Flood management in the Netherlands

Workshop on Flood Communication and Information Exchange in Dniester River Basin

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Without dunes and dikes, 66% of The Netherlands would be flooded on a regular basis.
Haringvliet (1971)
Oosterschelde (1986)
Storm Surge Barrier
Rotterdam (1997)
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Lower Rhine
The Rhine has the world’s largest IWT.

27 May 2010
Biesbosch
(where the Rhine and Meuse Delta’s meet)
2. Flood safety regulations in the Netherlands

Dike ring units 1 – 95
(safety levels are defined by law)

Outside:

- Open water, floodplain, beach, unprotected
- high grounds (flood safety is not prescribed by law)
Institutional setting

The regions don’t fit with the provinces and the districts don’t fit with the Water Boards! Neither do the dike rings... let alone the river basin level...
Actor analysis:
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River mathematics

land \prec \text{ sea} \\
\text{and}

\text{ sea} \prec \text{ rivers}

\implies

\text{land} \ll \text{ rivers}
High water in 1995 in Waal (= principal Rhine branch)
High water in 1995 in Waal (= principal Rhine branch)
Meuse, 1993 (and 1995 again)
3. Running flood defence programs

Short term (2020):

- Room for the River (Rhine Delta)
- Maaswerken (Masterplan)
- many ecological restoration projects

Long term (2030 -2050 - 2100):

- Delta Program
  - Main purpose:
    - Flood safety
    - Nature
    - shipping (Meuse)

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Room for the River Program

- River widening:
- flood channels
- floodplain lowering
- Ecological restoration
Flood defence measures
Bridges are bottlenecks...
... which can be solved!
Railway bridge Oosterbeek
flow through harbour

Existing embankments outside villages:
no elevation or removal

Embankments to be elevated and to be constructed, and natural heights

Flood channel Ooijen:
Upstream embankment
Germany

• Retention Polders along the River Rhine

Worms-Bürgerweide (Rhein-km 441): Flutung des Retentionsraums (2002)
Speyer (Rhein-km 403): Deichrückverlegung (2001)
Kollerinsel (Rhein-km 410): Retentionsraum (2005)
Rheindürkheim (Rhein-km 453.5): Bauarbeiten Deichvorverlegung (2005)
Eich (Rhein-km 467.4): Bauarbeiten Deichrückverlegung (2005)
Ingelheim (Rhein-km 517): Retentionspolder (2006)
Lohrwardt (D)
Lob van Gennep (NL)

1/1000 years
4. Flood maps and risk maps

- Obligation of the EU Flood Directive
- Pilot in two border areas: Vechte and Rur (relatively small rivers)
  - Flood maps Vechte
  - Risk maps Vechte
  - Flood maps Rur
  - Risk maps Rur
- ... insuring consistency with German maps (but we did not do it jointly !)
Waterdiepte

- minder dan 0,2 m
- 0,2 - 0,5 m
- 0,5 - 0,8 m
- 0,8 - 2,0 m
- 2,0 m - 5,0 m
- meer dan 5,0 m
5. Prediction models

Dutch-German co-operation: one system
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... for droughts and floods!!
Practical experiences

Rhine:

- Small near-border inconsistencies rating curves (stations Emmerich and Lobith)
- The national border is not the origin of the discharge anymore! Downstream adjustments of rating curves.
- Effect of German retention on Dutch safety.
- 250 milion m3 of water temporary lost during one event!! Storage in permeable subsoils.
Practical experiences

Meuse:
- Different models: result of Belgian model is input for the Dutch model.
- There is a standard modelling framework (a meta-model making models communicate).

So...
- Second best, but it works...
6. Communication during flood events

- Modelling is done by the Ministry of Infrastructure and Environment.
- Ministry, calamity center, water boards and municipalities have pre-defined communication procedures (pages 124-128).
- Different discharge levels mean different precaution levels and actions (closure of roads and dike coupures, flood buses).
Blue = inundation / evacuation
Red = freeboard is endangered
Orange = standard protection procedures (mobile equipment)
Yellow = alertness and first communication between responsibles
Green = normal situation (no flood threat)
Lviv, 28 May 2013

Code yellow
Lviv, 28 May 2013

Code orange

Military ‘flood bus’
Lviv, 28 May 2013

Code orange
Code orange
Code orange
Lviv, 28 May 2013

Code red
Code “blue” (1995)
EU Directives

Water Framework Directive:
- addresses water quality improvement

Flood Directive:
- addresses flood defence strategies

Goals:
- integrated water management
- international river basin planning
- consistency in river basin management between countries

Lviv, 28 May 2013
International river management

Lviv, 28 May 2013
Summary

• Our effectiveness both in strategic planning and crisis management depends on:
  - good engineering, data, technology and ICT,
  - the way we are (institutionally) organized.

• The first one is much better than the second one.

• We need a reorganization of the river management (river basin authorities) following the blueprint of EU WFD and FD. Next steps are needed.
Thank you for your attention!