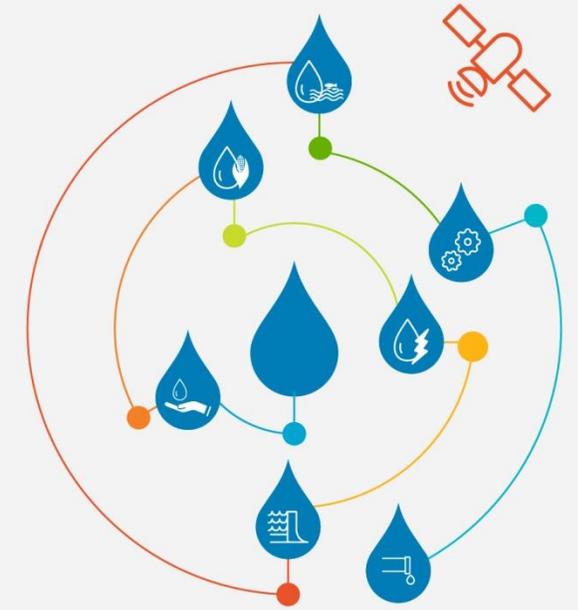


Artificial recharge as a solution for water shortage



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Artificial recharge, what and how?

- Solution for overexploitation
- Restoration of ecological conditions
- Secure resource for the water supply in metropolitan regions
- Store surpluses in the aquifer with surface water to overcome periods of water shortage
- ‘Artificial recharge’ can increase groundwater levels



Dutch solution to drinking water shortages

- The city of Amsterdam has received drinking water from the dune area since 1853.
- Artificial recharge with river water started in 1957.
- Current water supply capacity: 70 million m³/year.
- High-cost investment but for long-term and applicable to a wide-range of geographical environments.
- Potential to solve drinking water shortage problems in the world.

What are the benefits and for whom?

- Reliable groundwater reserves
- Availability of high quality water
- Strategic reserve
- It benefits the ecosystem, water authorities, drinking water companies, citizens, and agriculture.

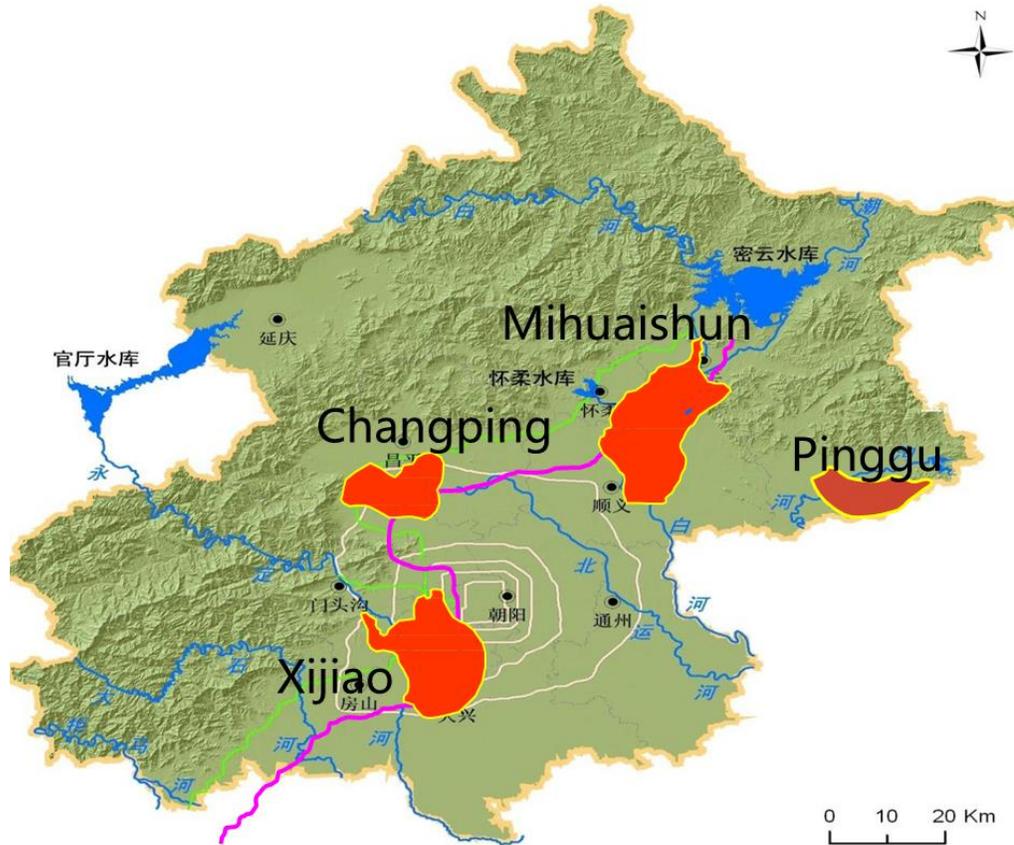


Pilot in China, Deyang (2014-2016)

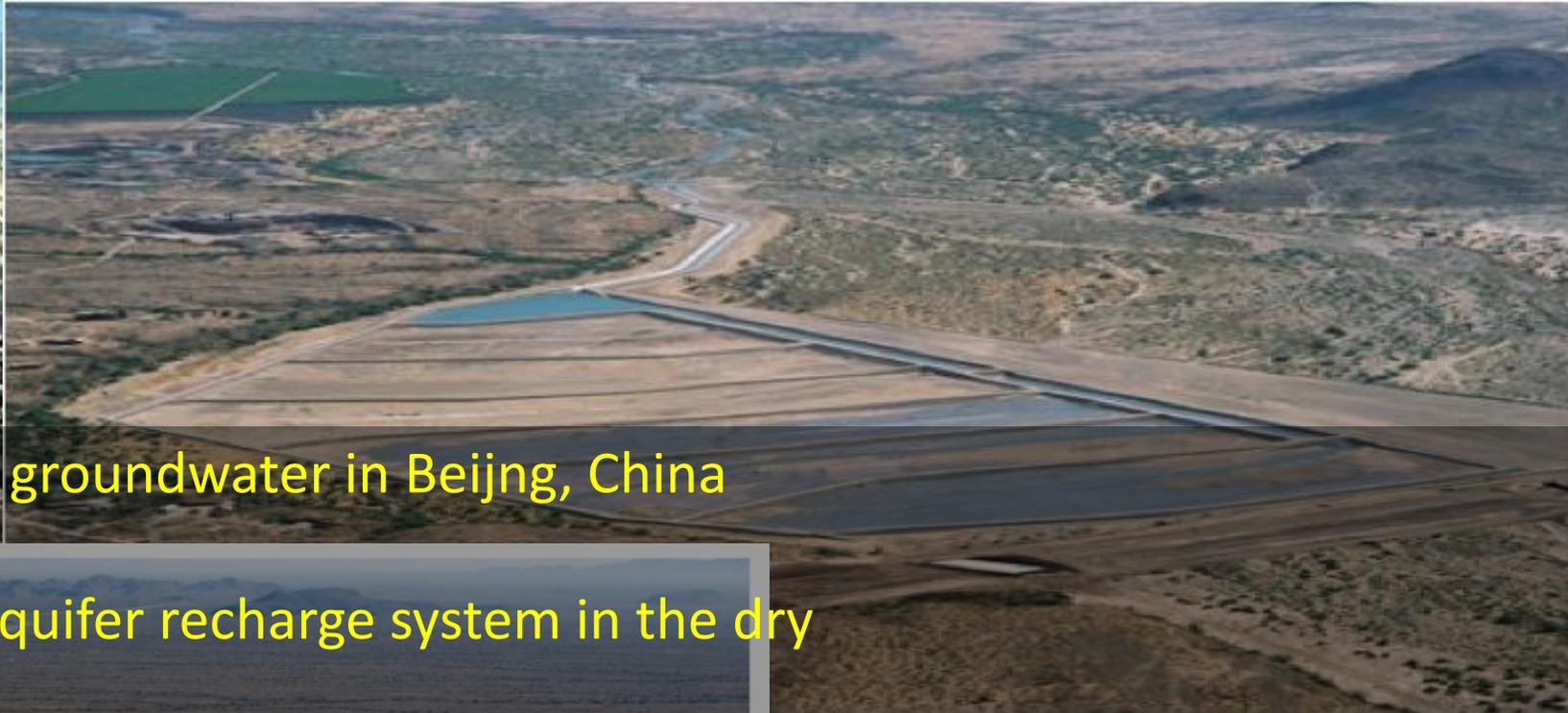


- multi-functional wetland park for drinking water supply, recreation, nature and education
- Pre-treatment of water of the Mianyuan river with coagulation, helofytes, sedimentation basin, sludge processing room, infiltration ponds.
- Robust drinking water supply system with reuse of surface (river)water

Project spin-off: China, Beijing



- Beijing City, Artificial Recharge in Chaobai Riverbed.
- Underground reservoir to store water from South-North-Water Transfer project.
- ADB finances 150,000US\$ for Dutch partners to implement a pilot in Beijing in 2017-2018.
- Publication: *'Guidelines and Good Practices for Managed Aquifer Recharge'*



Demonstration project on artificial groundwater in Beijing, China

Conceptual Design of a managed aquifer recharge system in the dry Chaobai riverbed



Enabling conditions

- Adapting to local circumstances
- Long term investments
- Operation and maintenance
- Pre-treatment depending on local water quality
- In the long run safe drinking water is available for a fair price. (In Amsterdam 0.80 euro/ m³.)

What is needed to scale-up application in the Asian and Pacific Region?

- Application of Guidelines and continuous knowledge-exchange
- Adapting to local circumstances
- Ownership by a stable organization
- Proper design
- Funding for implementation and long-term investments
- Continuous learning, every day better!