International perspectives in water resources management: the Paraná River watershed

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ABSTRACT. The University of Iowa’s IHR - Hydraulics & Engineering (formerly the Iowa Institute of Hydraulic Research) offers a multidisciplinary course that focuses on the global water resources environment. International Perspectives in Water Resources Planning is a two-to-three week study abroad course that encourages an interdisciplinary group of participants (including students and faculty from the host region) to study the effects of major water-resources projects on society and the environment. A hallmark of the course is close and in-depth interaction among a diverse group of students, researchers, practitioners and government officials in order to develop a better level of understanding of the impact of cultural diversity and global situations on decision-making. To date, this course has traveled to India (1998), Taiwan and Japan (1999), China (2000), Central Europe (2001), and Argentina and Brazil (2003). The article summarizes the overall course organization, activities, and student reactions to an employee named on the recent 2003 Argentina and Brazil course.

INTRODUCTION

(Questions made to students, a 22-year-old undergraduate hydraulic engineering student from the University of Buenos Aires, Argentina, and Yoshihiko Katsuhana, a graduate student from Japan) to be offered in a cup of traditional Argentine tea. Diversity has become the cornerstone of the modern global marketplace and universities are rapidly developing new tools for increasing students’ understanding of and ability to work in diverse situations with people from various cultural and geographical backgrounds.

As corporations increasingly seek employees who can succeed in a diverse international workplace, universities around the world are challenged to find ways to prepare students to meet that need. This challenge is particularly significant for engineering students who are often few, if any flexible credit hours or ove to diversify their curricula and gain international experience [1].

One way to assess students’ intellectual development is through a course that developed by Perry, who conducted open-ended interviews as students after each of their four academic years [4]. Perry identified a nine-stage scale that is aligned with their intellectual development in response to problem solving skills. The scale begins with students’ perceived learning in terms of dual absolutes (right or wrong), positions 1 and 2, and ascends to positions 7 through 9 where students appreciate the relative complexity of major projects, and that multiple solutions can exist for one problem, enabling them to make more complex decisions about their choices.

Traditionally, engineers have trained low on Perry’s scale due to the absolute nature of the discipline upon which engineering is founded. However, a paradigm shift is currently occurring. As societal challenges become increasingly complex and global, a broader range of problem solving skills and greater sensitivity to cultural diversity is warranted for today’s engineers.

At the University of Iowa, Iowa City, USA, one study-abroad program is addressing this need with a unique 0.5-credit, two-to-three week study international experience where students and faculty from North American universities live, travel and work with foreign students, colleagues and faculty in the host country. The experience is designed to bring together engineering students in North America with their counterparts in the host region to promote a better understanding of the professionals, economical, social and cultural similarities and differences that impact upon the planning and management of large water resources projects. These activities also expose participants to the realities of international decision-making [3].

PROGRAMME OVERVIEW

The University of Iowa course International Perspectives in Water Resources Planning was created in 1998 as an initiative of the IHR - Hydraulics & Engineering (formerly the Iowa Institute of Hydraulic Research). The IHR is known around the world as a research center in fluid mechanics, water resources engineering and hydrology. During its 80-year history, it has attracted international students, many of whom have returned to their home countries and made notable contributions in academia, government, industry and private practice. These international students have left a stamp on the IHR[5].

However, except for the occasional foyer into foreign cuisine and movies, local students have had little opportunity to gain an appreciation of the lands and cultures that international colleagues come from and return in practice their profession. The International Perspectives course was designed to remedy
Diversity and soft skills are further emphasised in the University of Iowa programme by sponsoring a group of hydraulic engineering students from the host country who accompany the group for the entire trip. The constant interaction allows for an experience similar to longer cultural immersion programmes, but with a condensed timeframe more manageable for time-constrained engineering students and faculty.

This experience not only benefits students and faculty from the USA, but also has a dynamic impact on the international students and faculty that interact with the IHR group. For example, this was the first experience for many of the Argentineans and Brazilian students to actually meet a person from the USA. In post-trip surveys, Argentine students credited the experience for disabusing many of their previously held negative stereotypes regarding people from the USA. One Argentine student wrote, Without doubt, the best part was the interaction with other students, and the good relationships within the group helped to break down certain prejudices I previously had.

2003 COURSE: THE PARANÁ RIVER WATERSHED

The 2003 course to the Paraná River watershed of Argentina, Brazil, Paraguay and Uruguay provided students with a unique perspective on water resources planning issues along one of the world’s great rivers. Figure 1 shows the itinerary map and activity schedule for the 2003 course.

The Paraná, with an average flow similar to that of the Mississippi River, and 1,600 miles in length, is the second largest river in South America after the Amazon. The course provided a broad spectrum of experiences with the Paraná by exposing the group to the river from a multitude of perspectives. By boat, the group was given access to the rainforest interior and the lower Paraná, where the river’s course is unlike the Amazon.

Walking through the massive jungle, structure and scaling inside a deserted unit at Yacyreta gave the group a new respect for the enormous scale of the two projects. Figure 2 shows students inspecting the massive Francis turbines for generating electricity at Itaipú, the world’s largest hydropower dam. The group was also impressed by the diplomacy involved with the construction of the dam.

The group returned to Brazil and Argentina, while Itaipú divided the electrical output between Paraguay and Brazil. In the latter, electricity is generated at two different frequencies for the two partner nations! Figure 3 shows the spillway at the Itaipu hydro-electricity dam.

Just as the dam emphasised the power of sound engineering and technological advances, the Iguaçu Falls highlighted the irrevocable force of nature unbridled. Figure 4 displays the majestic Iguaçu Falls viewed from the Brazilian side. Almost 275 waterfalls spanning a 2.7 km-wide arc fall 70 m in a breathtaking spectacle designated as one of the UNESCO World Heritage sites. The magnitude of the group lined walking throughout the 80s km of waterfalls at Iguaçu as one of the most enjoyable and valuable experiences of the course.

One aspect separating the IHR programme from other study abroad courses is the academic and cultural diversity of the participants. This year’s participants included students and faculty from environmental, civil and hydraulic engineering at the University of Iowa, the University of Illinois, Colorado State University, Argentina, Brazil, Costa Rica, Japan, Nicaragua, Romania, Turkey and Venezuela. This year’s course also included graduate students in urban and regional planning from both the USA and Argentina.
(1) Buenos Aires: Days 1,2,3,4,7,12,13,15,16 & 17
Tour Delta del Tigre, Meeting University of Buenos Aires, Water National Institute (INIA), Visit: Palacio San Martin, soccer museum, Attended tango show and soccer game

(2) Santa Fe: Days 4 & 5
Seminar at Facultad de Ingenieria y Ciencias Hidronicas (FICSH), View of Parana alluvial valley, Boat tour of the Parana river

(3) Posadas: Days 6 & 7
Visit Yacyreta Dam and "Ruinas Juquitianas"

(4) Iguazu: Days 8, 9 & 10
Visit: Iguazu Falls and Itba Dam

(5) Colonia: Day 14
Boat trip on the Rio de la Plata, Colonia city tour, Visit Plaza de Toros

Figure 1: Itinerary map and activity schedule of the 2003 course.

Figure 2: Station at the Francis turbines (18 x 7.15 MW each), which generate electricity at Itaipu, the world's largest hydro-power dam.

Figure 3: View of the spillway at the Itaipu hydro-electric dam.

Figure 4: The majestic Iguazu Falls as viewed from the Brazilian side.
The group toured the Bălcești Dam, a significant dam in the Jiu Valley, and also visited the nuclear power plant nearby. The tour highlighted the importance of hydroelectric power in sustainable energy production.

### CONCLUSIONS

The visit to Bălcești Dam reinforced the students' understanding of renewable energy sources and their role in addressing climate change. The experience underscored the need for continued education and research in this critical field.
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REFERENCES


