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 exist 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 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 Sehgal Foundation 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 Jaipur, Agra, Roorke, and Haridwar in northwest India. Field trips to cultural and historic sites strengthen participants’ cultural awareness and promote networking.

The activities conducted with Sehgal Foundation 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. The importance of direct interactions with local communities and other students and faculty during field trips cannot be underestimated. There are many examples of student-student and faculty-faculty communications that continue to exist over the years based on these short, but intensive interactions from previous visits in foreign countries.

Eligibility and Prerequisites: While we expect that the admission to this course is highly competitive, we have to limit the class attendance to no more than 15 students for logistic considerations (repeated field trips with smaller size vehicles in rural areas). To ensure the highest level of academic experience, the instructors will thoroughly review the applications for the final decision on admission. Specific criteria will include prior course work and its relevance to water-resources related areas (from hydrology, hydraulics to socio-economic and health aspects), good academic and disciplinary standing, student essays, academic classification (first year, sophomore, junior senior or graduate), permissions and academic letters of recommendation (from a professor or TA who has taught the applicant in a college-level course).

Grading Policy: Students earns 3 semester hours for this course. Components of this course include readings, discussions, classroom and field activities, individual investigations, working on a team, and a final presentation. Grades are based on activities conducted both before and during the trip.

Prior to departure (10% of final grade)
- Attendance at all required meetings prior to departure
- Short presentation on an individual assigned reading related to the class project

During the stay in India (90% of final grade)
- Participation in class and field work
- Daily progress on individual and team assignments
- Individual contribution to project objectives
- Technical presentation at the host institution

After returning, students are expected to present their work (as a group) at a planned seminar at the University of Iowa.

PARTNER ORGANIZATIONS
The S.M. Sehgal Foundation. The S.M. Sehgal Foundation registered as a trust since 1999 to further the wellbeing of rural communities in India (www.smsfoundation.org). The Foundation 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, builds capacities for rural development, and analyzes the impact of local state and national policies on rural development. Academic partners at Water Resources Management and Development Department, the Indian Institute of Technology at Delhi and Roorke will facilitate interactions between faculty and student participants along the course themes.

COURSE DIRECTOR AND INSTRUCTOR
Marian Muste is Research Engineer at IIHR-Hydroscience & Engineering (IIHR), The University of Iowa (UI). He is an Adjunct Professor with the Civil & Environmental Engineering Department and Geography and has a complementary appointment with the UI’s International Programs. 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 senor networks, and their implementation in research and education focused on sustainable use of water and land resources. Dr. Muste is an 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 an instructor of the International Perspectives in Water Science Resources and Management course organized by IIHR.

Allen Bradley is a Professor in the Department of Civil & Environmental Engineering, and a Research Engineer at IIHR-Hydroscience & Engineering (IIHR) at The University of Iowa. He holds graduate degrees in civil and environmental engineering. His research expertise is in hydrology and water resources, including watershed modeling, river forecasting, and risk assessment, and he has contributed to international research activities through the Hydrologic Ensemble Prediction Experiment (HEPEX) Project. Dr. Bradley teaches courses in hydrology and hydraulics, water resources engineering, and atmospheric sciences. He has also participated as an instructor in two International Perspectives in Water Science Resources and Management courses through IIHR.

ADMINISTRATIVE HOME
International Programs, University College is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 111 Jessup Hall or see: http://uc.uiowa.edu/academics.

STUDY ABROAD INFORMATION
The application deadline is Monday, September 21st. The India Winterim program application is available on the Study Abroad web site (under the “Application” tab): http://international.uiowa.edu/india-winterim. UI students submit their applications through an online form to Study Abroad. Students from other colleges/universities, please visit the web site for application instructions.

For information about scholarships and financial aid, go to http://international.uiowa.edu/study-abroad/funding.

Students may contact Study Abroad advisor Cory Petersen to discuss the application process, scholarships, and financial aid. To schedule an appointment, please call Study Abroad at 319-335-0353 (M-F, 8-5) and the receptionist who answers the phone can help you set up an appointment with Cory in International Programs, 1111 University Capitol Centre.