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1995
Annual External Evaluation Panel Review Report

for the Pond Dynamics/Aquaculture Collaborative Research Support Program

By EEP Member

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Contents

Introduction

This annual report is intended to provide insights and suggestions for strengthening and enhancing the Pond Dynamics/Aquaculture (PD/A) Collaborative Research Support Program (CRSP) from an overall program perspective. The annual External Evaluation Panel (EEP) review also offers an objective perspective for decision making on important and sometimes difficult institutional issues. The review more specifically provides an opportunity to: identify constraints; examine the priority setting process; report any problems relating to program performance, status and progress; probe issues relating to program representation and participation; identify gaps in programming; judge the balance and relevance of projects to program goals and budgets; report on future planning and evaluation activities; and examine linkages and networks that can lead to broadening program impacts and benefits.

The purpose, process and reporting of the EEP are described in the AID publication, Guidelines for the Collaborative Research Support Programs, June 1985. This review covers the period January 1995 to January 1996.

FY 1995 External Evaluation Panel

The PD/A CRSP has historically had three members serve on its EEP. Recent events have reduced that number to two. Roger Pullin resigned from the EEP during this review period and has not yet been replaced, however, efforts are underway to designate a replacement. The current, active EEP members are Richard Neal who serves as Deputy Director of the Southwest Fisheries Science Center of Department of Commerce's National Marine Fisheries Service and Gary Jensen who is National Program Leader for Aquaculture with USDA's Cooperative State Research, Education and Extension Service.

The need to increase the number of EEP members is recognized by the CRSP and is expected to occur in the near future. Unlike other CRSPs that have more funding, this CRSP annual review is not as extensive and involves the opinions of only one EEP member, Gary Jensen, who attended the PD/A CRSP annual meeting held in Bangkok, Thailand on January 26-28, 1996.

To aid in the review, the Management Entity (ME) provided copies of EEP annual reviews from other CRSPs, examples of previous EEP reviews and other pertinent background information. The author was also a member of a team that completed a review of the CRSP which reported its findings and recommendations in *An Evaluation of the USAID and Universities Collaborative Research Support Programs (April 1995)* submitted by Tropical Research & Development, Inc. (TR&D) under an AID contract.

Scope of Work

In past years this CRSP has not developed a specific scope of work (SOW) for the annual EEP review, but the EEP has provided an annual report based on observations and information obtained throughout the year and at the annual meeting. This year's format is new and is commended because the EEP can be more responsive and focused on specific issues important to the CRSP in addition to the general BIFAD guidelines.

The following are specific objectives for this review:

1. Evaluate the newly initiated CRSP work plan peer review process.
   Was it a worthwhile effort
   Assess the benefits and costs of the review
   Make suggestions for improvements in the process

2. Evaluate the *proposed* overall CRSP Philippines Project.
   Projects should present a balance between research and development activities; have regional applications; target key constraints; and develop institutional capacities in the US and Philippines. Proposed activities in the Philippines for the next 5 years of research include studies by staff at the following universities:
   Auburn University
   University of Arkansas
   University of Arizona
   University of Hawaii
   DAST

Note: Another objective (2b) was included in the original scope of work but was dropped after discussions at the annual meeting.

Highlights of Previous Annual Reports

The last extensive EEP review was reported in December 1993 for the period September 1, 1988 to August 31, 1993. Two annual reviews by the EEP were done for the years 1993 and 1994 and were presented more as comments by one EEP member. A summary of previous observations and comments linked to the current status and operation of the CRSP can reveal positive progress and development and/or constraints or problematic issues that may still persist.

1994 Report Observations

This report covered the period January, 1993 to January, 1994 and was based primarily on the March 1994 Annual meeting. The three areas addressed were: 1) progress of CRSP; 2) maturation of CRSP; and 3) future challenges.

1) The progress reported was favorable in regards to publications, research, presentations and team building. There was a recommendation to restate goals or identify new goals to respond to AID priorities, new Continuation Plan, funding constraints, and potential for discontinuation of program as was recommended for several other CRSPs. Objectives should be specific, identifiable and fruitful.

2) The program is maturing in a positive manner and contributions were being realized exponentially with results becoming progressively more valuable each year. The program was recognized as being responsive to AID needs and worth continuing. The linkages have expanded with both research and extension institutions and were commended highly to strengthen program effectiveness. Concern was raised on the ability of this CRSP to synthesize and analyze the data available from projects. The role of DAST was emphasized and increased participation of DAST scientists, but concern of underutilization was also expressed.

3) The challenge of preparing a proposal for program continuation was cited as very significant because of the need to address a new set of requirements yet maintain pond dynamics as a central theme in the face of likely reduced funding. An excellent framework had been developed but the social component needed strengthening. The challenge to treat solicited "outside" proposals equitably and professionally was raised and external reviews were thought to be necessary in the process. The development of a process that unites and integrates the various components rather than divide was also recognized as a difficult task.

Another point was the need to consider which activities can be finished and terminated and the need to strategically manage the program to include all critical elements in this small CRSP. The importance of maintaining a presence in SE Asia through Thailand was also emphasized.
The group was noted to be working well as a team with good interactions and effective interchanges.

1995 Report Observations

This report covered the period January 1994 to January 1995 and addressed observations associated with the annual meeting and other issues. The report was again presented as observations from one EEP member as one member had resigned recently and another was unable to attend.

There was an indication that the new proposal had not been completed to everyone's satisfaction which was surprising based on discussions at the previous annual meeting. Emphasis was made on the importance and serious nature of the completion of a highly competitive Continuation Plan which should be an all-out effort.

The collaborative aspect of the CRSP was recognized as a unique strength but indications were that quantifiable impacts are now needed which means more emphasis on effective application and outreach linkages. In view of seemingly changing AID priorities for short-term impacts rather than long-term research approaches, it would be advantageous to rejustify the collaborative research approach in the new proposal in order to make its advantages apparent.

There was an observation that the level of collaboration was somewhat less effective than in previous years as were communications. Disappointment was again cited with the slow progress of synthesizing and analyzing results as a collaborative model. The active use of the data base was not evident and little progress in synthesis work was noted.

An important point made was - is the global approach valid or is there a new rationale for continuation of the CRSP. The answer needs to be integrated into the new proposal. EEP opinion was the CRSP has accomplished a great deal and made important contributions to science and development. These stories need to be presented in the Continuation Plan. The outreach impacts can be accomplished by extension of CRSP results to other groups which could be viewed as being part of the CRSP constituency. The CRSP should investigate the degree of adoption of CRSP results by these groups.

The new emphasis on social and economic issues was praised and caution stated to pursue a collaborative research approach and not contract a series of special studies. The numerous program strengths were also cited as being more than are often recognized.

1995 Program Review

This review is intended to focus on the SOW as provided by the Management Entity (ME) and BIFAD guidelines for annual EEP reviews. To understand the sequence of important events and milestones that are associated with this annual review, a timetable is presented. It provides a perspective of duration and process for several important events.

This report represents a review of relevant documents, interviews with various CRSP staff, observations at the annual meeting and personal knowledge. The recommendations reflect the opinion of the author. In reviewing the annual EEP reports of other CRSPs it is evident that the PD/A CRSP has elected to change the reporting format and use the EEP in a manner as intended by AID.

Significant Events

There have been several events that have impacted the operation of the CRSP in 1995. These have affected progress on projects and adjustments in Work Plans.

CRSP participants have expended considerable effort in selecting a new core project site in Africa and adjusting to the transitional period between completing all activities and projects in Work Plans 6 and 7, and initiating new projects under the current Transitional Year Work Plan for the period May 1, 1995 to April 30, 1996. The process of obtaining AID approval of the 5-year Continuation Plan is still ongoing and hope is for AID to approve it before May 1, 1996. This process was initiated about 4 years ago, and especially consumed much time and energy of CRSP participants in 1995.

A CRSP team has visited several African countries to identify a suitable research core site and potential country and regional linkages. There is considerable tilapia farming in Africa and the CRSP can contribute to a much needed science-based knowledge that can have broad impacts in the region. Tilapia is a common species and most inputs are organic or inorganic based materials. The program, when established, may discover that much of what has already been learned from past and current CRSP work may have direct application to development and impacts may be apparent after a short period. This type of state-of-the-art assessment will be critical to both provide near-term benefits to rural farm families and develop a research program that will advance further fish farming technologies in the African region. Presently, Kenya has a site that is compatible with CRSP research after some facility improvements. The existing infrastructure and technical readiness of local institutions to effectively extend CRSP results to farm families are other important considerations in realizing the objectives of the program.

Two CRSP expatriates left their research sites in 1995 (Honduras and Thailand). Expatriate presence is expected to be re-established in Honduras on approval of the Continuation Plan and SE Asia (Thailand) still has a CRSP expatriate on-site. The Honduras site does need an expatriate to maintain program emphasis and conduct scientific studies because of the lack of persons trained to conduct scientific investigations. Different collaborative working agreements with the aquaculture staff at Escuela Agricola Panamericana (EAP) at Zamorano could lessen this need. However, logistics and other commitments, in addition to a shortage of "aquaculture research scientists" in Honduras strongly justify an expatriate position. Persons trained at other HC institutions or government agencies in Honduras have been lured to private sector jobs because of higher wages. EAP does not experience such high turnovers of professional staff and could provide some long-term continuity for conducting CRSP research.

The SE Asia site in Thailand should function well at present CRSP staffing and with the linkage to the Asian Institute of Technology (AIT) which offers M.S. and Ph.D. degrees in aquaculture, much based on CRSP work. In the case of the Philippines, there has been a strong dependence on short-term assistance from US staff by annual visits and correspondence in the planning and design of studies, and in the interpretation and reporting of data and findings. To create a more sustainable, applied research capacity at Central Luzon State University (CLSU), an investment in or facilitation of graduate training at the Ph.D. level in aquaculture with emphases in water quality and fish production may prove important in the long-term. Most of the original CLSU aquaculture staff who had this level of training have departed over the years. In the interim, a new CLSU staff person could be assigned to continue work with the CRSP through present short-term US assistance until the Ph.D. degree trained scientist returns to assume fuller overall research program responsibilities. Human and institutional capacity building at the SE Asia CRSP sites could also be strengthened by enhanced cross-country collaboration between expatriate, US based participants and HC collaborators to plan "regional" projects with research and development components.

The issue of the need for and critical nature for an expatriate presence versus other options to strengthen HC staff research capabilities through graduate training or provide technical/advisory assistance through periodic visits and distance communication is extremely important. It has implications for budget costs, program effectiveness and quality, developing human and institutional capacity for self-sufficiency and planning for long-term goals. Viable options for needed CRSP staff presence for each HC site should be developed based on specific site conditions, requirements to fulfill CRSP mission and budget justification. It is presumed that one component of a "core" site is an expatriate position. There may be some value in periodically assessing the need to graduate a companion site to a core site or downsize a core site based on strategic CRSP missions and budget implications. A careful assessment of CRSP staffing needs will be required in establishment of new African core site.

The PD/A CRSP is a rare and valuable program in LDCs because it conducts applied, scientific research which generates new knowledge and discoveries that can mean repeatable outcomes of new practices and technologies by farmers and others. Much aquaculture is based on subjective information, hit and miss methods, myths and hearsay which often result in failure or unmet expectations. This program generates science-based information which requires a working knowledge of proper planning, designing and conducting of scientific experiments and interpreting and reporting results in the peer-reviewed scientific literature and elsewhere.

The decision to make the Central Data Base more user-friendly and change the management oversight location from the University of Hawaii-Hilo to Oregon State University will entail another transition but is expected to add more value and extend broader benefits of the voluminous data. The high elevation studies planned for Rwanda are being conducted in the Philippines with some modifications. There are numerous elevation-related issues involving tilapia production in all geographic regions globally. With the exception of species, strain and input differences, the results of these studies should be broadly disseminated to address special conditions and economic or subsistence feasibility of tilapia farming in marginal geographical locations.

Another activity that has had an impact on the CRSP was the TR&D study which included the PD/A CRSP. This evaluation was conducted at the request of AID and contains recommendations directed at all CRSPs and some specifically to PD/A.

1995 has been a difficult year because of the uncertainties associated with program continuation beyond 1996. A 1 year extension (through 30 April 1996) was approved by AID. In April 1996 a three-month, no-cost extension (through 31 July 1996) was granted. However, as of April 1996, there has been no contractual approval of the Continuation Plan for 1996-2001 and the fiscal year 1996 appropriation for each of the CRSPs has not been finalized. This situation has exacerbated issues associated with planning long term research initiatives.

AID Reorganization and CRSP Implications

Under the current Administration, AID has undergone reorganizational changes and now all CRSPs, except Small Ruminants, are administered by the same Global Bureau Office of Agriculture and Food Security's Sustainable Technology Division. In the past the PD/A, Stock Assessment and Soils Management CRSPs were under the Division of Renewable and Natural Resources while other CRSPs were under the Agricultural Production Division. In the past the management styles and guidance were somewhat different between the two AID Divisions. With the reorganization, PD/A is expected to "look like" the structure and functions of other CRSPs. More focus and attention are expected to be directed at: regional networks and impacts; responsive BOD, TC and EEP; prioritization of constraints; rotation of TC and BOD members; IARC representation on TC and collaboration with CRSP; functional and programmatic interdisciplinary approaches to problem solving;

larger EEP membership; EEP collaboration with ME to establish criteria for work plan development; and increased visibility of CRSP in US and abroad. Several of these points are addressed in the 1995 Administrative Management Review Report and the new Continuation Plan.

Timeline of Events and Milestones

The following table presents a sequential time analyses of the CRSP. Events initiated in 1994 and continuing into 1996 are associated with this current review period. The CRSP is a dynamic program and does not adhere strictly to a calendar year schedule. Many CRSP projects and activities are ongoing and span a multiple number of years. Future projects are often dependent on the results of previous work. This timeline also is a quick reference to events which had and are still having an impact on CRSP functions and operations.

Year/Month	Event/Milestone
1994:	
January	Call for preproposals for consideration in New Continuation Plan
March	Annual Technical Meeting
April	Evacuation from Rwanda CRSP site
December	Site evaluation in Kenya
1995:	
January	Annual Technical Meeting
	1 year extension requested for Seventh and Interim Work Plan
	Draft proposal for Continuation Plan submitted to AID for comments
March	Egypt project terminated
April	Final Draft of TR&D Evaluation of USAID and Universities CRSPs
June	David Teichert-Coddington left Honduras CRSP site to return to Auburn University
	James Szyper left Thailand CRSP site to return to University of Hawaii
July	PD/A CRSP meeting with AID to discuss status Continuation Proposal and plan for submission
	Transitional Year Work Plan finalized
September	Administrative Management Review conducted
	Contacted by Rwandan government to re-establish project at Rwasave Station
	Conducted site evaluation in Niger
	Final Draft of PD/A Continuation Plan submitted to AID
October	Conducted site evaluations in Zimbabwe and Kenya
November	Conducted site evaluations in Malawi, Kenya and Tanzania
December	Restricted RFP for CRSP Central Data Base Project
	Revised Final Draft of PD/A Continuation Plan resubmitted to AID

1996:

February	AID Formal Review of PD/A CRSP 5-year Continuation Plan
April	Revised Continuation Plan based on AID review re-submitted to AID for review and approval
	AID approved 3 month extension on current Work Plan
	AID budget approved by Congress for FY 1996

Highlights and Observations

The CRSP collectively has done a good job of completing Work Plan activities with minor modifications and being responsive to both the Global Experiment and Special Projects. There is a challenge developing between the need and pressure to address the developmental needs of resource-limited farmers and those that are more advanced and seek the use of higher input technologies for export products. The CRSP has traditionally targeted small farm families and much of the CRSP generated technologies are directed to these conditions. However, in Honduras, Thailand and the Philippines there is a growing private sector that seeks assistance with commercial aquaculture enterprises growing aquatic stocks for export markets. The shrimp work in Honduras is a prime example and tilapia production is becoming more intensified in some LDC sectors.

Because most private sector commercial farms realize the benefits of science-based technologies they are more apt to adopt new practices and seek improved methods and technologies. Resource-limited constituencies however are often more reluctant and have more constraints to adopt promising technologies. Both constituents are important yet their constraints, appropriate research approaches and effective technology transfer methods are different.

With work done since 1982, direct involvement of farmers in yield trials, and recent socioeconomic studies conducted across CRSP countries, the program has a considerable body of scientific knowledge to "hand off" or transfer to strategic organizations and institutions both public and private that can reach potential beneficiaries.

The CRSP should identify those outreach implementing programs in SE Asia, Central America and Africa which can effectively reach and impact persons, families and communities to achieve the CRSP long-range goal. The CRSP has opportunities to leverage resources to translate scientific findings for end-user application in both technical and local language aspects. The POND manual has been translated to French and is undergoing translation to Spanish. Without these translations, the application of this decision-support tool will be limiting. In the case of the Philippines, CRSP studies have resulted in improved fertilization practices for tilapia production. Yet no plans exist to translate results to the local language for use by extension agents and farmers - the old recommendations still prevail.

Collaborative partnerships between the CRSP and HC programs should be forged to determine what CRSP results are "ready" for local language translation and packaging into formats understandable by priority constituencies and potential beneficiaries. This does not mean direct translation of an existing CRSP report in English, but rather the reporting of the findings and results in an applied context that can result in adoption of new practices by farmers or others. This should also involve cost-sharing agreements or provision of in-kind support to minimize budget costs. The CRSP is an invaluable generator of unique, often lacking, science-based information for application in developing countries. The extra step of "technology transfer" is a non-research function but the CRSP has conducted the social science "studies" with scientific analyses to facilitate the technology transfer process.

The CRSP needs to clearly identify its constituency from a regional perspective and realistically that same constituency in the US. Each project objective should have an endpoint which will result in an impact on those selected constituencies.

The scientific balance across disciplines needs continued attention and specific benefits from more interdisciplinary synergy should be identified and pursued. For example, in a recently completed socioeconomic study conducted across all CRSP countries which reached the farmer or constituency level, how will the findings influence the planning of future research? The complementary and supportive role of the DAST relative to field biology research should be more clearly defined and aligned with overall CRSP objectives. There is a tendency for the DAST to be regarded as a separate rather than an integrated component of the CRSP. Project site researchers report "their" results of which raw data are also submitted to the Central Data Base for additional analyses. The inter-relationship between modeling, decision support and field research should be clearly understood by all participants and the relevance and support to CRSP objectives defined. The programmatic "boxes" should become more overlapping and seamless in collaboration and function. When "collaboration" is referenced in a work plan, details should be presented which define the level of commitment and operations to accomplish collaborative objectives.

BIFAD Stipulations for Annual EEP Review

The following is a review and evaluation of the primary areas or topics identified by BIFAD as being components in an annual EEP review. Some are addressed in more detail than others based on the availability of information, updates at the annual Technical Committee Meeting and personal knowledge.

BIFAD Primary Areas for Annual EEP Review

BIFAD Area 1. Maintenance of programmatic focus and effective scientific balance of research toward achievable objectives.

The programmatic focus is reflected in the goal "to increase the availability of animal protein in developing countries through pond aquaculture" with the overall purpose "to improve the efficiency of pond systems by bringing together the resources of developing countries and US institutions into a long-term comprehensive research program in pond aquaculture".

To properly address this subject, the program's objectives need to be understood. Also, projects and activities should be designed and aligned for effective achievement of objectives. A cross-check can also help determine whether objectives are realistic and achievable as each should be associated with quantifiable measurements and an appropriate plan to evaluate impacts. The difficulty with an annual review is that the "snapshot" of time is often inadequate to evaluate all components because of the multi-year nature of projects and inherent time delays from the time of new discoveries to adoption of new technologies at the farm, country or regional levels. The more in-depth quinquennial reviews can more adequately address program impacts. Often in the routine conduct of work the objectives need to be restated to all CRSP participants to foster a stronger common vision of the overall program and continuously and purposely identify the strategic partnerships and linkages that are needed on a country-level and regional basis to accomplish program goals.

Each program activity or project should relate to one or more of the following eight objectives from the 1990-95 Continuation Plan. The following is a brief evaluation of the effectiveness of the CRSP in addressing the eight aforementioned objectives for 1990-95.

CRSP Objective 1: to continue to develop technology, through research, to overcome major problems and constraints affecting the efficiency of pond aquaculture in developing countries.

This objective can be evaluated in quantitative terms if baseline information is available on production systems and practices before CRSP technologies are applied. The program has been effective in developing improved technologies and the economic benefits have been evaluated based on research studies and/or farmer

yield trials. The key word is overcome and this implies creating an impact or change at the farm level. The balance of research has been adequate but the success of overcoming major problems and constraints requires additional attention. An example is there has been considerable work done at the Philippine's site to develop improved fertilization practices for tilapia farmers. The improper use of these materials is a problem yet the CRSP will be limited to effectively address this constraint if educational materials cannot be developed in local languages and reach pond farmers.

The "high elevation" studies initiated in Rwanda are being conducted in the Philippines. To maximize experiences and perspectives on this issue, CRSP staff familiar with the Rwanda projects should be involved in the planning and design of the new Philippines project. There is a sense that collaborative synergy between the former Rwanda team and present Philippines team has been minimal. Stronger cross-institutional planning and coordination should be encouraged for any future, similar situations to develop the most appropriate technologies.

In the PD/A CRSP Minutes of the 1994 Annual Meeting, reference was made for the need of a workshop to facilitate communication between biologists and modelers. This seems to be a reasonable activity, however, the completion of the Continuation Plan and development of new Work Plans have dominated the subsequent 1995 and 1996 meetings. This should be considered as time permits in the future.

The CRSP is working to identify opportunities to collaborate with the US aquaculture community. POND development staff made visits to Alabama, Arkansas and Mississippi to meet with producers and university staff to acquaint more persons with the POND software and assess applications to the US aquaculture industry. Several matters were discussed but no follow-up has occurred because activities are not included in the Work Plans and no funds are budgeted for these activities. The CRSP does have expertise and knowledge that have application to US aquaculture. The same essential collaboration and linkages found in HC also apply to the US. Aquaculture conditions in the US are considerably different from those in LDCs which means that some retrofitting and modifications will be required for US application. With no funds earmarked for this "extra" effort, new cooperative funding ventures will be required. The success will depend on the perceived and realized "value and relevancy" of the CRSP work to specific US constituents.

Efforts continue to be directed at improving technologies for sex reversal of tilapia which is of interest to the US tilapia sector. Work is underway to contribute data to support an INAD for methyltestosterone use and related studies. The CRSP needs to strategically use funds for critical data needs while clinical field trials are less important as others can conduct these studies. Auburn University's role as an INAD coordinator and holder is important for US tilapia producers. While Auburn University administers it outside the regular CRSP program, CRSP support has been used in this endeavor.

CRSP Objective 2: to maintain or improve national resource quality through proper management of aquacultural systems.

This objective is being addressed through a balance of research more visible and effective at some sites more than others. The water quality work associated with effluents of shrimp ponds in Honduras is a prime example of addressing this objective. The environmental sustainability of natural resource quality can be at risk in situations where animals or fish are concentrated in a watershed or drainage area in sufficient numbers and with high levels of inputs. The sustainability issue has varied relevancy depending on a country situation, however, the CRSP needs to be the advocate for sustainable systems and conduct the research needed to identify critical biological thresholds. These issues are often site specific so the development of generic research-based best management practices (BMPs) incorporating the different integral CRSP findings could address this objective. How to measure any impact indicators for this objective may be difficult because in many rural areas the impact from fish culture is likely small compared to other sources of contaminants that affect natural resource quality.

CRSP Objective 3: to stimulate and facilitate the processing and flow of new technologies and related information to researchers, to extension workers, and ultimately, to fish farmers in developing countries.

The CRSP has addressed this objective very effectively at some sites. The Thailand site is linked with AIT Outreach Program that operates in Thailand, Viet Nam, Cambodia and Laos. The CRSP has contributed to the knowledge extended to extension staff and farmers. Honduras has also directed efforts to extension programs and direct farmer involvement in CRSP studies, however, the impact of these efforts at the farm level is undetermined. The information processing and flow aspects also address CRSP Objective 1 and this in fact could be viewed as the implementing objective to accomplish Objective 1. The Philippines needs considerable more work in this area through stronger cooperation with existing infrastructures to better accomplish this objective. A recent CRSP report on various impacts associated with the program provides a detailed account based on farmer interviews. One observation was that no farmers interviewed had any direct or detailed knowledge of the PD/A CRSP research program or its findings. Herein lies the challenge related also to Objective 1 and an effective response by the CRSP to lessons learned from HC social science studies.

The new CRSP WWW home page should make more information accessible to persons throughout the world and can hopefully reach those programs that can add more "value" to information by reaching more aquaculture scientists and farm families. Again, strategic regional partnerships need to be sought and fostered.

CRSP Objective 4: to promote activities that encourage faculty and researchers to build and maintain linkages.

This is constantly being pursued by the CRSP yet always needs special attention. This is a humanistic objective and one that can mean much, especially for those who have much less and are in greater need. A better description, meaning and expected outcomes from these linkages may prove beneficial. The human resource dynamics of HC conditions are very different. AIT is an institution of higher education and, as with US institutions, is continuously expanding its network of graduate students and broadening its linkages. The scientist to scientist linkages are invaluable and critical for present-day and future collaboration. In Honduras the CRSP is associated with EAP-Zamorano and in the Philippines with CLSU. In Rwanda the CRSP collaborated with the National University of Rwanda.

CRSP researchers are active in the international scientific community and continue to create new linkages. One challenge is how to maintain constructive linkages with previous CRSP sites, for example, Indonesia, Panama and Rwanda. Again, with the emphasis on regional impacts, a concerted effort should be made to identify by region those organizations that may have an interest and could benefit from closer linkages with the CRSP. As an example, at the CRSP annual meeting, the Honduran PI referenced several Central American organizations. The CRSP should develop options for what can be gained or expected from different "regional" linkages and initiate contact in a manner to assess specific needs and areas of potential mutually benefiting collaboration. These may be public or private groups. The CRSP has been active in establishing linkages but a critical issue should be the ability and effectiveness to follow-up with specific initiatives and accomplishments that can be reported.

CRSP Objective 5: to create opportunities for greater multidisciplinary research in aquaculture and to enhance the socioeconomic and ecological aspects of the CRSP.

The CRSP does have a framework for multidisciplinary research. There has been increased involvement of social scientists in the program and cooperation with field biologists has improved. The Continuation Plan includes enhanced capabilities in nutrition, economics, marketing and reproduction. The real challenges are developing interdisciplinary approaches that address major constraints and problems, and planning and designing appropriate research studies and impact measuring initiatives. Each is influenced by the constituency of the CRSP and an understanding of farm level conditions. There have been several social science studies conducted that reveal farm level constraints. The question is can the CRSP analyze these findings through an integrated, multidisciplinary process with the goal to enhance program effectiveness through appropriate research initiatives both long- and short-term. Without knowing and understanding the conditions at the farm level, the research may not have any impact, yet contribute to the scientific literature. The ability to contract specialized expertise "outside" the CRSP institutions is a real strength and should be pursued to address key specific

constraints. The Honduras project arranged a short-term consultancy of an oceanographer from the University of Texas to provide needed technical assistance.

The ecological aspects of the CRSP are more apparent in some of the effluents and waste characterization studies. This subject is a foundation for the program in providing baseline data which involves the interdisciplinary interactions of limnologists, biologists and production specialists. There is an economic component to this topic which has not yet been specifically addressed.

CRSP Objective 6: to encourage information and data exchange among international agricultural research centers, universities, and nongovernment research community, and USAID centrally funded and mission-funded projects.

The CRSP does an excellent job with its newsletter, updated publication lists, annual reports both technical and administrative, notices on new publications and the ongoing project of completing a book on Pond Dynamics. The software POND has been distributed widely and the WWW home page will likely expand contacts with the program and its products.

The CRSP outputs are commendable and should be reaching those programs globally that are involved with international aquaculture development. It may prove useful for the ME to share a copy of their mailing list to CRSP participants or at least institutions and request additions. This is especially important for HC participants who may be able to identify new partnerships or collaborators in the region. Presently, US government agencies involved with aquaculture research and development programs are unfamiliar with this CRSP and should receive the newsletter at a minimum. AID may be able to provide guidance on apprising AID missions of the CRSP home page for access to aquaculture information. Most if not all AID missions have WWW access.

CRSP Objective 7: to expand results derived from the site-specific research to regional recommendations through a global analysis of the data.

This objective is commendable and is the foundation of the Global Experiment. A voluminous amount of data from CRSP project sites has been submitted to the Central Data Base. The leap from site-specific to regional recommendations has not materialized well for several reasons. Some of the CRSP studies have contributed more to the scientific understanding of pond dynamics rather than management applications. There have been delays in the synthesis and analysis of data for comparative purposes across CRSP sites and for regional applications. This is expected to be a subject of attention in the new Continuation Plan. Most researchers have been productive in reporting site specific data and findings in CRSP reports and in the scientific literature. The DAST has developed several models but they are more beneficial to the research community than to the pond production community. The POND software was developed in part from CRSP results and is intended to serve as a decision-support tool. However it has not been

used or tested for regional recommendations but a current cooperative project with FAO has regional aquaculture development assessment implications.

BIFAD Area 2. Identify inadequate performances, and irrelevant or marginal activities to CRSP objectives (provide an evaluation by project or activity)

It is beyond the scope of this review to address each relevant activity in Work Plans 6 and 7 and the Transitional Year Work Plan for this review period. Thirty-three activities are associated with both Work Plan 6 and 7. There is insufficient time and effort available for this level of evaluation. However, information is provided that relates to this BIFAD area in a programmatic sense rather than a per project focus.

At the annual meeting a summary of progress for all projects and each activity in Work Plans 6 and 7 was presented. This reporting was through August 1995. The project progress format indicates the study number, project description, proposed completion date and the reporting of results or progress in CRSP Annual Technical Reports each on a country basis. This is a worthwhile effort and should continue. The inclusion of a study in the Annual Technical Report allows sharing of findings among the CRSP team and other interested parties. The Annual Technical Report addresses the following for each study; introduction; objectives; materials and methods; results; anticipated benefits; and literature cited. To better monitor amendments to Work Plans that are approved by the TC and then accepted by the PMO, all amendments should be posted on the CRSP listserv and published in the Quarterly Reports as they occur. This can improve communication of changes within the CRSP community and assist monitoring of annual progress.

What is not addressed is the quality of the results, plans to reach a project endpoint and a follow-up on impacts. The Annual Technical Report from a CRSP perspective is perceived as an endpoint for AID reporting purposes. Individual researchers are responsible for publishing data in the scientific literature and facilitating the extension of findings to potential end-users. This issue should be re-examined with the intent of identifying endpoints linked to CRSP objectives that lead to or result in impact, change, improvement or benefit. The section on anticipated benefits is commendable at this stage in the life of the study and a follow-up that addresses key elements associated with project endpoint criteria may be helpful. Also in the Annual Technical Report the study could identify one or more CRSP objectives that are being addressed to forge a stronger link to critical program objectives. This could reinforce the orientation of the overall CRSP to a problem-solving mode with tangible documentation for impacts. The regional applicability could also be addressed with identification of key stakeholders in the region who need to be apprised of new discoveries and relevant information. The definition of an appropriate project endpoint linked to achieving CRSP objectives and directed at constituents could enhance benefits and strengthen the program's effectiveness.

Most studies in Work Plan 6 have been concluded and reported in the Annual Technical Report. There may be some confusion with some DAST studies in annual progress monitoring which may be associated with not listing completion dates in Work Plans because studies are assumed to be continuous over the life of the Continuation Plan. This may need clarification and inclusion of time lines for expected completion dates of specific studies or activities when possible. One study in Work Plan 7 was not presented in the Annual Technical Report. This is Study 10 Philippines Outreach project.

For the Egypt Project, technical reports have been published in the Annual Technical Report and as Research Reports. Some data collected by Egyptian researchers have not yet been provided to US PI to be included in additional publications.

Progress of projects under the Transitional (Interim) Work Plan was first reported in the July-September 1995 Quarterly Report. This Work Plan is in draft form and includes new initiatives such as African site evaluation and development planning, several new projects and the continuation of uncompleted studies from previous Work Plans.

There was little discussion on the status report of CRSP projects at the 1996 meeting. The EEP comments from 1994 Annual Meeting also addressed the lack of attention to project completion dates for scheduled activities. This should be addressed by the TC and the individual in charge of status reporting should articulate any issues relating to improving this monitoring procedure.
This issue should be adequately addressed with formation of new Technical Progress Subcommittee with three instead of one person charged with progress monitoring and more involvement by EEP in project performance tracking. The development and use of a standardized progress reporting template for all projects could facilitate this process.

The CRSP Quarterly Reports for 1995 provide a good overview on the status of studies by country, staff activities, problems and goals not met. Because of the collegial nature of collaborative research, an external peer review process can aid in providing an objective assessment of quality and relevancy. The new Continuation Plan incorporates this process which should address issues regarding relevancy. Inadequate performance pertains to quality and timely completion of work and reporting of results. In a stricter sense, it also relates to accomplishment of specific CRSP objectives beyond those of the study. Again the quality issue can be addressed in the peer review process involving qualified external reviewers. The annual progress monitoring should identify those studies that are behind schedule or in reporting. Accountability is essential along with a strong partnership and responsible roles for both HC and US participants.

The high expectations associated with the Global Experiment and Central Data Base have not yet materialized. This component of the CRSP has raised considerable

concern for numerous years and is still problematic regarding "global analyses and regional applications". The issues include confidence in the validity of data, delays in synthesis and interpretation, accessibility of raw data for public use, management changes , and relevancy for regional or global applications. Other issues concern what new data should be included, for example, soils and other nutrients. The Third EEP Report cited the Central Data Base as a resource of global importance. Two CRSP institutions responded to a restricted request for proposals to manage the Central Data Base Project. The project was awarded to Oregon State University on the recommendation of the TC at the last annual meeting. The budget has been increased and new objectives have been developed that address some of the aforementioned concerns.

Current realistic expectations and sound applications of the Central Data Base and Global Experiment need to be carefully examined and addressed. Until now the potential benefits of the Global Experiment have not been realized and CRSP advocacy for across-site analyses and regional or global applications have not resulted in any substantive initiatives. The TC should address this issue specifically because the primary focus is on individual, country specific studies. The CRSP needs to re-examine the role of the Global Experiment and what can realistically be accomplished from the continuous collection of current and new data across HC sites that have additional scientific value and development application.

One area that needs strengthening is the identification and recruitment of HC PIs who can be trained to design, conduct and develop inferences from scientific research. In the Philippines the HC PI should be more involved with data analyses and should have an opportunity to pursue a Ph.D. degree in collaboration with a CRSP institution. The situation in Honduras is challenging because trained government staff are easily recruited into the private shrimp farming sector. There is some university involvement which needs to be strengthened to sustain scientific research efforts. The Thailand HC site at AIT offers many capacity building opportunities among graduate students. The Thai PI functions in a supportive and facilitative role rather than as a research counterpart role. This is a very difficult issue but should be continuously pursued in the best interest of the HC and the long-term success of the CRSP.

BIFAD Area 3. Consider effective balance between research and training for development of institutional research capacity.

Because of funding constraints and lower levels comparative to other CRSPs, this program has directed most of its funding for research. However, the CRSP has been instrumental in training different audiences at the country level and numerous graduate students have been associated with CRSP projects both at HC sites and in the US. Several CRSP HC staff continue graduate studies in the US with other funding sources. The CRSP has succeeded well in leveraging funds and identifying training opportunities with minimal expense. The program does recognize the

importance of training HC outreach staff which is being accomplished at all sites both formally and informally. All sites have laboratories and technicians who are capable of conducting critical water quality sampling and analyses. This has proven to be an invaluable HC capability and a credit to the institutional building nature of the CRSP.

Although not included in this BIFAD area, mention of enhancement of outreach capabilities may be appropriate presently. Specifically in the Philippines there is an opportunity to enhance training efforts with BFAR staff. Both programs reside at CLSU and stronger collaboration will strengthen all parties. At all CRSP locations, more HC outreach staff are becoming involved with on-farm yield verification studies. This is an important training experience yet is challenging to aquaculture newcomers. Because of the importance of such work, the CRSP may find it helpful to develop "guidelines" for off-station field trials. The Thailand project completed a report which describes the results of on-farm studies. On-farm trials can be an especially difficult task and reporting lessons learned across CRSP sites may improve future field studies. These field studies can be used to effectively engage HC outreach institutions and staff which can use the opportunity to reach farmers beyond the cooperators. An awareness of and reference to successful extension models for different regions could enhance HC capabilities.

BIFAD Area 4. Assess the balance of domestic versus overseas research in terms of effectiveness of solving constraints.

With limited resources the CRSP should direct as much effort as possible to HC research sites that address regional relevancy and conditions. The emphasis should be on building and strengthening HC capacities to perform scientific research beyond the life of the CRSP. There should be few cases where pond studies are conducted in the US even to verify results at HC sites, with exceptions made only after strong, convincing justification. There are cases where US institutions have staff capabilities, instrumentation, laboratory facilities and other specialized conditions that do not exist at HC sites whereby US experiments are needed to advance knowledge on a particular constraint or fill a research gap. There is considerable interest in conducting laboratory studies relating to sex reversal of tilapia and the use of methyltestosterone (MT). This is a topic of interest to both US and foreign producers. Critical studies need to be conducted in the US under strict protocols. However, the most effective means of solving problems and constraints is to conduct work at HC sites. In many cases the intent is to change behaviors or practices of people and this is best accomplished by HC projects.

In the Continuation Plan, 80% of CRSP resources will be expended for research activities. Again, it is not the formula that is important but rather the strategic nature of the proposed work to actually and effectively solve constraints. Unfortunately, some of the developmental link constraints reach considerably beyond the scope or capacities of the CRSP, which reiterates the importance to

operate in countries with sufficient developmental infrastructures and technology readiness.

BIFAD Area 5. Evaluate the cost-effectiveness of the entire CRSP operation.

The CRSP has been effective in leveraging funds from both US institutions and HC organizations. For the period 1982 to 1993 the average percent cost sharing by US institutions was 28.1 percent. For this same period the average percent in-kind contribution from HC institutions was 35.5 percent. It is assumed that this trend has continued through 1995.

For the recently completed Egypt project, over the period October 1992 to March 1995, even though this bi-lateral project was not required to cost-share, CRSP universities, nevertheless, generated voluntary contributions to the project, amounting to 8.9 percent. This would be comparable to a cost-share of 33.9 percent on the CRSP grant. Many US participants are involved in supporting the CRSP effort and receive no direct funding. This in-kind support of senior staff time is a critical element in the successful performance of the program.

BIFAD Area 6. Examine ways of disseminating research results and the effectiveness of utilization, a measure of the appropriateness of research.

The CRSP disseminates information to approximately 300 persons in 42 countries in a variety of formats. Three technical series distributed are the Collaborative Research Data Reports, CRSP Research Reports and the Annual Technical Reports. The newsletter, *Aquanews*, serves to keep the CRSP community updated on new developments and topics of interest. The DAST also produces a newsletter that provides updates in the team's activities and projects. An important project involving the CRSP team is the book, *Dynamics of Pond Aquaculture*, which is in final stages of completion. This text will provide a useful body of knowledge based on CRSP research and experiences.

Several noteworthy publications in 1995 are the following; *Final Report of Egypt Project; Social, Economic, and Institutional Impacts of the Aquacultural Research on Tilapia in Rwanda, Honduras, the Philippines and Thailand;* and *Field Testing Least-Intensive Aquaculture Techniques on Small-Scale Farms in Thailand.* Also in 1995, POND Version 3.0 was released with improved capabilities over Version 2.0.

CRSP researchers involved with the POND decision support software, conducted a workshop at the World Aquaculture Society meeting in Bangkok, Thailand. This was an excellent initiative to acquaint an international audience with this software and provide education on its applications and constraints for broader use. The CRSP will be co-sponsoring the Fourth International Symposium for Tilapia in Aquaculture to be held November 1997 in Orlando, Florida. This will provide

another venue to disseminate research results to an international audience. The primary sponsors are the American Tilapia Association and ICLARM.

The CRSP now has a home page on the WWW which enables on-line access to some publications and on-line ordering of those available free. It includes a listing of available reports and documents and an introduction to POND software which can be downloaded to a PC. This global electronic access to CRSP products can broaden the application of information generated from the program. Information is also provided about the program.

The CRSP outputs are well developed and of high quality. One important aspect is who receives the information in a strategic sense meaning potential collaborators, consumers and users of this information and other networks that can further expand the awareness and availability of products. Time should be taken to review the mailing list by country and identify any gaps. For example, in the Philippines, the Philippines Council for Aquatic and Marine Research and Development (PCAMRD) funds aquaculture research projects in the country and has an interest in the advancement of the aquatic sector. This institution is regarded as strategic and should receive CRSP materials. There should also be thought given to informing AID missions of the CRSP home page to facilitate access of information by mission staff and acquaint them to the program.

As referenced previously, the CRSP does an excellent job of communicating within the global scientific community, but the importance of research discovery utilization at the farm level in LDCs cannot be overlooked. If the measures of program effectiveness and appropriateness of research are made at the farm level, then considerable more work is needed by the CRSP program and its network of collaborators. The fulfillment of CRSP objectives in part determines the appropriateness of the research. This implies changing human behaviors with new knowledge and practices. The CRSP is positioned to be a global leader in applied aquaculture research and development after operating for over a decade. The success will depend equally on relevant research addressing the most critical constraints, identifying specific constituents by country and regions, and fostering effective, strategic linkages with collaborators who can consume, utilize and extend the appropriate research-based information to farmers.

Evaluation of Work Plan Peer Review Process

Background

In 1994, the PD/A CRSP distributed a request for preproposals in order to solicit preproposals for possible inclusion in the 1996-2001 Continuation Plan. While the PD/A CRSP has issued RFPs for specific projects (e.g., the social sciences project, the data base project) in the past, this was the first time that the CRSP used this process for development of the entire program plan.
The goal was to enhance integration of social, economic and natural components with a focus on achieving positive social impacts with environmentally sound strategies. A multidisciplinary approach was proposed.
The program goal is increasing the availability of animal protein primarily in LDCs by developing aquaculture systems that are sustainable and appropriate within surrounding ecological and social systems. The beneficiaries are low income producers and consumers in LDCs, educational institutions, management agencies and private sectors in the US and LDCs.

A listing of experiments conducted by the CRSP were included in the RFP. Pond dynamics and aquaculture systems were two general areas identified for future research in addition to expanding previous work. The program intends to maintain a presence in Africa, Latin America and Southeast Asia. Current CRSP countries are preferred but consideration to work in new countries is possible with adequate justification. Projects should also have regional or global significance.

Funding issues included: at least 65% of AID funds must be spent in HCs; small studies are encouraged; minimizing expatriate researchers will reduce costs; and US institutions are required to contribute a minimum 25% match of non-exempted AID funds in cash or in-kind.

It was originally planned that all preproposals would be peer-reviewed for scientific merit to include objectives, methods, collaboration, networking/technology transfer and budget and development relevance to address global/regional applicability, needs of country and potential for impact in several areas. Each general category was to be rated by external peer reviewers with a numeric scoring. This external peer review process was not used to evaluate preproposals.

Twenty-five preproposals were submitted for consideration which were grouped into focus areas to streamline subsequent analysis by the TC.

In 1994 at the Annual Meeting, the TC members were asked to analyze the preproposals submitted to the ME for possible inclusion in the new Continuation Plan. They were assigned to seven thematic subgroups and each subgroup was assigned a TC member to serve as facilitator to address the following objectives:

1) Articulate the most important aspects/objectives for the focus area
2) Determine if the relevant preproposals address these aspects
3) If they did not, suggest how they might be modified to better address the priority aspects
4) Devise a preliminary action plan for rewriting the preproposals as necessary, by combining, deleting, etc.

It was suggested that research themes and relevant preproposals be categorized in a way to describe relative importance, such as, critical, important, desirable, and unimportant.

Few groups had time to address Objectives 3 and 4 and criteria for describing relative importance were not consistent across groups. Some sessions had no recommendations while others actually prioritized project topics. Because of time limitations, the TC was unable to sufficiently review all preproposals and determine how they would be included in the Continuation Plan. To address this issue a framework for the continuation proposal involving six main topics and TC theme developers was proposed and approved by the TC.

At the 1995 Annual Meeting a preliminary analysis of theme priorities for the continuation proposal based on TC recommendations from the 1994 meeting was presented. This listing, which was based on the 1994 TC Minutes, was circulated among the 1995 Annual Meeting participants, who were asked to check it for accuracy and completeness. When the PMO reviewed the table, it found that the table did not include preproposals 16, 17, 22, 24 and asked that the listing be corrected to include the priorities reported in the 1994 TC Minutes. The BOD requested that this listing be incorporated into the TC Minutes in order to provide objective criteria for eliminating activities in the event funding is inadequate. The prioritization process was difficult and required interpretation based on different priorities for sub-projects within the same preproposal. With this method only preproposal #5 had a lowest priority ranking. It addressed food security which is an AID priority.

The next step after approval of a preproposal submission was development of a 2-year Work Plan which reflected research described in the original preproposals or in revised preproposals (approved by TC co-chairs). The TC co-chairs and CRSP Director agreed to lead the Continuation Plan proposal development. The six main topic developers were assigned to work with the authors of relevant preproposals for inclusion in the continuation proposal. Each theme involved more than one developer from different institutions based on their expertise and knowledge of main topic. New research ideas were not accepted for the first period of May 1, 1996 to April 30, 1998. Work Plan Preparation Guidelines were developed with 4 page limitation for text and contents. A budget template was developed and budget justification was requested. A work plan development process was developed and used as a guide with a schedule for deadlines. The TC co-chairs established a new subcommittee to analyze and summarize all peer reviews. Work Plans were

reviewed as a group, meaning the same researchers reviewed all work plans in a common research area or theme.

The review process for work plans was as follows:

Phase I

- work plans were grouped into common thematic areas
- work plans distributed in general to two internal and two external reviewers
- reviewers returned forms to CRSP PMO
- TC co-chairs established membership for revised Work Plan/Budget Subcommittee
- TC co-chairs and PMO developed scope of work for revised Work Plan/Budget Subcommittee

Phase II

- PMO distributed reviews and WP proposals to revised WP/Budget Subcommittee
- PMO sent reviews to each PI to respond in writing to reviewers' comments if unable to attend Annual Meeting
- WP/Budget Subcommittee submitted report to PMO which justified its findings with criteria for rankings, summaries of internal and external reviews, and ranking of WP proposals as follows:
  fund and/or with modification
  fund if funding is sufficient and/or with modification
  do not fund
- PMO sent reviews and work plan proposals to BOD and EEP for their analysis
- PMO distributed PI's responses to reviews and WP/Budget Subcommittee report to voting TC, BOD and EEP
- Voting TC members at Annual Meeting discussed, revised, and approved Subcommittee Report and asked several WP authors to revise their WPs and suggested two WPs should be sent out for another review
- TC secretary sent Annual Meeting Minutes which contained TC recommendations to PMO for distribution
- BOD asked PMO to be excused from reviewing all WP reviews and to be only consulted in cases of diverging recommendations from TC and EEP
- EEP sent recommendations to PMO
- PMO distributed Minutes to TC, BOD and EEP.

Phase III

- PMO writes subcontracts based on recommendations of three advisory bodies (TC, BOD, EEP)

Researchers were requested to submit names of four external and four internal reviewers.

All work plans were reviewed by internal and external reviewers. An internal reviewer is an individual with current or prior association with PD/A while an external reviewer has no involvement with the program. There were 62 persons who participated in the peer review process which consisted of 30 internal reviewers and 32 external reviewers. The response rate of 83% was very satisfactory.

The ME following AID counsel and used the BOD and EEP to provide an independent analysis and recommendations on the proposed work plans and especially on the recommendations of the internal and external peer reviewers in Phase II of the review process. This was done to address potential conflicts of interest and maintain objectivity in the review process. All voting TC members submitted or are associated with work plans under review.

The BOD and EEP members were provided copies of the work plans and reviewer's score sheets to provide recommendations for each study as follows:

Fund (minor revisions may be necessary)
Fund with modifications
Reapply
Do not fund

The criteria offered as a suggestion for the evaluation included the following:

Subject familiarity of the reviewer
Internal inconsistencies which cannot be resolved by carefully reading the reviewer' s comments
Lack of substance of comments
Conflict of interest

Results

The evaluation criteria for preproposals and work plans were similar but inconsistent. For the preproposals the two criteria rated were overall scientific merit and overall developmental relevance. This assumes that each criterion is weighted equally. In the review criteria for work plans there were six criteria rated with only yes/no options for responses. There was no weighing related to scientific merit and developmental relevance as with the preproposals. The criteria checklist presented information that was often different from what was summarized for each criterion and often did not relate directly to the question requiring a yes/no response. This can be confusing as reviewers will simply address the question which may or may not relate to the additional information provided.

The Reviewer's Evaluation Form offered choices of excellent, average or not acceptable with corresponding letters and boxes. This format provides no quantitative scores for comparison but rather qualitative ratings. It may be easier to prioritize work plans based on numeric scores as WP/Budget Subcommittee

developed their own scoring system using 2.0 and 2.5 for Overall Judgment as a cutoff for different rating categories.

Reviewers were asked to provide other questions that should be addressed by the PI. Most reviewers did not exceed this space with comments while some included an extra page. This can be important especially if reviewers are not asked to "justify" their scores by specifying strengths or weaknesses.

For a first effort the peer review forms were adequate and generated responses as requested. The problem was that there was little information associated with many scores and this raised concerns about the qualifications of reviewers and the real "value" of their reviews. However, the peer review process has assisted in enhancing the quality of work plans and providing a framework for preliminary ranking.

In the information provided to Work Plan reviewers, the evaluation criteria did not apply to all work plans. There was a mix of research projects, studies and outreach programs in the Work Plans which did not all match-up with the criteria. The issue of definitions regarding the type of project was also confusing and made evaluation of some items particularly difficult. In some cases the budgets for individual projects were not segregated from the total budget for all activities and this created inconsistencies in addressing budget-related criteria.

The usefulness of the EEP reviews is difficult to ascertain as there were considerable inconsistencies in reviewers' scores and rankings and often scant substantive comments were included to gain any appreciation of the reviewers' familiarity with the subject. The BOD elected to not review the WPs unless there were discrepancies between the TC and EEP recommendations. However, the BOD represents individuals who are presently engaged in administrative duties or are actually retired from their university administrative positions. The present EEP members are also involved in administrative duties but are more active in research grants administration. Conflict of interest is especially difficult to address as the potential exists when individuals and institutions vying for limited funds are also involved in the peer review process. This CRSP needs to avoid any perception of conflict of interest to the best extent possible. Potential exists because all TC members are associated with work plans in some manner, BOD members represent CRSP institutions and other close relationships exist. The goal is to support collaborative research which assumes that each project has strategic relevance and meaning within the overall CRSP mission and that interdisciplinary approaches are essential because of the complexity of constraints and developmental issues.

The Work Plan/Budget Subcommittee charged with preparing an analysis and recommendations for priority classifications of work plans based on reviewer comments and their judgments noted several flaws in the peer review process. There was no HC PI on this Subcommittee, even though their participation was solicited by the PMO. In the future, HC PI participation should be more strongly

encouraged to validate broader collaboration in this important process. Logistical difficulties are recognized as problematic, but the use of fax and/or email can hopefully overcome this constraint.

One concern is that one PI did not receive notice and instructions for a written response to reviewer comments to be considered for discussion purposes by voting TC members at the 1996 Annual Meeting. There were inconsistencies in written responses. Another issue is the fact that non-voting TC members not on the Subcommittee did not receive the work items they were asked to rank until the meeting. The PIs attending the annual meeting were invited to make a brief presentation on their work plan and address any reviewer comments. The voting TC members participated in developing recommendations to the ME on funding for different "categories" of work items. There are 12 voting TC members. The TC did not prioritize individual work items within Category B which may be critical if funding levels are insufficient to fund all Category B projects.

An issue raised was the significance of a work plan item already included in the Continuation Plan submitted to AID and the fact that until the 1996 Annual Meeting, the TC had not had an opportunity to recommend "rejecting" or not funding any work item. This confusion appears linked to the new processes being implemented and associated changes. Ideally the peer review process is completed which does include a prioritization of Work Plan items for presentation in any Continuation Plan. The first 2-year Work Plan provides a foundation for implementation of the 5-year Continuation Plan.

The review process reportedly cost an estimated $12,000 and more than 450 hours of PMO time not including the time of others involved in the peer review process. This is a considerable expenditure in light of no actual peer review panel meeting with associated travel and per diem costs and no honoraria paid to reviewers. The fact is however that the peer review process has stressed the importance of quality, scientific merit and to a lesser extent relevancy. Another important value is the opportunity to consolidate similar projects, develop interdisciplinary teams and prioritize the work plans which is critical because of uncertain funding and annual budget cycles. The expense can also be "amortized" over the two year Work Plan period. Costs for future efforts can likely be reduced based on experience gained and use of cost-saving electronic communication technologies.

Recommendations

On the reviewer forms, if there are subset questions or criteria that are important relating to a general criterion topic they can be listed singly and rated numerically with predetermined weighted ranges. For example under Scientific Merit the following issues may be rated singly with different numeric scores depending on weight (importance).

- Is research protocol sound (0-10)
- Is research scientifically important (0-15)
- Is plan to measure impacts sound (0-20)

Budget issues do not relate to scientific merit, but should be a separate criterion category. Budget is referenced in criteria checklist under Other Factors but on Review Summary is referenced under Scientific Merit. There should be no inconsistencies among categories. In some cases only one question corresponds to a considerable amount of supportive information. When completing the Reviewer's Evaluation Form, should reviewers refer to the Criteria Checklist or the Review Summary or both? The yes/no format is very simplistic and provides too few options for responses. Note that some reviewers put marks between yes/no indicating answer is neither choice. Numeric scoring may provide more realistic ranges and options for reviewers rather than yes/no. A chart with the meaning of numeric value ranges for example, excellent (90-100% max. score), satisfactory (60-89% max. score), poor (59% or less of max. score) could be used to assign numeric scores. The external review process should use a numeric scoring system for ranking Work Plan items and not just the TC Subcommittee.

On the Reviewers Evaluation form there are two questions: 1) Quality of document provided by PI and 2) Recommendation for PI for future funding. There is little merit with these questions as there is no weight compared to other criteria yet they appear on Reviewer's Evaluation Form. There are no criteria or guidance offered to assist reviewers in their scoring. This is purely judgmental. If a PI is ranked as negative for recommendation for future funding what are the implications - or what does this really mean. There should be some explanation provided on the significance of these choices.

The Other Factors criterion on Review Summary has little meaning as presented. To acquire more "value" from the reviews and also to assess the quality of reviews, reviewers could be requested to provide brief comments on strengths and/or weaknesses for each rating.

There should not be more than one scientist at the same institution who reviews the same work plan or proposals, especially if the reviewer PIs are also competing for CRSP funds. The CRSP scientists both US and HC with input from their international networks and perusal of pertinent literature should be able to identify projects that do in fact address regional constraints or problems and are highly relevant to development and science and overall CRSP objectives. The use of two

"internal" reviewers and two "external" reviewers for each project should be modified. There should be at least three "external" reviewers for each project with an emphasis on external peer review not equally balanced with internal reviewers. The internal reviewers do have their opportunity to review and rank projects in the Work Plan/Budget Subcommittee and at the annual meeting by voting. With the present process there are some TC members who actually review the work plans three times if they are an "internal reviewer", member of Work Plan/Budget Subcommittee and voting TC member.

External reviewers who are accustomed to reviewing "scientific research" proposals can be expected to react negatively on many CRSP proposals because of the page limitation and format for work plan development. The format is dissimilar to that of "research" proposals that includes more detail and substance. A modified format to match the review criteria and an explanation of this format for reviewers may address false expectations and confusion by external reviewers in the future. CRSP work plan PIs after this first round of experience need guidance from the PMO to develop a proposal that matches the expectations of reviewers and review criteria. There is a notable weakness with literature reviews in several cases.

Several issues emerged that should be addressed. The matter of definitions for work plan, study, activity and experiment do need clarification of meaning and consistent use and context in the development and review of work plans. The review criteria should be weighted not only because of differences in proposed work (scientific research versus outreach education) but also on the criteria. Is innovation more important than scientific merit or collaboration? The criteria both for reviewers and the Work Plan/Budget Subcommittee should be developed by the TC. The criteria as mentioned previously need strengthening and attention to priorities, weights, and relevance to work plan topics. It is also noted that the PMO needs to develop a concise policy for work plan development procedures that are adhered by all proposers and attentive to peer review expectations.

The recommendations under Item II, which refer to the work plan process and not to specific technical work plans, in the Work Plan and Budget Subcommittee Report dated January 1996 are sound. This group made a good effort with their task and identified numerous issues that can improve the peer review process in the future. This Subcommittee provided recommendations for work plan "items". For ranking in different categories, the Subcommittee developed a numeric system based on the Overall Judgment rating of each work plan. This may be a false impression as the scoring in other criteria could be higher. Here again, a system of numeric scoring for priority criteria that are weighted could minimize this issue. It would have been helpful if each work item related back to the original preproposal number for cross checking purposes. It is important to understand that the preproposal process began in 1993 and after about 3 years some issues have changed especially those involving methyltestosterone. This is evident in Category C.2 items.

This task, however painful, needs to be accomplished in an objective manner. A numeric scoring for evaluations provides a wider range of reviews and could assist with this process. Even if CRSP 5-year Continuation Plan is approved by AID, the funding is approved on an annual basis and with current downward trend in many Agency budgets the CRSP may need some latitude to adjust budgets and work items on an annual basis because of uncertain or fluctuating funding streams.

The issue of core site projects should also be addressed as there are "fixed costs" associated with these sites and expatriate presence. The work load needs to match the available resources but work plan items need to also undergo an external peer review process. It is also incumbent that other work plan items associated with a core site clearly identify an interdisciplinary team approach and how special projects will be integrated with current efforts and complementarily advance both science and development in the country and region.

The TC Co-Chairs and the PMO co-developed, with input from some researchers, a schedule and guidelines for the work plan review. These guidelines delineated the rules and requirements for work plan development and were followed by new participants. However, the PD/A CRSP is undergoing a culture change and some current CRSP participants were experiencing difficulty with this process. While it would have been advantageous if the 'no preproposal no reviewable work plan' issue could have been avoided, it appears to be part of the growing pains associated with change.

It is recommended that each Work Plan item be reviewed by three qualified "external" reviewers. The external review ratings are then submitted to the TC for their review and recommendations to the BOD and ME. The EEP's role in this process should include a review of each Work Plan item, but equally important specific attention to strategic partnerships and linkages, level of collaboration and transdisciplinary approaches proposed to impact a region. The EEP should assist the ME and AID as requested within the confines of its recognized function and be interactive with the BOD on mutually important matters. The future role(s) of the EEP should be revisited and defined by its membership when its reaches a full complement of three in collaboration with the ME and BOD. The ME is responsible for final decision-making. An effective peer review process can facilitate this decision-making process with proper guidance and directives in an objective manner to strengthen collaborative research and enhance developmental impacts.

External reviewers would include persons who have not received any funding from this CRSP in the past or present and have no direct association with CRSP institutions as faculty members . Reviewer qualifications are important for acquiring meaningful reviews rather than reviews without substance or credibility. An effort to identify persons with relevant experience in aquaculture research, match their expertise with that being proposed and assure their understanding of international development conditions is preferred. With enough lead time and

with current email and faxing capabilities, persons outside of the U.S. can more easily participate.

The peer review process is commendable and needed to continuously strive to strengthen the CRSP program through a scientifically rigorous evaluation by renowned experts in various disciplines. This external peer process also exposes other scientists to the CRSP program and may identify future CRSP collaborators on special projects or other activities. The CRSP should seek to continuously solicit names of potential reviewers with expertise across CRSP disciplines and maintain a database for future use. Names of potential reviewers can be obtained from various aquaculture networks and matched with CRSP peer review needs. This should be an ongoing task of the PMO.

The external peer review should focus on the scientific merit of proposal, innovation in sense of scientific approach, budget, anticipated benefits or impacts and capacity strengthening to mention several areas. The TC in cooperation with the CRSP networks should be able to assess project relevancy in a regional perspective. The solicitation of priorities can be pursued from key regional stakeholders who can also benefit from the CRSP. This exercise can also facilitate the "regionalization" of the program by reaching out to new partners who become involved in the "process".

Evaluation of Proposed Overall Philippines Project

Background

The Philippines freshwater project started in 1991 as a companion site associated with the Thailand core site. In the original CRSP plan, the Philippines was a core site for brackish water studies involving the University of Philippines - Visayas. With AID budget cuts in 1986-87, the site was terminated and Thailand became the sole primary SE Asia site. The collaborating institution is now the Freshwater Aquaculture Center (FAC) at Central Luzon State University (CLSU). The university and faculty have responsibilities in research, higher education and extension. The Bureau of Fisheries and Aquatic Resources (BFAR), International Center for Living Aquatic Resource Management (ICLARM) and the University of Wales - Swansea tilapia genetics project each has facilities which are co-located in the same area. Conditions for collaboration are excellent, yet under-realized.

CLSU has a College of Fisheries with three Departments - Aquaculture, Inland Fisheries and Aquatic biology. The faculty at CLSU is young and many are seeking advanced degree opportunities through bilateral donor programs. Some of the original FAC faculty who had Ph.D. degrees in aquaculture have departed and the program is rebuilding its faculty expertise and capabilities.

The following is a brief profile of FAC staff. (R=Research, T=Teaching, E= Extension)

Name	Highest Degree	Specialization	Responsibilities
Tereso A. Abella	Ph.D.	Genetics	R, T, E
Ruben C. Sevilleja	Ph.D. candidate	Socio-Econ	R, T, E
Eduardo A. Lopez	M.A., M.S.	Agriculture, Aquaculture	R, T, E
Arsenia G. Cagauan	Ph.D. candidate	Water Qual.	R, T, E
Antonio V. Circa	M.S.	Socio-Econ	R, T, E
Apolinario V. Yambot	M.S.	Aquatic Health	R, T, E
Rodora M. Bartolome	M.S.	Nutrition	R, T, E
Emmanuel M. Vera Cruz	M.S.	Genetics	R, T, E
Remedios B. Bolivar	Ph.D. candidate	Genetics	R, T, E
Danilo C. Monje	M.S.	Agri-Bus.	R, T, E
Prescilla M. Monje	M.S.	Aquaculture	R, T, E
Janet O. Saturno	M.S.	Water Qual.	R, T, E

Mr. Eduardo Lopez is the CRSP Co- PI who is involved in many tasks, including serving as Chair of the Aquaculture Department. He depends on a Research Associate and laborers to do routine CRSP work and maintain the experimental ponds.

CLSU aquatic research programs depend heavily on external donor assistance and without it, program activities would likely be dropped. The CRSP budget to support several studies at CLSU has been level for several years and has not kept up with inflationary increases primarily associated with salaries. The CRSP has contributed to limited institutional development and staff training in the Philippines because of its companion site status. The working relationship between the US collaborating institution (University of Hawaii) and CLSU has been good, yet needs attention. There is too much dependence on the US institution for analyses of water quality data and reporting on completed studies has been delayed because of coordination difficulties.

With numerous aquaculture projects in the Philippines, the CRSP is the sole project addressing the optimum use of fertilizers for local conditions. Completed studies have generated findings that can benefit tilapia producers. However, because of the lack of funds, no written recommendations have been developed that can "impact" farmers. The project has conducted yield trials with two genetic strains of tilapia from the ICLARM GIFT and Swansea GMT projects. There is tremendous opportunity to develop a research-based best management program for tilapia producers using the CRSP results in collaboration with other projects. BFAR and CLSU both have extension functions and through other extension programs could disseminate this technology package to farmers in the country as "appropriate" technologies.

In the Transitional Year Work Plan, elevation studies originally planned for Rwanda began in the Philippines in December 1995. One of the three elevation levels was dropped because of site location problems. The Philippines team has not been as productive in reporting project results in the scientific literature as other project teams in a timely fashion. With tilapia being an important species in the country and many farmers relying on pond systems with fertilizer inputs, the project can realize significant impacts if results reach that constituency. The Philippine Council for Aquatic and Marine Research and Development (PCAMRD) does provide grants in aid through a competitive process and disseminates information. The CRSP may be able to leverage project support through stronger linkages with PCAMRD. Current studies involving polyculture of clarias and snakehead with tilapia are presumably in response to a shortage of tilapia fingerlings and an even more critical shortage of sex reversed tilapia for farmers. This project as other CRSP projects should provide some justification for planned studies that are linked to development constraints. For example, what are expected advantages of each piscivorous fish and what infrastructure exists to mass produce them for commercial or subsistence farming applications.

Status of the Philippine's Site

A real issue is the site status of the Philippines and the relationship with the SE Asia Project or Thailand site. CLSU has staff expertise and facilities yet most of the focus has been on genetics studies because of bilateral funding support and graduate degree training opportunities. The programmatic linkage to Thailand projects is not well defined and most study results should have direct application to the Philippines. This cross-site or regionalization approach is needed and should be attainable because of the CRSP programs in both countries. The CRSP could have a broader impact in the "region" by initiating collaborative MOUs with the various stakeholder institutions and organizations in each country which define complementary opportunities and regional cooperative initiatives with implementation strategies. This action could also identify research and development gaps which could justify expanding the role and capabilities of the Philippine site. There is a need for more institutional development support with critical equipment and staff training at the Ph.D. level to create more HC independence yet maintain mutual benefiting collaboration. With increased capabilities, the program at CLSU could compete for and attract additional sources of external funding.

One constraining issue is the lack of stronger, more effective cooperative linkages in the Philippines which is essential if the program is to realize its potential benefits and impacts to farmers. Complementary infrastructures exist, but more effort is needed to integrate activities and leverage resources with the common goal of advancing aquaculture in the Philippines and SE Asia region. AIT as a regional project has experienced fewer difficulties linking research to development because programs are jointly administered and resources have been adequate for both initiatives. In the Philippines, research and development programs exist within

numerous organizations and strategic planning that encompasses the strengths of each program within some coordinated framework is absent presently. The stature and role of the CRSP in the Philippines should be re-assessed in relation to ongoing projects and existing organizations with the goal to better integrate activities.

Proposed Overall Philippines Project

This evaluation addresses several issues that relate to the proposed projects in the 1996-98 Work Plan and Continuation Plan for 1996-2001. They include but are not limited to how do projects: present a balance between research and development activities; have regional applications; target key constraints; and develop institutional capacities in the US and Philippines. Current and past project activities should also be examined based on the aforementioned issues. What has been accomplished in the Philippines after a CRSP investment since 1991 and what are the opportunities to develop an integrated program that specifically addresses key constraints in a short-term and long-term planning horizon?

There is a tendency to fund projects but are they in fact directed at a particular CRSP objective and do they have regional relevancy with a specific constituency in mind? A recently completed impact assessment study conducted in the Philippines and other CRSP countries revealed considerable information related to farming conditions. Can the findings from this effort be used to re-evaluate farm-level constraints and engineer the Philippine's site to appropriately address issues that can make a difference to aquaculture development in the Philippines and other countries in the region? To what extent are the results from the Thailand site investment being employed in the Philippines and are technologies transferable between these two countries? Finally, who within the CRSP community are the advocates and monitors to assure that CRSP investments and findings are reaching and benefiting people and thus fulfilling the CRSP goal?

Auburn University Work Plan

Title: Monosex Tilapia Production through Androgenesis

The preproposal indicates studies will be conducted at Auburn University and all CRSP sites and the work plan relating to this preproposal indicates studies at Auburn University and Oklahoma State University. The level of technology is likely more relevant to US producers and advanced tilapia growers in LDCs rather than limited resource farmers. The strains being evaluated in the US are also likely different from those found in diverse geographical regions in Africa, Asia and Latin America. The adoption of this technology in LDCs should be carefully assessed in all detail. There is no method described to transfer any pertinent discoveries to CRSP HC sites or how YY male stocks might be established at foreign sites. The use of MT for sex reversal is moving toward FDA approval and is presently practiced in

LDCs. A comparative evaluation of different sex control procedures should be realistically conducted for LDC conditions to assess the applicability.

The University College of Swansea has spent years developing YY male stocks and the CRSP has used these stocks in yield trials. There is no reference to this work. Although the method of producing YY stocks is different the end result is the same. The technical readiness of LDCs to adopt this level of technology needs some study as the results may very well remain in the US only, which may in fact provide a more direct benefit to US tilapia producers. The work plan should address commercial or subsistence implementation of the technology as this will identify whether the project will be more important to science or to aquaculture development. Also there is no mention of HC site collaboration in the proposed study and participation of HC staff is not detailed. There is no developmental strategy in this research initiative. The capacity building aspect is vague with no specific actions to capacitate others to understand and actually employ the proposed methodology.

The Work Plan identifies beneficiaries but there is no indication how especially producers will actually access and use this alternative method. Its economic and logistical advantages compared to current methods also need some level of assessment. The recent impact study of all CRSP countries provides some information relating to technology diffusion and current practices of tilapia farming.

Title: Socioeconomic Dimensions of Aquaculture Development: A Comparative Assessment of Financial Returns, Adoption Barriers, and Impacts of Tilapia Production Regimes.

This proposal also involves participants from AIT and University of Hawaii (uncertain with departure of K. Hopkins). There is little direct involvement with the Philippines site and HC participation is not described in any detail. The project objectives are sound and can contribute valuable baseline data and documentation of CRSP impacts. A key issue is how will data gathered at the grassroots level of farmers influence or be used to identify important constraints that the CRSP may address through further investigative approaches? This implies an interdisciplinary approach to the identification of constraints and development of appropriate problem-solving approaches. The project does provide a good balance of research with a development orientation. Regional application is evident from involvement of several countries in the proposed study.

University of Arkansas-Pine Bluff Work Plan

Title: Production of Mixed-Sex *Oreochromis niloticus* with Controlled Reproduction

The Work Plan addresses primarily the African site. The application to the Philippines is questionable as studies have already been conducted with snakehead and clarias as predator species with mixed sex tilapia. What are the results of these studies and what is the feasibility of this method for the Philippines or elsewhere? The use of piscivorous fish in tilapia culture has been studied in most areas where tilapia are found. The real issue is identifying success stories where this polyculture system has worked and is being practiced. The addition of another species complicates application by resource-limited farm families unless seedstock is readily available and within economic reach. The "economic analysis" of this proposed method should also be highlighted. There is currently a shortage of tilapia seedstock in many countries and the introduction of another species with uncertain availability may be a tenuous situation.

The effort involved in screening unknown species of questionable performance in pond culture conditions for recruitment control can require years of work with uncertain outcomes. This Work Plan requires a more vigorous review of current scientific literature and strong justification that this approach is sound for LDCs. The use of largemouth bass for tilapia production in the US is unlikely compared to other alternative reproductive control options. The question is not whether predators can control or reduce tilapia reproduction as a body of knowledge presently exists, but what is the feasibility of its application to a CRSP constituency - subsistence or commercial as a first preliminary step.

Any research related to this topic should only be conducted at HC sites and not at US institutions. Largemouth bass is not representative of species endemic to Latin America, Africa or Southeast Asia. The project has limited regional application as the implementation of this approach is likely a constraint itself, unless preliminary assessments prove otherwise.

University of Arizona Work Plan

Title: Development of Low Cost Supplemental Feeds for Tilapia in Pond and Cage Culture

The Philippines reportedly has companies that are producing pelleted tilapia feeds and in fact CRSP fertilizer-based studies have shown better economic returns compared to feeding only. Large feed companies presently operate in the country and promote use of feeds. The use of fertilizers only, however, may be more appropriate in some cases and the CRSP plays an important role in examining different pond management strategies.

A recent CRSP survey of selected Filipino tilapia farmers revealed 64% used no feed, however, a variety of materials are used as feed supplements. The evaluation of low cost protein sources as feed ingredients is sound and worthy of study. Pelleting technology likely exists but the application of this technology to others besides large corporate feed companies requires more explanation. If local ingredients are identified, tested and proven to provide economic advantages to tilapia farmers, then the next step is large-scale feed manufacturing. For this important potential step to proceed the project should in its initial stages foster collaborative linkages with one or more local feed manufacturers. This cooperative venture can assist in assessing the economics of utilizing certain local ingredients in commercial feeds and secondly have a private company that can readily adopt new discoveries. This can strengthen the working relationship between CLSU and feed companies for future collaborative efforts.

In the US there have been numerous studies to assess the use of different materials for feedstuffs but the private, commercial implementation phase was overlooked and resulted in no adoption. The programs that work collaboratively with feed mills and have their interest and support have greatly impacted the improvement of aquaculture feeds in the US. This same public-private sector model may also be appropriate in the Philippines.

There is a need for this research and CLSU has facilities and expertise to conduct the studies. The enhancement of equipment will assist with institutional capacity building. A suggestion is to assign a faculty member at CLSU with a background in nutrition and feeds. One such individual has a M.S. degree in this subject. The current CRSP PI is overextended with many responsibilities and has a strong desire to pursue post-graduate studies. This is an opportunity to include more CLSU faculty in the CRSP and broaden human resource development. The specific technical role(s) of HC participants needs to be defined as too many work plans fail to address this subject with sufficient clarity. The project has regional application with potentially new feed ingredients and any effort to lower feed costs and improve farm level profitability targets a key constraint.

University of Hawaii Work Plan

The following activities are included in the Work Plan for 1996-1998.
Title: Photosynthetic Oxygen Production and Fish Production in Fertile Culture Ponds

There is a lack of specificity on what project activities will be conducted in the Philippines and what is the role(s) of HC participants. What level and detail of collaboration is anticipated at the HC site and who is the most appropriate HC counterpart for such proposed studies? The need to synthesize and analyze information across CRSP sites is important and worthy. These studies may likely

assist modelers and decision support programmers more than fish farmers. The need exists to better understand pond dynamics and specifically the relationship between oxygen production and fish production in fertile ponds. It is uncertain how this study addresses key constraints and strengthens institutional capacities.

Title: Examination of Optical Methods for Assessment of Color and Mineral and Biological Turbidity in Culture Ponds

This study is directed more at refining decision support models rather than addressing critical constraints in aquaculture. The issue of turbidity and its sources are site specific and would tend to vary considerably based on site specific characteristics. If the work plan was directed at scientific studies to effectively manage turbidity and associated problems under LDC conditions then the work plan would have more relevancy and address CRSP goals. Again, the role(s) of HC participants is not defined and it is stated that CRSP participants will be formally and informally invited to contribute data. This implies no prior commitment of collaboration or details of implementation at this stage of the proposal development. There is no indication of institutional building and regional importance and application are questionable. How has this issue been identified as a key constraint or contribute knowledge that addresses a CRSP objective?

Title: Data Base Examination of the Relationship Between Wind Speed and Density Stratification in Culture Ponds

There is a body of knowledge relating to wind action, temperature gradients and pond water stratification. This issue has been studied rather extensively as it has important management implications in intensively managed ponds. The proposed study addresses wind speed which in field conditions is not measured nor is pond water stratification in shallow tropical ponds. The tools to monitor these conditions are not used unless skilled managers are involved with progressive commercial operations in LDCs. This work has little significance in addressing problems of fish farmers. The work is designed more for refinement of simulation models that predict pond stratification conditions with changing influencing variables, namely wind speed. There are other factors which also impact this phenomena. Again, the study indicates no involvement by HC participants in the design and implementation of this study. The issue is how does this study address CRSP objectives if they involve problem-solving of critical constraints?
The involvement of HC participants is unknown as is how any constituency will be benefited from the proposed work. The link to development is questionable in making any significant impact at the farm level.

DAST Work Plan

Title: Decision Support System Development for Warmwater Pond Aquaculture

The proposed studies are intended to enhance the decision support models that are being developed in part from CRSP data. Further development of this decision support tool with more intelligence capability has application in teaching and general planning exercises. The incorporation of more variables increases the overall simulation power of the program but has yet proven to be of any significant value at the farm level. This effort does however capture the value of CRSP data into a format that does extend application opportunities. The involvement of HC participants in this study other than providing data is weak. One question is has the HC PI used POND software for any application in the Philippines? What is his feedback to the DAST? Has the HC PI expressed the usefulness or relevance of this computerized system in his country? Does the DAST exert efforts with HC participants to highlight applications under LDC conditions and are HC participants knowledgeable about using this software? There is an opportunity for institutional building if CLSU staff can use POND in teaching, research or planning applications.

1996 Annual Meeting

This meeting had a full agenda with inadequate time to address all items with the level of discussion and time needed. At least one agenda item was dropped. Several difficult issues involving voting by TC members on rankings of work plan items and institutional location for the Central Data Base management were handled well by participants. One observation noted was the surprising fact that some TC members were unaware of their proposed participation in work plans.

Another important matter was a plan to realign the TC membership based on disciplines and begin making transitional changes as directed by the new Continuation Plan. This involves a rotation schedule for TC and BOD members as individual membership has not changed for numerous years.

An Attendee Evaluation Form was developed and each participant was asked to complete it. There was no discussion on any recommendations or comments from the 1995 Annual Meeting. This is a worthwhile exercise to seek feedback and address issues that may improve the conduct of future meetings. This has been practiced for at least six years and the PMO mails summarized results to all CRSP participants.

One objective of the CRSP is to strengthen the institutional capabilities at HC sites. This involves both enhancing the availability of needed equipment and supplies to conduct scientific research and human resource development that is directed to self-sufficiency in designing, conducting, evaluating and reporting scientific discoveries and findings. The overview presentations by HC PIs are commendable and should

receive more focus to seek follow-up opportunities to "regionalize" projects to include new collaborative partnerships.

At the 1996 Annual Meeting there were only four HC CRSP participants at this event. This reflects under-representation for such an important annual planning and TC decision-making program. Also there was no HC representation on the Work Plan/Budget Subcommittee which developed recommendations on the approval status of all work plan items for possible inclusion in the new Continuation Plan. There should be a concerted effort to increase the involvement of HC participants in all phases of the CRSP program, including TC and BOD membership. The roles should be proactive and engaging.

In contrast to the low HC representation [Thailand (3), Philippines (1), Honduras (1)] many of the US institutions has numerous TC representatives; Auburn University (8), Oregon State University (4), University of California-Davis (1), University of Hawaii (2) and University of Michigan (2) and University of Arkansas - Pine Bluff (1). It seems that each US institution should be adequately represented by two individuals from different disciplines. With fewer US representatives, the CRSP could increase the number of HC participants, EEP members and resource persons or private sector representatives as needed to address any specific issue not sufficiently addressed with TC membership. There should be more strategic balance in representation that enables the CRSP to expand its vision, partnerships and linkages.

Conclusion and Recommendations

The PD/A CRSP has made considerable progress in developing a collaborative research program involving US and HC institutions. The quality of science has been strong based on contributions to the scientific literature. Recent events have had a significant impact on the program including; sudden closure of the Rwanda site, an open solicitation for preproposals, a reassessment of program goals and objectives, development of a new Continuation Plan, identification of a new Africa site, and uncertain budget levels to support expanded program activities in future years.

As with any program with funding limitations, there has been a concerted effort to balance research and development activities, to be responsive to US aquaculture interests, broaden networks and linkages and in fact conduct a global experiment with concurrent attention to country constraints. At times it is likely that expectations and responses to promising opportunities must seem overwhelming for a relatively small program. It is not anticipated that the program address each of the following points, but rather consider each on its merit for practical implementation and/or program strengthening. There are several challenges facing the program that may influence the effectiveness and ultimate fulfillment of the program's goal.

- The program should consider clearly defining its constituency and be responsive to its needs. The program has both a research and development thrust which can create synergy and unique contributions to aquaculture development. Presently, the program addresses the needs of rural, subsistence farmers and is becoming more involved with "commercial" farmers whose research needs and technical readiness are quite different. Both are important. The program, however, needs to reach a consensus on the relative importance of each based on AID priorities, CRSP goals, regional constraints, opportunities for impact and available resources.

- There is a constant need to integrate projects into a complementary mission whereby each contributes value in addressing a constraint and each is a component to achieving a specific goal or objective. There is a tendency to fund individual projects and not a coordinated programmatic approach to problem-solving.

- HC staff need to become more active and engaging in the program at all levels. Recruitment of individuals who can maintain the "flame" when the program eventually ceases or scales down is critical. The HC ability to design and execute studies and interpret and report scientific findings is also critical.

- Because of the complexity of some issues the latitude to contract services for special projects from renowned experts can be an important aspect of the program.

- The global experiment has involved the collection and archiving of considerable data relating to pond dynamics and aquaculture. This initiative was designed to compare conditions and explain differences across CRSP sites, develop scientific inferences from a regional perspective and contribute to the broader knowledge of factors affecting aquaculture production. There have been some modeling studies conducted and site specific analyses. However, there is a need to identify what data exist that can in fact address current aquaculture constraints. The work conducted to date has been more science based rather than problem-solving based. Certain expectations are associated with a Global Experiment and these expectations and needs should be adequately addressed in some order of priority.

- To become more regional the program should identify on a per country and regional basis those institutions, organizations or agencies that have a stake in aquaculture development and engage them directly in identifying constraints and in networking with the program. The CRSP is a unique program that generates technology and has much to pass off to technology users and consumers. An issue may be – is the program science driven or constituency driven.

- There has been some recent social science studies conducted at all CRSP host countries which reveal considerable information on farm-level conditions. How might this information be used in addition to CRSP experience to target "appropriate" technologies. What are the criteria for an appropriate technology for successful adoption and impact in LDCs?

- The technical readiness of the US aquaculture community is more advanced in general than that of communities in LDCs. In the development of technologies, there should be a clear understanding of this issue and who in fact can access and utilize the technology.

- The community of any university is diverse and rich in expertise, visions and abilities. The CRSP needs to explore the opportunities to engage this broader system in the program as appropriate as issues are often complex and require specialized disciplines.

- As accountability increases in the Federal government through the Government Performance Review Act, more effort will be needed to measure and document impacts and the achievement of stated objectives. The CRSP is in a position to establish some baseline data which will be important in addressing this issue in the future. The collection of this information can also be helpful to the program to identify strengths and possible weaknesses that can be enhanced.

- The issue of conflict of interest within the CRSP process of prioritizing projects and assigning budgets is always of concern. Funds are limited to an increasing number of participants and collaboration to develop and implement world class projects is the goal rather than competitiveness. All CRSP participants,

including the TC, BOD, ME and EEP need to be attentive of perceived or potential conflicts of interest.

- The RFP and peer review processes were time consuming and not without a cost. However, the program needs to continue this mode of operation because of the opportunity to strengthen and validate projects and seek continued improvement in achieving the program's goals and objectives.

- Proposed projects should be aligned with specific CRSP objectives and address problem-solving and mitigation of key constraints using scientific approaches.

- The DAST should be more interactive with field staff and seek a collaborative process to identify what data are most critical and relevant to analyze that will address a particular constraint or CRSP objective. There is a sense that the DAST is a separate project rather than a program that is integrated with field work.

- With the current body of knowledge generated by the program to date, the CRSP is in a unique position to develop science-based best management practices under LDC conditions for different aquaculture systems that would be a tremendous contribution to tropical aquaculture development worldwide. It could be envisioned that with such a product other stakeholder organizations and institutions would cooperate to translate these materials into different languages for broad dissemination.

- The CRSP should consider developing protocols on biosecurity for exotic or introduced species research and use of FDA unapproved drugs for investigative purposes. The regulatory requirements for research purposes is much different from that of commercial producers. With the intent to "commercialize" promising technologies the "legal" step from innovation to technology transfer needs to be understood and its feasibility assessed.

- The CRSP should consider a workshop on DAST issues and solidify an understanding of its role and how it can be responsive to constraints facing aquaculture. It seems that at annual meetings there is insufficient time for adequate communication between modelers and field biologists and some issues have been pending too long. The TC can address the importance this matter.

- Viable options for expatriate CRSP staff presence for each HC site should be assessed based on specific site conditions, requirements to fulfill CRSP mission, budget implications and pursuit to strengthen and foster HC self-sufficiency in aquaculture research.

- The change of structure of TC composition and rotational plans for BOD are positive actions. There should be an effort to assure strong HC participation in Annual Meetings and the EEP membership should be increased to its full complement of three in a timely manner.

- The CRSP should invest in Ph.D. degree training or seek opportunities to leverage this level of training for HC PI at the Philippine's site. This can strengthen HC capabilities in the long-term and offers opportunities to engage more CLSU staff in the CRSP.

- The relationship of the Philippines site to SE Asia site needs to be addressed more specifically in terms of accomplishing CRSP overall goals, leveraging existing resources and programs, and integrating activities to address constraints in this region. Cross-site collaboration should be strengthened and mutual objectives identified.

- ICLARM should be more involved with the CRSP through representation on the TC. An MOU that identifies specific areas of collaboration, leveraging and complementation and serves the best interests of the global aquaculture community through IARC and CRSP collaboration should be considered.

- The CRSP should identify a development endpoint for each research project that identifies a constituency, cooperating program(s) and implementation plan to realize overall CRSP program objectives not just the activity or study objectives. This "process" can focus research to problem-solving issues and identify gaps where more longer-term, fundamental approaches may be needed.

- The regional CRSP constituency should be clearly defined and identified. Then an effort should be initiated to engage key stakeholders to become "partners" in the program. The level and extent of these partnerships can vary based on strategic planning from simply information sharing, scientific exchanges and training to actual involvement in the program as participants.

- The SE Asia site is extremely important and strategic because of AIT's regional stature. Honduras provides a good geographical position in Central America where technologies and new knowledge generated from research activities have direct application to other countries in the region. The challenge is how to best regionalize the program through a non-regional project. The same challenge may result at the new African site.

- The CRSP should consider developing specific guidelines for institutions to assist with the proper acknowledgment of the CRSP in reports, meetings, conferences, etc. Universities are involved in other programs which are affiliated with the institution. It may not always be clear whether an individual with the CRSP is representing the interests of the CRSP or the university.

- Private sector representation and involvement with the CRSP should be explored and evaluated.

- The CRSP should identify those outreach implementing programs in SE Asia, Central America and Africa which can effectively reach and impact persons, families and communities to achieve the CRSP long-range goal.

- The program should make a stronger commitment to the Global Experiment in terms of its contribution to the advancement of aquaculture, mitigation of key constraints and fulfillment of overall program objectives. A realistic, objective assessment may be needed to determine what additional data may be needed and why, and what data are no longer needed and why. The country level Special Projects are becoming more common and with limited resources the program faces difficulties extracting the "value" from the Global Experiment for "regional" application and cross-site analyses. Today, in view of experience, accomplishments and future needs what is the relative importance of the Global Experiment, country level Special Projects and regional application of CRSP results?

- New institutions and sites should be integrated into the overall CRSP in a manner that they will contribute to fulfillment of the program's goals and objectives. There should be cross-links with other sites as appropriate and plans to collaborate with current institutions and researchers. Their inclusion should be strategically vital.

- To acquaint new PIs with CRSP operations, the PMO should plan an orientation workshop for any new participants to offer first-hand guidance and assistance to become a contributing "collaborator" in the program.

- The scientific balance across disciplines and CRSP functions needs continued attention to identify programmatic opportunities from interdisciplinary synergy whereby social, DAST and core-site scientists and others can plan, design and implement transdisciplinary projects with developmental impacting endpoints.