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Flood Defense In The Netherlands: A Story of Adaptation

Royal Netherlands Embassy Washington D.C.
A Story of Adaptation: Outline

• Traditional flood defense as from AD 1000: hard levees

• Shift in paradigm

• Building with nature

• Multi layered safety approach

• Lessons Learned
The Dutch Delta in NW Europe

- The Netherlands is the delta of Rhine, Meuse, Scheldt and Eems;
- 26% below sea level;
- 60% of population, 70% of GDP earned in area below sea level;
- 59% flood prone
Traditional flood protection since A.D. 1000: dams, levees, pumping!
Major Floods in 1916, 1926, 1953:
More and higher dams and levees

- Delta Project
  - Enclosure Dam (1932)
  - Maeslantkering (1997)
  - Scheldt Estuary Dams (1986)
The Delta Under Pressure: Challenges

- More/extreme storms?
- More/intense rainfall
- Spatial developments
- Salt intrusion
- Increased erosion
- Subsidence 20 cm/100yr
- Decreased river discharge - 60%
- Increased river discharge + 10%

Sealevel rise 35-85 cm/100y

Increased erosion

Subsidence 20 cm/100yr
A Story of Adaptation

• Traditional defense as from AD 1000: hard levees

• Shift in paradigm: from flood protection to flood management

• Building with nature

• Multi layered safety approach

• Lessons Learned
Shift in Paradigm

From flood *protection* to flood *management*

Dealing With Increasing Flood Threats:

- Living with Water -> adapt spatial planning:
  - Room for River
  - Create space for excess water in urban areas

- Adapting infrastructure: multifunctional sea defenses
Living with Water: Room for the River

Vulnerability assessment: 2001-2006

300+ possible riverine flood risk projects identified

Two equal goals: Flood risk reduction and improve spatial quality

2006-2009: stakeholder engagement

2011-2016: 35 projects completed ($3 billion)
Room for the River: Waal River at Nijmegen

Nijmegen: pop. 200,000k
Waal River busiest inland shipping route in Europe

Challenge:
- Reduce flood risk
- Accommodate high river discharges
- Safeguard connection to urban center
Room for the River: Waal River at Nijmegen

- Excavate river arm
- Widen river bed
Living with Water: Urban Flood Plain Rotterdam
Living with Water: Urban Retention Basin Rotterdam
Living with Water: Combined Parking Garage and Retention Basin Rotterdam
Living with Water: Adapted Urban Planning
Innovative Solutions Coastal Protection: Dam in Dune at Katwijk (2015)

- Enhanced coastal protection
- Improvement of spatial quality
- Dam in dune + parking 666 cars
- PPP-basis
Innovative Solution Coastal Protection: Scheveningen Boulevard The Hague
A Story of Adaptation

- Traditional Defense as from 1000: Hard sea walls
- Shift in paradigm: from flood protection to flood management
- Building with nature
- Multi layered safety approach
- Lessons Learned
Sand Motor
A Story of Adaptation

- Traditional Defense as from 1000: Hard sea walls
- Accommodating increasing flood threats: Living with Water
- Building with nature
- Multi layered safety approach
- Lessons learned

1. Prevention
   *Limit the risk of a flood disaster*
   *(dams, levees, dunes and barriers)*

2. Sustainable spatial planning
   *Limiting the effects of flooding*
   *(room for the river, urban flood plains)*

3. Crisis management
   *Reducing the consequences of a flood*
   *(awareness, preparation, evacuation)*
Crisis Management

Raise awareness:

- Acceptance that not every disaster can be prevented
- “Overstroom ik?” app (Will I flood?)
- Prepare public for evacuation
Lessons Learned

• Flood risk is not a singular, static issue: Holistic approach!

• There is and end to raising “hard” coastal defense

• Understand the landscape: geography, occupation, but also economics, behaviour and politics

• Awareness is crucial for support and succes!
Thank You!

Ministry of Infrastructure and the Environment