Ministerie van Verkeer en Waterstaat

13 september 2010
Broken lines outlines areas that were cooler than seasonal norms; solid lines outline areas that were warmer than seasonal norms. Each contour represents one degree Celsius, starting at -0.5 and +0.5 degrees C.
Climate Change and Inland Waterway Transport

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Rijkswaterstaat - Ministry of Transport, Public Works and Watermanagement

3 september 2010
The Deltacommission

In 2008, the Dutch cabinet took over the recommendations of the “Deltacommission”.

This commission concluded that “the fresh watersupply” in the Netherlands is not climate proof on the long term.”
A consequence of climate change...

Our country will face the consequences of sealevel rise, higher river discharges during wintertimes and more dry periods in summer.
The Deltaprogram

To anticipate to the consequences of climate change, the cabinet initiated the “Deltaprogram”.

It contains several research programs to provide the Dutch policymakers with the essential knowledge to realize a new “National Waterplan”.
And what about inland navigation?

Inland navigation is one of the users of the “national fresh watersystem”
And what about inland navigation?

Inland navigation (*binnenvaart*) is also an important mode in (inter)national freight transportation.
Knowlegde on Climate

- Climate change could be a threat for inland navigation
- Knowlegde on climate change is important to make proper policy and infrastructure planning
- The Ministry for Transport, Public Works and Watermanagement decided to participate in the research program “Knowlegde for Climate” (KvK)
KvK Research project: Effects of climate change on inland navigation and competitiveness of the port of Rotterdam

**TU Delft**
Framework, systemanalysis and -reliability

**VU**
Literature review & Interviews

**Deltarces:**
Effects on riverdischarges and waterdepths
Effects on rivermorphology

**Rijkswaterstaat**
Impacts on inland navigation (costs)

**TNO**
Impacts on modal split & Dutch ports
Effects on waterdepths

2004

2050 W+ scenario
## Effects on inland waterway transport costs

<table>
<thead>
<tr>
<th>Study</th>
<th>Increase costs</th>
<th>Time horizon</th>
<th>Region</th>
<th>Low/ High water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millerd, 2005</td>
<td>3% - 14%</td>
<td>2001-2030</td>
<td>Great lakes, USA/Canada</td>
<td>Low</td>
</tr>
<tr>
<td>idem</td>
<td>6% - 22%</td>
<td>2001-2050</td>
<td>Great lakes, USA/Canada</td>
<td>Low</td>
</tr>
<tr>
<td>Olsen, 2005</td>
<td>-44% - + 35%</td>
<td>2002 - 2100</td>
<td>Middle Mississippi, USA</td>
<td>Low + High</td>
</tr>
<tr>
<td>Nomden, van Deursen, 1999</td>
<td>10%</td>
<td>1990-2050</td>
<td>Rhine</td>
<td>Low + High</td>
</tr>
<tr>
<td>Jonkeren e.a., 2007</td>
<td>15%</td>
<td>2004-2050</td>
<td>Rhine (Kaub)</td>
<td>Low</td>
</tr>
<tr>
<td>Rijkswaterstaat, 2005</td>
<td>54%</td>
<td>Gem (1901 - 2000) - 2050</td>
<td>Dutch waterways</td>
<td>Low</td>
</tr>
<tr>
<td>Rijkswaterstaat, 2009</td>
<td>4%</td>
<td>2004-2050</td>
<td>All freight transport from/to/in NL</td>
<td>Low + High</td>
</tr>
<tr>
<td>idem</td>
<td>10% - 12%</td>
<td>2004-2050</td>
<td>All freight transport from/to/in NL</td>
<td>Low</td>
</tr>
</tbody>
</table>
How will shippers react on higher costs....

- Modal shift from navigation to road and rail transport
- Invent new logistical chains
- Postponement of transportation
- Transportation with smaller (less deeper) ships
- Investments in storage capacity
- Increase navigation speed
Effects on modal share

- No effect: 86%
- Acceptation: 6%
- Modal shift: 8%
  - Road: 13%
  - Railway: 87%

Commodity groups:
- Agricultural products
- Food
- Solid mineral fuels
- Crude oil and petroleum products
- Ores
- Metal products
- Minerals, building materials
- Fertilizers
- Chemicals
- Machinery, miscellaneous articles
Need for adaptation?

- Resumé
  - more wet-periods during wintertimes and dry-periods in summer if climate change persists
  - hinder for navigation because of higher and lower waterdepths in the rivers
  - higher transportcosts and delay in arrival of goods
  - modal shift from navigation to road- and railtransport

- What is the problem for the government?
Need for adaptation?

• Recall: navigation is not the only user of the fresh watersystem

• Rijkswaterstaat (2005):
  damage (in €) to agriculture because of draught is 2x damage to navigation
Work in progress

• Who owns the problem?
  Government, shippers, ports etc?

• Search for solutions.
  Together with all stakeholders.

• Extend and share our knowledge.
  Impacts of Climate Change on all freshwater users (agriculture, energy/industry, navigation, leisure) within the Deltaprogram and Knowledge on Climate

• Providing the proper information to the policymakers as input for our New National Waterplan to anticipate on climate change.