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HCPI Exchange Project Concludes with Kenya Workshop

by Jim Bowman, Oregon State University

Host-Country Principal Investigators (HCPIs) from five ACRSP countries concluded their information exchange activity by holding the last of their series of in-country workshops in Kenya from January 23–27. Earlier Aquanews articles have described the purpose of this project to facilitate the direct exchange of pertinent information regarding aquaculture technologies for tilapia and other cichlids used in the collaborating countries, with an eye towards transferring applicable information and knowledge among and between sites and establishing mechanisms for future collaboration among the host countries. Visiting PIs for the Kenya workshop included Remedios Bolivar (Philippines), Yang Yi (Thailand), Arlette Hernandez-Franyutti (Mexico), and Dan Meyer (Honduras). Nancy Gitonga, Director of the Kenya Fisheries Department, hosted the visit. Gitonga was assisted by her Aquaculture Officer, Betty Nyandat; Benson Thiga, Head of Station at Sagana Fish Farm; and Charles Ngugi, Head of the Moi University Department of Fisheries and Aquatic Sciences, who helped to relate the Kenya story and guide the visitors around.

The workshop began with introductions and a seminar at the Fisheries Department Headquarters in Nairobi. As was the case in previous workshops, this opening seminar

...continued on p. 6



Pacu (*Colossoma macropomum*) culture in Peru.

Academic and Research Collaboration in Aquaculture with Universities in Peru and Colombia

by Konrad Dabrowski
The Ohio State University

The School of Environment and Natural Resources aquaculture program at The Ohio State University is involved with the University of San Marcos (USM) in Lima, Peru, in both a collaborative research project and institutional strengthening through the training of graduate students. Maria Esther Palacios, from USM, completed her Masters degree in Columbus doing research on pacu, a South American frugivorous fish (feeding on nuts and fruits). This project is funded by the Aquaculture CRSP Program and involves M.C. Portella from Sao Paulo State University, Brazil; Wilfrido Contreras-Sánchez from the Universidad Juárez Autónoma de Tabasco, Mexico; and other investigators from South America. In 2005, this joint effort was expanded with a project funded by the Peruvian National Council of Science and Technology (Consejo Nacional de Ciencia Y Tecnología; CONCYTEC) on "Development of new techniques of reproduction, nutrition and rearing of South American catfish, doncella." New partners in this project include Professor V. Vergara from the Department of Nutrition, Agriculture University La Molina in Lima, and Manuel Flores, a fish farmer from Iquitos, Peru.

...continued on p. 4


Aquaculture Association of Southern Africa Meeting and BMP Workshop

by C. E. Boyd, Chhorn Lim, and Aaron McNevin
Auburn University, USDA, and WWF

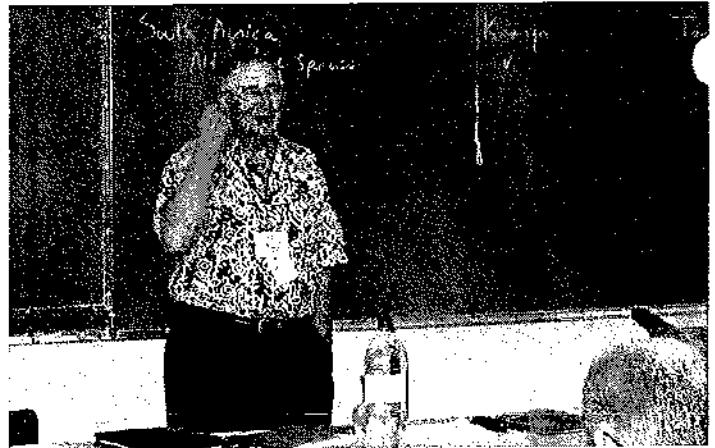
The 7th Bi-annual Conference of the Aquaculture Association of Southern Africa was held in Grahamstown, South Africa, from 12 to 16 September 2005. Approximately 200 individuals from several countries were in attendance, but most of the participants came from South Africa. There were two full days of presentations, several workshops, and a field trip. The presentations generally focused on the potential of aquaculture in southern Africa, and the program was dominated by speakers from South Africa. It is clear that aquaculture in southern Africa lags far behind that of other regions where the Aquaculture CRSP is involved. The commercial sector is poorly developed, and there is little assistance to rural aquaculture.

However, an aquaculture industry is developing in South Africa. The abalone industry has expanded rapidly, with kelp collected from the ocean constituting its major source of food, and is becoming internationally significant. The government recently implemented stricter regulations on kelp harvest, however, so some farms have responded by starting to culture kelp. The use of artificial feed as a partial substitute for kelp also has been initiated. There is considerable interest in other types of aquaculture, particularly in urban aquaculture for those in the impoverished townships. Several universities in South Africa have growing aquaculture programs, and the aquaculture knowledge and experience in this country can be of

immense benefit to aquaculture in neighboring nations.



The two-day Best Management Practices (BMP) workshop was developed and presented through funding from the Aquaculture CRSP to Auburn University and the University of Stellenbosch. The workshop provided a general discussion of BMPs in aquaculture with an emphasis on the process that should be followed to develop BMPs. The workshop began with a discussion of the environmental issues in aquaculture and the potential of BMPs for mitigating or preventing possible negative environmental and social impacts. Next came a presentation on the environmental issues related to the



CRSP researcher Claude Boyd discusses Best Management practices at an ACRSP workshop in South Africa.

use of feeds in aquaculture that particularly stimulated the interest of the participants. The audience also expressed considerable interest in the presentation on the expectations of World Wildlife Fund (WWF) and other NGOs for the development of environmentally responsible aquaculture. Following the introductory material of the first morning, Khalid Salie and Lourens de Wet of the University of Stellenbosch and other local speakers discussed South African aquaculture and aquaculture regulations in South Africa. The second day of the workshop was devoted to details about the environmental assessment of aquaculture, development of BMPs to avoid negative impacts, and the involvement of stakeholders in the process.

Over 70 participants registered for the workshop, but because of the variety of other activities in progress associated with the concurrent Aquaculture Association of South Africa symposium, fewer individuals participated in the entire program. Nevertheless, there were 25 to 50 individuals in the audience at all times, and an estimated 25 people attended the entire workshop.

A draft document, "Best Management Practices for Responsible Aquaculture," was prepared to summarize the contents of the workshop. This report will be useful in future ACRSP presentations on BMPs. Also, the PowerPoint® presentation on the environmental issues related to aquaculture feed developed by CRSP researcher Chhorn Lim provides excellent background information for future efforts about BMPs.

...continued on p. 9

TC Americas Meeting Convened Online

During the 2004 Annual Meeting, the Technical Committee voted to convene regional TC meetings. In response, the Aquaculture CRSP organized its Americas Technical Committee regional meeting by

way of an electronic bulletin board platform in December 2005. This system posed a simple solution to the common constraint of how to allow all of the members to connect over great distances and approach their common goals at little expense.

Regional Technical Committee meetings had already been held in Asia and Africa earlier in the year, and the Americas regional meeting was the last of three. The bulletin board was maintained on the Aquaculture

...continued on p. 3

New Center for Technology Transfer Begins in Mexico

by David Belcher, Mike Timmons, and Dale Baker
Cornell University

Modeled after the US Sea Grant program, the Centro de Transferencia Tecnológica para la Acuicultura (CETRA) was recently established in Mexico to help transfer sustainable aquaculture technology to the Mexican private sector through an inter-institutional collaborative network of Mexican and US universities. Initiated through an ACRSP award made to Cornell University and the Universidad Juárez Autónoma de Tabasco (UJAT), CETRA will operate as a virtual network that links researchers, projects, and extension personnel. ACRSP project team members also include collaborators from ITBOCA (Mexico), Texas Sea Grant, University of Arizona, Brooklyn College, University of Rhode Island Sea Grant, Puerto Rico Sea Grant, and Fundación Chile.

The organizational meeting of CETRA took place in Hermosillo, Sonora, in November 2005 and included over sixteen representatives from eight universities and institutions throughout Mexico. Enthusiasm for the concept of CETRA among participating members was high, indicating the need and interest for technology transfer among the Mexican research and extension community.

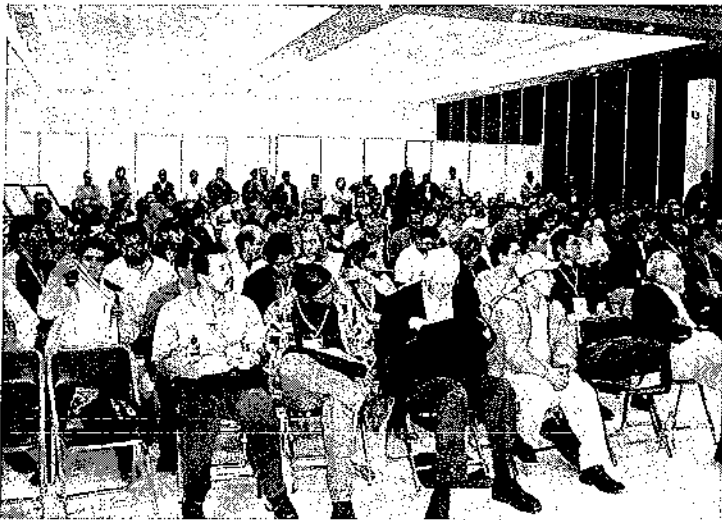
In addition to electing the first director of the center

(Eunice Perez Sanchez of UJAT) and co-director (Margarita Cervantes-Trujano of ITBOCA), the representatives successfully established a mission statement and set of goals for the center.

In its first activity, the center held a one-day workshop on recirculating aquaculture system (RAS) technology on 29 November 2005, as an addendum to the 2005 Hermosillo Aquaculture Forum. Over 240 participants from throughout Mexico and Central/South America attended this workshop, which included presentations in English and Spanish. Highlights from the workshop included two presentations on RAS fundamentals by Michael Timmons of Cornell University and Martin Hevia from Fundación Chile, a presentation on using Geographic Information Systems to site coastal aquaculture sites by Eunice Perez Sanchez of UJAT, and a presentation on urban aquaculture by Martin Schreiber of Brooklyn College.

In addition to technical presentations, there were also workshop presentations on how to develop an aquaculture outreach effort for Mexico. Dale Baker of New York Sea Grant, Ruperto Chaparro of Puerto Rico Sea Grant, and John Jacob of Texas Sea Grant discussed the Sea Grant model used for environmental and aquaculture outreach in the US, and how it might be made applicable for use in Mexico.

Future activities of CETRA include the establishment of a center website to link researchers, projects, and extension personnel (www.cetra.org.mx), development of a recirculation aquaculture system for family/multi-family tilapia production, and future workshops on recirculating aquaculture systems (RAS). Plans were made for a regional workshop on recirculating aquaculture systems to be held in March 2006 in the Guadalajara region and an international 3-day workshop on RAS to be held either before or after the 6-8 September 2006 ISTA Convention in Vera Cruz, Mexico. 🐟



The well-attended workshop on Recirculation Aquaculture Systems held in Hermosillo, Sonora, Mexico on 29 November 2005.

TC Americas Meeting continued...

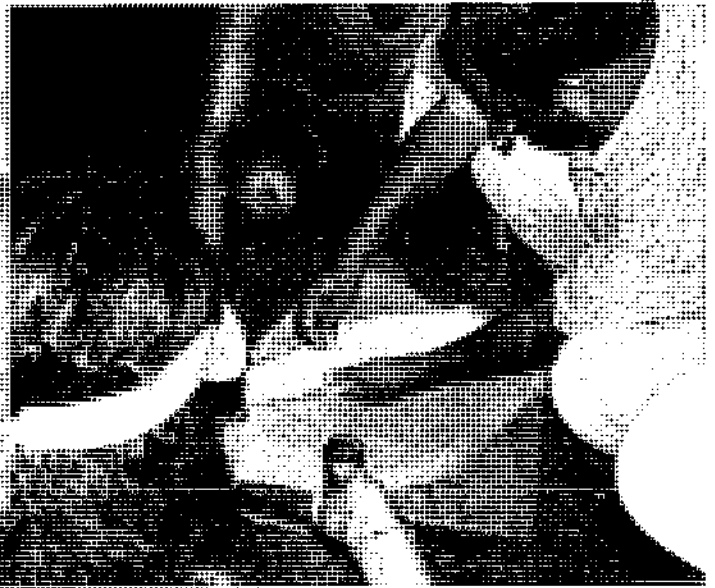
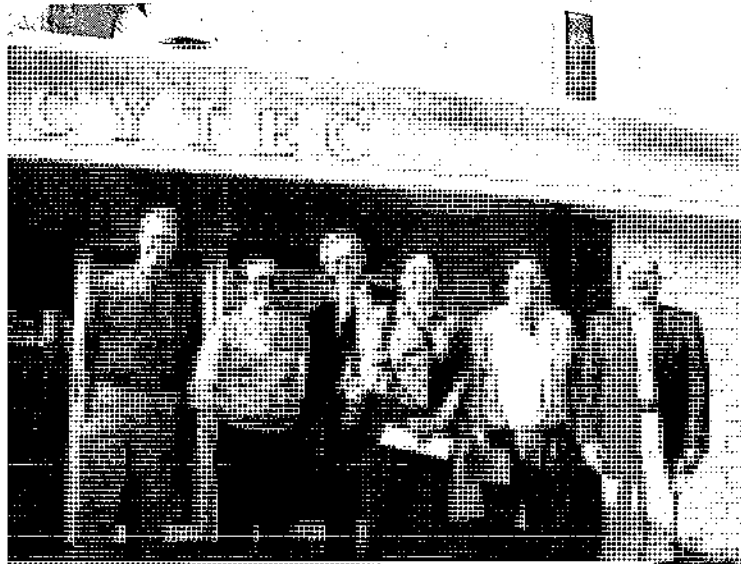
CRSP website to allow for responsive discussion on each of the participants' own time.

Technical Committee members from or working in the Americas region participated, with the other Technical Committee members

welcome to discuss as well. Finally, all other Aquaculture CRSP participants, especially those from or working in the Americas region, were encouraged to participate in the discussions.

The meeting's format proved successful, and the Aquaculture

CRSP plans to hold its upcoming planning meeting for the new Eagle/Condor Native American aquaculture exchange project in this same fashion. Thanks to all those whose participation helped to bring the Aquaculture CRSP Americas to a positive end!



Peru and Colombia continued...

Left: Dabrowski, J Tarazona Barboza, and Mr. Guillermo Alvarez, coordinator of aquaculture projects in Peru. Above: Researchers check for eggs in the African catfish.

Aquaculture CRSP Principal Investigator Konrad Dabrowski's visit to Lima included a meeting with the Vice President of CONCYTEC, J. Tarazona Barboza, and Guillermo Alvarez, coordinator of aquaculture projects in Peru. Both representatives expressed their support for The Ohio State University and the ACRSP to expand their current programs focused on the culture of doncella into new species. In particular, they encouraged further work on the propagation of paiche (*Arapaima gigas*), the largest fish of the Amazon and an endangered species.

Studies at San Marcos and La Molina, coordinated by Luz Valenzuela and V. Vergara, concentrate on the determination of optimum diet formulations (protein, lipids, energy) and use of plant proteins as fish meal replacements. Fish health is being evaluated by histological methods. Feeding experiments with broodstock of doncella are carried out in Iquitos by M. Flores where the effect of different protein levels in feeds is evaluated on the quality of doncella offspring. Dabrowski visited M. Flores' farm in Iquitos, which allowed an exchange of experiences related to maturation of doncella, and the two planned a sampling strategy

for the coming season. Dabrowski also visited new facilities at the Institute of Peruvian Amazon Studies (IIAP) in Iquitos, where Manuel Sandoval has initiated a large research program with the help of 14 graduate students currently working in his biotechnology laboratory on the use of phytochemicals in human and animal nutrition. Dr. Sandoval and ACRSP Ph.D. student Fred Chu collaborate on some aspects of nutrition and practical diet formulation for local fish farmers in the region.

Konrad Dabrowski visited San Marcos and Agriculture University La Molina and the University of Peruvian Amazon in Iquitos to present research results on related species of South American catfishes (genus *Pseudoplatystoma*) from Brazil that included results from the first induced reproduction in the US, larval rearing, and lipid and fatty acid requirements. These catfish are important to consumers and attract high market values, but numbers of fish caught in the wild (Amazon, Parana or Orinoco Rivers, and tributaries) are limited. As a result, aquaculture of these species is of a high priority in Brazil, Peru, Bolivia, and Colombia. At least

one hundred participants, including graduate students, staff, and feed industry representatives, attended three seminars.

Professor Martha Olivera Angel from the School of Veterinary Medicine, University of Antioquia, Medellin, Colombia, hosted Dabrowski during a two day visit. This institution is over 200 years old and is located in the green zone of a city of 3 million people. Dr. Olivera and other faculty in animal, veterinary, and food sciences are interested in academic exchanges with The Ohio State University. Dr. Olivera's interests are concentrated on reproduction, sperm physiology, and biotechnology of fish important to aquaculture. She was the editor of a special volume of "Revista Colombiana de Ciencias Pecuarias" devoted to aquaculture of cachama, frugivorous fish of Colombia. The laboratories are well equipped to do steroid hormone, amino acid, and fatty acid analyses, and plans include work with endangered fish species from the largest Magdalena River. A Memorandum of Agreement is scheduled between The Ohio State University and the University of Antioquia to further progress in the future. 🐟

Integration of Tilapia and Research into the Philippines Culture

by Chris Bridger

Host-Country Principal Investigators (HCPIs) from five Aquaculture CRSP countries traveled to the Philippines in July 2005 to continue their project, "Training and Information Exchange on Cichlids among Aquaculture CRSP Host Country Institutions."

This project was conceived to bridge the gap between the efforts in distant ACRSP Host Countries and, "facilitate the sharing and effective dissemination of information, methodologies, and technologies on cichlid biology and culture between sites. The knowledge gained through these visits will be applied towards accelerating aquaculture growth when the participants return to their home countries." A second goal of the project was to compare the adoption of Aquaculture CRSP technologies by cichlid producers in the five participating host countries.



The Fish market, Science City of Munez, Nueva Ecija, Philippines.

The HCPI Information Exchange project began its second leg of a two-week study tour of aquaculture-related facilities in Thailand and the Philippines, and the group departed Thailand for the Philippines on the morning of 23 July 2005, together on the same plane.

It is remarkable to see the important part tilapia plays in the fabric of the Philippines. The country today resembles other regions where the harvest of a single fish species, such as Atlantic cod or salmon, has formed the basis of the economy, but here farmed tilapia represents the species of choice.

Today, a non-native species—the Nile tilapia—comprises a large part of the Filipino fish diet. Tilapia have been present in the Philippines since 1972 and represent a major share of the marketplace; they appear in large fish markets, roadside vendors' tanks and aquaria, and billboard advertisements along the country's highways.

The HCPIs began their formal program on Monday morning with presentations from the five Host Country PIs. Invited to these presentations were executives of Central Luzon State University, faculty and staff, students, and fish farmers to total approximately 80 attendees. During his opening

...continued on p. 10



IIFET 2006 Portsmouth: Rebuilding Fisheries in an Uncertain Environment, 11-14 July 2006

The 2006 biennial IIFET conference invites professionals to discuss the current state of the world's fisheries and exchange ideas on the best means of rebuilding those damaged by natural disasters or human activities.

IIFET welcomes participation from academics, industry leaders, and government decision-makers. Economists and other social scientists, biologists, ecologists, resource users and managers, seafood traders, distributors and marketers, policy-makers, government representatives, legal scholars, and historians are all invited to submit abstracts for consideration.

Themes of the upcoming conference include:

- Fish for the future: recovering fisheries from crisis or collapse;
- Ocean management: fisheries and the ecosystem;
- Aquaculture;
- Development;
- International Trade;
- Marketing;
- Modelling; and
- Policy and Management.

By including contributions from a variety of disciplines, IIFET 2006 Portsmouth hopes to provide a program that will foster debate, broaden thinking, and provide an opportunity for new questions to be asked and to consider new answers to old questions.

Visit www.iifet2006.org for full information on the conference and guidelines for abstract submission.

HCPI Exchange Kenya continued...

allowed the participating PIs to share country and institutional background information from each of their home countries, as well as descriptions of how tilapia and other cichlids are cultured there. This was followed by a brief visit with Jacob O. Ole Miaron, Permanent Secretary of the Ministry of Livestock and Fisheries Development, after which the group boarded a flight to the western town of Kisumu on the shores of Lake Victoria.

Tuesday morning saw the group out on the road in Western Province for visits to private farms and the Fisheries Department's Wakhungu Demonstration Fish Farm, followed by a tour of the Dominion Farms site, a large commercial operation just getting underway near Yala Swamp and Lake Kanyaboli. Dominion Farms will occupy approximately 6,900 hectares of land area at this site, most of which will be devoted to land crop production (mostly rice), although some maize and soybeans will be produced for use in fish feeds to be produced at the site. For the aquaculture part of the operation, the company plans to install 50 1/4-acre circular raceways for the intensive culture of selected Kenyan strains of Nile tilapia, with a goal of producing primarily for export. The manager for Dominion Farms' fish farming operations is former ACRSP student Enos Mac'Were (MSc, Moi

University, 2002). Enos's wife, Jedidah, who also received partial CRSP support for aquaculture studies at Moi University, assists with hatchery operations.

After a brief Wednesday meeting with Moi University officials in Eldoret and Department of Fisheries and Aquatic Sciences personnel, the HCPIs visited the Moi University Fish Farm. The farm has grown from two tiny (100 m²) ponds in 2000 to a complex of over 40 ponds ranging in size from 100–300 m² in size, plus a large reservoir. Nile tilapia and African catfish (*Clarias gariepinus*) are grown here, both as part of ongoing research and to produce fish for local sales.

On Thursday the group traveled approximately 90 km north out of Nairobi to visit Sagana Fish Farm, the original ACRSP research site in Kenya. They were received by Benson Thiga, Head of Station, who gave a brief tour of the farm and hatchery, including the 800 m² and 150 m² series of ponds that were renovated for research work under CRSP activities beginning in 1997. Like the Moi University Fish Farm, Sagana Fish Farm grows Nile tilapia and African catfish.

The last day of the exchange included a tour of the Tilley Group's fish processing plant. This plant, located in Nairobi, is geared primarily to processing Nile perch (*Lates niloticus*)



Host Country Principal Investigators are shown one of the tilapia ponds at the farm of Mr. Manaseh Okelo, Western Province, Kenya. Mr. Okelo raises both tilapia and African catfish, *Clarias gariepinus*.

captured in Lake Victoria for export to Europe. There is a growing interest in processing tilapia as well, pending the production of larger and more steady quantities of good-sized fish from aquaculture.

By comparison with the other countries visited under this project, Kenya appears to be in the early stages of tilapia farming development. This is evidenced by the present practices of stocking ponds with either hand-sexed all-male tilapia or mixed-sex tilapia, a lack of commercially available fish feeds, and generally lower levels of production in farmers' ponds. The country does appear to be poised to "take off" with respect to tilapia production, however. Throughout the series of site visits and workshops undertaken by this HCPI group, the members have identified key factors such as the availability of reliable quantities of high-quality, all-male fish seed, the availability of affordable good-quality fish feeds, and the application of efficient management (appropriate fertilization and feeding practices) as requirements to rapid growth. Workers in Kenya appear enthusiastic and are ready to move forward on these important fronts. 🐟



Ethiopian, Kenyan, and Ugandan Project Synergisms

by Ernest W. Tollner, University of Georgia

A recent visit was made to Ethiopia, Kenya, and Uganda under the joint auspices of the Virginia Tech Amarew project and the Aquaculture CRSP project. Both projects are concerned with watershed assessment. The Ethiopian work under Amarew is centered on Lake Tana, the head of the Blue Nile, while the Kenyan work is centered in the Nzoia River, a tributary feeding Lake Victoria. A Ugandan student was identified to work on assessment aspects common to the Ethiopian and Kenyan projects.

The Bahar Dar region is at an elevation of about 1,800 meters. With the exception of a rainy July, temperatures are generally pleasant. The main crops are Maize with a variety of other crops and animal production.

Brahne Gebrekidan, Amarew project director, provided a quick tour of the Amarew aquacultural research at Lake Tana. This lake is at the headwaters of the Blue Nile, and the region provides nearly 70% of the runoff that reaches Egypt annually. The lake covers a large area but is an average of 8 meters deep, and there is some debate about the geologic age of the lake and how it came to be formed. Lake Tana also has unique fish species (*Barbus*) and there is much interest in preserving the lake fishery. Scientists and students from Holland and Russia are on site as well.

I sensed some reluctance to the idea of taking land out of production along the stream, which conveyed that major social hurdles may be required. There was much comfort with the idea of collecting and analyzing data with GIS to present strength, opportunity, weakness and threats maps. Much resolve is necessary on my part to encourage Miheret and his group at every turn that problems will have to be solved by Africans and that the solution will entail changes in the ways things are done if the research is to bear fruit. Land in Ethiopia is owned by the government, and the right to farm is inheritable but not privately transferable. This may be in a strange way beneficial, as the government may be in a better position to protect riparian land via public



Miheret with Lake Tana in the background.

policy than one might expect from a host of individuals who had complete ownership.

The first project objective was essentially a desk assessment. Much time was devoted to the discussion of specific data sources. The CRSP team discussed the possibility of Miheret coming to Georgia to receive GIS training and completing some of the analysis there. Miheret was encouraged to explore in-country sources for GIS training and resources, beginning with the Ethiopian mapping agency as a workable alternate plan. During Kenyan discussions, a plan was mapped to have a GIS workshop taught in Kenya, which could be a third alternative.

An additional objective was added, that stressed the need for proposed strategies to reduce sediment entry into the lake and their experimental verification. The third and fourth objectives were concerned with policy aspects. Extensive changes are anticipated to be made to the methodology, stressing the need to identify the specific data requirements of the desk assessment along with the cost of accessing this data. Specific data needs were discussed. Miheret has submitted an OCED fellowship application for study at Georgia.

The Kenyan portion of the visit was devoted to organizing the kickoff of the most recent Aquaculture CRSP project. CRSP Researcher Mucai Muchiri gave an overview of objectives. Maps were placed on the wall, where a general agreement was reached concerning the areas of focus. A broad land use map will cover the entire basin. Specific interest will be focused in the Cherungani Hills, which contain protected forest land next to intensive agriculture and the Moiben tributary near Eldoret. An expedition by the team is needed in the very near term to finalize specifics.

The next step in planning the project was a breakdown of the equipment the group would need for its experiments. CRSP Principal Investigator Bill Tollner presented an overview with the idea that monies can be initially transferred once appropriate documentation is presented. The team agreed that it will be important to share their resources and data for publication. 🐟



Watershed research team with Moi University administration building in the background.

CRSP Ambassador Visits USAID and AWRA Conference

by Jeff Burrignt and Chris Bridger

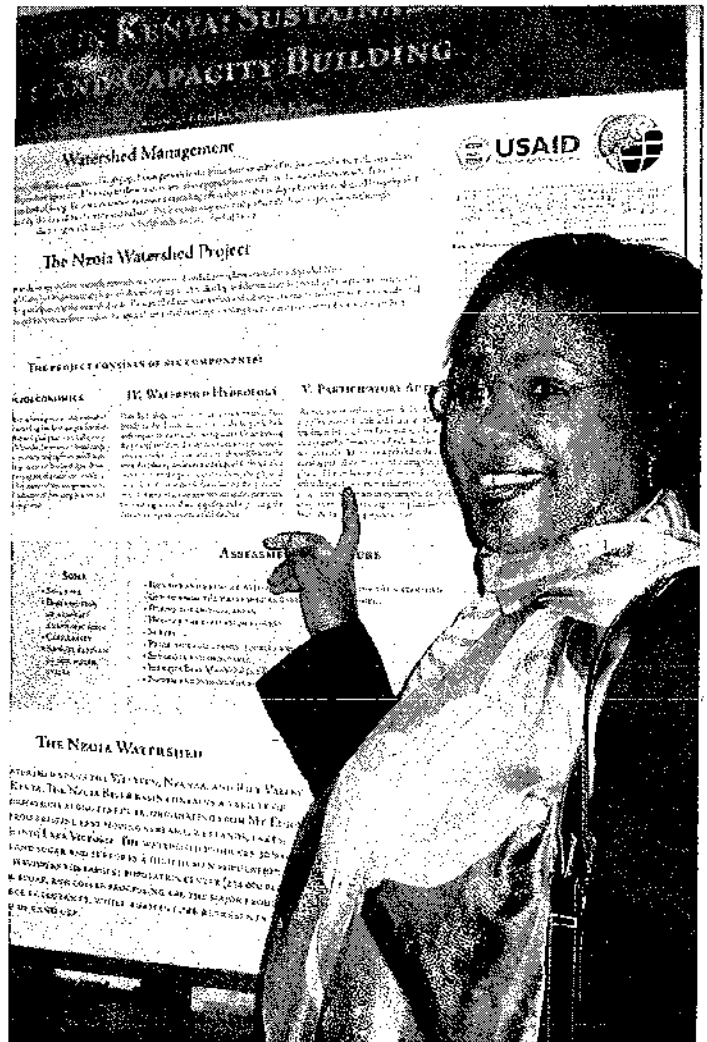
Nancy Gitonga, ACRSP Kenya Ambassador (and Kenya Department of Fisheries Director) visited the United States in November 2005 to attend the annual conference of the American Water Resources Association (AWRA) and act as an ambassador for Kenya and her department while also promoting the excellent work of the Aquaculture CRSP.

This visit was due in part to the Aquaculture CRSP Ambassador program, whose aim is to foster closer ties with USAID field missions and engage them in advanced understanding of the CRSP and the aquatic resources sector, provide qualified on-the-ground professionals to act as resources to the Missions, and help link Mission needs with CRSP capabilities.

On her way to the west coast, Gitonga stopped in Washington D.C. to make a presentation to the USAID Water Team on Kenya's progress and future in aquaculture.

She visited the CRSP management entity at Oregon State University to prepare for the AWRA conference, and in addition she presented a seminar titled, "New dawn on African fisheries and aquaculture for sustainable development and growth," to approximately 50 students at the OSU College of Fisheries and Wildlife on the future of aquaculture in Kenya. The next morning she also presented at the Hatfield Marine Science Center in Newport, Oregon.

She traveled to Seattle, Washington, with Research Projects Manager Chris Bridger, where the pair presented a CRSP-developed poster titled, "Watershed Management in Kenya: Sustainable Resource Management and Capacity Building," which outlined current CRSP work headed by researcher Bill Tollner that focuses on assessment and human capacity building to rehabilitate the River Njoro Watershed in Kenya. Nancy was outgoing and personable during the AWRA conference, and numerous individuals stopped to talk with her about Africa, Kenya, fisheries, and watershed management.



Nancy Gitonga with the CRSP poster at AWRA 2005.

Aquaculture CRSP Florence Annual Meeting Update

The 2006 Aquaculture CRSP Annual Meeting will be held in Florence, Italy on Monday 8 May and Tuesday 9 May, directly before the World Aquaculture Society meeting. The Baglione Hotel will host both meetings.

The CRSP will host a reception on Monday evening, a luncheon for host country Principal Investigators and co-Principal Investigators, and break-out sessions for regional project teams. We plan to break early on Tuesday to allow the participants to attend the WAS opening functions.

Additionally, the ACRSP is sponsoring a number of small pre-conference awards based on merit and need.

Pre-conference awards are available to all individuals presenting during the WAS meeting on research historically or presently funded by the Aquaculture CRSP.

Student Profile: Victoria Boit

by Jim Bowman and David Glindmeyer

Victoria Boit has been working on her masters degree in the Moi University Department of Fisheries (and Aquatic Sciences), Eldoret, Kenya, since September 2004. She was drawn to aquaculture because of its potential for production of high-quality, high-protein food for the people of Kenya and its potential as a source of income for Kenyan farmers. These potential benefits are especially important in the area around Victoria's home town of Kericho.

Victoria's research is part of a CRSP-sponsored series of experiments designed to identify factors and eliminate problems currently causing poor survival of catfish larvae during the nursery phase (rearing to fingerling size). Her thesis, entitled "Effect of sequential feeding under two light regimes on growth and survival of African catfish (*Clarias gariepinus*, Burchell, 1822) fry," will help shed light on the best management practices for catfish ponds both in Kenya and abroad.

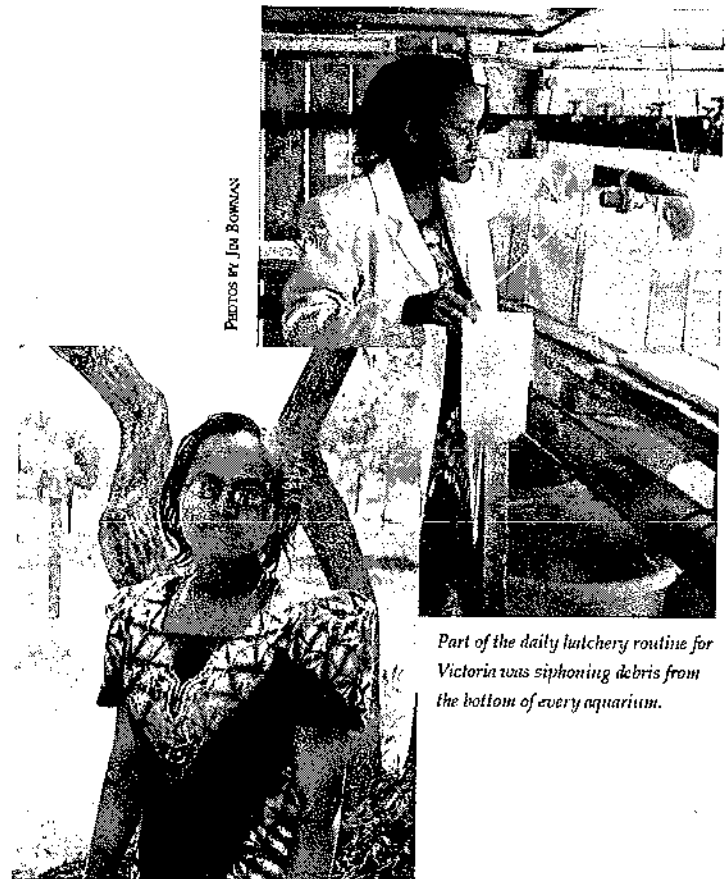
Victoria conducted an experiment comparing three feeding regimes for rearing catfish larvae at the Moi University hatchery (Chepkoiel Campus, Eldoret) in the summer of 2005. In all treatments she offered live rotifers to the larvae for the first four days of feeding. In one treatment she kept the fry on rotifers for an additional ten days and then switched them to a commercial diet (chick mash). In a second treatment, she substituted *Artemia nauplii* for ten days, after which she switched to chick mash. In the third treatment, the fry were switched to the chick mash immediately after the first four days on rotifers. The overall duration of the experiment was 30 days. Preliminary results suggest that the best feeding regime was the one in which the fry were fed rotifers for the first 14 days and chick mash for the remaining 16 days.

After completion of her masters degree, Victoria hopes to work at Moi University teaching fisheries and aquaculture

BMP Workshop continued...

The BMP workshop is scheduled for presentation in Brazil during the final week of March 2006. CRSP researchers Julio Queiroz and Lucia Tavares are making the local arrangements. The experience gained in presenting the effort in South Africa can hopefully be used to improve the program.

Information on BMPs in aquaculture have become increasingly important, for there is a growing interest in programs to improve the environmental and social responsibility of aquaculture. Restaurants and supermarket chains are beginning to source aquaculture products from facilities or regions known to employ better practices: Wal-Mart has signed an agreement with the Aquaculture Certification Council (ACC) to market only shrimp from



PHOTOS BY JIM BOWMAN

Part of the daily hatchery routine for Victoria was siphoning debris from the bottom of every aquarium.

and conducting further research. She would also enjoy participating in extension work, for example conducting seminars geared towards promoting aquaculture in the region, and collaborating with organizations like the CRSP, where there might be opportunities to conduct additional studies. She also plans to continue her education by working towards a Ph.D. at some point in the future.

Victoria enjoys fishing, reading, and swimming. She also enjoys conducting interviews, a passion that she adopted after working in an Eldoret, Kenya, radio station from 2001-2002.

farms certified by the ACC, Darden Restaurants have committed to sourcing their shrimp from ACC certified farms, the New England Aquarium has a partnership with Ahold USA for salmon sourcing, and there will be news of another large partnership between an NGO and major retail chain soon. Additionally, the World Wildlife Fund (WWF) devotes a large effort to obtain stakeholder agreements on issues related to the environmental certification of salmon, trout, catfish, tilapia, shellfish, and seaweed. Implementation of BMPs is considered by WWF to be the most reliable means of complying with certification standards and improving the environmental and social aspects of aquaculture. Thus, the implementation of BMPs will be a major activity in aquaculture for years to come.

HCPI Philippines continued...

statement, the CLSU President stated that there was a "need to commercialize our knowledge." To that end, the university has numerous income generating projects using technologies developed through research. In addition, CLSU has made a conscious effort to integrate hands-on learning in the field with more traditional classroom studies for both undergraduate and graduate students. This approach has resulted in applicable learning experiences for future real world employment.

Following the morning business session, the group was treated to a tour of the CLSU aquaculture-related facilities. These facilities include not only the CLSU Freshwater Aquaculture Center, but also numerous other organizations focused on aquaculture. This proximity has created synergies in research and development across numerous university, government, and NGO institutions, much the same as in any high technology research park.

Perhaps more striking than the importance of tilapia in the Filipino culture was the degree of integration evident between Aquaculture CRSP research at CLSU and local tilapia fish farmers. This general respect for research was also clear by the number of local fish farmers that attended the other HCPI presentations Monday morning. As it was, the group toured the farms of many of these same farmers throughout the week.

The HCPIs visited numerous small- to large-scale tilapia farmers that use various techniques, which ranged from pond to cage culture. Many of these farmers were active



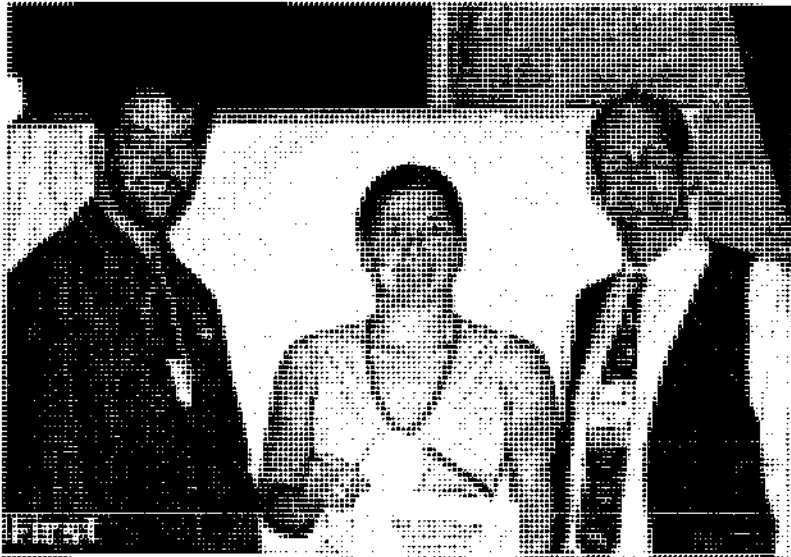
Remedios Bolivar talks about pond management practices research at CLSU.

participants in Aquaculture CRSP research through on-farm research trials. An example of this was Reynaldo Limos. Reynaldo was a full-time rice farmer who diversified his farm by integrating tilapia ponds within his operations. After positive returns from tilapia culture, Reynaldo further expanded his tilapia aquaculture operations by converting additional rice paddies into ponds. Today, he is a farmer cooperater with CLSU Aquaculture CRSP research. The trip's host, HCPI Remedios Bolivar, informed the participants that, "On-farm trials are useful because farmers see how the technology is good for them." This statement became self-evident as Reynaldo explained that in response to impressive results obtained through previous Aquaculture CRSP on-farm trials conducted at his farm he uses a 75-day delayed feeding strategy.

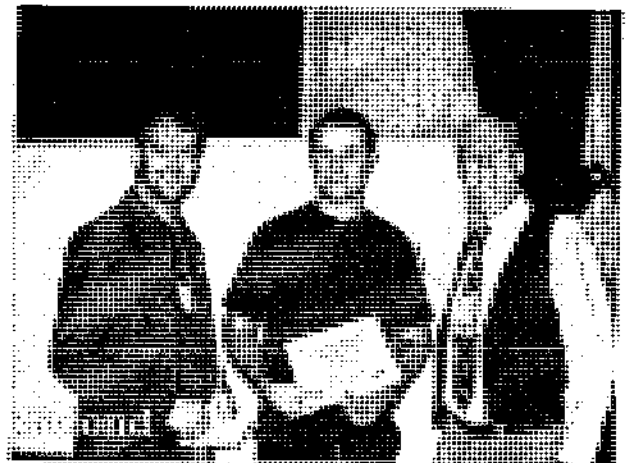
If the point of the exchange between the principal investigators in these five active host countries is to share and compare the best of what works in the development of aquaculture, the Philippines most represents the value of on-farm trials to legitimize research results and build a link between new methods and the people who will find and ultimately apply them toward greater success. 🐟



Tilapia from a roadside stand.



Left to right: Chris Bridger, Jamie Greene, and former WAS President and CRSP researcher Kevin Fitzsimmons.



Top: Warren T. Jones, Bottom: Kyle Schneider

Aquaculture America 2006 Aquaculture CRSP Poster Award Winners Las Vegas, Nevada 13–16 February 2006

First Place

IMPACT OF SUBSTRATE COLOR, MATERIAL, SURFACE AREA AND MESH SIZE ON SURVIVAL, AND GROWTH OF FRESHWATER PRAWN *MACROBRACHIUM ROSENBERGH* REARED IN POND MICROCOSM TANKS

Jamie Greene, James Tidwell, and Shawn Cole
Kentucky State University
Aquaculture Research Center
Frankfort, Kentucky

Second Place

DIETARY VITAMIN REQUIREMENTS FOR THE SEA URCHIN *LYTECHINUS VARIEGATUS*

Warren T. Jones, Mickie L Powell, Victoria Gibbs, Hugh Hamner, Addison Lawrence, John Lawrence, and Stephan A. Watts
Department of Biology
University of Alabama at Birmingham
Birmingham, Alabama

Second Place

HOW DOES LENGTH OF THE NURSERY PERIOD AFFECT SUBSEQUENT POND PRODUCTION OF FRESHWATER PRAWNS?

Kyle Schneider, Shawn D. Cole, James H. Tidwell, and Leigh Anne Bright
Kentucky State University
Aquaculture Research Center
Frankfort, Kentucky

Kudos:

Aquaculture CRSP Southeast Asia Project researcher Yang Yi was appointed as vice chair of the organizing committee, chair of the scientific committee, and one of three editors-in-chief for the 2nd International Symposium on Cage Aquaculture in Asia, to be held in Hangzhou, China on 3–8 July 2006.

Correction:

In our Fall 2005 Aquanews, we reported that CRSP researcher Kwamena Quagraine had moved from the University of Arkansas at Pine Bluff to Cornell University in September 2005, when in fact he has moved to the Department of Agricultural Economics at Purdue University. We apologize for the mistake and any confusion it may have caused.

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AQUANEWS

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