

AQUANEWS

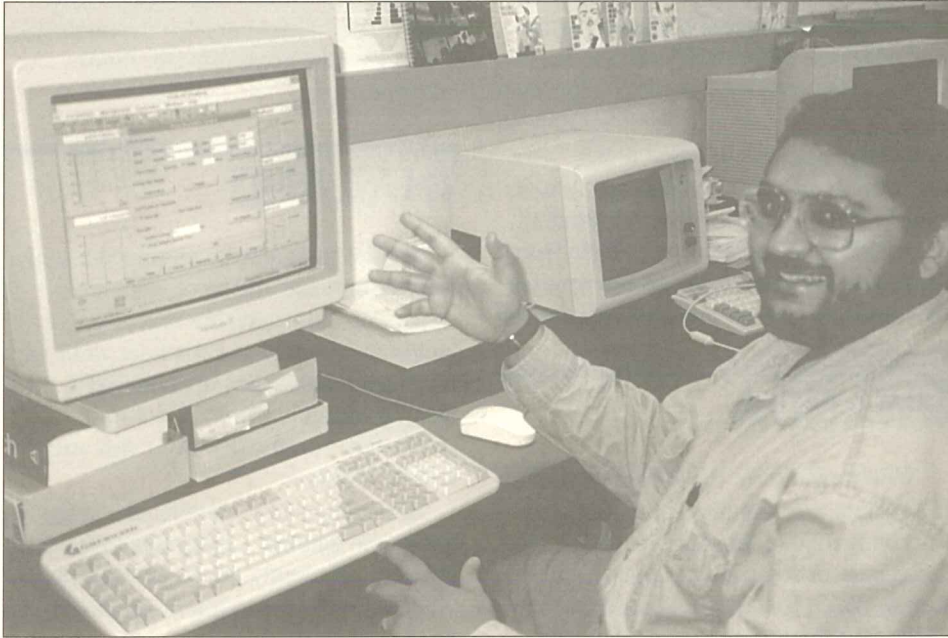
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POND: THE NEXT GENERATION OF PD/A CRSP SOFTWARE



Shree Nath, OSU DAST member, demonstrates the latest version of POND, a decision support program that runs on IBM-compatible computers

Those familiar with the CRSP know that the CRSP Central Data Base is the largest standardized data base on tropical aquaculture in the world. But not everyone knows what happens to the data once they are collected. The Data Analysis and Synthesis Team (DAST) has as its central mission the building of models and other useable products from the data base. PONDCLASS, the first "expert system" to result from this work was well received when it was released four years ago. John Bolte, Principal Investigator on the OSU DAST, notes that since the release of PONDCLASS, the requirements for tools that allow more comprehensive analysis of both individual ponds and entire facilities has increased. Therefore, the OSU DAST has most recently focused on extending the scope of PONDCLASS to allow simulation and analysis of these systems. These efforts have resulted in the release of POND.

POND is a computer-aided decision support system developed by the OSU DAST team of Bolte, Shree Nath, and Doug Ernst to guide decision-making processes relevant to warmwater pond aquaculture. POND gives users a tool for rapidly analyzing warmwater aquaculture systems under different management regimes, and assists them in developing optimal management strategies.

Pond analysis is accomplished primarily by the use of simulation models, combined with an economics package that can be used to generate enterprise budgets for a facility. The program can be used to set up facilities with different configurations and/or management strategies. Multiple simulations can be conducted to examine the effects of various pond management

PD/A CRSP PROJECT REPORTS

All CRSP projects work toward the goal of understanding the dynamics of pond aquaculture, using both the Global Experiment and the locally driven research studies. These project reports summarize activities through September 1994; further detail can be found in the Quarterly Reports, which are available from the Management Office.

HONDURAS

Researchers continue to monitor water quality in major estuaries of the shrimp production regions of southern Honduras to ascertain changes in water quality over time. The baseline information on water quality was established earlier this year by CRSP researchers.

Researchers are also continuing work on quantifying nutrient flow into and out of four farms located on two different estuarine types. Nutrient budget studies have been completed for all farms, and the data are ready for analysis.

An experiment evaluating relationships among stocking density, mean shrimp size, survival and carrying capacity was completed in November. Researchers calculated chemical budgets for ponds stocked with different densities to determine ecological efficiency of intensification. The results will help increase feeding efficiency and reduce water quality deterioration.

A study to determine the relative growth potential of tambaqui (*Colossoma macropomum*) in polyculture with tilapia was completed in May.

■ Projects continued, p. 2

■ POND continued, p. 3

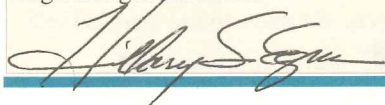
The immediate future of the CRSP requires decisions regarding potential new projects in Africa and South America. The Management Office, Technical Committee, and Board of Directors have worked together to identify criteria for evaluating new sites. Ultimately, however, the level of funding that is received from USAID this spring will determine whether suitable country sites actually become CRSP projects.

Criteria for establishing new sites are based on a number of factors, many of which must come together synergistically before collaboration can happen. Predicting which factors are most important is difficult, but at least three basic criteria must be satisfied. These are: USAID Mission support, including eligibility status and strategic objectives; host country government support, including national strategies for aquacultural development and mechanisms for institutional collaboration; and a strong CRSP interest in the site.

Other factors to be considered are:

- existing physical infrastructure
- research and extension infrastructure and human resources
- environmental/ecological/economic significance
- availability of physical, biological, social, and economic data including long-term records of climate, soils, water quality, and socioeconomic indicators
- availability of fish species for research
- possibilities for leveraging funds and attracting buy-ins
- potential for establishing a stable, long-term presence, including political stability and safety and health considerations
- regional and global benefits, and the possibility of establishing companion sites in neighboring countries.

Site evaluation will also take into account site-specific nuances, such as the possibility for successful collaboration among individuals as well as institutions. In keeping with the BIFADEC guidelines for CRSPs, the overall emphasis will remain on bringing new countries into a long-term global effort.



Projects, continued from p. 1

In July, a study was begun to define optimum nitrogen fertilization levels in inorganically fertilized ponds where phosphorus is not limiting.

David Teichert-Coddington is helping to prepare the Third Central American Symposium on Shrimp Culture, which will be held in Honduras 26-29 April 1995. Teichert-Coddington is also working with George Ward of the University of Texas in Austin on a proposal to set up a monitoring program for the Gulf of Fonseca to determine the exchange rate of the Gulf with the Pacific Ocean. This activity is a direct outgrowth of the work conducted at the laboratory in Choluteca, and was initiated at the Regional Conference on Shrimp Culture and the Environment that was hosted by the CRSP in May of this year. Data from the project will be helpful in determining the impact of shrimp industry effluents on the Gulf of Fonseca.

RWANDA

Withdrawal from the Rwasave Station in Rwanda was completed this fall, and the contractual relationship with the University of Rwanda was ended. Reports from Rwanda indicate that none of the CRSP equipment is recoverable. Revisions to Work Plan 7 were submitted and approved by the Technical Committee chairs, the Program Director, and the Board of Directors.

Two soils studies are underway, using soils from Kenya and Thailand. The first study examines phosphorus fixation and availability in pond soils. Findings will allow soil analyses to be used to predict how strongly pond soils can be expected to bind fertilizer phosphorus, and will be useful in selecting extractants for determining the availability of pond soil phosphorus.

The second study will determine the most effective method for estimating lime requirements in broadly different soil types under laboratory conditions. As part of this experiment, the PONDCLASS estimation procedure will be evaluated in comparison with three other methods in laboratory microcosms. Results should lead to more effective lime-application practices, decreasing unnecessary costs from over-application and potential loss of production from under-application of

lime. A laboratory has been established at OSU for evaluating lime requirements of soils from various sites. Data analysis has begun at Auburn for data from Rwanda and from the beginning activities of the revised Seventh Work Plan.

Site selection criteria were developed in conjunction with the CRSP Technical Committee and the Management Entity. After evaluating information on a large number of African countries, Kenya was judged to have high potential for CRSP involvement. Hillary Egna and Wayne Seim visited Kenya in late November to investigate the possibility for future collaboration.

THAILAND

In July, researchers completed a study to determine the effects of stocking density on pond carrying capacity, including fish size and total net yield, in fertilized ponds with supplemental feeding. Poaching from ponds has skewed the results; therefore, this study will be repeated.

Researchers also completed a study to determine whether caging tilapia for final growout efficiently produces large tilapia while utilizing the nutrients produced from feeding the caged tilapia to grow smaller tilapia. Differential mortality among cages was problematic, and this study will also be repeated.

In August, tilapia fry were stocked at the Huay Luang fisheries station in Udorn Thani province to begin a study evaluating the effects of fertilizer application frequency on the dynamics of rainfed ponds.

In November, a study began to determine how adding common carp to a tilapia monoculture will affect fish production, nutrient dynamics, turbidity, and primary productivity.

A study of diel cycles of temperature and dissolved oxygen stratification in deep rain-fed ponds is underway. Ponds in northeast Thailand are deeper than CRSP experimental ponds so they can hold sufficient water to sustain evaporative losses in the dry season. This greater depth (2-3m) suggests that density stratification will be more severe than in shallower ponds, making oxygen depletion more likely.

DAST

A doctoral dissertation based on CRSP research in respiration dynamics in aquaculture ponds is in the final stages of review. Changes in respiration rates appear to be dependent primarily on time, and not on temperature, dissolved oxygen concentration, or primary production rates.

A procedure has been developed to project stochastic values of solar radiation, wind direction, and wind speed. These values have been used in stratified temperature simulations for 20-day periods for ponds in Thailand. Researchers ran sufficient iterations that the results can be used to draw conclusions about the expected range in the output values. The model is operational in both Macintosh and Windows environments using Stella™ modeling language.

The User's Guide and diskettes for POND version 2.0 were mailed to approximately 85 recipients, including 40 PD/A CRSP participants (see story, p. 1). Work on the water quality models in POND is an on-going activity. Some descriptions for non-steady state nutrient dynamics have been implemented.

A number of tools are being examined for possible inclusion in the economic optimization of pond facilities. Levels of fertilization and feed are the variables suitable for optimization within the current framework of POND. The computer code for genetic algorithms is being implemented. The next phase will link the models in POND to the genetic algorithm routines for optimization.

EGYPT

As part of the Global Experiment, a study was conducted to compare growth and yield characteristics of Nile and blue tilapia in different pond environments. A companion study investigated the growth and yield characteristics of Nile tilapia stocked at 30,000 or 40,000 fish/ha.

USAID/Cairo and NARP have granted an extension of the PD/A CRSP Egypt Project.

At the Central Laboratory for Aqua-culture Research (CLAR) in Abbassa, studies are underway to evaluate the use of grass carp and black

POND's graphical user interface adds to ease of use. A sample screen from the economics program is pictured above.

POND, continued from p. 1
scenarios on fish yields and facility-level economics. The program is calibrated for tilapia, but the parameters can be adjusted for other species. In fact, the DAST team encourages researchers or extensionists working with striped bass or catfish to send in their data.

POND features several easy-to-use data bases for entering data specific to a facility/site and a graphics module for viewing the results of simulation runs. POND also provides on-line help for program operations. The range of capabilities and ease of use make POND

a useful tool for researchers, educators, planners, and extensionists.

This summer, version 2.0 of POND was sent to 85 reviewers around the world, including researchers, World Bank and FAO representatives, extension agents, and private producers. A survey included with this release asked for a general evaluation of the use of decision support systems for pond aquaculture, as well as an evaluation of the usefulness of POND. The results of the evaluation will help the researchers determine which variables to add to the program, and which variables will strengthen the economic applications.

POND requires an IBM-compatible personal computer running version 3.1 or higher of Microsoft Windows. The program also needs about 1.5 MB of available hard disk space, a minimum of 4MB RAM and 80386 or greater CPU. POND is distributed free of cost, and a copy may be obtained via anonymous ftp from eng.orst.edu. The subdirectory is /pub/bag, and the name of the file is pond.zip. Or, contact Shree Nath, Biosystems Analysis Group, Dept. of Bioresource Engineering, OSU, Corvallis, OR 97331, USA. Phone: (503) 737-3218, fax: (503) 737-2082, email: naths@ccmail.orst.edu

carp in conjunction with other species as building blocks for a polyculture system suitable to Egyptian conditions. Catfish-tilapia interaction, an aspect of the polyculture research, was investigated at the Asian Institute of Technology in Thailand.

A series of studies was conducted under the FDA INAD in order to obtain FDA approval for methyltestosterone (MT) sex-reversal technology.

A series of studies in the U.S. aims to develop a "YY" supermale breeding program. This will allow the creation of a

Projects, continued on P. 4

monosex population untreated with hormones. So far only one male produced 100% male offspring.

The establishment of a breeding program using broodstock with desired characteristics, such as the capacity to sire monosex offspring, may be enhanced by the development of cryopreservation technology. Experiments were conducted using dimethylsulfoxide (DMSO) or methanol as cryoprotectants for tilapia sperm.

Work on the effect of water temperature on Nile and blue tilapia fry production also continued. Survival during treatment increased to an average of 60% when researchers modified treatment tank management to improve water quality.

The experimental phase of a study to distinguish the growth-promoting from the sex-reversal effects of MT on *Oreochromis aureus* and *Oreochromis mossambicus* has been completed. Experiments to determine the safest and most effective procedure for tilapia fry sex-reversal is underway. Experiments in which tilapia fry are immersed in solutions containing either MT for masculinization or 17 α -ethynylestradiol for feminization are continuing.

A one-day tilapia fingerling production workshop at the CLAR was attended by fish farmers, extension personnel, university professors, and

M E E T I N G S

INDAQUA 1995, 27-30 Jan 1995, Madras, India. Contact R. Ganapathy, 17 Battery Place, Room 227 (2nd Floor), New York, NY 10004 USA. Phone (212) 425-9437; Fax (212) 363-3456.

PD/A CRSP Annual Meeting, 29-31 Jan 1995, San Diego, CA USA. Contact Naomi Weidner, Snell Hall 419, OSU, Corvallis, OR 97332-1651. Phone (503) 737-6417; Fax (503) 737-3447; email weidnern@ccmail.orst.edu

Aquaculture '95 Conference & Exposition, 1-4 Feb 1995, San Diego, CA USA. Contact Sea Fare Expositions, Inc., 850 NW 45th St., Seattle, WA 98107 USA. Phone (206) 547-6030; Fax (206) 548-9346.

Sustainable Aquaculture '95, 11-14 June 1995, Honolulu, HI USA. Contact Pacon Int'l, Box 11568, Honolulu, HI 96828 USA. Phone (808) 956-6163; Fax (808) 956-2580.

Stocking & Introduction of Fish in Freshwater and Marine Ecosystems, Apr 1996, University of Hull, England. Contact Dr. I.G. Cowx, International Fisheries Institute, Hull HU6 7RX, United Kingdom. Phone: 01482 466421; Fax: 01482 470129.

students. Bartholomew Green and Esam Rizkalla presented lectures to the 75 participants, followed by field demonstrations of reproduction pond harvest, broodfish handling, fry collection, handling and transport, and sex reversal treatment. Claude Boyd presented a two-day workshop on water quality management in aquaculture ponds.

PROGRAM MANAGEMENT OFFICE

The Program Management Office assisted in the reorganization of the Rwanda project, and in efforts to aid

researchers and families displaced by the war in Rwanda.

Management staff responded to requests from Tropical Research & Development for additional information regarding their review of the CRSPs, commented on the draft report, and worked with the CRSP Council to formulate a response on behalf of the CRSPs.

The PMO also responded to requests from USAID/Cairo and NARP regarding the pending extension of the Egypt project.

Coordination and writing continues for the CRSP Continuation Proposal for 1995 through 2000.

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