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Deltares Enabling Delta Life

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ADAPTIVE DELTA MANAGEMENT
Concept and some recent experiences

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(with input from Frans Klijn, Fulco Ludwig, Marjolein Haasnoot, Eelco van Beek and others)

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Delta management: what is it about?

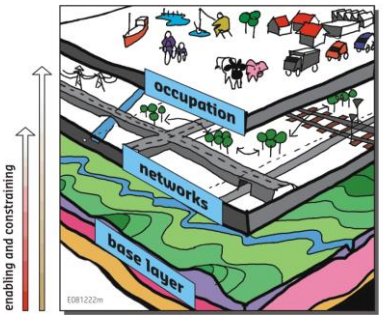
Deltas are complex dynamic human-environment systems

Evolving over centuries through interaction between occupation, infrastructure and physical conditions.

So delta management is not new!

It is our core business for centuries already

Still: complexity often pinpointed as key to ADM



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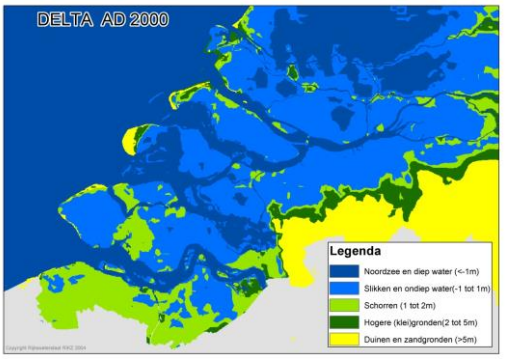
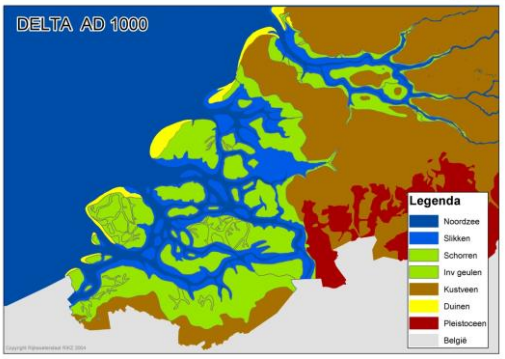
Base Layer





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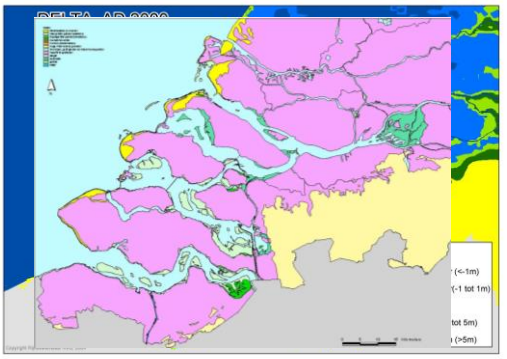
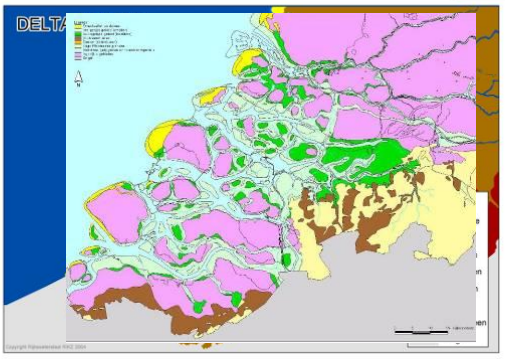
Network Layer



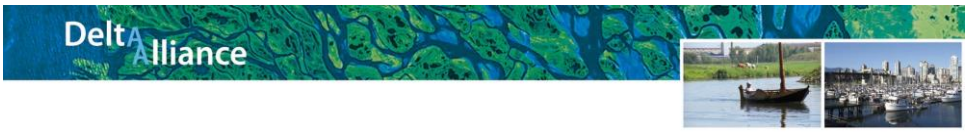


Veere (Zeeland ca. 1700)

Rotterdam (2010)

Adaptive then?

- We have adapted to changing circumstances for more than 1000 years already, to floods and droughts
  - Mounds, embankments, storm surge barriers (Delta works)
  - River training, irrigation and drainage
- But:
  - Used to be in response to disasters (1916, 1953, 1976)
  - Often caused unintended side-effects
  - Disadvantages of continuation of current practice become clear: need for a transition? (e.g. Room for Rivers)



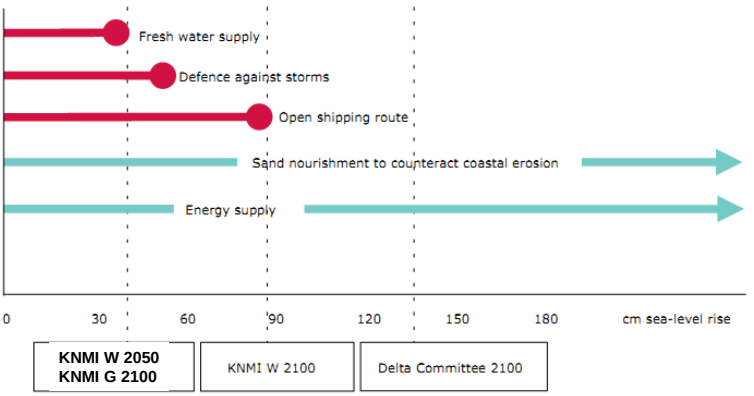
- So what is new?
  - If we intend to anticipate change we need new approaches and methods for policy analysis and planning
  - Especially because the future is uncertain

- **Dealing with 'fundamental uncertainties' is the key issue of ADM:**
  - "what to do and when to do it?"
  - "not too much, not too little"
  - "not too early, nor too late"

- How?

1. Scenarios (> 3 decades)
2. Adaptation tipping points (recent; Kwadijk et al.)
3. Flexibility / adaptation pathways (Haasnoot et al.)

Example Adaptation tipping points for Rhine Meuse Estuary



Note: Red bullets indicate endpoints of a strategy, blue arrows indicate the strategy can cope with higher sea levels. The climate scenarios used in the Netherlands are marked with dotted lines.

Source: Jeuken et al., 2010. EEA, 2013

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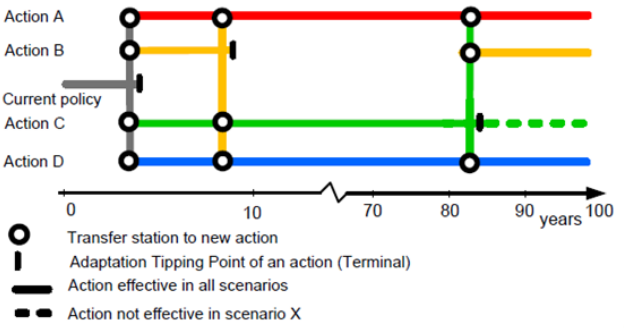
Adaptation pathway = a sequence of policy actions to achieve targets under changing conditions

(Haasnoot et al. 2012 Climatic change. DOI: 10.1007/s10584-012-0444-2)



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Adaptation pathways show…

- Alternative ways when a policy tipping point approaches
- When action should be taken/ how long we can carry on
- Which pathways are dead-ended (*lock in*)
- Which leave many other options open
- Which options are cut off when a certain direction is chosen
- Key is: prevent regrets and remain flexible (keep options open, precaution)

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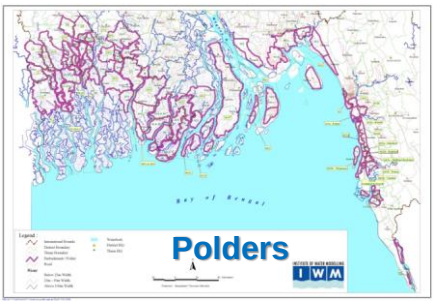
Example from Bangladesh

Given the **Accelerated Sea Level Rise**,

what is a sustainable coastal management strategy?



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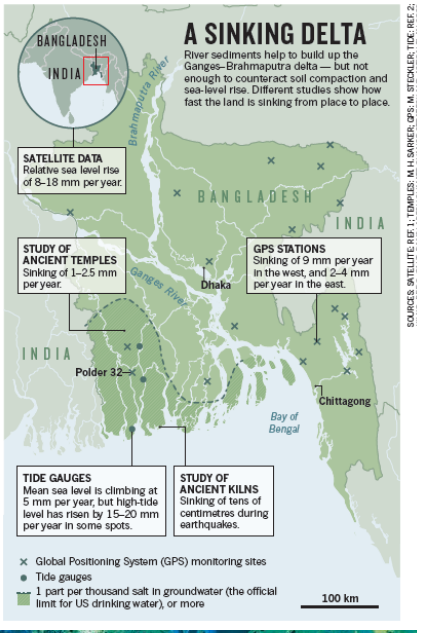
Are polders adaptive to sea level rise?

- River sediments help to build up the G-B delta, but not enough to counteract compaction and sea level rise.
- Polders keep out the water AND sediments.
- Tidal channels outside polders started to silt up leading to impeded drainage in polder
- Periodic flooding (tidal river management) could solve the problems.



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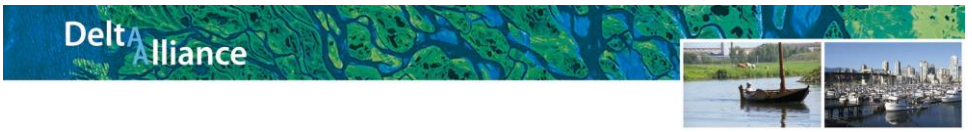
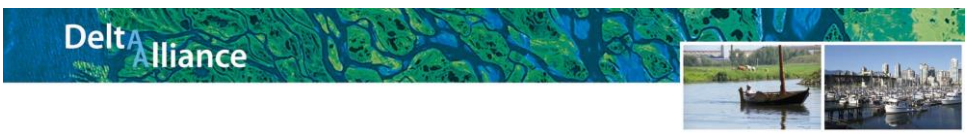
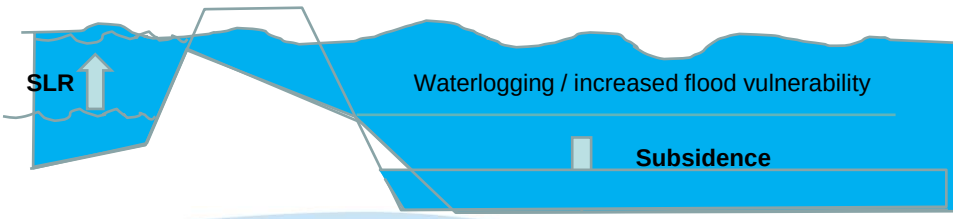


Bangladesh 2014

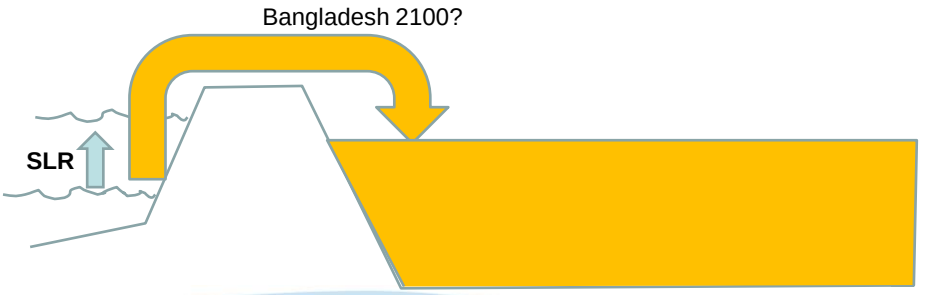


Bangladesh 2014

Bangladesh 2100?



Tidal River Management: The solution?



Publication:

Towards a Comprehensive Framework for Adaptive Delta Management

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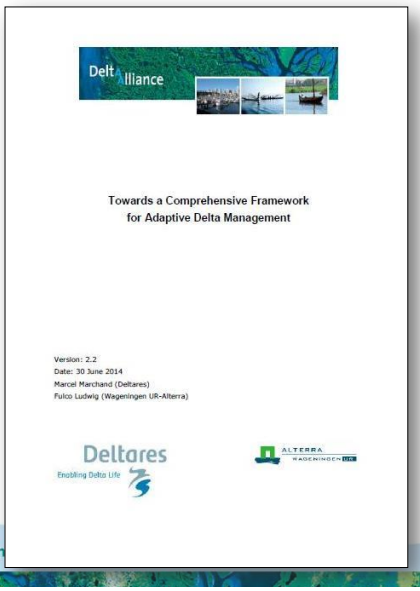
Delta Alliance Document
2014

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Thank you
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