditions and wind metrics.
- Abstractions from system behaviour models.
The abstractions arise from defence overtopping or failure, and the subsequent breach growth, and current failure modes will be discussed. The abstractions will also be dictated by the 2D modelling techniques used and recent schematisations will be presented.
- Analysis of system behaviour model outputs
A brief review of potential outputs from system behaviour analysis will be presented.
- Recent Projects
Demonstration of large scale projects from Hydrological Engineering Corps in the U.S. and Reinsurance industry.

REFERENCES

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