Bridging Science and Policy in water management

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Abstract

Water sustains life, the environment and development. Human rights to water, as water is becoming a commodity threatens the poor. Global water crisis in term of quantity and quality is man-made disaster linked to environmental imbalance and degradation of life-support ecosystem. It is a crisis of water management, fragmented institutions, inadequate policies and legal systems, political will, widening gap between science and policy making at the national , regional and global levels. Already one third of world population is living in water-scarce or water-short areas. Climate change will accelerate the figure to one half. 12% of World's population uses 85% of its fresh water. Water supply resources are being stretched to their limits. By 2050 additional 3 billion people will be born mostly in countries already suffering from water shortage

With the advent of climate change, most of water stressed areas particularly in arid and semi arid zones (Middle East and MENA regions) will face rainfall decline of 20% and temperatures rise 2-3^0 C. that would result of large losses of water resources, basic food, basic needs, and increased poverty.

Water science is a "must" in developing a unique water management scheme. It contributes to well defined policy for efficiency, sound strategy and sustainable plan of action. There is unlimited potential what science can do on our planet, where salt water comprises 97.5% of planet waters, and fresh water of 2.5% : 70% tied in polar caps, and of what is left to humanity only 30% in rivers, lakes and ground waters.

Fundamental change in water policies and engaging science to develop a unique water management scheme is imperative. Currently, water policies are divorced from sound science. Demands should be managed by new culture of efficiency, cutting losses, protecting water from overuse and pollution.

There is no doubt that problems with water management, is becoming more complexed due to rapid population growth, climate change and growing demands by industrial and agricultural development. Therefore, science becomes crucial in providing the basis of sound governance and a holistic approach to enlightened policy linked to water management. The potential of what modern science in term of R&D can do is unlimited.

At the global level; nanoscience in seeds-clouding, in nano-membrane, for efficient diffusion technology for harvesting fresh water from oceans and seas, coupled with nanosolar cells for utilizing efficiently sun-energy. The amount of sun energy falls on one square meter on the desert of the MENA region, equals to one barrel of oil (BTUs) annually. Arab region with 5% of world population produces 50% of desalinated water of the world. Generation of electricity is linked with water desalination utilizing fossil-fuel, in the Gulf region.

At the regional level; managing shared water resources whether rivers, or ground water aquifers, should be placed on the agenda of countries of water basins, bilateral or multilateral agreements should lead to stronger economic and political ties among countries of shared water-basins,

leading to peace rather to conflicts. Of all renewable water resources in Arab countries, two thirds originate from sources outside the region.

At the national level; science can contribute in acquiring knowledge via remote sensing to identify new ground water basins and develop policy for their wise-use and sustainable management.

Water governance should have stakeholders participation. Information is hardly shared between "policy makers" and authorities or between "government" and "nongovernmental sector" effective institution-strengthening and legal framework to expand public-private partnership needed.

Agriculture accounts for 83% of water use in Arab region against world average of 70%. Irrigation efficiency remains at 35%. Science can contribute in developing new local crop tolerant to aridity and salinity condition. (stressed physiology crops) Rain-harvest system is recommended. More efficient science-based agricultural practices and techniques in conserving water under i.e. plasticultures. Other policy reforms for new political economy of water acquiring water "virtually" through imports of crops from water-rich countries, while allocating scarce water resources to low-water consuming, high value adding crops that can generate foreign exchange. Food security may be achieved through well-balanced trade policies.

Waste-water generated by domestic and industrial sectors in the Arab region is 10 Km^3/year, of which 5.7 Km^3 undergoes treatment of the volume of the waste water that is treated, only one third is reused. Waste water treatment plants currently handle waste loads that exceed their capacity limits.

The untapped potential of waste water requires appropriate policy interventions. It should be augumented in the national water management strategy for water reuse policies. Dissemination of best scientific practices, cost recovery, professional training and public awareness.

Water leakage and theft rates in the distribution network of fresh water averages are estimated to be, 13% in Europe, 15% in USA, 25% in Turkey and 35% in the Arab region.

UN & UNESCO classify rich-water countries, those who secure 8000 m^3 per capita per year. World average estimated at 6.000 m^3 per capita per year. An allocation below 1000 m^3 is considered a water-scarce country, and an allocation of below 500 m^3 per capita per year represents severe water scarcity. 13 Arab countries are among world's 19 most water-scarce nations, and per capita water availability in 8 countries is below 200 m^3, less than half of UN-designated water-severe scarcity country.

Science in water stressed areas is more important than ever in finding solutions to water scarcity, where enlightened policy can rest. Barriers to the use of science in policy making, exist particularly, in the Arab region where political decision-makers do not value the impact of science on development and management of resources.

The Arab economical summit of Arab head states held in Kuwait 2009, declared that priority of science R&D in the Arab region should concentrate on three areas: **water**, **energy**, **food security**, but no Arab state had seriously incorporated it in the policy-making **needs**, and they continue to have it as slogan without **deeds**.