



How to obtain information on the effectiveness of potential flood risk management measures in only a few minutes?

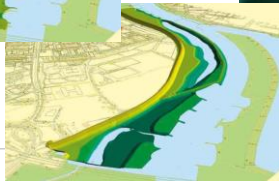
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Introduction

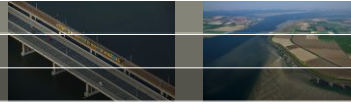
FRM in NL mainly focused on protection against floods by:

- Construction of levees
- Stormsurge barriers
- Giving room to the rivers (since the '90s)



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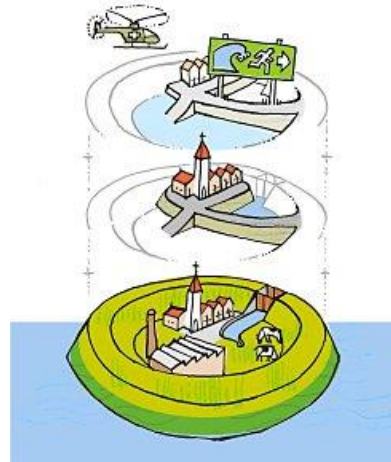
Introduction



Only recently we have started working on a **'multi-layer safety'** approach, (multiple tiered FRM)

With measures aiming at:

- Flood protection (levees, room for rivers,...)
- Reduction of the consequences of a flood by
 - reducing the exposure or vulnerability by better spatial planning (secondary dikes, building on mounds, floating houses, etc.)
 - improving flood event management (FEWS, evacuation, communication, etc.)



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Introduction



In many countries, this seems 'normal' or 'logical'

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In the past also in NL



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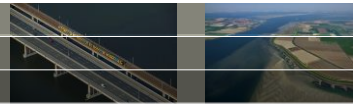
In the past also in NL



But now we feel safe, and do not feel the need to take additional measures



Aim



Problem:

Spatial planners and project developers often have little knowledge on measures that might be effective in a certain area

Aim:

To develop a set of maps indicating the (cost-)effectiveness of different types of Flood Risk Management measures

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Types of measures



building elsewhere
or otherwise, e.g.

evacuation

building on mounds



...or stilts



secondary dikes



living on the first floor



floating houses

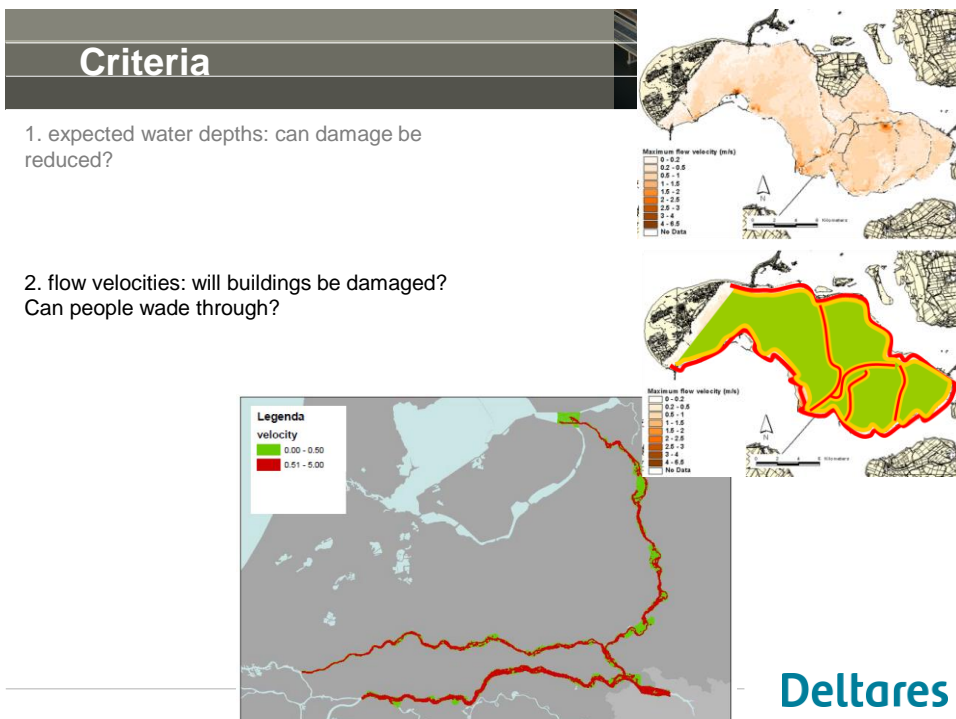
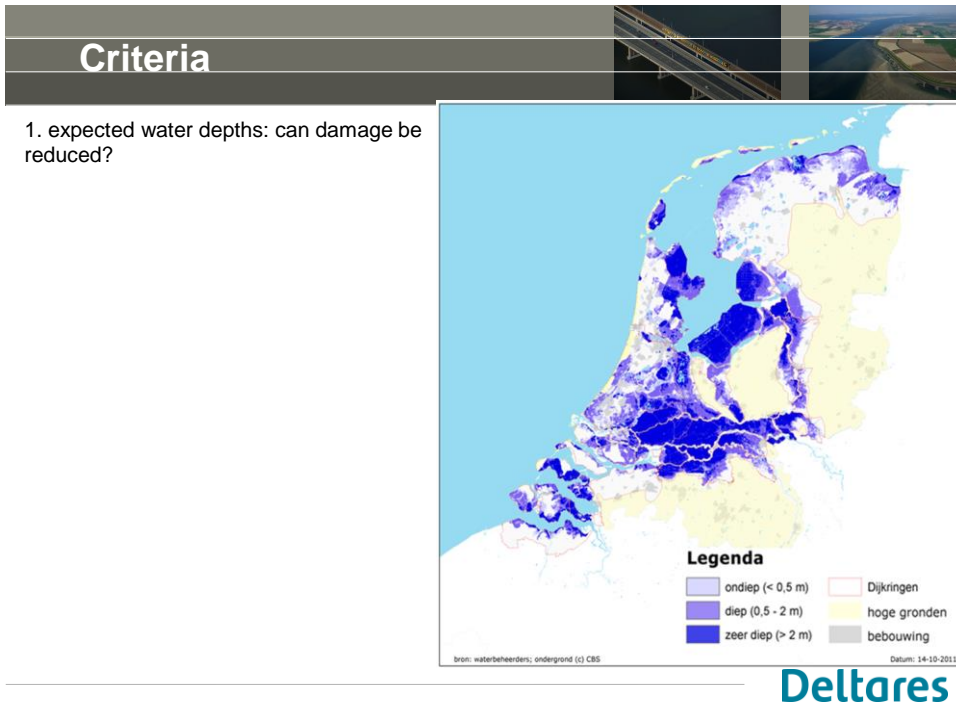


wet proof or
dry proof



outlet spillway

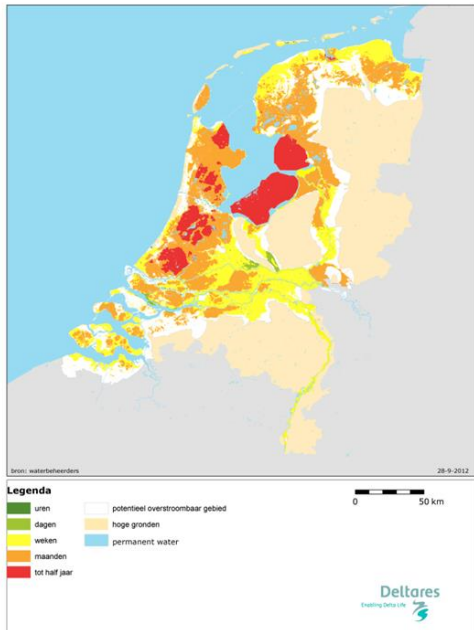
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Criteria

1. expected water depths: can damage be reduced?
2. flow velocities: will buildings be damaged?
Can people wade through?
3. flood duration: hours? days? months?

Geschatte overstromingsduur bij overstromingen als gevolg van doorbraken in primaire keringen
Op basis van vuistregels ontwikkeld in kader van EU-ROR



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→ maps already made available for the EU
Floods Directive 2007/60/EC !!

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An example (1):

Building elsewhere



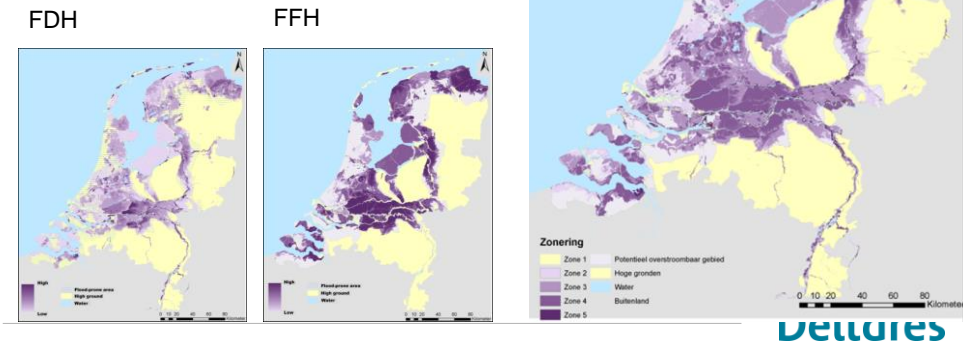
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An example (1):

Flood Hazard Zones

based on:

- flood damage hazard (FDH)
- flood fatality hazard (FFH)



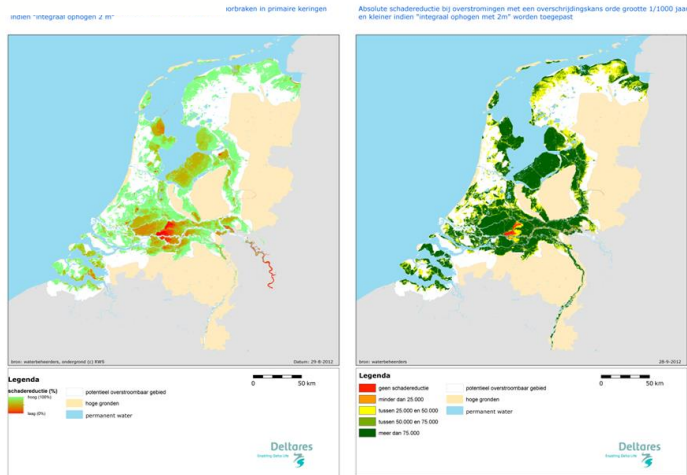
An example (2):

Building otherwise: mounds (2m)



Building on a mound (2m)

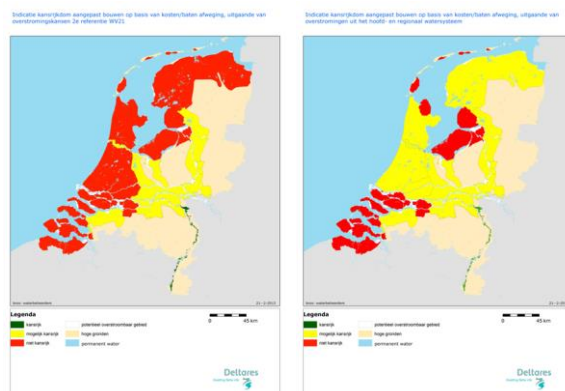
Step 1: damage reduction



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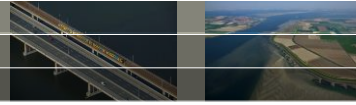
Building on a mound (2m)

- Step 2: limitations with respect to flow velocities? no
- Step 3: limitations with respect to flood duration? no
- Step 4: flood frequency (will investments be earned back?)

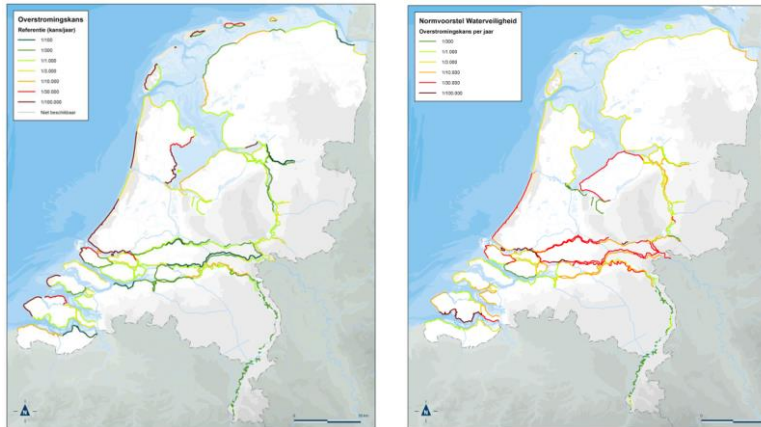


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Building on a mound (2m)



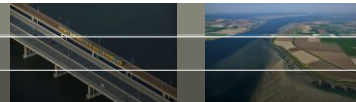
Will this measure become more attractive in the future?
(increased flooding due to climate change and sea level rise?)



If we would decide **not** to increase the protection standards: yes

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Summarizing....



- We developed a series of maps indicating the effectiveness of different flood risk management measures
 - from a hydraulic point of view (is the measure suitable given expected water depths, flow velocities and flood duration?)
 - and an economic point of view (will investments be earned back?)
- Maps can be compared with Flood Risk zonation maps (building elsewhere)
 - but also give perspective for action
 - this may help spatial planners and project developers
- And.... looking at the map only takes a few minutes!

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