

Global & Ecological Health Engineering: First Student Project in the Thar Desert, India

The first three GEHE students from Environmental Engineering traveled to Jodhpur, India this past July to tackle water scarcity issues in the world's most densely populated desert. Roshni Brahmhatt, Susan Vescovi and Tracy Yang spent a month at the facilities of the Jal Bhagirathi Foundation (JBF) to learn about the organization's efforts to promote water management among more than 81 project villages. These communities are scattered throughout the great Thar Desert, where the indigenous Marwarian people live remotely with limited access to goods, services, and life-sustaining water. Women, particularly young girls, are largely burdened with the task of retrieving the family's daily water, walking to fetch it from up to 5 km away, 5-10 L at a time (according to locals, an average family requires 50-70 L daily). This chore consumes their entire day, leaving women uneducated and with few opportunities to improve their lives.

Through its initiative of restoring the traditional wisdom of rainwater harvesting via catchment ponds (*talabs*), JBF has effectively eliminated much of this burden; water ponds are typically located a few hundred meters from village centers. This drastically cuts the allotted time required to gather water, and allows women to seek additional work while their children attend school. With the issue of water quantity largely addressed, JBF turned to Northwestern for help in establishing a water *quality* program. Currently, Marwarians use salinity as their only index of quality control – 'sweet' water is considered safe to drink, while 'salty' is not. Such basic parameters have led to numerous acute and chronic health issues that further impede villagers' ability to obtain a better quality of life.



A young girl gathers water from a deep percolation well.



Animal defecation is common in and around talabs, allowing bacterial colonies in the water to thrive.

Throughout July, Tracy, Susan and Roshni ventured out to JBF's project villages. Using the available resources, the students conducted a feasibility assessment in order to design a study relating seasonal changes in water quality with fluctuations in health outcomes. The facility contains a water analysis laboratory, informational library and vehicular transport to the remote communities. In the subsequent weeks the team visited several catchment ponds, spoke to local villagers, and collected basic health data in hopes of selecting a range of project villages for future study.



(from left)) Susan, Tracy and Roshni outside Mehrangarh Fort, Jodhpur



(from left) Tracy and Roshni analyzing water samples with JBF staff



(from left) Roshni and Tracy speaking with a village elder

The first objective of this multi-year partnership is to establish basic monitoring techniques for testing water quality with increased frequency. The simultaneous collection of health data in the selected villages is a second goal; a comparison between data sets will help establish links between quality and wellness. Such a project includes many challenges; not only are many villages in remote locations over an hour away, but they are also periodically inaccessible due to bad weather and roads. Furthermore, the barriers of language and cultural differences provide an additional obstacle. Given such difficulties, the NU students were pleased to encounter a genuine openness to new ideas and collaborative thought during their stay.

In four short weeks, the project team identified two suitable worksites for future research. These villages exhibited strong community support, minimal variability in water sources, and an organized social structure that would increase the feasibility of continuous data collection. Additionally, the team identified potential sources for inaccuracies in current analytical techniques, and acquired necessary lab equipment in preparation for the increased data collection. NU is currently researching the potential for creating a mobile laboratory, with which JBF staff can take basic measurements onsite in the future.