

Impact of including interdependencies between multiple riverine flood defences on the economically optimal flood safety levels

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Abstract

In risk analysis of riverine flood defence systems, sections of flood defences are often considered separately, herewith ignoring their interdependence, e.g. due to the hydraulic response following dike breaches in the system. In previous studies it has been found that such interdependence can have a significant influence on flood risk estimates and the spatial distribution. In this paper a method is proposed for the economic optimisation of riverine flood defence safety levels from a river system perspective. In order to deal with the computational challenge of integrating the hydraulic interactions in an economic optimisation, a surrogate model was developed. Despite the many simplifications, this model yields reasonably accurate results within acceptable time. The application of the model to a case study in the Netherlands has shown that taking into account interactions between flood defences has significant influence on optimal long term strategies for flood defences. The results suggest that accounting for interdependence in setting safety standards and reinforcement prioritisation yields a significant return on investment both in terms of lower investment cost and in terms of reduced risks.

Keywords:

Economic optimisation, cost-benefit analysis, system reliability, flood risk, flood defences

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