AQUANEWS

THE NEWSLETTER OF THE POND DYNAMICS/AQUACULTURE COLLABORATIVE RESEARCH SUPPORT PROGRAM

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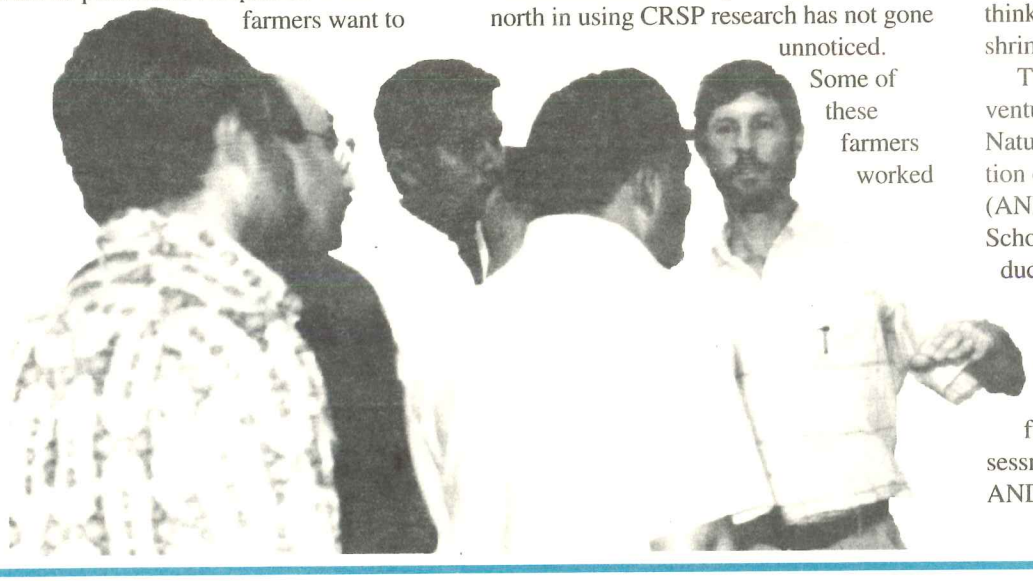
NEW OPPORTUNITIES CAPITALIZE ON TEN YEARS OF RESEARCH

Southeastern Honduras is ideal for growing shrimp. The land is open and flat. The Gulf of Fonseca rolls gently out to the Pacific, cradled between the arms of Nicaragua and El Salvador, framing the Gulf with two live volcanoes. And in the heat, says R. Oneal Smitherman, a PD/A CRSP Board member who visited the site last year with the External Evaluation Panel, you can almost hear the shrimp growing.

The first shrimp farms began in southern Honduras in the early 1970's and today the industry is in a period of rapid expansion. Long time residents have seen get-rich-quick schemes scar the face of their land in the past, and most emphatically do not want a repeat performance. During the 1960's, the area was deforested, the result of cotton farming and cattle ranching combined with short-sighted land tenure laws. To this day, siltation resulting from deforestation requires frequent dredging of water supply canals on farms.

Shrimp farmers here recognize both the opportunity and the challenges facing them now. Opportunity comes in the form of new markets for their shrimp; the attendant challenge is to protect the environment from ill-planned development. These farmers want to avoid the kinds of catastrophes that plagued the shrimp industry in Thailand and Taiwan; they want to base their economic decisions on environmental considerations. And the success of tilapia farmers in the north in using CRSP research has not gone unnoticed.

Del McCluskey (left), USAID representative, cuts the ribbon opening the new laboratory at La Lujosa. Looking on are (from left) Claude Boyd, PD/A CRSP, Auburn University, Carlos Lava, ANDAH President, Carlos Leba, Pan American Agricultural School, David Teichert-Coddington, PD/A CRSP, Auburn University, Alberto Zelaya, FPX, Oto Tercero, DIGEPESCA, Government of Honduras.



Some of these farmers worked and studied at the CRSP's freshwater research station over the last decade. They recognize that research can help answer important questions about water quality and phytoplankton dynamics—and they think that these answers will help make the shrimp industry sustainable.

Thus was born a public-private joint venture with the CRSP, the Ministry of Natural Resources, the National Association of Honduran Aquaculturists (ANDAH), the Panamerican Agriculture School (EAP), and the Federation of Producers and Exporters of Honduras (FPX).

The Ministry provides laboratory and office space at La Lujosa, close to Choluteca. ANDAH provides equipment and supplies for the lab, with funds coming from a self-imposed assessment on shrimp exports. In addition, ANDAH members provide ponds and

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From the DIRECTOR'S DESK

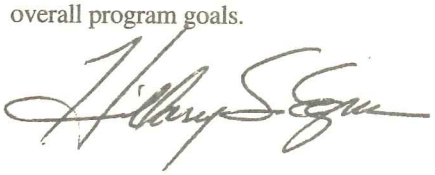
The natural sciences research agenda of the PD/A CRSP has recently been infused with a broad-based social sciences project. In three of our five country sites, social scientists from Auburn University are working with host country researchers and U.S. biologists to evaluate the effectiveness of CRSP technologies.

Joe Molnar, Len Lovshin, and Terry Hanson are studying various aspects of technology dissemination and adoption in Honduras, Thailand, and the Philippines. In each of these countries, researchers interview local farmers to learn about costs, industry structure, government policy, and local community attributes. Farmers are selected through discussions with industry representatives and other knowledgeable individuals during pre-survey investigations.

Survey data will be used to perform economic analyses of technological alternatives. Specifically, costs and returns of various CRSP production regimes will be developed into a profile of financial profitability for each system in each country. Another aspect of the project centers on assessing receptivity of technology adoption and then recommending various refinements to CRSP expert models.

The project commenced this summer in Honduras. Peace Corps interest in this study translated to generous logistical support for the Auburn University graduate student, German Arnoldo Cerezo-Casado, who is conducting the field study. Surveys in Thailand and the Philippines will be conducted in December and January.

Core funding usually allocated to the natural sciences component was used to support this study; consequently, CRSP natural scientists are especially interested in seeing that the study is cooperatively designed and implemented. The CRSP has supported stand-alone social sciences projects in the past but this new project affords us the opportunity to bring together the natural and social sciences in achieving overall program goals.



PROJECT REPORTS

Project Reports summarizes research activities for April through June 1993. Greater detail about the studies undertaken can be found in the *PD/A CRSP Quarterly Report*, which can be ordered from the Management Office.

HONDURAS

Researchers have been studying stocking density and protein content of various diets during both the good and bad growing seasons at Choluteca. The basic experiment–using stocking densities of 5 or 10 shrimp per square meter, and a diet of either 20 or 40% protein–was carried out simultaneously at three different sites, including two private farms in the area. This is a pioneering attempt to conduct simultaneous research at various farms in the area. Data collected so far indicate that responses to density and protein combinations in both the good and bad seasons are similar, although as expected, yields in the bad season are lower for all treatments because of environmental constraints. Work at the La Lujosa laboratory is focusing on developing analytical methodologies for use in brackish water; sampling of the estuaries began in April.

RWANDA

A study to determine if locally available feedstuffs can be used to improve tilapia utilization of protein is nearing completion. Balancing protein-energy intake with a properly designed feed could increase system productivity for tilapia while lowering operating costs and increasing the efficient recycling of scarce local materials.

Researchers comparing the economics of resource utilization in aquaculture to that of other agricultural crops are developing enterprise budgets for aquaculture production technologies to be used in mathematical modeling.

Farmer-generated data from over 1000 production cycles are being entered into a spreadsheet for analysis of the relationships between the following variables: fish production, stocking rate, fish population structure, fish species composition, elevation, nutrient inputs, culture period, producer characteristics, and other pertinent variables.

Laboratory experiments at Auburn isolated the effects of temperature from other environmental variables linked to elevation, such as soil characteristics and solar radiation. Researchers investigated the extent to which appetite, growth, and feed conversion efficiency are affected by temperature when feed is provided frequently and at varying rates.

The recently completed analysis of stomach contents from the polyculture study of *Gariepinus-Oreochromis niloticus* will provide recommendations for a fish culture strategy appropriate to elevation and economic circumstances of farmers.

THAILAND

The effect of stocking density on pond carrying capacity is being studied in fertilized ponds receiving supplemental feeding. Pond carrying capacity is expected to increase with supplemental feeding, but increased feed may contribute to

At the Abassa research station in Egypt, CRSP researchers record data for the Global Experiment, using a protocol similar to that used at other CRSP sites.

deterioration of water quality. The goal is to determine the appropriate stocking density so that extra fertility from supplemental feeding is effectively assimilated. Balancing food supply and water quality can allow farmers to achieve optimal economic production while maintaining environmental quality.

Data analysis is underway for a recently completed experiment to determine the relationships of pond size to fish yield, management practices, and system efficiency. The Thailand CRSP continues its involvement in the outreach project through the Asian Institute of Technology to field-test least-intensive aquaculture techniques on small-scale integrated farms in northeast Thailand. Regional verification of CRSP research results continues in the Philippines.

DAST

The UCD Data Analysis and Synthesis Team (DAST) continues work on quantification of light and dark respiration rates. The goal of this study is to develop improved computer models and field procedures for monitoring and optimizing the oxygen regime in pond systems. The models for temperature and dissolved oxygen in stratified ponds have been completed, and sensitivity analysis of the models is underway.

The fish growth model for PONDCLASS is being refined at OSU, using a database developed from a literature review. The refinements allow users to specify the expected temperature range during the culture period; the program uses a random number generator to insert a value for the expected temperature during the culture period and provides a graphical representation for multiple stocking weights and temperature profiles.

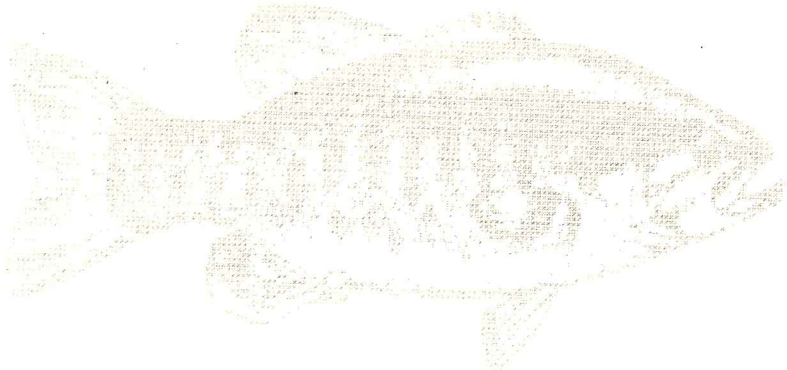
The first four chapters of the Users' Guide to PONDCLASS have been translated from English to French. Parts of the software corresponding to these chapters have also been translated. The last two chapters of the guide are being translated by in-country personnel of the Rwanda project.

The DAST Newsletter was published in July, and described the experimental protocol for the Global Experiment for the Seventh Work Plan. Copies of the Newsletter can be ordered from the UCD / DAST (fax: 916-752-2640.)

EGYPT

At Abbassa, work on the Global Experiment began in earnest this summer after project equipment and supplies were procured, and 24 ponds at El Abbassa were stocked. The bioconversion experiments, featuring grass and black carp, are also in progress.

The biotechnology studies are underway at three U.S. universities. At Oregon State University, experiments have been conducted to compare the androgen binding characteristics of cytosol. At the Mariculture Research and Training Center at Hawaii, the preparations for the experiment investigating the effects of methyltestosterone on fish growth are underway. Progeny testing on tilapia populations with skewed sex ratios, focusing on the contribution of "YY" supermales, has begun at Auburn University.



MEETINGS

25th Annual Symposium of the Desert Fishes Council, 11-13 Nov 1993, Monterrey, Mexico. Contact: Phil Pister, Desert Fishes Council, P.O. Box 337, Bishop, CA 93515 USA. Tel: 619 872-8751.

12th Biennial International Estuarine Research Federation Conference, 14-18 Nov 1993, Hilton Head Island, South Carolina, USA. Contact Rick DeVoe, c/o ERF93 Planning Committee, SC Sea Grant Consortium, 287 Meeting St., Charleston, SC 29401 USA. Tel: 803 727-2078; Fax: 803 727-2080.

4th Brazilian Shrimp Farming Symposium and 1st Brazilian Aquaculture Congress, 22-29 Nov 1993, Joao Pessoa, Paraiba, Brazil. Contact: Itamar Rocha, MCR Aquaculture Ltda., Av. Flavio Maroja, 39, Tambia, Joao Pessoa, Paraiba, Brazil, CEP 58.020-630. Tel: 55 83 222 3561; Fax: 55 83 222 4538.

Fisheries & the Environment Beyond 2000, 6-9 Dec 1993, Serdang, Malaysia. Contact: The Conference Secretariat, Faculty of Fisheries and Marine Science, Universiti Pertanian Malaysia, 43400 UPM Serdang, Selargor Darul Ehsan, Malaysia. Tel: 6 03 948 6101 ext. 2520; Fax: 6 03 948 8246, 2697.

International Symposium on Socio-economics of Aquaculture, 14-17 Dec 1993, Taiwan, Republic of China. Contact: Dr. Y.C. Shang, Dept. of Agricultural & Resource Economics, University of Hawaii, 3050 Mailey Way, Honolulu, HI 96822 USA. Fax: 808 956-2811.

World Aquaculture '94 and Aquaculture Expo VII, 12-18 Jan 1994, New Orleans, LA USA. Contact: Bill Glasscock, Aquaculture Productions, Inc., P.O. Box 24866, Little Rock, AR 72221 USA. Tel: 800 467-3350 or 501 225-6102; Fax: 501 224-8230.

Pond Dynamics/Aquaculture CRSP Annual Meeting, 28-31 March 1994, Hilo, Hawaii. Contact: Naomi Weidner, OIRD, Oregon State University, Corvallis, OR 97331-1641 USA. Tel: 503 737-6417; Fax: 503 737-3447.

Uses & Effects of Cultured Fishes in Aquatic Ecosystems, 12-17 March 1994, Albuquerque, NM USA. Contact Delano Graff, Commonwealth of Pennsylvania, Fish & Boat Commission, Bureau of Fisheries, 450 Robinson Lane, Bellefonte, PA 16823 USA. Tel: 814 359-5154; Fax: 814 359-5153.

•Continued from front page

inputs to conduct the CRSP experiments. FPX extensionists assist in collecting data from their members and disseminating research information back to them. Students under the direction of EAP conduct research in shrimp culture and water quality analysis. This extensive network of collaborators supports CRSP researcher David Teichert-Coddington, along with lab technicians Nelson Claros, Delia Martinez, and Jaime Lopez, in focusing on research issues–estuarine monitoring, pond fertilization and shrimp feeding strategies–that will help answer farmers' concerns. As a result, the newly refurbished laboratory was dedicated this spring, and shrimp growers and farm managers have begun collaborating with the CRSP to study water quality issues that affect shrimp production and the estuarine environment surrounding the farms. Already, money-saving feeding strategies that lessen the load of nutrients being pumped into the Gulf have been developed.

This public-private collaboration prompted ANDAH member Ralph Parkman to write the CRSP Board of Directors, saying, "It is ANDAH's intention . . . to develop a sustainable industry in Honduras, dependent on a healthy aquatic environment in the Gulf of Fonseca. A sustainable industry will permit long term benefits to all, and would not be possible to achieve without programs such as yours."

As the Honduras CRSP develops innovative ways to foster collaboration and branches out into brackish water research, the freshwater research is far from forgotten. Ten years of research in pond dynamics, coupled with formal and informal aquaculture training by the CRSP, have helped set the stage for the tremendous growth in the tilapia industry on Honduras' north shore. In addition to helping supply the expanding industry with well-trained aquaculturists, the CRSP has established a research base for techniques, such as fingerling production, that support the growth of the industry.

Hermes Alvarenga, a former Research Assistant for the CRSP, and Marco Ivan Rodriguez, a former Principal Investigator, are both involved in developing and managing tilapia farms in the north. Alvarenga, now the aquacultural advisor for FPX, is supervising construction of a model farm, oriented to commercial tilapia farmers. Technicians who received their training at El Carao have also been hired by the industry.

Farmers using the El Carao method (which got its name from an association with the CRSP research station at El Carao) purchase sex-reversed *Oreochromis niloticus* fingerlings from the El Carao station. Fingerlings come with a suggested cultivation plan that specifies fertilization of the pond with chicken litter. A few *Guapote tigre* fingerlings are included to help control unwanted tilapia reproduction.

Word of the method's success has spread, and now dozens of small-scale farmers produce a pond or two of fish for family and neighbors, while medium-scale producers supply urban markets. Building on years of painstaking dedication by CRSP researchers and collaborators, aquaculture in Honduras–in the north and in the south–seems ready to deliver on its promise to better the lives of the Honduran people.

MILESTONES

Ricardo Gomez, Principal Investigator for Honduras, has been awarded a scholarship for graduate studies in Spain. A Host Country Principal Investigator for Honduras has not yet been named to take his place.

Research Associate **Luis Lopez** recently accepted a position as a biologist in the shrimp industry in Honduras.

Chris Knud-Hansen returned to Thailand this summer on a temporary appointment to participate in the outreach project in northeast Thailand. While in Thailand, he also taught a course on experimental design at AIT, analyzed experimental data, prepared manuscripts, and assisted Jim Szyper, the new Co-PI in Thailand.

Dr. El Gamal is carrying out a research project on polyploidy production and cold tolerance of tilapia at the Southeastern Fish Cultural Laboratory in Marion, Alabama.

AQUANEWS

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