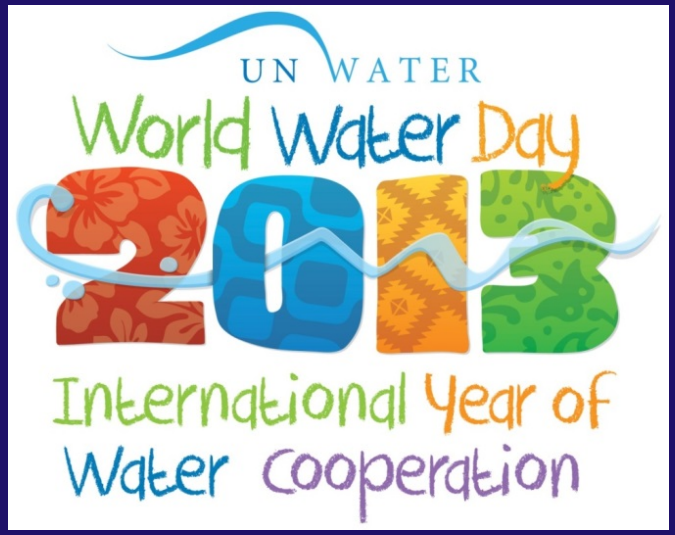
Managed Aquifer Recharge, Conjunctive Use and Groundwater Buffering

Regional experiences and GW Governance



Thematic Paper No.4
Management of aquifer recharge and discharge processes and aquifer storage equilibrium

Albert Tuinhof

Acacia Water
Solutions in Groundwater

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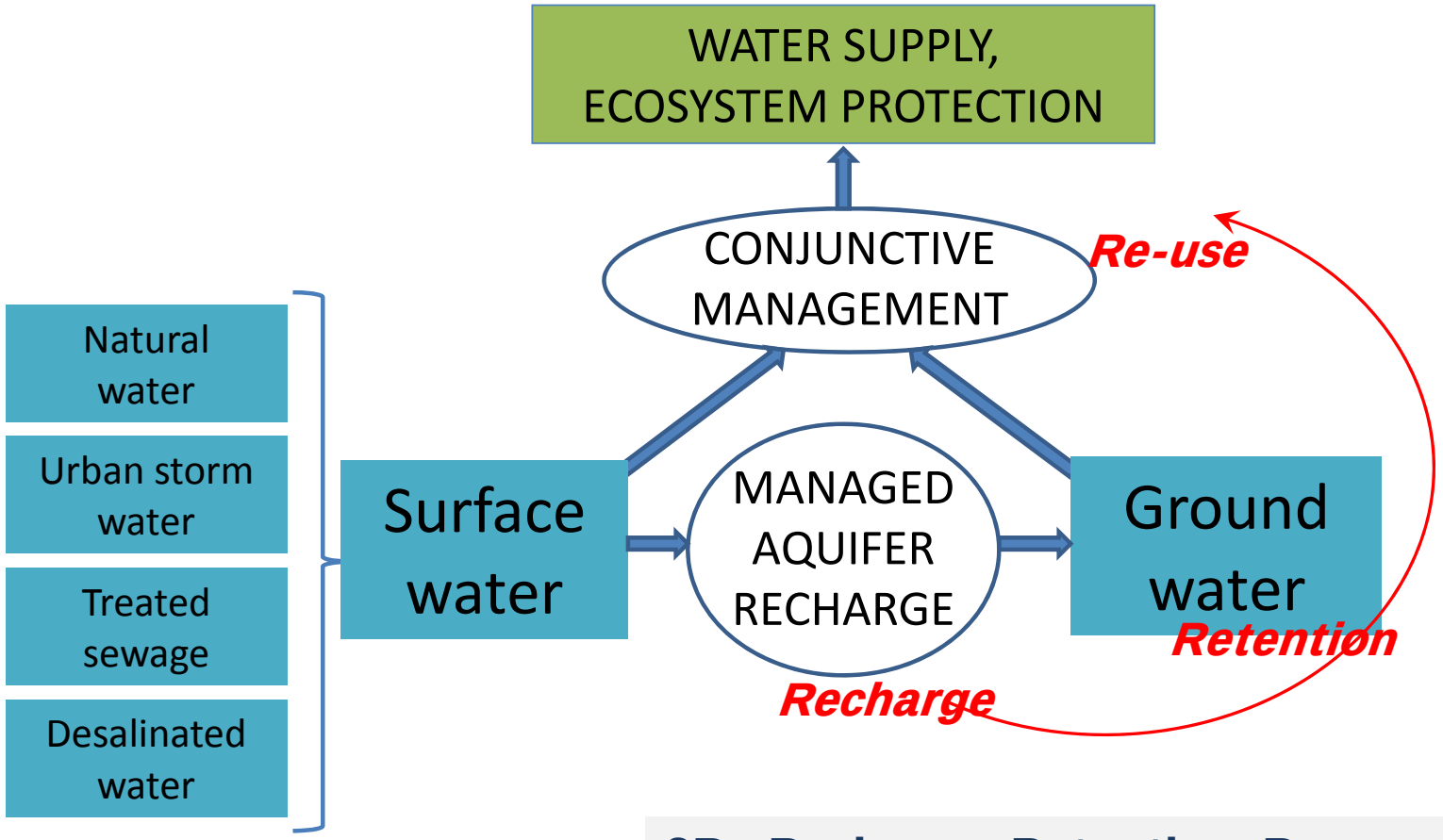
Managed aquifer recharge and conjunctive use



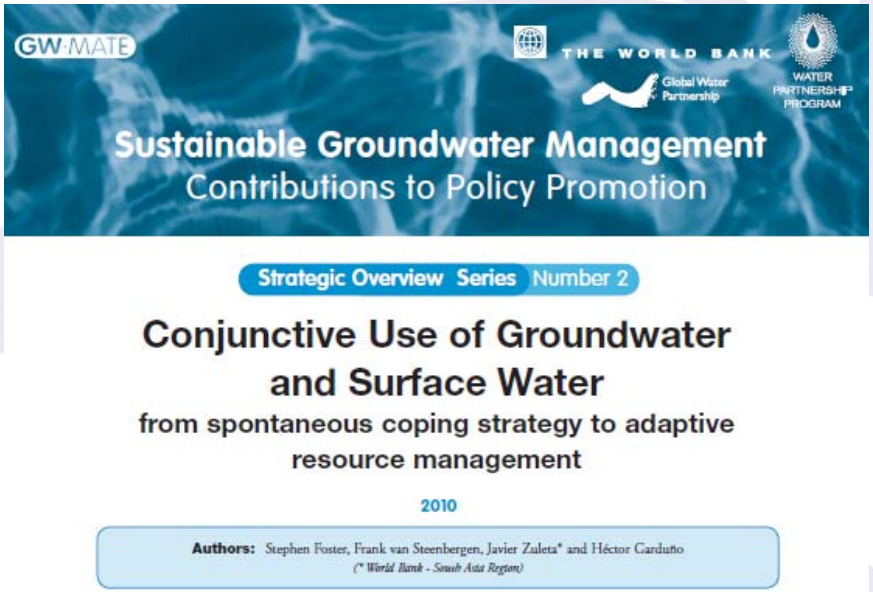
3R: Recharge, Retention, Re-use

Management of the water buffer

CONJUCTIVE USE OF GW AND SW
Making the best use of both resources

Combining the use of groundwater and surface water in a way that optimizes the benefits of each. An example of CU is when water providers use SW as their primary water supply and use GW only to meet peak needs or to supplement supplies in times of drought (both irrigation and for water supply)

Unplanned and planned



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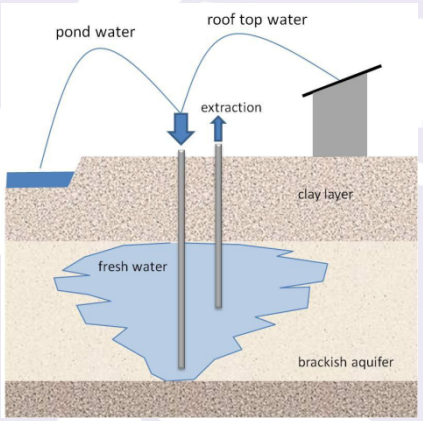
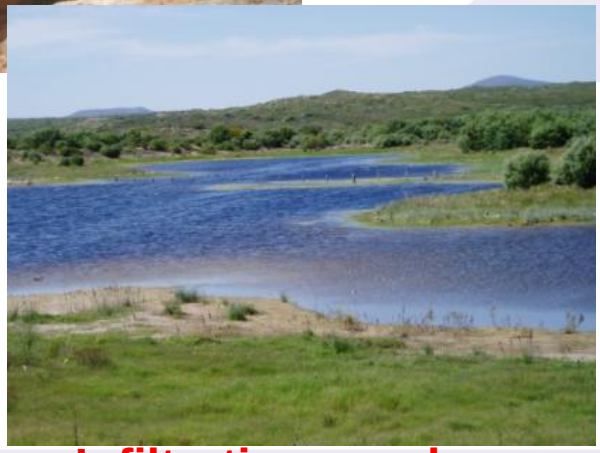
Managed aquifer recharge /3R

increase in groundwater recharge over what would have occurred naturally, as a result of interventions designed to enhance groundwater storage and quality

Sand dam

Shallow GW infiltration





Infiltration pond

River bank infiltration

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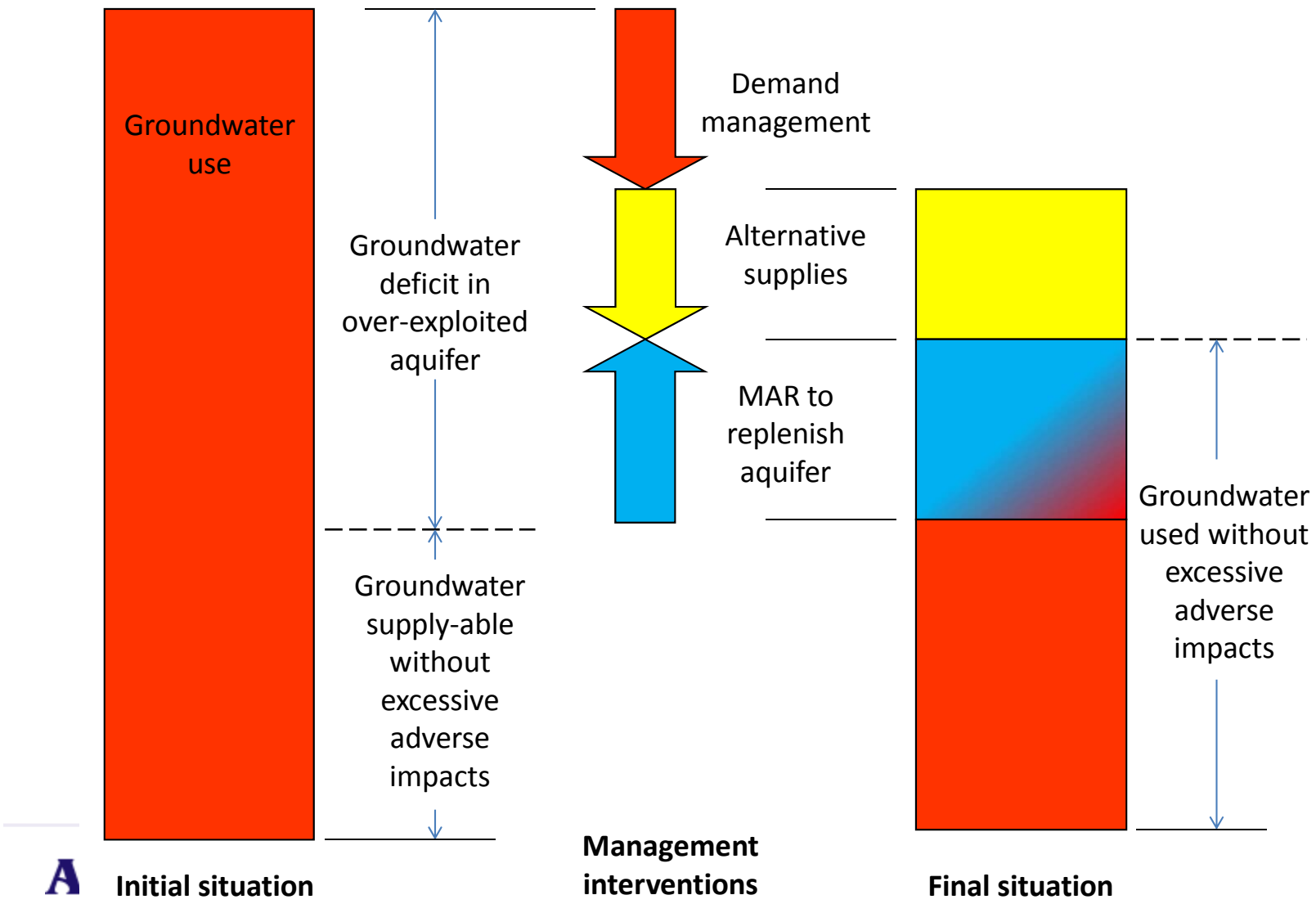
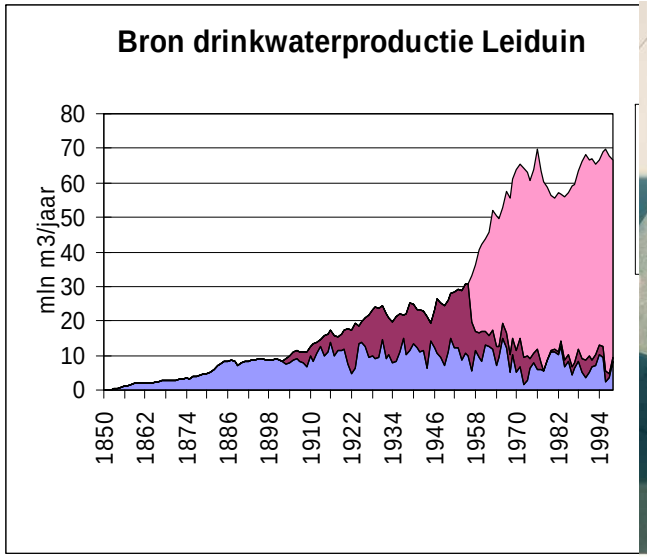
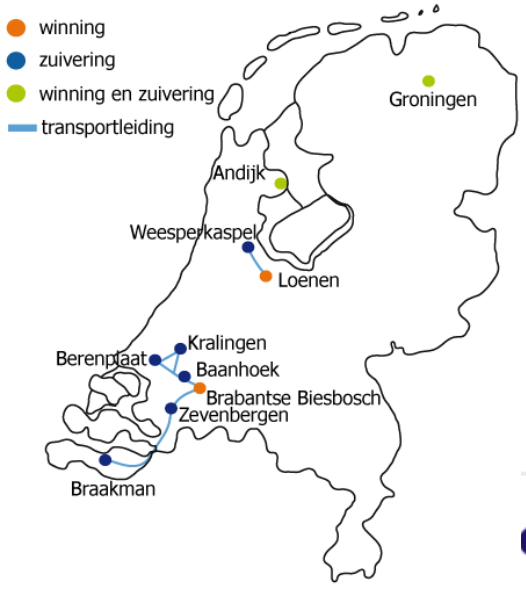
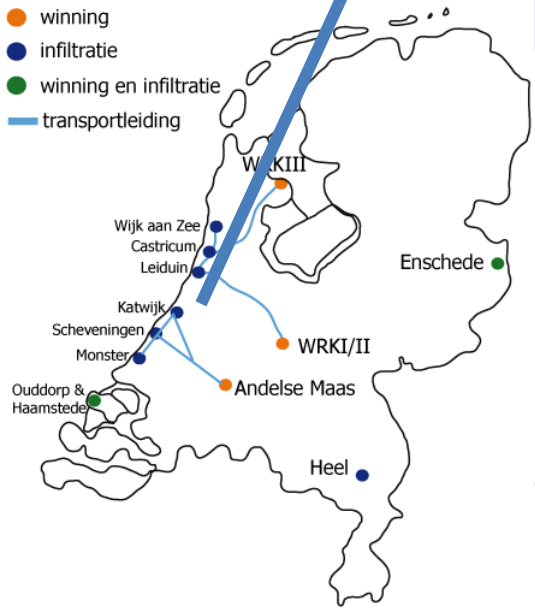
MAR in Groundwater Management / IWRM

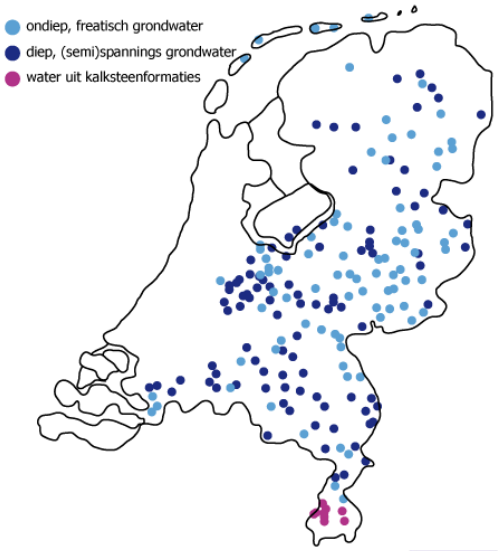


Large scale dune infiltration

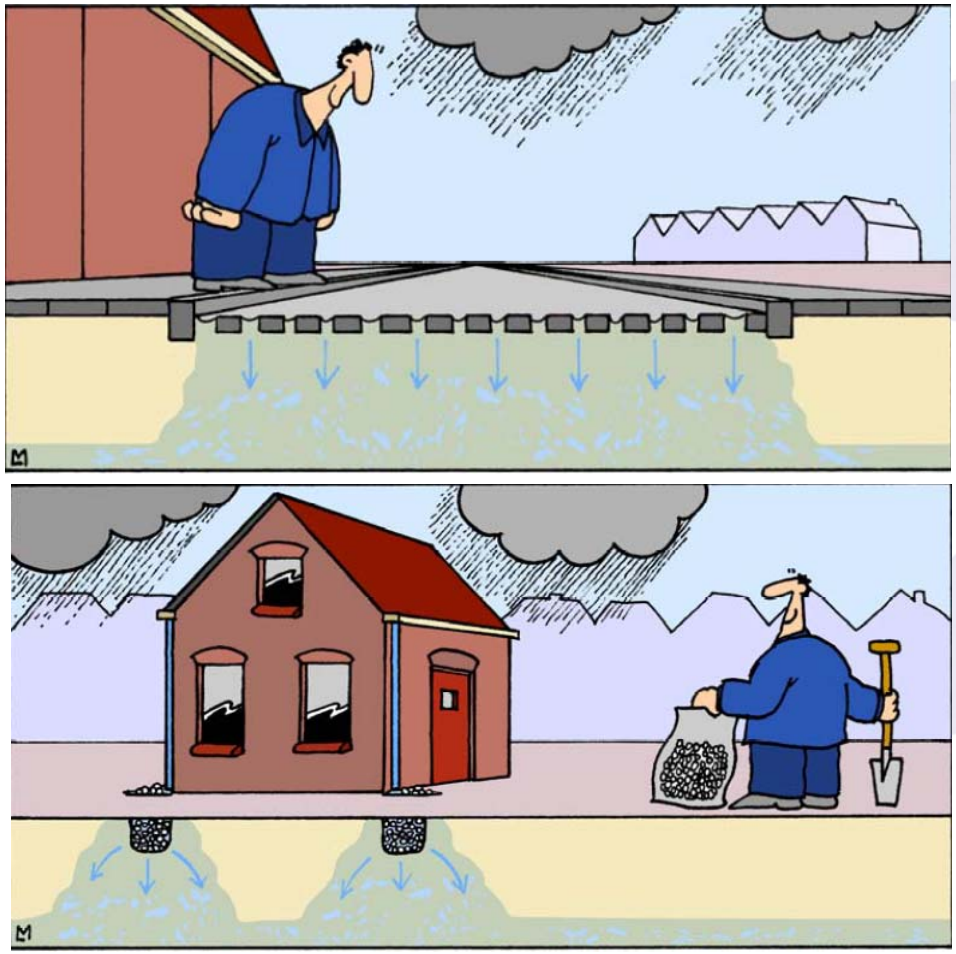


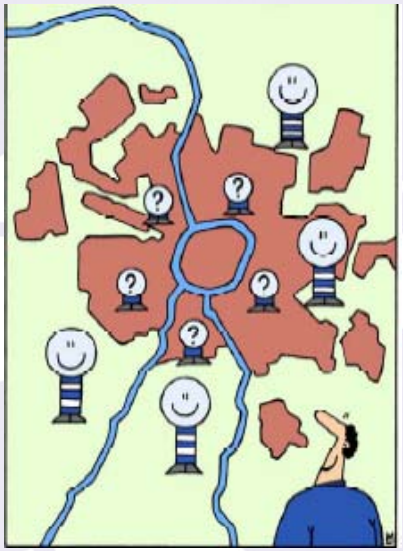


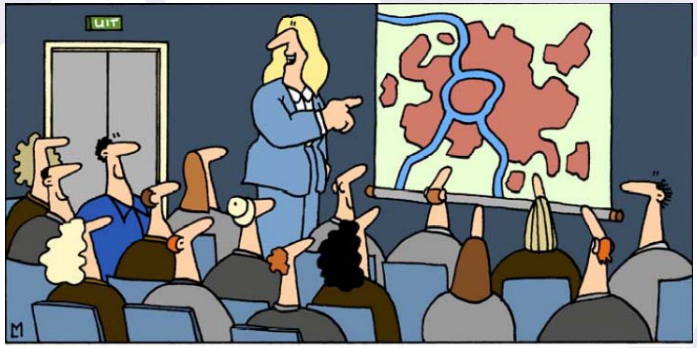




Urban water and storage







Public and Private interventions

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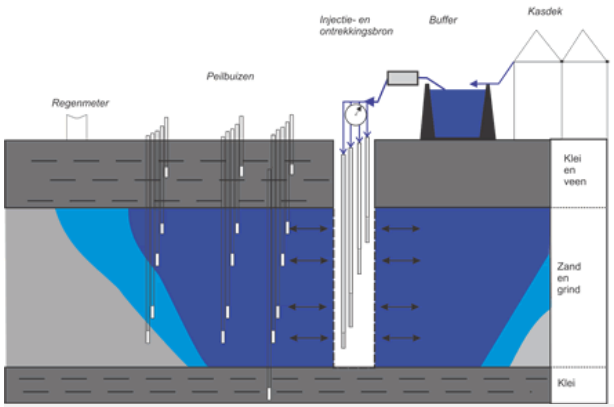
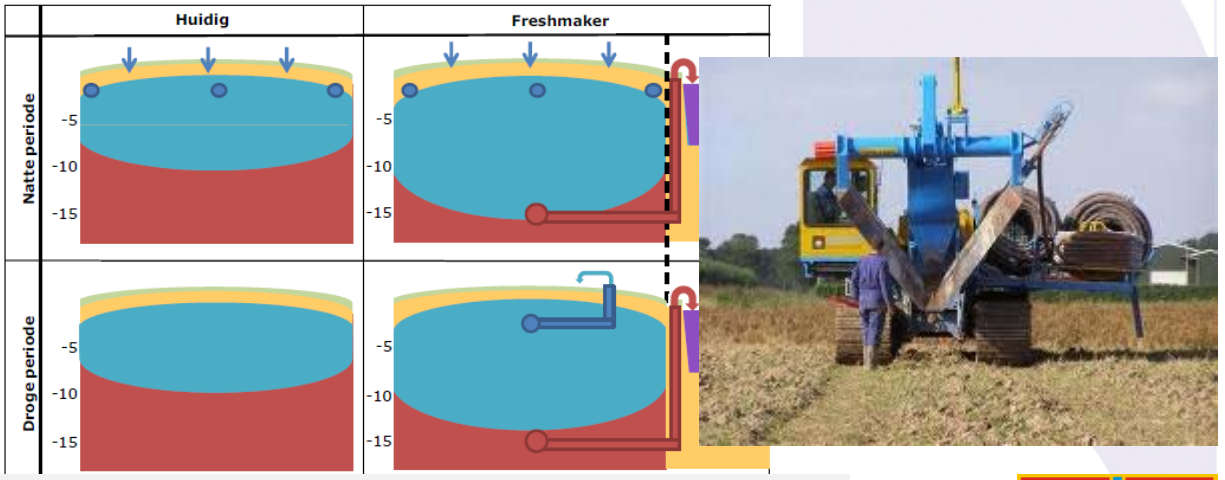
MAR in agriculture



MAR for greenhouses



On-farm shallow groundwater storage (freshmaker)

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European WFD and MAR

MAR is a supplementary measure to reach a good quality /quantity status but : prohibits any actions that may deteriorate groundwater quality

MAR has been in use for decades throughout Europe, to replenish groundwater resources, but countries show a conservative approach for authorization of new projects, especially for infiltration of storm water and treated waste water (while infiltration of lake/river water may contain relevant amounts of waste water or pollutants

There is a lack of harmonized and adequate regulation. Guidelines on water quality depending on targeted re-use are needed

Key Messages

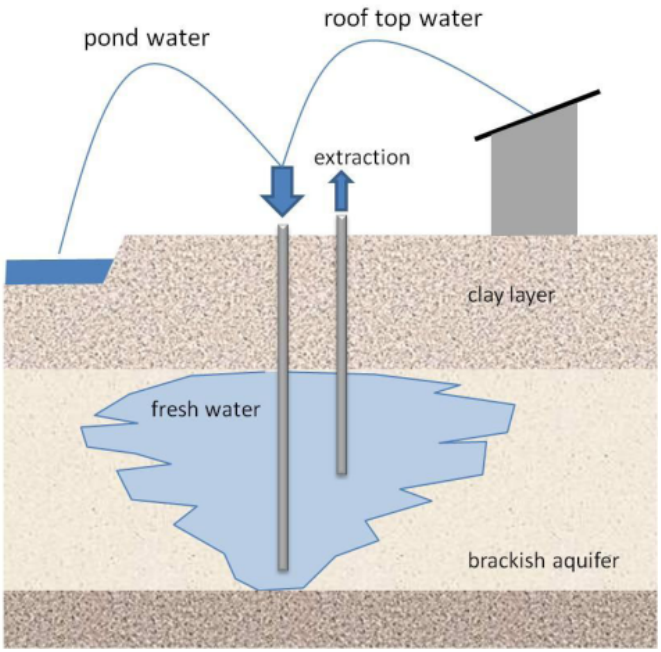
Important role of the private sector/users in studies (often PPP) and implementation

Local actions can be effective ahead of national reforms

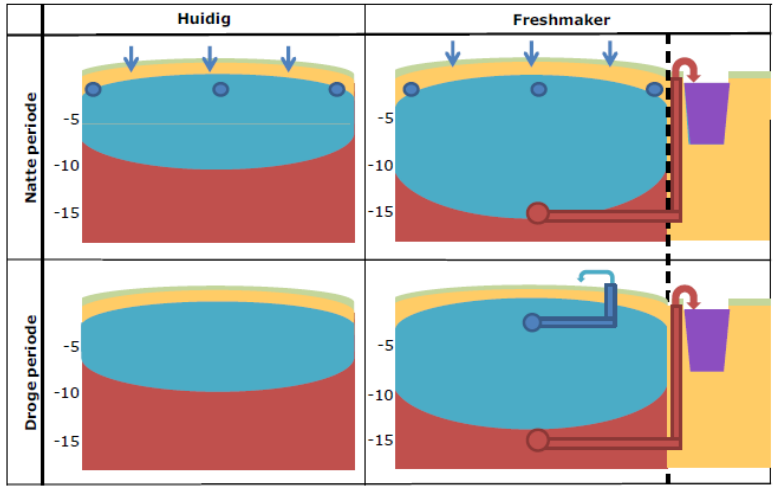
Unified and updated regulation on (national and EU-WFD), especially with respect to water quality <> MAR

Exchange of good practices and innovation: within Europe and globally

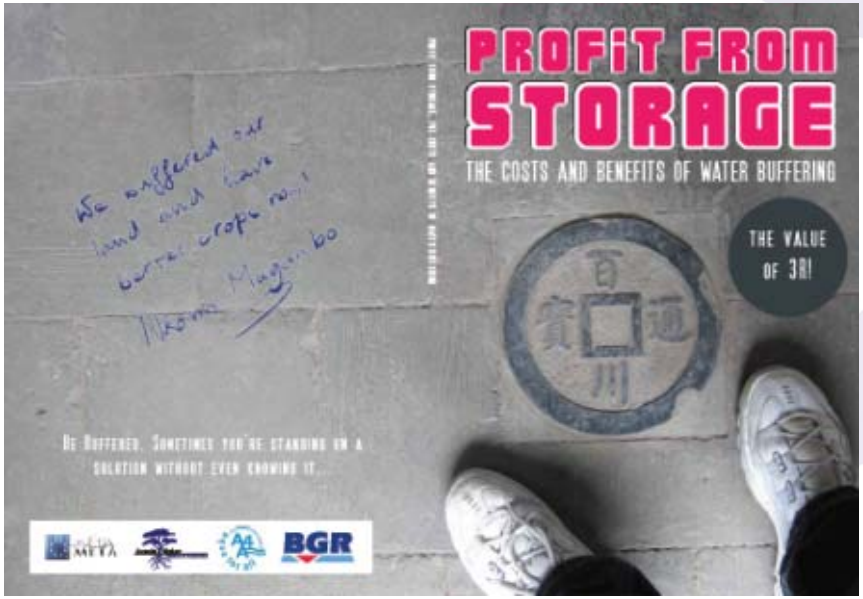
bangladesh

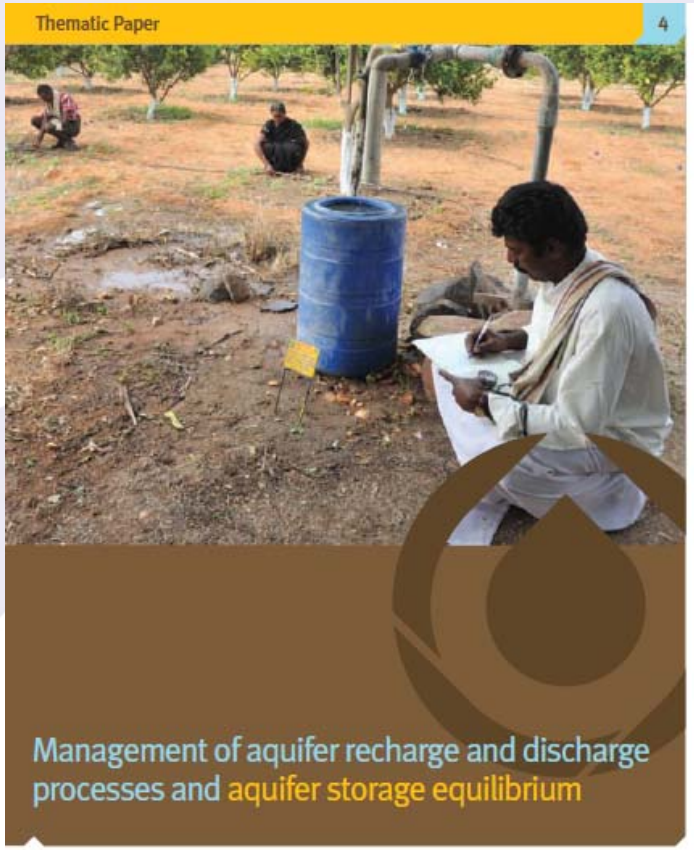


netherlands



THANK YOU





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Groundwater Governance
A Global Framework for Action

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