

# Water Resource Management

In a world predicted to be 8 billion strong by the year 2030, water scarcity will be one of the key factors affecting food security, socio-economic development and ecological preservation. Producing enough food for the growing population will require greater water efficiency in agriculture. Human activities that precipitate contamination, watershed modification, or extraction in excess of inflow rate will need substantial controls to stabilize the amount of water available for direct consumption, and the variable nature of water resources in arid regions makes demands for water all the more difficult to manage.

Properly managed water resources are a critical component of socio-economic growth and a healthy ecosystem. Yet development agencies, national planners, and policy-makers often lack the basic information needed to address water resource management problems. For example, indicators at the basin scale on water flow, water use, water quality, dams, or biodiversity are inadequate for most of the watersheds in the world. The value of useable water to future generations is hard to quantify and define and requires considerations of quantity, quality, timing, and accessibility. Because the availability of water is likely to decline in the future for most arid lands, we must do a better job of managing the resources that we have by increasing water use efficiency and reuse.

**Research sponsored by the IALC is aiding efforts to implement a more integrated approach to water resource management that balances development and environmental needs. IALC projects have contributed to a better understanding of the socio-economic, hydrological, and biological factors affecting water resources at the basin level, and demonstrated the possibilities of water reuse and the benefits of implementing groundwater management methods to the people who use and depend on these resources.**

**See the reverse side for detailed examples of these IALC Water Resource Management Projects:**

- 1. Land Application of Wastewater for the Creation of Manmade Forests in Egypt (2002).**
- 2. Developing a Sustainable Groundwater Management System from Decreased Nitrogen Use (1999).**
- 3. Arid Lands Water Resources Monitoring for Outlier Events on Un-gauged Watersheds Using Radar Rainfall Measurements (1994).**

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Read more about IALC Water Resource Management Projects on our website: <http://ialcworld.org>.

## **1. Land Application of Wastewater for the Creation of Manmade Forests in Egypt (2002).**

**New Mexico State University, Ministry of Agriculture and Land Reclamation – Egypt, University of Ain Shams (Egypt) Walter Zachritz (Principal Investigator)**

Applying wastewater and sludge to land for remediation has been recommended by the Environmental Protection Agency (EPA) as a method to recycle nutrients and organic matter and conserve water resources. Egypt has begun an extensive program of afforesting and reclaiming arid lands using wastewater. The objective of this research was to develop sustainable designs for Egyptian wastewater treatment systems based on land application on man-made forests. The results of this study can help to: a) predict tree growth and schedule irrigation, b) understand trees response to environmental and water stress, and c) provide better analyses of future research efforts.

## **2. Developing a Sustainable Groundwater Management System from Decreased Nitrogen Use (1999).**

**New Mexico State University Shane Ball (Principal Investigator)**

Increased concern over potential contamination of groundwater from nitrogen fertilizers has generated a need for better tools to assess regulations concerning chemical use. The objectives of this project were to: a) demonstrate to farmers that by using chloride as a tracer, they can determine the irrigation and nitrogen use efficiency of their management system, b) demonstrate that this information can be used to increase profitability by decreasing nitrogen inputs, and c) develop a case study describing the factors that determine farmers' adoption or non-adoption of this natural resources innovation.

## **3. Arid Lands Water Resources Monitoring for Outlier Events on Un-gauged Watersheds Using Radar Rainfall Measurements (1994).**

**The University of Arizona, Ministry of Agriculture and Rural Development - Israel (Ruppin Institute), USDA Agricultural Research Service, Hebrew University of Jerusalem (Israel)**

**Soroosh Sorooshian (Principal Investigator)**

Effective monitoring of water resources in arid land regions is critical for both restoration efforts and efficient land use; however frequent representative sampling requires substantial budgetary resources and is difficult in arid and semiarid areas, where rainfall events are typically more variable. An Israeli and U.S. team tested several methods of acquiring and analyzing hydro-meteorological data from isolated watersheds, including radar-rainfall estimation and comparisons with nearby experimental watersheds. The results are promising for the development of an arid lands water resources monitoring system for outlier events in un-gauged watersheds using radar-rainfall measurements, coupled with a distributed rainfall-runoff model.



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