Risk based management of contaminated sites and megasites

Deltares
Enabling Delta Life

TNO | Knowledge for business

WAGENINGEN UR
For quality of life

Research centre on soil, groundwater, and sediment quality

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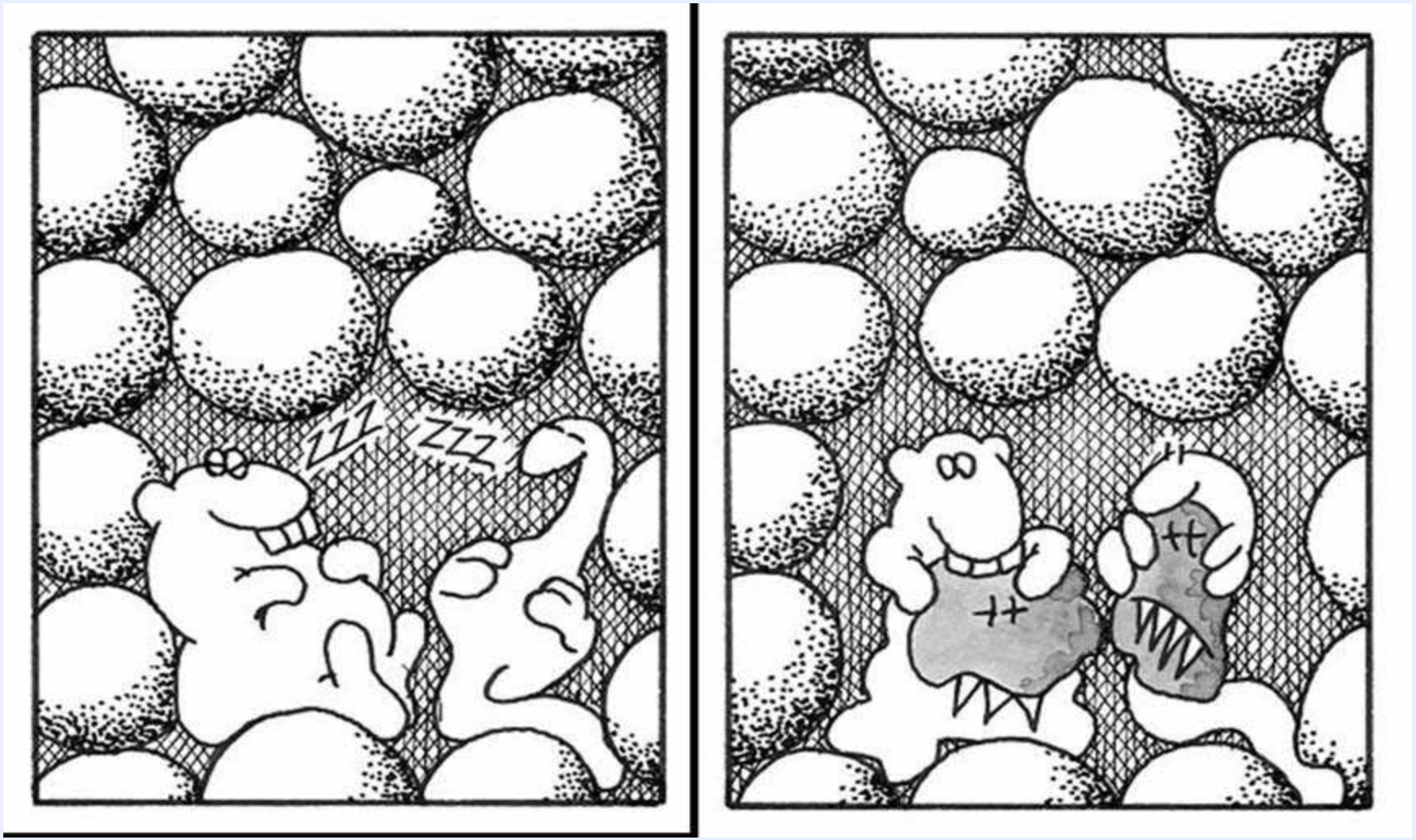
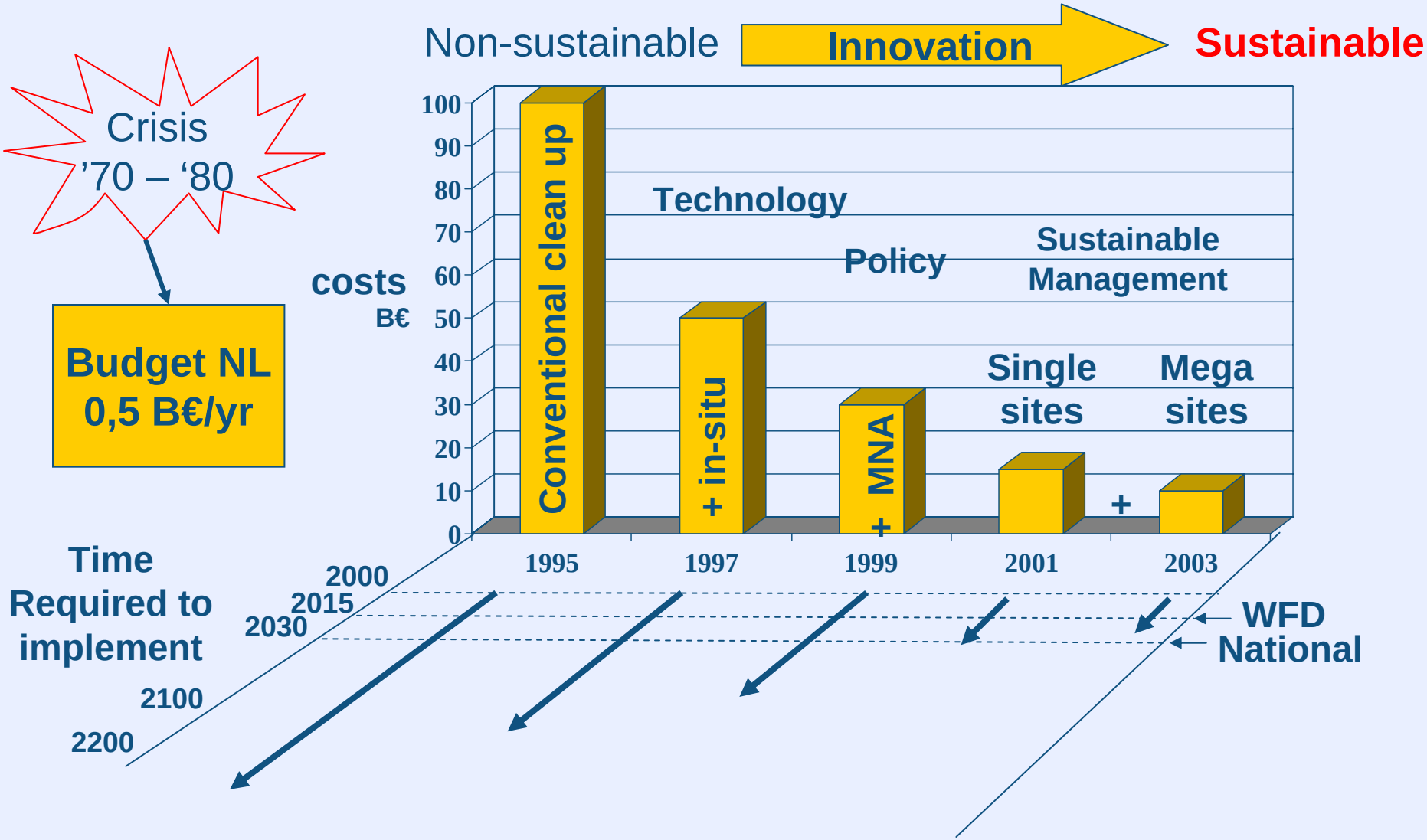
1) Wageningen University
2) TNO/Deltares
3) VITO

Maintaining and restoring soil-water functions on a regional scale

Reactive subsurfaces and sediments: integrated technology to maintain and restore functions based on use of micro-organisms and geochemistry



Soil and Groundwater Remediation: More than just technologies

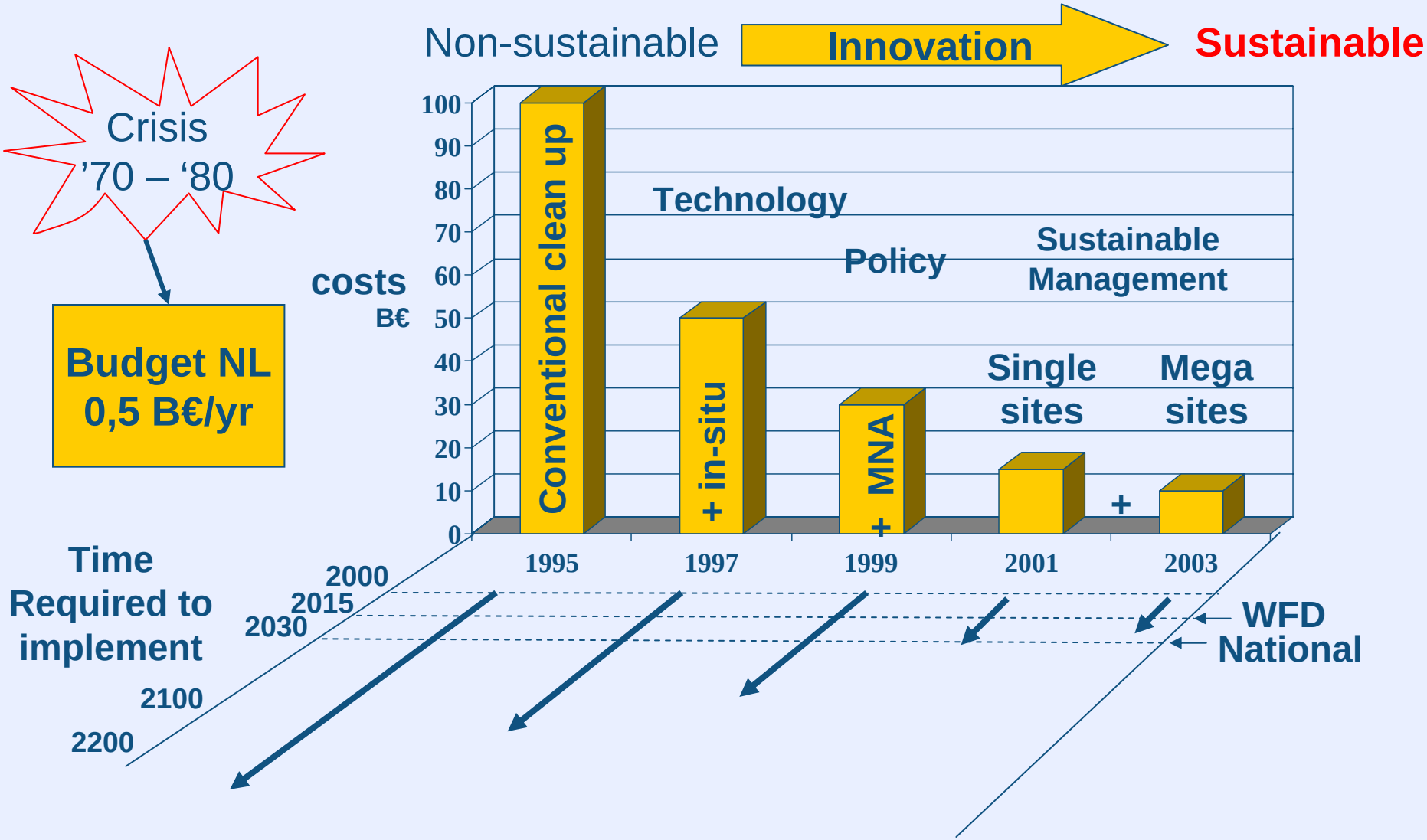


Of 600.000 suspected contaminated sites 30.000 Sites to be remediated in NL

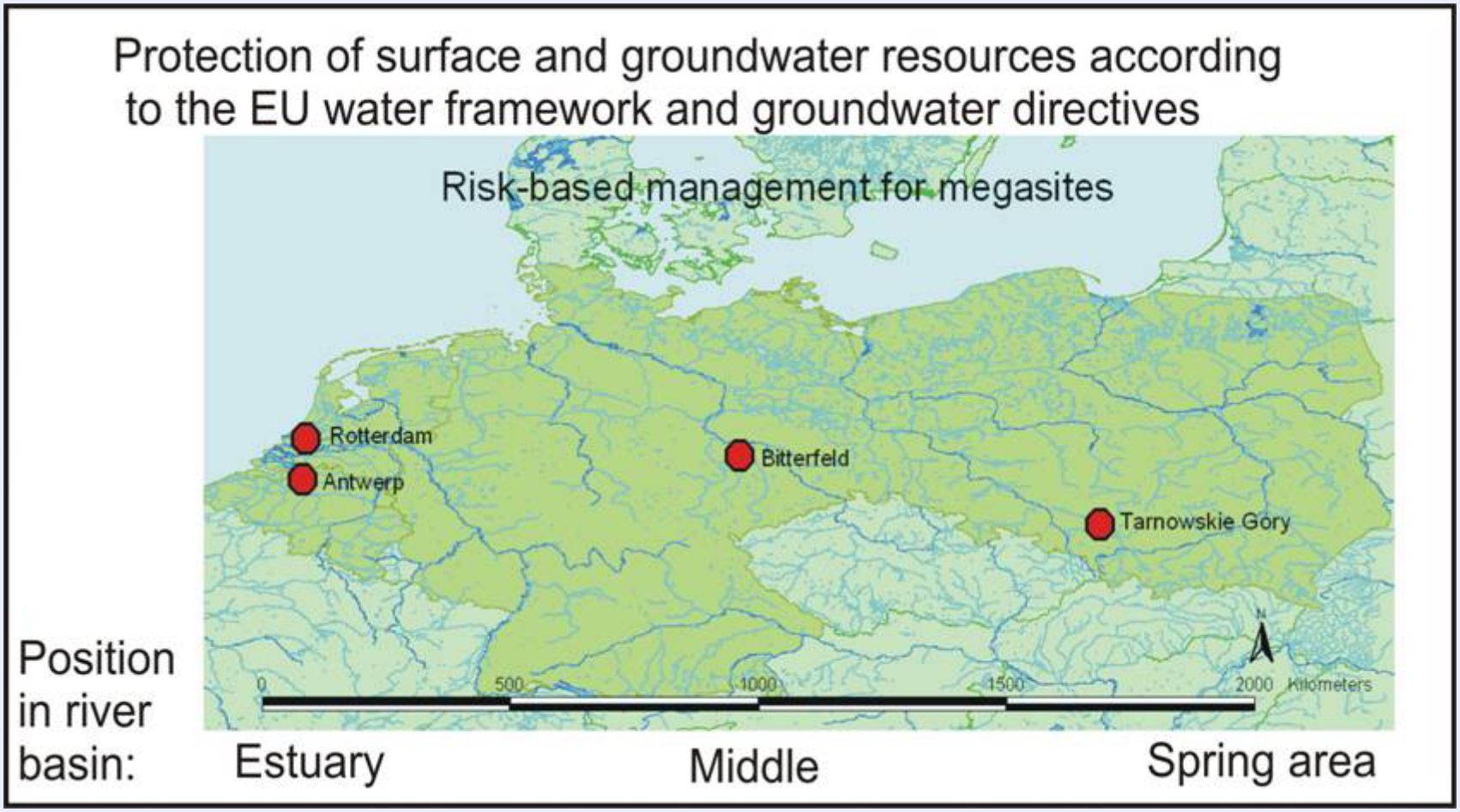
Site Characteristics		*Occurrence (% of total)*
Contaminant type (C)	C.1 Chlorinated Hydrocarbons	45
	C.2 Aromatics/Oil/MTBE/Cyanide	45
	C.3 Other	10
Geo-hydrology (G)	G.1 Permeable (sandy)	45
	G.2 Layered, permeable and impermeable layers	45
	G.3 Other	10
Built Environment (B)	B.1 Urban	70
	B.2 Industrial	25
	B.3 Other	5


25 demonstration pilot projects
- effectiveness of risk based approach
- solve final technological and process barriers
- confidence in sustainable solutions
Holland
In-Situ
Proeftuin
hip
VOLVO

Soil and Groundwater Remediation: More than just technologies



Towards a regional approach: megasite cases
The EU FW5 Welcome project (www.euwelcome.nl/)



Adres http://www.euwelcome.nl/kims/manual/index.php?index=28sec=1

Welcome | Strategies | Manual | Examples | Tools | Questions | Glossary | About

Integrated Management Strategy for Prevention and Reduction of Pollution of Waterbodies at Contaminated Industrial Megasites

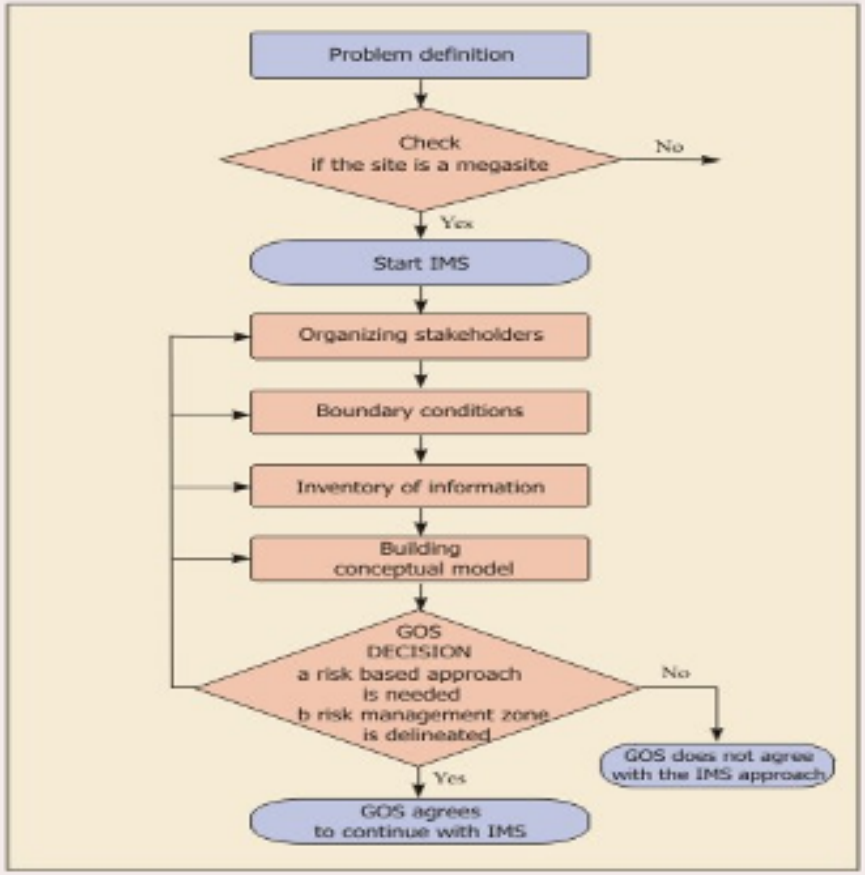
IMS

Manual

IMS > Manual > Starting IMS

- **Introduction**
- **> Starting IMS**
  - Problem definition
  - Organizing stakeholders
  - Boundary conditions
  - Inventory of information
  - Building a conceptual model
  - Decision on IMS
- **Risk Assessment**
  - Megasite characterization
  - Clustering
  - Modelling
  - Determining risks
  - Finalize clustering
- **Risk Management Scenarios**
  - Basic scenarios
  - Potential and preferred scenario
  - Final scenario
- **Implementation**
  - Management plan
  - Monitoring program
  - Review process

Starting IMS



Definitions

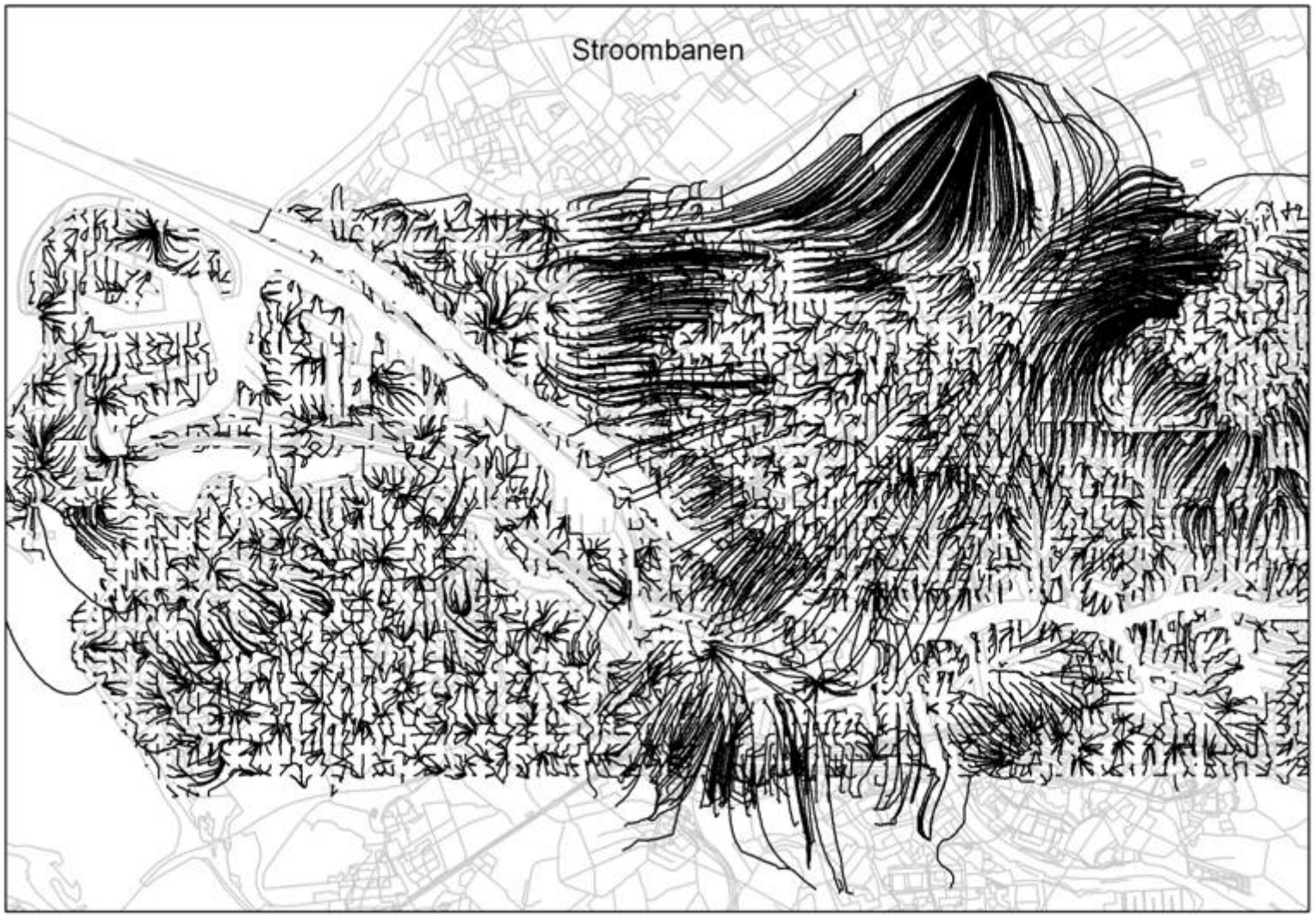
- BC - Boundary conditions
- CM - Conceptual model
- GIS - Geographical Information System
- IMS - Integrated Management Strategy
- Megasite
- Plane of compliance
- RMZ - Risk Management Zone
- Stakeholders

Integrated Management Strategy

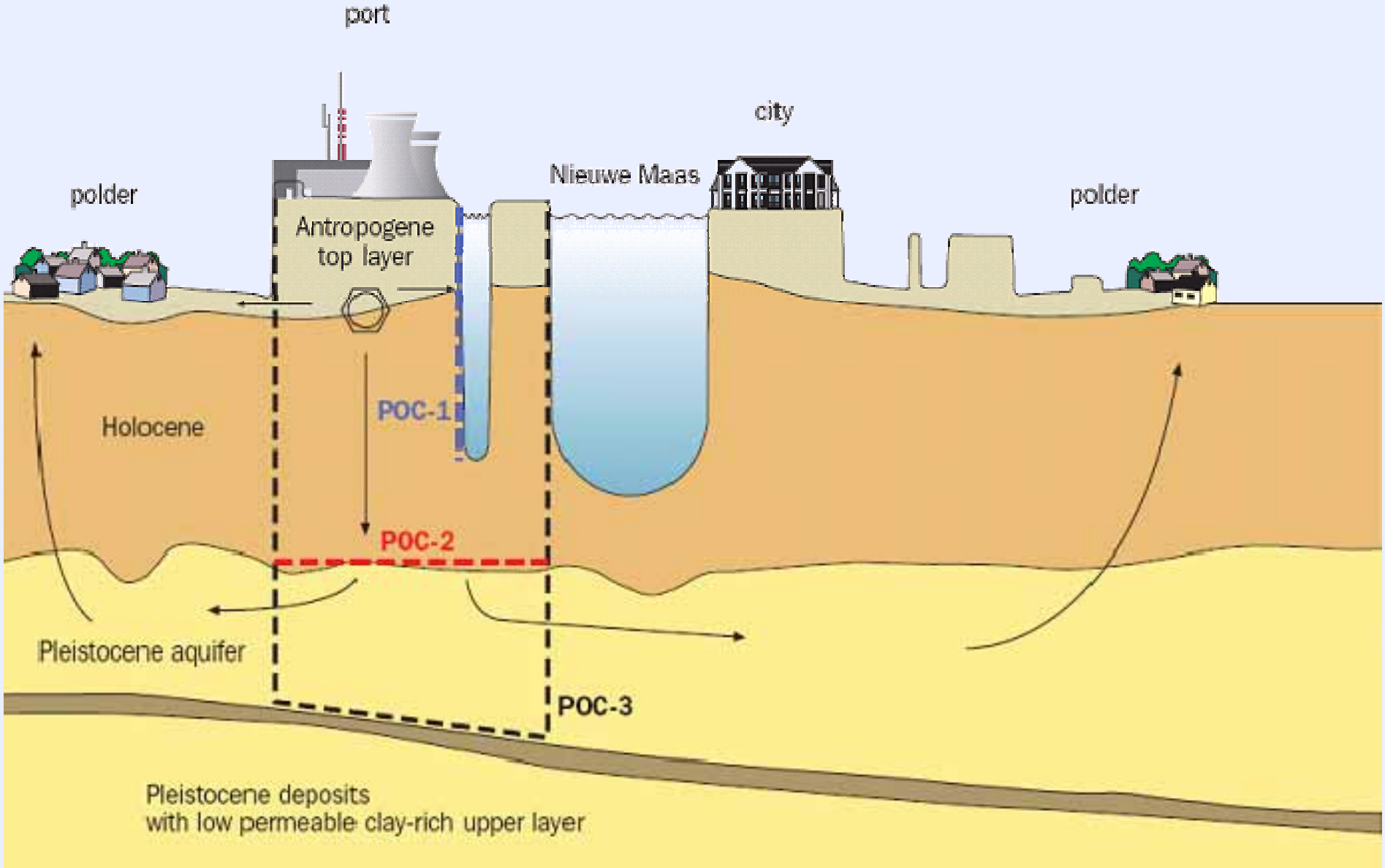
Rotterdam harbour

Development of the Rotterdam harbour area

Regional Groundwater flow

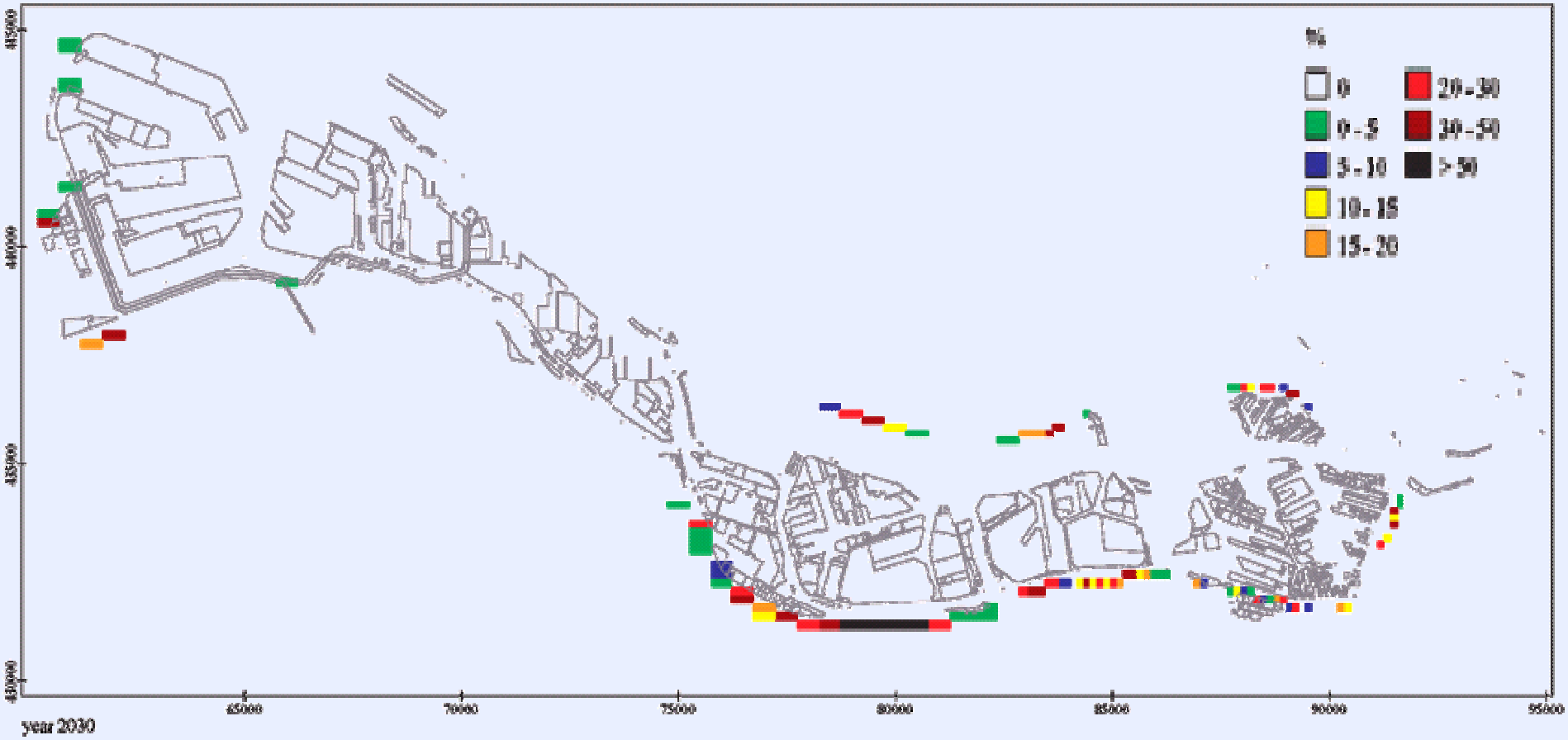


Conceptual model for Rotterdam Harbor Area Risk-based Management Approach

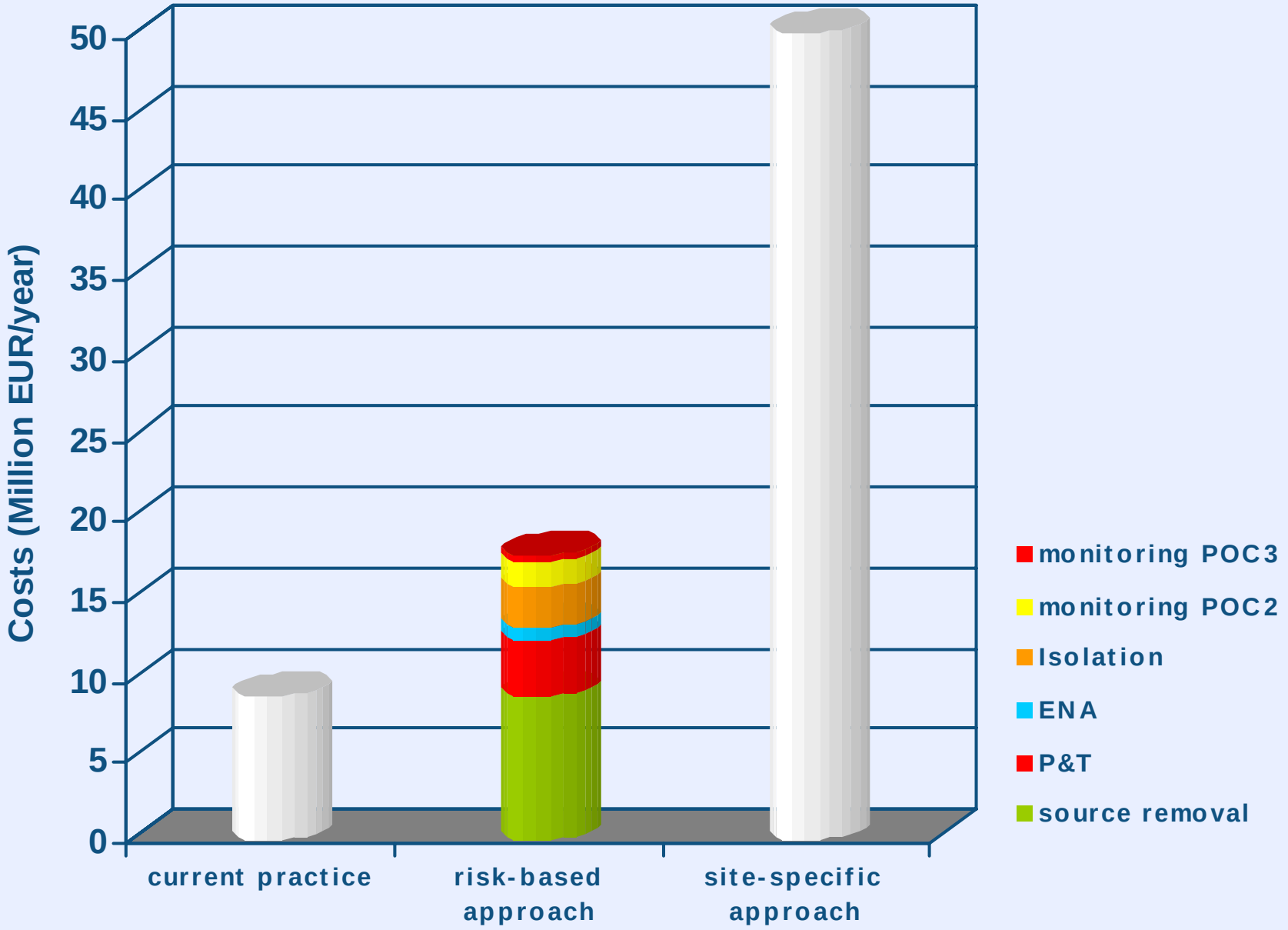



3rd plane of compliance

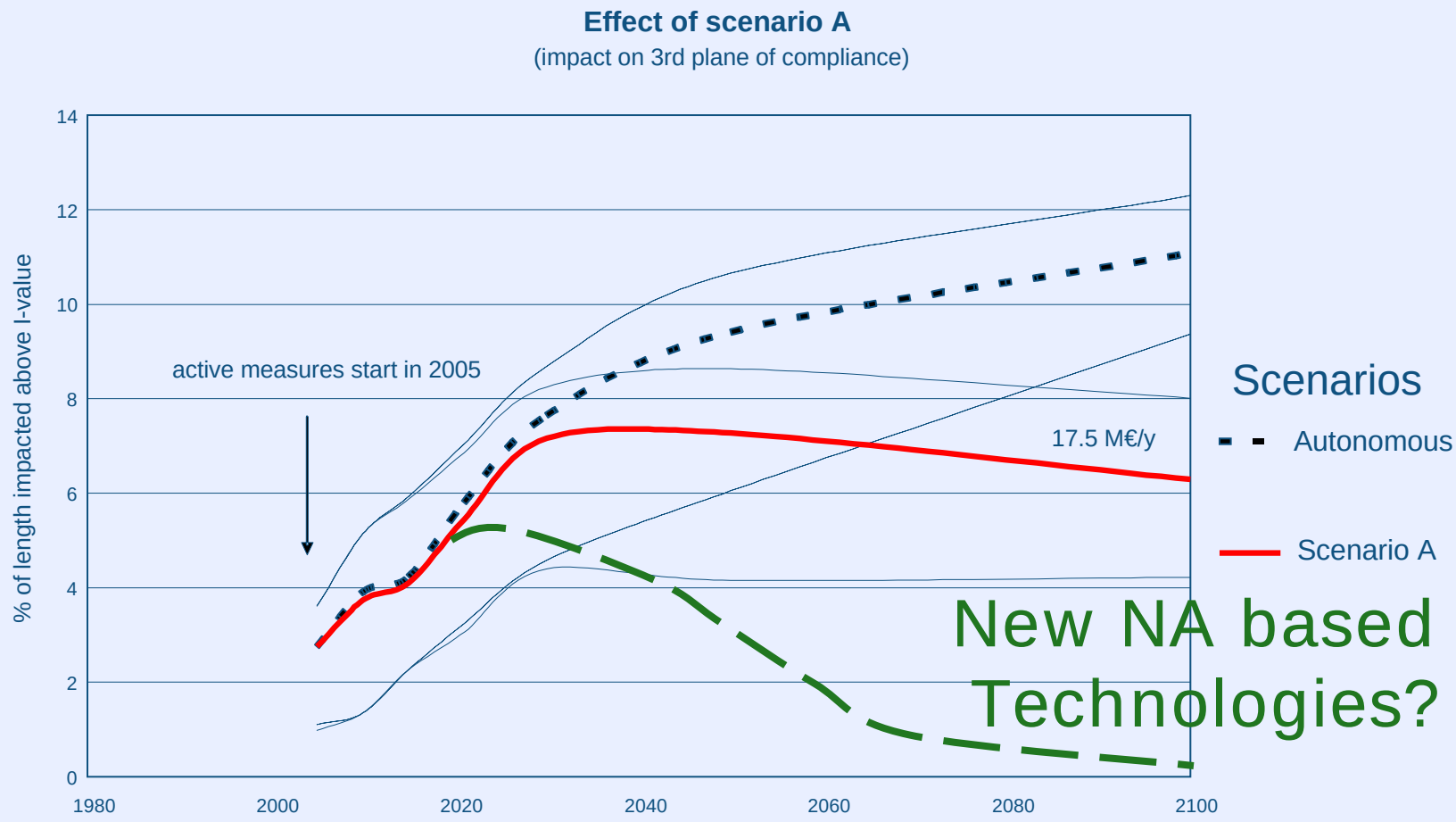
2030: Chance of exceeding intervention value at 3rd Plane of Compliance

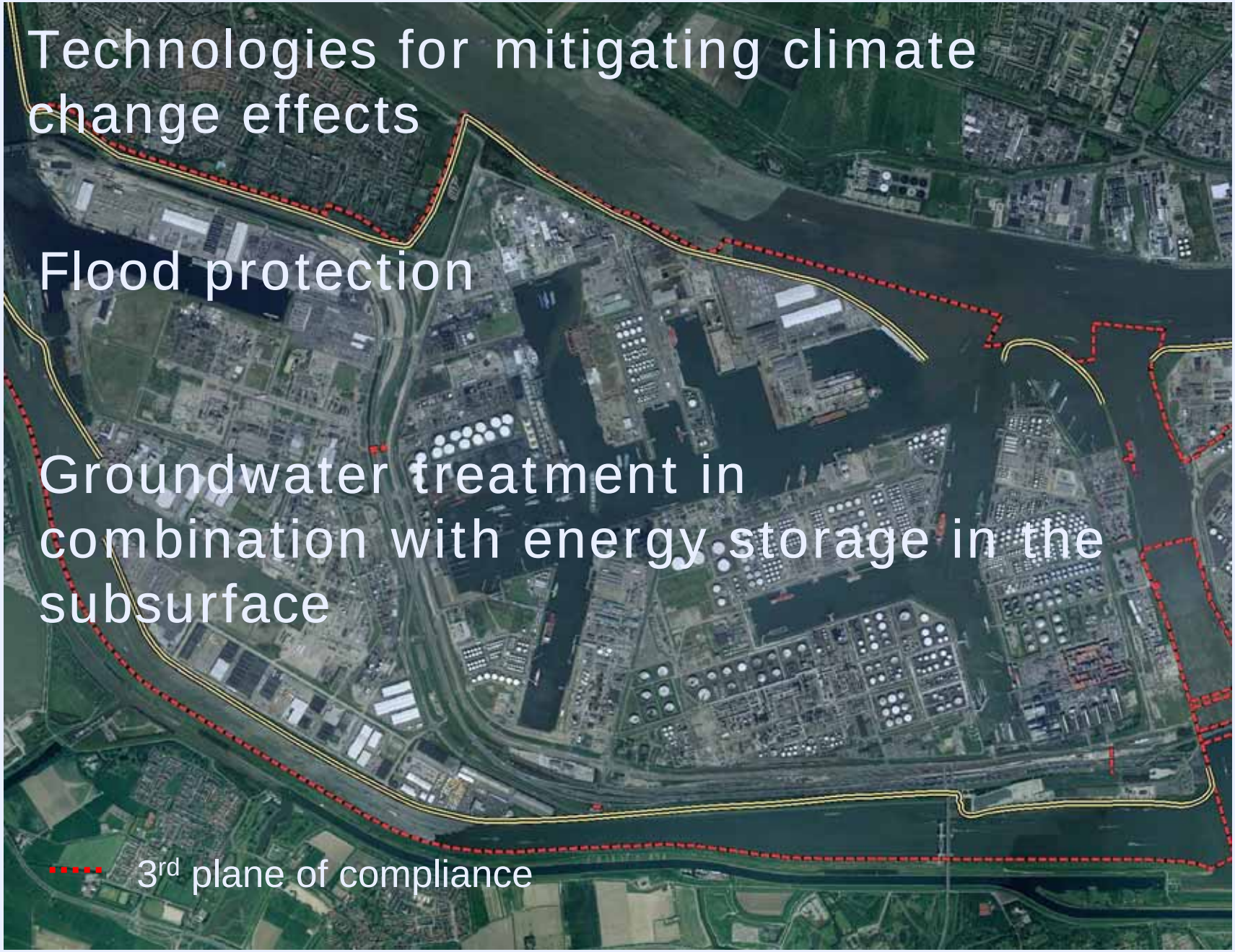


The Benefits

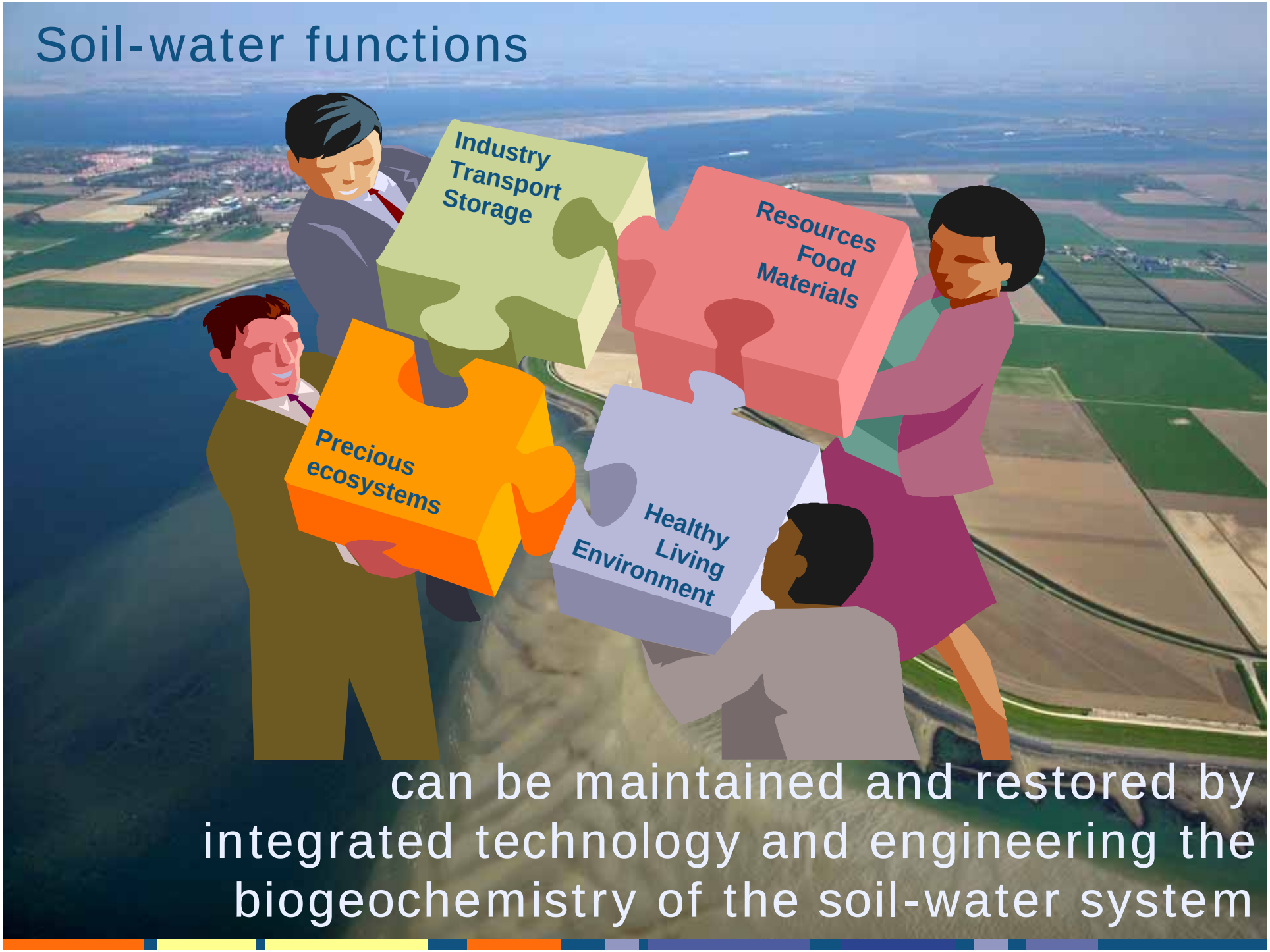


Scenarios for effect of risk management measures (e.g. source removal, NA, Isolation)




Technologies for mitigating climate change effects
Flood protection
Groundwater treatment in combination with energy storage in the subsurface
3rd plane of compliance

Soil-water functions



can be maintained and restored by integrated technology and engineering the biogeochemistry of the soil-water system