AQUANEWS

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SEARCH FOR NEW CRSP AFRICA SITE CONTINUES

By Jim Bowman

The Africa site selection committee has continued its extensive search for a replacement site for the Rwasave Station in Rwanda. In October, Wayne Seim, Karen Veverica, and Jim Bowman met in Harare, Zimbabwe to participate in a planning meeting with the Aquaculture for Local Community Development Programme (ALCOM). They exchanged views with ALCOM members from several of the participating Southern Africa Development Community (SADC) countries. The discussions generated enthusiasm for networking with ALCOM and provided valuable information relating to potential sites in several SADC countries.

The team then followed up a 1994 visit to Kenya by Wayne Seim and Hillary Egna to the Sagana Fish Culture Farm, to re-evaluate the potential of the Sagana site, and to look at other potential sites in Kenya. The team met with the Permanent Secretary of the Ministry of Tourism and Wildlife (responsible for aquacultural research at the Sagana Farm), then traveled to Kisumu, on Lake Victoria, to visit the Kibos Fry Production Center. The team was satisfied that Sagana meets most CRSP technical criteria for a primary site. Opportunities for potential collaboration with FAO and the Lake Basin Development Authority workers in the Kisumu area on outreach/extension activities add to the attractiveness of Kenya as a CRSP site.

In November, Bowman, Tom Popma, and Veverica visited Malawi, where Veverica presented a paper at ALCOM's "Technical Consultation on Extension Methods for Smallholder Fish Farming in Southern Africa," in Lilongwe. They then visited the Domasi Experimental Fish Farm, Zomba, where ICLARM's Africa Project is based, and Bunda College of Agriculture, where an aquaculture program is being developed as part of the curriculum of the Department of Animal Science. Both sites meet most criteria for companion sites for CRSP research in Africa, although *Oreochromis niloticus* can not be used in Malawi.

CRSP Researcher Jim Bowman meets with Edward Nsikee of the Southern Africa Development Community's Inland Fisheries Unit Technical Training, at the ALCOM meeting in Harare, Zimbabwe last October.

The team then returned to Kenya to discuss the possibility of establishing a CRSP project there with officials of the Kenya Ministry of Tourism and Wildlife, and to further examine specific site development needs for the Sagana Station. They also made contact with the Department of Zoology, University of Nairobi, which is interested in aquacultural research. In Tanzania, the team visited the Kingolwira Aquaculture Center and Sokoine University of Agriculture, both in Morogoro. Kingolwira is intended to become the National Aquaculture Center for Tanzania, but is still in early develop-

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CONTINUATION PLAN UPDATE

By Brigitte Goetze

The PD/A CRSP Continuation Plan 1996-2001 was mailed to USAID in mid-December, and included revisions made as a result of USAID's comments on the preliminary draft submitted in September. Also included in the final draft was the PMO response to the USAID Administrative Management Review. USAID has tentatively scheduled a review of the Continuation Plan for mid-January 1996, and is currently assembling a review panel. In addition to internal reviewers from USAID, the panel will include Anson Bertrand, Mel Blase, Merle Broussard, Clarence Grey, and Mort Neufeld. Director Hillary Egna, Board Chair Oneal Smitherman, TC Co-Chair Bryan Duncan, and Deputy Director Brigitte Goetze will represent the CRSP at the review.

From the

DIRECTOR'S DESK

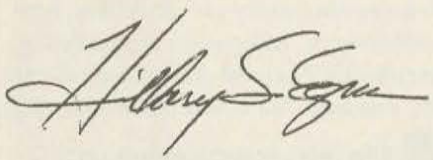
A Proposed Verse Re: Our Proposal

We sent our proposal to USAID,
Hoping a decision soon would be made.
We waited and waited with plans all well laid–
What the heck's going on at USAID?

Then came October's budget battles and woes,
And a Congress that bickered while a decision froze.
The lengthy revision cost beaucoup postage,
But USAID's budget Jesse held hostage.

Delays, budgets, furloughs, negotiations,
What these boys need are lots of libations.
Chanukah came, then Christmas, then Kwanzaa
We opened our parcels, but found no bonanza.

Another one-year extension is not acceptable,
Unless someone's got money stashed away in a receptacle.
As a research program we're pushing on the gate,
But we realize all we can do is wait,wait, wait.



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ment, with no earthen ponds yet in place. Similarly, while interest at Sokoine University is high, the aquaculture program is in the early stages of development, and research ponds are not yet available. However, the potential for CRSP involvement in Tanzania, through outreach, networking, and cooperative projects seems good.

CRSP PROJECT REPORTS

CRSP research is described below according to project. Researchers are continuing work on experiments described in the Sixth and Seventh Work Plans, and began work on experiments under the Interim Work Plan. The Interim Work Plan covers the period from 1 May 1995 through 30 April 1996, at which time Continuation Plan activities are scheduled to begin. Copies of the Interim Work Plan are available from the Program Management Office

Honduras

Researchers established baseline information on water quality for major estuaries of the shrimp production regions of southern Honduras in early 1994. They continued to monitor water quality to ascertain changes over time. Estuarine water quality appears to be improving with regards to nitrogen and phosphorus concentrations. This is apparently linked to drastically reduced feeding levels in shrimp ponds throughout the region because of the Taura Syndrome. Researchers are trying to obtain information about total feed input, protein level of feed, and shrimp production by farm, month, and estuary since 1993, in order to correlate farm inputs with estuarine water quality.

Last August, researchers began a study to test the effect of diet protein level on feed conversion and nitrogen effluents during shrimp production at semi-intensive stocking levels during the warm (wet) season and cool (dry) season. The harvest of shrimp larvae in the estuaries was higher than normal this season, so nursery-size ponds were fully utilized. Taura Syndrome has little effect on the survival rate of larvae harvested from the estuaries, unlike laboratory produced larvae, whose survival rate is only 25% in the presence of Taura Syndrome, making the laboratory-produced larvae three times more expensive than the wild-caught larvae.

Students from the Panamerican Agriculture School are writing theses based on data generated by CRSP research on tidal effects on nutrient, oxygen, temperature, and salinity profiles.

As part of CRSP special topic research, a study testing the efficacy of different levels of dietary MT and treatment environment on sex reversal of tilapia was conducted at Auburn during August 1995. In addition, the use of freeze-dried bull testes as a dietary source of testosterone was tested to determine its efficacy in sex reversal of tilapia.

David Teichert-Coddington has continued to be actively engaged in the Honduras project, returning monthly to supervise on-going extension work at La Lujosa. Bart Green, who assumes management of the Honduras project in January 1996, has also made frequent trips to Honduras.

In September, Teichert-Coddington, Green, and Dan Meyer of the Panamerican Agriculture School in Zamorano met with commercial tilapia producers in the north coast area of Honduras to determine their interest in a collaborative research program on tilapia, similar to the cooperative program in Choluteca for shrimp culture. The farmers expressed great interest in collaborating with the CRSP. Contact was also made with the north coast office of the Federation of Export Producers (FPX) to discuss the possibility of their collaboration with tilapia research in the north. FPX, a collaborator in the Choluteca shrimp research activities, supports the idea of collaboration with tilapia research, and may finance some of the experiments.

The commercial tilapia farms in the north coast area are generally small- to medium-sized, and all express a need for more technical expertise. The farms are financially solvent, but stiff market competition will indubitably take a toll on the technically inefficient farms. The farmers and producers agreed that the CRSP continuation proposal to link on-farm tilapia research directly to research at the El Carao National Aquaculture Research Center would be appropriate and beneficial to the country of Honduras and the tilapia industry.

Scott Smith, a CRSP research associate with the Africa project, completed his thesis work while at Choluteca, and was

successful in revitalizing the El Carao station as a fingerling production facility.

Africa Site

The CRSP has been actively engaged in selecting a new Africa site from which to build regional capacity in aquaculture research. To this end, CRSP researchers visited several sites in Africa during fall 1995. In addition to visiting potential sites, researchers participated in the ALCOM planning meeting in Zimbabwe.

One of the strengths of the CRSP is its resiliency in the face of disruption. Studies that were originally planned for implementation at the Rwasave Station in Rwanda have been modified to be carried out at other sites. One such study underway at Auburn evaluates the appetite and growth response of tilapia fry to different temperature regimes. The three-stage study is currently in the final stage.

A study to examine lime requirement estimators, including PONDCLASS and three other "standard" methods, is underway at OSU. Soils from Rwanda, and additional soils from Honduras and other sites in Africa, are being examined. Also, isolation columns are being used as in-pond units to test selected liming rates *in situ* to compare with those laboratory results. Data from this experiment are currently being processed.

Another study that was re-located from the Rwanda site to Honduras compared Nile and red tilapia. Researchers at the El Carao station are looking for differences in the reproductive efficiency of adults, and the growth and response of fry to sex reversal treatments of two, three, and four weeks duration. Data analysis is in progress.

Two other laboratory experiments will establish:

•if there is a degree-day relationship between temperature and timing of gonadal differentiation in Nile tilapia fry; and

•effects of storage temperature on the shelf life of a commercial methyltestosterone-treated feed. Indicators of shelf life are fry growth and efficacy of sex-reversal treatment.

Researchers are also investigating whether the laboratory-developed immersion method of masculinization of tilapia developed at OSU could be scaled up to production levels. Fry from a production pond were immersed in methyldihydrotestosterone rather than being subjected to treatment with methyltestosterone-treated feed.

Thailand and Philippines

Researchers in Thailand are investigating whether the addition of large bodied fish (e.g., carp) to tilapia monocultures can break down stratification in deep rainfed ponds. As carp may also utilize different food items, the net yield of fish may improve over a tilapia-only culture.

An initial round of grow-out trials was harvested at the Freshwater Aquaculture Center of Central Luzon State University (FAC/CLSU) and on nearby farms. Collaborating farmers were solicited for a second round.

Work continues at the FAC/CLSU and at on-farm sites for the "High Elevation" studies which were re-programmed from the Rwanda project. The on-farm trials have been harvested, and an on-station experiment comparing manipulated and selected tilapia strains in polyculture with snakehead and Chinese catfish is underway.

Work continued on studies of relationships to be found in the CRSP Data Base concerning primary production and fish yield, and among measures of suspended particulates in ponds.

DAST

The first version of a combined water quality and fish growth model has been completed at UCD. The model can be used to calculate water temperature, dissolved oxygen, and fish growth over a growing season, and uses stochastic input variables for solar radiation, wind speed, and wind direction. Dissolved oxygen calculations use equations based on earlier results of this study, and the fish growth component of the model was adapted from work done by the OSU/DAST.

Randy Brummet (ICLARM/Africa) and CRSP researcher Karen Veverica inspect tanks holding juvenile African catfish at the Domasi Experimental Fish Farm in Zomba, Malawi. Veverica was part of the CRSP Africa site selection team that visited Malawi, Kenya, and Tanzania last fall.

Work on an integrated agriculture/aquaculture model focusing on nitrogen dynamics also continues at UCD. The pond sub-model of the integrated system makes use of work by the OSU and UCD DAST. The recently modified bioenergetic growth model now includes: 1) separate digestibility coefficients for artificial feed and phytoplankton, and 2) feed quality coefficients that account for feed quality variability.

During the summer, data from the Global Experiment, Seventh Work Plan, were received from Honduras, Philippines, and Thailand. Data analysis is in progress. Minor modification of the computerized fertilization guidelines to better account for nutrient cycling in ponds is also being undertaken based on preliminary results of the data analysis.

Water balance and flow calculations in *POND*© enable simulation of pond or tank facilities where estimating water requirements and pond water effluent discharge quality is necessary. Improved feed estimation capabilities have also been added to the software. Further, the energetic and water quality models have been modified to explicitly account for the effects of feeds of differing quality on production and the overall pond water environment.

Project Reports continues on p.4

CRSP-FAO Collaborate on Regional Scale Analysis

By Shree Nath

In the Fall 1995 issue of Aquanews, we reported that the OSU/DAST and FAO personnel were collaborating on a regional-scale study to assess aquaculture potential in Latin America. As part of this collaborative effort, OSU graduate student Shree Nath visited the FAO headquarters in Rome on October 28 to November 11, 1995 to provide assistance in the integration of *POND*©models (for water temperature and fish growth) with GIS software (ARC/INFO) that is being used by the FAO for the overall analysis. In order to facilitate this integration, the relevant *POND*©models were packaged as independent applications designed to run either within the DOS or UNIX operating environments.

. . . this type of regional-scale analysis is useful for strategic planning at national and sub-national levels. . .

A pilot study was conducted to predict annual water temperature profiles for Latin America using a complete gridded dataset of minimum/maximum air temperatures combined with a simple weather generator that predicts other input data needed by the model. Maps generated using the results of this study suggest that the water temperature model produces seasonal trends that are consistent with profiles expected at Northern and Southern latitudes for Latin America.

In conjunction with the pilot-scale effort on water temperature predictions, the number of crops per year for two fish species, Nile tilapia *(Oreochromis niloticus)* and the tambaquí *(Colossoma macropomum)*, was also projected for the entire Latin American grid under the assumptions of commercial operations with a feeding rate equivalent to 75% satiation and fixed harvest sizes of 350 and 1000g respectively for tilapia and tambaquí. Depending on water temperature, fish growth model output ranged from 0-2.0 crops/yr (0-14,000 kg/ha/yr) for Nile tilapia and 0-1.1 crops/yr (0-16,500 kg/ha/yr) for tambaquí. The approach used in the pilot-scale study appears to be of considerable use in assessing pond aquaculture potential for large regions. This is partly due to the capability of generating realistic water temperature profiles that account for variations in weather characteristics. Improved water temperature predictions are expected when this collaborative effort resumes in February 1996, at which time a complete gridded weather dataset (including air temperature, solar radiation, wind speed, cloud cover, and relative humidity data) is expected to become available from the FAO Agrometeorology Group.

These profiles will then be used as inputs to the fish growth model in order to generate new crops as well as feed requirements required to achieve this potential. We will also investigate the possibilities of extending the approach to include alternate fish culture systems, subsistence-level aquaculture and integrated farming systems. In a broader sense, this type of regional-scale analysis is useful for strategic planning at national and sub-national levels, particularly when combined with engineering and economic factors important to fish production. Marketing and socioeconomic constraints to aquaculture development.

Project Reports, Continued from p.3

Social Sciences

Researchers conducted data analysis, reported on survey data, and elaborated the economic analyses of CRSP technologies and production strategies. A draft of the report has been reviewed by CRSP researchers at several institutions.

Program Management Office

Highlights of Activities

- Hillary Egna, Brigitte Goetze, Gary Jensen, and Bryan Duncan participated in a strategic planning meeting in Washington DC regarding the upcoming PD/A CRSP Continuation Plan review.
- Revised and edited the final draft of the Continuation Plan, which was submitted to USAID 30 September 1995. After receiving comments from USAID staff, revisions were made and the final draft was re-submitted 14 December 1995.
- Conducted an analysis of constraints to aquaculture development worldwide.
- Discussed new research areas as identified by the constraints analysis with CRSP and non-CRSP researchers and administrators, including USAID, ICLARM, and FAO.
- Coordinated the review of incoming book chapters for *Dynamics of Pond Aquaculture*, to be published by CRC Press.
- Developed, with the Technical Committee Co-chairs, a process and schedule for the upcoming work plan review for 1996-2001.
- Initiated the selection of a new EEP member due to the resignation of Roger Pullin.
- Continued planning for the Fourteenth PD/A CRSP Annual Meeting, to be held 26-28 January 1996 in Bangkok, Thailand, in conjunction with the World Aquaculture Society meeting.
- Assisted the OSU DAST in arranging the *POND*© workshop at the World Aquaculture Society meeting in Bangkok in January 1996.
- Completed a review of the CRSP Central Data Base. Copies are available from the PMO.
- Facilitated and supported the attendance of CRSP Sociologist Joe Molnar at the SANREM workshop on indicators. A report on this workshop is available through the PMO.

Marion McNamara, center, tries to check into the Fule Estates in Huairou, China, for the Fourth World Conference on Women. She was eventually admitted, but not until her CRSP literature had been throughly inspected by hotel security personnel and police.

THESES USING CRSP RESEARCH COMPLETED

The following theses have been completed this year by students working with CRSP researchers and/or with CRSP data.

- Amechi, Enc O. 1995. An Assessment of By-Catch Biomass in Experimental Fish Ponds. M.Sc. Thesis. Asian Institute of Technology.
- Ahmed, Saleh. 1995. Assessment of Chlorine as a Pisicide in Freshwater Fish Culture. M.Sc. Thesis. Asian Institute of Technology.
- Baouthong, Pompimon. 1995. The Effect of Feeding Regime on Growth and Body Composition of Shrimp *(P. monodon)*. M.Sc. Thesis. Asian Institute of Technology.
- Chughtai, Muhammad A. 1995. Effects of Water Spinach *(Ipomoea Aquatic)* on Nutrient Regime and Fish Growth. M.Sc. Thesis. Asian Institute of Technology.
- Rungruengwudhikrai, Em-om. 1995. Characterization and Classification of Off-Flavour of Nile Tilapia. M.Sc. Thesis. Asian Institute of Technology.
- Vuthana, Hean. 1995. Fish Pond Turbidity in Cambodia. M.Sc. Thesis. Asian Institute of Technology.
- Ungsethaphan, Theapparath. 1995. An On-Farm Trial to Investigate Feeding Strategies for Nile Tilapia *(Oreochromis niloticus)* Broodfish. M.Sc. Thesis. Asian Institute of Technology.
- Xie, Jian Jun. 1995. Alternative Methods for Maggot Production. M.Sc. Thesis. Asian Institute of Technology.
- Md, Rafiqul Islam, 1995. A Field Survey of the Factors Involved in the Use of Ponds for Fish Culture in Bangladesh, With Emphasis on Water Quality. M.Sc. Thesis. Asian Institute of Technology.

CRSP ADMINISTRATOR ATTENDS WORLD WOMEN'S CONFERENCE

Assistant Director Marion McNamara represented OSU's Women in Development program at the NGO Forum of the Fourth World Conference on Women in China. McNamara was a presenter at a workshop on Women in Decision Making. She notes that out of the hundreds of workshops, panel discussions, and plenary sessions, only three dealt with aquatic resources, a reflection perhaps of the diminished emphasis the conference organizers placed on agriculture or of women's traditional underrepresentation in this area.

Although the CRSP did not pay for travel expenses, McNamara used the opportunity to bring CRSP information for distribution at the conference, which attracted over 30,000 participants from around the world. However, the information almost didn't make it through the scrutiny of the Chinese authorities.

While checking into her hotel, McNamara's luggage was searched by the hotel staff, and CRSP brochures were taken. She waited while the police were summoned, and animated discussions took place. Through an interpreter, McNamara was quizzed on the content of the brochures, and questioned about her intent in bringing them into the country. Chinese-speaking friends intervened to explain the non-subversive nature of the literature, and finally she was allowed to enter the hotel with all but one brochure–which was confiscated by the police for further investigation.

CRSP RESEARCHERS ATTEND FOURTH ASIAN FISHERIES SOCIETY FORUM IN BEIJING

By C.K. Lin

Researchers C. Kwei Lin and Yang Yi attended the Asian Fisheries Society Forum at the Beijing International Convention Center in Beijing, 16-20 October 1995.

The tri-annual meeting attracted participants from many countries. More than 800 papers in 12 technical sessions were presented. Technical sessions included: aquaculture, capture fisheries, disease, ecology, fish biology, genetics, biotechnology, nutrition, post-harvest technology, shrimp culture, socio-economics and fisheries resources.

Lin and Yi presented the following papers at the Forum:

- Current status and research needs for aquacultural systems, Lin, C.K.
- An integrated cage culture system in earthen ponds: stocking density of caged Nile tilapia *(Oreochromis niloticus)*. Yi, Y., C. K. Lin and J. S. Diana.

CRSP Researcher Addresses Tilapia Culture Symposium in Costa Rica

By Bartholomew W. Green

Commercial tilapia aquaculture is expanding rapidly in Central America, particularly in Costa Rica and Honduras. In Nicaragua and Panama, commercial tilapia production is a nascent industry. Most development of the tilapia culture industry in this region is occurring at semi-intensive or higher production levels as producers race to meet market demands.

Much of the Central American tilapia production is classified as a non-traditional agricultural export, primarily in the form of fresh fillets exported to the US, but local markets for tilapia are also developing. In Costa Rica, where whole, gutted tilapia is marketed on ice, consumers demand a 600-gram fish, while in Panama, the market size of tilapia is about 500 grams. Exports of fresh tilapia fillets from Central America to the US have doubled since 1993. During the first six months of 1995, exports of fresh tilapia fillets to the US were 482,499 kg from Costa Rica, 22,334 kg from Honduras, and 4,940 kg from Nicaragua.

. . . rapid growth has naturally attracted the attention of farmers and investors . . .

This rapid growth has naturally attracted the attention of farmers and investors, and led to the First Central American Symposium on Tilapia Culture. The symposium was organized jointly by the Regional Program to Support Fisheries Development in the Central American Isthmus (PRADEPESCA), a European Union-financed project, the Costa Rican Institute for Fisheries and Aquaculture (INCOPESCA), the National University of Costa Rica and Aquacorporación S. A. The symposium provided a forum to discuss scientific, technological, and marketing advances for tilapia aquaculture regionally and worldwide. The three-day conference, held 15-17 November 1995, was attended by more than 240 researchers, producers, investors and extension personnel from Central America, as well as from Mexico, Venezuela, Colombia, Ecuador, and Israel.

Field visits to Aquacorporación S. A., the Enrique Jimenez Nuñez Research Station, INCOPESCA, and the tilapia cage culture project in Lake Arenal took place on the final day of the symposium. Aquacorporación S. A., the largest tilapia farm in Costa Rica, is an intensively managed production facility with 98 existing ponds (25 ha water surface area) and an additional 20 ponds under construction. Currently the farm produces 3,000 MT of tilapia annually, exported as fresh fillets to the US.

Also present at the symposium were a number of shrimp farmers from Central and South America who wanted to learn more about tilapia culture. High shrimp mortality caused by Taura Syndrome and shortages of seed stock in some areas have prompted many shrimp farmers to consider crop diversification. Tilapia, because of its salinity tolerance, and good production and marketing characteristics, is one species being evaluated in Honduras and Ecuador.

Auburn University researcher Bartholomew Green was an invited speaker at the symposium, with travel expenses provided by PRADEPESCA. Green presented the paper entitled, "Polyculture of Tilapia with Marine Shrimp." Polyculture of tilapia with marine shrimp appears feasible, particularly during rainy season months and the first several months immediately following the rainy season. Still, a number of production, logistic, and processing/marketing considerations need additional attention. For example, optimal stocking rates and sizes for tilapia and shrimp, and pond management strategies have not been determined. Systematic research on tilapia-shrimp polyculture is part of the 1996-2001 PD/A CRSP Continuation Proposal.

DAST Provides Decision Support for Pond Aquaculture in the US

By Shree Nath

In September, Shree Nath, OSU/DAST, met with producers, extension agents, and researchers associated with the channel catfish, baitfish, and striped bass aquaculture industries in Alabama, Mississippi, and Arkansas. The primary goals of this trip were to familiarize potential users of *POND*© software with its capabilities and to examine applications of the software in these industries. Discussions with catfish researchers and extension agents suggest that *POND*© models are likely to be of use in simulating fish growth and water quality in catfish ponds. Calibration of the *POND*© fish growth model for catfish has been accomplished and simulation results are encouraging. DAST researchers anticipate collecting more detailed growth and water quality data sets from researchers at the Stoneville research station in Mississippi in an effort to parameterize the more complex models in *POND*©. Discussions with extension agents and farmers in Arkansas indicate that the fertilization guidelines gene rated by *POND*© may be of use both in baitfish and striped bass ponds.

The possibility of on-farm testing of these guidelines at selected locations in Arkansas is being pursued. During the trip, seminars that included a demonstration of *POND*© were conducted at Auburn University and the University of Arkansas at Pine Bluff. In addition, several copies of the software were distributed to producers, extension agents and researchers.

HOME, HOME ON THE PAGE

By Ingvar Elle

A home page for the PD/A CRSP came on-line 15 December (see below). The page includes an introduction to the CRSP and a selection of tools and applications that can be downloaded. A publications section currently includes the full text of the Twelfth Annual Administrative Report, abstracts of CRSP Research Reports, CRSP Research Data Reports:Volume I General Reference, and a complete list of CRSP publications. The CRSP home page is dynamically linked to other aquaculture-related listservs and environmental organizations.

There is also a form to order hard copies of CRSP Research Reports; the titles of all reports are linked to their respective abstracts. There is also a separate form to order hard copies of Annual Administrative Reports, Work Plans, Data Reports, Aquanews and other publications. Eventually, most CRSP publications will be on-line, and Netsurfers will be able to search CRSP publications by key words. The URL for the CRSP home page is: http://www.orst.edu/Dept/crsp/homepage.html

Welcome to the PD/A CRSP

The Pond Dynamics/Aquaculture Collaborative Research Support Program (PD/A CRSP) represents an international community of researchers and institutions dedicated to the efficiency of pond aquaculture systems.

Who We Are - Brief introduction to the PD/A CRSP.

Publications - List of CRSP publications (a few are online, most must be ordered).

Data Tools - Global aquaculture database and the POND$ decision support software.

Related Organizations - Extensive lists from the University of Stirling's Institute of Aquaculture.

To comment on the quality and contents of this page please send mail to ellej@ucs.orst.edu
For questions regarding the PD/A CRSP organization send mail to crspmail@oce.orst.edu

Bytes from **THE ELECTRONIC POND**

This column highlights useful resources on the Internet for those interested in issues that relate to the CRSP mission of increasing food security through developments in pond aquaculture. Many of the highlighted resources can be found as links in the PD/A CRSP homepage.

ALCOM (Aquaculture for Local Community Development Programme) is an inter-regional program executed by the Food and Agriculture Organization (FAO) that aims to improve the living standards of rural communities by increasing their income and improving the protein content in their diets through the practice of aquaculture and improved fisheries management. The ALCOM homepage includes links to its quarterly newsletter, publications catalog, and information service, which includes a list of their available databases. Databases available include:

- Africa Inland Fisheries (statistical information on all African Inland waters)
- FIPPDAT Africa (a fishery policy and planning database system)
- AGRIS Fisheries 1975-93 (A fisheries prototype containing more than 100,000 selected bibliographic records on fisheries and aquaculture)
- AGRIS 1991-92 (an international information system for agricultural sciences and technology)
- FAO AGROSTAT PC (agricultural statistics and other related data)
- FIPIS Project Information (the Fishery Project Information System)
- REGIS II Africa Aquaculture (information on aquaculture in Africa)
- Small Water Body database (information on small water bodies, mainly reservoirs, in several countries of SADC)
- FISHBASE (an information system with key data on the biology of all important fishes).

The ALCOM homepage can be reached at <http://www.zamnet.zm/zamnet/alcom/alcom.htm>.

Netsurfers now have access to the U.S. Government Printing Office (GPO) award-winning GPO Access on-line service. All Internet and dial-in users can now receive electronically, at no charge, the Congressional Record, Federal Register, congressional bills, and a growing list of important government documents on the same day of publication. Government databases can be reached via the Internet or by dial-in through a modem:

http://www.access.gpo.gov/su_docs/
telnet to swais.access.gpo.gov; then login as guest
Dial-in call (202) 512-1661; type swais and then login as guest.

Questions about the GPO Access service can also be directed to a nearby Federal Depository Library. At least one such library is located in each congressional district. For orders and assistance, contact the GPO Access User Support Team: fax: (202) 512-1262; phone: (202) 512-1530; email: <help@eids05.eids.gpo.gov>.

First National Tilapia Culture Workshop Held in Nicaragua

By Bartholomew W. Green

Nicaragua's abundant hydrologic resources are currently used for capture fisheries, and hold great potential for aquaculture. The Lake Nicaragua capture fishery alone supplied nearly 13,000 kg of frozen tilapia fillets (about 43,000 kg live weight equivalent) to the US during the first six months of 1995. Nicaraguan farmers and investors are aware of the rapid, successful development of commercial tilapia aquaculture in neighboring Costa Rica and Honduras. They see real promise for tilapia aquaculture in Nicaragua, particularly as pond culture using the lakes as a water source, or as cage culture in one of the lakes.

Over 200 prospective tilapia farmers and investors attended the First National Workshop on Tilapia Culture which was held at the Olof Palme Convention Center in Managua on 26 July 1995. The Workshop was sponsored jointly by the Financiera Nicaragüense de Inversiones, the Centro de Exportaciones e Inversiones, Programa Regional de Apoyo al Desarrollo de la Pesca en el Istmo Centroamericano (PRADEPESCA), and the Fisheries Department, Ministry of Agriculture (MEDE-Pesca). The objectives of the Workshop were to provide participants with a general overview of the technical, financial, and marketing aspects of commercial tilapia aquaculture. Researcher Bartholomew W. Green, AU/Honduras, was invited to make technical presentations on tilapia fingerling production systems and tilapia grow-out systems. Green's travel was financed by the Financiera Nicaragüense de Inversiones.

While in Nicaragua, Green met with Dr. Roger Gonzalez, Vice President Latin American Campus, University of Mobile, San Marcos, and with Dr. David G. Hughes, former Panama CRSP researcher, who is now on the faculty of University of Mobile, San Marcos. Green had the opportunity to give Gonzalez and Hughes an overview of the operation and research results of the Honduras CRSP, pointing out the applicability of the production systems developed in Honduras to Nicaraguan fish farmers. They also discussed opportunities for collaboration between the aquaculture program at the University of Mobile San Marcos Campus and the Honduras CRSP, possibly as a companion site. All agreed to pursue this opportunity once it was certain that the 1996-2001 PD/A CRSP extension has been approved.

Int'l Centers Week Offers Opportunity for Collaboration

By Brigitte Goetze

In response to USAID's request to improve collaboration with the International Center for Living Aquatic Resources Management (ICLARM), Director Hillary Egna and Deputy Director Brigitte Goetze attended International Centers Week, held in Washington DC in late October, as observers. The meetings focused on the final milestone in the renewal process of the Consultative Group on International Agricultural Research (CGIAR); the theme was *Priorities and Strategies of the CGIAR System*. Emphasis was placed on strengthening the National Agricultural Research Systems (NARS)-CGIAR partnership in international research and development.

The CRSP was especially interested to learn about ICLARM's activities relating to the Central Laboratory for Aquaculture Research (CLAR), Abbassa, Egypt. The CRSP was active at this site for two and a half years, through March 1995. ICLARM, whose interest in this site was spurred in part by the CRSP activities there, proposed to increase the scope of activities at Abbassa and to support CLAR in its efforts to become a regional aquaculture center at a proposed funding level of five million dollars per year. Egna met with Meryl Williams, the new Director General at ICLARM, to discuss possible cooperation in Egypt and elsewhere.

Recent Publications, Presentations by Researchers

Information about CRSP research is disseminated through a variety of channels. During the last quarter, CRSP researchers had papers accepted for publication, and gave presentations at several professional meetings. The following reports and papers have not been published by the PMO, so inquiries should be directed to the authors.

Bowman, J.R. and J.E. Lannan. 1995. Evaluation of soil pH-percent base saturation relationships for use in estimating the lime requirements of earthen aquaculture ponds. *Journal of the World Aquaculture Society*, 26 (2):172-182. (CRSP Accession No. 1099)

Green, B.W. 1995. Tilapia fingerling production systems. Presented at the First Symposium on Tilapia Culture, Managua, Nicaragua. 26 July 1995.

Green, B.W. 1995. Grow-out pond management strategies for tilapia production. Presented at the First Symposium on Tilapia Culture, Managua, Nicaragua. 26 July 1995.

Teichert-Coddington, D. In press. Effect of stocking ratio on semi-intensive polyculture of *Colossoma macropomum* and *Oreochromis niloticus* in Honduras, Central America. Accepted for publication in *Aquaculture*. (CRSP Accession No. 1111)

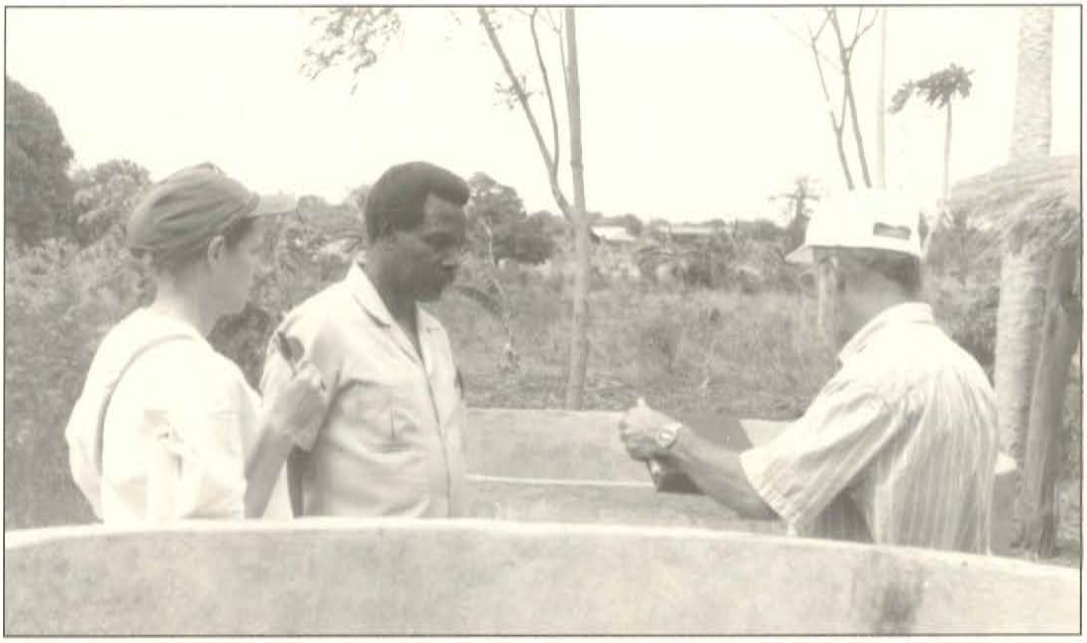
Szyper, J.P. In press. Observations and model predictions of daily areal primary production in a eutrophic brackish water culture pond. Ecological Modelling. (CRSP Accession No. 1115)

Molnar, J., T. Hanson, and L. Lovshin. 1995. The multiple identities of tilapia as a farm enterprise: the growth of a global commodity in the context of development assistance. Presented to the Annual Meeting of the Rural Sociological Society, Washington, DC. (CRSP Accession No. 1124)

Yohe, J.M., P. Barnes-McConnell, H. Egna, J. Rowntree, J. Oxley, R.G. Hanson, D. Cummins, A. Kirksey, The CRSPs: International Collaborative Research Support Programs., in *Disease Analysis through Genetics and Biotechnology*, Leslie & Frederiksen, Eds., Iowa State University Press, Ames, IA, 1995, 321.

CRSP Joins in Planning Workshops for West African InterCRSP

By Jim Bowman



At the Kingolwira Aquaculture Center in Morogoro, Tanzania, CRSP researchers Karen Veverica and Thomas Popma discuss ferrocement tanks with Raphael Lema, Senior Aquaculturist of the Tanzanian Fisheries Division.

Since the early 1980's, several of the CRSPs have conducted independent projects in West Africa. During the past year, three of these CRSPs have participated in an InterCRSP initiative, the Hamdallaye Project, a small natural resource management project near Niamey, Niger. The success of this pilot InterCRSP effort has attracted attention in the region, and suggests that natural resource management and agricultural development activities can be successfully integrated. Wider application of such integrated activities in West Africa through further InterCRSP efforts would be appropriate because it would be mutually beneficial to the West African countries involved and the US.

To further explore the possibilities for InterCRSP activities in West Africa, two workshops were held. Brigitte Goetze, PD/A CRSP Deputy Director, attended the planning workshop in Washington, D.C. last August. The result of the planning workshop was the working session, *Technology Development and Transfer to Improve Natural Resource Management,* held in Niamey, Niger in September, and hosted by Niger's Institut National de la Recherche Agronomique du Niger (INRAN). Jim Bowman participated in the Niamey workshop prior to meeting other members of the Africa site selection group in southern Africa.

Representatives from regional and national institutions and NGOs in Benin, Burkina Faso, Cameroon, the Cape Verde Islands, Côte d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, and Chad attended the Niamey workshop. Also attending were representatives from six CRSPs, including the PD/A, Peanut, Intsormil, Integrated Pest Management, Small Ruminants, Soil Management, and SANREM CRSPs, as well as USAID representatives from the Missions and Washington. Technologies and outputs available as a result of prior research conducted by the various CRSPs were presented. Participants discussed the natural resource management needs of the various countries and ideas about how an InterCRSP effort in West Africa might be structured.

Although the primary objective of the workshop was to develop a workplan for a coordinated InterCRSP project to improve natural resource management in West Africa, an intangible benefit was the emergence of a spirit of regional cooperation for natural resource management, even though most of the participants had not worked together in the past.

Most participants were interested in natural resource management in the semi-arid (Sahelian) regions of their countries; as a result, the initial thrust of an InterCRSP project may be to develop a single project at a semi-arid site. Although participation by the PD/A CRSP in such efforts would be limited, if future InterCRSP efforts are expanded to include humid or sub-humid sites, the PD/A CRSP could become significantly involved as a result of participating in these early planning workshops.

MILESTONES

- **Roger Pullin** has resigned from the External Evaluation Panel. We extend thanks for the service he has rendered the CRSP. The Management Entity has begun the process of selecting a new EEP member.
- **Kevin Hopkins** has resigned as CRSP Central Data Base Manager, and as researcher on the Thailand/Philippines project, effective in April.
- **Danielle Clair** joined the PMO as a Program Assistant in January.
- **Naomi Weidner** left the PMO in June.
- **Brad Herbison** is the new part-time office assistant.
- **C. Kwei Lin** has been nominated as a Director for the World Aquaculture Society. If elected, he will serve a three-year term.

CALENDAR OF EVENTS

International Aquaculture Technology Expo '96, 1-3 February 1996, Kobe, Japan. Contact Daniel E. Gruenberg, 9-5-26-606 Akasaka Minato-ku Tokyo 107 Japan. Phone 81 3 3470-4302; Fax: 81 3 3470-3995; email <jifasdeg@gol.com>.

Western Regional Aquaculture Expo '96, 7-10 February 1996, Radisson Hotel, Sacramento, CA. Contact California Aquaculture Association, P.O. Box 1004, Niland, CA 92257. Phone (619) 359-3474; email <fish@cts.com >.

Eleventh Indian Seafood Trade Fair, 9-11 February 1996, Bombay, India. Contact The Marine Products Export Development Authority, Cochin, India, Phone 91-484-311979; Fax 91-484-313361.

Pacific Fisheries Technologists Annual Meeting, 18-21 February 1996, Red Lyon Hotel, San Diego, CA. Contact Michael Morrissey, Oregon State University, Astoria, OR, Phone (503) 325-4531; email <sfl@bcc.orst.edu >.

Fourth Symposium on Biogeochemistry of Wetlands, 4-6 March 1996, The Monteleone, New Orleans, LA. Contact Karen Gros, Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge, LA 70803. Phone (504) 388-6423.

Twenty-fourth Benthic Ecology Meeting, 7-10 March 1996, University of South Carolina, Columbia, South Carolina 29208 USA. Contact information: Fax (803) 777-3935; email <info@marine.geol.sc.edu>.

The 61st North American Wildlife and Natural Resources Conference, 22-27 March 1996, Adams Mark Hotel, Tulsa, OK. Contact Dick McCabe, Wildlife Management Institute, 1101 14th St. NW, Ste. 801; Washington D.C. 20005. Phone (202) 371-1808; Fax (202) 408-5059.

Open-Ocean Aquaculture Conference, 8-10 May 1996, Portland, Maine. Contact Rollie Barnaby, UNH. Phone (603) 679-5616; Fax (603) 679-8070; email <rollie.barnaby@unh.edu>.

International Conference on Fish Inspection and Quality Control, 19-24 May 1996, Washington D.C. Contact National Fisheries Institute, 1525 Wilson Boulevard, Suite 500, Arlington, VA 22209. Phone (703) 524-8881; Fax (703) 524-4619; email <Zbigniew.Karnicki@fao.org>.

International Symposium on Fish Vaccinology, 5-7 June 1996, Soria Moria Hotel, Oslo, Norway. Contact Paul J. Midtlyng, VESO VetResearch, P.O Box 8109 dep.N-0032, Oslo, Norway. Phone +47 22 96 46 05; Fax +47 22 56 62 54; email <Paul.Midtlyng@vetinst.no>.

Second International Interdisciplinary Conference on the Environment, 15-20 June 1996, Newport, Rhode Island, Contact Demitri Kantarelis, Fax (508) 799-4502; email <dkantar@eve.assumption.edu>.

PACON 96, June 17-22 1996, Ilikai Hotel, Honolulu, Hawaii. Contact PACON International. Phone (808) 956-6163; Fax (808) 956-2580; email <pacon@wiliki.eng.hawaii.edu>.

World Congress on Coastal and Marine Tourism, 19-22 June 1996, The Ilikai Hotel, Honolulu, Hawaii. Contact Dr. Jan Auyong, CMT 96 Convenor, c/o Oregon Sea Grant College Program, Oregon State University, AdS A500G, Corvallis, OR 97331-2131 USA. Phone (541) 737-5130; Fax (541) 737-2392; email <auyongj@ccmail.orst.edu>.

International Congress on the Biology of Fishes, 14-18 July 1996, San Francisco State University, San Francisco, CA. Contact Don MacKinlay, Fisheries and Oceans, 555 West Hastings Street, Vancouver, BC V6B 5G3, Canada. Phone (604) 666-3520; Fax (604) 666-3540.

Second Worldwide Fisheries Congress, 28 July- 2 August 1996, Brisbane Convention and Exhibition Centre, Brisbane Australia. Contact Second World Fisheries Congress, P.O. Box 1280, Milton, Queensland 4064, Australia. Phone (617) 369-0477; Fax (617) 369-1512.

The 126th Annual Meeting of the AFS : Sustainable Fisheries: Economics, Ecology and Ethics, 25-29 August 1996, Hyatt Regency Hotel, Dearborn, Michigan. Contact Paul Brouha, AFS, 5410 Grosvenor Lane, Ste.110; Bethesda, MD 20814. Phone (301) 897-8616; Fax (301) 897-8096.

AQUANEWS

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