

# I. Introduction

## Historical Overview

The Pond Dynamics / Aquaculture Collaborative Research Support Program (PD / A CRSP) is an international effort to develop aquacultural technology as a means of confronting food security problems in developing countries. The PD / A CRSP is funded by the U.S. Agency for International Development (USAID), under authority of the International Development and Food Assistance Act of 1975 (P.L. 94-161), and by the universities and institutions that participate in the CRSP. Oregon State University (OSU) is the Management Entity (ME) for the CRSP and has technical, administrative, and fiscal responsibility for the performance of grant provisions.

The CRSP is a cohesive program of research that is carried out in selected developing countries and the United States by teams of U.S. and host country scientists. The resources of U.S. and host country institutions are brought together to improve the efficiency of pond culture systems through sustainable aquaculture.

In the original structure of the CRSP, Auburn University, the Consortium for International Fisheries and Aquaculture Development (CIFAD), and the University of California at Davis participated in a tripartite management of the CRSP, with Oregon State University serving as lead institution and Management Entity. CIFAD was dissolved in early 1995.

The program's new 5-year grant—the *Continuation Plan 1996-2001*—awarded in September and retroactively effective 1 August 1996, modifies the CRSP's original advisory structure to increase representation among participating institutions and provide an effective mechanism for new institutions to be represented on the Board of Directors and Technical Committee.

A Memorandum of Understanding (MOU) is executed between the host country institution and the lead university for each project or with the Management Entity. During the reporting period host country institutions with formal linkages to the CRSP through MOUs included the Royal Thai Department of Fisheries, Asian Institute of Technology, Department of Renewable Natural Resources in Honduras, and Central Luzon State University of the Philippines. In the past OSU has held MOUs with the Université Nacional de Rwanda and with the Agricultural Research Center of Egypt. Numerous linkages are maintained with other U.S. and host country governmental and non-governmental institutions, and with private companies and farmers.



*Indonesia was among the CRSP's first host countries.*

CRSP activities were formally initiated on 1 September 1982 after several years of planning. From 1982 to 1987, CRSP projects involved the participation of government agencies and educational institutions in six host countries: Honduras, Indonesia, Panama, the Philippines, Rwanda, and Thailand. Funding constraints during 1986 and 1987 forced a reduction in operations. A reorganization plan was submitted in 1986 to the Joint Committee on Agricultural Research and Development (JCARD) Panel on CRSPs and the USAID Agricultural Sector Council Subcommittee.

The plan, effective September 1987, called for maintaining a regional presence in Central America, Africa, and Southeast Asia, areas USAID had originally selected for CRSP activity. Three country sites were chosen: Rwanda, Thailand, and Panama. Subsequent political initiatives in Panama made it necessary for the CRSP to relocate, and largely through the efforts of Auburn University and through continuing financial commitments of the USAID Mission, the CRSP was welcomed back into Honduras in April 1988. Research there began anew in August 1988 with the assistance of the Honduran Department of Renewable Natural Resources (RENARE). Under the new grant the CRSP will add Peru to its list of formal host countries.

The long-standing collaboration between the CRSP and the Université Nacional de Rwanda was unfortunately halted when Rwandan political and civil upheaval in 1994 necessitated abandoning the Rwasave Fish Culture Station. Although formal ties to Rwanda are no longer in place, CRSP members have actively assisted former colleagues and their families, where possible. Linkages created by the CRSPs long-term presence in East Africa facilitated the selection of a new research site and host country collaborators for work to be carried out in Kenya, with the Kenya Department of Fisheries, under the new grant.

Some years ago USAID underwent an overall restructuring to better serve the strategic and humanitarian goals of U.S. foreign policy. This restructuring had little effect on day-to-day operations of the CRSP, but it did change the USAID bureau in which the PD/A CRSP program officer is located. CRSP program officers were earlier housed in the Office of Agriculture within the Bureau of Science and Technology located in Rosslyn, Virginia. The PD/A CRSP project officer is now in the Sustainable Technology Division of the Office of Agriculture and Food Security, Center for Economic Growth, located in the Global Bureau in Washington, D.C.

## New Activities

In preparation for beginning work under the *Continuation Plan 1996-2001*, the Program Management Office conducted a confidential peer review of work plans submitted for inclusion in the Eighth Work Plan. On average each proposed study or experiment was reviewed by two external and two internal reviewers. Reviewers were drawn from the international aquaculture community. Current CRSP participants and new institutions submitted work plans. Participants were invited to revise work plans in accordance with reviewers' comments. This process resulted in improved experimental design and relevance of activities.

The results framework of the PD/A CRSP *Continuation Plan 1996-2001* provided the basis for the design of impact indicators which were developed jointly by principal

investigators and the PMO. These quantifiable characteristics or results of PD/A CRSP research activities will be made part of all project subcontracts issued under the new grant. Principal investigators are required to collect the necessary information and report results to the PMO.

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*Principal investigators and program administrators together designed impact indicators to help quantify the impact of CRSP research and outreach.*

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During the reporting period the PD/A CRSP began activities at the new site in Peru. Researchers from the Southern Illinois University at Carbondale, a new U.S. collaborating institution, collected climatological, soil, and water quality data in order to describe the unique characteristics of the Peruvian site. Research there will focus on developing a native species, *Colossoma macropomum*, for aquaculture, a new and exciting research venture for the PD/A CRSP.

In an effort to make CRSP technical and programmatic information as widely available as possible, the CRSP brought a WWW homepage on-line in December 1995. Internet users linking to this site have access to information relating to study sites, software, and publications (available in both html and Acrobat formats). Users are also able to place publication orders or other requests for information directly to an electronic mail account at OSU. The site, located at <http://www.orst.edu/dept/crsp/homepage.html>, also contains numerous options for linking to other existing aquaculture sites on the Internet.

Up to now, the PD/A CRSP has stored data collected during 14 years of standardized experiments in tropical pond aquaculture in the PD/A CRSP Central Database. In an effort to improve accessibility of these data to the world aquaculture community, the PD/A CRSP has engaged in a collaborative venture with the Consortium for International Earth Science Information Network (CIESIN). CIESIN will develop a user interface and the underlying computer software components needed to provide access to the CRSP Central Database via the WWW. The system will allow a user having only an html 2.0 compliant WWW browser (such as Netscape Navigator or NCSAs Mosaic) to query the database in a variety of ways and to receive the results of queries in an understandable and readable format.

During the past years, the CRSP Central Database was housed at the University of Hawaii in Hilo. When Kevin Hopkins resigned as database manager, the PMO issued a restricted Request for Proposals. Two proposals were received, and the proponents were invited to deliver presentations to the Technical Committee during the 1996 Annual Meeting. The Technical Committee recommended approval of the proposal submitted by John Bolte of OSU. Following concurrence of the Board of Directors, and Program Director, the ME issued a subcontract, and the CRSP Central Database was transferred to OSU in May 1996.

## Continuing Activities

The period described in this report was a time of transition between the third grant, originally scheduled to end 31 August 1995, and the fourth grant, which took effect on 1 August 1996. USAID awarded the CRSP a one-year funded extension from 1 May 1995 through 30 April 1996. Research activities for this transition year were described in the Interim Work Plan. Later a three-month (1 May through 31 July 1996), no-cost extension allowed the PD/A CRSP to finalize activities under the Interim Work Plan and insure the continuity of technical and programmatic operations through the effective date of the new grant.

PD/A CRSP research under the program's first three grants (1982-1996) focused on determining the role of biophysical constraints in tropical aquaculture. In the first three years, researchers at all CRSP sites conducted a standardized global experiment. After completing these cycles, the CRSP emphasized statistical analysis of the collected data and model construction. A decrease in funding and other constraints necessitated a reduction of host country sites.

By successfully maintaining a presence in the major agroecological zones for which the program was designed, the CRSP sustained the global focus of its research activities. In addition to global activities, the CRSP also started to investigate more site-specific questions.

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Adherence to the standardized research format allowed comparison of research activities at any particular host county site over time. These temporal and spatial comparisons are also used in CRSP model building and verification.

While such research activities have encompassed the vast majority of CRSP efforts in host countries as mandated by BIFAD, CRSP researchers have in recent years become more active in outreach

activities. The PD/A CRSP sees the partnership of these two types of activities as critical to achieving positive social impacts. Outreach has been achieved through various avenues: on-farm research, workshops, and seminars conducted on the station, direct collaboration with extension agents, and participation in host country institution



*El Carao Fish Culture Research Center in Honduras, where CRSP research activities are carried out.*

outreach programs. The CRSP has collected submissions from researchers about the lessons learned from on-farm research and will publish these in a separate publication.

When the CRSP discontinued activities in Rwanda in 1994, the Africa Site Selection Team initiated a search for a new host country in East Africa by first developing site selection criteria and later visiting potential sites in several East African countries. At the CRSP's 1996 Annual Meeting, the Site Selection Team recommended the Sagana Fish Culture Farm in Kenya as a prime site for CRSP activities in Africa. The Government of Kenya, as well as the USAID Mission in Kenya, has expressed great enthusiasm about the potential of CRSP collaboration. Negotiations for an MOU between Kenyan institutions and the PD/A CRSP have been moving forward as anticipated, and finalization of an agreement is expected in early 1997.

As noted above, the research described in the Interim Work Plan was designed to smooth a transition between the third and fourth grants. While the latter focused on production research, the new grant emphasizes an approach to aquaculture research that addresses environmental effects and social and economic aspects as well as production optimization.

The Honduras team has taken a lead role in studying the effects of aquaculture practices on brackish water systems. Researchers, shrimp farmers, farmers' organizations, and government officials have worked together in this pioneering effort, which has attracted the

attention of additional farmers and of neighboring countries. These same groups have started a grassroots effort of collaboration to maintain the health of the Gulf of Fonseca, which is the life blood of shrimp farms for three Central American countries. Researchers in Thailand conducted a study on the effect of polyculture on water quality.

In contrast to the experimental approach employed in the Gulf of Fonseca, other CRSP researchers studied the effects of the environment on the efficacy of aquacultural practices. This is evidenced in activities from all sites. The Global Experiment focused on the development of nitrogen and phosphorus budgets but also studied the effects of water and sediment quality on pond management strategies. Soil and sediment research was also conducted by the PD/A CRSPs Data Analysis and Synthesis Team (DAST) and the Africa team. Other research conducted by the Honduras and Africa teams evaluated various environmental effects on fish reproduction.

The decision support system POND<sup>®</sup> reached a larger audience during the World Aquaculture Conference (WAS) 1996 in Thailand. DAST members offered a full-day POND<sup>®</sup> workshop. Twelve participants from 10 countries attended the workshop, which involved an overview of the software, and computer-based exercises designed to introduce users to its applications in pond aquaculture planning and management.



*Participants at the day-long POND<sup>®</sup> workshop held during the WAS meeting in Bangkok in February 1996.*

The decision support system POND<sup>®</sup> also attracted the attention of Food and Agriculture Organization (FAO) of the United Nations. This resulted in collaboration between DAST and FAOs Inland Water Resources and Aquaculture Service. FAO is currently developing a geographical information system to assess aquaculture potential in Latin America, and needed a method to estimate fish yield. DAST members used the heat balance model from POND<sup>®</sup> to generate temperature profiles for continental Latin America. These profiles were used in the POND<sup>®</sup> fish growth model together with pre-set satiation feeding levels and harvest size to assess the number of crops possible per year under commercial-scale and small-scale or subsistence farming.

In the program's early years CRSP participants collaborated in writing "Principles and Practices of Pond Aquaculture." The text became a standard reference for those interested in tropical aquaculture, and is now in its third printing. Since the first publication of this book, many new insights have been gained through research conducted at CRSP sites and elsewhere.

Summarizing and synthesizing more recent achievements in aquaculture studies, CRSP researchers, and other members of the aquaculture community have collaborated on a new 16-chapter book entitled, "Dynamics of Pond Aquaculture." During the past year, manuscript chapters have been peer-reviewed, edited, and submitted to CRC Press/Lewis Publishers for final technical review. Publication of this concise new reference for students and practitioners of aquaculture is expected in mid-1997.

The CRSP also continues its collaboration with international research institutions. During the WAS 1996 meeting in Thailand, the PD/A CRSP director and ICLARMs (International Center for Living Aquatic Resources Management) Director General convened and discussed avenues for possible collaboration at ICLARMs new site in Egypt.

InterCRSPing, an effort to establish a new avenue for collaboration among the various CRSPs, continued under the guidance of the CRSP Council. This project aims to strengthen National Agricultural Research Systems (NARS) and to develop agricultural management systems that will maintain a sustainable natural resource base. During the reporting period PD/A CRSP researchers participated in meetings in Niamey, Niger, and the U.S. (Washington D.C. and St. Louis, Mo.) and submitted materials for a poster presentation at InterCRSP meetings in Dakar, Senegal. Researchers from the PD/A CRSP also collaborated in the development of two preproposals for a proposed new West Africa site for InterCRSP Natural Resources Management activities.

## ***CRSP Continuation Plan 1996-2001***

**T**he PD/A CRSP submitted the draft Continuation Plan on September 1995 to USAID. That same fall USAID conducted a five-year administrative review of the PD/A CRSP. The review, along with the ME response, was included in the Continuation Plan. The plan was also revised to incorporate USAID suggestions. The final draft was submitted to

USAID in December 1995. Traditionally, BIFAD orchestrated the CRSP renewal process. However, when the newly-formed BIFAD met for the first time in September, the board did not decide on its involvement in the renewal process of CRSPs, requiring USAID to develop an alternative process for CRSP renewal.

USAID assembled a review panel of international agriculture research professionals and USAID personnel which met with CRSP representatives in February 1996. The panel recommended approval of the Continuation Plan, contingent on the inclusion of proposed changes. The ME replied to the panel's suggestions and resubmitted the revised plan to USAID in April 1996. After receiving budget authorization from the U.S. Congress, USAID authorized the PD/A CRSPs new 5-year grant at nearly the amount requested.

### CRSP Annual Reports

The PD/A CRSP annually summarizes programmatic and research activities and results in two volumes – the Annual Administrative Report and the Annual Technical Report. The Annual Administrative Report provides an account of all administrative, research, and outreach activities during the reporting period and includes sections on program history, personnel, financial status, administrative, and management activities, abstracts of all technical experiments conducted during the past year, and non-research activities such as training, publications, and service. The Annual Technical Report focuses on the research accomplishments of the program and contains full technical reports.