

IWMI-China: Celebrating over 20 years of research cooperation on water issues



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The International Water Management Institute (IWMI) has collaborated with China on water management research since 1991.

Joint projects have included soil conservation techniques on sloping lands, water-saving irrigation techniques and water productivity assessment in paddy rice, strategies to reduce groundwater over-pumping on the North China Plains and governance capacity building through scientist exchange programs.



China's achievements in water management are extensive:

- Supporting economic growth by consistently investing in water resources development and related research.
- Turning around problems of degraded water quality faced by many transition economies through integrated solutions such as on the Hai River.
- Setting up water conservation targets and incentives for a comprehensive approach to a “water-saving society.”

- Irrigation continues to be recognized as a key element to national food security and rural development, which is reflected in national policies and investments.
- Actively testing and implementing reforms in agriculture and water sectors backed by cutting-edge technology, as evidenced by the use of prepaid swipe cards in certain areas to track and manage groundwater consumption by farmers.

Highlights of the IWMI-China relationship

Early projects:

Overcoming Groundwater Depletion:

IWMI's research examined how groundwater overdraft starts, and helped determine sustainable pumping amounts through the testing of various options. IWMI's research on the structure, conduct and performance of decentralized groundwater markets in India inspired similar studies in China for the first time.

Sustainable Management of Sloping Lands:

IWMI worked with farmers to demonstrate and develop methods of soil conservation, so that sloping lands could be managed more sustainably.

Zhanghe Irrigation System in the Yangtze River Basin (2001-2005)

Scientists from IWMI and the International Rice Research Institute (IRRI) collaborated with Chinese scientists and water managers to find ways of producing "more rice with less water."

The research evaluated alternate wetting and drying (AWD) and other water-saving technologies, fertilizer use, financial cost-benefit scenarios, irrigation management transfer and the possibility of scaling-up interventions.

Researchers found that a coordinated shift to a demand-driven and participatory management structure enabled better adoption of water-saving technologies and improved irrigation efficiencies through water reuse with local storage. The results from Zhanghe provide research evidence for many rapidly urbanizing economies to consider and adapt.

Yellow River Basin

The Yellow River Basin has been a focal project under the CGIAR Challenge Program on Water and Food (CPWF), coordinated by IWMI. Projects have included:

- Groundwater Governance 2006-2008, led by IWMI. CPWF and the Center for Chinese Agricultural Policy collaborated on a capacity building program on groundwater management in the Indo-Gangetic Basin in South Asia and the Yellow River Basin in China. A total of 78 scientists and groundwater managers from India, Nepal, Pakistan, Bangladesh and China participated in the project, which included 5 weeks of classroom training and 15 additional weeks of research work for junior fellows.

The basic premise was that proper groundwater management needs to be built on informed knowledge of professionals from the region, with an emphasis on interdisciplinary knowledge and understanding the situation in the rural areas. The project concluded with a better appreciation for collaboration among scientists and researchers, with the goal of a more favorable policy environment in support of community level livelihood improvements.

Other CPWF projects in the Yellow River Basin include the following:

- Assessing conservation agriculture in rainfed areas – International Maize and Wheat Improvement Center (CIMMYT).
- Aerobic rice cultivation – International Rice Research Institute (IRRI).
- Managing water scarcity – International Food Policy Research Institute (IFPRI).
- Valuing wetland resources – WorldFish Center (WFC).

(the CGIAR Center leading each project is also stated)

2012: Water User Associations in Minqin County, China

IWMI evaluated whether water user associations (WUAs) are responsible for curbing groundwater depletion in Minqin County, China. Formerly a green area on the edge of the Gobi Desert, it had suffered from falling water tables and dying vegetation. In 2007, the Chinese Government embarked on a major project to “save the oasis.” The plan included forming a WUA in every village, with each household becoming a member. The WUAs are responsible for issuing water permits and calculating each household’s water rights according to a water quota.

Researchers noted that, through the WUAs, the Chinese Government had transformed its influence from trying to control water exploitation to managing conservation. The closure of wells has led to reduced crop production in the area, but researchers concluded that this may be an inevitable trade-off to curbing groundwater depletion.



What cooperation between IWMI and China can offer today:

- Building on strategies to “produce more with less” and coping with the increasing pressures on agricultural land and water resources.
- Enhancing ecosystem resilience through new approaches to sustainable intensification.
- Managing pollution, in part, through wastewater reuse in urban and peri-urban farming.
- Working on Integrated Water Resources Management at the basin level, which includes modernizing irrigation and water-permit systems, groundwater recharge, and the monitoring and evaluation of agricultural water development and conservation.
- Promoting south-south cooperation and capacity building, as reflected by the successful Groundwater Governance project which focused on the Indo-Gangetic and Yellow River basins.
- Developing and coordinating partnerships for research for development across national and regional boundaries.

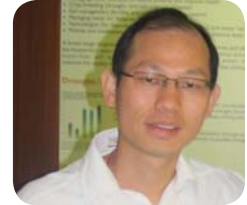


Photo credit: Vladimir Smakhtin/IWMI

IWMI's research partnerships in China

Xueliang Cai – Researcher - Water Resources and Remote Sensing, IWMI, Pretoria, South Africa

Xueliang Cai received his doctorate degree in irrigation water management at Wuhan University in China in 2007. He started working on a collaborative project with IWMI beginning in 2003 and then joined the Institute as a postdoctoral fellow in 2007. Since 2010 he has been based at IWMI's regional office in Pretoria, South Africa. Xueliang has been working on a range of issues related to water resources management for irrigation development and ecosystem conservation across Asia and Africa. His experience includes water-saving irrigation and reuse, irrigation diagnosis and performance evaluation, small storage development for irrigation and aquaculture, hydrological functions of ecosystems and global irrigated area mapping. He is currently playing a leading role in two projects to assess a participatory approach to small-scale water resources development for irrigation in response to socioeconomic and climate changes.



“Having obtained my PhD in China through an earlier collaboration with IWMI, I, myself, am a product of the IWMI-China cooperation. I think such cooperation is important for both IWMI and China in the post-Millennium Development Goal era. China, with the world's largest population, is experiencing increasing pressure on natural resources, particularly land and water. The rapid social and economic development further exacerbates the situation at the cost of the environment. Meanwhile, China has been consistently prioritizing agriculture to support rural development by investing in agriculture and water management over the past decades. How to balance food security, better targeted poverty alleviation and environmental conservation is the key to ensuring sustainable development. IWMI as an international research and development center is well-positioned to contribute to this process through its holistic approach and, potentially, help China disseminate the precious experience and lessons learned to wider developing communities across Asia and Africa.”

Tushaar Shah, Senior Fellow, IWMI, Anand, India

Tushaar Shah joined IWMI in 1999 as leader of the program on Policy, Institutions and Management. In 2001, he took over the leadership of IWMI's new theme on Sustainable Groundwater Management. Shah also built and led the IWMI-Tata Water Policy Research Program in India – the first-ever collaboration between an international center and an Indian foundation. In 2002, he was selected as “Outstanding Scientist of the Year” by the Consultative Group on International Agricultural Research (CGIAR). In 2005, Shah created two IWMI research projects funded by the CGIAR Challenge Program on Water and Food (CPWF): “Groundwater Governance in Indo-Gangetic and Yellow River Basins” and “Strategic Analyses of India's National River-Linking Project.” He serves on the Academic Council of the Center for Chinese Agricultural Policy (CCAP).



“Understanding the Chinese irrigation economy can be extremely important for South Asia because the latter have so much to learn from China's experiments. Groundwater regulation through direct means is considered nearly impossible in South Asia, but China has already been experimenting with it. Billions of dollars invested in irrigation modernization have produced little benefit in South Asia. But China's ambitious program to invest USD 600 billion in modernizing its canal irrigation systems will provide new lessons on how South Asia can revitalize its public irrigation systems.”

IWMI-China milestones

1991: The International Irrigation Management Institute (IIMI), as IWMI was then known, started doing irrigation research in China.

1994: IIMI and Wuhan University co-sponsored an international workshop on irrigation management.

2000-2001: Conducted research to promote sustainable practices for soil conservation on sloping lands. The project looked at seven Asian countries, including China.

2000-2002: Evaluated groundwater dynamics and promoted sustainable management in the North China Plains. Research explained why groundwater levels were declining despite decreases in pumping rates.

2001: IWMI and the Center for Chinese Agricultural Policy (CCAP) signed a memorandum of understanding to collaborate on projects of joint interest.

2001-2005: Conducted research on a project to “grow more rice with less water.” Promoted water management techniques to reduce the pressure on overtaxed resources and improve food security for the poor. In 2005, an international workshop was held in central China to discuss the findings.

2003: IWMI co-sponsored the First International Yellow River Forum, which discussed new approaches to water management, food security and the environment in the Yellow River Basin.

2005: IWMI researcher, Tushaar Shah, was appointed to the Board of Academic Advisors of CCAP for the 2005-2006 term.

2006-2008: IWMI (through the CGIAR Challenge Program on Water and Food [CPWF]) and China worked together on water governance and capacity building in the Indo-Gangetic Basin in South Asia and the Yellow River Basin in China. The project included classroom training and field research exploring socioeconomic changes under different groundwater conditions.

2008: Established the Chinese Academy of Agricultural Sciences - IWMI Center of Excellence for Water Management in Agriculture.

2008-2010: Studied the relationship between wetland conservation, food production and development activities in the Sanjiang Plain Wetlands of Heilongjiang Province, China. The study identified trade-offs between conservation and poverty reduction and development.

Today: The IWMI-led CGIAR Research Program on Water, Land and Ecosystems (WLE) is examining land use changes in southern Yunnan Province.

Joint IWMI-China publications

IWMI and China have collaborated on 38 joint publications over the years. Highlights include:

Cai, X.; Cui, Y.; Dai, J.; Luo, Y. 2012. Local storages: The impact on hydrology and implications for policy making in irrigation systems. *Water International* 37(4): 395-407.

Molden, D.; Bin, D.; Loeve, R.; Barker, R.; Tuong, T.P. 2007. Agricultural water productivity and savings: Policy lessons from two diverse sites in China. *Water Policy* 9(Supplement 1): 29-44.

Mukherji, A.; Villholth, K.G.; Sharma, B.R.; Wang, J. (Eds.). 2009. *Groundwater governance in the Indo-Gangetic and Yellow River basins: Realities and challenges*. London, UK: CRC Press. 325p. (IAH Selected Papers on Hydrogeology 15).

Shah, T.; Giordano, M.; Wang, J. 2007. Irrigation institutions in a dynamic economy: What is China doing differently from India? In: *The Global Importance of Groundwater in the 21st century: Proceedings of the International Symposium on Groundwater Sustainability, Alicante, Spain, January 24-27, 2006*, ed., Ragone, S. Westerville, Ohio, USA: National Groundwater Association. pp.177-187.

Sun, R.; Jin, M.; Giordano, M.; Villholth, K.G. 2009. Urban and rural groundwater use in Zhengzhou, China: Challenges in joint management. *Hydrogeology Journal* 17(6): 1495-1506.

Wang, J.; Huang, J.; Xu, Z.; Rozelle, S.; Hussain, I.; Biltonen, E. 2007. Irrigation management reforms in the Yellow River Basin: Implications for water saving and poverty. *Irrigation and Drainage* 56: 247-259.

Key partners IWMI has worked with in China

Ministry of Water Resources
Chinese Academy of Agricultural Sciences
Yellow River Commission
Center for Chinese Agricultural Policy
Wuhan University
Zhejiang University
China University of Geosciences
Zhanghe Irrigation System Authority
Soil and Fertilizer Institute
Guizhou Academy of Agricultural Sciences
Henan Provincial Water Conservancy Research Institute

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IWMI is a member of the CGIAR Consortium and leads the:



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