



Deltares
Enabling Delta Life

ALTERRA
WAGENINGEN UR

Climate Adaptation Support Toolbox

Dr ir Frans H.M. van de Ven, Reinder Brolsma (Deltares)
Robbert Snep (Alterra)

Deltas in Times of Climate Change II
Rotterdam

22 September 2014



How to reduce climate vulnerability?



Tiered approach

Three steps:

- 1: Vulnerability scan
- 2: Strategy to reduce vulnerability
- 3: Select set of adaptation measures



Lots of adaptation measures can be taken

Many, many options:



Deltares

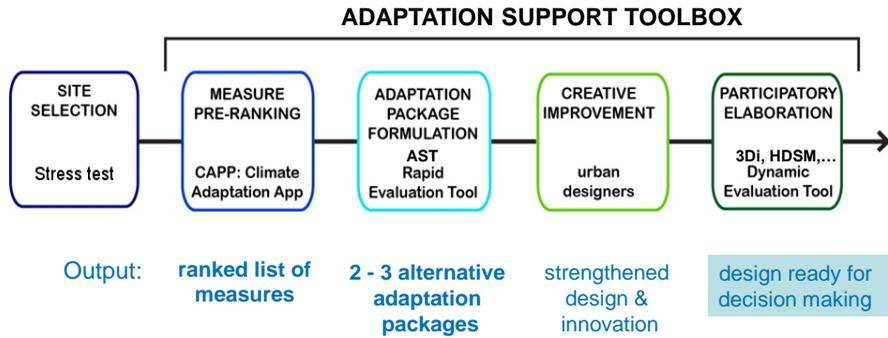
Select and co-design solutions



e.g. on a touch-table, involving the stakeholders

Deltares

..with our Adaptation Support Toolbox



Climate Adaptation App (www.climateapp.org)

ADAPTATION SOLUTIONS

FILTER

- Project type
 - Redevelopment
- Scale
 - Neighborhood
- Adaptation target
 - Groundwater flooding
- Land use
 - City Centre
- Dominant soil type
 - Peat
- Surface level and slope
 - Sloping area
 - Flat area on high ground
 - Flat area on low ground

28 Adaptation solutions

CLIMATE INFORMATION

ABOUT

climate shores spatial planning

ADAPTATION SOLUTIONS

- Canal
- Seepage barrier
- Improved construction site preparation
- Raising land
- Raising the groundfloor level
- Infiltration and Transport-sewer
- Emergency supplies and utilities
- Pumping station
- Drainage below surface level
- Constructions on piles
- Amphibious (floatable) constructions
- Smart-drain (groundwater)

Adaptation Support Tool

Measures

8:	Infiltration boxes	39%
9:	Inclination of roads	38.73%
10:	Sewer system (increase capacity)	35%
11:	Rainwater storage below buildings	35%
12:	Green facades	35%
13:	Porous pavement	35%
14:	Raised curbs/ hollow roads	34.375%
15:	Intensive green roof	34%
16:	Helophyte filter	33.75%
17:	Extensive green roof	33.5%

Active measures

Infiltration boxes	Heatstress: 0.00 °C
	Storage capacity: 3.97 m ³
	Peak flow reduction: 0.00
Infiltration boxes	Heatstress: 0.00 °C
	Storage capacity: 4.76 m ³
	Peak flow reduction: 0.00
Water squares	Heatstress: -0.03 °C
	Storage capacity: 59.94 m ³
	Peak flow reduction: 0.05

Contribution

Climate

Storage capacity:	68.67 m ³
Heat reduction:	-0.03 °C
Peak flow reduction:	0.05
Drought reduction:	

Blue Green Dream Deltares

Adaptation Support Tool

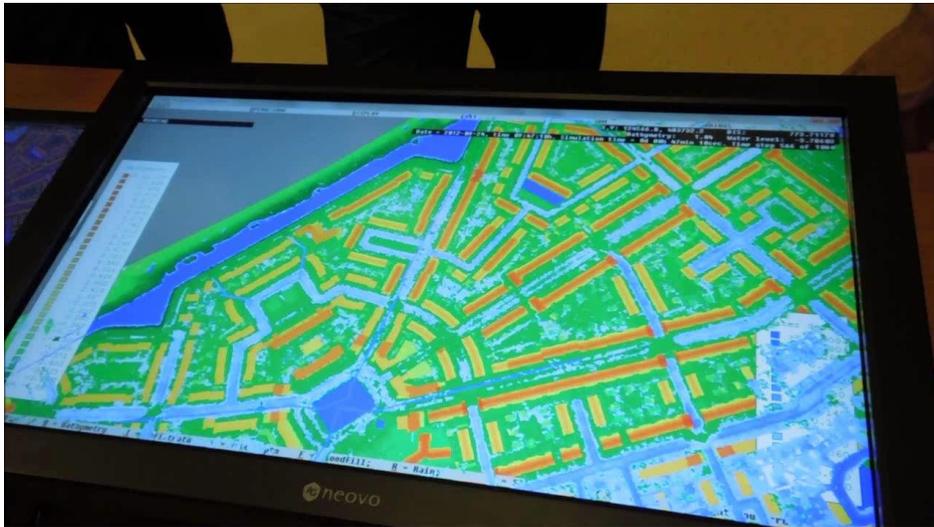
Dashboard with performance estimates based on key figures:

- Storage in water assignment (m³)
- Peak flow reduction (T_{return})
- Retention for supply (m³)
- Evaporative cooling (mm/d)
- Groundwater recharge (mm/yr)
- Water quality improvement:
 - Nutrient reduction (%)
 - Heavy metals, PAH, min.oil reduction (%)
 - Bacteriological quality
- Cost (construction & maintenance)
- Benefits and co-benefits

Blue Green Dream Deltares

Dynamic Evaluation Tools

e.g. effect of adaptation measures on flooding



3Di on MapTable, showing flood-prone areas

Deltares

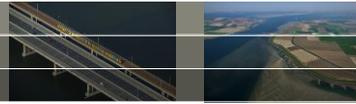
Design support tools

for a resilient, sustainable and healthy city



Deltares

Closing



Thank you for your attention!

