R-MAR

the R-WASH Managed Aquifer Recharge programme

January 2025

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Background

The lack of predictable rainfall is a major cause of water scarcity globally. Combined with population growth, the World Economic Forum has rated it as one of the most prominent risks of the decade to development. The question is then how we can more effectively harvest water within the landscape, especially in semi-arid or arid zones given often the episodic nature of rainfall events resulting in rapid flooding, the outcome of which is often considered a hazard rather than an opportunity to make water less scarce.

The Concept

The concept hinges on slowing and capturing surface water from suitably sized rainfall events, then giving this stored water the opportunity to infiltrate into the ground and enhance recharge to local aquifers where it can be stored and used when needed. This concept is by no means new and is commonly termed Managed Aquifer Recharge (MAR) from which there are a variety of ways in artificially recharging aquifers dependent on the objectives for water management and also the enabling environment (soil types, land use, geology, hydrogeology, geomorphology, topography, hydrology, climate, community participation, local and national policies regulation and guidelines).

Practical Experiences from Implementation to Date

Within the framework of the R-WASH, MAR is being planned and scoped out in Dollow in Somalia on the border with Ethiopia, with the aim of mitigating the impacts of both climate change and population growth on existing shallow groundwater resources in the area. Existing knowledge and data suggests that the issue is

a transboundary issue and will benefit communities both sides of the border, if the enabling environment allows. The proposed site is a RWASH site with the main stakeholder being the water utility. A significant challenge is the lack of understanding of this shallow aquifer at both the catchment and local level where MAR will be potentially implemented, as well as the hydrogeology of the catchment and water balance overall. Planning proper groundwater mapping and assessments, monitoring the resource and stakeholder engagement then are key factors to the success of any MAR programme.

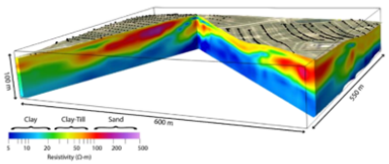
The Process and Innovative Approach

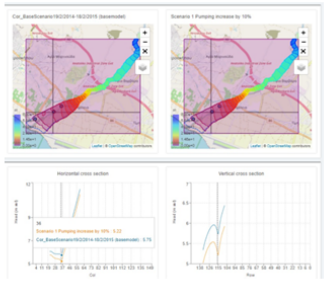
The following phased approach is proposed:

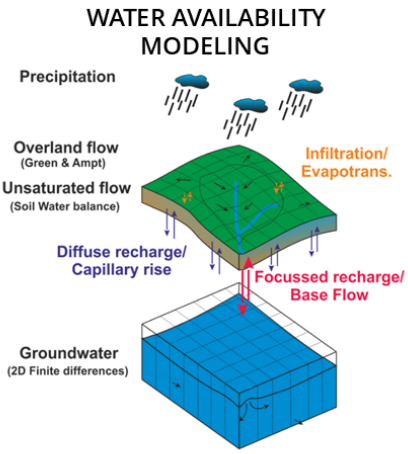
- Phase 1 – create the enabling environment by establishing strong collaborations and partnerships with all stakeholders, including international and local academia, local authorities and other implementing partners, to allow an invested interest in the success of the project and to ensure that each team member can contribute effectively
- Phase 2 – assess if technically MAR is feasible in this context through site studies
- Phase 3 – pilot solutions on MAR and monitor in real-time
- Phase 4 – develop a toolkit for scaling the solution regionally

In a first instance phases 1 and 2 will be implemented during a one year period for the proposed R-WASH sites (see table below); the output studies will inform phases 3 and 4. The uild the capacity of stakeholders to manage and monitor MAR regionally with knowledge transfer

For the pilot in Dollow, a partnership between **Technical University Dresden** (TUD), **ERIMOS LTD** (EL), **Aarhus University** (AU) and **arche noVa** (AN) has been established. The group will localize and develop a toolkit and provide training to local stakeholders and support the Somalia **Ministry of Energy and Water Resources** with the development of the solution. TUD will provide the overall knowledge and technical coordination on MAR tools (building on their previous experience; see https://inowas.com/); AU provides the 3D geophysical imaging know-how (https://hgg.au.dk/instruments/ttem); ERIMOS provides a model for estimating water availability for storage and AN supports the field implementation.







Scalability and Expected Impact

Given increasing water scarcity, MAR offers significant capacity to address water insecurities in areas with distinct wet and dry seasons, particularly under increasing climate stress. Expected outcomes include increased water availability, improved water quality, enhanced environmental sustainability, and strengthened community resilience to climate-related hazards. Direct beneficiaries include rural communities, particularly women and children, who currently face challenges accessing clean water. MAR indeed is an area where many UNICEF Country Offices are exploring support. UNICEF Office of Innovation is prepared to cost-contribute to this pilot and the development of a toolkit and training package, so that in future, this approach can potentially be scaled up.