Real time floodrisk management

Kolen, Bas; Zethof, Marit; de Bruijn, Karin; Hazenoot, Evert

Publication date
2017

Document Version
Final published version

Citation (APA)
Kolen, B., Zethof, M., de Bruijn, K., & Hazenoot, E. (2017). *Real time floodrisk management*. 66-67. Abstract from 7th International Conference on Flood Management 2017, Leeds, United Kingdom.

Seventh International Conference on Flood Management (ICFM7)

5 - 7 September 2017

“Resilience to Global Changes - Anticipating the Unexpected”

University of Leeds, UK

Book of Abstracts

Oral Presentations

57. Real time floodrisk management

Bas Kolen[1,]**, Marit Zethof *, Karin de Bruijn ***,*

*Evert Hazenoot ****

* HKV Consultants*

** Delft University of Technology, Delft Safety & Security Institute*

*** Deltares, Department of Flood Risk Management*

**** Waterboard of Rivierenland*

[1] *Botter 11-29, 8232 JN Lelystad, Netherlands, B.kolen@hkv.nl, +31 320 294242*

KEYWORDS: Flood risk, emergency management, uncertainty, mapping.

ABSTRACT

The central issue for authorities (as well as the public) is how and when to respond to forecasted extreme water levels on rivers, lakes and along the coast and large-scale flooding is an actual risk. The decision-making process is influenced by contradicting information, overloads and gaps in information, rumours, uncertainties in forecasts, the consequences of a flood and the effectiveness of measures. Emergency measures can be taken to reduce the probability of flooding(e.g. placing sand bags), other measures can be taken to reduce the consequences of a flooding (such as evacuation of inhabitants). For many of these measures, decisions are made days or hours prior to the expected moment of occurrence of the flooding. Using forecasts of water levels, by definition uncertain, and forecasts of the strength of levees, decisions can be made based on the acceptability of the actual flood risk level. The concept of risk can be used to prioritise measures in case of limited time.

In this paper we present a (semi-probabilistic) method to develop risk based operational water management and emergency management based on integral flood risk assessments. The application of the method is discussed based on a pilot study for the waterboard of Rivierenland.

The method integrates forecasting of water levels, levee assessments, inspections, effectiveness of emergency measures and realtime flood risk mapping.. To define the conditional probability of failure we use fragility curves for each levee section. These take different mechanisms of failure as seepage, overtopping and macro instability into account and link water levels to conditional probability of failure.

We combine the conditional probability of failure and the uncertainty in hydraulic loads with flood scenarios which are prepared in advance. These flood scenarios describe the consequences of a flood over time given a set of boundary conditions. These scenarios describe economic damage or loss of life. The consequences of a flood mainly depend on the location, size and number of breaches and the hydraulic load. Infinite flood scenarios can be defined, therefore we use classes of scenario's representing a range of possible scenario's for each section of a levee. Combining the expected water levels, conditional probability of failure and flood scenarios, real time (conditional) risk maps are developed. These maps can be used to identify the high risk areas and support emergency services to prioritise decisions with regard to the areas to evacuation, the protection of critical infrastructure and emergency measures to reduce the conditional probability of flooding.

The pilot study shows the potential benefits of this method. We also discuss challenges we encounter when integrating this risk based approach in crisis management mechanisms.