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Introduction and Table of Contents

Brenda Seevers

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Introduction and Table of Contents

Abstract

The *Journal of International Agricultural and Extension Education* is the official refereed publication of the Association for International Agricultural and Extension Education (AIAEE). Its purpose is to enhance the research and knowledge base of agricultural and extension education from an international perspective.

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The *Journal of International Agricultural and Extension Education* (*JIAEE*) is the official refereed publication of the Association for International Agricultural and Extension Education (AIAEE). The purpose of the *JIAEE* is to enhance the research and knowledge base of agricultural and extension education from an international perspective. Acceptance rates for the past 3 volumes are: Volume 16=10%; Volume 17=16%; Volume 18=14%.

Articles intended for publication should focus on international agricultural education and/or international extension education. Articles should relate to current or emerging issues, cite appropriate literature, and develop implications for international agricultural and extension education. **Manuscripts, or portions of manuscripts, must not have been published or be under consideration for publication by another journal**. Three types of articles are solicited for the *JIAEE*: Feature Articles, Tools of the Profession Articles and Book Reviews.

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Feature articles focus on philosophy, current or emerging issues, and the methodology and practical application of specific research and appropriate technologies, which have implications for developed and developing countries. For publication in the *JIAEE*, feature articles must pass the ***JIAEE's* double blind, referee process**, where peer reviewers evaluate manuscript content and ensure readability. Reviewers are selected from the AIAEE membership of current and past authors. In the double blind, referee process, all references to authors are removed before the manuscript is sent to reviewers. Feature articles may be submitted for peer review a total of three times before they are no longer acceptable for publication in the *JIAEE*. Failure to meet the submission formatting guidelines will result in an automatic 1st rejection.

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Commentary articles state an opinion, offer a challenge, or present a thought-provoking idea on an issue of concern to international agricultural and extension education, including a published article in the *JIAEE*. These articles are invited by the editors. Tools of the Profession articles report specific techniques, materials, books and technologies that can be useful for agricultural and extension educators in a global context and/or in a country/region. Book Reviews provide insight on current books related to international agricultural education.

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From the Executive Editor

I am pleased to publish the first issue of Volume 19 of *JIAEE*. This issue includes four feature articles related to the internationalization of undergraduate programs and unique programs conducted in Honduras, South Africa, and Nepal. In addition, you will find two Book Reviews and one Tools of the Trade article. I am sure you will find much of interest and value among the contributions to this issue.

This is the first issue with the new editorial team of Brenda Seevers, Executive Editor; Amy Harder, Managing Editor and Kim Dooley, Past Editor. Additionally, there are a few other changes worthy of noting on the editorial team. Dr. Tim Kock will replace Dr. Amy Harder as the US representative. Dr. Ben Swan will also assume responsibility as the Associate Editor for Tools of the Trade/Book Reviews. Our heartfelt thanks are extended to Dr. Traci Irani who previously held this position. We also want to deeply thank Dr. Maria Navarro who is retiring as the Associate Editor for Commentary Articles. As a reminder, beginning with this volume and issue, Commentary articles focusing on key issues and trends within international agricultural and extension education will be invited by the editors. No other Commentary articles will be accepted.

The journal is an important scholarly publication in international agricultural and extension education. Its relevance and credibility are directly related to the quality of submissions received and published. We are encouraged by your efforts and look forward to continuing to receive the high quality articles this journal is noted for. If you have suggestions or comments for improving *JIAEE,* we hope to hear from you. Remember, beginning this year, *JIAEE* has a new email address, jiaee@aiaee.org.

Sincerely

Brenda Seevers, PhD
Executive Editor, *JIAEE*

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Using an Integrative Approach to Working with Small-Scale Farmers

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Keywords: Sustainable Development, Capacity-Building, Program Evaluation, Participatory Training, Delivery, Extension Methods, Case Study Research

Gabathuler, E., Bachmann, F., & Kläy, A. (2011). *Reshaping Rural Extension: Learning for Sustainability—An Integrative and Learning-Based Advisory Approach for Rural Extension with Small-Scale Farmers*. Weikersheim, Germany: Margraf Publishers. 100 pages. $29.00 (USD).

Overview

The authors present an argument for reshaping rural extension based on their programming and research experiences in Africa and Asia. The book is composed of four major sections: (a) Extension confronts new opportunities and challenges, (b) The fundamentals of agricultural extension, (c) Learning for Sustainability (LforS) — A learning-oriented integrative extension approach, and (d) Developing and managing an integrative learning-oriented extension approach. In the first section, the authors highlight the need to take smallholder farmers into account when addressing Millennium Development goals. This section, further, provides recommendations for extension and advisory services working with smallholder farmers. They make the case for extension and advisory service to use integrative approaches when working with this population. The second section provides a short background on extension and advisory services and concludes that "the more successful… agricultural extension is in adapting its activities and methods to the prevailing economic, social and ecological environment, the greater will be its chances of success" (p. 13). The third section introduces their integrated model, Learning for Sustainability. This model has seven components: stakeholder dialogue, organizational development, knowledge management, awareness raising, capacity building, social mobilisation for implementation, and monitoring and evaluation. The authors use case studies to document how the model has been used. The fourth section focuses on key elements necessary for an extension or advisory service to be effective in addressing its clientele's needs. The authors' overall approach to this book was to provide key insights into reshaping rural extension, based on their collective experiences. The book is not a prescriptive formula for bringing about their recommended changes; rather it establishes parameters (approaches, methods, and tools) from which extension and advisory services may consider changes. The authors note that the approach they present is an "idealized example" (p. XI) of what could be.

Evaluation

Gabathuler, Bachmann, and Kläy have produced a well-written, well-organized book that is a beneficial read for those interested in successful project design, implementation, and monitoring and evaluation at the grassroots level. They have created a descriptive model for extension that focuses on Learning for Sustainability (LforS). The authors successfully introduce their model by fully addressing its expectations and nuances at every interaction point. The LforS learning-based extension approach shows three fundamental components (knowledge management, organizational development, and stakeholder dialogue) as the basis for this model. Through the four-part sequence of (a) awareness raising, (b) capacity building, (c) social mobilization, and (d) monitoring and evaluation activities, extension goals can be implemented. The authors have used this approach with varying degrees of success in both developed and developing countries around the world, including India, Kyrgyzstan, Madagascar, Mali, Mongolia, Morocco, Mozambique, Rwanda, Switzerland, Tajikistan, Thailand, and Turkmenistan.

Holistic involvement from the beginning to the end of the process is a strength of the LforS model. As the three fundamental components are implemented along the sequence, stakeholder and beneficiary involvement is required at every level, from individual farm to region. Another strength of the LforS model is the importance that is placed on the development and managing of such a model. The book's fourth section addresses this topic, discussing the development of extension methods and general organization and the selecting and training of qualified extensionists.

Two case studies add to the overall understanding of the model-flow and the potential impact of the model's usage. The Madagascar case study showed how the LforS extension approach was successful in addressing afforestation, and the case study of the formation of water user groups in Mongolia demonstrates organizational development and the ensuing negotiations that must take place to establish rules and responsibilities in agricultural extension.

Weaknesses of the Learning for Sustainability model are its similarity in principle and action to both the Participatory Rural Appraisal and Participatory Learning and Action models and its lack of historical documentation. Participatory Rural Appraisal and Participatory Learning and Action models have been in use for years and, like LforS, focus on beneficiary involvement in the identification of the problems, creation of the solutions, and long-term management and evaluation methods.

Recommendation

While the book is a bit pricey for its length, persons interested in development projects of all types, and extension efforts in general, will find this book a useful reference guide. Although somewhat idealistic, the Learning for Sustainability model demonstrates the importance of beneficiary buy-in and organizational cooperation at all levels to achieve successful project implementation. While the book includes an extensive list of recommended readings and web resources at the end of the book, citations are not provided within the text itself. We believe the case studies were the stars of the book and wanted to read more. It would have been useful to have an extended appendix with LforS tools available to the reader to implement and test.

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Ending Poverty by Encouraging Business, Not Aid

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Keywords: Africa, Agricultural Development, Business, Capacity Building, Charity Aid, China, Education, NGO, Marshall Plan, Poverty

Hubbard, R. G. & Duggan, W. (2009). *The Aid Trap: Hard Truths about Ending Poverty*. New York: Columbia University Press. 198 pp. $22.95 USD

After decades of aid programs from wealthy countries, 49 least developed countries and some 2.5 billion people remain destitute and steeped in poverty. The literature is replete with proposed solutions to improve livelihoods and lift economies; however, the results have been disappointing. *Aid Trap* authors R. Glenn Hubbard, dean of Columbia Business School, and William Duggan, a senior lecturer, are experienced in business policy and development practice. They argue equivocally "business is the only solution" (p. 3).

In six chapters, the authors introduce the charity trap, describe business first and business last, and then prescribe strong medicine while recognizing that the devil is in the details. Finally, Hubbard and Duggan draw a succinct 13-page conclusion for development practice.

In the first half of the book, the authors examine root conditions of poverty and how some countries escape while others remain trapped. They describe the evolution of business cultures—beginning ca. 5000 B.C. in Mesopotamia and continuing through Africa and Asia, including transformations of China and Vietnam in the 21st century. The authors paint with a broad bush and primary colors to challenge current policies of charity aid and promote business systems. In abbreviated fashion, Hubbard and Dugan describe the history of development and economic success over centuries, concluding that a thriving business sector best explains development success.

Hubbard and Duggan describe four enduring reasons for aid to poor countries: 1) as an alternative to war; 2) stifling aid support from liberal nations, particularly Britain and France; 3) in response to celebrity support, including from Nobel Prize winning economists such as Wassily Leontief, Robert Solow, and Arthur Lewis; and, 4) as a practical way to distribute foreign aid.

In the second half of the book, Hubbard and Dugan reexamine the Marshall Plan of 1947 and describe why and how it should be adopted in today's poor countries. They reiterate the World Bank's 10 elements of doing business as touchstones for development. Their recurring question is, "when you find a need, do you design a project or start a business?"

Hubbard and Dugan propose solutions for problems created by undisciplined aid. They suggest ways to improve the effectiveness of aid sent to poor countries. Their philosophy is reminiscent of the Lao Tzu proverb, "Give a man to fish, feed him for a day. Teach a man to fish, feed him for a lifetime." They advocate business practices emerging from an adapted Marshall Plan as the "strong medicine" essential to heal poor countries.

Hubbard and Dugan concede that charity touches the hearts of people, but they argue it never moves them to change. They later acknowledge that charity aid is here to stay, but they insist that aid should enhance the growth of local business rather than merely serve as a handout. The authors argue that aid should concentrate only on areas such as medical needs, education, agriculture, and emergency relief.

The authors summarize the scale of world poverty, noting that the World Bank reports 1.4 billion people live on less than $500 per year. Doubling personal income will require $700 billion each year—seven times the current total world development aid budget. The authors suggest switching

from charity donations and reallocating aid to boost private business.

Hubbard and Dugan warn that aid should not involve economic projects that weaken the development of local business. They conclude that an emerging business class is the core driver of economic growth and the only effective check on government power. China is an example of a rapidly transforming business sector. However, the transformation process is filled with fierce arguments from government leaders, misunderstanding from different social classes, unemployment for ordinary people, and even social unrest. The change brings huge shocks to transitional populations—shocks mixed with promise, disappointment, restlessness, excitement, and sometimes hopelessness. The consequence is positive, but the process is strong medicine.

Hubbard and Dugan wrote *The Aid Trap* as a treatise on the power of business to transform the economies of the poorest nations as it has transformed those of the now-industrial world—or those making the transition from socialism to private enterprise. The microfinance model launched by Muhammad Yunus demonstrates that providing aid in the local business sector is a good anti-poverty tactic.

Unlike many other books full of afterthought and simply a description of the dilemma, Hubbard and Dugan have the courage to draft a blueprint to deal with an ominous and pervasive global problem. The authors offer suggestions for government officials, employees in NGOs, and students in the business schools of both rich and poor countries. This book is also informative for people who have a heart for charity aid. In the final chapter, Hubbard and Duggan acquiesce—"Business must come first in solving the problem of poverty, but there are many problems it can't solve" (p.164). They recognize the need for balance among the three sectors—business, NGO, and government.

As reviewers, we recommend *The Aid Trap: Hard Truths about Ending Poverty*—a book easy to read but challenging to put into action. The book will be beneficial for policy makers and functional for agricultural development workers. It encourages people to teach others the business of fishing—a much better strategy than giving a fish that will suffice for only a meal or two.

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A Biotechnology Short Course for Developing Countries

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Abstract

Biotechnology offers benefits, but few developing countries have approved genetically engineered (GE) crops. Extension educational programs could help prepare stakeholders in developing countries to influence biotechnology policies. Michigan State University (MSU) developed a two-week course that was taught 14 times from 2002 to 2010 for 251 participants from 58 developing countries. This course helped form an international network of biotechnology specialists who collaborate with stakeholders.

Key words: Agricultural Biotechnology, Biosafety, Capacity Building, Developing Countries, Education, Training, Transgenic Crops

Introduction

Agricultural biotechnology can reduce hunger, enhance farm profitability and protect the environment, but only fifteen developing countries have approved genetically engineered (GE) crops (James, 2010). Davis, Irani and Payson (2004) identified a need to train international stakeholders to participate in agricultural biotechnology policy development. Navarro (2006) claimed that extension educators could help lead a new Green Revolution with biotechnology. Others cited a need to build biotechnology capacity, including human resources, infrastructure, facilities, policies and partnerships (Grebmer & Omamo, 2005; Johnston, Monagle, Green & Mackenzie 2008).

Continuing a Michigan State University (MSU) legacy of international education and outreach, we developed an international short course in agricultural biotechnology for participants from developing countries. The intent was for this course to become part of a basket of international training programs that MSU offers to build human resources and institutional capacity in agriculture (Weir & Maredia, 2006).

Development and Implementation

We sought collaboration and financial support from the United States Department of Agriculture Foreign Agriculture Service (USDA-FAS). The agency provided funding for the development and initiation of this course at MSU in 2002. Since then, USDA-FAS has helped identify and recruit participants from developing countries, and it sponsors many of them through the Cochran Fellowship Program.

To develop course curriculum we obtained input from experts in universities, government agencies, non-profit organizations, biotechnology companies, and USDA-FAS. Based on needs identified in developing countries we decided to go beyond the science of biotechnology to also cover policies, regulations, commercialization, and communication. We offered the first course in September 2002, and since then have taught it thirteen more times. For the fourteen courses, 251 participants from 58 developing countries in Africa, Asia, Eastern Europe, Latin America, and the Middle East have attended. Government employees made up 46% of the participants, and 39% were scientists. Other participants included lawyers, journalists, business managers and NGO representatives.

Course Components

The first week of the course is held at Michigan State University. Scientists share information on their research projects in plant and animal biotechnology so that participants become familiar with biotechnology applications in agriculture. Participants also meet farmers who grow GE crops and, together with extension specialists, discuss their experiences with GE crop production and marketing. The first-week curriculum also covers societal acceptance of technology, communication, intellectual property rights (IPR), technology transfer and an open forum with faculty members involved in biotechnology research.

During the second week, participants travel to observe biotechnology firms that develop and commercialize agricultural products worldwide. Visits to the Donald Danforth Plant Science Center and Monsanto have been included in some courses. Then the course moves to Washington, D.C for a concluding session. Representatives from the federal government, international organizations and the media discuss their programs related to biotechnology regulation, communication and outreach.

The short course provides a platform for stakeholders in the U.S. to create new linkages with participants involved in

agricultural biotechnology around the world. Graduates receive copies of the presentations on a CD, which also contains web links of biotechnology resources and a list of faculty and participants for future networking.

Evaluation

In 2009 we surveyed participants in the previous twelve courses. Ninety-two percent of the respondents strongly agreed with the following statement: "The MSU course provided me with sufficient information and training to raise my understanding on biotechnology issues." All of the respondents agreed or strongly agreed that the course provided them with tools to influence policy in their countries. None disagreed with the statement that the course provided tools to build stakeholder coalitions.

We asked participants, in an open-ended question, about key strengths of the course. They identified opportunities to see GE crops in the field and to interact with various stakeholders, especially farmers, as hallmarks of the course. The farm visits included a lunch in which participants were served GE sweet corn. Participants also valued other communications-related components, including networking with participants from other countries and practical exercises in GE acceptance.

Participants suggested several enhancements, including sessions related to co-existence of GE crops with organic agriculture, new GE products in development, and international trade regulations. Some suggested a session to reveal perspectives of stakeholders who oppose biotechnology. Many participants expressed strong interest in forming partnerships for collaborative research and for offering similar courses in their home countries.

Impacts

Short course graduates contribute to biotechnology programs in their home countries. One participant from Albania published articles in agricultural magazines and is involved in the Ministry of Agriculture's discussions about biotechnology. A participant from Peru is serving on the Advisory Board of PeruBiotec, a new NGO that brings stakeholders together for discussions on biotechnology. Another graduate is working with Malaysian Biotechnology Information Center (MABIC) in building coalitions among biotechnology stakeholders. One Sri Lankan is actively involved in the formulation of the National Biotechnology Research and Development Program.

Many other participants use course materials and resources that were provided for their teaching needs. These spillover effects have been significant and will continue in the future. The success of this course has made it an integral part of the international agricultural development programs at MSU. Faculty have conducted Training of Trainers programs for offering similar courses in developing countries for academic and non-academic audiences. This is achieved through collaboration with local universities and non-profit organizations with interest in training and capacity building. Many universities around the world are using materials from this course in their educational programs.

References

Davis, K., Irani, T. & Payson, K. (2004). Going forward in education on agricultural biotechnology: Extension's role internationally. *Journal of International Agricultural and Extension Education*, *11(4),* 25–34.

Johnston, S., Monagle, C., Green, J. & Mackenzie, R. (2008). Internationally funded training in biotechnology and biosafety: Is it bridging the biotech divide? Yokahama, Japan: *The United Nations University—Institute of Advanced Sciences.* http://www.ias.unu.edu/sub_page.aspx?catID=111&ddlID=673

Grebmer, S. & Omamo, K. (Eds.) (2005). Lessons and recommendations. *Biotechnology, agriculture and food security in southern Africa*, S. Were Omano & K. von Grebmer, eds., Washington, DC: IFPRI and Harare, Zimbabwe: FANRPAN.

James, C. (2010). *Brief 41: Global status of commercialized biotech/GM crops: 2009 International Service for the Acquisition of Agri-Biotech Applications* http://www.isaaa.org/resources/publications/briefs/41/contents/default.asp

Navarro, M. (2006). How can agricultural and extension educators contribute to a successful new green revolution? *Journal of International Agricultural and Extension Education, 12(2),* 83–95.

Weir, C. & Maredia, K. (2006). Building food safety capacity worldwide: An example of international extension opportunities. *Journal of International Agricultural and Extension Education*, *13(3),*103106.

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Coffee as a Livelihood Support for Small Farmers: A Case Study of Hamsapur Village in Nepal

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Abstract

Coffee production as an income-generating project has been promoted by the Nepalese government with the collaboration of international development agencies. Those areas of Nepal with suitable climate and geography have the potential to grow high-quality Arabica coffee for the international market. This research examines the possibilities of organic coffee production as a livelihood support for small-scale farmers in Hamsapur village in Nepal. Using value chain analysis, coffee producers and collectors were interviewed, and semi-structured interviews were conducted with key informants. Findings showed that local farmers have great interest in coffee production; however, the income generation promises have not been realized because of insufficient quality, a lack of transparency in the local coffee market, and organizational issues. Analysis showed there is a need for alternative business relationships with producers along the coffee value chain that result in greater benefit to farmers.

Keywords: Value Chain Study, Coffee, Nepal, Small-Scale Farmers, Social Business, Rural Development

Introduction

Nepal is one of many countries growing coffee for the international export market. Started as a soil erosion project, coffee production spread quickly in Nepal due to perfect climate conditions and the high market value of coffee. Coffee is grown mostly in the Western part of Nepal, and only Arabica coffee, the variety sold as high-quality specialty coffee, is produced (Manandhar et al., 2009; Panthi et al., 2008). In the village of Hamsapur in the Kaski district, coffee cultivation started in the 1980s as an income-generating project with the support of CARE Nepal, a branch of an international non-governmental organization, as well as Indragufa, a Hamsapur-based non-profit organization. They provided seedlings and training free of charge to those who were interested in coffee production, with the collaboration of the Kaski District Coffee Producers Association (DCPA), the district level coffee producers' association. Currently, there are about 446 coffee producers in the Hamsapur village.

Purpose and Objectives

Nepal remains as one of the poorest countries in South Asia, with a GNI per capita of US $440 (The World Bank, 2009). As in many developing countries, the agricultural sector plays a critical role in the Nepalese economy. Unemployment in rural areas and subsequent migration are critical issues in Nepal, so creating employment opportunities within the agricultural sector has the potential to significantly benefit those living in rural areas (Haggblade et al., 2002; Henson et al., 2008). Thus, coffee is gaining attention from aid agencies and the Nepalese government as a source of livelihood support. An analysis of the current local coffee market is critical in order to evaluate the current situation as well as for the future development of the local coffee market. The objectives of this study are the following: 1) to analyze the value chain of coffee production; 2) to study obstacles to coffee production; and 3) to develop recommendations for the development of the coffee market.

Methods

Face-to-face interviews were conducted in Hamsapur in the Kaski district with both producers and key informants along the coffee value chain. The sample of coffee producers (N=48) was selected from all coffee producers in the village (N=446) using a snowball sampling method. The sample of key informants was also selected using this method, and key informants were interviewed from coffee collectors, local non-profit organizations, international development agencies, government officials, and local coffee buyers. In addition, in order to include an example from the international retail side of the coffee trade, interviews were also conducted with one retailing company in Tokyo, Japan.

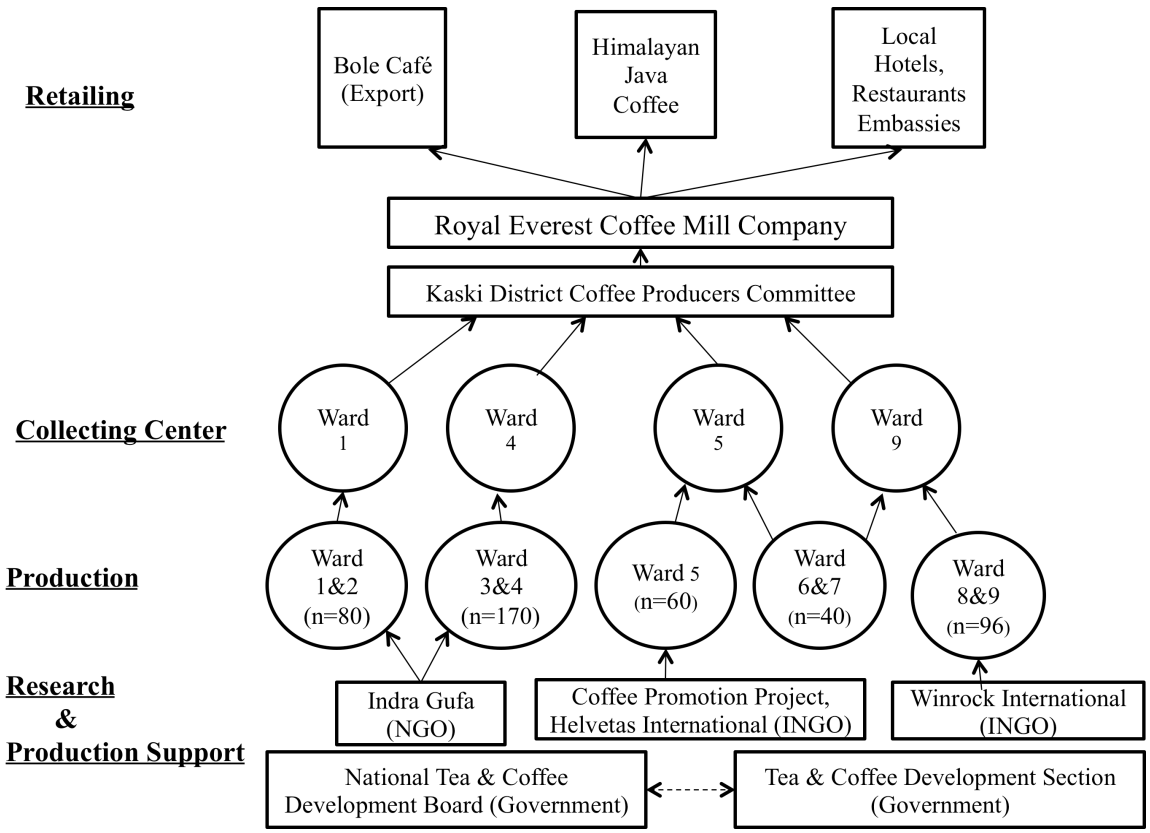

Figure 1. Value Chain Analysis for Hamsapur Coffee

The following terms will be used throughout this paper. The term *coffee cherry* refers to those ripe and ready to be harvested coffee beans. Once a coffee cherry is harvested, it is *pulped*, which is the process of removing the pulp by machine. The pulped coffee beans are called *parchment*.

Findings

Figure 1 describes the value chain map of Hamsapur coffee and indicates the relationships among these key informants and coffee producers (Bernsten & Staatz, 1992; Haggblade & Ritchie, 1992). The National Tea and Coffee Development Board (NTCDB) and Tea and Coffee Development Section promote coffee as part of the Ministry of Agriculture, providing policy, organizational development support, and extension services. Coffee Promotion Project (CoPP) and Winrock International are major international development agencies supporting coffee production and Indragufa, a Hamsapur village-based non-governmental organization, also supports coffee production at the local

Table 1. Summary of Scale of Coffee Production, Practices, Income

Ward		1 & 2 (n=11)	3 & 4 (n=24)	5, 6, 7 (n=8)	8 & 9 (n=5)	Total Average (n=48)
Scale	Average # of Plants	131.4	236.6	45.1	107.2	167.1
	Fruiting Plants	86.4	82.2	21.5	87.2	73.1
	Average per Tree (kg)	6.5	9.6	5.3	6	7.8
	Total Production (kg)	212.3	104.4	28.5	138.7	120
Practice	Fertilizers					
	Manure	63.6%	62.5%	75%	40%	62%
	Manure +Compost	27.3%	29.2%	-	-	20.8%
	No Fertilizer Used	9.1%	8.4%	25%	60%	14.6%
	Irrigation					
	Yes	27.3%	29.2%	25%	40%	29.2%
	No	72.7%	70.8%	75%	60%	70.8%

level. As Figure 1 indicates, all coffee produced in Hamsapur is collected by the District Coffee Producers Association (DCPA). Kaski DCPA charges 10 rupees to each member and requires each to have over 100 coffee plants, which they enable by providing extension services. Coffee collectors receive payment at an exchange of 2% of the commission from the Kaski DCPA. Kaski DCPA also functions as a connection between the buyer and producers. After collection, the Kaski DCPA sells the coffee beans to the Royal Everest Coffee Mill Company, a leading coffee retailing company in Nepal. The company purchases coffee from eight different districts and they currently purchase approximately 70 metric tons of green beans from all over Nepal. The Royal Everest Coffee Mill Company sells their coffee to the international market and local retailers, including embassies and local coffee shops such as Himalayan Java Coffee.

Challenge of Quality Management

The 48 respondents who participated in this survey were 58.3% male and 41.7% female, and the average age was 51 years old. The study showed that the average number of people in the household was 4.7. Table 1 summarizes the study findings on the scale of coffee production and growing practices. The findings on production show that there are significant scale differences in each ward.

The number of plants is considerably higher in wards 3 and 4, but the total production volume is largest in wards 1 and 2. This is because producers in wards 1 and 2 started coffee production earlier than the other regions, which results in a higher volume of production because of older coffee trees. Also, producers in wards 3 and 4 only started receiving seedlings from Indragufa in 1997, so although the number of coffee plants is large, many of these trees have not reached production stage yet, since it takes about 3 years for coffee trees to fruit. In addition, the findings from Table 1 show the inconsistent practices of fertilization and irrigation between each ward. Table 2 demonstrates the relationship between irrigation and scale of production and shows that small-scale coffee producers apply irrigation more frequently than larger scale coffee producers. This is because farmers have to carry irrigation water from community water sources, and it is more difficult for larger scale farmers to provide water without a proper irrigation system. These study results show the diversity in production practices and the importance of ward-based strategy and promotion for coffee in Hamsapur.

Table 2. Cross Tabulation: Irrigation and the Scale of Production

Statement		Irrigation		Total
		Yes	No	
Number of coffee plants	1–50	7	11	18
	51–100	6	8	14
	101–150	0	4	4
	151–200	1	2	3
	251–300	0	4	4
	301–350	0	1	1
	450 more	0	4	4
Total coffee production (kg)	1–10 kg	2	2	4
	11–50kg	4	11	15
	51–100kg	3	8	11
	101–150kg	2	4	6
	151–200kg	1	1	2
	201–250kg	1	1	2
	251–300kg	0	2	2
	301–350kg	1	0	1
	350kg more	0	3	3

Although the production practices differ by ward, it was commonly recognized that the majority of the respondents (70.8%) do not provide irrigation or water during the dry season. In particular, the delay of the monsoon in 2009 raised concerns with many producers, and four out of five (79.2%) producers mentioned irrigation as the biggest challenge in production. One of the producers said: *"*I know the necessity of irrigation, but there is a shortage of water so I cannot irrigate my coffee plants.*"*

Water plays a very important role in both the production and processing of coffee, and lack of water negatively impacts its quality (Van der Vossen, 2005). The issue of quality management was frequently mentioned during interviews with the key informants, since the majority of the coffee produced is exported to the international market (CoPP, 2008). Since Nepal focuses on high-quality Arabica coffee, quality management is essential. However, as the findings from the farmers' interviews showed, quality management has not been practiced at the farm level in Hamsapur. Even though Hamsapur provides excellent growing conditions for Arabica coffee, the farmers have not been able to take advantages of its environment. The president of the Royal Everest Coffee Mill said:

> We have lack of water in remote areas. After pulping, we ferment for 24 hours, and we should wash for three times but we do not have water for washing. After washing, we need to put the beans 24 hours again into the water, but again, we do not have enough water.

In addition to the lack of irrigation and insufficient fertilizer, scattered and small-scale production also creates a challenge to quality management. Because of the hilly terrain, farmers produce coffee on small, scattered plots. Moreover, coffee collectors in the village were selected not by location, but by availability and trust from other farmers, which has resulted in inefficient coffee collection. Water accessibility was not a criterion at the time of the distribution of pulping machines to the collectors; therefore, some of the collectors are far from water sources, which makes wet-processing, the process of washing beans, and the fermentation process, harder. The project manager at CoPP said:

> Coffee production is scattered all over the district. You go to one district, and there is one group with 25 members, and maybe 500 plants in that village. In such a scattered production, we cannot increase the production and the quality.

The president of Himalayan Java stated that "…when you actually buy coffee in such small quantity from different farmers, there is no way we can control the quality

Table 3. Results of a *t* Test about Scale of Production

Statement	Committee Member	N	Mean (Sd)	*t* value	Sig (2-tailed)
Number of coffee plants	Yes	22	176.3 (190.4)	.18	.855
	No	26	159.3 (397.1)		
Average coffee production per tree (kg)	Yes	21	9.4 (6.9)	.97	.333
	No	26	6.7 (11.2)		
Total coffee production in 2008/09 (kg)	Yes	21	177.3 (207.6)	2.33	.024
	No	25	72.0 (81.1)		

of coffee." However, another result in the study suggested a potential solution for the quality management issue, which is to promote a coffee committee in each ward. There are coffee committees in wards 2, 4, 5, and 8, which provide support with the charge of 10 rupees as an annual fee. A *t* test shows a statistically significant result in the total coffee production in 2008 and 2009 among these members of coffee committees (Table 3). It should be noted that a significant result is only seen in totalcoffee production. This is likely because of the time required for coffee plants to grow. Therefore, the results of Table 3 imply that farmers' participation in coffee committees has the potential to expand the scale of production in Hamsapur village.

Fair Price or Unfair Price?

In addition to the challenge of quality management, an argument over the price of coffee was noticeable during the study—in particular, disagreement over the fairness of coffee prices. While 10.4% of the farmers raised "lack of market" as a challenge to coffee sales, both coffee suppliers and the government mentioned that Nepalese coffee has high international demand. The comparison of producers' and key informant interviews highlights different perspectives on coffee markets. For example, the coffee producers mentioned, "Coffee is the most profitable crops, but there should be fair prices and proper market."

On the other hand, one of the buyers said that the supply of Nepalese coffee has not even met the international demand. The owner of the Himalayan Java coffee shop said, "Although we have a market and we have a buyer, we are not even meeting the demand. We have the market and the buyer, but the supply is not there." The disagreement over the coffee market between coffee producers and suppliers was based on different views of the coffee price. As the farmers' interviews indicated, 52% of the respondents thought the price of coffee was unfair and brought this up as one of the biggest challenges of selling.

Table 4: Coffee Price Comparison (2007)

Country	Producer price (per kg)
Nepal	$1.36
India	$1.54
Sri Lanka	$2.09
Indonesia	$1.20

Source: FAOSTAT

Additionally, the delay in payment negatively affected the motivation of the producers. None of the producers had received payment even a few months after the end of the harvest season. According to the Kaski DCPA, this is the first year the Royal Everest Coffee Mill delayed payment. However, many of the farmers were particularly frustrated about the delay of payment because they received no explicit explanation. Those farmers who were discouraged by low prices had cut down their coffee trees. Many respondents asked the researcher to find out the official price of coffee because they felt they were not well informed, and some of the farmers even said they felt they were exploited by the trader. On the other hand, the key informants thought that Nepalese farmers were paid higher prices compared with other coffee-producing nations. Some of the key informants said Nepalese coffee producers received more than fair prices, so there should be enough incentive for the producers. The owner of Himalayan Java Coffee said, "[What Nepalese coffee producers are getting is] more than the fair price, so we do not need the big fair price logo or anything. It is already fair price."

Comparisons of the comments between the producers and the key informants show the need for further investigation. In order to offer a comparison with other coffee-producing countries, Table 4 shows the list of coffee prices among major Asian coffee-producing countries. It indicates the producer price of green beans, which is the price after pulping. According to the data, producers in Sri Lanka receive significantly higher prices compared with producers in Nepal. However, Nepalese producers receive higher prices than those producers in Indonesia, the fourth largest coffee-producing country in the world. Thus, the comparison with other coffee-producing nations suggests that coffee producers in Nepal do not receive significantly higher payment compared with other coffee-producing nations.

For further analysis of coffee prices, Table 5 indicates the distribution of coffee revenues at the local market level. Producers receive 27 rupees per kilogram for fresh cherries, and collectors get 155

Table 5. Distribution of Coffee Revenues at the Local Level

Producers **27Rs (US$0.34)/kg**	• Grow coffee trees, harvest fresh cherries and bring them to collectors
Collectors **155Rs (US$2.04)/kg**	• Wash, pulp, ferment, dry, and bring to DCPA (4.25kg fresh cherry = 1kg dry parchment)
District Coffee Committee **3Rs (US$0.04)/kg**	• Collect coffee from entire district, taking 2% commission
Royal Everest Coffee **800Rs (US$10.4)/kg**	• Roast, package, market coffee

rupees per kilogram after processing. Collectors bring coffee parchment to the Kaski DCPA, and the DCPA takes a 2% commission from the total coffee payment as a handling fee. Then, Royal Everest Coffee visits the Kaski DCPA to collect the coffee parchment from the entire district. The company sells the final product for 800 rupees per kilogram in the domestic market. As illustrated in Table 5, this is approximately 30 times higher than the price farmers receive. However, the cost of production and processing should also be taken into consideration. The representative from the CoPP points out that coffee producers do not realize that they are getting good prices compared to their investment for coffee.

> We did the cost of production estimation. It was around 18 rupees per kilogram of fresh cherry, and this is higher part of cost of production. But if you go to the farmers who are not investing in coffee, it will be lower than that. They are getting 27 rupees per kilogram, so it is already good profit for the farmers.

Additionally, he points out that farmers do not realize how much processing is required for coffee to be sold as the final product. However, the issue appears to be the lack of transparency on the retail side. Producers must be informed about coffee prices, including the price at which the retailer is selling to the market and how much it costs for them to produce the final product. Such lack of transparency and communication is creating disincentives for the producers, and it will eventually affect the quality of products, because producers feel they are exploited by the buyers. Thus, the buyers must be aware of the importance of transparency in the coffee value chain, not only to build better relationships with producers but also in order to improve the overall quality of the coffee.

Organizational Challenges

The interviews with key informants and value chain analysis also made it clear that organizational issues are another challenge. First of all, there is only one coffee buyer in the district, creating a monopoly of the market. The market monopoly also exists in other districts, and specific coffee buyers dominate each district in Nepal. The community level involvement of these companies makes it difficult for other buyers to enter the district and prevents competition among buyers. In Hamsapur, Royal Everest Coffee Mill has been involved with the coffee growers since the beginning of coffee production and they have developed a network within the community, including monitoring production and collecting coffee beans. Although the company has significantly contributed to the development of coffee production in the village, its monopoly of the market has also created a lack of transparency, including insufficient information about coffee prices and delay of payments, as has been discussed above. If there were another buyer in the village, farmers might have been able to access information about coffee prices, and they could choose a buyer with better prices. However, the current local market system makes it difficult for other buyers or companies to intervene.

Additionally, political instability affects the lack of government leadership not only in the coffee industry but also in overall agricultural development in Nepal. The conflict between the democracy movement and the Maoist party has caused instability in the government of Nepal. Despite the government's promotion of coffee, support from the government for the coffee sector is insufficient (Blaikie et al., 2002; Brown & Kennedy, 2005; Shrestha et al., 2007). Criticism of the government was often heard from the private sector because the private companies have been the driving force for the development of the international coffee market. However, the support for private companies growth in Nepal is not adequate, making business growth difficult or sometimes even impossible (Aryal, 2003).

Social Business for Rural Development

Despite several challenges for the current coffee market, interviews with farmers indicated that there is a high potential for the industry to grow (Kattel et al., 2009; Poudel et al., 2009). To the question, "Do you think coffee production has helped the improvement of your community?" an overwhelming number of respondents (97.8%) answered yes. About two thirds (66.7%) of the respondents indicated that this is because coffee offers economic benefits to households as well as utilizing land and requiring less labor. However, as the study showed, farmers are not satisfied with the current value chain of coffee for the reasons discussed above. How can this gap between farmers and the local coffee market be filled? (Govereh & Jayne, 2003; Loveridge et al., 2002) Obviously, there are several development

agencies already involved, and it will be challenging for the government to take the initiative given current political instability. The failure of income generation projects can be seen in various parts of the world due to the lack of sustainable support from international development agencies and the local government. (Bacon, 2005; Daviron & Ponte, 2005; Jaffee, 2007) The challenge is to create a system that sustains itself so that local farmers can continuously benefit from the project. Perhaps, one potential alternative is for the private sector to lead the industry further, but in a way that supports community development through empowerment of farmers. *Social business* refers to a hybrid of a profit-maximizing business with a social mission using market forces (Miehlbradt & McVay, 2005; Yunus, 2009). Social businesses target the poor and provide services or goods through private companies at inexpensive prices. Private sector approaches in international development have increasingly gained attention because of their innovation and efficiency.

One such successful example in agricultural development is Alter Trade Japan (ATJ), a unique private company promoting "alternative" agricultural trade based in Tokyo, Japan. The company handles products such as bananas, shrimp, tea, cocoa, and coffee which have historically been traded as cash crops and promoted for poverty alleviation by international development agencies. However, instead of promoting their work as a "development project," ATJ has implemented it as a "business" by connecting small-scale farmers with Japanese consumers. The company, in collaboration with local and international non-governmental organizations, directly purchases products from farmers and sells to cooperative retailing stores in Japan. Another unique characteristic of this company is that it does not use any certification systems on its products (such as fair trade or organic). This is also reflected in the company name: "alternative trade company" rather than "fair trade company." Instead of certification, quality assurance is conducted at each step of the production process, and ATJ staff members test the quality and the taste before selling to the market. Under ATJ's philosophy, traceability means that they are able to trace back commodities from consumers to producers. It might seem that such a quality control system is loose, but the success of the quality assurance system is shown by satisfied feedback from Japanese consumers, so called the "strictest" consumers in the world. ATJ is a private company, but the company also exists as a supportive organization for small-scale farmers in developing countries. ATJ has successfully been in business for over 20 years, supporting farmers by becoming a business partner, not providing donations as a donor agency.

As the example of Alter Trade Japan has shown, one potential alternative for further development of the coffee

market in Hamsapur is to apply the social business strategy. The study showed farmers' high interest in coffee production; however, the current local market is not creating a sustainable market. If farmers were provided with better and guaranteed prices as Alter Trade Japan does for small-scale farmers in many developing countries, it would give better incentives for them to grow higher quality coffee. In order to do so, the establishment of a private company, not another development project, might provide one sustainable solution for the current situation. If such a business becomes successful, farmers would be able to send their children to school, leading to more sustainable development for the local economy. Therefore, creating a private company could multiply initial investments. Perhaps it is time to rethink development projects and to have holistic approaches for more effective and efficient project implementations.

Conclusion

This study attempted to provide an analysis of the current situation of the coffee market in Nepal using Hamsapur village as a case study. In order to investigate the coffee industry in Hamsapur, value chain analysis was applied. In particular, the study objectives were the following: 1) to analyze the value chain of coffee production; 2) to study obstacles to coffee production; and 3) to develop recommendations for the future. The value chain of Nepalese coffee production was analyzed by assembling interviews with coffee producers and key informants, and Figure 1 summarizes the value chain map of Hamsapur coffee. Quality management is raised as one of the biggest challenges for Hamsapur coffee because Nepal focuses on the market niche of high quality Arabica coffee. The findings also revealed the information gap over coffee prices that exist between the producers and the key informants. One of the reasons for this information gap is a lack of transparency at the local market level because of the market monopoly. The Hamsapur coffee market is monopolized by one company, causing a lack of transparency in price and its value chain. Furthermore, political instability has caused insufficient support for farmers and the private sector. Promotion of coffee committees and training should be considered as the immediate approach for improvement. Moreover, the study explored the potential for a social business approach, since the fundamental purpose of coffee promotion was for economic development in order to empower the rural community. Promoting such a social business might be one of the answers for sustainable rural community development.

References

Aryal, A. P. (2003). Development of agribusiness enterprises: Nepal. In Oliver, R. (Eds.), *Report of APO Seminar on Development of Agribusiness Enterprises*. Bangkok,

Thailand: Asian Productivity Organization.

Bacon, C. (2005). Confronting the coffee crisis: Can fair trade, organic, and specialty coffees reduce small-scale farmer vulnerability in northern Nicaragua? *World Development, 33*: 497–511.

Bernsten, R.H., & Staatz, J.M. (1992). The role of subsector analysis in setting research priorities. Presentation delivered at Symposium on the impact of technology on agricultural transformation in Africa, Washington, DC.

Blaikie, P., Cameron, J., & Seddon, D. (2002). Understanding 20 years of change in west-central Nepal: Continuity and change in lives and ideas. *World Development*, *30*(7), 1255–1270.

Brown, S., & Kennedy, G. (2005). A case study of cash cropping in Nepal: Poverty alleviation or inequity?. *Agriculture and Human Values*, *22*, 105–116.

Coffee Promotion Program (CoPP). (2008). *Coffee promotion programme annual report 2008.* Lalitpur, Nepal: Helvetas International.

Daviron, B., & Ponte, S. (2005). *The coffee paradox: Global markets, commodity trade and the elusive promise of development* . New York, NY: Zed Books Ltd.

Haggblade, S., & Ritchie, N. (1992). CARE/Thailand, Small Economic Activity Development. (1992). *Opportunities for intervention in Thailand's silk subsector* (Gemini Working Paper No. 27). Retrieved from http://pdf.usaid.gov/pdf_docs/PNABK663.pdf

Haggblade, S., Hazell, P., & Reardon, T. (2002). *Strategies for stimulating poverty-alleviating growth in the rural nonfarm economy in developing countries*. International Food Policy Research Institute. Retrieved from http://www.ifpri.org/publication/strategies-stimulating-poverty-alleviating-growth-rural-nonfarm-economy-developing-count

Henson, S., Jaffee, S., Cranfield, J., Blandon, J., & Siegel, P. (2008). *Linking African smallholders to high-value markets: Practitioner perspectives on benefits, constraints, and interventions* (World Bank No. 4573). Retrieved from http://econpapers.repec.org/RePEc:wbk:wbrwps:4573

Jaffee, D. (2007). *Brewing justice*. Berkeley, CA: University of California Press.

Govereh, J. & Jayne, T.S. (2003). Cash cropping and food crop productivity: Synergies or trade-offs? *Agricultural Economics*, *28*, 39–50.

Kattel, R. R., Jena, P., & Grote, U. (2009). The impact of coffee production on Nepali smallholders in the value chain. Presentation delivered at Tropentag 2009, Germany.

Loveridge, S., Mpyisi, E., & Weber, M. T. U.S. Agency for International Development, (2002). *Farm-level perspectives in Rwanda's coffee supply chain coordination challenge.* (CDIE reference number PN-ADH-721). Retrieved from http://aec.msu.edu/fs2/rwanda/ps_2e.pdf

Manandhar, G. B., Adhikary, S. K., & Sah, G. (2009). *Sustainable agricultural practices and technologies in Nepal.* United Nations Social and Economic Commission for Asia and the Pacific, Asian and Pacific Centre for Transfer of Technology Tech Monitor.

Miehlbradt, A. O., & McVay, M. (2005). *From BDS to making markets work for the poor: The 2005 reader*. Geneva, Switzerland: United Nations International Labour Organization.

Panthi, B. B., Devkota, B., & Devkota, J. U. (2008). Effect of botanical pesticides on soil fertility of coffee-orchards. *The Journal of Agriculture and Environment*, *9*, 1–7.

Poudel, K.L., Nepal, A.P., Dhungana, B., Sugimoto, Y., Yamamoto, N., & Nishiwaki, A. (2009). Capital budgeting analysis of organic coffee production in Gulmi district of Nepal. Paper presented at International Association of Agricultural Economists conference, Beijing, China.

Shrestha, N.P., Manandhar, H.K., Joshi, B.R., Sherchan, D.P., Paudel, K.P., Pradhan, A., & Gurung, T.B. United Nations Social and Economic Commission for Asia and the Pacific, CAPSA. (2007). *Poverty alleviation through agriculture and rural development in Nepal*. Bangkok, Thailand: Nepal Agriculture Research Council.

Van der Vossen, H. A. M. (2005). A critical analysis of the agronomic and economic sustainability of organic coffee production. *Experimental Agriculture*, *41*, 449–473.

World Bank. (2011, February). *Nepal at a glance*. Retrieved from http://devdata.worldbank.org/AAG/npl_aag.pdf

Yunus, M. (2009) *Creating a world without poverty: Social business and the future of capitalism*. New York: Public Affairs.

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Steps toward Internationalization in Undergraduate Programs: The Use of Preflective Activities for Faculty International Experiences

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Abstract

If American universities and colleges desire to maintain a position at the forefront of global institutions of learning, they must work to create graduates who are able to demonstrate global competence. In the university setting, globalization is often addressed through strategies such as study abroad opportunities, travel courses, and globally focused courses. Aside from study abroad opportunities, faculty members bear the greatest responsibility for providing students with exposure to international content. The USDA-funded Teaching Locally, Engaging Globally (TLEG) project provides one effort to increase the international experience of faculty. In a qualitative study of this project, a diverse group of faculty members from one university were selected to participate in an international experience in Ecuador. Prior to the experience, participants were asked to complete a reflection activity regarding the attitudes and beliefs they had prior to visiting Latin America in order to provide awareness of potential assumptions and biases. Five main themes that emerged from the analysis (influences on pre-trip attitudes, the physical environment, social expectations, cultural identity and government) were found to be consistent with current research. It is therefore recommended that preflective activities be used when planning international faculty experiences.

Keywords: Internationalization, Study Abroad, Experiential Learning, Preflection, Latin America

Introduction & Theoretical Framework

In 2006, Casner-Lotto and Barrington found corporate employers believed that in the next five years foreign language knowledge and competence would increase in importance over any other basic skill. This is just one indicator of the growing importance for higher education graduates to be globally and culturally prepared for a diverse workforce experience. The National Association of State Universities and Land-Grant Colleges (NASULGC, 2004) urged presidents of land grant universities to initiate change in the current system. NASULGC clearly indicated that if American universities and colleges desired to maintain a forefront position in global institutions of learning, "we must truly be universities and colleges of the world…we must internationalize our mission—our learning, discovery and engagement" (NASULGC, 2004, p. v). College graduates must demonstrate global competence, or the ability "not only to contribute to knowledge, but also to comprehend, analyze, and evaluate its meaning in the context of an increasingly globalized world" (NASULGC, 2004, p. 2).

Research supporting the globalization of university programs often revolves around the provision of student international opportunities (Dooley, Dooley, & Carranza, 2008), with some research specifically recommending exploration of globalization as it applies to colleges of agriculture (Dooley & Rouse, 2009; Zhai & Scheer, 2004). A 1997 NASULGC recommendation called for all undergraduate students to graduate with international experience. Unfortunately, achievement of this goal has fallen short (Moore, Boyd, Rosser, & Elbert, 2009).

In the university setting, globalization is often addressed through strategies such as study-abroad opportunities, travel courses, and globally focused courses. U.S. student participation in study-abroad opportunities has more than tripled over the past two decades (Institute of International Education [IIE], 2009). However, these opportunities are still only accessed by a limited number of students, as demonstrated by the only 260,327 students who participated in study-abroad opportunities during the 2008/09 school year (IIE, 2010) out of the approximately 15.6 million undergraduate students enrolled in higher education institutions in the U.S. during that same time period (National Center for Education Statistics, 2009). Fortunately, student-based travel is not the only manner in which globalization may occur in higher education.

Russo and Osborne (2004) stated that, aside from study-abroad opportunities, faculty members bear the greatest responsibility for providing students with exposure to international content. Bruening and Shao (2005) identified several teaching methods suggested for use in undergraduate international courses, including facilitating interactions with professionals who have worked abroad. Teaching faculty may, themselves, be able to serve in this type of a role. Bearing such responsibility, faculty need to have opportunities to gain international experience. However, significant barriers often prevent teaching faculty from engaging in international activities (Dewey & Duff, 2009). Barriers include a general lack of communication regarding opportunities to engage in international initiatives, funding limitations, various disincentive policies and procedures maintained by administrations, and a lack of support staff and personnel. Universities desiring to enhance the undergraduate experience with international content must provide support and incentives to faculty in order for them to pursue valuable

international experiences (Dewey & Duff, 2009; Russo & Osborne, 2004).

One effort to increase access to international experience for faculty is the USDA-funded Teaching Locally, Engaging Globally (TLEG) project. The first phase of the TLEG project provided teaching faculty from three land-grant universities with funding to travel internationally to locations in Latin America and the Caribbean. Following the experience, faculty members developed reusable learning objects (RLOs) for use in related undergraduate courses. The RLOs were designed to address contemporary issues in agriculture from a global viewpoint, providing undergraduate students access to content that was culturally rich, yet contextually relevant.

Experiential learning theory (Kolb, 1984) was used to frame the project and the study. According to Kolb, learning is a "continuous process grounded in experience" (Kolb, 1984, p. 28). Within the context of this project, faculty members were asked to "involve themselves fully, openly, and without bias in new experiences" (Kolb, 1984, p. 30). While it is preferable for learners to enter into an experience without bias, some literature suggests that most participants simply manipulate the new information into the constructs of an existing conceptual framework, unless a participant's assumptions and biases are specifically addressed in the context of the new situation (Eyler, 2002). Eyler's finding gives cause for concern, since additional research has shown that barriers for participation in international experiences abound, and one significant barrier to participation in global opportunities revolves specifically around reactions to cultural differences (Geelhoed, Abe, & Talbot, 2003; Zhai & Scheer, 2004).

In order to provide awareness of potential assumptions and biases that may exist, individuals can be asked to participate in intentional reflection activities prior to a learning experience. This type of activity, known as preflection, is "the process of being consciously aware of the expectations associated with a learning experience" (Jones & Bjelland, 2004, p. 963). A preflection stage provides a new starting point to Kolb's experiential cycle, beginning not with the experience itself, but with a conscious assessment of pre-existing thoughts, attitudes, or biases which may impact the learning process.

Andreasen (2003) describes ten potential internal barriers that faculty may experience when determining their personal level of international involvement. Internal barriers purported by Andreasen (2003) and pertinent to this current study include fear of a different culture, ethnic prejudices, cultural biases, fear of political unrest, not being able to communicate, introverted personality, and a sense of American superiority. This perceived sense of American superiority is echoed in the writings of Pike (1992) who noted,

> We…like to see ourselves as prime exemplars of all that it means to be civilized….Latin Americans, as we are wont to see them, remain static; they are trapped in a primitive state of nature, the victims of rather than the masters of nature. (p. xiii)

Within the context of this civilized/primitive relationship, Pike (1992) situates various ethnic prejudices and cultural biases that may emerge as stereotypes or beliefs in the American mind.

In addition to the perceptions identified by Pike (1992) and Andreasen (2003), issues of perceived safety and security of the region may also determine a faculty member's level of international involvement. Perception of violence and crime in a region can impact travel

intentions and destinations, as suggested by Ryan (1993).

According to Morrison, Buvinic, and Shifter (2003), "the Latin American and Caribbean region has the reputation of being one of the most violent in the world" (p. 93). Efforts by the media to report such outbreaks of violence can impact perceptions for local citizens as well as those abroad (Morrison et al., 2003).
In their study of faculty abroad experiences in Mexico, Dooley et al. (2008) found many of the barriers proposed by Andreasen (2003) held true within participant preflective exercises. Participants indicated concern about security issues and social problems, citing issues ranging from the danger of the host city itself to the overall instability of the nation (Dooley et al., 2008). There was also evidence of what the authors labeled "American academic arrogance" (Dooley et al., 2008, p. 33), directly related to Pike's (1992) and Andreasen's (2003) sense of American superiority. Since this and other research suggests pre-existing perceptions create barriers for international involvement, it is appropriate to identify preexisting conditions that may impact participants' learning within the TLEG experience.

Purpose and Objectives

The purpose of this study was to develop an understanding of pre-existing perceptions that may influence faculty learning during an international experience. The study sought to identify the attitudes, beliefs, and expectations that faculty members from the University of Florida had prior to their participation in the TLEG project in the Latin American country of Ecuador. Research objectives for this paper are: (a) Identify general pre-trip attitudes and beliefs about Latin America; (b) Identify specific pre-trip attitudes and beliefs about Latin American culture.

Methods

This study was conducted using a basic qualitative research design (Merriam, 1998). Participants were purposefully selected in order to gain insight from the individuals "from which the most can be learned" (Merriam, 1998, p. 61). In this study, participants ($N = 8$) were faculty at the University of Florida who represented a variety of departments, including Agricultural and Biological Engineering; Agricultural Education and Communication; Agronomy; Family, Youth, and Community Science; Food Science and Human Nutrition; Fisheries and Aquatic Sciences; Religion Studies; and Wildlife Ecology and Conservation. Participants were selected based on their interest in learning about Latin America and a desire to integrate an international perspective of their subject matter into their undergraduate courses.

A sample size of eight was consistent with the purpose of the inquiry as well as the time and resources available (Patton, 2002). According to Patton, "in-depth information from a small number of people can be very valuable" (p. 244). This study sought to explore attitudes, beliefs, and expectations that faculty held prior to engaging in a travel-abroad opportunity in Latin America. Since the travel opportunity was funded as part of a USDA Higher Education Challenge Grant, resources for participation were limited. Therefore, in order to provide an experience that was as culturally rich as possible, the number of participants had to be restricted.

Three weeks prior to departure, each participant was asked via e-mail to complete a preflection activity in order to identify pre-existing attitudes, beliefs, and expectations regarding both the trip and the cultures that would be encountered. The preflection exercise consisted of four open-ended questions which asked participants to

identify initial attitudes and beliefs about the experience and anticipated gains from the experience. The first two questions have been analyzed in order to compare pre-existing attitudes and beliefs held by participating faculty to those suggested in previous literature (Andreasen, 2003; Dooley et al., 2008; Ryan, 1993). Specifically, these questions asked participants to identify their top five pre-trip attitudes and beliefs about visiting Latin America as well as their top five pre-trip attitudes and beliefs regarding the culture of Latin America. Responses were received from all participants.

The constant comparative method of data analysis was used to sort the data from the preflection exercises into emergent themes (Lincoln & Guba, 1985). Within the constant comparative method, bits of data are compared to others in order to identify similarities and differences which may be present (Merriam, 1998). The data were independently coded by two of the researchers, who then confirmed or revised their initial findings using procedures outlined by Lincoln and Guba (1985). The findings were then used to create conceptual maps of the emergent themes. According to Merriam (1995), "qualitative research is based on differing assumptions regarding reality, thus demanding different conceptualizations of validity and reliability" (p. 52). In the context of qualitative research, issues of validity and reliability are often addressed with strategies that researchers use to enhance trustworthiness in the study, including: triangulation, member checks, peer/colleague examination, subjectivity statements, and audit trails (Merriam, 1995). Within this study, triangulation, member checks, and an audit trail were used to increase the trustworthiness (Lincoln & Guba, 1985; Merriam, 1995).

Findings/Results

When examining the general attitudes and beliefs of participants regarding Latin America, three themes emerged: *influences on pre-trip attitudes*, the *physical environment*, and *social expectations* (see Figure 1). More specifically, participants held attitudes, beliefs and expectations regarding Latin American culture focused around two themes: *cultural identity* and *government* (see Figure 1). Evidence for each theme follows, with emergent themes and sub-themes italicized in text for emphasis.

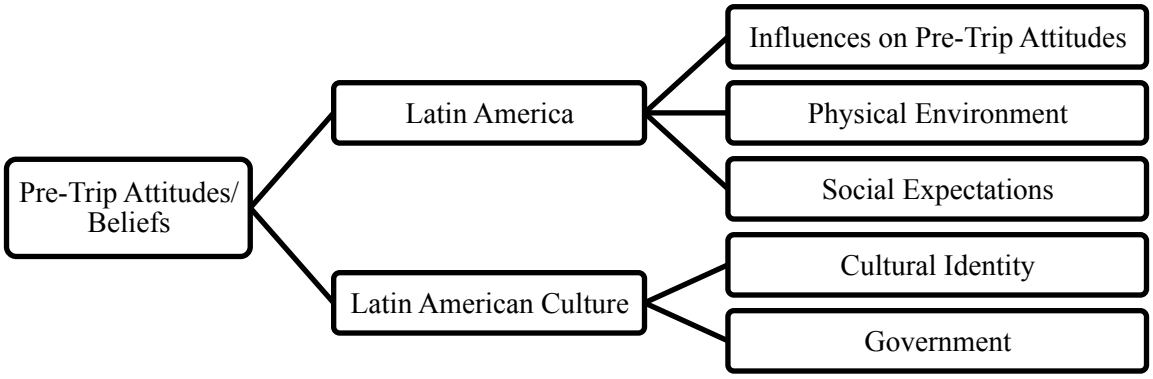

Figure 1. Emergent themes from faculty preflections.

Table 1: Emergent Themes of Pre-Trip Attitudes and Beliefs about Latin America

Themes	Sub-theme	Areas
Influences on pre-trip attitudes	Potential learning opportunities	Cultural; Content-specific
	Travel-related concerns	Dietary; Infrastructure
Physical environment	Beliefs about natural environment	Biodiversity
	U.S. comparisons	Management
Social expectations	Cultural expectations	Diversity; Interpersonal
	Third World expectations	Poverty; Crime
	U.S. comparisons	Materialism; Role of church

Pre-Trip Attitudes and Beliefs about Latin America

Participants were asked to explore the attitudes and beliefs they had prior to visiting Latin America. Three main themes emerged from the analysis: *influences on pre-trip attitudes*, the *physical environment*, and *social expectations*. Each emergent theme revealed additional sub-themes and areas of note (see Table 1). The *influences on pre-trip attitudes* theme was composed of subthemes addressing *potential learning opportunities* for faculty and *travel-related concerns*. Faculty members were excited to "experience a new culture and learn about issues…in Latin America" (R2). In addition to general excitement, faculty members (R2, R3) also identified expectations about learning content-specific information such as "plant biodiversity and its role in agriculture" (R3). One faculty member summarized the anticipated impact that traveling with colleagues would have on the trip, stating, "traveling with a group of colleagues, somewhat isolated from the native culture, will magnify the experience—the range of different things that I consciously observe, learn, think about, and the number of different feelings and perceptions I will be experiencing" (R4).

However, several participants' (R4, R5, R8) pre-trip attitudes were influenced by *travel-related concerns*. Some participants (R4, R8) cited concerns with the differences in diet, such as "I expect that most of what we eat will be unfamiliar." (R8). Others (R4, R5, R8) were concerned with the adequacy and comparability of infrastructure to what they were accustomed. One participant (R8) stated, "I am expecting that we will not have the amenities that we are used to, such as air conditioning." Therefore, while responses about potential learning opportunities included mostly positive perceptions, travel concerns seemed to be mainly negative in nature.

Physical environment, the second major theme to emerge from participants' perceptions about Latin America, included responses that identified a variety of beliefs about the natural environment. Several responses (R3, R4, R8) within this theme focused on the biodiversity within the region. Another response, "the management of natural resources will not be as well planned, maintained or management compared to the U.S." (R6), revealed a perception regarding possible inadequacy within the management of natural resources. This quote also highlights a common underlying theme found throughout each of the three major themes—a comparison to conditions within the United States. More than half of the participants (R2, R3, R4, R6, R8) used comparisons between the U.S. and

Latin America to frame some of their perceptions.

Social expectations, the third theme, emerged in connection with participants' attitudes and beliefs about Latina America. Participants compared the U.S. and Latin American cultures from two broad concepts: materialism and the role of the church. One participant suggested that "with more materialism and materialistic mindsets, more is wasted (*in the U.S.*); whereas with cultures with less of a materialistic rather means-making mindset, more can be accomplished with less" (R2). The role of the church in daily matters was best captured by the comment, "(*the central cathedral and plaza*) are typically vibrant and active, both commercially and religiously, linking activities that are typically perceived as separate in the U.S." (R3).

In addition to the U.S. comparisons already mentioned, the theme of *social expectations* also included the subthemes of *cultural expectations* and *Third World expectations*. One participant thought "strong ethnic and gender inequities are likely to be evident" (R1) while another (R3) acknowledged the cultural, economic, and religious diversity across all of Latin America. Other respondents (R3, R5, R6) demonstrated a perception of the pervasiveness of religion and family throughout Latin America.

Specific beliefs about the interpersonal characteristics and other generally held beliefs about Latin American people also emerged under the *social expectations* theme. Participants envisioned people within Latin American communities as being "very open, helpful and friendly towards visitors" (R6), willing to "work more cooperatively or collectively" (R2), "energetic and passionate" (R7), and "easy-going and slow" (R7). However, one respondent cited concerns about the way they would be received, stating "I am not sure if we will be welcomed or seen as intrusive" (R8).

Though the participants' *cultural expectations* tended to be positive, participants also identified a number of *Third World expectations*. Comments such as "most Latin American countries would be considered Third World because of poverty" (R5) exhibited some participants' concerns of expected levels of poverty, while others (R1, R5) provided statements which highlighted beliefs about the criminal activity found throughout these areas.

Pre-Trip Attitudes and Beliefs about Latin American Culture

The researchers expected variations between cultures to have some influence on the building of expectations and perceptions prior to participation. A second question asked participants to identify their attitudes and beliefs about Latin American culture, specifically those regarding language and customs, as well as social, economic, or political issues. Two major themes of *cultural identity* and *government* emerged from their responses. Table 2 presents a summary of the emergent themes, sub-themes, and related areas.

Cultural influence was a subtheme within *cultural identity*. Participants identified five perceived areas of *cultural influence* within the life of Latin Americans: cultural values, heritage, religious influences, family dynamics, gender roles and stereotypes. The first and most frequently identified area was cultural values.

Responses concerning cultural values focused on community dynamics, such as "Latin American culture values collectivism…rather than rugged individualism of materialistic, capitalistic societies" (R2) and "mobility is less valued than attachment to place" (R3). Participants

Table 2: Emergent Themes of Pre-Trip Attitudes and Beliefs about Latin American Culture

Themes	Sub-theme	Areas
Cultural identity	Cultural influence	Cultural values; Heritage; Religious influences; Family dynamics; Gender roles and stereotypes
	Communication	Use of Spanish language; Nature of communication styles and interactions
Government	Economic perceptions	Distribution of wealth; Discrimination; Access to resources; Personal versus community-level poverty
	Politics	Political philosophies; Political security

considered socio-political affairs, stating "land reform and land equity is an important socio-political issue for many in Latin America" (R3) and "political party affiliation affects one's social standing" (R2). However, others (R5, R7, R8) focused on the pace of life often associated with Latin American societies, with quotes such as "I am expecting that the people will not be as busy, pressured as I am, i.e., it is more of a slow-paced culture" (R8).

The richness of heritage was captured in comments such as "I expect the people of Ecuador will be extremely diverse in terms of cultural heritage—indigenous, European, etc. This will be reflected in the food, agricultural systems, music" (R4). Religious influences focused on the role and dominance of the Catholicism on the community, with quotes such as "Catholicism has been the dominant religious form in Latin America…quite different from U.S. or even European Catholicism, due, in part, to conscious and unconscious grafting of Catholic symbols, ideologies, etc. onto native traditions, theologies, and customs" (R3).

A fourth area of *cultural influence* focused on the close-knit nature of family dynamics within Latin American cultures. Four participants (R1, R3, R5, R6) perceived Latin Americans place a high level of importance on relationships with extended family. One participant stated "there is a high priority placed on family and elderly family members are likely to reside with their children and grandchildren" (R1).

A fifth area that emerged from this sub-theme of *cultural influence* focused on the gender roles and stereotypes that are perceived to exist within Latin American cultures. Regarding social interactions, one respondent stated that women "tend to have more traditional roles in Latin American society compared to the U.S." (R6), while another believed "men can be more expressive with one another in Latin American cultures than in the U.S." (R2).

Participants' perceptions of *cultural identity* were influenced by their beliefs about *communication* within Latin American. Five participants (R1, R2, R3, R4, R6) conveyed an appreciation for the presence of both Spanish and other indigenous languages within the area. However, some participants functioned under the assumption that "everyone speaks Spanish" (R5) or that "most everyone will speak exclusively Spanish" (R8). Two participants (R2, R7) noted differences

between Latin American and U.S. communication styles, including the speed and expressiveness of communication. Other responses (R4, R6, R8) focused on the expected nature of the interactions between the host country and the participants, well summarized by the response "I expect people to be generally gracious, respectful, helpful and direct in our interactions…I look forward to very rich, friendly, and enthusiastic interactions" (R4).

While perception of Latin American's *cultural identity* tended to be positive, participants were more critical of the role of *government* in Latin American culture. Within this theme, two distinct subthemes emerged—*economic perceptions* and *politics*. An unbalanced distribution of wealth was noted by multiple participants (R1, R3, R6). One respondent believed indigenous populations were economically disadvantaged, stating "the indigenous population tends to live in specific regions of the country and many times these areas of the country may represent marginal lands or areas where there are less available resources" (R6). Other assessments about the economy included statements such as "land tenure policies…have concentrated land ownership into the hands of the few" (R3). Some participants provided greater detail on perceived economic conditions for nationals as exhibited in comments such as "I understand Ecuador to be a relatively poor country. I expect people in public places will be trying to sell us things, offer to help for money, and I need to be wary of stealing" (R4). In addition to perceptions about personal poverty, some participants mentioned economic lack at the community level, expecting "limited community supported infrastructure such as policemen and firemen" (R2).

The second subtheme, *politics*, focused on two major areas—political philosophies and political security. In regards to perceived political philosophies of the region, participants provided comments such as "Latin American countries do not, in general, have strong democratic rule" (R1) and "while a series of elections and/or revolutions attempted to address these issues (*land reform and land equity*), imbalances remain" (R3). These perceptions for inequity were also reflected in the perceived political security within these nations. Two participants (R2, R5) commented on the generally perceived political unrest that exists within most Latin American countries, with one of them stating "I view the political climate in Latin American countries and territories as volatile and less stable than that of the U.S….such a climate, combined with limited community support infrastructure…may allow insurgent groups to have more power" (R2). However, another participant noted that in the case of Ecuador, "I do not expect political or social unrest. Ecuador rarely re-elects a president and Correa was recently re-elected. So people are probably feeling fairly secure and hopeful" (R4).

Conclusions, Recommendations, and Implications

The purpose of this study was to develop an understanding of faculty perceptions prior to a study tour to Ecuador. These perceptions were specifically focused on identifying general pre-trip attitudes and beliefs about Latin America and Latin American culture. As noted in experiential learning theory (Kolb, 1984), learners' prior knowledge and perceptions impact how they interpret their experiences. When examining the attitudes, beliefs and expectations faculty held prior to their experience, three themes emerged: *influences on pre-trip attitudes*, beliefs about the *physical environment*, and *social expectations* (see Figure 1). Faculty participants were excited to learn about Ecuador, but a little worried over travel-related issues like food and road conditions. These concerns were consistent with previous research about barriers to international travel (Andreasen, 2003; Dooley et al., 2008). Social expectations

largely focused on comparing Ecuador to the U.S., which was also noted by Pike (1992).

Furthermore, two themes comprised participant perceptions of Latin American culture: *cultural identity* and *government*. Within cultural identity, faculty perceptions identified beliefs and expectations about everyday life in Ecuador and communication styles. Faculty anticipated seeing differences in values, pace of life, heritage, family structure, and gender roles. Unlike previous research (Andreasen, 2003), participants seemed to express anticipation, rather than fear. Faculty also expressed concerns over communication, which is consistent with the findings of Andreasen (2003). Within the government sub-theme, faculty expected to see very different economic conditions from the U.S. and expressed some concerns about the stability of the Ecuadorian government.

Implications of this work directly link to the practical strategies necessary to ensure a positive international experience for faculty. First and foremost, faculty members involved in international trips need an opportunity to consider and express their pre-trip attitudes. As conveyed by Fiske and Taylor (1984), individuals will manipulate a new experience in order to minimize cognitive dissonance as a result of the new experience. Allowing participants to express pre-trip attitudes gives trip coordinators the insight to encourage the most beneficial experiences, regardless of the particular amount of dissonance. Having faculty participate in preflective exercises promotes their own recognition of expectations, both positive and negative of the experience. Failure to implement reflective activities (pre and post) minimizes the value of participants' feelings and expectations for their experience, and may ultimately reduce learning.

The second implications relate to the theme of physical environment. While this theme often focuses on participants' perceptions that international locations will be physically different from their home country, it also demonstrates a disconnect between what participants think they will experience or see and what will actually happen. Faculty traveling abroad in order to explore a particular region may allow beliefs about the physical environment to create a level of inhibition due to the unknown. They may also experience a certain level of disappointment if and when their perceptions are not accurate. Providing participants with visual references and resources prior to departure gives participants an accurate visual of the area that, in turn, will promote a more accurate view of the international location. If faculty feel ill-prepared for the physical environment of the experience they may spend a disproportionate amount of time acclimating and compensating versus assimilating and experiencing.

A third theme focuses on the social expectations. This theme could potentially be the most detrimental to the success of a trip since faculty who are not prepared for social or cultural differences may feel isolated and uncomfortable for the extent of the experience (Geelhoed et al., 2003; Zhai & Scheer, 2004). Allowing faculty to explore and experience their environment may promote the best outcomes related to social expectations. Participants need an opportunity to understand the natural differences that exist between their home country and their host country. Promoting role plays or case studies will assist in preparing for these differences. By doing so, participants will begin to assimilate earlier in the experience. However, there are some times when, regardless of the amount of pre-trip planning, reading, and exposure, nothing creates an understanding of cultural differences like the trip itself.

Recommendations are provided in two areas for future consideration: practice and research. Each recommendation should be considered in relation to the particular international experience. When planning

faculty international experiences, participants should be required to spend time exploring their own attitudes and beliefs through preflective activities in order to identify preexisting biases. Research and discussion about the host country should be conducted prior to the trip, with people from the host country utilized to provide potential scenarios and specific details regarding the areas to be visited. Furthermore, participants should be provided with case studies and role-playing scenarios to assist them in exploring their comfort with different situations. From these activities, discussions should be facilitated among participants in order to provide a forum for expressing and addressing various perceptions and areas of concern.

Several recommendations for research were identified from this study. An exploration of comparative preflective strategies (i.e., journal writing versus guided discussion) should be conducted in order to identify the most effective method of assisting participants in identifying and addressing preexisting biases, attitudes, and beliefs. Research should also be conducted to examine the nature of the perceptions and biases which faculty express during the preflective activity. One study could seek to identify the root causes for these particular biases and perceptions, while another may seek to describe the differences in faculty perceptions based upon level and extent of previous international exposure. It may also be of interest to explore differences between various strategies for minimizing pre-trip concerns (i.e., guest presenter versus role play scenario). Finally, an examination of the extent that pre-trip workshops contribute to a sense of safety and security should be conducted in order to identify the necessity for this type of participant engagement prior to the experience.

References

Andreasen, R. J. (2003). Barriers to international involvement. *Journal of International Agricultural and Extension Education, 10*(3), 65–69.

Bruening, T. H., & Shao, X. (2005). What should be included in an international agriculture undergraduate course? *Journal of International Agricultural and Extension Education, 12*(1), 47–54.

Casner-Lotto, J., & Barrington, L. (2006). Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce. New York: The Conference Board. Available at: http://www.conferenceboard.org/pdf_free/BED-06-Workforce.pdf

Dewey, P., & Duff, S. (2009). Reason before passion: Faculty views on internationalization in higher education. *Higher Education*, *58*(4), 491–504. doi:10.1007/s10734-009-9207-z

Dooley, K. E., Dooley, L. M., & Carranza, G. (2008). Beliefs, barriers, and benefits of a faculty abroad experience in Mexico. *Journal of International Agricultural and Extension Education, 15*(3), 29–38.

Dooley, K. E., & Rouse, L. A. (2009). Longitudinal impacts of a faculty abroad program: 1994–2007. *Journal of International Agricultural and Extension Education, 16*(3), 47–58.

Eyler, J. (2002). Reflection: Linking service and learning—linking students and communities. *Journal of Social Issues, 58*(3), 517–534.

Fisk, S.T., & Taylor, S.E. (1984). *Social cognition.* Reading, MA: Addison-Wesley.

Geelhoed, R. J., Abe, J., & Talbot, D. M. (2003). A qualitative investigation of U.S. students' experiences in an international peer program. *Journal of College Student Development, 44*(1), 5-17.

Institute of International Education. (2009). *Open doors 2009: Fast facts*. Retrieved from Institute of International Education website: http://www.iie.org/en/Research-

and-Publications/Open-Doors

Institute of International Education. (2010). *Study abroad by U.S. students slowed in 2008/09 with more students going to less traditional destinations.* Retrieved from Institute of International Education website: http://www.iie.org/en/Who-We-Are/News-and-Events/Press-Center/Press-Releases/2010/2010-11-15-Open-Doors-US-Study-Abroad

Jones, L., & Bjelland, D. (2004). International experiential learning in agriculture. *Proceedings of the 20th Annual Conference of the Association for International Agricultural and Extension Education, Dublin, Ireland*, 963-964. Retrieved from http://aiaee.tamu.edu/2004/Carousels/jones-carousel-NEW.pdf

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications.

Merriam, S. B. (1995). What can you tell from an N of 1?: Issues of validity and reliability in qualitative research. *PAACE Journal of Lifelong Learning, 4*, 51–60.

Merriam, S. B. (1998). *Qualitative research and case study applications in education.* San Francisco: Jossey-Bass.

Merriam, S. B., & Caffarella, R. S. (1999). *Learning in adulthood: Comprehensive guide*. San Francisco: Jossey-Bass.

Moore, L. L., Boyd, B. L., Rosser, M. H., & Elbert, C. (2009). Developing an international agricultural leadership program to meet the needs of a global community. *Journal of Leadership Education, 18*(1), 118–129.

Morrison, A., Buvinic, M., & Shifter, M. (2003). The violent Americas: Risk factors, consequences, and policy implications of social and domestic violence. In H. Frühling, J. S. Tulchin, & H. A. Golding (Eds.), *Crime and violence in Latin America: Citizen security, democracy, and the state* (pp. 93-122). Washington, DC: Woodrow Wilson Center Press.

National Association of State Universities and Land-Grant Colleges. (2004, October). *A call to leadership: The presidential role in internationalizing the university*. Washington, DC: APLU. Retrieved from http://www.aplu.org/NetCommunity/Document.Doc?id=340

National Association of State Universities and Land-Grant Colleges, International Agriculture Section (1997). Globalizing agricultural science and education programs for America. Washington, DC: National Association of State Universities and Land Grand Colleges.

National Center for Education Statistics. (2009). *Digest of education statistics, 2008* (NCES 2009-020). Retrieved from http://nces.ed.gov/fastfacts/display.asp?id=98

Patton, M. Q. (2002). *Qualitative research and evaluation methods.* Thousand Oaks, CA: Sage.

Pike, F. B. (1992). *The United States and Latin America: Myths and stereotypes of civilization and nature*. Austin, TX: University of Texas Press.

Russo, S. L., & Osborne, L. A. (2004). *The globally competent student.* Retrieved from: http://www.aplu.org/NetCommunity/Document.Doc?id=41

Ryan, C. (1993). Crime, violence, terrorism, and tourism: An accidental or intrinsic relationship? *Tourism Management, 14*(3), 173-183.

Zhai, L., & Scheer, S. D. (2004). Global perspectives and attitudes towards cultural diversity among summer agriculture students at The Ohio State University. *Journal of Agricultural Education, 45*(2), 39–51. doi 10.5032/jae.2004.02039

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Knowledge Levels and Perceived Effect of Ecosystem Services and Valuation on Extension Delivery in North West Province, South Africa

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Abstract

A simple random sampling technique was used to select 100 extension officers in North West Province, South Africa. Data on knowledge levels and perceived effect of ecosystem services and valuation on extension delivery were collected and analyzed using percentages. The results show that a wide range of knowledge levels exists on ecosystem services and valuation issues and that extension services should change from a generalist approach to a specialist approach; "extension messages should incorporate ecosystems service information"; extension agents would benefit from "increase[s] in extension research skill" and "use of multimedia strategy"; users require new skills; "extension officers need…new training" and "extension messages should address vulnerability of ecosystem services" in response to ecosystem services and valuation issues. The results have several implications for training and educating extension officers in the areas of ecosystem services used for tourism, hedonic pricing, and governance of ecosystem services.

Keywords: Ecosystem Services, Extension Delivery, Extension Officers, North West Province, South Africa, Knowledge, Valuation

Introduction

The need for increasing food production to feed the world's population of nine billion people by 2050 has intensified pressure on agricultural production systems, and there are also increasing expectations and needs that cultivation practices be sustainable. However, expansion of areas under cultivation and exploitation of additional natural resources for future increases in agricultural production and rural income have become unpopular as compared with system intensification. Braimoh et al. (2010) state that "agriculture continues to experience a crisis influenced by rapid financial, and structural changes and with enormous influence on ecosystem health" (pp. 5–10).

Nature has independently or through human interference provided valuable goods and services which, due to increasing human demand and economic neglect, has resulted in a high rate of deterioration of many ecosystem services. There is a "disproportion between direct reliance and the capacity to compensate for ecosystems services by the world's poor" (World Resources Institutes [WRI], 2005, p. 225). The "link between human well-being and ecosystem services is gaining increasing global recognition" (Millennium Ecosystem Assessment [MEA], 2005, p.12).

Boyd & Banzhaf (2006) defined ecosystem services as components of nature used to support and improve human well-being (p. 6). Ecosystem components include surface water, oceans, vegetation types, and species resources, while biological, chemical, and physical interactions between ecosystem components are ecosystem processes and functions. Obtaining measures of importance and worth by estimating the amount people are willing to pay to preserve or enhance ecosystem functions constitutes the ecosystem services valuation process (p. 10). Values are categorized as *use* and *non-use*, or "passive use," values. Bateman & Willis (1999) stated that "use values is the actual use of the environment, while non-use values are those not associated with actual or alternative use of an ecosystem or its services" (p. 30).

A major component of interventions in developing countries is payment for ecological services generated by specific land uses (World Bank, 2005); however, empirical evidence on what these values might be is mixed (Kaimowitz, 2001). The blueprint for ecosystem service conservation does not exist in many countries, even when such exists for biodiversity conservation (Balvanera et al., 2001). "Ecosystem services management should integrate biophysical, economic and political factors that will mediate access and apportion resources among competing users" (Costanza et al., 1997, pp. 30–35). Methods of management should measure the costs of ecosystem services conservation to various user groups (Turner et al., 2003), as well as trade-offs inherent to the maintenance of ecosystems (Chan et al., 2006).

Boone et al. (2007) stated that "the need to keep the productive capacity of natural resources relative to population growth and economic demands while protecting and restoring environmental quality has stressed the concept of sustainability" (p 5). "The sustainability challenge is that educators and farmers as well as stakeholders in the agriculture value chain should examine the effects of practices, interactions and the ever changing agricultural systems in the long-run" (p. 6). Through the process of continuous experimentation and the use of different farming strategies, agricultural stakeholders are attempting to reach sustainability in their operations, environments, and communities. Boone et al. (2007) report that there is need for a continuous network of information,

new technologies, and innovations for farmers who practice sustainable agriculture to be successful in managing their farmlands (p. 6).

Agunga (1995) noted that "extension not only has a long history of service to farmers and thus extension officers must be abreast of the latest agricultural research and technology that will enable them to understand the needs and problems of their clientele" (p. 169). The existing public and private extension frameworks, "have responsibility for the promotion of sustainable agriculture education; this is however contingent, on the conviction of the value of sustainability by extension agents before they can introduce the concept to farmers successfully" (p. 180). Agricultural extension is the most important source of information to farmers in most African countries (Agbamu, 2002) and plays a significant role in affecting farmers' adoption of innovations (Van den Ban & Hawkins, 1988). Agricultural extension programs are very diverse in international contexts as they are managed variously as public sector agencies (most common), non-governmental organizations (NGOs), and by private firms and private organizations. An equally important variation occurs in the skill and competence of extension staff (Oladele & Sakagami, 2004). The effectiveness of extension service delivery is critically dependent on the knowledge of extension officers about the various agricultural innovations they disseminate to farmers. Extension officers' knowledge will influence their attitude and the kind of awareness they create about ecosystem services and valuation among farmers. Long and Swortzel (2007) noted that in order to meet farmers' needs and enable them to make informed decisions about their economic, social and cultural well-being, extension services must provide research-based information, educational programs and technology.

Purpose and Objectives

The purpose of this study was to determine knowledge levels and perceived effect of ecosystem services and valuation on extension delivery in North West Province, South Africa. The specific objectives of the study were to:

1. Identify the personal characteristics of extension officers
2. Determine extension officers' knowledge of ecosystem services and valuation techniques
3. Ascertain the perceived effect of ecosystem services valuation on extension message delivery

Methods

The study was carried out in North West province, South Africa. The study population was all the extension officers (200) in the province. Extension officers in this study are employees of the Department of Agriculture who have the responsibility of providing information to farmers on all aspect of farming. A simple random sampling technique was used to select 100 extension officers from whom data were collected. Frame error was controlled by excluding administrative and support staff, while selection error was eliminated by ensuring that all frontline extension (field officers) was contacted for the study. A structured questionnaire was developed based on the study objectives and related literature, which was divided into three parts. The first sought demographic characteristics of extension officers, and the second elicited information on extension officers' knowledge, sub-divided into *ecosystem services* (40 items), *valuation* (15 items), and *sustainability and vulnerability*

(20 items). This knowledge was anchored as correct (2) or incorrect (1). The scoring was reversed for negative statements. The overall minimum score on the knowledge scale is 75, while the maximum score is 150.

The third section of the questionnaire measured perceived impact of ecosystem services and valuation on extension delivery (25 items) on a 3-point scale of high (3), medium (2), and low (1). The minimum and maximum scores on the impact scale were 25 and 75, respectively. The questionnaire was validated by lecturers from the Department of Agricultural and Extension at North West University, and their suggestions were incorporated into the instrument before data collection. The questionnaire had an overall reliability coefficient of .90 determined by the split-half technique. Reliability coefficients for the different sections of the questionnaire were *ecosystem services* (.75), *valuation* (.80), *sustainability & vulnerability* (.85) and *impact on extension delivery* (.92). Non response error was controlled through call-backs and follow-ups on the questionnaire. Data obtained were analyzed with the Statistical Package for Social Sciences (SPSS) using percentages.

Results

Personal Characteristics of Extension Officers

Of extension officers in the study, about 63% are male, and their mean age was 44 years. About 75% were married and 84% were Christians. In terms of educational qualification, 875 of the extension officers held a diploma in agriculture, with a mean of 12 years working experience. About 87% live in their job location, notwithstanding whether it is rural or peri-urban. This agrees with the findings of Oladele and Tekena (2011) and Zwane (2009), who reported that extension officers in North-West and Limpopo provinces of South Africa were mainly males, between 40 to 49 years, and held a diploma as their educational qualification. Bembridge (1991) also reported similar findings in terms of the personal characteristics of extension officers in South Africa.

Knowledge of Ecosystem Services

Knowledge of a concept, tool or innovation occurs when an individual knows both its function and application (Rogers, 1995). The knowledge of ecosystem services is particularly associated with the sources, types, and benefits to mankind (MEA, 2005). Its application or "how-to" knowledge begins with the understanding of the examples and activities related to ecosystem services. In this paper, prominent ecosystem services knowledge demonstrated by extension officers in the study area included "ecosystem services are benefits derived from natural resources" (97%); "examples of ecosystem services are water bodies, watershed, forest land" (96%); "ecosystem services provision services include water" (96%); "ecosystem services provision services include hydropower biomass fuel" (98%); and "ecosystem services enhances carbon sequestration" (90%) (Table 1). Al-Subaiee, Yoder and Thomson (2005) reported that extension agents in Riyadh region of Saudi Arabia had a positive perception towards sustainable agriculture concepts and that the perception provides a basis for sustainable agriculture development. Conversely, extension officers had low performance on ecosystem services knowledge such as "wax and gums from trees are an example of ecosystem services" (50%); "honey is an example of ecosystem services" (46%); "ecosystem services include hiking" (40%); "ecosystem services include angling" (57%), and "ecosystem services include swimming" (58%). The concept of ecosystem services became more prominent when the Millennium

Table 1: Knowledge Level of Extension Officers Regarding Ecosystem Services (n=100)

Items	Correct	Incorrect
Ecosystem services provision services include hydropower, biomass fuel	98*	2
Ecosystem services are benefits derived from natural resources	97	3
Examples of ecosystem services are water bodies, watershed, forest land	96	4
Ecosystem services provision services include water	96	4
Ecosystem services create opportunity for recreation	92	8
Ecosystem services enhances carbon sequestration	90	10
Water shed is an example of ecosystem services	89	11
Biodiversity conservation is a benefit from ecosystem services	87	13
Non-timber forest products is an example of ecosystem services	83	17
Natural resources are not invulnerable and infinitely available	83	17
Rotational landscapes simulates ecosystem services	83	17
Many livelihood activities depend on ecosystem services	83	17
Tree plantations simulates ecosystem services	83	17
Ecosystem services provision services include crops, wild foods, spices	82	18
Forest plantation simulates ecosystem services	81	19
Environmental Impact assessment is important to conserve ecosystem services	79	21
Ecosystem services create opportunity for tourism	79	21
Ecosystem services include mitigation of droughts and floods	78	22
Ecosystem services include generation, preservation and renewal of soils fertility	78	22
Orchards simulates ecosystem services	78	22
Ecosystem services help in climate change mitigation	78	21
Ecosystem services include cycling and movement of nutrients	76	24
Ecosystem services include detoxification and decomposition of wastes	75	25
Ecosystem services include birding	74	26
Ecosystem services include pollination of crops and natural vegetation	74	26
Ecosystem services help conserve genetic resources	74	26
Ecosystem services include control of vast majority of potential agricultural pests	72	28
Agro forestry systems simulates ecosystem services	72	28
Ecosystem services help in biological control	71	29
Ecosystem services increases organic carbon deposit	70	30
Carbon projects enhances ecosystem services	70	30
Ecosystem services is one of the Millennium Development Goal focus	69	31
Ecosystem services provision services include pharmaceuticals, biodiversity	69	31
Ecosystem services include dispersal of seeds	67	33
Ecosystem services include hiking	60	40
Ecosystem services include purification of air and water	60	40
Honey is an example of ecosystem services	54	46
Wax and gums from trees are an example of ecosystem services	50	50
Ecosystem services include angling	43	57
Ecosystem services include swimming	42	58

*Figures are percentages

Development Goals were introduced but has often been covered under broad discussions of sustainable agriculture; the focus being on the practices that will not jeopardize the resources for future generation. Karami and Hayati (1998) and Chizari, Karbasioun, and Linder (2006) reported that agricultural extension professionals and experts in Iran had problems understanding the concept of sustainability in agriculture. Chizari,

Karbasioun and Lindner (1998) noted that the ability to plan and execute effective educational programs and other technology transfer activities by extension will be seriously limited without an adequate number of well-trained agents. Erbaugh, Kibwika and Donnermeyer (2007) noted that extension agents in Uganda had training needs regarding integrated pest management (an integral part of ecosystem service management).

Knowledge of Ecosystem Services Valuation

The conceptual knowledge base for ecosystem valuation is complex and multidimensional (Chan et al. 2006); fifteen items were combined into a rating scale to measure extension officers' knowledge. The coefficient of reliability for knowledge of ecosystem valuation was 0.85, indicating an acceptable level of reliability (Nunmaly, 1978). From the valuation of ecosystem services in Table 2, extension officers had high knowledge of items such as: "ecotourism is a business opportunity created by ecosystem services" (85%); "economic valuation of ecosystem services will encourage social responsibility" (85%); "ecosystem services is refer to as Green GDP"(80%) and "economic valuation of ecosystem services will encourage environmental management" (82%); however, low knowledge scores were recorded for "hedonic pricing of ecosystem services reflects the price people will pay for associated goods." Martin-Lopez, Montes, and Benayas (2007) reported that personal behavior and knowledge of ecosystem importance influenced the willingness to pay for sustaining ecosystem services provided by biodiversity in Donana, Spain. Cai and Smit (1994) alluded to the capacity and capability of extension staff to influence the integration of climate and weather information into agricultural production and natural resource management. Hagmann, Chuma, and Murwira (1996) stated that agriculture extension officers need a change of role from "teachers" to "facilitators" to be effective with appropriate tools to promote sustainable agricultural practices (including climate/weather) in extension strategies (Düvel & Botha, 1999).

Knowledge of Ecosystem Sustainability and Vulnerability

Knowledge and awareness are generally considered prerequisites to adoption of new technologies, and change agent success in securing adoption is related to clients' perception of change agent credibility (Rogers, 1995). Change agent credibility is linked to clients' perceptions of change agent knowledge and technical competence. Thus, extension agent knowledge is a vital link in the implementation of conservation of ecosystem services. In terms of ecosystem sustainability and vulnerability, prominent items with correct responses among extension officers included "user associations are important in ecosystem services" (88%); "there is increasing vulnerability of ecosystem services" (88%); and "the sensitivity of ecosystem services is high"(90%) (Table 3). On the other hand, extension officers indicated low knowledge on items such as "ecosystem services is well managed by the government"; "ecosystem services is well managed by local institutions"; "multi-use situations determines ecosystem services form of governance"; and "multi user situations determines ecosystem services form of governance." Extension agents in Ohio, Pennsylvania, Virginia, and West Virginia indicated that sustainable agriculture was a priority for future clientele interactions and that it was socially acceptable,

Table 2: Knowledge Level of Extension Officers Regarding Ecosystem Valuation (n=100)

Items	Correct	Incorrect
Ecotourism is a business opportunity created by ecosystem services	85*	15
Economic valuation of ecosystem services will encourage social responsibility	85	15
Ecosystem services is refer to as green GDP	82	18
Economic valuation of ecosystem services will encourage environmental management	80	20
Ecosystem services valuation of involves social communication and information	79	21
Ecosystem services has economic values	78	22
Economic valuation of ecosystem services will create business opportunities	74	26
Replacement cost is the cost to replace services with manmade systems	72	28
Avoided cost of ecosystem services allow society to avoid costs that would have been incurred in the absence of those services	69	31
Travel cost of ecosystem services reflects the implied value of the service	66	34
Factor income is the services provided for the enhancement of incomes	64	36
Contingent valuation reflect the cost to be paid for hypothetical scenarios of alternatives to ecosystem services	62	38
Hedonic pricing of ecosystem services reflects the price people will pay for associated goods	56	44

*Figures are percentages

Table 3: Knowledge Level of Extension Officers Regarding Ecosystem Sustainability and Vulnerability

Items	Correct	Incorrect
The sensitivity of ecosystem services is high	90*	10
There is increasing vulnerability of ecosystem services	88	12
User associations are important in Ecosystem services	88	12
Over exploitation of ecosystem services leads to unsustainable development	87	13
Deforestation is not ecosystem services conservation	86	14
Ecosystem services are threatened by human activities	83	17
Depletion of ecosystem services increases vulnerability of users to poverty	81	19
Adaptation involves capacity and resilience of ecosystem services	76	24
Environmental impacts of anthropogenic action affect ecosystems	77	23
Land degradation is not ecosystem services conservation	76	24
Ecosystem health is conservation of natural resources	74	26
Desert encroachment is not ecosystem services conservation	71	29
Industrialization hinders ecosystem services conservation	71	29
Stakeholders platforms enhances ecosystem services management	69	31
Participatory approaches are important for ecosystem services management	68	32
Vulnerability assessment reduce effect of ecosystem services depletion	66	34
Multi user situations determines ecosystem services form of governance	48	52
Multi-use situations determines ecosystem services form of governance	47	53
Ecosystem services is well managed by local institutions	42	58
Ecosystem services is well managed by the government	40	60

*Figures are percentages

environmentally sound, and economically feasible (Boone et al. 2007). According to Buford, Bedeian, and Lindner (1995), the importance of an effective staff training program for extension agents becomes evident when considering challenges facing extension agents in the learning of new skills to maintain their proficiency or become qualified for promotions.

The effect of extension officers' perceptions of how ecosystem services and valuation issues will impact extension delivery presented in Table 4 were rated on a 3-point scale of high, medium, and low and consisted of 25 items. Extension officers indicated that climate change would have high impact in terms of "extension services should change from generalist approach to specialist" (71%); "extension messages should incorporate ecosystems service information" (64%); and the need for an "increase in extension research skill" (62%) and "use of multimedia strategy" (60%).

Table 4: Knowledge Level of Extension Officers Regarding Ecosystem Services and Valuation on Extension Service Delivery (n=100)

Items	High	Medium	Low
Extension services should change from generalist approach to specialist	71*	20	9
Extension messages should incorporate ecosystem service information	64	24	11
Increase in extension research skills	62	26	12
Use of multimedia strategy	60	28	12
Extension has to be abreast of new discoveries in agriculture	58	28	14
Extension officers' knowledge on ecosystem services should change	58	37	5
Extension messages should address carbon sequestration practices	57	27	16
Extension messages should address genetic erosion	57	35	8
Use of rural radio, community radio and FM stations	56	32	12
Extension messages should address changing water use efficiency	56	28	16
Extension messages should address users coping strategies with climate change	55	36	9
Attitude towards coverage of ecosystem services	55	37	8
Media coverage of ecosystem services	53	35	12
Users need of new training	52	24	24
Extension officers exposure to new technology	51	35	14
Extension messages should address changing and diversified livelihoods	51	36	13
Users will need specialized and privatized extension	50	33	17
Extension messages should address vulnerability of ecosystem services	48	40	12
Users require new methods of coping with their livelihoods	47	41	12
Extension officers require new skills	46	41	13
Extension messages should address changing irrigation efficiency	46	40	14
Users exposure to new technology	44	27	29
Increase in proportion of ecosystem service information in extension messages	41	45	14
Extension officers need of new training	36	45	19
Users require new skills	30	52	18

*Figures are percentages

Moderate impact was indicated for items about users requiring new skills (52%); "extension officers need[ing] training" (45%) and whether "extension messages should address vulnerability of ecosystem services" (40%). Milburn, Mulley, Susan, and Kline (2010) noted that "extension messages need to cover issues that include land assessment, wetland and woodlot management, new forms of sustainable economic development such as tourism, and conservation and stewardship to increase public awareness and support" (p. 7) On the contrary, extension officers reported that ecosystem services and valuation would have low impact on "users' exposure to new technology." Extension agents in Ohio, Pennsylvania, Virginia, and West Virginia indicated that research skills on sustainable agriculture were still in their infancy. Karami (1995) wrote that perceptions, attitudes, educational training, and beliefs of extension agents are major factors affecting the issue of sustainable agriculture education in Iran. Hersman (2004) reported that the knowledge level of extension agents determines the amount of information the agents offered to their clientele. Milburn, et al. (2010) noted that the role of extension agent as a partner in the research process increases both the relevance and impact of extension.

Conclusion, Recommendations and Implications

The future of agricultural production due to its dependence on natural resources has made ecosystem services and valuation critical. Extension, as a major source of information to farmers, plays important roles in educating farmers on how to respond to ecosystem services and valuation issues. Using a survey of extension officers in North West Province, South Africa, this paper has added to the existing literature by providing evidence to show that extension officers' knowledge about ecosystem services and valuation is influenced by personal characteristics.

Without sound human capacity to understand and train end-users, ecosystem services loss will continue to be a major contributor to food insecurity. The multifaceted nature of ecosystem services and the many scientific and technological processes involved require training and capacity development at all levels, particularly for extension officers who act as a link and facilitate between policy, research and end-users (Milburn, et al. 2010).

From the findings of this study, extension officers displayed a wide range of knowledge levels regarding ecosystem services issues related to ecosystem services, valuation, sustainability, and vulnerability but recognized extension services should change from a generalist approach to a specialist approach. They also recognized that "extension messages should incorporate ecosystems service information", the importance of "increase in extension research skill," and "use of multimedia strategy"; that users require new skills and "extension officers need… new training"; and that "extension messages should address vulnerability of ecosystem services" in response to ecosystem services and valuation issues. Paulso (1995) stated that Minnesota extension agents varied considerably in terms of knowledge, views, openness and involvement in alternative agriculture.

Erbaugh et al, (2007) stated that frontline extension agents are vital to program implementation because they provide the necessary links with farmers and communities, manage on-farm research efforts, and deliver education and training programs. However, many have identified frontline extension agents' lack of awareness and understanding of natural resources management as an impediment to effective

transfer of strategies to farmers (Yudelman et al., 1998; Zalom, 1993). The results have several implications for training and educating extension officers in ecosystem services and valuation issues. The specific areas include the identification of ecosystem services related to tourism, hedonic pricing, and the multi-stakeholder governance of ecosystem services. Extension officers should work proactively rather than reactively, because of the large number of clients and the economic impact of ecosystem services and valuation. It is also important that extension curriculum address contemporary issues in agriculture, including ecosystem services and valuation.

References

Agbamu, J.U. (2002). Agricultural Research-Extension Farmer Linkages in Japan: Policy issues for Sustainable Agricultural Development in Developing Countries. *International Journal of Social and Policy Issues*, 1: 252–263

Agunga, R. (1995). What Ohio Extension say about sustainable agriculture. *Journal of Sustainable Agriculture, 5*(3), 169-187.

AL-Subaiee, S.S., Yoder, E.P., & Thomson, J.S. (2005). Extension agents' perception of sustainable agriculture in the Riyadh region of Saudi Arabia. *Journal of International Agricultural and Extension Education* 12(1): 5–14

Balvanera, P., Gretchen, C. D., Ehrlich, P. R., Ricketts, T. H., Bailey, S-A., Kark, S., Kremen, C., & Pereira, H. (2001). Conserving Biodiversity and Ecosystem Services. *Science*: 291 (5511): 2047

Bateman, I. J. & Willis, K. G. (1999). *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EU, and Developing Countries*. New York, NY: Oxford University Press.

Bembridge, T. J., (1991). The Practice of Agricultural Extension, A Training Manual, Development Bank of South Africa, Halfway house. *Development Southern Africa,* 8(2),289–290.

Boone Jr, H. N., Hersman, E. M., Boone, D.A., & Gartin, S. A. (2007). Knowledge of Sustainable Agriculture Practices by Extension Agents in Ohio, Pennsylvania, and West Virginia. *Journal of Extension* 45 (5) http://www.joe.org/joe/2007october/rb2.php Accessed July 2010

Boyd, J. & Banzhaf, S. (2006, January).What Are Ecosystem Services? The Need for Standardized Environmental Accounting Units. Resources for the Future. Discussion papers. (RFFP Discussion Paper 06-02) Washington, DC: Resources for the Future.

Braimoh, A. K., Subramanian, S. M.; Elliott, W. S., & Gasparatos, A. (2010). *Climate and Human-Related Drivers of Biodiversity Decline in Southeast Asia*. Tokyo: United Nations University Press

Buford, J. A., Bedeian, A. G., & Lindner, J. R. (1995). *Management in Extension* (3rd ed.). Columbus, OH: Ohio State University Extension.

Chan, K. M. A., Shaw, M. R., Cameron, D. R., Underwood, E. C. & Daily, G. C. (2006). Conservation planning for ecosystem services. *Public Library of Science Biology, 4*:e379

Chizari, M., Alibaygi, A.H. & Breazeale, D. (2006). Analysis of training needs of multi-functional extension agents associated with sustainability. *Journal of International. Agricultural Extension Education. 13*:51–58

Chizari, M., Karbasioun, M., & Lindner, J. R. (1998). Obstacles facing extension

agents in the development and delivery of extension educational programs for adult farmers in the province of Esfahan, Iran. *Journal of Agricultural Education,* l:48–55.

Costanza, R., Norton, B. & Bishop. R. C. (1995). *The Evolution of Preferences: Why Sovereign Preferences May Not Lead to Sustainable Policies and What to Do About It.* SCASSS workshop on Economics, Ethics and the Environment, Sweden.

Düvel, G. H., & Botha, A. J. (1999). Human constraints to sustainable agriculture in the arid regions of South Africa. *The Journal of Agricultural Education and Extension,* 6(1), 47–60.

Erbaugh, J.M, Kibwika, P. & Donnermeyer, J. (2007). Assessing extension agent knowledge and training needs to improve IPM dissemination in Uganda. *Journal of International Agricultural and Extension Education*, 14(1), 59–70

George, D.A., Birch, C., Clewett, J.F., Wright, A., & Allen, W. (2005). Major issues and solutions to applied climate education in Australia. *Journal of International Agricultural and Extension Education*, 12(3),21–31.

Hagmann, J., Chuma, E., & Murwira, K. (1996). Improving the output of agricultural extension and research through participatory innovation development and extension: experiences from Zimbabwe. *Journal of Agricultural Education and Extension,* 2(4),15–24.

Hersman, E.M. (2004). Knowledge and Dissemination of Sustainable Agriculture Practices by County Extension Agents in Ohio, Pennsylvania, and West Virginia. Master's thesis, Davis College of Agriculture, Forestry, and Consumer Science, West Virginia University.

Kaimowitz, D. (2001). *Useful Myths and Intractable Truths: The Politics of the Link between Forests and Water in Central America*. San Jose, Costa Rica: Center for International Forest Research (CIFOR).

Karami, E. (1995). Agriculture extension: The question of sustainable development in Iran. *Journal of Sustainable Agriculture,* 5(2), 47–54.

Karami, A. and Hayati, D. (1998). Sustainable agriculture in comparison to conventional agriculture: assessment of attitudes. *Journal of Agriculture Science & Natural Resources,* 2:1–17

Long, J. L., & Swortzel, K. A. (2007). Factors influencing individual job performance of Extension agents in the Mississippi State University Extension Service. *Proceedings of the American Association for Agricultural Education,* 34, 29–40.

Martín-López, B., Montes, C., & Benayas, J. (2007). Influence of user characteristics on valuation of ecosystem services in Doñana Natural Protected Area (south-west Spain). *Environmental Conservation* 34, 215–224

Milburn, L-A. S., Mulley, S. J. & Kline, C. (2010). The End of the Beginning and the Beginning of the End: The Decline of Public Agricultural Extension in Ontario. *Journal of Extension* 48(6) http://www.joe.org/joe/2010december/a7.php Accessed July 2010

Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-Being: Synthesis*. Washington, DC: Island Press.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill Company.

Oladele O.I. & Tekena S.S. (2010). Factors influencing agricultural extension officers' knowledge on practice and marketing of organic agriculture in North West Province, South Africa. *Life Science Journal,* 7(3), 91–98

Oladele O.I &J.-I. Sakagami (2004) SWOT analysis of extension systems in Asian and West African countries. *International Journal of Food, Agriculture & Environment Finland* 2 (2), 232–236.

Paulso, D. D. (1995). Minnesota extension agents' knowledge and views of alternative agriculture. *American Journal of Alternative Agriculture* 10, 122–128

Turner, R. K., Paavola, J., Cooper, P., Farber, S., Jessamy, V. & Georgiou, S. (2003). Valuing nature: lessons learned and future research directions. *Ecological Economics*, 46, 493–510.

Van den Ban, A.W. & Hawkins, H. S. (1998) *Agricultural Extension*, second edition. Oxford: Blackwell Science Publication.

World Bank. (2005). Where is the Wealth of Nations? Measuring Capital for the 21st Century. Washington, DC: The World Bank.

World Resources Institute (2005). The wealth of the poor: managing ecosystem to fight poverty. Washington, DC: WRI.

Yudelman, M., Ratta, A., & Nygaard, D. (1998). Pest management and food production: Looking to the future. Food, agriculture, and the environment (Discussion Paper 25). Washington, DC: International Food Policy Research Institute.

Zalom, F. G. (1993). Reorganizing to facilitate the development and use of integrated pest management. *Agriculture, Ecosystems and Environment,* 46, 245–256.

Zwane, E. M. (2009) Participatory Development of an Extension Approach and Policy for Limpopo Province South Africa. A Doctoral thesis in the Department of Agricultural Economics Extension and Rural Development, University of Pretoria.

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Students' Experiential Learning of Hydroponics and Local Markets on the Island of Roatán, Honduras

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Abstract

International experiences for students provide a means for globalization of higher education, promoting communication and understanding of real world issues. Undergraduate students participating in a 10-day short course study abroad to Honduras experienced first-hand entrepreneurial education by working directly with a farm business while learning applied science of water and light relations with regard to hydroponically grown plants on the island of Roatán. This paper describes the teaching methods the professors implemented in order to help improve students' understanding of complex issues related to science. Undergraduate students worked in pairs to collect greenhouse data and helped to harvest and package lettuce and mint to sell to local markets. The students were given a pre-test about water and light relations and were asked to respond to questions about issues they might encounter related to plant water uptake within a tropical greenhouse setting. The students participated in reflective sessions with the business owner after work experience, followed by post-tests after completing the exercises. These teaching methods were repeated for two years with a total of 20 participants. Overall, the post-test scores showed a gain in science knowledge. During reflective sessions, students commented that they enjoyed this unique mini-research experience and felt it was more valuable than just touring. Students appreciated the comprehensive interactions with the agricultural business and gained self-awareness related to entrepreneurship in agriculture. Study-abroad courses should try to include hands-on experiences for students to engage with local entrepreneurs and to apply science-based questions to promote critical thinking skills.

Keywords: Entrepreneurship, Greenhouse, Honduras, Hydroponics, Lettuce, Study Abroad, Tropical Agriculture

Introduction

International experiences for students provide a means for globalization of higher education, promoting communication and understanding of real world issues. For a student to step outside of his or her comfort zone is important because he or she will learn more and gain understanding of other cultures while embracing new phenomena (Harari, 1981). According to Arum and Water (1992), international education refers to the multiple activities, programs, and services that fall within international studies, international educational exchange, and technical cooperation. Overall, students benefit by immersing themselves in a foreign culture and by gaining new experiences that provide a different perspective on their worldview (Barton et al., 2009).

Very little research has been reported about how study-abroad experiences relate to students' engagement within the context of entrepreneurship intertwined with the complexities of research science (e.g., hydroponic production of specialty crops such as lettuce or mint). Better understanding how students respond to these types of short studies helps to provide insight for further development of short study-abroad courses and to encourage faculty to include these activities during their courses. This study reports the involvement of undergraduates in both research and experiential learning of entrepreneurship during a short-term study-aboard course to the island of Roatán, Honduras in Central America.

Purpose and Objectives

The purpose of this study was to assess the importance of students' engagement in experiential learning in helping them develop critical thinking skills through hands-on learning opportunities in science with local entrepreneurs in Honduras. While this study of science could have been completed at the students' home institution, growers in the Midwest do not have to deal with extremely high relative humidity (RH), so the practical implications of producing a crop in such an extreme environment led to a quicker understanding of the effect of the water-potential gradient on water loss in plants. In addition, we wanted the undergraduates to relate the science to the business environment and culture of the country. Often, textbook-based teaching leads to regurgitation of text materials with low comprehension (Friedler, 1985; Cottrell, 2004). We hypothesized that teaching these concepts in a foreign environment would allow for more productive discussion of the environmental consequences of water relations for plant growth. The objectives of this study were to determine undergraduates' knowledge of agricultural issues and problems related to growing food crops within a greenhouse while integrating them into an entrepreneurial business. Our overall goal was to utilize experiential learning (Kolb, 1984) in a relatively short period to help students understand plant–water relations relative to entrepreneurial mentality.

Methods

This study was descriptive and qualitative. There were 20 participants, who enrolled in a 10-day experiential learning study-abroad course, conducted during spring breaks of 2008 and 2009. Students came from several different states in the Midwest region with backgrounds in agricultural economics, agronomy, animal science (pre-vet), industrial management, and plant science. Due to the small size of the group, results should not be extrapolated beyond the limits of the environment described within the study.

How do each of the following changes affect water uptake in plants? Give your answer based on the conditions in the greenhouse given below. Please evaluate each question independent from each other.

Current conditions: relative humidity 90%; light level 75% full sunlight; air temperature 85 °F; water pH 7.0

1) Light intensity increases to 90% full sunlight
   a) increased water uptake
   b) decreased water uptake
   c) no effect

What is your confidence in answering this question: 1 to 5 (highest)

2) Light intensity decreases to 50% full sunlight
   a) increased water uptake
   b) decreased water uptake
   c) no effect

What is your confidence in answering this question: 1 to 5 (highest)

3) Air temperature cools down to 50 °F
   a) increased water uptake
   b) decreased water uptake
   c) no effect

What is your confidence in answering this question: 1 to 5 (highest)

4) Relative humidity decreases to 70%
   a) increased water uptake
   b) decreased water uptake
   c) no effect

What is your confidence in answering this question: 1 to 5 (highest)

5) Root zone fertilizer concentration doubles
   a) increased water uptake
   b) decreased water uptake
   c) no effect

What is your confidence in answering this question: 1 to 5 (highest)

Figure 1. Pre- and post-trip quiz given to students participating in a study-abroad program in Honduras to assess their understanding of environmental effects on plant–water relations.

Pre-Course Preparation

VanDerZanden, Haynes, Nonnecke, and Martin (2007) documented that pre-trip preparation benefited student learning. Thus, before departing, students participated in a 4-week course that incorporated essential concepts including water relations and the environmental variables affecting plant–water relations. Students took a quiz (see Figures 1 and 2) designed to determine their current knowledge of plant–water relations. This quiz was given as a pre-test (before departure) and as a post-test (after returning from Honduras). The quizzes were designed so that students would respond to theoretical changes in environmental conditions while being exposed to the specific units used for environmental variables.

Circle one number on each of the following scales to indicate the optimal value for a hydroponics lettuce production system in Honduras:

Light
µmol·m^{-2}·s^{-1} 0 200 400 600 800 1000 1200 1400 1600 1800 2000

Air temperature
°C 14 16 18 20 22 24 26 28 30 32 34 36 38 40
°F 50 55 60 65 70 75 80 85 90 95 100 105 110 115

Relative humidity
% 0 10 20 30 40 50 60 70 80 90 100

Water temperature
°C 14 16 18 20 22 24 26 28 30 32 34 36 38 40
°F 50 55 60 65 70 75 80 85 90 95 100 105 110 115

pH
4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

Root zone electrical conductivity
dS·m^{-1} 0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Root zone dissolved oxygen
ppm 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Figure 2. Pre-test and post-trip quiz given to students participating in a study-abroad program in Honduras to assess their understanding of environmental effects on plant–water relations.

Study-Abroad Activities

While abroad, the students first participated in a tour of the facilities at Blue Harbor Plantations. The farm project (121 acres) began as a hobby for the owner and operator in 2002. Later, the farm began focusing on ways of supplying local resorts and restaurants with fresh, unstressed vegetables, lettuce, and herbs grown hydroponically, a relatively unknown production system in Central America, though common in the US. The greenhouse space is a 13,000-square-foot screen house, which is not cooled (cooling prevents lettuce from turning bitter and bolting on hot days). On the tour through the greenhouse, most of the discussion centered on two main topics: (1) control of heat and RH and (2) water composition and quality. Discussion also addressed how water quality analyses could help growers make informed decisions that affect their business profitability.

Scientific Data Collection

Following the tour, the students formed groups of three for data collection. Environmental variables (temperature, dew point, RH, light intensity and transpiration) were measured throughout the day. One of the goals of the experience was to make the units used to quantify environmental variables more relevant to students. Prior to data collection, shade cloth of different intensities was placed at different areas within the poly house. Lettuce of the same variety and age was grown under each shade

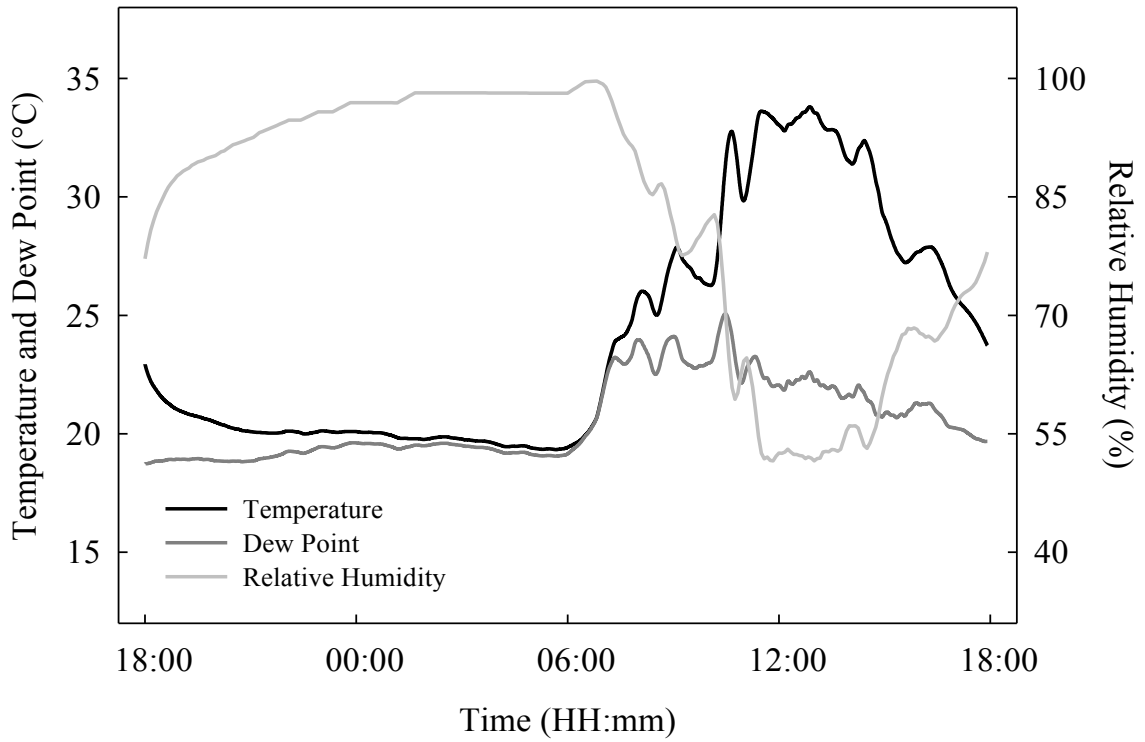

Figure 3. Temperature, dew point, and relative humidity during a 24-hour period in a hydroponics facility in Roatán, Honduras. During this period, the students on the trip conducted measurements of environmental variables and plant–water relations in the facility.

intensity so comparisons of plant growth and water loss could be made. As students toured the facility, they measured temperature, dew point, and RH and were shown how to measure this data in real time throughout the day (see Figure 3). One of the fundamental concepts discussed throughout the day was the effect of water gradients on water uptake and movement in plants. References were made back to the discussion of these concepts in pre-trip lectures. Students were shown the overnight and early morning data and were surprised to learn that RH was near 100% (see Figure 3), making water loss negligible in the lettuce crop.

Environmental variables that affect water loss in plants were expressed with units many students do not encounter on a daily basis. One of the goals of the exercise was to allow students to measure some of these variables and thereby gain a better appreciation of the units. In both the pre- and post-trip quizzes, students were asked to estimate optimal environmental values for the hydroponics production facility. The goal of this portion of the quizzes was to allow students to become familiar with the units commonly used in measuring environmental factors. Light and temperature were measured throughout the day under the different shade intensities with portable data loggers (Onset Computer Corp, Bourne, MA). The shade cloth installed prior to the student tour provided sufficient contrast light levels so plant responses to light and RH could be discussed (see Figure 4A).

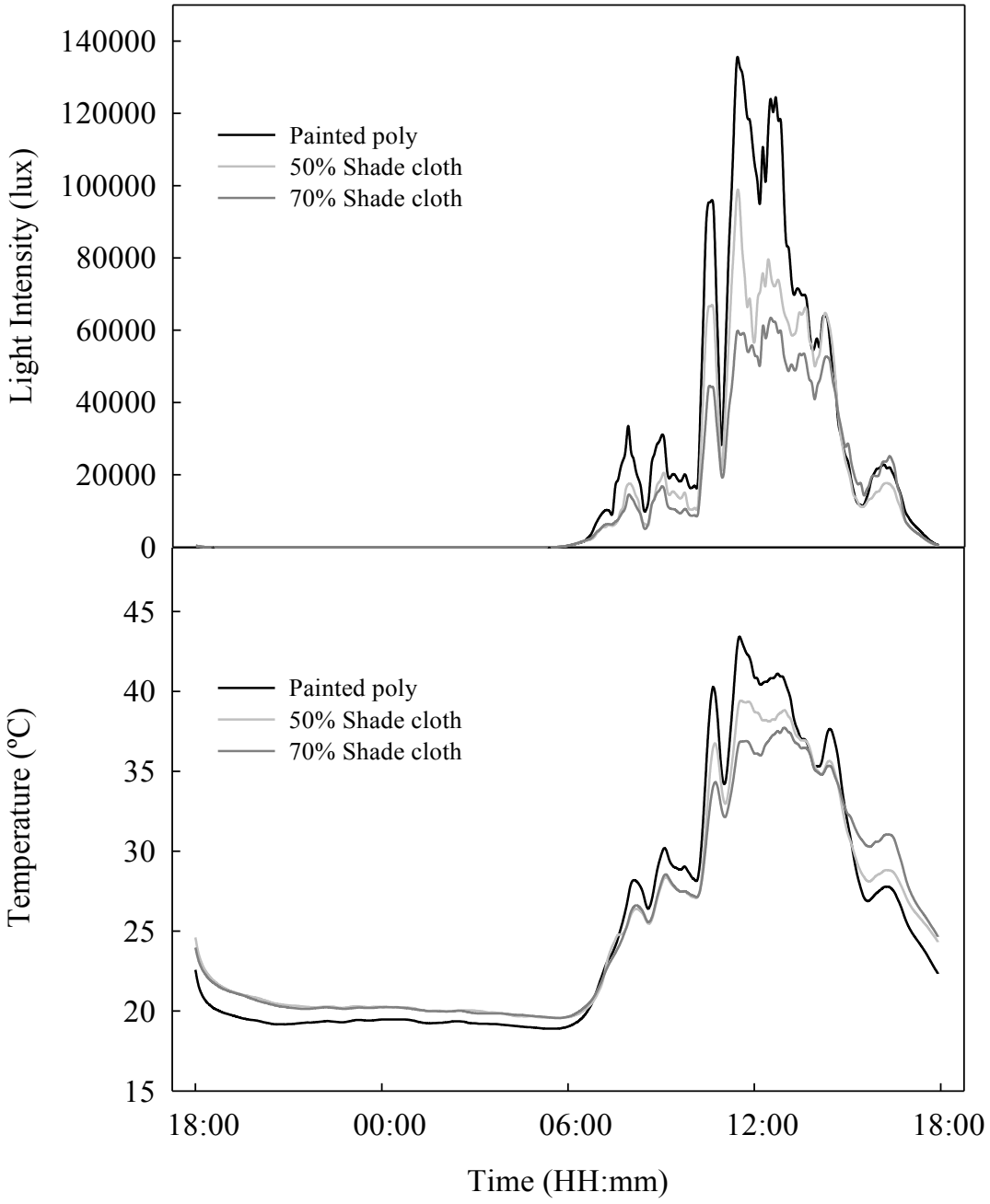

Figure 4. Student measurements of light intensity (A) and temperature (B) at crop level under a painted polyethylene covered greenhouse, 50% shade cloth, and 70% shade cloth by students participating in a study-abroad program in Roatán, Honduras.

Temperature did not differ significantly under the different shade intensities at the beginning of the day, but midday temperatures were affected by light level (see Figure 4B). In groups of three, students measured light levels and transpiration

throughout the course of the day with one of the instructors. The discussion during these measurements focused on both the units used to quantify environmental variables and how to measure plant response. Students measured light directly with a hand-held light meter (LI-250A, Li-Cor Biosciences, Lincoln, Nebraska). Students first measured light levels outside the poly house, then under the treated poly, 30% shade cloth, and 50% shade cloth (see Figure 5B). Students measured transpiration of individual lettuce leaves under the three light levels in the poly house using a single hand-held porometer (Decagon Devices, Pullman, WA). This porometer utilizes the steady state method, whereby the vapor gradient near a leaf is used to estimate transpiration. This was an excellent tool to use in this situation because the concept of water concentration gradients driving water loss at the leaf level was easily explained to students. Furthermore, the fact that this exercise was conducted in a very high RH environment allowed the instructors to discuss how the magnitude of the water-potential gradient affects plant–water movement and loss. In this case, the instructors were able to discuss how high RH reduces the gradient, thereby reducing nutrient uptake in plants, and the management strategies that need to be employed to deal with this issue. The instructors noted that in the discussions the students appeared to understand this concept well.

As expected, transpiration rates were low in the early morning when RH was very high and in the late afternoon when high temperatures resulted in closed plant stomata (see Figure 5A). Students were able to make measurements in both the morning and afternoon so the changes in environmental variables over the course of the day could be discussed (see Figure 4 and 5). Inquiry-driven approaches to teaching plant physiology are likely more successful than traditional lab approaches where students are given a set of measurements to conduct (Joly et al., 2000). While it was not possible in the short timeframe to allow instructors to develop a completely inquiry-driven approach, students were asked to predict plant response, based on environmental variables they measured, prior to measuring transpiration. This approach and the discussions that occurred during measurements appeared to greatly enhance the student's ability to understand plant–water uptake and loss.

Entrepreneurial Integration

To better understand the entrepreneurial experience, students were asked to harvest and package lettuce and mint to sell to local markets. The students also participated in reflective sessions with the landowner and operator and other local businesses to reflect upon their scientific processes and to learn about the business operations. This discussion addressed inputs, outputs, associated costs and the number of employees employed to help with harvest and distribution.

Findings/Results

Overall, the students said that they felt this experience expanded their worldviews on food production and business management, which echoes the work of Barton et al., (2009), where students immersed themselves in a foreign culture and gained new experiences that provided a different perspective on their worldview. According to pre-test results, students felt most confident in answering questions related to light relationships within a greenhouse. They had relatively low confidence on questions related to RH and root-zone fertilizer concentrations.

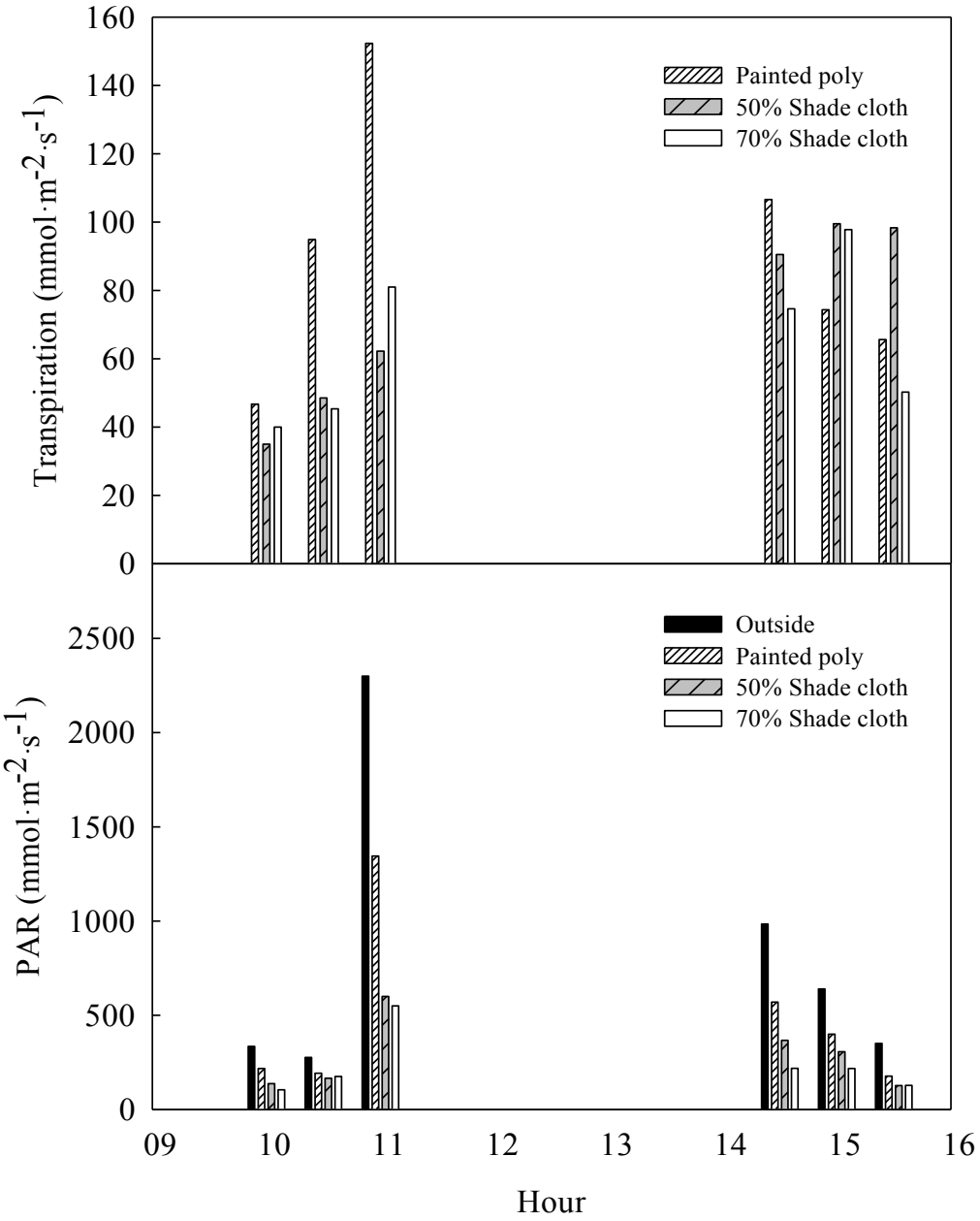

Figure 5. Student measurements of transpiration (A) and light levels (B) during the morning and afternoon period outside the shade house (PAR only), under a painted polyethylene covered greenhouse, and with additional 50% or 70% shade cloth added above the crop.

Several students wrote, "don't know" next to the questions involving RH. The average for the pre-test store was 62.8%. The post-test scores increased to an average of 70.8% (an 8% increase from the pre-test score with a standard deviation of 5%). The range of average pre-trip confidence for all questions was 1.9 to 2.7 (where 5 = very confident), whereas the post-trip confidence range was 3.3 to 4.4 (where 5 = very confident).

Even though the students' scores were not as high as the professors would have liked, the students' confidence in answering the questions increased, and the student felt more comfortable contributing and reflecting on why and how things may be different, showing evidence of the development of critical thinking skills. The students reflected heavily on how they originally did not realize where supplies of fresh salad and mint came from and what preparations it took to put in place a business plan and get these products to restaurants and stores. In addition, the students commented that having locally grown produce helps supply valuable nutrients both to locals (who might otherwise have to buy more expensive imports from the main land) and to tourists, who tend to demand specialty salads and "mojitos" (mint-infused drinks) during their island vacations. Overall, the students' experiences were positive and they enjoyed having this unique mini-research experience. They felt this was a more valuable experience than just touring a farm. The students commented that the farm was a good example of how problems can be overcome. They realized the importance of sustainability and of recycling water, even in tropical humid environments. Later in the day, the students enjoyed a fresh-grown salad, which they had picked, packed and helped deliver to the local restaurant in which they had lunch. Prior to their morning's experience, the students had intended to avoid eating salad greens in fear of "Montezuma's revenge," as they commented in their reflective session. The following are some of the students' reflections: (P1) "The hydroponic farm was my favorite part of the trip in order to understand both science and entrepreneurship working together"; (P2) "I loved the hydroponic farm—the operation and the owner was extremely interesting and entertaining"; (P3) "The hydroponic farm experiments were really well structured"; (P4) "Everyone should have this experience"; (P5) "Most definitely an enjoyable course; (P6) "One of the best experiences I've ever had; the visits to the local schools and walks within the communities opened my eyes to how people really live."

Conclusions, Recommendations, and Implications

Students often struggle with concepts of water relations, partly because they don't clearly understand the environmental variables affecting water loss and movement in plants. We found that using a combination of written materials (quizzes), detailed discussion from a grower's perspective, and actual measurements of both environmental factors and plant responses helped increase student retention of the subject content.

Study-abroad short courses should try to include hands-on experiences for students to engage with local entrepreneurs and to apply science-based questioning that promotes critical thinking in an international setting. Instructors in such settings should be prepared to address the challenges and differences in world-view students encounter. Further, pre-test and post-test exercises help assess student performance; however, they are not the only means of evaluating student performance. Students' reflections allow instructors to listen to critical aspects of their experiences, helping to highlight student impact. Exposing students to the entrepreneurship mentality is crucial for this type of short-term study-abroad courses; however, at times these types of opportunities may be difficult to achieve. Researchers must take into account how individuals learn and how different modes of learning influence opportunities to identify with entrepreneurship and to practice critical thinking (Corbett, 2005).

Exposure to short-research data collection also helps develop students' critical thinking about how to address climate and water issues.

This type of experience can also be useful to teachers of agricultural sciences at the secondary level if they incorporate some of the data students collect into their teaching methods. The examples within this paper demonstrate how data plays a role in real-life agricultural business and impacts the issues businesses encounter.

References

Arum, S., & Van de Water, J. (1992). The need for a definition of international education in U.S. universities. In C. B. Klasek, B. J. Garavalia, & K. J. Kellerman (Eds.), *Bridges to the future: Strategies for internationalizing higher education.* Carbondale, IL: Association of International Education Administrators.

Barton, S., Bruck, J., & Nelson, C. (2009). Exploring ways to enhance student learning during study abroad: landscape exploration of Brazil. *HortTechnology*. 19:459–464.

Corbett, A. C. (2005). Experiential learning within the process of opportunity identification and exploitation. *Entrepreneurship Theory and Practice,* 29(4)*,* 473–491. doi: 10.1111/j.1540-6520.2005.00094.x

Cottrell, T.R. 2004. Capturing difficult botanical concepts with a net of previous knowledge. *American Biology Teacher* 66:441–445.

Friedler, Y. (1985, April). *Identifying students' difficulties in understanding concepts pertaining to cell water relations: An exploratory study*. Paper presented at the 58th Annual Meeting of the National Association for Research in Science Teaching, French Lick Spring, IN.

Harari, M. (1981). *Internationalizing the Curriculum and the Campus: Guidelines for AASCU Institutions*. Washington, DC: American Association of State Colleges and Universities.

Joly, R.J., Jones, M.L., Verlinden, S. , Rhodes, D. & Woodson, W.R. (2000). Learning in an inquiry-driven plant physiology laboratory. *Journal of Natural Resources and Life Science Education* 29:31–35

Kolb, D.A. (1984). *Experiential Learning: Experience as the Source of Learning and Development.* Upper Saddle River, NJ: Prentice-Hall.

VanDerZanden, A.M., Haynes, C., Nonnecke, G.R. & Martin, R. (2007). Attitudes and perceptions of participants in a horticulture study abroad course at Iowa State University. *HortTechnology* 17:128-132.

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