Evacuation during flooding: Higher ground is often better than fleeing

September 25 2013

What is the best evacuation strategy during a flood threat? Contingency plans are particularly focused on preventative evacuation. However, that is not always feasible or smart. Instead Bas Kolen demonstrates that it can be wiser to employ a basic strategy of 'vertical evacuation' in contingency plans, with evacuees moving to a higher floor or a dry location in a flooded area. 'Following current contingency plans, it may happen that we send people in the wrong direction.' That is why he has prepared an information leaflet outlining contingency plans. Kolen will defend his PhD thesis at Radboud University Nijmegen on Wednesday 9 October.

Our knowledge of sea and river flooding – from river overflow or storms

– is mostly from abroad. In the Netherlands, it is rare that flood defences threaten to collapse and evacuation must be considered. Nevertheless, government authorities and emergency services are preparing themselves and calling for citizens and businesses to be self-sufficient.

Effectiveness of contingency plans overrated

'Preparation is now primarily focused on preventative evacuation - the timely evacuation of people from flood areas. However, all the plans are based on best case scenarios and assume that a decision can be made in time, that everything will go to plan and that everyone will follow directives. The reality is often less than perfect and unambiguous. We have been ignoring that', observes PhD candidate Bas Kolen, who works as a consultant for crisis management and water safety for the consultancy firm HKV Lijn in water. 'The effectiveness of contingency plans is overrated. We simply have no way to take uncertainties into account.'

Vertical evacuation

According to Kolen, it would be much smarter to set a vertical evacuation as the standard to start from – evacuation to dry, higher ground in the area. 'Think of an office tower, school building or possibly even the residents' own apartments.'

Kolen calculated that vertical evacuation is often safer than preventative evacuation. 'It depends on different factors, but it roughly comes down to the following: when time is limited, vertical evacuation results in fewer victims. Preventative evacuation is a bonus that can be used if conditions allow.

'Vertical evacuation is conducted more rapidly than preventative

evacuation. Thus, you can defer the evacuation decision longer and lower the uncertainty factor. In this way, it also leads to less social and economic disruption, especially if flooding does not occur.'

Investment in centralised coordination

A second recommendation concerns the efficiency of evacuation. 'At the moment, municipalities, emergency services, security regions, provinces, water authorities, the national government and Rijkswaterstaat all have their own emergency services. These are preoccupied with frequently occurring disasters and not flooding. I demonstrated in my research, through a cost-benefit analysis, that it would be more efficient to centralise preparation and decision-making at a national level and form an expert committee to tackle this topic.

Current: Delta Programme 2014

Next year the flood defence standards will be revised by Minister Schultz (Infrastructure and Environment), as evidenced by the Delta Programme 2014. These revisions take into account, among other things, the risk of potential victims. The effectiveness of evacuation and the self-reliance of individuals play a major role. If a different or better evacuation strategy leads to demonstrably fewer victims, it may have consequences for not only the requirements of flood defences but also for buildings as places of flight.

There are no requirements in the Netherlands on the result of evacuation plans; nevertheless, it is often argued that things are "satisfactory". According to Kolen, the contribution of evacuation, including the impact [bw] of uncertainties, can be determined with the help of his research. 'This also allows the government to determine the outcome requirements of disaster management.'

More information: Bas Kolen, 'Certainty of uncertainty in evacuation for threat driven response. Principles of adaptive evacuation management for flood risk planning in the Netherlands'
PhD defence date: Wednesday 9 October 2013, Radboud University Nijmegen. PhD supervisor: Prof. I. Helsloot, co-supervisor: Prof. M. Kok, TU Delft

Provided by Radboud University Nijmegen