



Sylvanet

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A large African Mahogany in a natural stand in Ghana. Students on the Forestry Study Tour to Ghana had the chance to see and learn about many of Ghana's native species.

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SYLVANET is published twice a year by the International Forestry Program at North Carolina State University. We welcome submissions of abstracts, travelogues, news, announcements, photos, and up to 5 page papers, reports, or perspectives on issues pertaining to international forestry—especially by faculty, students, alumni, and associates of NC State. If you would like to submit an article or be added to our mailing list, email Kelly Jones at kmjones@ncsu.edu or Dr. Erin Sills, the faculty advisor for *SYLVANET* at erin_sills@ncsu.edu.

Reflections from the Field: Islam and the Tsetse Fly

Arthur Green



Tchabal Mbabo Cliffs,
Cameroon

“Ironically, what the devoutly Muslim pastoral communities do not eat might end up killing them and their cattle...”

Now it is dry. The savanna grass is low and brittle. It crunches like broken straw underfoot. The desert winds are blowing from the North. The cows find nothing left to eat on these dry, highland plateaus; it is time to go down the mountains to the riverside pasture. That is the way it has always been; never easy. When you descend the mountains you risk certain things. You could lose it all. The cattle sometimes tumble off the precipitous cliffs. Wild and sometimes dangerous animals (buffalos, panthers, hyenas, wild pigs, warthogs, and lions) wander these woods. Yet worst of all is another almost invisible danger, one that is certainly more dangerous than the obvious risks. It is the fearsome tsetse fly (*Glossina* species). One bite from these ubiquitous, little flies in the remote forests of Dodeo and you or your cows could fall deathly ill. The tsetse flies' bite transmits the infamous protozoan parasite, *Trypanosoma brucei*, cause of African Trypanosomiasis or Sleeping Sickness.¹ Unfortunately, for Mbororo and Fulbé herders, the tsetse flies congregate in the lowland pastures near river beds and threaten the herders and their cattle as they follow the rivers which harbor the only productive pastures during the parched 5-month dry season.

A lost cow is the loss of hundreds of dollars for a family; it is a giant risk to go down the cliffs. Yet, if the cattle spend the dry season on the vast plateau, where there is no grass

left, they will starve to death. There is no choice. The herders go down the mountains, hope for the best, find their traditional grazing lands next to the Dodeo River, and wait 5 months for the rains to return so that they can leave the river basin and retreat home, up the cliffs to the cold, windy highlands of Tchabal Mbabo.

This is the Mbororo transhumance. It is the pastoralists' traditional practice of seasonal migration, modified by time and experience so that it now happens like clockwork. The herders say that the cows even know the way and the day; they could almost lead the herder. When the grass is dry and the cows feel the winds change, they leave the plateau on their own to find the traditional lowland grazing areas where fresher riverside pastures sprout and farmers on the forest edge have left millet and corn stover in their fields to encourage cows to manure them. The herders have done this for years and, like many traditional customs, the transhumance serves a crucial economic purpose for the herders as well as for other local communities. Agricultural communities get seasonal access to meat, fertilizer, and milk (Green and Tchinkelé 2004). However, not all the traditional practices of Mbororo pastoralists serve such a clear and positive purpose. In fact, on the remote highland plateaus of northern Cameroon, there is a growing realization of a natural resource management crisis that is equally caused by dynamic external

socio-economic pressures and the very social values and dietary habits of the Muslim pastoralists (Tiayon 2004).² Ironically, what the devoutly Muslim pastoral communities do not eat might end up killing them and their cattle...

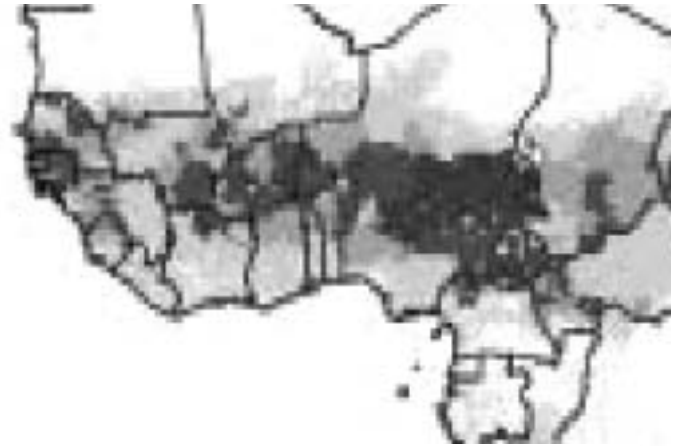
Livestock are the primary form of personal wealth holdings in many parts of Sub-Saharan Africa (Burnham 1999). The importance of livestock to Africans can be measured by how they allocate resources to livestock raising. Africa, with over 24 million km² of land used for livestock, has the largest amount of land dedicated to livestock production systems of any region in the world (Thornton et al. 2002). The indelibly deep cultural and economic link to livestock ownership throughout Africa is rooted in the continent's ecological and political realities. With relatively unstable regional banking and political systems, many entrepreneurs in Sub-Saharan Africa fear the sudden collapse of currencies or banking systems (Boutrais 1999). They keep their riches in commodities; in cattle rather than banks. Poorer members of the community, such as small farmers, may also own small livestock. The small farmers rely on the resilience and fertility of these animals for quick returns on their investment, profitable byproducts (milk or manure), and an ability to easily liquidate assets in times of need. Yet, there is a nuanced but clear difference between raising livestock and practic-



Map 1 : Tsetse-Infested Zone (Rege et al. 2004)

ing pastoralism. Unlike the entrepreneurs and small farmers, pastoral communities rely almost exclusively on livestock for their livelihood.

The Sub-Saharan African dry-land and highland regions are well-known for their pastoral communities (for example, the Fulbé, Tuareg, Massai, and Mbororo). These pastoral populations have found ways to cope with ecological instability by practicing transhumance or nomadic migrations. The pastoral migrations attempt to opportunistically capitalize on seasonal vegetative regeneration in dry areas, avoid disease vectors, avoid heavy taxes, and allow access to markets that give the highest value for cattle. African producers, like nearly all economic agents, search for stability despite their long trials with massive ecologic vicissitudes. The producers must cope with the long dry season in Sahelian (the semi-arid lands below the Sahara) regions, cyclical major droughts, and the fact that natural vegetation occurring in this region is largely unpalatable and of little use to humans. In fact, occasional opportunities for quick and robust growth and subsequent rapid decline, a "Boom-Bust" ecologic cycle, is a defining characteristic of the long-term economic patterns in this region (Reader 1999). In their quest for stability, producers have modified their behaviors to give somewhat stable economic outputs that are immune to the ecologic "Boom-Bust" cycles. In fact, contrary to some common beliefs that humans were first nomadic herders before settling down into agricultural lifestyles, anthropologists now theorize that nomadic herders in Africa were once sedentary farmers. These sedentary people may have been forced to take up nomadic lifestyles in response to historical expansions of the Sahara desert, which caused ecological crises and turned agricultural enterprises into barren desert and agricultural communities into nomadic herders. The nomadic herding lifestyle was an appropriate response to ecological instability; it allowed people to take advantage of inedible,



Map 2 : Cattle Density in West-Central Africa (Thornton et al. 2002)

sparse natural vegetation that could be easily converted into edible livestock products (Reader 1999).

The main limitation to further expansion of the already large areas dedicated to livestock (specifically cattle) production in Africa has always been the presence of tsetse flies which give livestock (specifically zebu breeds), as well as humans, the deadly trypanosomiasis disease.³ Tsetse flies are common in humid, warm, moist areas. African pastoralists therefore have been traditionally limited to dry regions or cooler highland regions (GESEP 2004; Hamadama 2004; Reader 1999). In fact cattle husbandry has never made significant inroads below the Sudano-Guinean vegetation belt where tsetse flies become ubiquitous (see maps 1 and 2).⁴ By limiting cattle movement and economic alternatives, tsetse flies have made an incredible impact on the cultural geography of Sub-Saharan Africa. This is especially clear in Cameroon where religious, ethnic, and economic regions are clearly related to the tsetse fly regions that have constrained expansion.

The Adamaoua (Adamawa) plateau, a massif that crosses Nigeria, Cameroon, and the Central African Republic, is one of the best regions in all of Africa to raise cows. Located on the Nigerian and Cameroon border, the remote Tchabal Mbabo plateau includes some of the highest (above 2000 meters) and best pastures in the Adamaoua. Upon arrival, an United States American is immediately reminded of the vast plains of Wyoming. Fulbé and Mbororo pastoralists settled this region over the past 200 years through a series of Muslim jihads and subsequent economic migrations. This region is almost entirely Muslim. It is also the only real homeland for the pastoralist Mbororo people. When the Mbororo pastoralists first settled here 200-some years ago they found open lands with a perennially cool climate (annual temperatures average around 70°F) free of tropical bovine parasites, abundant pastures and river gallery forests, and relatively close and large markets where they could sell their cattle. A



Akou Mbororo Cows grazing on the cliff edge

few Mbororo clans pioneered this ideal area and adapted their resource management strategies to suit the new ecological realities (Boutrais 1995; Boutrais 1999; Tiayon 2004). In fact, Tchabal Mbabo is known as "the last pastoral refuge" in anthropological literature (Boutrais 1995). The plateau and its surrounding region are commonly recognized among the Fulbé and Mbororo pastoralists who live in the highlands as their last good options for settlement and transhumance in an environment that is increasingly hostile to mobile pastoralists (Mbontodjé Elders Council 2004).

Despite their attempts⁵ to adapt to the new realities of being semi-sedentary pastoralists, the long-term settlement of the Mbororo on Tchabal Mbabo has led to some serious natural resource management problems that endanger local ecologies as well as the pastoral communities themselves. Some of the long-term problems of this region are typical of developing countries: bush meat hunting, deforestation, loss of soil fertility, erosion, polluted or sparse water resources, and ecological changes due to overgrazing (Thomas and Thomas 1996). But, there are some other unique problems here caused by the ways in which the pastoralists' religious values and social norms dictate resource management. The most interesting of these is the age old problem of the tsetse fly.

There are many tsetse fly vectors, but the most common carriers are animals in the Suidae family—pigs, wild pigs, and warthogs. Interestingly, it is widely recognized that during the recent history of pastoralist occupation and management in this region the number of warthogs and wild pigs (as well as baboons) has actually increased while other animal populations have decreased. These trends are directly attributable to the pastoralists' religion. The Muslim pastoralists and the many agricultural communities that

they have Islamized do not eat pigs. In fact, many pastoralists who own either bow and poisoned arrows or homemade guns for their own protection will not even kill the pigs and warthogs for fear of what the people in the community would think of them. While Islam forbids them from eating pork, their own cultural norms and societal expectations keep them from killing the very animals that serve as the main vector of the tsetse flies, the largest threat to the pastoral communities' well-being.

Once, while traveling through the cliffs with an ethnically Gbaya Christian friend and a Mbororo Muslim pastoral leader, we came upon two wild pigs. The pigs were about 10 paces away. The pastoralist shouldered his rifle and watched patiently as the pigs recognized us, ambled into the forest, and disappeared. The Christian Gbaya man went into a five minute heated monologue of disbelief. Just one of those pigs shot and taken back to the village would double his monthly salary and feed his family for a week. Yet here this "crazy Mbororo herder" had not even aimed at the pigs. I asked the pastoralist why he did not just shoot the pigs. After all, it is the pigs that bring trypanosomiasis and my friend would have paid him for the animal. He grimaced at the thought. He responded that there was no reason to waste a bullet on the animal and maybe, if he killed it, people in his village would say that he also ate the forbidden meat and he would lose their respect.

In studying or working with natural resource management strategies in the developing world we often find problems that are fascinating and tough to tackle. While the above thoughts are just an anecdotal footnote of a development worker in the field, I hope that they bring some specific and poignant concerns to mind. The above thoughts indicate the importance of social research in understanding how natural resources are managed and should be managed. In our current world, many development projects are confronting the divide between international priorities and local concerns. National agencies and international organizations are attempting to integrate local priorities into development projects in order to encourage local ownership and create successful outcomes. For local populations, the non-scientific elements of religion, social norms, and cultural ideals play an important role in how natural resource management decisions unfold on the ground.

In regions such as Sub-Saharan Africa, Southeast Asia, Central Asia, and Western China local concerns and priorities are often based on some variety of Islamic values. In the case of Tchabal Mbabo, the Muslim pastoralists often said that when they could pray with a man, they would trust what he said to their community; anyone with whom they could pray would never shoot a pig. In Iraq, wetland restoration experts have found that Muslims will not eat certain fish types. In fact, they release these forbidden fish species back into the marshland waters. Thus, the recovering marshes' fish population pyramid is tilted in a bizarre and unsustainable balance (Richardson 2004). While each

community presents special challenges, ways in which Islamic values influence resource management strategies will be central to our efforts to understand community priorities in many war-torn or underdeveloped regions.

References

BirdLife International (BLI). 2001. GEF proposal: Project 1286: Transboundary Collaboration for Ecosystem Conservation: the Mountain Forests of Gashaka Gumti National Park, Nigeria and Tchabal Mbabo, Cameroon. http://www.gefweb.org/Projects/Pipeline/Pipeline_7/Concept_draft_5_Final.DOC

BomBome, K., B. Sock, C. Manga, J. Zibi, and J. Mbiang. 2004. Evaluation of mammalian fauna potential, habitat and socio-economic aspects of the Tchabal Mbabo region in the Adamawa province of Cameroon. Yaoundé: Jane Goodall Institute.

Boutrais, Jean. 1995. Hautes terres d'élevage au Cameroun. 3 vol. Études et thèses ORSTOM. Paris: ORSTOM. boutrais@ehess.fr

1999. Nouvelles Techniques D'Elevage En Savanes, Nouvelles Inégalités (Aadamaawa, Cameroun). In: Pastoralists Under Pressure by Azarya, V., Anneke Breeveld, Mirjam de Bruijn, and Hans Van Dujik. Leiden: Brill. pp.161-190.

Burnham, Philip. 1999. Pastoralism Under Pressure?—Understanding change in Fulbé Society. In: Pastoralists Under Pressure by Azarya, V., Anneke Breeveld, Mirjam de Bruijn, and Hans Van Dujik. Leiden: Brill. pp.161-190.

Gestion et Securitization d'Espaces Pastoral (GESEP)/ Union des GIC pour l'Eradication des Mouches Tsetse Dans l'Adamoua (UGICETA). 2004. Ismaila Bello, Director of Mapping.

Green, Arthur and Jonas Tchinelé. 2004. Evaluation of Mbororo Transhumance Routes and Natural Resource Management in the Tchabal Mbabo-Dodeo Region. Yaoundé: BLI.

Hamadama. 2003. President of MBOSCUA and representative of Ministerie d'Elevage (MINEPIA). Personal Communication.

Mbontodjé Elders Council. 2004. Personal Interviews with the leaders of Mbontodje #1 and #2.

Reader, John. 1999. Africa: A Biography of a Continent. New York, New York: Vintage.

Rege, J.E.O., G.S. Aboagye and C.L. Tawah. 2004. Identification and characterization of West African Shorthorn cattle.

FAO: <http://www.fao.org/docrep/t1300t/t1300T04.htm>

Richardson, Curt. 2004. Presentation on Hydrological and Ecological Changes in the Iraq Wetlands. Duke Wetland Center Presentation at North Carolina State University.

Thomas, D and Thomas, J. 1996. Tchabbal Mbabo Botanical Survey. Report to WWF. Yaoundé; Cambridge; BLI.

Thornton, P.K. and R.L.Kruska, N.Henninger, P.M.Kristjanson, R.S. Reid, F.Atiemo, A.N.Odero and T.Ndegwa.2002. Mapping Poverty and Livestock in the Developing World. International Livestock Research Institute. Nairobi, Kenya. <http://www.ilri.cgiar.org/InfoServ/Webpub/fulldocs/mappingPLDW/index.htm>

Tiayon, Francois. 2004. Assessing people's participation in Conservation Initiatives in the Mbabo, Dodeo, and Mayo Kelélé Areas (Adamoua Province). Yaoundé; Cambridge; BLI.

1. In Fulfuldé the disease is known as pi'al or pi'e. "The disease is found in 36 sub-Saharan countries and exists in two clinical forms due to *T. brucei gambiense* and *T. b. rhodesiense* which so far are geographically separated. The clinical presentation of *T. b. rhodesiense* is more acute; the *T. b. gambiense* form is chronic, with months to years elapsing before the appearance of obvious signs or symptoms. Sleeping sickness is fatal if untreated." (see: <http://www.eanett.org/whatis>)

2. The region is almost entirely Sufi, but recently trends toward strict doctrines from radical sects like the Wahhabis are discernable due to influences from northern Nigeria, pilgrims returning from Saudi Arabia, and Modibo teachers from other regions coming to preach about revisions of the general understanding of Islam that is based on emotional Sufi interpretations mixed with local animistic rituals.

3. There are a few exceptions to this, according to Rege (2004), "There are two major groups of trypanotolerant cattle on the continent, the Hamitic Longhorns (represented by the N'Dama) and the Shorthorns (represented by several breeds/strains). The latest estimated population of cattle of N'Dama origin is 4.9 million head (49.5 percent) out of a total of 9.8 million. The various Shorthorn breeds, therefore, collectively represent only about 50 percent of the total. Several countries of the subregion have virtually only N'Dama cattle. These include the Gambia, Guinea, Guinea-Bissau and Sierra Leone. Sudano-Sahelian countries, including Senegal and Mali, form the transition zone between the N'Dama and zebu, while Côte d'Ivoire and Liberia form the transition belt between the N'Dama and the Shorthorns."

4. While it is true that Fulbé and other pastoralists have made some inroads into humid areas thanks to modern veterinary medicines and cattle breeding programs (Hamadama 2004), the buffer areas of danger between tsetse free zones and heavily infested zones are in constant fluctuation. The main vectors of tsetse reintroduction are considered to be herders that do not properly utilize insecticides, inefficiencies in eradication programs, and the subject of this article... wild animals (Boutrais 1995; Boutrais 1999).

5. The Mbororo pastoralists of Tchabal Mbabo have the rare distinction of being one of the few Mbororo communities in all of Africa to undertake agriculture (corn) and forestry (eucalyptus) activities.

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For more information on the Masters International Program, see: http://www4.ncsu.edu/%7Eesills/mi/mi_home.htm.

Forestry Study Tour: Ghana

Stibniati Atmadja and Kelly Jones



A waterfall at Ghana's tallest mountain, Afadjato.

"In West Africa and in much of the less developed world, management and utilization of forest areas for tourism, timber production, and conservation cannot be done in isolation of the communities that live adjacent to these areas."

Introduction

In May 2004, 10 students and 3 professors from the Forestry Department at North Carolina State University had the opportunity to participate in a forestry study tour to Ghana. The forestry study tour focused on the management and utilization of Ghana's forests, and some of these findings will be discussed below. However, during the study tour, students also had many opportunities to learn about and participate in the culture of Ghana. Students participated in a 2-night home-stay with a Ghanaian family, they were introduced to Ghanaian food and dance, and they visited many historical sites in Ghana, including some of its legendary slave castles.

Half of Ghana's forest resources were depleted before 1950. Currently, Ghana has 28% forest cover that is diminishing at a rate of 1.7% annually due to local uses for fuel wood, bushmeat, and the conversion to agricultural land. Added to this are increased urbanization, timber and mining operations. Starting in the early 90's, Ghana began to join a series of global forest initiatives and also began to create some of their own forest protection initiatives. While still plagued with numerous regulatory and enforcement issues, Ghana is trying to revamp its forests to be both competitive in the global market and sustainably managed for future generations.

In West Africa and in much of

the less developed world, management and utilization of forest areas for tourism, timber production, and conservation cannot be done in isolation of the communities that live adjacent to these areas. The millions of people who live in close proximity to forest resources depend on these resources for their livelihood. Limiting access to fuel wood, food products, medicinal products, water resources located within the forest, and to income generating activities (hunting, mushroom or honey collection, etc.) is a complex and difficult task. In light of this, governments, international agencies, and forest managers are trying to find solutions that can both conserve forest resources and allow forest-dependent communities to access the same resources.

This article addresses the topic of integrating communities into forest management, through ecotourism, small-scale development projects, educational campaigns around protected areas, agroforestry systems and private management plans. Participants of this trip were not only direct observers of this process of community forestry but also had the opportunity to talk with villagers, government agencies, and forest managers. They used a methodology called Rapid Rural Appraisal (RRA) to process how stakeholders viewed and used the forests of Ghana. RRA is a participatory learning method that asks questions of people informally and formally to

assess their needs, wants, and views of a topic. Some of the findings from this process are discussed below.

Rapid Rural Appraisal

Students were encouraged to interview a diverse set of people to illicit their views on local forest management and the benefits they perceive from forest services. The questions focused on five forest products and services: bushmeat, fuelwood, timber, tourism and water. The interview process used open-ended questions that mimic daily conversations. Roughly half of the interviews were with people that were familiar with our group, and the rest were done with people met during stops throughout the trip. There were 16 observations, equally divided between male and female respondents. Most were interviewed in the Western or Volta Regions. Their age ranged from 22 to approximately 70 years old; their occupations ranged from hairdressers and restaurant waiters to forest rangers and NGO officials. Due to the trip itinerary, the results were biased towards the perception of people in rural areas and those affected by the tourism industry. Respondents were asked to refer to the forest that they benefit from or use the most, or the one nearest to their residence.

Most of the forests that were discussed in the interviews were (perceived to be) owned by either the government or the community. There were only two occasions where pri-

vate individuals owned forest land, and both were living in the same village. There was no clear relationship between the legal owner of land and the entity that enforces the law. Village chiefs sometimes enforced laws on government forests, and conversely, the government sometimes enforced laws on community forests. It seems that in general, communities prefer to handle forest encroachment issues at the village level, and refer it to the government (i.e. police) only when necessary. Response on whether laws are actually enforced was mixed. Respondents believed violators would be punished when the village chief enforced the law; they seem to be more skeptical when the government is involved.

All respondents agreed that the forest produced fuelwood, regardless of whether they use it. An interesting finding is that only half (47%) of the respondents agreed that the forest produces timber, a product that is very similar to fuelwood. The general perception is that people do not think timber is important for their own families, but it is important for Ghana. A possible reason for this is that individuals may have difficulties to access, harvest or sell timber compared to the other products/services, and thus tend to ignore timber as a forest product that they can benefit from.

Only three people (19%) did not agree that the forest provides bushmeat; they consisted of a village leader, owner of a small eatery and a person that works in tourism. It is possible that their occupation made them reluctant to admit using bushmeat because it is becoming increasingly illegal to hunt them in the forest. Alternatively, they may simply think that bushmeat has become too scarce in the wild that the forest practically does not provide it anymore.

More than half (63%) of the respondents recognized that the forest contributes to tourism. Those who did not feel that tourism is a service provided by the forest were not employed in the tourism industry, with the exception of a waiter working in a beach resort. Other respondents recognized this benefit regardless of whether they received income from tourism. Note that approximately half of the respondents (53%) said that they received income from tourism.

A large majority of respondents (75%) saw the positive link between forests and water supply. It was an unexpected result, since watershed protection is the least tangible of all the forest benefits covered in the RRA. The responses were not influenced by gender, age, or where they lived. It seems that everyone who worked closely with



Women collecting firewood in a rural area of Ghana.

natural resources, such as farmers, forest rangers and tour guides, saw this benefit. This group consisted of 56% of the respondents. The other 19% who did not work in these fields but knew of watershed protection may have heard of it from their neighbors or village leaders.

Female respondents seem to be familiar with a wider range of forest products; they talked about chew sticks, pounding sticks, fruits, cane (rattan) and medicine. Men were more familiar with bushmeat and the laws on hunting. The men also talked about laws governing fuelwood collection, which was interesting because unlike hunting, fuelwood is usually collected by women.

The respondents were asked what they would do if they could use the forest as they wished. Most (11 out of 15 responses) said they would farm it, usually with coco or casava. Others said they would harvest timber or hunt bushmeat. In one of the villages we visited, a village elder commented that it was good that the government owned the forest that surrounded them, because it kept the community from converting all the forest into coco farms.

Forest-Fringe Communities

A common theme, around ecotourism projects, government forest reserves, and private forests was the need to incorporate local communities into the conservation and management process. Years of top-down conservation policies had created an environment in Ghana where local people were opposed to conservation and forest management because they had seen no benefits from these areas. In the past two decades that approach has been shifting to one of commu-



Kid selling grass cutter, a popular form of bushmeat, in Ghana.

“The respondents were asked what they would do if they could use the forest as they wished. Most said they would farm it, usually with coco or cassava.”

nity-based conservation and management. In Ghana, they use the term forest-fringe communities and are trying to funnel forest revenues back to the local people through direct payments and/or small-scale development projects. The hope is that local communities will take up conservation and the policing of forest reserves once they see the economic value associated with them. This strategy does not come without its own problems. Use of forest reserve money is not always transparent, individuals do not always benefit equally, and the issue of migration into an area that is successful is a concern.

Ecotourism

Ecotourism is allowing Ghana to capitalize on its natural resources and attract tourists away from Accra and the coastal areas, while providing incentives for local people to protect and manage their forests. Communities making money or benefiting through ecotourism sites and the development projects associated with them are helping to manage and protect their forest resources. Two ecotourism sites visited on this study tour that were trying to protect forest and wildlife resources included the villages of Liate Wote and Gbledi. These villages surrounded the highest mountain in Ghana, Mount Afadjato, and a large waterfall that was visited by many tourists. These ecotourism projects were trying to funnel money back to the village through community development projects. This system seemed to work well, as long as funds were well accounted for. In Liate Wote, tourism revenue was being split between local authorities, the tourism committee, landowners, maintenance, and development projects. In this case, people owning land in the protected area were paid directly for their property each quarter and anyone owning large timber trees in the reserve was paid annually for the protection of their trees. Extra revenue was used for community development, past projects included obtaining electricity for the village and building a new schoolroom.

Another common component of these ecotourism projects was the incorporation of small enterprise development projects and/

or conservation education for the community. The Gbledi project, with help from the Ghana Wildlife Society, was incorporating a conservation education component and small enterprise development (SED). Conservation education was taking place in local primary schools around the area. SED consisted of providing loans to individuals in the community for activities such as palm oil processing, gari making, and beekeeping. They were also trying to promote grasscutter (a large rat) rearing. At Liate Wote, other organizations had initiated similar projects, including mushroom raising, beekeeping, and soap making.

National Parks

Around Ghana's National Parks, government officials were working with forest-fringe communities to ensure that conservation priorities were being met. Kakum and Anakasa National Parks were both trying to funnel revenues back to the surrounding communities to encourage locals to stop using resources found in the protected area. Kakum NP has 5 surrounding communities that are receiving funds from tourism revenues. Originally money was given directly to the chief and his council but this money was being mismanaged. Today the government is facilitating the use of revenues by meeting with each community to discuss and decide on a development project together. The government then manages the funds while the community provides the labor for the project.



Women preparing palm oil in one of the many small enterprise development programs.

A park guard is stationed in each community to monitor encroachment into the park. Violators are dealt with at the national level and are fined and usually sent to prison.



The entrance to Anakasa National Park.

Anakasa NP has a similar program with its surrounding communities. But its most notable program is its conservation education program, funded by outside donors. This program targets schools within a 7km radius of the park. Schoolchildren at two different grade levels are brought to the park for 4 days. During these 4 days they take walks in the park, play a series of ecological games, and learn about the importance of forests and wildlife. The only contribution the school children make is by providing some of their own food. Most schoolchildren walk away from this experience with a new outlook on the importance of forest ecosystems and they are important teachers to their parents and others in their communities.

The Forest Department and Agroforestry

The Forest Department is currently trying to rehabilitate nine of its forest reserves through an agroforestry system known as taungya, which incorporates forest-fringe communities. To establish a taungya system, a piece of land is cleared and planted with tree

seedlings. At the same time food crops, such as plantain, cocoyam, or corn are planted among the trees. These food crops can be farmed for duration of 2 to 3 years depending on how quickly the tree canopy develops. After 3 years, the trees remain on the land until they are harvested and then the system can be repeated.

Farmers can raise seedlings, peg or plant trees to earn income during the first year of the taungya system. After the trees are planted, the individual is allowed to farm on their compartment for 2 to 3 years, depending on the tree species planted. They are only allowed to plant crops approved by the Forest Department. Farmers are phased off the land at the end of 3 years, but can apply to participate in any new taungya systems.



An example of taungya agroforestry in Ghana. This plot contains the timber species *Tectonis grandis* and the food crop cassava.

Tree species planted in the taungya system vary according to the soil and climate of the area; but all of the tree species planted are important timber species. Common species used included *Tectonis grandis* (Teak), *Cedrela odorata* (Cedrela), and *Terminalia superba* (Ofram). These trees will be left in the plantation for an estimated 25 years. After harvest, 40% of the timber revenue is supposed to go back to the farmers who participated from the forest-fringe communities.

Private Initiatives

The idea of integrating forest-fringe communities into forest management was even being recognized at the private level in Ghana. A private timber company, named Portal, which produces high quality wood panel doors, had designed initiatives of its own to integrate the communities surrounding its timberland. Portal's rationale for doing this was two-fold, they wanted to maintain a good rapport with the surrounding villages so that extraction of valuable trees and use of land for agricultural purposes would be minimized on Portal's property and so that future concessions/land in the area might become attainable in the future.

Some of Portal's ideas were to provide improved socioeconomic conditions to these villages, in terms of improved housing structures, electricity, sanitation systems, health care and education components. They also had plans to introduce high value crops to the farmers, which would then be bought back by Portal to process and sell on the market. Portal also hoped to offer employment to some of the villagers living near their land.

While some of Portal's ideas seemed unrealistic, the fact that they were thinking in this way at all emphasizes the impact of this change in mind-set from a top-down forest management approach to an approach that attempts to minimize the impact of forest decisions on local communities.

Conclusion

Direct observations and responses from RRA demonstrated the dependence that Ghanaians had on forest products. The awareness level of local people on their uses and the importance of forest resources was also high, with 100% of RRA respondents noting that the forest provides fuelwood, 81% noted that the forest provides bushmeat, 75% noted that the forest protects water resources, 63% noted that the forest provides tour-

ism activities, and 47% noted that the forest provides timber. Despite the values placed on forest resources, the majority of people were honest about their desire to convert more land into agricultural use. Harvesting more food precludes any initiative to conserve forest resources.

Working with surrounding communities is inseparable to protecting forests and wildlife. People living in proximity to a resource are the ones most affected by any limitation on that resource; therefore, policies that exclude communities in the decision-making process are bound to be viewed negatively and will not be honored by the communities. Communities are also honest about their desire to convert more land to agricultural uses; providing economic incentive to communities to protect their forests is necessary to circumvent the loss of more of Ghana's forest resources.

Ghana's approach to forest-fringe communities is allowing villagers, government agencies, non-governmental organizations and private industries to work together at designing a better future for Ghana. This initiative is a learning process and there are going to be setbacks, but the fact that Ghana has set out on this path at all is encouraging for the rest of West Africa.

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For more information on the study tour to Ghana, see: <http://www.ncsu.edu/project/cnrint/GHANA/>.



An old growth tree species in Kakum National Park.



Participants of the Ghana Study Tour at Shai Hills National Park in Ghana.

CNR faculty in Brazil: from araucaria to loblolly pine

Orlando Rojas

In March 6-13 of this year I joined Professors Fred Cabbage (Head of the Department of Forestry at that time) and Erin Sills (International Forestry Program) for a tour to Brazil following an invitation made by Dr. Argos Gumbowsky, Academic Director of Universidade de Contestado.

We tried to make the most of this trip by visiting several other institutions during the one-week period, as we believe there are a lot of opportunities for collaboration and synergies with Latin America, especially with countries that are key players in the forestry and forest-based products arenas, such as Brazil.

The visit started in Piracicaba, a 170 km drive from the country capital, São Paulo. There Dr. Cabbage visited Imaflora (<http://www.imaflora.org/>), the Institute for Forest Certification in Brazil and also met with faculty at the "Escola Superior de Agricultura Luis de Queiroz" of the Universidad de São Paulo (<http://www.esalq.usp.br/>). Overall these efforts were aimed at consolidating ongoing initiatives for collaboration with Brazil. NCSU is also working with partners in Argentina, South Africa, South Korea and Sweden to create forest certification coursework and study the development of criteria and indicators for forest management and sustainability. During this time I visited Votorantim Cellulosee Papel (<http://www.vcp.com.br>) where I gave a seminar on Colloid Chemistry in Papermaking and explored possibilities for alliances with industry in Brazil.

We learned that planted forests in Brazil are mostly concentrated in the States of São Paulo, Paraná and Bahia, which together hold more than half of the plantations in the country. Espírito Santo, Santa Catarina and Paraná were identified as significant

regions in terms of the relative reforested areas.

Brazilian pulp and paper companies chose three states in particular to concentrate their operations: São Paulo, Paraná and Santa Catarina, which together account for ca. 83% of all paper production in Brazil and 58% of the total pulp production (the states of Minas Gerais and Espírito Santo are also significant pulp producers). These five states are located in the South and Southeast regions of Brazil. The differences between these states result from the raw materials used and the final products created. For example, the paper industries in São Paulo are prominent in printing and writing papers, carton boards, and special papers produced almost exclusively from short fibers, whereas production in Paraná and Santa Catarina focuses on kraftliner, packaging paper and newsprint, using long fibers.

The following day both Dr. Cabbage and I visited the Brazilian Pulp and Paper Association and presented an overview of our programs and also discussed opportunities for exchange. The same day we flew to Curitiba where we were met by Dr. Antonio Higa who is a professor in the College of Forestry at Universidad Federal de Parana (<http://www.floresta.ufpr.br>). Activities at this university included our presentations highlighting the programs in Forestry, Wood and Paper Science and Parks Recreation and Tourism Management and discussions of the possibility for faculty exchange and student recruitment. A variety of individual meetings included Dr. Jorge R. Malinowski regarding timber harvesting; Dr. Flavio Kirchner who works on remote sensing and geographical information systems; Dr. Umberto Klock on Pulp and Paper technology; and Dr. Ricardo Berger and other forest economics and policy

faculty.

Dr. Higa toured us through their facilities, and his students presented a very nice database and interactive information system for forestry planning and reforestation that was developed under the auspices of various forestry entities and federal agencies (please contact us for a CD demonstration). That day we were joined by Dr. Sills and together we embarked on a road trip further south to Santa Catarina, specifically to Canoinhas.

The regional concentration of plantations and related industrial, governmental and university initiatives in this area (Paraná and Santa Catarina) is the result of a combination of historical factors and soil and climate characteristics. It was only in the 20th century that industrial wood utilization began in Paraná, using *Paraná* pine (araucaria) as a raw material, which was very abundant in the region. The large supply of raw material in the South of Brazil helped sawmills prosper and expand, and contributed to the increase in skilled labor specializing in wood products.

This great concentration of sawmills, along with incentives for forestry activities, stimulated wood and pulp producers to expand to other pine species on an industrial scale. Additional incentives offered by the government in the 1960s were applied effectively to tree planting. Since then the two states came to use mainly pine, focusing on the North American species *Pinus elliottii* and *Pinus taeda*, which are well adapted to the region's climate and have become the raw material for local production. The successful trip made many years ago by North Carolina's own loblolly pine to Brazil is an anecdotal link between NC State and our Brazilian counterparts, which foretells good success.

A factor that we quickly noticed after meeting the faculty of Universidade de Contestado in Canoinhas was the number of last names with foreign origins (German, Italian, Polish, etc.). We were told that this was another contributing factor to the rapid development of the industry in the South, as many immigrant groups were actively engaged in prosperous initiatives together with indigenous communities.

We visited Rigesa Company (<http://www.rigesa.com.br>), which is part of the MeadWestvaco Corporation, and met with personnel from the forestry and pulp and paper divisions. Dr. Arnaldo Ferreira, who works in tree improvement and biotechnology, gave us an overview of the research efforts in this area. Along with a tour of the mill, we also had the opportunity to visit their pine plantations and witness silvicultural and harvesting activities in the field.

Rigesa controls all steps from seed production to wood harvest and transport, which involves intense forest management and research. Their reforestation program began 16 years before the start-up of the paper mill. Native tree species are not used to supply Rigesa's paper production line and the Forestry Division has been working on genetic improvement of pine and development of faster-growing, cold-resistant eucalyptus. Currently Rigesa owns over 48,000 hectares of forest land of which 13,000 is covered with natural vegetation with a total lumber stock exceeding 44 million trees.

The final day was focused entirely on a visit to the facilities of Universidade de Contestado in Canoinhas, hosted by Dr. Argos Gumbwosky. We first presented an overview of the Forestry, Wood and Paper, and Parks, Recreation and Tourism Management programs of the NCSU College of Natural Resources to an auditorium filled by faculty and staff who showed great interest in the subject. We held a planning meeting where some concrete initiatives were discussed.

I was particularly overwhelmed by the majestic size and beauty of araucaria pines and the friendliness of Brazilian people. We were attended with incredible hospitality during our visit and we greatly appreciate their interest in looking for ways for cooperation between our programs. Everything from the mill and plantations tour to the "churrascaria" and the mate infusion were wonderful. We believe that there are good opportunities for scientific and educational cooperation and we are in the process of promoting these prospects to our faculty and students.

Note: the author wishes to thank Dr. Cabbage for his support and Dr. Sills for her companionship and exemplary efforts in the International Forestry Program. As a result of this trip various other visits to Brazil followed and some tangible results are evident. We hope we can continue these ventures.

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Erin Sills (left), Orlando Rojas (front row, center) and Fred Cabbage (the tallest guy) with some colleagues and residents of Canoinhas.

Sustainable Uses of Natural Resources in the Yucatan Peninsula *Timothy Bass*



Students visiting local farms in the Yucatan.

“We were there not only to learn about the subject matter, but we were there to see and experience it first hand.”

I came to college four years ago thinking that I was going to figure out what I wanted to do with my life and finish as quickly as possible. The first few years in school, all I could think about was getting a degree so I could get a job and make a lot of money. I never listened to all of the people around me who told me that college was an experience and to take advantage of all it has to offer. One great thing that college offers that I was not willing to take advantage of was study abroad. I did not see the point of taking a class in another country even though I had only heard good things about such programs. As the years progressed, I began to appreciate college life more than ever before. I then came across a wonderful opportunity through North Carolina State University’s Department of Forestry. The program was sending NCSU students to the Yucatan Peninsula in Mexico to study with students from other universities from around the globe. I signed up and convinced my parents that I was going to Cancun to learn and not just to party.

As the time to depart for my trip to Mexico approached, I started to have a few doubts. I did not know any of the students going on the trip. I had only met one of the two professors a couple times. I did not know the native language very well and I was worried about being in a foreign country for three weeks.

Even though I was apprehensive about all of these issues, I knew that this was going to be a wonderful experience and that I could not pass it up.

I arrived in Cancun, Mexico and was immediately exposed to both the land and the culture. I had been to this area once before but had only been exposed to the tourist areas: the beaches, nightclubs, and resort type experience. I had not been exposed to what was to come from this study abroad program. Meeting other students and professors from other schools was a priority for the first day. Students and professors represented four different universities: Purdue University, Swedish University for Agricultural Sciences, North Carolina State University, and a University from the Yucatan, UADY. This was one of the greatest aspects of the entire course. The students from the Yucatan had a better understanding of local concerns, and students from Sweden and Purdue brought different perspectives including how things we learned about in the Yucatan were different from where they lived.

The class itself consisted of lectures and field trips. That was one thing that was great about this whole study abroad experience. We were there not only to learn about the subject matter, but we were there to see and experience it first hand. The class was called Sustainable Uses of Natural Resources in the Yucatan

Peninsula. We learned about the history of the area, the current uses of the land, and how some people are trying to make the land uses more sustainable.

This area of the world has a very interesting history. We learned about the ancient Mayan civilization and then we were able to see the archaeological sites of Chichen Itza and Uxmal. Reading about these ancient cities was interesting, but being able to see them in person was just amazing. We were able to see things that are not in books and climb the ancient temples. Just being in the presence of these structures was a great feeling. Another way that we experienced the history of the area was just by being in the cities of Merida and Cancun. Merida has a great history due to its foundation in 1541. Old cathedrals and architectural designs from the past surround the city and we saw this every day we were there. Cancun, on the other hand, is the polar opposite of Merida. It was established only 35 years ago as a tourist destination to attract people from all over the world. Just spending time in these cities allowed us to experience the everyday life of the people and their culture. A major part to the history of the area was the Henequen plantations. We were able to learn about these and actually traveled to Ake where there is a Henequen factory still in operation. We saw all the processes required to make balls of twine in this factory. We were also able to interact with people from the town and learn even more about their cul-

ture. We learned about the histories of different societies and cultures in school but nothing was as interesting as actually being there and seeing it for yourself.

In the Yucatan, it is very clear that tourism is what drives the economy. Everywhere that you went people tried to get you to take this tour or try this activity. Cancun is a city that is solely based on tourism. The city is home to the people who work at the big resorts that people come from all over the world to visit. It is home to the most beautiful beaches I have ever seen and some of the best night-clubs in the world. Besides Cancun, there are tourist attractions all over the peninsula, such as the archeological sites that we visited. We also went to Xel ha ecotourism center where we snorkeled and saw some of the beautiful wildlife in the area. We went to Sian Kaan and Celestun Biosphere Reserves and saw their attempts to preserve the land in the

Yucatan. On some of our free time, two other students and I went to Cozumel and saw what that island had to offer. The snorkeling was amazing, and it had a great atmosphere.

Besides tourism, another important economic activity is harvest of mahogany wood, for export. We visited a sawmill where we saw the process of converting tree trunks into boards that were to be shipped to other areas of the world for furniture production. This also gave us a chance to witness working conditions in the rural areas of the country. For example, one of the men working a saw blade was missing a finger. We also visited milpa-farms, which are the typical farming system in small villages. A major problem with this system is growing enough food to last the entire year. In fact, sometimes the crop production is only enough for three months. Some of the village people then have to work in factories in order for their families to survive. Even though these other forms of land use are

important, the majority of people realize that the area is a major tourist attraction and that is their key source of livelihood.

The whole experience of study abroad in the Yucatan was a once in a lifetime opportunity. We were able to not only learn about a new culture, but also able to live in it for three weeks. I met a lot of new friends from all over the globe and did things that I never thought I would do. I have learned a lot about myself in the four years that I have been in college, but I still do not know what I want to do for a living. From my study abroad experience, however, I learned that I want to travel the world and learn more about other cultures and see and do new things. I would recommend to any student not to let college just pass you by but to experience all that it has to offer. Study abroad is one of those great experiences offered by the Department of Forestry at NC State.

Timothy Bass is an undergraduate student in Environmental Technology at NC State.

The study abroad program in the Yucatan was led by Dr. Gary Blank of the NC State Department of Forestry and Dr. Andy Gillespie of Purdue University.



A local sawmill in the Yucatan.

Working Toward Sustainable Agriculture in Cambodia

Bryan Berenguer

Diammonium phosphate, Methomyl, Methyl Parathion, Monocrofos. These words are a few of many that have been greatly affecting the face of Cambodian agriculture. As in many developing countries, agricultural technologies developed in modern countries and introduced to Cambodia are being highly misused. Cambodian farmers often believe the use of chemicals to be fashionable—a passage into the more developed world. Little do they know that most of the chemicals they buy have arrived in their local market simply because they are no longer wanted by the modern world, mostly due to the health risks associated with their use. Basically, the majority of Cambodian farmers are fashionably using other countries' outdated materials. It is not their fault. Cambodian farmers are not aware of this simply because they have not been educated about the chemicals or how to apply them. The labels of pesticide and synthetic plant hormone bottles sold in the markets are mostly written in Thai or Vietnamese. Why? The majority of the pesticides sold in the market have been classified by the World Health Organization as class I chemicals (extremely/highly hazardous to human health) and have therefore been banned in their country of origin. The farmers have no idea of the dangers associated with the chemicals nor the rates for proper application. Usually, a "more is better" approach is taken and application rates are constantly increased. Slowly, Cambodian farmers are killing themselves and the ecosystem they depend on.

Such was the case upon my arrival to The Sharing Foundation's farming project in Roteang village, Kandal Province, Cambodia. Since its creation in 2001, the farm has relied heavily on chemical inputs for its production.



BJ and a group of farmers working with The Sharing Foundation.

Chemical fertilizers and synthetic plant hormones have masked the decreasing productivity of the land caused by continuous cultivation—allowing the land to produce past the point of exhaustion. The soil in the farm has been almost depleted of organic matter, giving it a cement like quality that is difficult to work with. This poor soil structure makes it difficult for water to penetrate or beneficial microbes to flourish. Consequently, the farm has become increasingly dependent on agricultural chemicals, which must be applied at ever higher rates to receive an acceptable product. The crops have also been kept insect-free by toxic pesticide cocktails applied without the use of proper safety equipment or regard for others in close proximity. Farmers could be seen spraying pesticides in shorts and sandals, often smoking a cigarette, while others were working in the same field. Usually a rotation of three to four farmers was needed to spray one field as those applying the chemicals often reported dizziness and nausea after a short period. Pesticides were usually applied around three to four times a week, with the concentration used each time often increased until all the insects in the fields were eliminated. Even if there was no insect infestation, the fields were sprayed for good measure. This overuse has caused the insects on the farm to become increasingly resistant to pesticides, making the farmers respond by using more toxic brands.

The Roteang farming project is now turning over a new chemical-free leaf. After around two months of trials with various organic approaches, the farm became pesticide-free on July 17th 2004 and completely organic on August 1st 2004 with the termination of chemical fertilizers. Proper crop rotation and management of crop residues are now the primary means of maintaining soil fertility. The farm now uses a prescription of one legume fallow for every two cash crops. The legume usually consists of longbeans or soybeans and the entire plant is tilled into the soil rather than harvested, adding both nutrients and organic matter to the soil. The un-merchantable parts of the cash crops, previously discarded in a pile off the fields, are also incorporated into the soil after harvest to further aid fertility.

Soil amendments in the form of compost, compost "tea" and manure "tea" are also used to fertilize the crops. The "tea" is created by fermenting manure or compost in water and the extract is used for periodic plant feedings. It is either applied to the roots during watering for direct fertilization or used as a spray for foliar fertilization and to protect the crops from fungus. In addition, native leguminous trees of the leucana and flemingia genus have been planted throughout the farm. These trees will be pruned at about one meter in height and their leaves added to the fields as a "green manure."

The TSF Roteang farm has also been reorganized to increase ecological diversity and restore the balance of insect predator/prey relationships destroyed by previous heavy pesticide use. Fields have been divided into 1/2 acre plots with adjacent areas cultivated in plants of different families. The result is crops of similar families distributed in small plots throughout different areas of the farm, making it more difficult for plant-specific insects to find their meal or damage the entire product. Intercropping techniques are also used to prevent unwanted insects. For example, the farmers had some success in deterring winged insects by planting a row of spring onion in the middle of each bed where kale was grown. Currently a tomato/chinese cabbage intercrop is being tested to aid in the control of problematic flea beetles. There is also a plan to grow marigolds, which produce a smell unfavorable to insects, along plot borders once enough seed has been collected.

A variety of natural pesticides are being used to combat insect infestation. Fermented chilies, garlic and onion are sprayed every three to four days on susceptible crops as an insect repellent. This has been found quite useful in the control of thrips. Soap, BT toxin, tobacco and neem (a native tree that produces an insecticidal chemical in its leaves, bark, and seeds) are used solely or in combination as pesticides. Often, a natural pesticide is not even required. The fruit of the bitter gourd has been successfully protected from insect damage simply by wrapping it in a sheet of newspaper (previously this crop was sprayed every two days with a chemical pesticide). Already, there are signs of the returning ecological diversity with beneficial insects such as dragonflies and ladybugs noticeably increasing in number.

So far the results have been quite promising. Luckily, the crop currently in production has not been as hard hit by insects as predicted and merchantable crops are already being produced. The farm harvested

its first ever chemical-free longbeans the first week in August and pesticide-free bitter gourd and caraway (a spice used in soup) the second week of August. In addition, an organic watermelon and pesticide-free kale harvest are just around the corner. Products unfit for the market (for example-curved bitter gourd or undersized longbeans) are given to the orphanage or to local families in the village.

The farmers are increasingly believing that vegetables can be produced in Cambodia without the use of chemicals. They too are noticing the increase of wildlife into the farm. Dragonflies now constantly hum overhead and more birds are seen hunting insects in the fields. The workers are no longer reporting the nausea and dizziness associated with spraying chemical pesticides or the skin rash experienced with handling chemical fertilizers. One farm family has even begun to make compost and use natural pesticides on the small plot of land they rent.

Unfortunately, the Roteang farm cannot sell its produce for a higher price since there is a three-year waiting period before it can be considered officially organic. Currently the farm simply enjoys a healthier environment and will seek an appropriate market in Phnom Penh at the end of the waiting period.

This is an exciting time for the TSF Roteang Farming Project. It is a chance to set an example for the neighboring farms by using progressive techniques that are based on agroecology rather than chemicals. More importantly, it is an opportunity for those working and living in/near the Roteang farm to sit back, relax and breathe in the clean air.

Bryan Berenguer is a Masters International student in the College of Natural Resources. He is currently serving as a Peace Corps Volunteer in the Gambia.



BJ and longbean in Cambodia.

The Sharing Foundation (TSF) is a nonprofit organization established to help meet the physical, emotional, educational and medical needs of orphaned and seriously disadvantaged children in Cambodia. More information can be obtained at : www.sharingfoundation.org.

Reports from the field....

The report below was excerpted from a recent email from Dr. Larry Nielsen. He recently traveled to China with CAMCORE. Dr. Nielsen is a professor and the Dean of the College of Natural Resources at NC State University.

I traveled as part of the annual CAMCORE technical meeting this summer to China. Our CAMCORE folks-Bill Dvorak, Gary Hodge and Willi Woodbridge-led the trip, and Bailian Li, from our Tree Improvement Cooperative, attended as well (and helped mightily as our internal interpreter of language, custom and technical forestry). The trip not only gave me an opportunity to experience China, but also to concentrate on CAMCORE's programs and potential.

So, here is what I think I learned:

1. CAMCORE is the world's leading tree conservation program. With support from leading companies around the world for 24 years, the program has been preserving genetic resources and evaluating them for potential use by industry worldwide. I encourage you to spend some time getting familiar with CAMCORE's programs-you'll be proud of us for what we are doing here. (To learn more about CAMCORE, see: <http://www.camcore.org/>)

2. China is an unexpected mix of modern and traditional. The big cities are impressively modern-new construction everywhere, impressive infrastructure (including roads), attractive and extensive public parks and art, clean, safe, friendly, and very polluted. The countryside is traditional, with small villages, small-scale agriculture, and fresh-air markets.

3. China may have a communist government, but it has a capitalist spirit. The strong central government allows things to get done (roads, etc.), and the commitment to capitalism in the economic sector allows them to make and sell things aggressively. The people are hard-working, energetic, and innovative.

4. Observing these things confirmed for me what everyone has been saying-look to China for future markets, competition, and opportunity. We (and that is "we" anyway you wish to use it) need to be watching China, working with them and partnering with them.

5. Intensive forestry in China is concentrated in the southern provinces (Guangxi, Guangdong), where we spent most of our time. Reforestation has been a national priority

for the past couple of decades, but productivity is not high and most of the forests are quite young and non-native (eucalyptus is dominant). Consequently, wood, for fiber or solid-wood products, is in short supply and will be for the foreseeable future. China is a huge importer of wood fiber and solid wood.

6. As it has been for centuries, China remains an enigma to most of us. We had a difficult time trying to understand all that we saw, and it seemed like we often heard very different versions from one site to the next. For example, we heard repeatedly that the hardest part of practicing forestry in China was getting access to land-a company might make a deal with the central government, but then local governments and individuals make claims to the land as well, and the central government punts, saying it is the company's problem to work out. How various companies manage this issue, and what they were willing to tell us varied substantially.

7. The CNR folks who were there all agreed that our college has a substantial lead over other U.S. colleges in our connection to and understanding of Chinese forestry and natural resources. We have faculty in all departments who are from China and who are actively engaged there. We have contacts that go back a long way; Bailian, for example, is a graduate of the Beijing Forestry University and we met many of his classmates who are now leaders in government, industry, and academia. Coupled with other resources at NC State and in the state of North Carolina, this makes us think that our college can be a national clearinghouse for information about Chinese natural resources.



The update below is taken from a recent email from Dr. Frederick Cabbage. He is currently on sabbatical in Argentina and Uruguay. Dr. Cabbage is a professor in the Department of Forestry.

I am currently in Tacuarembó, Uruguay. Overall, the stay here has been a delight. I stayed at the Instituto Nacional de Investigación Agropecuaria (INIA) for my four weeks here. I stayed in a separate little house (they called it a chalet), and I bought a bike to ride to town, but it had two flats, so was only half the bargain.

I am enchanted with the country and people. Things are pretty clean and neat; everything seems very safe; the people are friendly, but not falsely effusive; and they are clearly hard working. The country is very rural, with farms and pastures in the center, and forests more along the borders with other countries. Uruguay is very pastoral and scenic, with rolling hills in a farm state sort of way, and lots of new plantation forests. The small towns are in pretty good shape all in all.

The country is hopefully recovering from a drastic economic crisis in 2001, when they lost 50% of their total gross domestic product in one year. Thus their international debt went from less than 50% of annual GDP to more than 100%, and unemployment is still at about 14%.

They too are having elections here, which are much more interesting to watch than in the US. They ride through the streets with loudspeakers campaigning, paint the sides of many buildings and local walls with campaign propaganda, and run ads nonstop on TV, back to back for different candidates. The left is likely to win. The sitting president did not run for re-election after their economic crisis, and currently the popularity polls rate him at less than 10% approval rating.

The crisis has made the level of government infrastructure and services very low, as well as real incomes. I got a haircut today for about \$1.25, and most meals are under \$6 if you forego alcohol. On the other hand, books cost about \$10 and newspapers more than a \$1. Good for services, but not so hot for readers and literacy. (Although they have the highest literacy rate in Latin America, at about 97%, and their schools, though poor, are their pride). Most cars cost as much or more than in the US too. People have everything from mules to bikes to scooters to junkers to Mercedes for vehicles, and ride them through the country and through the city. Whole families of 3 or 4 people will ride one scooter together (without helmets).

The experiment station has been great, but has suffered from lack of funding for 4 years. The computers all say they are Y2K compliant and run Windows 98 (sometimes) and I have truly only been able to successfully print anything once in four weeks. I was inadvertently the cause of the collapse of their entire internet system, which probably made me unpopular, but everybody was very gracious (It was my connection, not my fault!). But the internet is now working well for everybody, at a modest rate of speed.

The work and sabbatical part of the stay could hardly have been better. I came in with some knowledge and high expectations for Argentina, and the reverse perhaps for Uruguay. I am pretty sure I will reverse those opinions. Uruguay has plenty of problems, but much hope and character. I think Argentina faces a bigger chance of social and political disaster. The forestry sector looks good from afar, but Argentina's unemployment is worse (15%); prospects of defaulting on international loans are high; and protests, crime, and kidnapping are rampant.

In Uruguay, I have seen four major forestry companies that are local or are subsidiaries of major companies in other countries—one from Spain, one from Finland, one from USA, and one local. All but the company from the USA are certified by the Forest Stewardship Council for sustainable forest management and for chain of custody. They are all very professional and well managed. Plus they are growing loblolly pine, slash pine, or eucalyptus at least twice as fast as we do, in the US south. I did get a fair amount of information from them about certification, and some about timber yields and investment returns. Fodder for enough papers for a year already!

In later emails from Montevideo, Fred reported that he visited universities and the Forest Service and presented a talk on world forests that was very well attended. He also got to spend a weekend in beautiful Punta del Este. The rest of his itinerary takes him to Patagonia, Iguassu Falls, and Misiones in Argentina.



The message below was excerpted from an email by Chris Henry. Chris graduated from the Department of Forestry in 2000 and is now serving as an agroforestry extension agent with the Peace Corps in the Dominican Republic.

So what am I up to? Well my Peace Corps assignment was for agroforestry but nothing more specific. I now live in Jarabacoa which is roughly in the middle of the Dominican Republic, a country that isn't half as big as NC. The D.R. was luckily out of the way of Hurricane Ivan but still got quite a bit of rain from the most recent hurricane. During the first three months of language and technical training, Peace Corps assesses our skills and personalities and tries to find a good fit with sites where volunteers are needed. I am working with the forestry school here in the D.R.. The name is Escuela Forestal Nacional, the National Forestry School, and it trains technicians for the country's forestry system. It falls under their Forest Service and offers a 2.5 year training program. In many ways it reminds me of the forestry summer camp at NCSU: a hand-full of concrete buildings for classrooms and one large dormitory that reminds me of military barracks, which is where I live. Right now, there are not any classes being taught because the students are about to graduate. The students are working on their final projects and doing co-ops getting experience while waiting to graduate. There are a couple universities that have Forestry as a major, but almost none of the students are graduates. Practically all of the foresters in this country have gone through this school, and a handfull have studied abroad in places such as Honduras. The next batch of forestry students will probably start in January. In the last three months I have been at the school doing my "organizational diagnostic" which is a big part of PC's plan for understanding your community and their needs before starting any projects. Along with the diagnostic, I generally serve as a TA to the students, helping them with their projects, teaching Excel formulas and graphs, helping them at times with Word, GPS work, translating, fixing computers and printers, fighting forest fires and teaching English. It is funny how much stuff is brought to me to fix (because the gringo knows): stuff like broken printers and digital cameras. So far I have had success getting things working again but it is still amusing because usually the problem is not that serious. Once the new students arrive, I will start teaching: two semesters of English for translating and a computer class to teach Excel and Word. I will also help teach GPS and ArcView and be a TA for other forestry classes. Furthermore I will help with a few other projects such as increasing their existing library and putting life back into their equipment shed which is missing many basic forestry tools. For these two

ship Program, in order to raise the needed funds. Funds come from a combination of donor organizations, returned Peace Corps volunteers and friends/family/colleagues.

Other than work, I have had the chance to travel through the Island, and it is beautiful. I am lucky that I live near Jarabacoa in the mountains at about 1500 ft, so it is a lot cooler than the rest of the Island. There is an abundance of birds; for example, there is a humming bird the size of a large beetle that I see every so often. I have summited the highest point on the Island, Pico Duarte, at 10,000 ft. Another volunteer and I climbed it in one day (16 hours and 41 min.) and now a group of us are planning to run it on the 24th of October. From the starting point to the summit and back is roughly a marathon so I do not know if we will really be able to run the whole thing-but we will try. I have found a few places to climb and I plan to build a secondary ecotourism project around that activity. I live close to several waterfalls that are gorgeous, and there are even some areas where I can cliff jump.

The message below was excerpted from an email by Jeremy Ferrell. Jeremy graduated from the Department of Forestry in 1999 and served as an agroforestry extension agent with the Peace Corps in Paraguay. He is currently working as a natural resources consultant in Paraguay for the Peace Corps and GTZ.

Currently I am working in a first time partnership between Peace Corps and GTZ (German Technical Cooperation). Our primary objectives are to recuperate soils through no-till, green-manure conservation practices, protect existing forest with proper management, and promote agroforestry systems. Our target population is small-scale subsistence farmers throughout the interior department of Caazapa. I am working in design and implementation of agroforestry systems especially with citrus, using demonstration plots. These plots serve as teaching tools where other farmers can see first hand these new conservation methods. Training of local Extension Agents is also a big part of my job as most are qualified agronomists but have little experience in forestry. The main challenge is to take the knowledge and technology to the people and therefore I see myself primarily as an extension agent who is respected and truly values the integrity and lifestyle of rural people.

Conference Information

Conference Reports

Global Protected Areas: Cross-boundary Benefits, Sustainable Tourism and Effective Management
Dr. Yu-Fai Leung, Assistant Professor, Department of Parks, Recreation & Tourism Management

Organized by IUCN World Commission on Protected Areas (WCPA), the World Park Congress (WPC) is held once every 10 years and is perhaps the most important global forum on protected area issues. I was honored to receive an invitation to participate in the 5th WPC held in Durban, South Africa in September 2003, joining the other 2,500 leading protected area professionals and scholars from around the world.

The main theme of WPC this time was "benefits beyond boundaries", with the primary goal of examining the ways in which the benefits of protected areas can extend beyond administrative and national boundaries as well as across societies and generations. Current issues in protected areas were addressed through seven workshop streams and three cross-cutting themes. Examples of key issues include linkages in landscape/seascape, building broader community and governmental support, new ways of governance and co-management, sustainable resource and visitor use, management effectiveness, gender equity, marine protected areas and World Heritage sites. The Durban Accord and Action Plan for global protected areas, 30 WPC Recommendations on specific issues, WPC message to the Convention of Biological Diversity, State of the World's Protected Areas Report, and the updated World Database on Protected Areas are among the important outputs from this event. Details can be found at <http://www.iucn.org/themes/wcpa/wpc2003/index.htm>.

My participation at this congress focused on tourism and protected areas sessions, including ecotourism and certification workshops, global tourism trends, and tourism and partnerships. I also attended a number of side meetings, such as WCPA Tourism and Protected Areas Task Force meeting, World Heritage and Sustainable Tourism meeting, Conservation International's 'Tourism and Biodiversity: Mapping the Footprint' meeting, WCPA-North America regional meeting, WCPA Wilderness Task Force meeting, and World Heritage New Partnerships meeting. Finally, I participated in the drafting of the Tourism Recommendation (#5.12) as part of the congress outputs.

I was fortunate to be able to learn so much about current issues and challenges in managing protected areas and about how IUCN and other global organizations are working to-

gether in maximizing the multiple benefits of protected areas. A substantial amount of information and documents were collected that are enriching the contents of my classes. The two-day field trip I took to St. Lucia Wetland Park northeast of Durban was an eye-opening experience for me who has never seen hippopotamuses, warthogs and zebras in the wild. It was also an important opportunity to network with colleagues from around the world. Some of the interactions may lead to potential collaboration in the near future. The only two drawbacks I could think of were the long flights and that I did not learn any Zulu language during my stay. Nevertheless, my Durban trip was a truly wonderful experience that benefits my scholarship tremendously. I look forward to the next WPC in 2013!

Conference Announcements

There are several international conferences in the next twelve months that have a primary focus on protected areas, recreation/tourism, and resource management:

1. 3rd IUCN World Conservation Congress (Bangkok, Thailand; Nov. 14-25, 2004. Website: <http://www.iucn.org/congress/>)
2. From Knowledge to Management: Balancing Resource Extraction, Protection and Experiences — 11th International Symposium on Society and Resource Management (ISSRM) (Östersund, Sweden; June 16-19, 2005. Website: <http://www.issrm2005.com/>).
3. Sustainable Management of Protected Areas for Future Generations — IUCN 5th Conference on Protected Areas of East Asia (Hong Kong, China; June 21-25, 2005. Website: <http://parks.afcd.gov.hk/IUCNWorld/>)
4. 1st International Marine Protected Areas Congress (Geelong, Australia; Oct. 23-27, 2005. Website: <http://www.impacongress.org/>).



Awards

Bruce and Barbara Zobel Endowment

The Bruce and Barbara Zobel Endowment for International Forestry Studies was established in 1998 to provide sustained recognition for the Zobel's contribution to production forestry. The broad objectives of the endowment are to instill an international sense in forestry students and to enable them to obtain first-hand experience with forestry in diverse environments around the world. The endowment supports student activities in the Department of Forestry at North Carolina State University.

Since 2003, the Endowment has provided mini-grants to undergraduate and graduate students for travel to other countries. Recent Zobel mini-grant recipients include:

- Rodrigo Arriagada for MS research in Costa Rica
- Mike Tighe for research and development of a pollen handbook for Central/South America
- Rafael Rubilar for PhD research in Chile

The Zobel Endowment also provides fellowships for graduate students who wish to learn about production forestry in other parts of the world, thus broadening their educational background. Recently, the Zobel Fellowship was awarded to Miao Yu from China. She is advised by Bailian Li.

For more information on this endowment, contact Dr. Erin Sills at erin_sills@ncsu.edu.

Fulbright Awards

Dr. Joseph P. Roise has been selected to be the Fulbright Chair in Sustainability at Simon Fraser University, near Vancouver. From January until June 2005, he will be collaborating with the BC Ministry of Forests and Dr. John Nelson, from the University of British Columbia. They will be working on sustainability effects and influences of conversion of the BC timber market to a free market.

Dr. Fred Cabbage has been awarded a Fulbright Environmental Science Award. The award focuses on the interactions among sustainable forestry, forest certification, intensive forestry and biodiversity. Dr. Cabbage will spend five months lecturing and conducting research on these subjects at universities and government research organizations in Uruguay and Argentina. He also has a grant to develop an international course on certification and sustainable forest management while he is away.

Holladay Medal for Excellence

The NC State Board of Trustees has awarded the Alexander Quarles Holladay Medal for Excellence to five faculty members in recognition of their outstanding careers at NC State. Dr. Bruce Zobel was one of the recipients. The Holladay Medal is the highest honor bestowed on a faculty member by the trustees and the university. For more information on the winners visit:

http://www.ncsu.edu/BulletinOnline/05_04/holladaywinners.htm.

Scholarships

The Office of International Scholar and Student Services (OISSS) is charged with meeting the administrative, advising, and programming needs for the nonimmigrant students, staff, and faculty at NC State University.

Julio Rojas, a PhD student in Forestry, was awarded a 2004 Alumni Scholarship from OISSS.

Study Abroad

The Department of Forestry awarded scholarships for study abroad to the following undergraduate students in 2004:

- Erin Shown, Environmental Technology
- Jared Milrad, Fisheries and Wildlife Sciences
- Megan Lebda, Natural Resources-Ecosystem Assessment
- Matthew Ipock, Environmental Science and Watershed Hydrology
- Amy Judkins, Natural Resources-Ecosystem Assessment

The Department of Forestry is offering several \$500 to \$750 study abroad scholarships to majors in the department in 2005. Application requirements include a minimum 2.5 GPA, completion of two semesters at NC State prior to participation in the study abroad program, and evidence of progress towards a degree in the Department of Forestry (forest management, natural resources, environmental sciences, or environmental technology). For more information go to:

<http://www.ncsu.edu/studyabroad/>.

Announcements

CNR 75th Anniversary

Tilla Fearn, Information Communication Specialist for the College of Natural Resources

The College of Natural Resources at North Carolina State University celebrated its 75th anniversary with a series of events held on October 21 and 22.

Activities included a symposium titled "Natural Resources - Sustaining Success for a New Century"; an exhibition featuring student projects, research and programs; a campus tour; a paper science and engineering 50th anniversary recognition luncheon; and the annual meetings of the N.C. Forestry Foundation and the Pulp and Paper Foundation.

Additional activities featured some of the college's programs and partnerships, including a visit to the college's summer camp at the Hill Forest; the Partnership for Art and Ecology tour of the N.C. Museum of Art and Art Park; and a short-game golf clinic with the college's professional golf management students.

Dale Bumpers, former governor and senator of Arkansas, delivered the keynote address. Additional speakers included Sharon Haines, from International Paper; Jamie Rappaport Clark from Defenders of Wildlife; Fran Mainella from the National Park Service; Melissa Johnson from the President's Council on Physical Fitness and Sports; Mike Phoenix from Environmental Systems Research Institute, Inc.; and W. Steven Burke from the NC Biotechnology Center.

Visiting Professor from Ukraine

Ihor Soloviy is an Associate Professor in the Department of Ecological Economics at the Ukrainian State University of Forestry and Wood Technology. He is currently visiting the Department of Forestry at NC State University on a Fulbright that will last until June 2005. His primary focus is forest policy. He is interested in learning more about how different policy instruments can be used and the appropriate set of instruments for designing a country's forest policy. Dr. Soloviy plans to use the information he collects while at NC State to develop a sound scientific forest policy that will influence the creation of a national forest policy in his own country. While he is here he will be reviewing articles and books, talking with professionals, visiting local forests, and giving lectures and presentations.

Visiting Professionals

Dr. Clive Carlyle, Director of the Growing Plantations section within the CSIRO Forestry and Forest Products Division, visited NC State from July 15 to July 21, 2004. Dr. Carlyle has over twenty years of research experience in the UK, Australia, and Chile and has contributed to understanding of the biophysical limitations of plantation growth.

Dr. Nilgul Karadeniz, faculty in the Department of Landscape Architecture at the University of Ankara, visited the US from April 12 to May 7, 2004. She has been working on issues of land use planning, land cover changes and their effects on natural resources. Her discussions at NC State focused on landscape structural analysis.

Summer Course in Sweden

The summer Study Abroad course, Sustainable Use of Natural Resources-Sweden (NR350 proposed), will occur June 27 to July 22, 2005. Mats Olssen is planning next year's course and intends to focus on uses of Europe's soils, from Sweden to Italy. Starting with a week of classes and day trips in south central Sweden, the class will then travel across the continent examining differences in soils and in the ways soils have been and are being used. Any university student can participate and earn 3 hours of credit, usable as a technical elective. Moreover, undergraduates of all majors in the Department of Forestry are eligible for scholarship support. Inquiries for more details should be directed to gary_blank@ncsu.edu. Look for announcements in the weeks ahead.



Standing on 5 meters of peat, Lars Franzine lectures about 5000 years of global climate change, in a previous study abroad course in Sweden.

International Society of Tropical Forestry Activities

The NC State Chapter of the International Society of Tropical Foresters (ISTF) is a student-run non-profit organization that seeks to enhance the international perspective of forestry studies at NC State University.

ISTF has started its potluck series for the Fall. Speakers so far have included Dr. Sarah Warren, Dr. Ted Shear, Dr. Gary Blank, and Dr. Bob Kellison. ISTF also participated in the CNR anniversary silent auction, raising nearly \$500 from items donated by faculty and students. A SWOT (strengths, weaknesses, opportunities, and threats) luncheon is planned to evaluate ISTF as a national organization and to brainstorm for means of improvement. The big event on the horizon is a trip to the Working Forests in the Tropics Conference at the University of Florida in Gainesville, Feb. 13-15, 2005. The cost will be subsidized and space is still available. Our events are open to everyone, so come out and get involved in the issues that make the world go round! Questions? Email Nevin Dawson at nevindawson@yahoo.com.

News from CAMCORE

CAMCORE is a non-profit, international program that works for the conservation of tropical and subtropical forest tree species. It was formed in 1980 by NC State University, private forest industry, and government agencies around the world.

Recent activities of CAMCORE have included:

* CAMCORE held its annual meeting in China on September 12-25, 2004. There were 30 participants from 8 countries present. Field trips during the meeting included visits to nurseries and plantations around the Beijing area and in the southern provinces of Guangxi and Guangdong. Hosts for the meeting included the Chinese Forest Academy, the Guangxi Forestry Department, and Oji Plantation Forest Co. Ltd. A number of new and important contacts were established with the hope that future CAMCORE members will come from China. Attending the meeting from the CNR were the Dean, Dr. Larry Nielsen, Dr. Bailian Li and CAMCORE staff members Dr. Bill Dvorak, Dr. Gary Hodge, and Mr. Willi Woodbridge.



* The CAMCORE staff has been asked by the Guatemalan forest service (INAB) to write a proposal to fund a National Tree Improvement Program. Bill Dvorak and Gary Hodge made several visits to Guatemala in 2004 to gather information for the proposal. A nine-year project is envisioned, the first three years will be covered by this proposal. Initially, the improvement of five species will be targeted: *Tectona grandis*, *Cybistax donnell-smithii*, *Pinus maximinoi*, *Pinus caribaea* and *Cedrela odorata*. If the proposal is funded in its entirety, CAMCORE staff will serve as external experts in supervising the project in Guatemala. Funding will also be available for a Guatemalan student to come to NCSU to complete a MS degree in tree improvement as well as for several Guatemalans to attend a tree breeding short-course in Chile in 2006.

* A new member from East Africa will join CAMCORE in 2005. The member includes a consortium of government forestry agencies from Kenya, Tanzania, and Uganda. Their prime interest in CAMCORE is to enlarge existing genetic bases of *Eucalyptus urophylla*, *Pinus tecunumanii* and *P. maximinoi* for fuel wood and construction industries. Participation of the first year membership in CAMCORE was sponsored by the Gatsby Foundation (London). We look forward to strengthening relationships between the East African forest community and the CNR.

CAMCORE Manual-Collection and Management of Pollen from Natural Stands

Pollen collection and management is an increasingly important facet of pine breeding programs within the CAMCORE membership, and throughout the forest industry. Although good reference resources exist for some pine species, little information exists about subtropical species in general, especially in Spanish and using rustic methods.

In 2003, Research Forester Michael Tighe received a mini-grant from the Bruce and Barbara Zobel Endowment for International Forestry Studies at NC State. He used this grant to compile some of the methods and research evaluated at CAMCORE for pine pollen management. The stated objective of this project was to produce a Spanish-language manual that detailed many of the pollen collection and storage protocols and also offered some recommendations for subtropical pine pollen based on CAMCORE research.

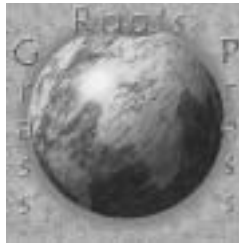
Some limited copies of the manual are available from CAMCORE; the PDF version is available on the CAMCORE webpage (<http://www.camcore.org/>) under the "Publications" link.



NC State's Department of Forestry has an active international program at the graduate level. Over one-quarter of the graduate students are either international students or are in programs leading towards professional employment in international forestry. Opportunities for undergraduate participation include the International Society for Tropical Foresters, international field trips, and scholarships for study abroad. Several graduate students are pursuing an MI, Masters International degree, in which graduate work is combined with Peace Corps service in agroforestry extension and other forestry and natural resource development fields. Faculty involvement in research throughout the world generates diverse international opportunities for students. For more information about the department, please visit the website at <http://www.cfr.ncsu.edu/for/>

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