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المنتحى العربي للبيئة والتنمية ARAB FORUM FOR ENVIRONMENT AND DEVELOPMENT



2010 REPORT OF THE ARAB FORUM FOR ENVIRONMENT AND DEVELOPMENT

#### © 2010 Arab Forum for Environment and Development (AFED)

Published with Technical Publications and Environment & Development magazine P.O.Box 113-5474, Beirut, Lebanon

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ISBN: 978-9953-437-31-6

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*Water: Sustainable Management of a Scarce Resource* is the third of a series of annual reports on the state of Arab environment, produced by the Arab Forum for Environment and Development (AFED). The first AFED report, published in 2008 under the title Arab Environment: Future Challenges, covered the most pressing environmental issues in the region. The second report, Impact of Climate Change on Arab Countries, was published in 2009 and addressed the vulnerabilities to climate change facing Arab countries. This report covers water issues in the driest region of the world.

Water is the major challenge facing the Arab region. Arab countries are already in the midst of a water crisis. As early as 2015, almost all Arab countries will be below the level of severe water scarcity at less than 500 cubic meters per capita per year; nine countries will be below 200 cubic meters, six of which below 100 cubic meters. Climate change will worsen the situation. Water flow in the Euphrates may decrease by 30% and in the Jordan River by 80%. An average increase in temperature of 2°C may decrease the flow in the Nile by 50%. Over 85% of fresh water is used for agriculture, with more than half wasted due to unsustainable practices. Efficiency levels of water for human use are low, even in countries depending almost entirely on desalination. Although the region produces more than half of the world's desalinated water, it depends entirely on imported technologies and equipment.

In addition to documenting the latest data on the state of water in the Arab countries, the report is designed to contribute to the discourse on the sustainable management of water resources. The treatment of the subject is both broad and multidisciplinary, thus providing the public, experts and decision makers with critical understanding, without being overly technical or academic in nature. The report combines in one volume a large amount of critical material on water from a variety of sources, analyzes them, discusses success stories as well as shortcomings, and proposes policy measures. While contributing to the dissemination of knowledge and information sharing, the report ultimately aims at inciting action for sustainable water policies.

The Arab water sector has been the subject of numerous studies by government agencies, development banks, and aid organizations. Therefore, critical issues in the Arab water sector have been researched and documented. The World Bank 2009 report, *Water in the Arab World: Management Perspectives and Innovations*, is but one example. This AFED report does not duplicate work already done, but rather builds on it to propose specific reforms and action plan.

Despite investments in Arab water infrastructure, the benefits of a sustainable, secure, and equitable management of water resources continue to elude the region

with serious ramifications on public health and well-being. The report sets the context by laying down why these benefits have been slow to come by and what challenges need to be addressed to attain water sustainability in the region.

The report also describes new trends and the prospects for reforms affecting the future of water in Arab countries. It addresses water governance, management of shared water resources, the role of laws and customary arrangements, the sustainability of desalination, constraints in water reuse, water pricing, use of analytical tools such as remote sensing, and the management of agricultural, municipal, and industrial water resources, among others.

AFED Secretariat wishes to thank all those who supported this initiative, specifically the report's main editor Dr. Mohamed El-Ashry, Dr. Mostafa Kamal Tolba and Dr. Mohamed Kassas who helped in laying down the methodology and appraising of the outcome, and Dr. Shawki Barghouti who put at our disposal the resources of the International Center for Biosaline Agriculture (ICBA). AFED's special thanks go to the OPEC Fund for International Development (OFID) for its continuous genuine support to the Forum's program, the Islamic Development Bank (IDB), and all corporate and media partners who made this endeavor possible. Thanks are also due to the authors and the many experts who contributed to the contents, and the editorial and production team of *Al-Bia Wal-Tanmia* (Environment & Development) magazine for their dedication to produce this report and book up to the highest standards and in record time.

AFED hopes this report will contribute to the ongoing dialogue on the future of water in Arab countries and catalyze institutional reforms. If this report can inform and help shape public policy for sustainable water management in the Arab world, then it would have served its purpose.

> **Najib Saab** Secretary General Arab Forum for Environment and Development

# EXECUTIVE SUMMARY ARAB ENVIRONMENT WATER 2010 Report of the Arab Forum for Environment and Development (AFED)

The Arab world is facing the prospect of severe water and food shortages unless rapid and effective measures are taken to address the region's water scarcity dilemma. Even if all available fresh water resources in the region were utilized, Arab countries on the whole would still find themselves below the water scarcity level. Alarmingly, the 2010 report of the Arab Forum for Environment and Development (AFED) has found that Arabs will face, as early as 2015, the condition of severe water scarcity, at which the annual per capita share will be less than 500 cubic meters. This is below one-tenth of the world's average, currently estimated at over 6,000 cubic meters. Water scarcity is a limitation to economic development, food production, and human health and well being.

Why does an allocation that is below 500 cubic meters (500,000 liters) per capita represent severe water scarcity? Some figures can serve as a useful illustration: it takes 150 liters of water to make a quarter liter cup of coffee; one kilogram of wheat needs 1,300 liters, while one kilogram of beef takes 15,000 liters of water to be produced. The larger the difference between a region's water resources and its water needs, the higher its degree of water (and food) insecurity.

Water supply sources in the Arab world, two-thirds of which originate outside the region, are being stretched to their limits. Thirteen Arab countries are among the world's nineteen most water-scarce nations, and per capita water availability in eight countries is already below 200 cubic meters, less than half the amount designated as severe water scarcity. The figure drops to below 100 cubic meters in six countries. By 2015, the only countries in the region which will still pass the water scarcity test, at above 1,000 cubic meters per capita, will be Iraq and Sudan – and even that assumes that water supplies from Turkey and Ethiopia will continue to be sustained at their present levels. Without fundamental changes in policies and practices, the situation will get worse, with drastic social, political and economic ramifications.

The Arab region is one of the driest in the world. More than 70% of the land is dry and rainfall is sparse and poorly distributed; climate change will exacerbate the situation. By the end of the 21<sup>st</sup> century, Arab countries are predicted to experience an alarming 25% decrease in precipitation and a 25% increase in evaporation rates, according to climate change models. As a result, rain-fed agriculture will be threatened, with average yields estimated to decline by 20%.

Water use in the Arab region is dominated by agriculture, which utilizes about 85% of the water resources, against a world average of 70%. Irrigation efficiency is very low in most countries, at 30% against a world average of about 45%.

Agricultural productivity is still measured by tons produced per hectare of land regardless of water wasted, while it should be measured by tons produced per cubic meter of water so that water usage can be captured as part of the cost of production.

Since surface water supplies do not meet growing demand due to population growth and economic development, groundwater resources have been overexploited beyond safe yield levels. This has resulted in significant declines in water tables and in the pollution of aquifers. Water pollution is a major challenge in the region due to increasing discharges into water bodies of domestic and industrial waste water, as well as agricultural chemicals, which raises serious health risks, especially among children. Over 43% of waste water in the region is discharged without treatment, while a small fraction not exceeding 20% is reused. Furthermore, overexploitation of groundwater along coastal areas is resulting in salt water intrusion.

Water shortages have compelled a number of Arab countries to rely heavily on desalination for the bulk of their municipal and industrial water needs. With 5% of the world population, Arab countries are endowed with just 1% of the world's renewable fresh water resources, while they have over 50% of the world's desalination capacity. At the projected rate of annual increases, current desalination capacity will be doubled by 2016, using expensive, fully imported and polluting technologies. In some countries part of the expensive desalinized water is being used to irrigate low-value crops, or even golf courses. The discharge from desalination stations contributes heavily to increased salinity and higher temperatures of seawater in coastal areas. Sustainability of desalination to meet increasing demand depends on technological breakthrough and developing local capacity, which make the technology more affordable and environmentally friendly. This might be achieved mainly by introducing new desalination methods using solar energy.

This AFED report has found that most public organizations in the Arab world, serving both irrigation and urban water needs, do not function properly and have not served their clients effectively. Responsibility for managing water and water services is dispersed across multiple institutions which rarely coordinate among themselves. Moreover, decision making is top-down with no, or ineffective, stakeholder participation.

The report argues that free water is wasted water. Artificially low prices and

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