

# 'Water scarcity in Middle East North Africa: challenges and opportunities for water science cooperation'

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Water scarcity in the MENA region has many dimensions: natural physical water scarcity of the region, human-introduced water scarcity, as well as unsustainable practices of water utilization. It is also referred to as a scarcity or deficiency of water resources' governance.

Located within a semi arid to arid region, the Middle East and North Africa (MENA) has an extremely poor endowment of water resources: rainfall scarcity and variability coupled with high evaporation rates have characterized this part of the world. Global system changes both in terms of environmental conditions (e.g. climate, hydrology) as well as in terms of anthropogenic influences (e.g. water use, water pollution) increasingly influence water availability in the region. However, the increasing scarcity of renewable water resources is not the only distinctive characteristic of the region. In addition, the water crisis is also a function of unequal distribution and of political processes. Weak governance and inadequate levels of management, increasing water deficits and the continuous deterioration of the quality of natural water resources have become equally distinguishing features during the past decades. Now, water scarcity is among the most pressing challenges confronting the MENA countries, presenting a tangible threat that already negatively impacts socio-economic development opportunities and ecological sustainability.

In order to tackle these challenges we present three water research strands focused towards tangible, applied results: water technologies, water governance, and water information systems and call for a coordinated German research initiative on water in the MENA region. Following the description of the main research strands we highlight some challenges and opportunities for research cooperation in the MENA region.

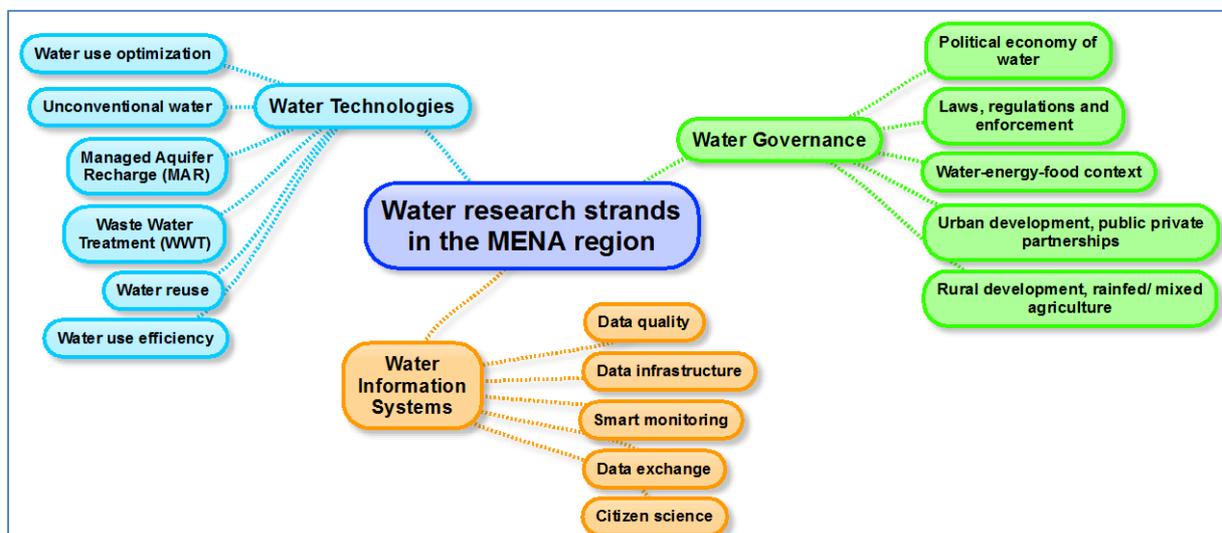


Figure 1 Priority water research topics discussed during the 6<sup>th</sup> Water Research Horizon Conference

### **Water Technologies:**

The research strand 'water technologies' is meant to encompass water scarcity issues dealing with better use of available water resources and ways to utilize unconventional resources. The technological aspect is chosen to emphasize the applied nature of the envisioned research topics and should also include management solutions or applicable protocols and technical regulations in the different topics.

Specific topics, relevant to the MENA region have been identified as water use optimization, unconventional water resources, managed aquifer recharge, waste water treatment, technologies for reuse and water efficiency. This research strand includes technology acceptance, implementation, and capacity development.

### **Water Governance:**

'Water governance' is a research strand that aims at investigating and explaining existing governance systems and practices also in the context of the still ongoing Arab transitions; the development of adequate measures for improving socially inclusive and environmentally sustainable water governance; and at contributing to capacity development for improved water governance. Often, in the MENA region, centralised approaches to water governance have been favored with limited civil society involvement and sometimes insufficiently informed decision-making. The region requires governance approaches to fit the local conditions (such as MENA adapted polycentricity approaches) and a clear set of governance performance indicators.

The governance research strand is meant to address topics such as political economy of water; laws, regulations and enforcement, potential fields relate to the water-energy-food context; collective action on common pool resources such as in farming or rainfed / mixed agricultural systems; as well as water in the context of urban development and public private partnerships. This also includes to better integrate water governance aspects in other water research projects.

### **Water Information Systems:**

Research strand 'water information systems' is strongly linked to data scarcity which especially in the MENA region is a common issue. It is widely accepted that a solid assessment of available resources is required for managing resources or for evaluating resource values ("You can't manage what you don't measure!"). This is often based on scarce data and therefore afflicted with high uncertainties.

This research strand focuses on technological aspects, such as monitoring infrastructure, communication systems, but also addresses data processing, data quality, data exchange, data infrastructure, as well as methodologies for new data collection, such as smart monitoring or Citizen Science.

### **Existing Challenges and New Opportunities:**

Challenges are seen in the often nationally focused research funding schemes in many MENA countries. These, of course, support excellent and highly relevant research at the national level, however, they do not encourage collaborative research projects and networks in the region. Such efforts are largely initiated from outside funding organizations such as BMBF, DFG, EU, USAID, World Bank, etc.

Water research is becoming increasingly interdisciplinary - as can also be seen from the prioritized topics. This diversity is not only visible in the research projects themselves but also in the composition of the national government agencies involved in water research and related calls. Social sciences' research on water is still weak in many MENA countries. Strengthening local capacities in this regard

and promoting research collaboration on these issues is therefore highly relevant. Collaborative water research can act as an 'honest broker' between different stakeholders at national levels such as local ministries and government authorities and as 'door opener' for new opportunities even beyond research agendas. New opportunities can be seen in the growing attention for implementation research also at national levels and through this the opportunity to improve interdisciplinary research and implementation of results.

To secure long-term impact of the research it is necessary to involve strong governmental partners and stakeholder networks, in addition to excellent and reliable research partners and networks in the region that are at par with international researchers on a scientific level. The build-up of and support to long-term strong research partners and networks in the MENA region (such as e.g. AGYA, AWARENET, MENA NWC<sup>1</sup>) has been identified as a major step towards a successful application and implementation of water research results for improved water management and the long-term benefit of a more sustainable and inclusive socio-economic development in the region.

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<sup>1</sup> Arab-German Young Academy of Sciences and Humanities (AGYA); Arab Integrated Water Resources Management Network (AWARENET); Middle East and North Africa Network of Water Centers of Excellence (MENA NWC)