Post-Elbe Flooding Land Use Risk Control in Germany

Stefan Greiving

1. The great Elbe and Danube flood in June 2013
2. Spatial planning and flood risk management
3. Performance of flood prevention in planning practise
4. New approach for flood risk management
5. Conclusions
1. The great Elbe and Danube flood in June 2013 (II)

- Return period partly less than 1:500 years.
- Large area in Europe affected
- Cyclone rotated against the clock cycle around the Alps and lead to heavy rainfall north of the Alps
- Damages of about 10 bill. € in Germany.

1. The great Elbe and Danube flood in June 2013 (II)

- Europe is divided into river basins according to EU WFD and FRM directives.
- Rhine: 1,230 km length, medium run-off: 2,270 m³/s, (3rd biggest in Europe)
  1%-flood: 12,700 m³/s
- Elbe: 1,070 km, medium run-off 770 m³/s, 1%-flood: 4,600 m³/s
- European Flood Risk Management Directive came into force in 2007
  - Hazard and risk maps for three return periods (low, medium, high probability)
  - Flood risk management plan for river basin
  - Active involvement of the public
  - Implementation up to member states

1. The great Elbe and Danube flood in June 2013 (III)

- Dam failure at Elbe river in Saxony-Anhalt on 9 June.
- About 200 m³/s flew out the river channel for nine days, flood wave was cut by 40-50 cm.
- Area of about 450 km² flooded
- High-speed railway Hannover-Berlin used by 90,000 passenger a day, was closed for six month!
- 25,000 people were evacuated.
- Option for readjustment of scattered settlement structure (in terms of a decentralized concentration in order to support the maintenance of services of general interest.

BfG (2013), p. 47
BfG (2013), S. 44
1. The great Elbe and Danube flood in June 2013 (IV)
2. Spatial planning and flood risk management (I)

• Space can be defined as the area where human beings and their artefacts are threatened by spatially relevant hazards.
• Every hazard has a spatial dimension.
• Spatial effects might occur if a hazard turns into a disaster, or by spatial planning response.
• Spatial planning takes decisions for society whether and how space is used.
• Spatial planning can influence both, the (flood) hazard as well as the vulnerability.
• In Germany), a new development is legally allowed when it is conforms to the regional/local plan.
• This regulatory function of spatial planning is known under the term “conforming planning” in the international discourse on planning theory (Rivolin 2008).
Minimization of damage potential through regulatory planning:

a) Keeping areas free of (further) development
b) Differentiated decisions on land-use
c) Adaptation of building structures
d) Retreat from hazard-prone areas

Source: Heiland (2002)
2. Spatial planning and flood risk management (III)

- Committee of Federal State ministers for regional planning laid down the following fields of action (MKRO 2013):
  - Protection of existing priority zones for flood prevention as retention areas
  - Extension of retention areas
  - Risk prevention in flood prone areas protected by levees (as priority or reserve zones)
  - Improvement of water storage capacity in the entire water basin
  - Protection of areas designated for flood control measures
- Reflect “traditional way” of dealing with floods in spatial planning. Quite effective way to keep areas free of further development, but retreat is not mentioned at all.
- Land-use restrictions (by means of priority zones for flood prevention) are determined by the return period of the hazard only.
- Neither flood depth and velocity nor vulnerability are considered.
- No land-use restrictions for technically protected areas.
Flood priority and reserve zones in the Dresden region
3. Performance of flood prevention in planning practice

- Nationwide evaluation of all regional plans in Germany.
- Currently, in average only 43% of the existing options for flood prevention are used in practice.
- Large differences from region to region.
- In many regions, future settlement areas are still designated in hazard prone areas.
- Traditional approach can only mitigate the further increase of flood risks.
- Existing building stock at risk is the most important problem in Germany.
- Financial support for individual relocation activities of private households has become possible for the first time ever (in Saxony) – but only on a voluntary basis.
3. Performance of flood prevention in planning practice (III)

Observed settlement development in flood prone areas (Dresden) outside the flood zone (based on 100-year return period)

Source: Seiffert (2012)
Controversies about flood protection measures in Germany

• Those regions which were severely affected by floods invest more in flood protection.
• The more investments, the more conflicts – true enough, but
• Planning and implementation of flood protection differ from federal state to federal state.
• Risk communication is able to mitigate controversies or to intensify them (Newig et al. 2014).
• In North Rhine-Westphalia, round tables were established at a very early stage of the planning process – opposite to Saxony. It follows just the formal requirements for public participation in plan approval procedures.

Source: Thieken et al. (2014)
4. New approach for flood risk management

- Result of collaborative, transdisciplinary project in cooperation with regional planning authority of Cologne (Rhine), but transferable to Elbe basin.
- Consideration of all hazard characteristics (return period, flood depth, velocity)

<table>
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<tr>
<th>Hazard level</th>
<th>In front of levees</th>
<th>In protected areas</th>
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<td>= HQ100 &gt; 200cm oder HQhäufig &gt;0cm</td>
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- Priority zones will be designated for hazard levels 3 + 4 which include protected areas and lead for the first time ever to binding settlement restrictions.
- Vulnerability is considered by keeping flood prone areas free of any kind of critical infrastructure. In unavoidable cases, building protection has to be implemented against the greatest possible flood – even in protected areas.
New flood hazard map for Cologne district
New flood susceptibility map for Cologne district
Flood risk map for Cologne district
Details of flood hazard map, showing designated settlement areas at flood hazard.
Details of flood risk map
3. Performance of flood prevention in planning practice

Amount of designated settlement areas (in ha per municipality) in hazard zones

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<tr>
<th>Kreis</th>
<th>Gemeinde</th>
<th>ASB zurücknehmbar (ha)</th>
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5. Conclusions

- Second severe flood in the Elbe catchment within a ten-years-period.
- Most likely influenced by climate change.
- Severe indirect economic effects due to damage of transport infrastructure.
- Visible shift from improving technical flood control (opposite to aftermath of 2002 event) to comprehensive, planning based approaches.
- Demographic chance is a trigger for projects on retreat - particularly in areas whose population is shrinking.
- New federal funding program for urban renewal (currently in preparation) will support voluntary retreat nationwide.
- New flood risk assessment and management approach is needed in order to make a real reduction of given flood risks possible – particularly under growth.