

165:197 INTERNATIONAL DEVELOPMENT

Section 011: Development of Resilient and Sustainable Agricultural Watersheds

053:185 INTERNATIONAL PERSPECTIVES IN WATER SCIENCES AND MANAGEMENT

December 27, 2011 - January 15/16, 2012

Gurgaon, Delhi, and Roorke (India)

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COURSE DESCRIPTION

Objectives: The climate and land use changes that occurred in the last decades have increased the vulnerability of our water resources, both natural and man-made, thus requiring a systems approach for analyses that connect the biophysical characteristics of the river basin with the socioeconomic components of the water cycle. New and adaptable approaches, better suited to account for the risks associated with an uncertain future, are warranted to help ensure resilient and sustainable water governance. Sustainability is related in the present context to watershed communities that meet the environmental, economic, and social equity needs of its residents today without reducing the ability of future generations to meet their needs.

The main goal of the course is to gain a deeper understanding of the environmental and socioeconomic impacts of climate and land use change on the quantity and quality of water in agricultural landscapes using case studies in Northern India (Mewat District, Haryana). In Mewat, groundwater is the primary source of water. Available groundwater is limited to a few freshwater pockets and the remainder is saline. In fact, freshwater pockets are contained in the ground only in 61 villages out of 503 villages in Mewat. Saline groundwater cannot be utilized for domestic or agricultural purposes because of high levels of total dissolved solids. Despite this, most villagers continue to use saline water for their livelihoods. Many other problems arising from the limited freshwater supply are exacerbated by the mass extraction of freshwater which is outpacing the natural water recharge. If exploited at the current rate, fresh groundwater in Mewat is expected to be depleted within the next 10 to 15 years.

Specifically, we seek to better understand the adaptability, resilience, and sustainability of natural and built water systems given climate variability and land use dynamics by addressing the following questions:

1. What **best management practices for retaining and preserving the freshwater** in the foothill area of the region?
2. What are the **best strategies to avoid encroachment of saline water in the freshwater pockets**. Solutions include desalinization of the groundwater in low-lying areas.
3. What are the **socioeconomic and environmental trade-offs** associated with choices in management practices, floodplains, ecosystems, and water infrastructure and what **governance and institutional arrangements are needed for a sustainable management** of the water resources in the region?

Academic Activities: This is a 3 SH credit course for junior, seniors, and graduate students with interest in watershed resource development from the scientific (geo-economics, agriculture, water resources, environment), engineering (water and energy infrastructure, energy production and management), and sustainability perspectives. To attain the course goals participant students will undertake research on watershed resources as related to agricultural development, governance, and poverty reduction through development of sustainable watersheds. Most of these activities will be conducted on the grounds of the Institute of Rural Research and Development (IRRAD) in Gurgaon, Haryana. We will visit village clusters in the Mewat District, and conduct education and outreach activities for both learning and sharing knowledge in relevant areas of interest. The day by day

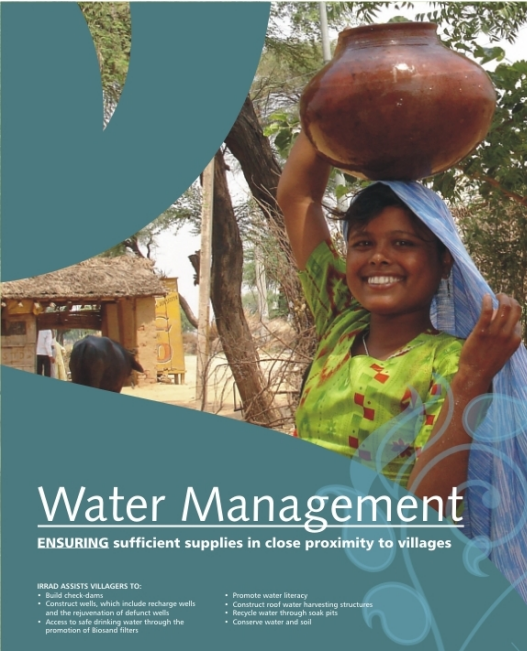
activities within the NGO will be complemented with afternoon and weekend cultural activities and networking: visits at Jaypur, Agra, Roorke, and Haridwar in North-West India. Field trips to cultural and historical sites strengthen participants' cultural awareness and promote networking.

The activities conducted with IRRAD will be echoed and expanded in the dialogue with academic partners in Department of Civil Engineering, IIT Delhi and Department of Water Resources Development, IIT Roorke. Besides the Mewar region water resources problems, the academic and professional dialogue will include the major (for both countries) theme of **flood mitigation**. The importance of direct interactions with local communities and other students and faculty during field trips cannot be underestimated. Many examples of student-student and faculty-faculty communications that continue to exist over the years based on the short, but intensive interactions during previous visits in the foreign countries.

The requirements for receiving 3 semester hours of credit would include readings, discussions, classroom and field observations and seminar participation, public presentations, and one final presentation on January 14th in India. Within six weeks of their return to the US, all UI students are expected to actively participate in a forum and share their experiences in India with the UI community.

PARTNER ORGANIZATIONS


The Institute of Rural Research and Development (IRRAD). The Institute is an initiative of the S.M. Sehgal Foundation registered as a trust since 1999 to further the wellbeing of rural communities in India (www.smsfoundation.org). IRRAD envisions rural people across India motivated and empowered to make their lives more secure and prosperous through education, better health, improved skills and supportive governance. The Institute develops need-based strategies and programs for poverty alleviation, undertakes research and creates knowledge on sustainable rural development, build capacities for rural development, and analyze the impact of local state and national policies on rural development. Academic partners at **Indian Institute of Technology at Delhi and Roorke** will facilitate interactions between faculty and student participants along the course themes.



Water Management
ENSURING sufficient supplies in close proximity to villages

IRRAD ASSISTS VILLAGERS TO:

- Build check dams
- Construct wells, which include recharge wells and the rejuvenation of defunct wells
- Access to safe drinking water through the promotion of Biosand filters
- Promote water literacy
- Construct roof water harvesting structures
- Recycle water through soak pits
- Conserve water and soil



IRRAD
INSTITUTE OF RURAL RESEARCH AND DEVELOPMENT
An Initiative of S M Sehgal Foundation

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Dates	Location	Host	Comments
Dec 27- Jan 1	Gurgaon	IRRAD	Includes Mewat site visits
		IIT Delhi	Specific dates to be determined
Jan 1 - 3	Roorke	IIT Roorke	Includes Haridwar
Jan 4-6	Gurgaon	IRRAD	
Jan 7-9	Jaipur-Agra		
Jan 10-13	Gurgaon	IRRAD	

Course Director: Marian Muste is Research Engineer at IIHR-Hydrosience & Engineering (IIHR), The University of Iowa (UI). He is Adjunct Professor with the Civil & Environmental Engineering Department and Geography and has a complementary appointment with the UI's International Program. He holds graduate degrees in civil and environmental engineering. His most recent area of research is the development of large-scale data/information management systems, sensors and sensor networks, and their implementation in research and education focused on sustainable use of water and land resources. Dr Muste is expert for UNESCO and World Meteorological Organization projects. He has extensive international experience as a Fulbright Fellow (2004, 2006, and 2009) and grantee of the Japan Society for the Promotion of Science (2001). Since 2001, he is instructor of the International Perspectives in Water Science Resources and Management organized by IIHR.

Course Instructor: Nandita Basu is an Assistant Professor in the Department of Civil and Environmental Engineering, and an Assistant Research Engineer at IIHR-Hydrosience & Engineering (IIHR) at The University of Iowa (UI). She holds graduate degrees in civil and environmental engineering. Her research expertise lies in the domain of sustainable management of water resources, specifically the fate and transport of pollutants at the watershed scale. She teaches graduate level courses on Groundwater and Water Resources Sustainability at the University of Iowa. Dr. Basu is on the Editorial Board of two leading water resources journals – Hydrology and Earth System Sciences and Hydrological Processes.