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Enabling Delta Life

ALTERRA
WAGENINGEN UR

Climate Adaptation Support Toolbox

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Deltas in Times of Climate Change II
Rotterdam

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How to reduce climate vulnerability?



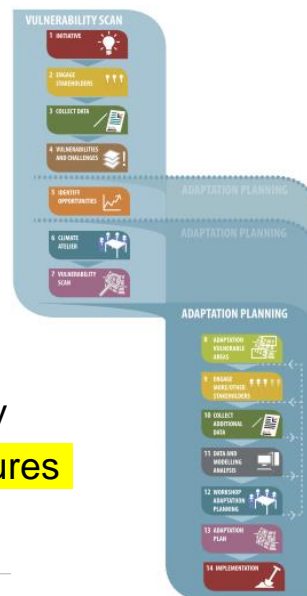
Tiered approach

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:



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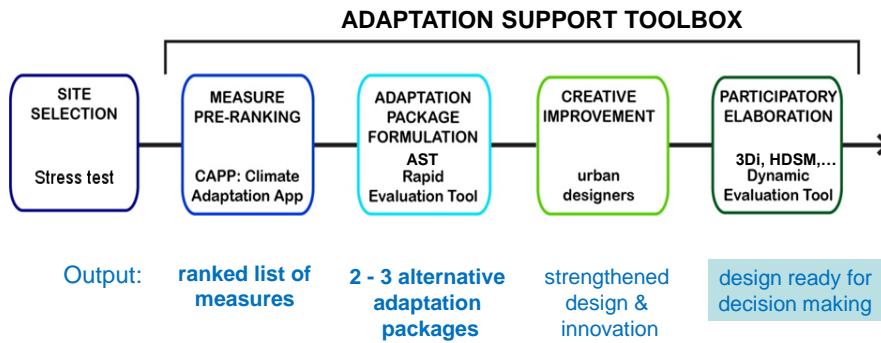
Select and co-design solutions



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

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..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

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:	

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Adaptation Support Tool

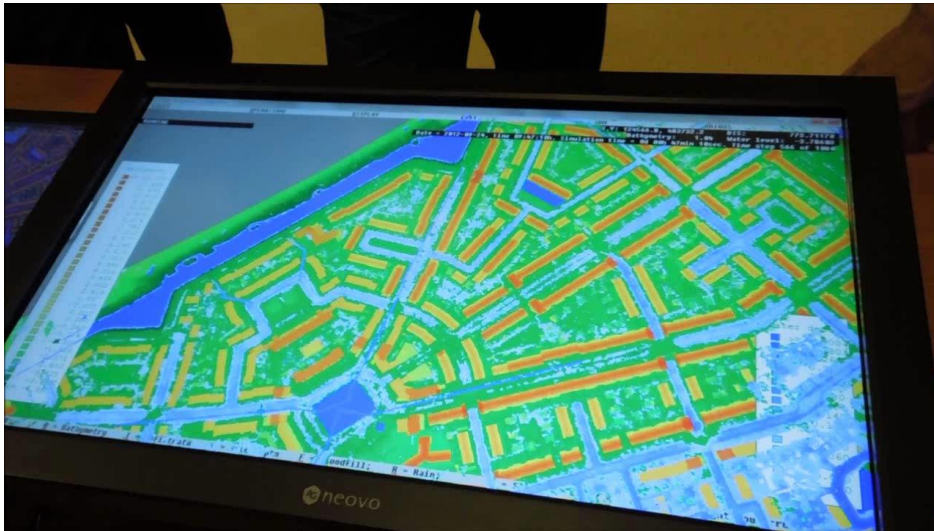
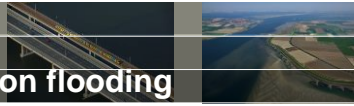
Dashboard with performance estimates based on key figures:

- 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

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Dynamic Evaluation Tools

e.g. effect of adaptation measures on flooding

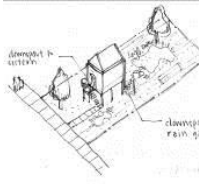
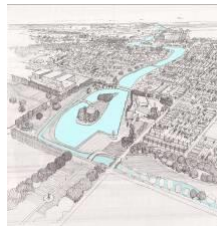
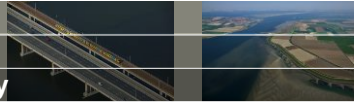


3Di on MapTable, showing flood-prone areas

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Design support tools

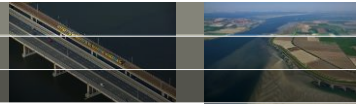
for a resilient, sustainable and healthy city



Dutch Dialogues III, April 2010, www.dutchdialogues.com
www.livingwithwater.com 2013 GNO Urban Water Plan

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Closing



Thank you for your attention!

