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International perspectives in water resources management: the Paraná River watershed

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ABSTRACT: The University of Iowa’s IEHR - Hydroscience & Engineering (formerly the Iowa Institute of Hydraulic Research) offers a multidisciplinary course that focuses on the global water resource projects. International Perspectives in Water Resources Planning is a two- to three-week study abroad course that encourages 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. So far, this course has traveled in India (1998), Taiwan and Japan (1999), China (2000), Central Europe (2001), and Argentina and Brazil (2003). The course emphasizes the overall course organization, activities and student reactions with an emphasis placed on the recent 2003 Argentina and Brazil course.

INTRODUCTION

Quiero ser (I want to be) a 22-year-old undergraduate hydraulic engineering student from the University of Buenos Aires, Argentina, asa Yoshizou Katsuhama - a graduate student from Japan to be offers him a cup of traditional Argentinian tea. Diversity has become the cachet 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. The challenge is particularly significant for engineering schools who often have few, if any, flexible credit hours or space to diversify their curricula and gain international experience [1].

One way to assess student’s intellectual development is through the scale of problem solving skills. The scale begins with students’ perception learning in terms of distinct abstractions (eg high 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 conscious commitments about their choices.

Traditionally, engineers have studied low on Perry’s scale due to the abstract nature of engineering education. 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, a one-semester 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 professional, 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 IEHR - Hydroscience and Engineering (formerly the Iowa Institute of Hydraulic Research). The IEHR 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 IEHR [3].

However, except for the occasional foray into foreign cuisine and movies, local students have had little opportunity to gain an appreciation of the lands and cultures their international colleagues came from and returned in practice their profession. The International Perspectives course was designed to remedy this and provide a unique opportunity for the local students to discover the diversity that exists within our profession.
India (1998);
Taiwan and Japan (1999);
China (2000);
Central Europe (2001);
Argentina and Brazil (2003) [2][4].

Many of these projects have been—and still are—subject to worldwide scrutiny, and it is proper that today's student and tomorrow's water professionals have first-hand knowledge of the relevant issues. In all cases, the IEIR has relied on its extensive international alumni network for logistical support.

By exposing students to the international and multi-faceted issues surrounding the management of major water resources projects, the IEIR seeks to increase student's awareness and understanding of global issues and to enhance their understanding of international processes and decisions. By emphasizing the importance of both the technical and cultural aspects of water resources planning, the course gives students technical experience while helping them to better grasp the geopolitical and cultural context that influences resource development, an element more common in the liberal arts curriculum than in engineering sciences.

In order to reinforce the interdisciplinary goals of the course, the programme's itinerary includes technical lectures and site visits, as well as activities meant to experience the unique cultural characteristics of the host region. For example, the most recent programme to South America included tours of the Itaipú Dam, one of the seven modern wonders of the world, and of Iguazú Falls, one of the seven natural wonders of the world.

Students are assigned to groups that are based on their experiences abroad. This year's projects included the following:

A comparative analysis of the Mississippi and Paraná watersheds;
A research proposal for a more detailed comparative analysis of the Mississippi and Paraná rivers to support ecological engineering goals and to learn what the future or past of one river by studying the other;
The creation of a course Website: http://www.izt.ac.in/education/international/argentina/argentina.html;
Writing an article presenting the unique aspects of each project. This article is based on information gained during a post-trip survey of students and faculty from Argentinian and US institutions.

One aspect separating the IEIR 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.

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 IEIR group. For example, this was the first experience for many of the Argentinians and Brazilian students to actually meet a person from the USA. In post-trip surveys, Argentinian students rated the course for disseminating 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 perspective 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 waterworks of the great dams at Yacyretá and Iguazú.

Walking through the massive Iguazú structure and standing inside a dammed unit at Yacyretá gave the group a new respect for the enormous scale of the two projects. Figure 2 shows students inspecting the massive Paranae turbines for generating electricity at Iguazú, the world's largest hydro-power dam.

The group was also impressed by the diplomacy involved with the hydroelectric projects. It is shared by Argentina and Paraguay, while Iguazu divides the electrical output between Paraguay and Brazil. In the latter, electricity is generated at two different frequencies for the two nations: Figure 3 shows the switch at the Iguazu hydroelectric dam.

Just as the dam emphasised the power of sound engineering and technological advances, the Iguazu Falls highlighted the incredible force of nature unbridled. Figure 4 displays the majestic Iguazu Falls viewed from the Brazilian side. About 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 majesty of the group lined walking throughput the acres of waterfalls at Iguazu as one of the three most enjoyable and valuable experiences of the course.

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Buenos Aires: Days 1, 2, 3, 11, 12, 13, 15, 16 & 17

Santa Fe: Days 4 & 5
Seminar at Facultad de Ingenieria y Ciencias Fisicas (FICF), View of Paraiba alluvial valley, Boat tour of the Paraiba river.

Posadas: Days 6 & 7
Visit Yacyreta Dam and "Ruinas Joya de Flaca."

Iguazu: Days 8, 9 & 10
Visit: Iguazu Falls and Itaipu Dam.

Colonia: Day 14

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

Figure 2: Stages at the Francis turbines (18 x 7.5 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.

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The group noted the admirable regional environmental protection measures, including the establishment of national parks on both Argentinian and Brazilian sides of Iguazu Falls and of a modern specialized research center at the Iguazu dam located at the Rio de la Plata confluence with the ocean, faciliated the group by its elegant and active environment, the warmth of its people, and the variety of attractions. Meetings of the American students at the University of Buenos Aires and DNA facilitated a bi-directional flux of information on water resources management. Lectures given by both sides were followed by discussions written smaller, specialised groups on focused areas of interest that sparked an exchange of publications and future collaborative plans.

Buenos Aires

Argentina's capital, Buenos Aires, a megapolise of 11 million inhabitants located at the Rio de la Plata confluence with the ocean, faciliated the group by its elegant and active environment, the warmth of its people, and the variety of attractions. Meetings of the American students at the University of Buenos Aires and DNA facilitated a bi-directional flux of information on water resources management. Lectures given by both sides were followed by discussions written smaller, specialised groups on focused areas of interest that sparked an exchange of publications and future collaborative plans.

By boat, the group toured the wealthy Buenos Aires suburb of El Tigre, where the river housed the famous Argentinian crew teams. They saw, firsthand, how the river provides food and serves as the kitchen, bathroom and laundry for people along the river's banks in the city of Paraná. Too poorly kept, low quality buildings along the river in Paraná were stark contrast to many of the grand structures along the Delta del Tigre. These obvious differences raise the issue of the influence of stakeholders in political decisions affecting the river and its inhabitants.

The issue of stakeholders and their political capital in water resources planning in Argentina was highlighted in the recent flooding in Santa Fe, located to the east of the Paraná River. Just before the students arrived in Argentina, this provincial capital was inundated by the worst floods in the history of the colonial city, and over 50,000 people were evacuated. A levy that would have prevented the tragedy had not been completed, apparently because it would have obstructed the view of the river from a golf course. This tragedy provided students with a very real example of the high potential for social impacts and political aspects of water resources management. Figure 5 shows some of the tremendous damage in the wake of the flood at the soccer stadium of Colón de Santa Fe.

Bus travel was the most common form of transportation among participants, such as the 20 plus hour drive from Iguazu Falls to Buenos Aires, provided students with extensive views of the northern Argentinian landscape. Many of the students commented on how similar the terrain was to their own midwestern vistas. Relationships like this help emphasize the global commonalities among people and places and are unique to the study abroad experience.

CONCLUSIONS

Being able to work alongside people from diverse backgrounds, has become a necessity for students entering the global workforce. Where International Perspectives in Water Resource Planning excels is in the constant interaction between diverse groups of students. Living with fellow engineering students from other countries provides a greater understanding of different cultures and perspectives than is possible in a typical short-term study abroad experience.

In the post trip survey, 99% of the participants, both Argentinian and those from US institutions, listed social interactions as the most valuable element of the course and many credited this interaction with significantly increasing their understanding of key issues. Indeed, it was stated that:

Both the students and faculty were open, knowledgeable and always available for us. Most of what I learned about environmental issues was gained from discussions with Argentinian faculty and students.

The International Perspectives programme is valuable in addressing and effecting the clustering of people with similar backgrounds that is common on university campuses, despite diverse student populations. Figure 6 exhibits a group photograph of participants from the 2003 course.

The programme format is essential to increasing cultural sensitivity about water resources planning and to better the cultural and political contexts influencing resource management decisions. The IDW course is a successful example of one university's attempt to provide students with the soft skills and real life experiences needed for success in an increasingly global workplace.

Figure 5: Flood aftermath at the soccer stadium of Colón de Santa Fe.

Figure 6: Group photograph at the ruins of Iguazu mission.
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REFERENCES


