Workshop 2
Management of flood risk; from science to implementation

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Introduction
Traditionally river systems have been a source of economic prosperity, but also the cause of devastating floods. In the Netherlands centuries ago the first flood defence systems were constructed. Since the 1950s Dutch flood defence policy has been based on fixed standards for maximum allowable flood frequencies. With the growing population and increasing economic capital behind the dikes, the risk of economic damage and casualties has increased. During the past few years the insight has therefore grown that flood policy should be based on flood risk reduction. Flood risks can be reduced by reducing the flood frequency, but also by reducing the potential economic damage and number of casualties. In several national and international conferences scientists and politicians have reflected on the topic and there appears to be a widespread common notion on the necessity of flood risk policies. The discussion on how to implement the new thinking on risk management is still going on. During the NCR-days a workshop has been devoted to the practical and scientific questions and dilemmas in implementing flood risk strategies.

Set-up of the workshop
The workshop was chaired by Bart Parmet of the Directorate General Water of the Ministry of Transport, Public Works and Water Management. The panel consisted of:
- Peter Glas, dike reeve (dijkgraaf) of Water Board De Dommel;
- Robert Smaak, manager Water and Safety, Directorate General Water;
- Arjen Hoekstra, professor Multidisciplinary Water Management, University of Twente.

The topic of the workshop was introduced in the plenary session by Arjen Hoekstra, who provided a number of propositions for discussion in the workshop (see below). At the start of the workshop, Robert Smaak gave a brief introduction of the shift in thinking about flood management that currently takes place at the DG Water. Peter Glas introduced himself as a ‘dike reeve without dikes’ and reflected on the topic from a practical point of view, the view of a Dutch Water Board.

Six propositions
In the plenary session in the morning, Arjen Hoekstra introduced the topic and provided arguments for the following propositions:

1. Adopt the old dike design principle that says that the crest of the dike should be x cm beyond the highest water level ever recorded. If, for instance, at Lobith the safety margin x is taken at about 100 cm, this rule corresponds with the current probabilistic rule of a maximum exceedance frequency of once in 1250 years. The advantages of the old rule are:
   a) it is transparent, easy to communicate and to account for;
   b) naturally dikes are heightened when the sense of urgency is highest;
   c) most important: response to climate change is direct and experiments show that the application of this rule results in less instances of dike overtopping than the slow-responding probabilistic rule (see abstract Hoekstra and De Kok elsewhere in this volume).

2. Replace the flooding frequency standards in Dutch law by safety-board standards. This is the practical implication of replacing the probabilistic dike design rule by the simpler and safer rule based on a margin on top of the maximum recorded water level.

3. Cost-benefit analysis is a wrong tool to formulate flood policy. Flood risks – if interpreted as chance of flooding times damage – are very low in the Netherlands, lower than many other risks, e.g. traffic risks. From economic point of view, lowering economic risk of flooding will in most cases not have a ‘net benefit’. The real issue is not that flood risks – if defined as above – are high; they are not. Flood risks become worth investing only if another question is posed: what are the biggest disasters to be faced in the Netherlands? Now flooding comes up probably as number one, even though the chance of a big flood disaster is extremely small. Flood mitigation should thus aim at disaster reduction, not at economic risk reduction.
4. **Do not prepare for the ‘most probable’ but for the ‘worst possible’ disaster.** Integral risk can most effectively be reduced by addressing the most probable flood scenarios, thus by addressing the weakest links and reducing the flood chance \( P \) where \( P \) is largest. System risk (the threat of disasters) can only be reduced by addressing the worst-case scenarios (which are not most probable but most disastrous). Here, reducing \( P \) doesn’t help; the vulnerability to large damage (e.g. cascade-effects) should be reduced.

5. **Regular flood incidents should be allowed; associated effects should be minimized.** ‘Actual risk’ is key in estimating actual threats of flooding. ‘Perceived risk’ is key in understanding how people act. Flood risks can only be controlled if a sense of urgency is maintained, which requires visible threat, i.e. regular flood or near-flood incidents. Proof of history: 1916, 1953, 1993 and 1995.

6. **Flood insurances will not reduce flood risk.** The insurance premiums would be too low to act as an incentive to citizens or businesses to actually reduce potential flood damage; they will simply pay the premium.

**The workshop results**

None of the above propositions was definitely adopted or rejected. Each one led in fact to quite some discussion. The idea of replacing the exceedance frequency standards by a simple rule of a safety margin on top of the highest recorded water level received little positive response. It was pointed out that replacing current dike design rules in the law by simpler ones would not address the issue of reducing potential flood damage, which is true indeed. It was also pointed out that the simpler rule would result in a much more frequent need to heighten the dikes, but Hoekstra pointed out that the frequency of dike increases is low in any case (see the abstract Hoekstra and De Kok elsewhere in this volume). Nevertheless, the majority seemed to prefer to stick to the current probabilistic dike design rule that has proven itself in practice.

The proposition on cost-benefit analysis seemed to receive more understanding, even from the few economists that were present. Nevertheless, there was some misunderstanding about the implications of the proposition. It was generally felt that economic analysis is important and does make sense, but the question is rather what role economic cost-benefit analysis has in the final debate about setting acceptable standards, about spatial diversification of those standards and about evaluating measures aimed to reduce flood probabilities versus measures aimed at reducing potential damage. Obviously, other arguments than economic arguments play an important role as well, possibly more decisive.

The proposal to prepare for the ‘worst possible’ disaster and not for the ‘most probable’ flood scenario received some recognition. But the ultimate implication – namely that reducing potential damage is more important than strengthening the so-called current ‘weakest links’ – was not accepted. Rather most workshop participants felt that both flood probabilities and potential damage should be lowered. There was no general consensus on putting priority to reducing potential damage.

The idea of allowing regular flood incidents was heavily debated. The fact that flood incidents have a function in keeping citizens alert was acknowledged, but the question that arose was at which scale and with which frequency we should allow such incidents. The debate did not lead to consensus.

Time was insufficient to discuss the final proposition about the effectiveness of flood insurances.

The overall conclusion from the workshop was that the topic was good for a lively debate, but that there were few issues where the participants generally agreed. The only general agreement was about the relevance of the topic itself. Everybody seems to agree on the idea that risk reduction is a broad issue and should not be scaled down to an issue of reducing flooding probabilities.