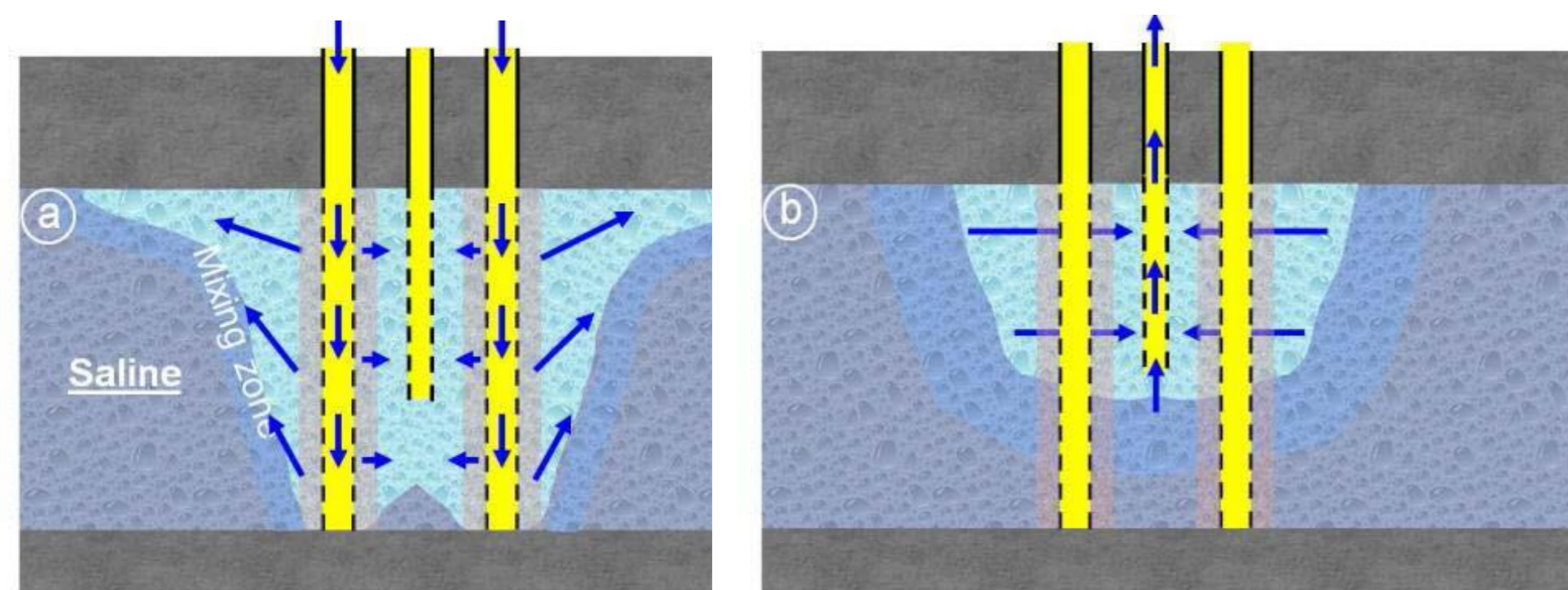




# Δ-MAR: Governance and hydrogeological prerequisites for sustainable water supply through MAR systems in urbanizing deltas, applied to Bangladesh

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## 1. Managed Aquifer Recharge (MAR) in a nut shell

- Promising technique to secure a freshwater supply.
- Infiltration wells, which recharge the shallow aquifer during the wet season.
- During the dry season, the stored groundwater is recovered from a central well
- Small-scale MAR systems are relatively low-cost and can be operated by local users



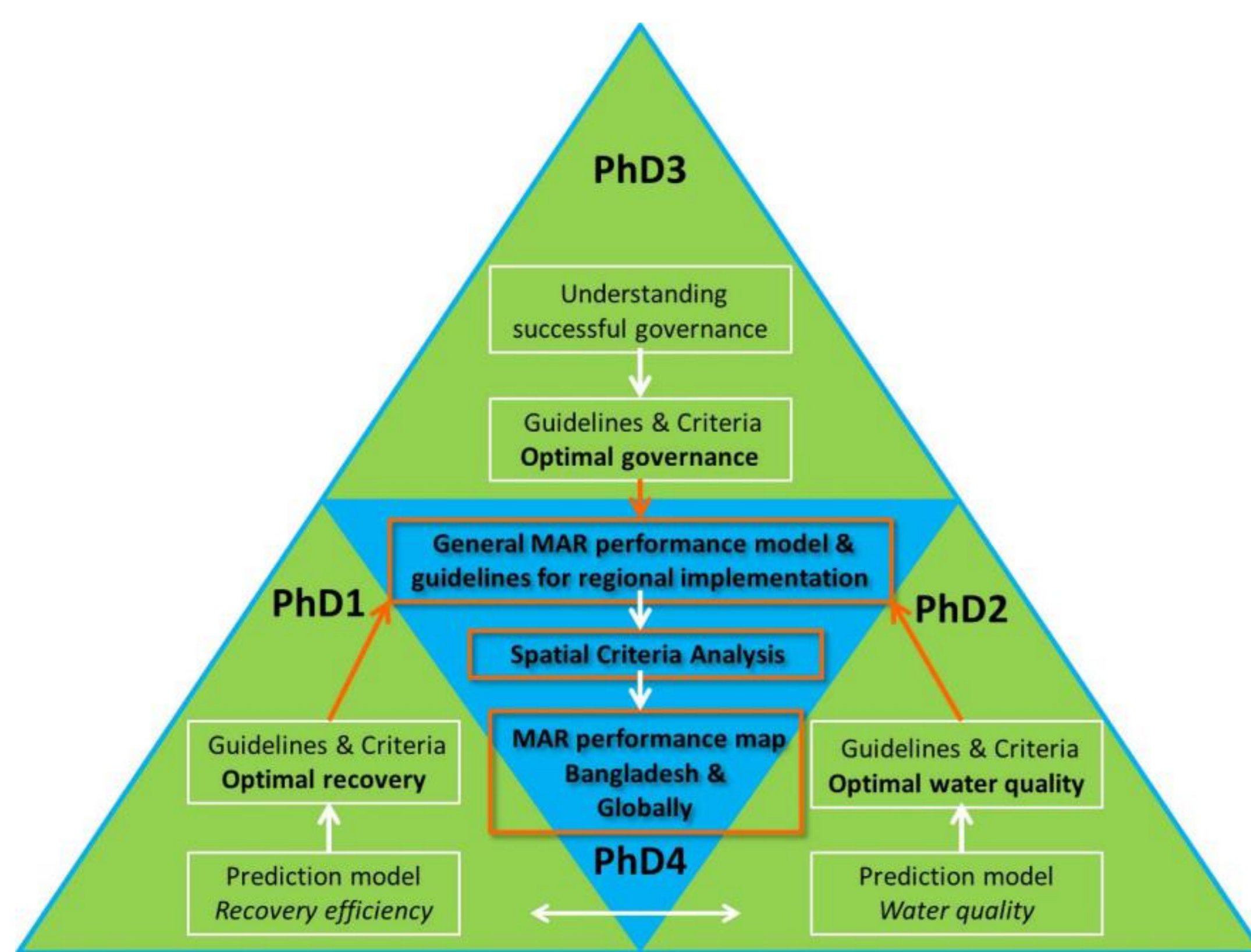
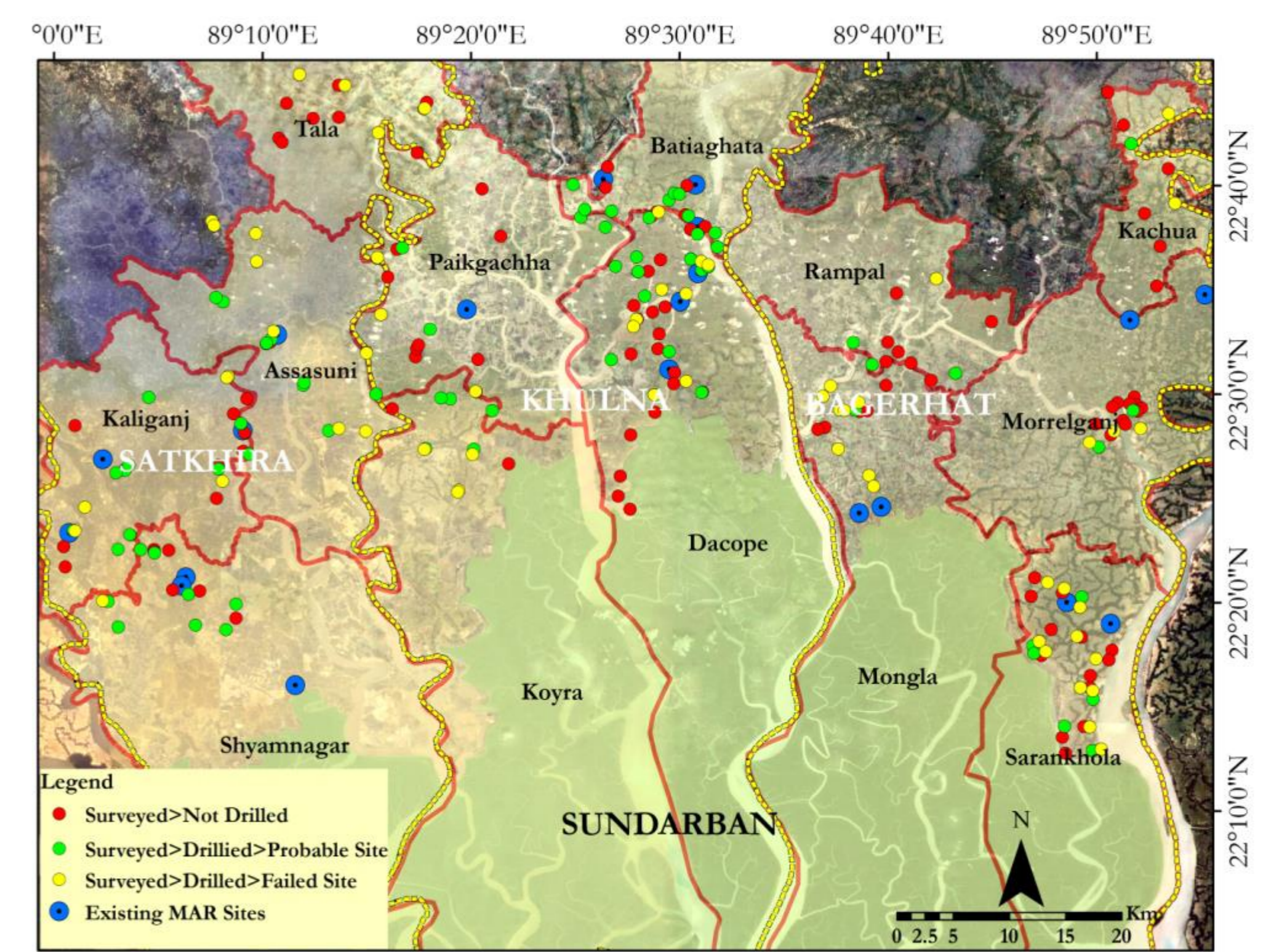
## 2. Δ-MAR Objectives

Overall objective:

To assess hydrogeological, technical and governance preconditions for sustainable MAR performance in diverse settings of saline deltas in developing countries

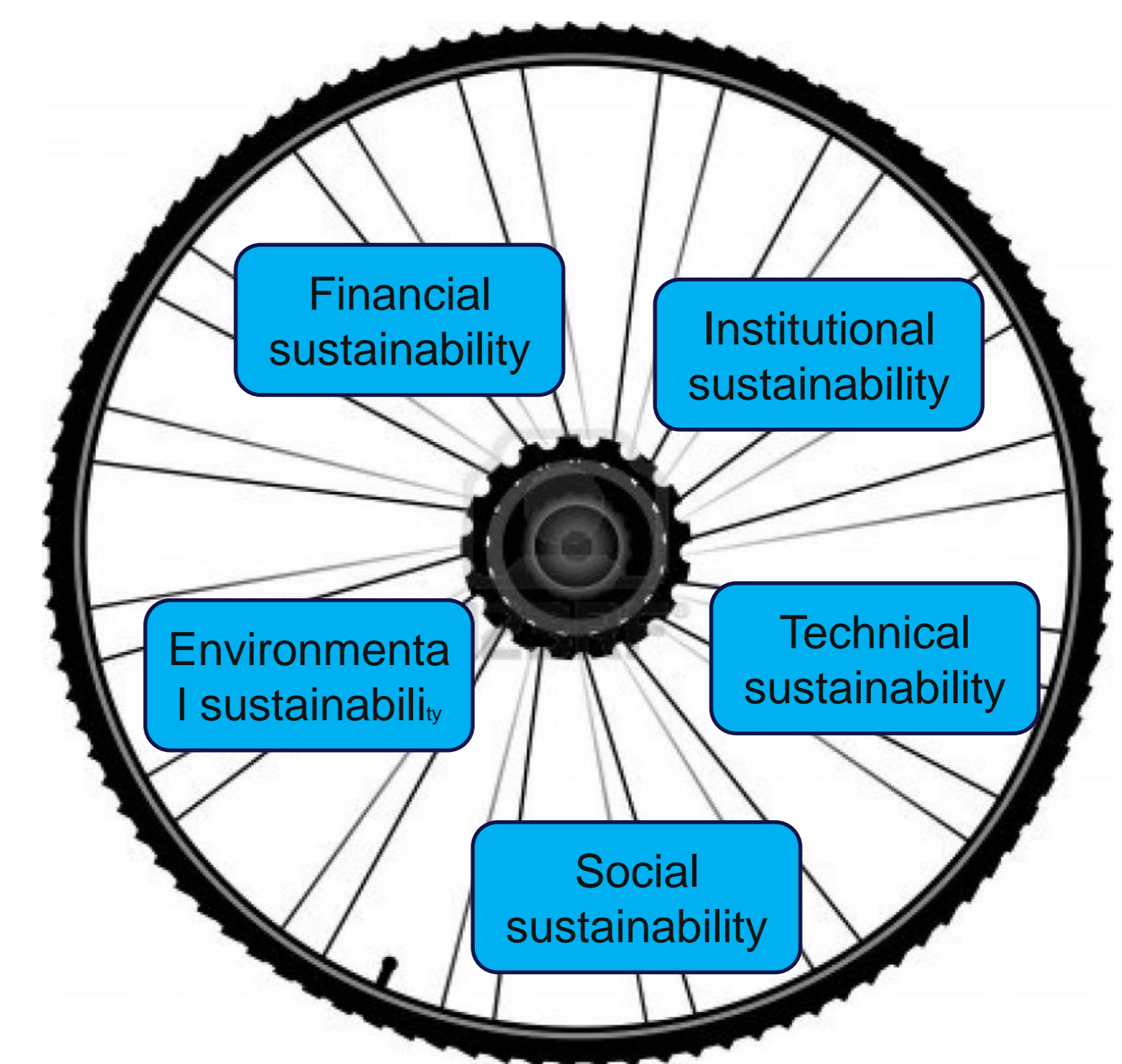
Specific objectives:

- Develop knowledge and guidelines for optimal MAR design and operation regarding fresh water recovery;
- Develop knowledge and guidelines for optimal MAR performance regarding drinking water quality;
- Develop an intervention strategy leading to optimal MAR governance arrangements at the local level, and rapid and cost-efficient diffusion of MAR at the regional level;
- Develop an a priori evaluation method for MAR performance in saline deltas, based on integration of hydrogeological and socio-economic parameters;
- Contribute to capacity building of stakeholders in the Bangladesh coastal region regarding the realization of sustainable MAR systems;
- Disseminate and valorize the knowledge generated in this project in other urbanizing deltas.



## 3. Δ-MAR – Rationale & Structure

- **PhD1: Water quantity:** optimize recovery efficiency of MAR systems in saline aquifers and to develop design and operational guidelines for sustainable operation.
- **PhD2: Water quality:** achieve a priori assessment of MAR performance with respect to drinking water quality, notably trace metals (arsenic, manganese, iron) and pathogen levels.
- **PhD3: Governance:** design policy guidelines for public and private stakeholders, that will improve local MAR governance performance, and accelerate the efficient diffusion of MAR at a regional level.
- **PhD4: Synthesis:** Develop an a priori evaluation method for MAR performance in saline deltas, based on integration of hydrogeological and socio-economic parameters.



## 4. Δ-MAR – Cross-cutting themes & linkages with other UDW projects

- Shifting Grounds: Institutional transformation, enhancing knowledge and capacity to manage groundwater security in peri-urban Ganges delta systems
- Rise and Fall: strategies for the subsiding and urbanising Mekong Delta (Vietnam) facing increasing salt water intrusion
- Strengthening strategic delta planning processes in Bangladesh, the Netherlands, Vietnam and beyond
- Adaptive delta management: development, acculturation, and dissemination in Bangladesh and Indonesia
- Sustainable freshwater supply in urbanizing Maputo, Mozambique
- Hydro-Social Deltas": Understanding flows of water and people to improve policies and strategies for disaster risk reduction and sustainable development of delta areas in the Netherlands and Bangladesh

