Understanding Disaster Risk

DRR strategies benefit from ex-ante CBA to optimize investments in preventive measures

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By 2050 the number of people vulnerable to flood disaster is expected to increase to 2 billion
Characteristics of the Netherlands

- **Safe Delta**
  - CNN 21/5/2017

- **Important Economy**

- **Unique nature**

- **Attractive to live**
Netherlands Policy on DRR

55% of the Netherlands is flood prone:
- 29% below sea level
- 26% river flood plains

- International catchment (Rhine, Meuse, Scheldt, Eems)
- 350 km coastline
- 3500 km of flood defences,
- hundreds of locks, sluices, pumping stations

10 million people, and € 2000 billion invested capital, 70% GDP behind the dikes and dunes

3-layered national policy:
- Emergency management, evacuation
- Sustainable, flood-proof spatial planning and building
- Prevention of flooding: Reduction of probability and consequences
Drivers and Challenges

Issues to face: Delta under pressure

- More / extreme storms
- Sealevel rise
- Increased erosion

- More / intense rainfall

- Spatial / economic developments
- Salt intrusion
- Subsidence

- Increased river discharge
- Decreased river discharge
An innovative approach: NL Delta Programme

- To keep NL a good, safe and attractive place to live and work
  - now and in the future [2050-2100], protected against floods under changing water levels
  - Fresh water supply guaranteed, also in dry periods
  - Principles: solidarity, flexibility, sustainability
- For the people and the economy (incl. investors)
- Not in response to a disaster, but in advance, to be prepared and avoid it

The Five Dutch D’s for sustainable DRR governance:

1. Delta Programme
2. Delta Decisions
3. Delta Commissioner
4. Delta Fund
5. Delta Act
Ex-ante Cost Benefit Analysis for sound Investments

Static CBA:
- How much to invest?
- Minimize total of investments as well as expected damages

Dynamic CBA:
- How much, when and when again to invest?
- Minimize total of investments and expected damages

For generic (national level) risk assessments various tools are easily available (web, open) (e.g. *Aqueduct* for flood and drought risks)

For assessing local measures more in depth models are needed, and climate risk informed decision analyses (e.g. *CRIDA*).
Results ex-ante CBA - Floods

- Existing Flood Risk Reduction standards for levees and dikes were not efficient (too high, too low)
- Higher standards are needed esp. along rivers Rhine and Meuse
- Earlier advice of 2nd Delta Commission, 2008: ten-fold increase in standards everywhere >> at considerable cost!

<table>
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<tr>
<th></th>
<th>Add. Invest. costs</th>
<th>Residual flood risk</th>
<th>Total costs</th>
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<tbody>
<tr>
<td>No change</td>
<td>0</td>
<td>15</td>
<td>15</td>
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<tr>
<td>2nd Delta Committee</td>
<td>11.5</td>
<td>1.5</td>
<td>13</td>
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<tr>
<td>CBA</td>
<td>3.7</td>
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- Hence, ex-ante CBA leads to savings in additional investment cost of €7.8 billion (and €4.3 billion in total costs) in National Safety Plan.
The Dutch National Risk Assessment: An All Hazard strategy connecting multidisciplinary science and policy

Incl. Guidance on vital infrastructure, within EU context for DRR

Figure 2 Risk diagram: comparison of different threats and hazards
Concluding Statements

- **Risks increase** due to intrinsic population development, economic growth and climate change
- In DRR strategies, include **climate change projections** to be better prepared, having a **long term vision** and guiding short/medium term interventions, pathways into an uncertain future
- Don’t only focus on **multi-hazard early warning**
- **Preventive measures pay back!** E.g. climate resilient infrastructure for protection against flooding or reservoirs for storage of water
- **Nature based or hybrid solutions** can be cost effective alternatives
- Conduct **ex-ante CBA** to optimize sustainable investments to reduce disaster risk from both sudden and slow onset disasters
- **Inclusive**, people centered approaches and **participatory** decision framing are key for sustainable DRR interventions