



# IWMI Research in South Asia

- Improving Agricultural Water Productivity
- Water-Energy Nexus
- Pro-poor Interventions and Livelihood Strategies
- Urban and Peri-Urban Agriculture
- Recommendations for Policy and Institutional Reform
- Sustainable Watershed Development
- Drought Mitigation



## About IWMI

IWMI is an international non-profit scientific organization supported by the Consultative Group on International Agricultural Research (CGIAR). IWMI works in the developing world and has offices in both Asia and Africa.

### IWMI's Mission :

Improving the management of land and water, for food, livelihoods and nature

### Research Themes :

1. Basin Water Management
2. Land, Water and Livelihoods
3. Agriculture , Water and Cities
4. Water Management and Environment

*IWMI's Asia office is located in Delhi, India. This office oversees activities carried out in South Asia, while specific research activities are coordinated by offices located in India, Pakistan, Sri Lanka and Nepal.*

## Overview of Projects and Activities

IWMI's research portfolio in South Asia focuses on poverty reduction and food security through the sustainable management of water and land resources. Droughts and floods severely tax poor communities in South Asia, leading to loss of crop productivity and livelihoods, land degradation, poor human health and low incomes. The lack of availability of clean water, forces poor people to extract water from alternative and often unsafe sources, such as untreated wastewater. One of the key factors directly affecting the poor is inequity in irrigation water distribution, further aggravated by inequity in land holdings which underpins the need for more focused pro-poor options to increase returns to poor farmers in low productivity areas. Groundwater is a key research area in South Asia. Arsenic contamination of groundwater in Bangladesh is a risk to health and for most of India, groundwater overdraft threatens the sustainability of the resource.

## Improving Water Productivity in the Krishna Basin, India

IWMI is studying the implications of different water allocation scenarios for food production and long term resource sustainability in the water-scarce Krishna River basin.



Water scarcity is a serious issue in South Asia. In the Krishna Basin, India, IWMI is carrying out research on water allocation and identifying opportunities for improving water productivity.

In 2004, IWMI launched this four-year project to improve basin-scale water productivity through integrated hydrologic, water resources, and economic research. The research is developing an integrated framework to formulate water allocation strategies. Activities to date have focused on:

- Land use/land cover mapping, including advanced remote sensing techniques for mapping irrigated areas.
- Documentation of the spatial and temporal patterns in hydroclimatology and crop water demands over the past five decades.
- Water-poverty mapping, to analyze the relationships between poverty and spatial variables, especially unequal access to adequate and safe water supplies and land resources.

Future research will evaluate the water productivity in different allocation scenarios, including inter-project and inter-sectoral tradeoffs. IWMI's studies in the Krishna Basin will provide useful generic lessons to address problems relating to water management and poverty in closing river basins.

**IWMI's partners in the Krishna river basin include the University of Melbourne (UM), Jawaharlal Nehru Technological University (JNTU) and the Central Water Commission (CWC) and Irrigation Departments in Andhra Pradesh, Maharashtra and Karnataka.**

## Local Partners in South Asia:

- Aga Khan Rural Support Program
- BAIF Development and Research Foundation
- Central Soil Salinity Research (CSSRI)
- Center for Economic and Social Studies (CESS)
- Gujarat Ecology Commission (GEC)
- Indian Council for Agricultural Research (ICAR)
- Irrigation Dept NWFP Water and Power Development Authority
- International Development Enterprise (IDE)
- Institute of Rural Management (IRMA)
- NM Sadguru Water and Development Foundation
- Professional Assistance for Development Action (PRADAN)
- Seva Mandir
- Self-Reliant Initiative Through Joint Action (SRIJAN)

IWMI also works with a range of universities across South Asia, and with the governments of India, Bangladesh, Sri Lanka, Pakistan and Nepal

## Scaling up Water Productivity

The Rechna Doab basin in Pakistan is one of IWMI's benchmark basins where research was carried out to assess water productivity, identify knowledge gaps and synthesize existing knowledge in a comprehensive assessment. The project conducted an overview of land and water productivity at field and farm levels in the four canal commands of the Rechna sub-basin. Studies showed that when assessing water productivity, it is important to take into account the water balance and that both physical and economic productivity indicators are useful when linking water demand to supply. While many technologies can reduce irrigation water requirements for farmers, more research is needed to determine if they actually do save water.

## Modernizing Agricultural Water Management in Pakistan

IWMI is involved in modernizing the irrigation operations of the lower part of the Upper Swat Canal and Pehur High Level Canal (PHLC) under the PHLC Project in the North West Frontier Province. The modernization of this irrigation system has been done with careful design taking into account the local environment, as water is supplied on demand and must be managed properly to avoid excessive return flows and groundwater accessions. This project is studying the impacts of improved irrigation supplies and seeking to match irrigation demand and supply while also monitoring canal operation procedures. In addition, IWMI is engaged in significant capacity building for managers and users. Project partners are the Irrigation Department NWFP, Water and Power Development Authority and the CEMAGREF of France. The project is funded by the Asian Development Bank.



## Managing The Water-Energy Nexus

Currently, over 80% of irrigated agriculture in India is supported by groundwater, resulting in severe overexploitation of this resource. With very little control on groundwater extraction, the country faces serious groundwater depletion. Because energy is needed to pump groundwater from tubewells, energy and water need to be supported with sound and effective co-management options. India has 23 million pumps and almost another million added every year.



IWMI together with USAID and other national partners are working to develop an energy-water policy framework and provide support for proper assessment and efficient utilisation of groundwater resources and institutional arrangements for sustainable co-management of energy and water management in target sites.

In addition, work carried out by the IWMI-Tata Program shows that universal metering of pumps is not the solution to the problem and recommends supply-on-demand management, which provides power when farmers need it most, and increases the tariffs gradually. For enhancing the management competence of groundwater professionals in the region IWMI has initiated the implementation of a three year project on groundwater governance in Asia named "Capacity building through action research in the Indo-Gangetic and Yellow River basins".

## International Partners in South Asia:

- Cemagref, France
- CIMMYT, Mexico
- ICRISAT, India
- ILRI
- IRRI, Philippines
- The International Sedimentation Research Institute, Pakistan

IWMI's research also targets policy planners and decision makers providing them with guidelines and recommendations to make informed decisions on water and land resources management. IWMI regularly organizes roundtable discussions, training workshops and conferences. These gatherings range in size from village meetings to national stakeholder consultations or international fora.

## Pro-poor Interventions and Livelihood Strategies in Asia

### Understanding the Links between Irrigation and Poverty

IWMI, together with support from the Asian Development Bank, led a project to assess the relationship between poverty and irrigation and to strengthen the poverty alleviation impacts of irrigation systems management. The project was the first of its kind in terms of geographic coverage and scope of research covering 6 Asian countries: India, Pakistan, Bangladesh, China, Indonesia and Vietnam. Research showed that access to irrigation plays an important role in boosting household income and expenditure. This pro-poor study offers a comprehensive framework for identifying and designing pro-poor interventions, and a detailed set of specific actions and guidelines for policy makers.

### Resource Management for Sustainable Livelihoods in Nepal and India

IWMI together with the CGIAR Challenge Program Water and Food as well as national and international partners, is studying the linkages between forest and water management with a view to enhancing sustainable livelihood opportunities and reducing the vulnerability of poor rural people in upper catchments in the Begnas Watershed in Western Nepal and the Kyunjagad Watershed in India. The project will directly support opportunities for poor women's and men's food security and improved livelihoods, based on community-managed water and food resources, with a focus on rainfed agriculture, harvesting of common property resources, small-scale irrigation systems, spring-fed drinking water supply community forestry and watershed management.



Research shows that access to water has a definite impact on poverty as it improves food security, livelihoods, income generation, health, and employment opportunities.

## Urban and Peri-Urban Agriculture

### Wastewater Agriculture

Research carried out by IWMI and partners in India and Pakistan has shown that wastewater irrigation is a common practice in UPA but with major undocumented and poorly understood trade-offs. Wastewater is often the only source of irrigation water for poor farmers. Farmers benefit from this resource through access to water, reliability of irrigation timing, employment, income and savings in fertilizer costs as wastewater is nutrient-rich. Because of proximity to urban markets, farmers can grow perishable but high value crops. Although wastewater irrigation carries health and environmental risks, it is an important source of livelihood for the urban poor. IWMI is looking at ways and means of minimizing the health risks to farmers and consumers while maximizing the benefits.



Proximity to urban markets allows wastewater farmers to grow high value crops for their livelihoods.

## Donors :

- Australian Center for International Agricultural Research (ACIAR)
- Asian Development Bank (ADB)
- Catholic Relief Services (CSR)
- Department For International Development (DFID) U.K.
- DGIS
- Food and Agriculture Organization (FAO)
- International Development Research Center (IDRC)
- IWMI-Core
- RAMSAR Foundation
- Sir Ratan Tata Trust
- Swiss Development Cooperation (SDC)
- USAID

## Policy Recommendations

### IWMI-Tata Water Policy Program



The IWMI Tata Water Policy Program (ITP) was founded in 2000 and is supported by the Sir Ratan Tata Trust. (SRTT) The program's objective is to help policy makers at central, state and local levels address their water challenges in areas such as sustainable groundwater management, water scarcity, rural poverty and livelihoods, by translating research findings into practical policy recommendations. Through this program, IWMI works with a range of partners across India to identify, analyze and document relevant water management approaches and current practices. These practices are synthesized for maximum policy impact in the "Water Policy Briefing" series.

#### Creating Impact through the Central India Initiative

Despite significant investments in irrigation infrastructure, large tracts of India remain unserved by irrigation water, including much of central India, with over 70% of India's tribal population, representing perhaps the largest concentration of rural poverty in South Asia. The absence of appropriate policy action to support agriculture development in this region means these communities depend on rainfed farming and distress migration. The opportunity for enhancing tribal livelihoods through small-scale land and water management interventions was recognized by the IWMI-TATA Water Policy Program During 2002-04, ITP created the Central India Initiative (CII) to document proven approaches, through a broad alliance of researchers and practitioners. Mid-way through the research process, in 2003, SRTT adopted 'CII' as a key component of their grant-making program on livelihoods initiatives in this region.

For more information, see [www.iwmi.org/iwmi-tata](http://www.iwmi.org/iwmi-tata)

## Watershed Development

### Research in the Uda Walawe Basin, Sri Lanka

The Uda Walawe basin in the South of Sri Lanka is a benchmark basin of IWMI, where research is carried out on water allocation and basin management as well as livelihood strategies and environmental issues. The lower and middle regions of the basin grapple with water scarcity while there is excessive water in the upper catchments often leading to floods. IWMI works closely with local partners to improve watershed management in upper catchment areas. IWMI with its partners also conducts awareness programs to train farmers in best practices that can improve crop productivity and soil fertility, as land degradation is a serious issue.



IWMI works with local partners to improve water management at field and farm levels.

In the days immediately following the Indian Ocean tsunami of January 2005, IWMI carried out A "Rapid Needs Assessment" in the coastal region of the Hambantota in the lower basin. Research was also carried out to determine the physical damage and changes to coastal wetlands from Hambantota to Colombo in the aftermath of the tsunami.

## Fighting Drought – Towards a Better Prepared South Asia

Despite the frequent occurrence of droughts in South Asia, coordinated and well-planned drought mitigation strategies are lacking in the region. IWMI's Project on Drought Assessment and Mitigation—carried out as a short-term rapid assessment study in India, Pakistan and Afghanistan—is nearing completion and is generating a range of beneficial outputs and identifying areas for future regional collaboration, study and development. Although the initial study was limited to Southwest Asia, the project hopes to achieve full South Asian coverage and develop a regional anti-drought community of practice.

#### Project Outputs

- DMS Monitoring System
- Software for Analysing Drought with multiple options
- Comprehensive Rainfall Database with 90 monitoring stations and 30-year coverage
- Drought Website: [www.iwmi.cgiar.org/droughtassessment/index.asp](http://www.iwmi.cgiar.org/droughtassessment/index.asp)

with overview of project activities, links to partner websites and other drought-related websites and databases on drought-related literature.

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