Risk assessment in trans-boundary cooperation between the Netherlands and Germany

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Presentation overview

- Introduction
- Study area
- Risk-assessment method
- Sensitivity analysis
- Summary and future plans
Introduction

- Flood protection in boundary area of Germany and the Netherlands
- Identify and reduce flood risk for 2 dike ring areas along the Rhine
- Cooperation!

RMWTH
Introduction

- Project initiation: 2005
- Three phases
- Joint method, based on existing software/techniques
Study area

Transboundary dike rings along the river Rhine

Flood Defence  Toronto, May 6-8, 2008
Scope of the project

- Group 1: failure probabilities & failure mechanisms
- Group 2: flooded areas
- Group 3: damage
- Group 4: cost - benefit

Risk = failure probability \times damage
Failure mechanisms
Computation of failure probabilities

- Overflow
- Wave overtopping
- Bursting of the soil & piping
- Stability of the slope
- No structures
Failure mechanisms / probabilities

- Identification of 10 weak spots, based on Dutch deterministic assessment method and local expert knowledge
- Probabilistic computation of failure probabilities every 100 meters for wave overtopping only
- Detailed probabilistic computation of failure probabilities for 10 weak spots
Differences in dike design

**Netherlands**
- Design water level: 16,000 m³/s
- T = 1250 years
- 0.5 m freeboard (minimum)

**Germany**
- Design water level: 14,600 m³/s
- T = 500 years
- 1.0 m freeboard
Difference in maintenance
Breach and flood simulation
Breach and flood simulation

Waterdepths (m)
- 0.02 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- > 4.0 m
Toronto, May 6-8, 2008

Damage assessment

Flood simulation

Damage and loss of life module

Land use

Damage function for agriculture and recreation

Damage (k Euro)

- < 25k
- 25k - 50k
- 50k - 100k
- 100k - 1,000k
- > 1,000k

Flood depth [m]

Damage factor

0 0.2 0.4 0.6 0.8 1.0 1.2

0 1 2 3 4 5
Flood risk

Risk = probability × consequence

- big probability, big consequence
- big probability, small consequence
- small probability, big consequence
- small probability, small consequence
Cost-benefit analysis of measures

Types of (structural) measures:

– Dike strengthening

– Compartment dikes
Compartment dike

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Compartment dike

Waterdepths (m)

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Sensitivity analysis

Verification of sensitivity to assumptions

– Critical overtopping discharge

– Breach development (width, water level, moment of breach)

– Flood wave (shape and height of discharge wave)

– Correction of damage and costs
Summary and future plans

• Cooperation very successful as a result of the communication and identification phase

• Much added value because of different partners

• Project in last phase

• Final results this summer (symposium)
Thank you for your attention!