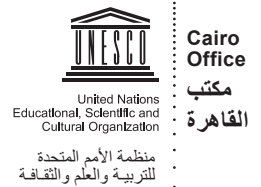


# WATER HARVESTING IN THE ARAB REGION

## POLICY BRIEF



### Key Messages

- Water harvesting augments water availability for domestic and agricultural uses and is also important for meeting ecosystem needs and sustainability. Though some forms of water harvesting had been successfully used in the region since ancient time, the technology has developed considerably in the last few decades.
- Adoption and upscaling of water harvesting interventions in the Arab region face many challenges including lack of information on sites with potential for technically and economically feasible water harvesting investments. High cost of installation and maintenance of water harvesting infrastructure is also a constraint to the expanding of pilot projects. Farmers' out-dated knowledge of water harvesting methods and land tenure problems reduce the motivation to invest in new water harvesting structures.

Policy recommendations include strengthening current water harvesting-related policies and hydrological monitoring systems, and developing maps for potential water harvesting areas in the region. Recommendations also cover supporting regional cooperation, applied research, and the construction of pilot scale water harvesting demonstration projects.

### Context

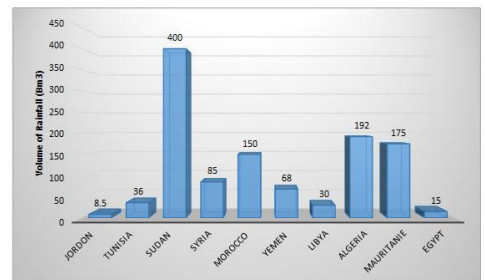
Water harvesting can be defined as “the collection and sustainable management of moisture, rainwater, floodwater and/or groundwater.” Water harvesting is a complementary supply source and is considered by several scholars as a non-conventional water resource. Water harvesting supplements water availability for domestic and agricultural uses and is also important for maintaining ecosystem balance.

The need for water harvesting to cope with water scarcity has been explicitly recommended in the 2030 Agenda for Sustainable Development Goals (SDG 6, Target 7) and the 8th phase of the International Hydrological Program of UNESCO (IHP-VIII, 2014-2021). Water harvesting was also highlighted in many other regional and international declarations and strategies, including the Arab Water Strategy of 2012. There are also strong commitments among the Arab countries to adopt demand management strategy and develop non-conventional water resources including various water harvesting technologies.

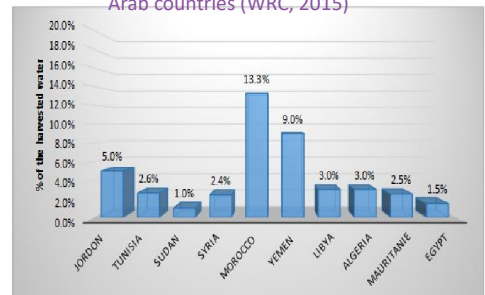
This policy brief outlines trends, challenges, and constraints related to water harvesting development in the Arab region.

The brief provides recommendations for policy solutions. This effort is part of the mandate of the Arab Water Council and UNESCO to establish an Arab Regional Initiative in support of the non-conventional water resources (NCWR) development. The initiative will help mobilize the financial, legal and technical support required to adopt proper policies and build up appropriate structures and human capacities for the sustainable development of NCWR including water harvesting.

Amount of rainfall water in some



Percent of harvested water in some Arab countries (WRC, 2015)



## Challenges and Constraints

Constraints militating against the adoption and up scaling of water harvesting in the Arab region include inadequate data on rainfall and run-off, un-gauged catchment conditions and inefficient hydrological techniques, and the high cost of acquisition, installing, monitoring and maintaining water harvesting infrastructures. Water stress and rainfall variability risks caused by climate change have also remained a challenge to adopt various water harvesting technologies. Socio-economic constraints include farmers' out-dated knowledge of water harvesting methods and land tenure issues that reduce the motivation to invest in new water harvesting structures.

## POLICY RECOMMENDATIONS

Developing the knowledge base and capacity in water harvesting means enhancing and integrating the utilization of this precious resource for better products in rain fed agriculture, rural development, domestic use and ecosystem sustenance. Improving water harvesting techniques requires the following:

- A long-term government policy with commitment to support related research centers and extension services, adequate institutional structures, beneficiary organizations (associations, cooperatives), and training programs for farmers, pastoralists and extension staff.
- Water harvesting policy and physical interventions must be complemented by socioeconomic and institutional measures. Sufficient involvement of local communities in the selection and design of water harvesting schemes is a major key to success.
- Countries should map areas with high water harvesting potential identifying their economic feasibility and taking into account different hydrological and environmental factors. Some of these sites may be used for pilot projects demonstrating new water harvesting technologies.

## ACTION RECOMMENDATIONS

Adoption of the following abridged statements will be important steps towards the sustainable utilization of the water harvesting potential in the Arab region:

### **1. Enhanced Policies and Improved Hydrological Data Reliability**

- a. Governments should strengthen the existing hydrological monitoring systems and develop maps for potential feasible water harvesting areas in the region.
- b. Water harvesting should be part of the government's policies and strategic integrated lands and water resources development plans. This should be coupled with creating incentive policies for public-private partnership.

### **2. Strengthen Regional Cooperation and Applied Research**

- a. Establishment of effective networks to increase the cooperation among stakeholders at the local, national and regional levels. Networks could be a platform to develop regional database, share related information, scientific knowledge and techniques for water harvesting;
- b. Public awareness, capacity building, and scientific research programs should be implemented to sustain the development of water harvesting.

## Trends and Potentials

About one quarter of the population of Arab countries are poor, and 76 percent of them live in rural areas, where the agriculture sector represents a considerable part of their economy.

The agriculture sector in the Arab region is highly dependent on rainfall with a rain-fed area of seasonal crops approximately equal to 40 million hectares in 2011 which represents 80% of the total cultivated area. Rainfall is also becoming increasingly erratic - across West Asian and North African, for instance, annual totals are generally below 250 mm, and sometimes as little as 50 mm. Meanwhile, temperatures can rise as high as 50 degrees. Because of the high fluctuation in precipitation rates due to climate variability and change in the arid Arab region, rainfall water harvesting is essential to ensure supplemental water supply for reliable rain-fed agricultural productivity.

FAO (1991) and ICARDA (2001) references refer to various forms of rain-water harvesting for supplementary irrigation. The aim is to complement rather than replace the existing water-use system. Improving crop yield in irrigated and rain-fed areas has a considerable potential for enhancing food security in the Arab region and source for drinking water in remote areas. Field results in some developing countries have shown that yields can be increased two to three times through rain-water harvesting, compared with conventional dry farming. Water harvesting helps in rehabilitating poor quality land by providing improved vegetation cover, thus mitigating degradation and erosion.

The most commonly used conservation methods in the Arab countries include cisterns, micro-catchments which is adjacent to cultivated areas, small dams and underground storage. Spreading systems include terraces (masateh, in Oman, Saudi Arabia and Yemen), irrigation diversion dams, sloped catchment areas next to fields (meskat, in the Maghreb region), artificial recharge and check dams (Box 1). Shallow dug wells and pit galleries also abstract water from shallow aquifers and exploit groundwater in the coastal sand dunes. These diverse systems manage rainfall; protect soil moisture and control soil erosion and desertification.

Water collected from fog harvesting, and rooftops serve as a source of water for human consumption in areas where running water is not available for part of the year and fogs occur frequently. Weather modification technologies are also being tested in the region. United Arab Emirates, Jordan, and Saudi Arabia reported positive results with cloud seeding experiments.

### Box 1. Water Harvesting History in the Region

Floodwater harvesting was historically being used by building retarding or damming structures across Wadis since old times, including the famous Maarib Dam in Yemen and Sisud Dam in Saudi Arabia which was constructed in the year 58 AH. The system is still widely used in many countries by building recharge dams across Wadis (in Saudi Arabia and Oman). Moisture harvesting had been in use in the region from ancient times by the Nabatans and in Yemen, among other countries of the region.



Figure 1. Examples of water harvesting techniques

### 3. Improved Water Harvesting Sustainability

- a. Establishment of an Arab regional initiative on water harvesting as part of the proposed initiative for non-conventional water resources utilization. The focus of the water harvesting component would be to provide the financial and technical support to adopt and build up appropriate water harvesting technologies and structures. This effort should build on the FAO Regional Water Scarcity Initiative (WSI) adopted and supported by the League of Arab States' Arab Water Ministerial Council; and
- b. Pilot-scale water harvesting projects could be financed and constructed at potential areas to demonstrate new technologies utilizing indigenous regional knowledge.

## For Further Reading

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