

PD-AAN-817

TITLE XII
COLLABORATIVE RESEARCH SUPPORT PROGRAM

POND DYNAMICS/AQUACULTURE

FIRST ANNUAL ADMINISTRATIVE REPORT

December 1983




**Pond Dynamics/Aquaculture CRSP
Program Management Office
OREGON STATE UNIVERSITY
Marine Science Center
Newport, Oregon 97365
(503) 867-3011**

FIRST ANNUAL ADMINISTRATIVE REPORT

December 1983

This administrative report addresses the management and technical accomplishments of the Pond Dynamics/Aquaculture CRSP during the reporting period from 1 September 1982 through 31 August 1983. Program activities are funded in part by AID Grant No.: DAN-4023-G-SS-2074-00.



7/1

TABLE OF CONTENTS

	<u>Page</u>
List of Tables	iv
EXECUTIVE SUMMARY	v
1. INTRODUCTION	1
BACKGROUND	1
PURPOSE OF THIS REPORT	2
PROGRAM OBJECTIVES DURING THE REPORTING PERIOD	2
ORGANIZATION OF THIS REPORT	2
2. PROGRAM ACCOMPLISHMENTS	3
OVERVIEW OF PROGRAM ACTIVITIES	3
PROGRAM MANAGEMENT	4
RESEARCH ACTIVITIES	10
Honduras - Auburn University Project	11
Indonesia - Michigan State University Project	12
Panama - Auburn University Project	14
Philippines - University of Hawaii Project	16
Rwanda - Oregon State University Project	18
Thailand - University of Michigan Project	19
3. STAFF SUMMARY	21
4. FINANCIAL STATEMENT	27

11

LIST OF TABLES

<u>Table Number</u>		<u>Page</u>
1.	Professional Staff Summary	22
2.	Summary of AID Funds Budgeted and Expended for CRSP Projects and Management	28
3.	Summary of AID, U.S. Institution, and Host Country Contributions to Collaborative Research Projects.	29

iii

EXECUTIVE SUMMARY

The Title XII Collaborative Research Support Program (CRSP) in Pond Dynamics and Aquaculture is a coordinated international effort to develop aquacultural technology as a means of confronting food and nutritional problems. The program is partially supported by a U.S. Agency for International Development (AID) grant awarded in August 1982, under the authority of the International Development and Food Assistance Act of 1975 (P.L. 94-161). Oregon State University is the Management Entity for the CRSP and has technical, administrative and fiscal responsibility for the performance of grant provisions.

The Pond Dynamics/Aquaculture CRSP was envisioned as a cohesive program of collaborative research to be carried out in selected less developed countries (LDCs), with a component of basic research to be carried out at participating U.S. universities. The U.S. institutional participants are Auburn University, the University of California at Davis, and the Consortium for International Fisheries and Aquaculture Development (CIFAD). CIFAD, in turn, represents five universities: the University of Arkansas at Pine Bluff, the University of Hawaii, the University of Michigan, Michigan State University and Oregon State University. As a result of program planning activities undertaken prior to the formal establishment of the CRSP, eight developing countries were identified as potential participants in the program.

PROGRAM ACCOMPLISHMENTS

The first operational year of the program, the period covered by this first Annual Administrative Report, was devoted to completing the administrative and technical tasks necessary to get the CRSP research underway. By the end of the reporting period, projects were established in six developing countries and the framework for the U.S. research component was established.

Program Management

A three member Executive Council serves as the primary policy making body for the CRSP. During the reporting period, the Executive Council confirmed the appointment of Dr. James E. Lannan as the Program Manager, guided efforts in the development of the U.S. research component of the CRSP, and selected candidates for an external evaluation panel that will assess CRSP performance.

A three member Technical Advisory Committee counsels the Program Manager and the Executive Council on technical aspects of CRSP planning and performance. The Committee had a lead role in the development of a standardized CRSP research plan by U.S. and host country researchers during a workshop held in Davis, California on March 2-3, 1983.

Oregon State University, the Management Entity for the CRSP grant, established a Program Management Office and appointed a Fiscal Officer to facilitate and coordinate research activities and to prepare summary and fiscal reports. Under the leadership of Dr. James E. Lannan, the Program Management Office assisted in the formalization of six host country agreements,

prepared ten management funding agreements, and provided logistic support for the establishment of overseas research activities. In addition, the Program Management Office coordinated efforts to develop a data management plan for the CRSP, and prepared a number of key documents, including a standardized research plan for the first experiment cycle, a directory of CRSP participants, and the first issue of a quarterly CRSP newsletter.

Research Activities

The CRSP Research Team is a union of the U.S. and Host Country Principal Investigators participating in the program. During the reporting period, the Team formalized research agreements, developed a detailed standardized work plan for a first round of field experiments and established an on-site research staff for each of the following collaborative research projects:

- Honduras - Auburn University
- Indonesia - Michigan State University
- Panama - Auburn University
- Philippines - University of Hawaii
- Rwanda - Oregon State University
- Thailand - University of Michigan

Host Country and U.S. Research Associates in residence at the overseas work locations worked to complete technical preparations for field studies. During the reporting period, experiments were initiated at four of the six host country research sites.

STAFF SUMMARY

The Pond Dynamics/Aquaculture CRSP represents the joint efforts of more than 40 professionals, specializing in fields such as research administration, limnology, fisheries and data management. Of those professionals having a major role in the program, 17 are in residence within the participating host countries.

FINANCIAL STATEMENT

A total of \$650,000 of AID funds were budgeted for CRSP projects and management during the reporting period. Of this total, the Management Entity paid invoices amounting to \$394,969*. Participating U.S. institutions expended a Total of \$138,097 in non-federal funds in the performance of CRSP activities during the reporting period, which exceeds the 25 percent cost sharing requirement specified in the CRSP grant. Although host country cost sharing is not required, contributions by participating host country institutions amounting to \$344,081 indicate a strong commitment to the program.

*This figure is a minimum estimate since invoices for some expenses incurred during the reporting period may not have been received as of the date of this report.



1. INTRODUCTION

The Title XII Collaborative Research Support Program (CRSP) in Pond Dynamics and Aquaculture is sanctioned by the U.S. Agency for International Development (AID) and the Title XII Board for Food and Agricultural Development (BIFAD) under the authority of the International Development and Food Assistance Act of 1975 (P.L. 94-161). Through cooperative effort, selected universities in the U.S. and institutions in less developed countries (LDCs) are working to develop aquacultural technology as a means of confronting food and nutritional problems.

BACKGROUND

Aquaculture was identified by BIFAD as an important target area for Collaborative Research Support Program activities in 1977. As a first step in initiating an Aquaculture CRSP, AID contracted in 1977 with Resources Development Associates of Los Altos, California to complete a planning study for a fisheries and aquaculture CRSP. Resources Development Associates submitted the findings of its planning study to the Joint Research Committee (JRC) of the BIFAD in August 1978. Among other priorities identified in this report, investigation of the principles and mechanisms of pond culture systems was recommended as an appropriate CRSP area with a high probability of increasing food fish production in the LCDs. In response to this recommendation, AID through the BIFAD, initiated further development of an aquaculture CRSP.

In February 1980, the JRC announced its selection of Auburn University, the Consortium for International Fisheries and Aquaculture Development (CIFAD), and the University of California in Davis to participate in this CRSP. CIFAD is composed of the University of Arkansas at Pine Bluff, the University of Hawaii, the University of Michigan, Michigan State University, and Oregon State University, which serves as the lead institution. At a meeting of university, AID and JRC representatives on 22 February 1980, it was recommended and later approved by the JRC that these institutions would participate in a tripartite management of the CRSP, and that Oregon State University would be designated as the lead agency in the management of the program. At this same meeting the participants were instructed to prepare a preliminary proposal for the CRSP to be presented to the JRC at its meeting in June 1980.

In preparing the preliminary proposal, the participating universities elected to develop a staged proposal for the development and implementation of an aquaculture CRSP. The proposed first stage provided for completion of program development. Collaborative research was to be initiated in the second stage. Staging was considered necessary because the planning study accomplished by Resources Development Associates addressed the subject area of fisheries in its broadest sense, and thus did not provide adequate information for development and implementation of an aquaculture CRSP.

The preliminary proposal was presented to and approved by the JRC on 10 June 1980. However, since the proposed program involved completion of program development as well as collaborative research activities, AID and the BIFAD elected to support the program development activities under a Title XII planning grant and to defer award of a CRSP grant until such time

as the JRC had reviewed a detailed proposal of collaborative research activities identifying collaborative institutions and research plans. AID subsequently awarded a planning grant to Oregon State University as Management Entity for the Aquaculture CRSP (Specific Support Grant Number AID/DSAN-G-0264).

Summary of Program Planning

The approach taken in the development of this CRSP was to accomplish a review and synthesis of the state-of-the-art of pond aquaculture and to undertake overseas site visits to determine research needs in the LDCs and to negotiate provisional administrative agreements with potential collaborating institutions. The findings from the state-of-the-art survey and the site visits were translated into planning guidelines to prepare the CRSP work plan and to develop a financial plan for the CRSP. This proposal was submitted to and approved by the JRC on 16 November 1981. AID subsequently awarded a second grant, which formally established the CRSP, to Oregon State University (Collaborative Research Support Grant Number DAN-4023-G-SS-2074-00).

PURPOSE OF THIS REPORT

In accordance with the provisions of the Collaborative Research Support Grant for the Pond Dynamics/Aquaculture CRSP, the purpose of this first Annual Administrative Report is to summarize program management activities and technical accomplishments during the period from the effective date of the grant, 1 September 1982, through 31 August 1983.

PROGRAM OBJECTIVES DURING THE REPORTING PERIOD

The overall goal of the first operational year of the CRSP was to complete all administrative and technical tasks necessary to initiate field experiments in a number of host country locations. This was to be accomplished according to a time-phased implementation plan as described in the CRSP grant, in which specific activities to be accomplished during each quarter of the first operational year were identified. Key activities included:

- Formalization of host country and funding agreements.
- Completion of personnel assignments.
- Development of a detailed experimental protocol for a first cycle of field experiments.
- Establishment of an on-site research staff, preparation for and initiation of experiments at each host country project location.

ORGANIZATION OF THIS REPORT

The remainder of this report is presented in three chapters. Chapter 2, summarizes the administrative and technical accomplishments of the first operational year of the program. This chapter includes an overview of organization and management, and project summaries for activities being carried out in six host countries. Chapter 3 summarizes the fields of specialization and work locations of personnel participating in the CRSP. The final chapter of this report is a financial statement, summarizing the CRSP budget and identifying the contributions of U.S. and host country institutions participating in the program.

2. PROGRAM ACCOMPLISHMENTS

The Pond Dynamics/Aquaculture CRSP was envisioned as a cohesive program, consisting mainly of a series of parallel studies to be carried out in the participating host countries and basic research to be accomplished at U.S. institutions. Further, the CRSP was designed to be truly collaborative, with all participating institutions sharing in the direction of research efforts. In accordance with these themes, activities during the first operational year of the CRSP focused on developing a spirit of teamwork while completing the practical requirements involved in getting CRSP research underway.

OVERVIEW OF PROGRAM ACTIVITIES

A time-phased implementation plan for the first operational year of the CRSP is described in the CRSP grant. Overall, the tasks identified in this plan were accomplished during the reporting period. Accomplishments include:

- Conduct of meetings of the Executive Council and the Technical Advisory Committee.
- Formalization of Management Entity funding agreements with U.S. institutions for Collaborative Research Projects, Executive Council and Technical Advisory Committee.
- Formalization of host country agreements between U.S. and host country institutions for six CRSP projects.
- Selection of U.S. Research Associates for all six projects and selection of Host Country Research Associate for five projects.
- Completion of most preparations for logistic support (e.g., host country clearances, equipment and supplies).
- Conduct of meeting of the Collaborative Research Team to finalize a standardized work plan for a first cycle of experiments and to provide orientation for Research Associates.
- Relocation of U.S. Research Associates to host country research sites.
- Initiation of technical work (e.g., site preparation, initiation of field experiments) at research locations.
- Identification of candidates to serve on an external review panel.

There were three areas where tasks identified in the first year plan extended into second operational year of the CRSP:

- In the case of one project, a joint effort between Oregon State University and the National University of Rwanda, the Host Country Research Associate was not selected during the reporting period.
- Delays in obtaining Grant Office authorizations for the purchase of essential supplies and equipment (e.g., vehicles, fertilizer) precluded initiation of field experiments during the first operational year in Indonesia and Rwanda.
- Action on the implementation of a U.S. research component for the CRSP initiated but will continue into the second operational year of the program.

The remainder of this chapter addresses program accomplishments in more detail. An initial section summarizes accomplishments related to program management. This is followed by a brief review of the research activities established during the reporting period.

PROGRAM MANAGEMENT

Technical, administrative and fiscal responsibility for the performance of the CRSP rests with the Management Entity. Oregon State University created a Program Management Office for CRSP activities and designated a Fiscal Officer to provide program accounting and consolidation of fiscal reporting from institutions expending funds provided by the grant. An Executive Council selected a Program Manager with the approval of the Management Entity. The Executive Council and the Program Manager, with the support of a Technical Advisory Committee and a CRSP Research Team, have worked closely to guide the CRSP in areas of policy, budget management, and technical performance.

Executive Council

The Executive Council is the primary policy making body for the CRSP. It is composed of one administrative representative each from Auburn University, CIFAD and the University of California at Davis. The members of the Executive Council are:

Dr. Alfred M. Beeton
(Chairman of the Council)
Director, Great Lakes & Marine Waters Center
University of Michigan

Dr. Wallis H. Clark, Jr.
Director, Aquaculture Program
University of California at Davis

Dr. E. W. Shell
Head, Department of Fisheries & Allied Aquaculture
Auburn University

During the reporting period, the Executive Council held two conference call meetings and convened a two-day meeting at Davis, California in March 1983. In summary, actions taken at these meetings included:

- Advisement of the Management Entity on matters of CRSP policy.
- Confirmation of Dr. James Lannan of Oregon State University as the CRSP Program Manager.
- Appointment of the Co-Principal Investigators for the CRSP projects as standing members of the CRSP Research Team.
- Identification of three candidates and three alternate candidates to be invited to serve on an external evaluation panel, which will conduct a performance evaluation of the CRSP commencing in 1984 and to be completed early in 1985.
- Review of the performance of the Program Manager.

- Guidance of efforts to develop a U.S. research component of the CRSP, including an identification of critical research needs.
- Assignment of the task of developing a data management plan for the CRSP.

Technical Advisory Committee

The Technical Advisory Committee advises the Executive Council and the Program Manager on technical aspects of CRSP planning and performance. Auburn University, CIFAD and the University of California at Davis each appointed one member to serve on the Committee. In addition to the CRSP Program Manager and the AID Project Manager who serve on the Committee in an ex-officio capacity, the members of the Technical Advisory Committee are:

Dr. Donald Garling
Department of Fisheries & Wildlife
Michigan State University

Dr. R. O. Smitherman
Department of Fisheries & Allied Aquaculture
Auburn University

Dr. George Tchobanoglous
Aquaculture Program
University of California at Davis

During the reporting period, the Technical Advisory Committee had a lead role in the development of the research plan for the first year of CRSP activities. The Committee reviewed the generalized research plan, prepared as part of planning grant activities, and assembled background materials in three areas critical to the research planning process: experimental design, sampling protocol and data management. These efforts served as a framework for the development of specific experimental protocols by the CRSP Research Team (composed of U.S. and Host Country Principal Investigators) in cooperation with the Technical Advisory Committee and the Executive Council during a meeting held in Davis, California on March 2 and 3, 1983. The results of this meeting are represented in part by the *CRSP Work Plan: First Experimental Cycle, Volume 1, Experimental Protocol and Methods* which is described below.

Program Management Office

The Program Management Office provides executive linkage between the Management Entity and operations under the CRSP. Management responsibilities include facilitating and coordinating interactions between the collaborating institutions, monitoring research activities and preparing summary and fiscal reports. The Program Manager, selected by the Executive Council, serves at the pleasure of the Management Entity and is responsible to the Executive Council for overall operation of the CRSP in compliance with policy guidelines. The Fiscal Officer for the program designated by Oregon State University, is responsible to the Program Manager.

The staff of the Program Management Office includes:

Dr. James E. Lannan, Program Manager (0.4 FTE)
 Ms. Michele Leslie, Assistant Program Manager (1.0 FTE)
 Ms. Anne Kapuscinski, Graduate Research Assistant, Data Base
 Management (0.5 FTE)
 Ms. Carman McBride, Secretary (0.25 FTE)
 Fiscal Officer
 Mr. William R. Millison
 Office of Business Affairs
 Oregon State University

The Program Management Office is located at Oregon State University's Marine Science Center in Newport, Oregon. Facilities include adequate office space, word processing equipment, a micro-computer and main-frame access system, and a branch library specializing in aquaculture and fisheries biology.

During the reporting period, the Program Manager directed efforts necessary to implement the CRSP. In summary, the accomplishments of the Program Manager include:

- Conclusion of Management funding agreements with U.S. institutions regarding the participation of individuals in research projects, the Executive Council and the Technical Advisory Committee.
- Direction of U.S. Principal Investigators in efforts to formalize administrative agreements with participating host country institutions based upon the provisional agreements concluded under the planning grant.
- Arrangement of and participation in meetings of the Executive Council and the Technical Advisory Committee.
- Assistance in obtaining host country clearances for U.S. personnel.
- Assistance in obtaining administrative approvals for equipment purchases for country projects.
- Initiation of a quarterly newsletter for the CRSP.
- Synthesis of the results of meetings and workshops including finalization of the CRSP work plan for a first experimental cycle.
- Strengthened the Management Office by recruiting an Assistant Program Manager.
- Organized an ad-hoc committee (approved by the Executive Council) to advise on development of a data base management system to CRSP research, and initiated development of the data base management system.

The first two tasks summarized above, formalization of host country administrative agreements and conclusion of funding agreements with U.S. participants represent a major proportion of management effort during the reporting period.

Host Country Administrative Agreements.

The approach taken to formalizing administrative agreements with Host Country institutions was to delegate this responsibility to the Principal Investigators of the several projects. The rationale for this approach was

that the Program Manager had already visited these Institutions and met the responsible individuals, whereas the Principal Investigators had not had this opportunity. Further, because the administrative agreements were to be based upon the previously concluded provisional agreements, it was anticipated that little additional negotiation would be required. Thus, the Principal Investigators' travel to the host country to formalize the agreements served several purposes; (1) it enabled the Principal Investigators to meet their host country collaborators, (2) it provided a forum for the U.S. and host country participants to discuss and commence preparations for collaborative research, (3) it eliminated the necessity for the Program Manager to make an additional trip to the various locations. In summary, this strategy resulted in substantial economies to the entire program.

The experiences of the Principal Investigators in formalizing the administrative agreements are described in the project summaries in the following section.

During the reporting period, six formal administrative agreements between the U.S. and Host Country Lead Institutions were negotiated, authorizing the initiation of CRSP activities in those host countries. These agreements, which are listed below, specify the responsibilities of each institution in carrying out collaborative research over the long-term and indicate anticipated levels of funding that would be made available for the first two years of each project's operation.

- Auburn University and the Ministry of Natural Resources, Republic of Honduras, December 1982. Memorandum of Agreement.
- Michigan State University and the Institut Pertanian Bogor (IPB) of Indonesia, August 1983. Memorandum of Understanding.
- Auburn University and the Ministry of Agricultural Development of the Republic of Panama, December 1982. Memorandum of Agreement.
- University of Hawaii and the University of the Philippines System, April 1983. Memorandum of Understanding.
- Oregon State University and the National University of Rwanda (UNR), May 1983. Agreement of Inter-University Cooperation.
- University of Michigan and the Department of Fisheries (DOF), Ministry of Agriculture and Cooperatives, Thailand, April 1983. Memorandum of Understanding.

Funding Agreements with U.S. Participants

A number of subgrant agreements between the Management Entity and participating U.S. Institutions were written or extended during the reporting period. These agreements, which are listed below, specify the responsibilities of the contractors in carrying out elements of the CRSP during a given performance period and obligate portions of the original AID CRSP Grant to support those activities.

- Oregon State University and the University of Michigan, May 1983. Subcontract modification extending the period of performance and increasing funding accordingly for Dr. Beeton's participation on the Executive Council.
- Oregon State University and the University of California at Davis, June 1983. Subcontract modification extending the period of performance and increasing funding accordingly for Dr. Clark's participation on the Executive Council and for Dr. Tchobanoglous' participation on the Technical Advisory Committee.
- Oregon State University and Michigan State University, May 1983. Subcontract modification extending the period of performance and increasing funding accordingly for Dr. Garling's participation on the Technical Advisory Committee.
- Oregon State University and Auburn University, November 1982. (Extended by subcontract modification in May 1983). Agreement for the implementation of a CRSP project with the Directorate of Renewable Natural Resources (RENARE) of Honduras.
- Oregon State University, operating as coordinator for the Consortium for International Fisheries and Aquaculture Development (CIFAD) and Michigan State University, November 1982. (Extended by subcontract modification in May 1983). Agreement for the implementation of a CRSP project with the Institut Pertanian Bogor (IPB) of Indonesia.
- Oregon State University and Auburn University, November 1982. (Extended by subcontract modification in May 1983). Agreement for the implementation of a CRSP project with the National Directorate of Aquaculture, Ministry of Agriculture (MIDA) of the Republic of Panama.
- Oregon State University, operating as coordinator for the Consortium for International Fisheries and Aquaculture Development (CIFAD), and the University of Hawaii, November 1982. (Extended by subcontract modification in May 1983). Agreement for the implementation of a CRSP project with the University of the Philippines in the Visayas (UPV) of the Philippines.
- Oregon State University, operating as coordinator for the Consortium for International Fisheries and Aquaculture Development (CIFAD), and Oregon State University, October 1982. (Extended by subcontract modification in May 1983). Agreement for the implementation of a CRSP project with the National University of Rwanda.
- Oregon State University, operating as coordinator for the Consortium for International Fisheries and Aquaculture Development (CIFAD), and the University of Michigan, November 1982. (Extended by subcontract modification in May 1983). Agreement for the implementation of a CRSP project with the Department of Fisheries (DOF), Ministry of Agriculture, Thailand.

- Oregon State University and Auburn University, June 1983. Subcontract modification extending the period of performance and increasing funding accordingly for Dr. Shell's participation on the Executive Council and for Dr. Smitherman's participation on the Technical Advisory Committee.

CRSP Reports and Documents

Although technical reporting is not anticipated to start until the second year of CRSP operations, the CRSP nonetheless assembled and circulated several significant documents and reports during the first year of operation. These are briefly described below.

CRSP Work Plan. Pond Dynamics/Aquaculture CRSP, Program Management Office, undated. CRSP Work Plan: First Experimental Cycle, Volume I, Experimental Protocol and Methods. Oregon State University, Marine Science Center, Newport, Oregon.

This document summarizes the results of a meeting of the CRSP Research Team, held on March 2-3, 1983 in Davis, California. The report outlines a standardized experimental approach to be employed at each of the six host country research sites. It was noted that a key element of the research plan is the use of a common culture organism, *Tilapia nilotica*. As described, the first round of experiments involves the application of fertilizer at specified rates to stocked culture ponds and the regular measurement of selected physical, chemical and biological parameters to indicate response to nutrient enrichment. Procedures for pond preparation, fingerling production, sampling and analyses are given.

State of the Art Report. Lannan, J. E., R. O. Smitherman and G. Tchobanoglous, September 1983. Principles and Practices of Pond Aquaculture: A State of the Art Review. Pond Dynamics/Aquaculture CRSP, Program Management Office, Oregon State University, Marine Science Center, Newport, Oregon.

This review of the state-of-the-art of pond aquaculture was completed as part of planning activities for the CRSP, prior to the issuance of the AID CRSP grant. The printing and distribution of the 240 page volume occurred during the reporting period. The report contains contributions by 23 research scientists and includes articles in five categories: (1) Collaborative Aquaculture: An Overview, (2) Principles of Pond Aquaculture, (3) Pond Culture Practices, (4) Modeling of Pond Culture, (5) Pond Aquaculture: The Future.

CRSP Directory. Pond Dynamics/Aquaculture CRSP, Program Management Office, May 1983. CRSP Directory and Bio-Data of CRSP participants. Oregon State University, Marine Science Center, Newport, Oregon.

This 30 page directory was prepared to facilitate communication between CRSP participants. Included are addresses and telephone numbers for Pond Dynamics/Aquaculture CRSP participants, AID Offices and Missions, the BIFAD and Management Offices for other CRSPs. Part 2 of the directory presents abbreviated resumes for the U.S. university participants in the CRSP.

CRSP Newsletter. Leslie M. Aquanews: The newsletter of the Pond Dynamics/Aquaculture CRSP.

During the reporting period, work was initiated on the first issue of the quarterly CRSP newsletter. A draft of a Fall 1983 issue was prepared, including an introduction to the program and a feature article on the Panama-Auburn University Project. A masthead and the layout of the newsletter were designed. A printer was selected and an initial distribution list was prepared.

RESEARCH ACTIVITIES

The research activities of the CRSP Research Team and the several Collaborative Research Projects are described in this section.

CRSP Research Team

The CRSP Research Team, a consolidation of Co-Principal Investigators and a standing body of a select group of other scientists to be appointed by the Executive Council, is responsible for establishing and maintaining standardized CRSP research practices. During the reporting period, the Executive Council confirmed the appointment of the Co-Principal Investigators to the Research Team but elected not to appoint additional scientists pending addition of the U.S. research component to the CRSP. Members of the Research Team, with support from a number of the CRSP Research Associates, transformed a generalized work plan developed by the Technical Advisory Committee into a set of detailed experimental protocols during a meeting held in Davis, California on March 2 and 3, 1983.

Collaborative Research Projects

A total of eight developing countries were identified in the CRSP Grant Proposal as potential participants in the program. As a result of budgetary constraints, efforts during the first operational year of the CRSP were restricted to the initiation of research programs in the following six countries: Honduras, Indonesia, Panama, The Philippines, Rwanda, and Thailand. Research sites in these countries represent several types of pond culture environments. The pond systems under investigation range in terms of temperature, salinity and intensity (density of cultured organisms).

The program plan for the Pond Dynamics/Aquaculture CRSP called for parallel development of the host country projects. The first operational year of the CRSP was mainly dedicated to accomplishing administrative tasks, developing a standardized work plan through the cooperative efforts of the CRSP participants, and completing on-site preparations for a first round of field experiments in each host country. Accomplishments during the reporting period are detailed in the following six project summaries.

HONDURAS - AUBURN UNIVERSITY PROJECT

U.S. LEAD INSTITUTION

Auburn University

U.S. PRINCIPAL INVESTIGATOR

Dr. Ron Phelps

HOST COUNTRY LEAD INSTITUTION

Directorate of Renewable Natural
Resources (RENARE)
Ministry of Natural Resources

HOST COUNTRY PRINCIPAL INVESTIGATOR

Ing. Mario Berrios

POND CULTURE SYSTEMS INVESTIGATED

Cooler water tropical ponds at medium to high elevations in Latin America.

Auburn University was established as the U.S. Lead Institution for the Honduras Project by an agreement with the Management Entity, signed in November 1982. A Memorandum of Agreement between Auburn University and the General Directorate of Renewable Natural Resources of the Republic of Honduras, signed in December 1982, authorized the initiation of pond dynamics studies within the host country. In association with the formalization of the host country agreement, a research site review was undertaken, twelve ponds located at the Comayaqua Aquaculture Station were reserved for CRSP activities, and basic needs for equipment and supplies were identified.

The Co-Principal Investigators each selected a Research Associate for on-site participation in CRSP activities. Mr. Bartholomew W. Green of Auburn University was selected as the U.S. Research Associate, and Mr. Hermes Alvarenga of Honduras was selected as the Host Country Research Associate.

On March 2-3, 1983, the Co-Principal Investigators and the U.S. Research Associate met with other CRSP participants in Davis, California to develop a standardized work plan for a first cycle of pond dynamics studies. Ing. Berrios and Mr. Green participated in a panel on experimental design, and Dr. Phelps assisted in the selection of procedures for sampling and analysis.

Mr. Green and his wife traveled to Washington, D.C. in March to participate in an AID orientation program. They began residency in Honduras on April 25, 1983.

During the reporting period, technical activities in Honduras were directed toward preparing the Comayagua Station facilities for field experiments. *Tilapia nilotica* fingerlings were brought to the station from Panama. These fish were reared to maturity to serve as broodstock for the production of fingerlings to be used in research at the Comayagua Station, providing a common genetic line for CRSP research activities in Panama and Honduras. Local suppliers of fertilizers and chemicals were identified. Pond soil samples were collected and were sent to the Oregon State University Soil Testing Laboratory for analyses, in accordance with the provisions of the standardized work plan. A first round of experiments will be initiated at the start of the dry season in January 1984.

INDONESIA - MICHIGAN STATE UNIVERSITY PROJECT

U.S. LEAD INSTITUTION

Michigan State University

U.S. PRINCIPAL INVESTIGATOR

Dr. C. D. McNabb

HOST COUNTRY LEAD INSTITUTION

Institut Pertanian Bogor (IPB)

HOST COUNTRY PRINCIPAL INVESTIGATOR

Dr. Kusman Sumawidjaja

POND CULTURE SYSTEMS INVESTIGATED

Cooler water tropical ponds at medium to higher elevations in Asia.

Michigan State University was established as the U.S. Lead Institution for the Indonesia Project by an agreement with the Management Entity, signed in October 1982. (This agreement was modified in May 1983, extending the contract period and increasing financial support accordingly.) Following authorization, the U.S. Principal Investigator traveled to Indonesia to meet with AID Mission personnel and to initiate the formalization of a host country agreement with the Institut Pertanian Bogor (IPB). During the site visit, basic needs for equipment and supplies were determined and it was determined that a minimum of twelve fish culture ponds at IPB would be reserved for CRSP activities. The Memorandum of Understanding between Michigan State University and the Institut Pertanian Bogor was signed in August 1983.

The Co-Principal Investigators each appointed a Research Associate to participate in the CRSP project. In the U.S., a personnel search and Affirmative Action process led to the selection of Dr. Bette J. Premo as U.S. Research Associate. Mr. Komar Sumantadinata was appointed as the Host Country Research Associate. Dr. McNabb and Dr. Premo participated in a language-cultural training program from 3 January through 15 March 1983, with financial support from an AID Title XII Strengthening Grant Program at Michigan State University.

The AID Title XII Competitive Grant Committee at Michigan State University awarded \$2500 to the Indonesia CRSP Project for a literature search and summary of environmental factors influencing fish culture productivity in Indonesia. This work was carried out from 14 January through 1 August 1983 by Dr. Premo and a graduate student assistant.

A meeting of the CRSP Research Team was held on March 2-3, 1983 to develop a standardized work plan for a first experimental cycle. Since the Host Country Agreement for the Indonesia project was still pending, the designated Host Country Principal Investigator was unable to attend the workshop. However, the U.S. Principal Investigator and the U.S. Research Associate did attend the meeting and contributed substantially to the CRSP work plan. Dr. McNabb served on a panel investigating approaches for data management. Dr. Premo served on a panel on experimental design and synthesized the participants' findings by outlining the methods, sampling location and minimum sampling frequency required for all analyses.

On 30 August 1983, the U.S. Principal Investigator and the U.S. Research Associate arrived in Indonesia to initiate the CRSP project. All equipment and supplies necessary to conduct the first cycle of experiments, other than those to be purchased in-country, accompanied the Michigan State University participants to Indonesia. During the remainder of the reporting period, efforts were undertaken to prepare the site for field experiments.

PANAMA - AUBURN UNIVERSITY PROJECT

U.S. LEAD INSTITUTION

Auburn University

U.S. PRINCIPAL INVESTIGATOR

Dr. Ron Phelps

HOST COUNTRY LEAD INSTITUTION

National Directorate of Aquaculture
Ministry of Agricultural Development
(MIDA)

HOST COUNTRY PRINCIPAL INVESTIGATOR

Dr. Richard Pretto M.

POND CULTURE SYSTEMS INVESTIGATED

- 1) Small, low intensity tropical pond systems in Latin America characterized by limited external inputs of feed and fertilizers.
- 2) Brackish water and hypersaline ponds in Latin America.
- 3) Fry production systems in support of all types of pond production systems.

Auburn University was established as the U.S. Lead Institution for the Panama Project by an agreement with the Management Entity, signed in November 1982. A Memorandum of Agreement between Auburn University and the Ministry of Agricultural Development of the Republic of Panama, signed in December 1982, authorized the initiation of pond dynamics studies within the host country. In association with efforts to formalize the Host Country Agreement, review of MIDA's brackish water/marine fish culture station in Aquadulce and freshwater aquaculture station in Divisa was undertaken. It was determined that CRSP pond dynamics studies would be carried out at both locations, with a total of twelve to sixteen ponds being committed to these activities. Concurrently, an assessment was made of basic needs for equipment and supplies to support CRSP research.

The Co-Principal Investigators each selected a Research Associate for the project. Mr. David Hughes of Auburn University was appointed as the U.S. Research Associate and Mr. Orlando Garcia was selected as the Host Country Research Associate.

On March 2-3 1983, the Co-Principal Investigators and the U.S. Research Associate met with other CRSP participants in Davis, California to develop a standardized work plan for a first cycle of pond dynamics studies. Dr. Phelps and Dr. Pretto participated on a panel responsible for the selection of sampling protocols to be employed in CRSP research. Mr. Hughes contributed to efforts in the area of data management.

Mr. Hughes began residency in Honduras on April 25, 1983. In addition to the U.S. and Host Country Research Associates, two other host country biologists, three university of Panama students, and six students in a practical shrimp training program, were selected to participate in CRSP research activities. With the consolidation of the resident research staff, the CRSP project in Panama became operational rapidly. Pond dynamics experiments at the brackish water station began in July 1983, with the transmittal of pond soil samples to Oregon State University Soil Testing Laboratory for analyses.

Work at this station was targeted toward the production of marine shrimp (*Penaeus*) and the development of shrimp-fish polyculture systems. Activities at the freshwater station focused on the production of an adequate supply of *Tilapia nilotica* fingerlings of uniform age and size to be used in pond dynamics research. Three approaches to spawning were studied: hapa (net pen) spawning of fish contained in earthen ponds; open pond spawning with partial cropping of free swimming fry several times a week; and open pond spawning with biweekly drawdowns with all eggs and fry removed. Eggs and sac fry collected from the ponds were incubated in funnel incubators. Free swimming fry were reared in concrete tanks, where two types of artificial diets were tested.

PHILIPPINES - UNIVERSITY OF HAWAII PROJECT

U.S. LEAD INSTITUTION

University of Hawaii

U.S. PRINCIPAL INVESTIGATORS

Dr. Philip Helfrich
Dr. Arlo Fast

HOST COUNTRY LEAD INSTITUTION

University of the Philippines in
the Visayas

HOST COUNTRY PRINCIPAL INVESTIGATOR

Dr. Jose A. Carreon

POND CULTURE SYSTEMS INVESTIGATED

Brackish water and hypersaline tropical ponds in Asia

The University of Hawaii was established as the U.S. Lead Institution for the Philippines Project by an agreement with Oregon State University, signed in November 1982. A Memorandum of Understanding between the University of Hawaii and the University of the Philippines System, signed in April 1983, authorized the initiation of CRSP pond dynamics studies in the host country. In association with efforts to formalize the host country agreement, a review of facilities at the proposed research site was undertaken and basic needs for equipment and supplies were determined. Eighteen 1,000 square meter ponds at the Brackish water aquaculture Center (BAC) of the University of the Philippines in the Visayas were made available for CRSP activities.

The Co-Principal Investigators each selected a Research Associate to participate in the project. Dr. James Woessner of the University of Hawaii was selected as the U.S. Research Associate and Dr. Romeo Fortes of the University of the Philippines of the Visayas was appointed as the Host Country Research Associate. Other personnel participating in the project include Mr. Gerald Akiyama of the University of Hawaii, who provided logistic and technical support; and more than 20 staff and support people at the Brackishwater Aquaculture Center, who assisted in site preparation and in carrying out CRSP experiments.

On March 2-3 1983, representatives of the Philippines Project met with other CRSP participants in Davis, California to develop a standardized work plan for a first cycle of pond dynamics studies. Dr. Woessner served on a panel responsible for experimental design. Dr. Fast participated in the selection of sampling and analytic methods to be employed in CRSP research. Dr. Carreon assisted in the development of an approach for data management.

Dr. Woessner commenced residency at the host country work location in May 1983. Initial project efforts included the draining of 18 research ponds, followed by the application of manure and lime. In July 1983, the ponds were refilled and then were stocked with either *Tilapia nilotica* or *Chanos chanos*. For each pond, a series of physical, chemical and biological parameters were measured in accordance with the CRSP standardized work plan. The ponds will be drain harvested starting December 10, 1983 and comparisons will be made between ponds. A second set of baseline experiments will begin

in January 1984. During the reporting period, efforts a series of special topic expermients in support of the CRSP were planned and/or initiated. Special topics include: A qualitative and quantitative evaluations of "lab-lab" (algal species used in milkfish culture); growth comparisons between strains of *T. nilotica*; investigation of stratification problems in the ponds; evaluation of artificial circulation; tests of the acclimation of *T. nilotica* to seawater; and identification of toxicants.

RWANDA - OREGON STATE UNIVERSITY PROJECT

U.S. LEAD INSTITUTION

Oregon State University

U.S. PRINCIPAL INVESTIGATORS

Dr. Richard A. Tubb
Dr. Carl E. Bond

HOST COUNTRY LEAD INSTITUTION

National University of Rwanda (UNR)

HOST COUNTRY PRINCIPAL INVESTIGATOR

Dr. Valens Ndoreyaho

POND CULTURE SYSTEMS INVESTIGATED

Cooler water ponds at medium to higher elevations in Africa.

Oregon State University was established as the U.S. Lead Institution for the Rwanda Project by an agreement with the Management Entity (operating as coordinator for the Consortium for International Fisheries and Aquaculture Development), signed in October 1982. An Agreement of Inter-University Cooperation between Oregon State University and the National University of Rwanda (UNR), which was formalized in May 1983, authorized the initiation of pond dynamics studies within the host country. While negotiating the host country agreement in Rwanda, Dr. Bond visited the aquaculture research facilities at the National University. It was determined that the host country participants would undertake the substantial effort necessary to rehabilitate and construct ponds and laboratory facilities required for CRSP activities, and committed R 17,000,000 (\$170,000 U.S.) for this purpose. It was agreed that at least nine ponds would be made available by March 1, 1984.

The U.S. Principal Investigators selected Dr. Boyd Hanson of Oregon State University to serve as the U.S. Research Associate for the Rwanda Project. The Host Country Research Associate was not selected during the reporting period.

On March 2-3, 1983, Dr. Bond and Dr. Hanson met with other CRSP participants in Davis, California to develop the standardized work plan for a first cycle of pond dynamics studies. Dr. Bond participated in a panel responsible for experimental design and Dr. Hanson assisted in the selection of sampling and analytic techniques to be used in the CRSP studies.

A meeting of the Host Country and U.S. Principal Investigators, the CRSP Program Manager and the CIFAD Coordinator, was held at Oregon State University on 5 April 1983. During this meeting, difficulties concerning the proposed host country agreement and the future of CRSP activities in Rwanda were discussed. These discussions and subsequent communications with AID Mission personnel lead to the formalization of a satisfactory agreement.

Dr. Hanson began his residency in Rwanda in June 1983. Efforts during the remainder of the reporting period were focused on site preparation and obtaining necessary equipment and supplies for a first round of CRSP experiments.

THAILAND - UNIVERSITY OF MICHIGAN PROJECT

U.S. LEAD INSTITUTION

University of Michigan

U.S. PRINCIPAL INVESTIGATORS

Dr. Karl F. Lagler
Dr. James Diana

HOST COUNTRY LEAD INSTITUTION

Department of Fisheries (DOF)
Ministry of Agriculture and
Cooperatives

HOST COUNTRY PRINCIPAL INVESTIGATOR

Dr. Thiraphan Bhukaswan

POND CULTURE SYSTEMS INVESTIGATED

- 1) Small, low intensity tropical ponds in Southeast Asia characterized by limited external inputs of feed and fertilizer.
- 2) Higher intensity tropical ponds in Asia characterized by substantial inputs of feed and fertilizer.

The University of Michigan was established as the U.S. lead institution by an agreement with the Management Entity, signed in November 1982. A Memorandum of Understanding between the Department of Fisheries (DOF), Ministry of Agriculture and Cooperatives, Thailand and the University of Michigan, signed in April 1983, authorized the initiation of CRSP pond dynamics studies in the host country. In association with efforts to formalize the host country agreement, Dr. Lagler visited facilities of the National Inland Fisheries Institute (NIFI) located 120 km from Bangkok. Twelve ponds at this location were reserved for CRSP activities and basic needs for equipment and supplies to support the CRSP project were identified.

The U.S. Principal Investigators selected Dr. Chang Kwei Lin of the Institute of Science and Technology, Great Lakes Division, University of Michigan to serve as the U.S. Research Associate for the Thailand Project. Dr. Bhukaswan named Dr. Vijai Sirsuwanatach as the Host Country Research Associate. The U.S. and Host Country Research Associates joined with other CRSP participants on March 2-3 1983 in Davis, California to develop a standardized work plan for a first cycle of pond dynamics studies. Dr. William Chang also attended the meeting as a technical representative of the University of Michigan. Mr. Sirsuwanatach participated in a panel on experimental design, and Dr. Chang and Dr. Lin assisted in the development of the data management approach.

Dr. Lin commenced residency in Thailand in April 1983. During the remainder of the reporting period, Dr. Lin and Mr. Sirsuwanatach directed preparations for a first round of CRSP experiments. Twelve experimental ponds, each measuring 800²m, were drained, repaired and ridded of weeds. Depth gauges and sampling platforms were installed. Pond soil samples were collected and sent to the Oregon State University Soil Testing Laboratory for analyses. An initial set of water samples was collected and analyzed at the National Inland Fisheries Institute. In addition, the investigators secured

and cleaned a 3,200 m² pond to be used for the production of tilapia fingerlings. After liming and fertilizing the pond, 30,000 tilapia fry were introduced. It was estimated that the fingerlings would reach experimental size in mid-October 1983, at the onset of the local dry season.

3. STAFF SUMMARY

The Pond Dynamics/Aquaculture CRSP represents the joint efforts of more than 40 professionals and a number of support personnel. As shown in Table 1, four major fields of specialization were represented during the reporting period: Research Administration, Limnology/Water Chemistry, Fisheries/Aquaculture, and Data Management. It should be noted that Ms. Michele Leslie of the Program Management Office and the U.S. and Host Country Research Associates for the six projects were the only CRSP participants employed on a full-time basis. Time commitments of other professional participants varied in accordance with program responsibilities.

Table 1. Professional staff summary.

Individual	CRSP Function	FIELD(S) OF SPECIALIZATION				Location of Work ¹
		Research Admin.	Limnology/ Water Quality	Fisheries Aquaculture	Data Management	
EXECUTIVE COUNCIL						
Dr. Alfred M. Beeton	Chairman	•	•			Ann Arbor, MI.
Dr. Wallis H. Clark, Jr.	Member	•		•		Davis, CA.
Dr. E. W. Shell	Member	•		•		Auburn, AL.
TECHNICAL ADVISORY COMMITTEE						
Dr. Donald Garling	Member			•		East Lansing, MI.
Dr. R. Oneal Smitherman	Member			•		Auburn, AL.
Dr. G. Tchobanoglous	Member			•		Davis, CA.
MANAGEMENT ENTITY						
Dr. James E. Lannan	Program Manager	•		•	•	Newport, OR.
Ms. Michele Leslie	Assistant Program Manager	•	•	•	•	Newport, OR.
Ms. Anne Kapuscinski	Graduate Research Assistant			•	•	Newport, OR.
Mr. William R. Millison	Fiscal Officer	•				Corvallis, OR.

¹Denotes primary work location and excludes host country site visits and travel for attendance of meetings.

Table 1. Professional staff summary (Continued).

Individual	CRSP Function	FIELD(S) OF SPECIALIZATION				Location of Work ¹
		Research Admin.	Limnology/ Water Quality	Fisheries Aquaculture	Data Management	
HONDURAS - AUBURN UNIVERSITY PROJECT						
Dr. Ronald P. Phelps ²	U.S. Principal Investigator			•		Auburn, AL.
Ing. Mario Berrios	H.C. Principal Investigator			•		Tegucigalpa, Honduras
Mr. Bartholomew W. Green	U.S. Research Associate		•	•		Comayagua, Honduras
Mr. Hermes Alvarenga	H.C. Research Associate		•	•		Comayagua, Honduras
Dr. Claude Boyd ²	Technical Advisor		•			Auburn, AL.
Dr. David Bayne ²	Technical Advisor		•			Auburn, AL.
Mr. James Buston ²	Technical Advisor				•	Auburn, AL.
INDONESIA - MICHIGAN STATE UNIVERSITY PROJECT						
Dr. Clarence D. McNabb	U.S. Principal Investigator		•	•		East Lansing, MI.
Dr. Kusman Sumawidjaja	H.C. Principal Investigator			•		Bogor, Indonesia
Dr. Bette Premo	U.S. Research Associate		•	•		Bogor, Indonesia
Mr. Komar Sumantadinata	H.C. Research Associate		•	•		Bogor, Indonesia
Mr. G. Jacobs	Administrative Advisor	•				

¹Denotes primary work location and excludes host country site visits and travel for attendance of meetings.

²Researchers involved in two projects.

Table 1. Professional staff summary (Continued).

Individual	CRSP Function	FIELD(S) OF SPECIALIZATION				Location of Work ¹
		Research Admin.	Limnology/ Water Quality	Fisheries Aquaculture	Data Management	
PANAMA - AUBURN UNIVERSITY PROJECT						
Dr. Ronald P. Phelps ²	U.S. Principal Investigator			•		Auburn, AL.
Dr. Richard Pretto M.	H.C. Principal Investigator			•		Santiago de Veraguas, Panama
Dr. David Hughes	U.S. Research Associate		•	•		Aguadulce and Divisa, Panama
Mr. Orlando Garcia	H.C. Research Associate		•	•		Aguadulce and Divisa, Panama
Dr. Claude Boyd ²	Technical Advisor		•			Auburn, AL.
Dr. David Bayne ²	Technical Advisor		•			Auburn, AL.
Mr. James Buston ²	Technical Advisor				•	
PHILIPPINES - UNIVERSITY OF HAWAII PROJECT						
Dr. Philip Helfrich	U.S. Co-Principal Investigator			•		Kaneohe, HI.
Dr. Arlo W. Fast	U.S. Co-Principal Investigator		•	•		Kaneohe, HI.
Dr. Jose A. Carreon	H.C. Principal Investigator			•		Diliman, Quezon City, The Philippines
Dr. James Woessner	U.S. Research Associate		•	•		Diliman, Quezon City, The Philippines

¹Denotes primary work location and excludes host country site visits and travel for attendance of meetings.²Researchers involved in two projects.

Table 1. Professional staff summary (Continued).

Individual	CRSP Function	FIELD(S) OF SPECIALIZATION				Location of Work ¹
		Research Admin.	Limnology/ Water Quality	Fisheries Aquaculture	Data Management	
Dr. Romeo D. Fortes	H.C. Research Associate		•	•		Diliman, Quezon City, The Philippines
Mr. Gerald Akiyama	Technical Assistant			•		Kaneohe, HI.
RWANDA - OREGON STATE UNIVERSITY PROJECT						
Dr. Richard A. Tubb	U.S. Co-Principal Investigator			•		Corvallis, OR.
Dr. Carl E. Bond	U.S. Co-Principal Investigator			•		Corvallis, OR.
Dr. Valens Ndoreyaho	H.C. Principal Investigator			•		Butare, Rwanda
Dr. Boyd Jay Hanson	U.S. Research Associate		•	•		Butare, Rwanda
THAILAND - UNIVERSITY OF MICHIGAN PROJECT						
Dr. Karl F. Lagler	U.S. Co-Principal Investigator			•		Ann Arbor, MI.
Dr. James Diana	U.S. Co-Principal Investigator		•	•		Ann Arbor, MI.
Dr. Thiraphan Bhukaswan	H.C. Principal Investigator			•		Bangkok, Thailand
Dr. C. Kwei Lin	U.S. Research Associate		•	•		Bangkok, Thailand

¹Denotes primary work location and excludes host country site visits and travel for attendance of meetings.

Table 1. Professional staff summary (Continued).

Individual	CRSP Function	FIELD(S) OF SPECIALIZATION				Location of Work ¹
		Research Admin.	Limnology/ Water Quality	Fisheries Aquaculture	Data Management	
Dr. Vijai Sirsuwanatach	H.C. Research Associate		•	•		Bangkok Thailand
Dr. William Chang	Technical Advisor				•	Ann Arbor, MI.
Mr. Nelson Navarre	Administrative Advisor	•				

¹Denotes primary work location and excludes host country site visits and travel for attendance of meetings.

4. FINANCIAL STATEMENT

This section summarizes the expenditure of AID and non-federal funds for CRSP projects and program management. The information used in compiling this unaudited financial statement is derived from audited quarterly reports provided to AID by the Management Entity Research Accounting Office and from annual reports provided by the Principal Investigators of the several projects. These data are intended to provide an overview of progress in implementing the CRSP relative to budgeted amounts reflected in the CRSP Grant.

The AID funds expended relative to amounts budgeted for various program areas are presented in Table 2. The expenditures are based upon invoices paid by the Management Entity for costs incurred during the reporting period. The expenditures should be regarded as minimum estimates since it is likely that additional expenses were incurred during the reporting period which had not been invoiced as of the date of this report. Additionally, since the reporting period of this report is the implementation period for the CRSP, the rate of expenditure of funds has been greater in the final quarter of the reporting period than it was in earlier periods.

The contribution of non-federal funds by the participating U.S. and host country institutions relative to AID funds expended are presented in Table 3. These data indicate that the participating U.S. institutions have shared in the cost of the CRSP in excess of grant requirements. The aggregate cost sharing of 33% is conservative in that some fraction of the AID funds were expended for costs which would not require cost sharing in accordance with BIFAD policy.

Unaudited host country contributions estimated by the Principal Investigators of the several projects are also presented in Table 3. Although host country cost sharing is not required, these data indicate a substantial commitment by the various host country institutions to participation in the CRSP.

Table 2. Summary of AID funds budgeted and expended for CRSP projects and management.

	Budgeted ¹	Expenditures ²
Collaborative Research Projects		
Honduras - Auburn University	\$ 68,028	\$ 63,743
Indonesia - Michigan State University	95,845	³
Panama - Auburn University	77,969	51,347
Philippines - University of Hawaii	91,503	40,467
Rwanda - Oregon State University	82,549	82,549
Thailand - University of Michigan	67,752	44,030
Sub-Total	\$483,646	\$282,136
Program Management		
Management Office	\$132,355	\$104,932
Executive Council and Technical Advisory Committee	33,999	7,901
Sub-Total	\$166,354	\$112,833
TOTAL	\$650,000	\$394,969

¹From CRSP Grant (Table B.1).

²Invoices paid by Management Entity.

³Michigan State University had not submitted invoices for payment at date of this report.

Table 3. Summary of AID, U.S. Institution, and Host Country contributions to Collaborative Research Projects.

Project	(a) AID Contribution ¹	(b) U.S. Institution Contribution	(c) Program Total (arb)	(d) U.S. Inst. Cost Sharing (%) (b ÷ c x 100)	(e) Host Country Contribution ³
Honduras - Auburn Univ.	\$ 63,743	\$ 21,690	\$ 85,433	25	\$ 43,000
Indonesia - Michigan State Univ.	-	24,180	24,180	100	36,740
Panama - Auburn Univ.	51,347	23,297	74,644	31	75,000
Philippines - Univ. of Hawaii	40,467	32,394	72,861	44	30,000
Rwanda - Oregon State Univ.	82,549	22,604	105,153	21	81,541
Thailand - Univ. of Michigan	44,030	13,932	57,962	24	77,800
TOTALS	\$282,136	\$138,097	\$420,233	33 ²	\$344,081

¹From Table 2.

²This figure must equal or exceed 25%.

³Estimates provided by project Principal Investigators.