

The University of Costa Rica's Masters Program in Water Resource Management and Hydrogeology



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[Photo: Masters students in Costa Rica.]

Last August, some 50 high-ranking government ministers, vice ministers, and institute directors met in Managua, Nicaragua to consider the future of the city's water supply. According to Managua's master water supply plan, dependence on an aquifer located right below the city should be reduced. The plan claims that the aquifer — the sole source of water since 1925 — has been pumped too hard in recent decades and can not supply Managua's growing population much longer. It recommends searching for an alternative water source far away from the city.

But the news they heard that day challenged the master plan. In a detailed presentation, a graduate student working with the Nicaraguan Ministry of the Environment and Natural Resources argued that the Managua aquifer still has plenty of water left. It needs more care and management — including protection from potential sources of contamination — but the aquifer is in excellent condition, overall.

Study could save millions

This study, which could ultimately save Nicaragua millions of dollars in unnecessary construction costs, is the product of Oscar Cruz, one of the first recipients of a Masters in Water Resource Management and Hydrogeology from the University of Costa Rica's [Escuela Centroamericana de Geologia](#). Launched in 1993 with financial support from the International Development Research Centre (IDRC), the program is unique in Latin America. Its goal is to help the region increase its capacity in hydrogeology and thereby reduce its dependence on foreign expertise.

The two-year Masters Program evolved out of the Latin American Urban Water Management Network, which was initiated by IDRC in the mid-1980's. The idea for a graduate program came from the late Robert Farvolden, a former professor and Dean of Science at the [University of Waterloo](#) in Ontario, and co-founder of the [Waterloo Centre for Groundwater Research](#). "Prior to this program, you could count on one hand all of the trained hydrogeologists throughout Central America," says [David Bethune](#), a Waterloo graduate who works with the Costa Rica program.

No shortage of work

According to Bethune, there is no shortage of work in the region for people with training in hydrogeology — a discipline that provides critical information and analysis for the exploration, development, and management of groundwater resources. In Latin America, 80% of the urban population relies on groundwater for drinking water, irrigation, and other purposes. But the rapid growth of urban areas is placing greater stress on available water resources. At the same time, increased industrialization, the intensive use of agrochemicals, and inadequate sewage treatment systems translate into a greater potential for water contamination.

To address such issues, the University of Costa Rica program has adopted a multidisciplinary approach, providing instruction in both groundwater science and engineering concepts as well as water resource management in general, says Bethune. Courses began in early 1995 and are currently being taught by professors from Costa Rica, Brazil, Canada, and the United States. (Eventually, the goal is to fill all faculty positions with Latin Americans.)

"We're accepting professionals who are employed by water institutes in the region," says Bethune. "Many of these employees have some practical experience in hydrogeology. They are motivated students who are often receiving a full salary from their employers. What we do is bring them to Costa Rica for two years and train them at a fairly high level." In cases where a candidate is not affiliated with a specific institution, he adds, "we try to foster an affiliation to get some level of support from their home country."

Thesis projects

When choosing thesis projects, "we sit down with the directors of the students' institutes to find out what they would like us to work on," continues Bethune. "Often, they ask us what we think they should be doing." This process ensures that students and staff work mainly on applied hydrogeological problems, often of national importance. Meanwhile, the Masters Program gains access to the technological and human resources of different institutes (as well as linkages to international organizations supporting these institutes, such as the [International Atomic Energy Agency](#), the [Canadian International Development Agency](#), and the [Pan American Health Organization](#)).

Bethune notes that students are maintaining contact with the Masters Program and each other after graduation. "They help each other on projects and problems. I think in that way we are creating the seeds for a really solid network of hydrogeologists," he concludes.

John Eberlee is the features editor of Reports online. [Photo: David Bethune]

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