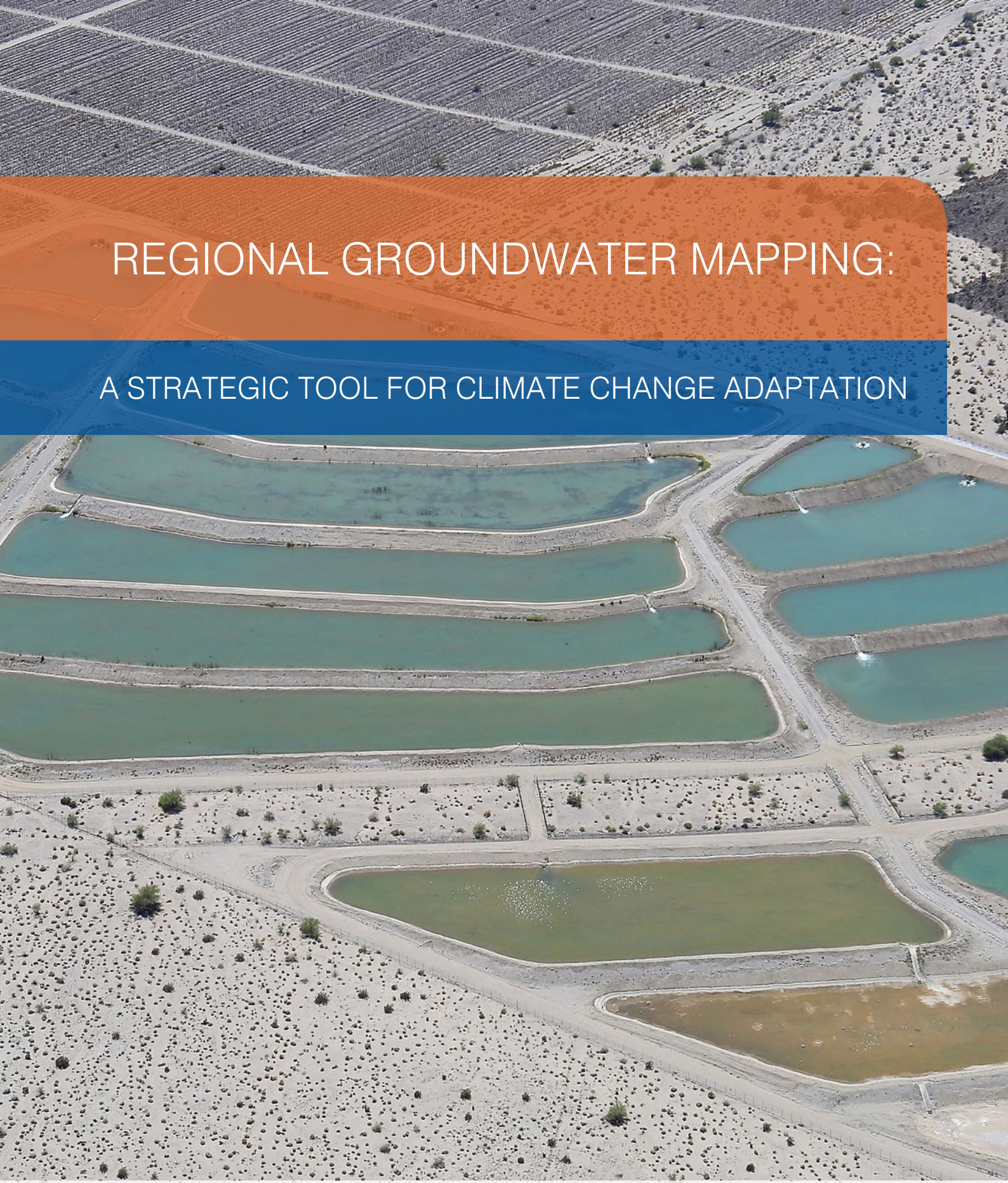
REGIONAL GROUNDWATER MAPPING:

A STRATEGIC TOOL FOR CLIMATE CHANGE ADAPTATION



igrac
International Groundwater Resources Assessment Centre

ACACIA WATER

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Enhancing underground storage of water is a practical measure to augment the availability of fresh water for future use and to reduce vulnerability to climate change.

INTRODUCTION

Climate change poses an immediate threat to water resources worldwide. Increased variability in precipitation, surface water and soil moisture also have a direct impact on the water supply to groundwater reservoirs. At the same time, indirect climate change impacts such as the intensification of human activities and land use changes increase the demand for groundwater. The strategic role of groundwater for global water and food security in a changing climate is becoming more and more important.

Regional groundwater mapping

To provide images which help with water resources management on a level where little information is available, IGRAC and Acacia Water work together on an integrated approach for regional groundwater mapping. Mapping out the biophysical, hydrological, geological and metrological characteristics on regional basis helps defining the places with the highest potential for measures which use the underground as a buffer for storage of fresh water.

THE MEASURE

Enhancing underground storage of water is a practical measure to augment the availability of fresh water and to become more resilient to climate change adaptation. This measure, Managed Aquifer Recharge (MAR), involves building infrastructure and/or modifying the landscape to intentionally enhance groundwater recharge. MAR can be used to recover groundwater levels in over-exploited aquifers, to store water for future use or to control saltwater intrusion. MAR may also be applied to sustain or improve the functioning of ecosystems.

In particular, in areas coping with an increase in climate extremes, both in rainfall and in droughts, MAR can be a beneficial water management measure. The water surplus in wet periods can be stored underground and used in periods of droughts. Also coastal regions and islands that are subjected to saltwater intrusion can make good use of MAR.

A main advantage of MAR technology is its flexibility and applicability to different scales and purposes. MAR is however not a remedy for water scarcity in all areas. Aquifer characteristics must be suitable, excess water available and the local conditions favourable. The potential of MAR applications should be preliminarily assessed before field activities take place.

Despite its obvious economic and ecological benefits acknowledged by hydrogeologists, MAR can be perceived by decision makers as a rather costly and potentially risky solution due to its invisible (underground) component. A careful feasibility assessment which considers all aspects of MAR implementation will substantially reduce uncertainties and eventually the costs of the MAR implementation.

MAR as a climate change adaptation measure for improved water security

- Provide sustainable freshwater supply
- Provide a unique buffer during extended dry periods
- Provide a resilient water buffer in emergency situations (e.g. tsunami)
- Control salt water intrusion in coastal regions

WHAT DO WE OFFER?

We provide an integrated approach to assess the feasibility and bring forward optimum solutions of MAR on a regional and local scale. All aspects required for successful implementation of MAR are considered. Combining geohydrology with socio-economy and institutional aspects provides a powerful feasibility analysis, to lay the foundation for an effective implementation.

1. An integrated approach

The multi-disciplinary assessment includes a wide range of aspects relevant to the governance and management of groundwater resources; the assessment looks at the hydrogeological, environmental, socio-economic, legal and institutional aspects of aquifers. Assessment is applicable on regional, national or even transboundary scale. It provides a first scan where MAR could be beneficial. It also considers if proposed measures are consistent with ongoing strategies and plans.

2. Hydrogeological feasibility

The potential for different MAR applications within the region are identified and mapped. Remote sensing, GIS analysis and modelling tools are used to map the hydrogeological feasibility. Hydrometeorological data are combined with land-use, water demand and socio-economic characteristics to guide decision making where MAR intervention could be applied successfully.

3. Hydro-economic feasibility

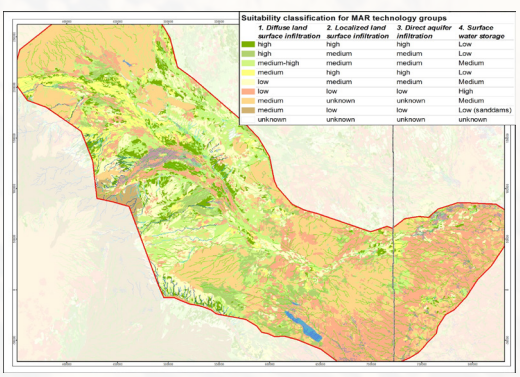
The hydro-economic feasibility assessment considers all costs and benefits of MAR implementation. These benefits are expressed, for example, in terms of extra crop yield or improved livelihood. Integration of the costs with the socio-economic characteristics mapped during step 2 provides feasibility recommendations. Comparing hydrogeological feasibility and the economic carrying capacity provides understanding of the steps which need to be considered towards effective implementation. Clearly showing the costs and benefits deriving from MAR, supports communication about the importance of MAR, both to policy makers and the water users.

4. Facilitate information and knowledge dissemination

A web-based information management system is an essential component in the implementation of the integrated MAR approach. The IMS assures that all the necessary data and information are stored in appropriate manner, allowing easy visualization and inspection. The system operates as a data and information sharing platform between involved project partners and to communicate results to the wider public, including the scientific community and policy makers.

CASE STUDY

Acacia Water and IGRAC implemented the methodology for the transboundary Merti aquifer shared between Kenya and Somalia. The Merti aquifer is a large non-renewable aquifer that is one of the few reliable water sources in this semi-arid region. Both the local population and the growing number of refugees depend on groundwater. The MAR feasibility study provides a first identification of MAR potential in the Merti aquifer.



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IGRAC

The International Groundwater Resources Assessment Centre (IGRAC) is a non-profit organisation and operates as UNESCO's Global Groundwater Centre. IGRAC works under the auspices of the World Meteorological Organisation (WMO) and cooperates closely with the International Association of Hydrogeologists (IAH).

IGRAC delivers products and services mainly for governments and intergovernmental organisations in groundwater related projects.

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ACACIA WATER

Acacia Water is a leading supplier of practical advices regarding groundwater challenges. Acacia Water delivers services for clients like governments, private sector, and both national and international NGOs.

Acacia Water is globally active contributing to clean and safe drinking water and water for agricultural purposes. It is a research oriented consultancy and has a strong cooperation with universities and research institutes; focused on translating scientific knowledge to innovative and practical solutions.

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