

# *FIRST ANNUAL REPORT*

OF THE  
AQUACULTURE & FISHERIES  
COLLABORATIVE RESEARCH SUPPORT PROGRAM

USAID CA/LWA No. EPP-A-00-06-00012-00

30 September 2006 to 30 September 2007



**AQUAFISH CRSP**  
**MANAGEMENT ENTITY, OREGON STATE UNIVERSITY**



**USAID**  
FROM THE AMERICAN PEOPLE





# AQUAFISH CRSP FIRST ANNUAL REPORT: 2006 – 2007

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## **Cover Photo**

Hapas in Ghana. Photo by Hillary Egna.

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# CONTENTS

<b>I. INTRODUCTION</b> .....	<b>1</b>
<b>II. FIRST YEAR IMPLEMENTATION</b> .....	<b>3</b>
<i>A. RFP PROCESS; REVIEW PROCESS; AND AWARD PROCESS</i> .....	3
<i>B. GLOBAL PORTFOLIO &amp; SYNTHESIS COORDINATION PROCESS</i> .....	5
<i>C. GLOBAL PORTFOLIO IMPLEMENTATION</i> .....	15
<i>D. IMMEDIATE CAPACITY BUILDING INITIATIVE IN HOST COUNTRIES</i> .....	20
<b>III. RESEARCH PROJECT STARTUP REPORTS</b> .....	<b>23</b>
<i>A. US LEAD INSTITUTION: NORTH CAROLINA STATE UNIVERSITY</i> Improved Cost Effectiveness and Sustainability of Aquaculture in The Philippines and Indonesia.....	23
<i>B. US LEAD INSTITUTION: PURDUE UNIVERSITY</i> Improving Competitiveness of African Aquaculture Through Capacity Building, Improved Technology, and Management of Supply Chain and Natural Resources .....	26
<i>C. US LEAD INSTITUTION: UNIVERSITY OF ARIZONA</i> Developing Sustainable Aquaculture for Coastal and Tilapia Systems in the Americas .....	28
<i>D. US LEAD INSTITUTION: UNIVERSITY OF CONNECTICUT–AVERY POINT</i> Development of Alternatives to the Use of Freshwater Low Value Fish for Aquaculture in the Lower Mekong Basin of Cambodia and Vietnam: Implications for Livelihoods, Production and Markets .....	29
<i>E. US LEAD INSTITUTION: UNIVERSITY OF HAWAI’I AT HILO</i> Human Health and Aquaculture: Health Benefits Through Improving Aquaculture Sanitation and Best Management Practices .....	31
<i>F. US LEAD INSTITUTION: UNIVERSITY OF MICHIGAN</i> Improving Sustainability and Reducing Environmental Impacts of Aquaculture Systems in China, and South and Southeast Asia.....	32
<b>IV. PROGRAM-WIDE REPORTS: CAPACITY BUILDING AND ASSOCIATE AWARDS</b> .....	<b>34</b>
<i>CAPACITY BUILDING</i> .....	34
<i>MALI ASSOCIATE AWARD PROPOSAL</i> .....	38
<b>V. LESSONS LEARNED</b> .....	<b>40</b>
<b>VI. FINANCIAL SUMMARY</b> .....	<b>41</b>
<i>PROGRAM FUNDING</i> .....	41
<i>MATCHING FUNDS</i> .....	42

<b>APPENDICES .....</b>	<b>43</b>
<i>APPENDIX A. MANAGEMENT TEAM &amp; PROGRAM PARTICIPANTS.....</i>	<i>44</i>
<i>APPENDIX B. NEWSPAPER COVERAGE OF USAID AWARD ANNOUNCEMENT .....</i>	<i>49</i>
<i>APPENDIX C. EIP REVIEW &amp; COMMENT ON RFP.....</i>	<i>50</i>
<i>APPENDIX D. PRE-RFP RELEASE NOTIFICATION .....</i>	<i>53</i>
<i>APPENDIX E. RFP—GLOBAL RESEARCH, CAPACITY BUILDING, &amp; INSTITUTIONAL DEVELOPMENT IN AQUACULTURE &amp; AQUATIC RESOURCES MANAGEMENT.....</i>	<i>54</i>
<i>APPENDIX F. CHECKLIST FOR PROPOSALS .....</i>	<i>64</i>
<i>APPENDIX G. PROPOSAL REVIEW CRITERIA .....</i>	<i>65</i>
<i>APPENDIX H. LINKAGES.....</i>	<i>68</i>
<i>APPENDIX I. ACRONYMS .....</i>	<i>71</i>



## I. INTRODUCTION

The mission of the Aquaculture & Fisheries Collaborative Research Support Program (AquaFish CRSP) is to enrich livelihoods and promote health by cultivating international multidisciplinary partnerships that advance science, research, education, and outreach in aquatic resources. USAID looks at the AquaFish CRSP to “develop more comprehensive, sustainable, ecological and socially compatible, and economically viable aquaculture systems and innovative fisheries management systems in developing countries that contribute to poverty alleviation and food security.”

This report describes the activities and accomplishments of the AquaFish CRSP from 30 September 2006 to 30 September 2007. The United States Agency for International Development (USAID) funds the AquaFish CRSP under authority of the Foreign Assistance Act of 1961 (PL 87-195), as amended. Significant funding is also provided by the participating US and Host Country institutions. The AquaFish CRSP is a partner of USAID’s Economic Growth, Agriculture, & Trade (EGAT) Bureau’s Office of Agriculture.

AquaFish CRSP’s cohesive program of research is carried out in selected developing countries and the United States by teams of US and Host Country researchers, faculty, and students. Now operating under its first USAID award, which was received on 29 September 2006, the CRSP is guided by the concepts and direction set down in the *Program Description*, which is funded under USAID CA/LWA No. EPP-A-00-06-00012-00. This award authorizes program activities from 30 September 2006 to 29 September 2011.

The activities of this multinational, multi-institutional, and multidisciplinary program are administered by Oregon State University (OSU), which functions as the Management Entity (ME) and has technical, programmatic, and fiscal responsibility for the performance of grant provisions. ME technical and programmatic activities at OSU are carried out by a Management Team (Director and staff), which is supported in the task of program administration by advisory bodies. Management Team personnel and advisory group membership during the reporting period appear in Appendix A.

The AquaFish CRSP diverges from the previous Aquaculture CRSP (ACRSP) in both organization and theme. Organizationally, this new CRSP is a Cooperative Agreement, with a Leader with Associates (LWA) term of reference. The LWA is a mechanism for allowing additional USAID funding to complement core activities. Core activities are funded by EGAT’s Office of Agriculture at \$8.9 million over five years. Associate Award activities under the Lead are estimated at an additional \$3 million, although there is no obligation by USAID to fund these Associate Awards. Thematically, the new AquaFish CRSP focuses on aquaculture with its core funds, and on both aquaculture and fisheries with its Associate Awards. The themes echo much of the sustainable aquaculture emphasis of the Aquaculture CRSP, since that earlier CRSP incorporated a farsighted and mindful approach.

For this first reporting year, the primary activity of the AquaFish CRSP Management Team was producing an RFP, selecting sub-award finalists, and setting up the framework for program startup. Major program publications and reports during this period included: Program Posters; Program Brochure; newspaper article (Appendix B); USAID impacts matrices; Request for Proposals 2007-2009 and RFP website ([pdacrsp.oregonstate.edu/afcrsp/rfpnew/](http://pdacrsp.oregonstate.edu/afcrsp/rfpnew/)); and CRSP Council reports. CRSP researchers generated 22 peer-reviewed journal articles. Quarterly *AquaNews* issues and monthly *EdOP Net* listserv postings were continued under the concurrent ACRSP (end date of 30 September 2008) and covered items of interest to both CRSPs. Under

AquaFish CRSP, layout, design, and production of reports is unfunded in the management budget; thus, program participants are asked to share in the challenge. AquaFish CRSP is able to leverage existing talent and resources to produce some publications on-line, but editing, design and layout will, by necessity, be less formal than in ACRSP. This can be seen in the present publication where project reports are printed as submitted with minimal formatting.

Meetings sponsored and/or organized by the ME office included: CRSP Council Meeting in August 2007; CRSP *Orientation Meeting & Pre-Synthesis Workshop* in Washington DC in May 2007; WAS sessions in San Antonio, Texas in February 2007; IIFET 2006. Both CRSPs sponsored workshops and conferences — attribution to one or the other CRSP is difficult, and it is safe to say both CRSPs deserve credit. For the most part, ACRSP provided funding and direction for these conferences, and AquaFish CRSP provided some staff and researcher time, plus continuity.

A new Host Country Principal Investigator (HCPI) Exchange Project in tilapia and native cichlid technology was conducted during this reporting year (see *Immediate Capacity Building Initiative in Host Countries*, pp. 20-22).

AquaFish CRSP is getting off to a strong, promising start. There are six new lead research projects operating at 12 US universities, in 17 countries, with over 300 collaborators, and one new program-wide project. Degree-training and capacity building efforts have identified 73 students in undergraduate and graduate degrees primarily at regional universities (see *Capacity Building*, pp. 34-38). Attention to gender has yielded a commitment to including an equal percentage of women and men in long-term training. Looking back to the ACRSP, AquaFish's 50% inclusion rate represents the highest involvement of women yet, demonstrating a renewed commitment to diversity. Lessons learned observations are integrated into the report.



matchmaking service for Host Country and US interested parties (November 2006 – January 2007); (6) regularly updating the FAQs web posting and answering questions from prospective applicants (November 2006 – January 2007); (7) holding two external, NSF-based technical review panels; (8) conducting a transparent selection process; (9) selecting six proposal finalists; and (10) shepherding the finalists through proposal revisions and first-stage project implementation. This effort by the ME represented a phenomenal amount of work in a relatively short amount of time.

The six finalists were awarded subcontracts with the ME at OSU. The requisite administrative components of subcontract assignment and distribution were on their way to full completion by the end of this reporting period. These activities followed the timeline presented in Figure II-1 and Table II-1.

Table II-1. Schedule for RFP, review, and award processes from RFP announcement through subcontract completion.

Activity	Details	Date <sup>a</sup>
<b>RFP</b>		
RFP Finalization	USAID and advisory group input	Oct 2006
Pre-RFP Notification	Official announcement	29–30 Oct 2006
Revision of RFP	RFP revised using USAID and advisory group inputs	45 days
RFP Release	Final RFP posted on CRSP website	23 Nov 2006
Matchmaking, FAQs and Q&As	ME service for prospective applicants	23 Nov 2006–31 Jan 2007
RFP Response Period	Proposals accepted	23 Nov 2006–31 Jan 2007
Closed	Proposal submission deadline	31 Jan 2007
<b>Proposals</b>		
Proposal Completion Check	Proposal checklist <sup>b</sup> verified	early Feb 2007
Review Panel Organization	Reviewers identified	8 Feb 2007
External Technical Peer Review	NSF-style, panel review <sup>c</sup>	9 & 12 Mar 2007
Ranking of Finalists	Identification of proposals in top 30%	mid-Mar 2007
Selection of Finalists	Six finalist proposals selected	31 Mar 2007
Mission Concurrence	Finalist proposals reviewed by USAID Missions for concurrence <sup>d</sup>	Mar–Apr 2007
IEE/Gender Review at USAID	Points to be covered in proposal revision	21 May 2007
Programmatic Review of Finalists	Review by USAID and ME <sup>e</sup>	late Mar–late Apr 2007

<sup>a</sup>Due date, response period, or date completed.

<sup>b</sup>See Appendix F for the proposal checklist.

<sup>c</sup>See Appendix G for the proposal review criteria.

<sup>d</sup>Mission concurrence received via the CTO. See Table II-2 for concurrence summary.

<sup>e</sup>The EPAC was not involved with this review due to a conflict of interest. Also, EPAC participation in proposal reviews is optional.

Table II-1 (cont). Schedule for RFP, review, and award processes from RFP announcement through subcontract completion.

Activity	Details	Date <sup>a</sup>
<b>Awards</b>		
ME Announces Awards	Finalists notified	26 Apr 2007
ME and Sub-awardee Partners Negotiate Terms	Technical, USAID and programmatic reviews submitted to finalists for review and comment	May–Aug 2007
Proposal Revisions	Finalists address reviewer issues and revise proposals	13 Jun 2007
Sub-awards Finalized	Revised proposals sent to USAID	Jun–Aug 2007
Sub-award Contract Completion	Prepared by OSU	Sept–Oct 2007
	Signed by Sub-awardees	25 Oct–11 Nov 2007 <sup>f</sup>

<sup>a</sup>Due date, response period, or date completed.

<sup>f</sup>Signature dates by sub-awardees ranged from 25 October – 11 November 2007. Contracts for Purdue University and University of Hawai’i at Hilo were not dated.



## B. GLOBAL PORTFOLIO & SYNTHESIS COORDINATION PROCESS

AquaFish CRSP is managed in a manner to achieve maximum program impacts, particularly for small-scale farmers and fishers, in Host Countries and more broadly. CRSP program objectives address the need for world-class research, capacity building, and information dissemination. Specifically, the AquaFish CRSP strives to:

- Develop sustainable end-user level aquaculture and fisheries systems to increase productivity, enhance international trade opportunities, and contribute to responsible aquatic resource management.
- Enhance local capacity in aquaculture and aquatic resource management to ensure long-term program impacts at the community and national levels.
- Foster wide dissemination of research results and technologies to local stakeholders at all levels, including end-users, researchers, and government officials.
- Increase Host Country capacity and productivity to contribute to national food security, income generation, and market access.

The overall research context for AquaFish CRSP projects is poverty alleviation and food security improvement through sustainable aquaculture development and aquatic resources management. Discovery of new information forms the core of projects. Projects also include institutional strengthening, outreach, and capacity building activities such as training, formal education, workshops, extension, and conference organizing to support the scientific research being conducted.

Projects focus on one USAID-eligible country within a region, but have activities in nearby countries within the same region. All projects received USAID country-level concurrence prior to award (Table II-2). Non-concurrence meant that a project or investigation was not approved

Table II-2. USAID Mission concurrence with the implementation of proposed AquaFish CRSP activities as transmitted by the CTO in April 2007.

Country or Regional Mission	Lead US University for Proposed Project	Action
<b>Africa</b>		
Ghana	Purdue University	concur
Kenya	Purdue University	concur
Tanzania	Purdue University	concur
WARP <sup>a</sup>	Purdue University	concur
<b>Asia</b>		
Bangladesh	University of Michigan	reject <sup>b</sup>
Cambodia	University of Connecticut – Avery Point	concur
Indonesia	North Carolina State University	concur
Nepal	University of Michigan	concur
Philippines	North Carolina State University	concur
Vietnam	University of Connecticut – Avery Point	concur
Vietnam	University of Michigan	concur
RDMA <sup>c</sup>	University of Michigan	concur
<b>Latin America &amp; the Caribbean</b>		
Guyana	University of Arizona	concur
Mexico	University of Arizona	concur
Mexico	University of Hawai'i at Hilo	concur
Nicaragua	University of Hawai'i at Hilo	concur

<sup>a</sup>West Africa Regional Program

<sup>b</sup>USAID-Bangladesh rejected the proposed investigations due to staffing and budget constraints.

<sup>c</sup>Regional Development Mission for Asia

for funding, as was the case with an investigation that included Bangladesh whose USAID Mission did not concur due to a perceived management overload.

### **B.1. PRE-SYNTHESIS & ORIENTATION MEETING**

On 21-22 May 2007, the ME organized an *Orientation Meeting & Pre-Synthesis Workshop* in Washington, DC for the sub-award finalists represented by the respective US Lead PIs and Host Country (HC) Lead PIs. In addition to the CRSP Director and staff, the CTO (Harry Rea) and other USAID staff also attended. The ME and PIs collectively discussed gender integration issues and AquaFish CRSP development themes in order to optimize each project in light of USAID goals. An IEE (Initial Environmental Examination) assessment was performed and all projects complied by making changes per instructions from the EGAT Environmental Officer, Joyce Jatko. To meet the objectives of its global plan, the ME, along with its partners and PIs, sought to address critical research questions and larger development priorities expressed through USAID strategies and performance objectives. Notes from the meeting are available at [aquafishcrsp.oregonstate.edu/pre\\_synthesis\\_meet.php](http://aquafishcrsp.oregonstate.edu/pre_synthesis_meet.php).<sup>2</sup>

During the meeting, the Director presented an overview of the AquaFish CRSP program concept and management structure, set the timeline for proposal revisions in accordance with the RFP Review Panel comments and recommendations, discussed operational details, and

<sup>2</sup> This current web address replaces the temporary location of the May 2007 meeting minutes on the ACRSP website.

emphasized changes from the previous Aquaculture CRSP (ACRSP) program. The CRSP Director also introduced two new technical advisory bodies, the Regional Centers of Excellence (RCE) and Development Theme Advisory Panels (DTAP), both discussed in more detail below. USAID staff led discussions on the USAID EGAT Indicators for Development Impact (Susan Thompson), gender integration (Julie Swanson), and environmental compliance (Joyce Jatko, Tim Resch, and Victor Bullen). The sub-award US Lead PIs presented their respective project visions for achieving development impacts. Using a peer-group training perspective, PIs also offered these models for successful project approaches:

- Establish metrics for deliverables
- Engage non-University partners and expand stakeholder bases
- Set field-driven research and outreach agendas in multi-institutional/ multi-disciplinary projects
- Integrate gender into all aspects of the work and outreach
- Improve strategies for dissemination and outreach
- Involve high numbers of students in a quality education experience

**B.2. ME NOMINATION OF REGIONAL CENTERS OF EXCELLENCE & DEVELOPMENT THEME ADVISORY PANEL LEAD COORDINATORS**

Oregon State University’s vision for the AquaFish CRSP advisory coordination brings together highly creative and knowledgeable people in functional advisory groups. Advisory groups provide linkages to the broad global community engaged in aquaculture and fisheries development issues.

The ME established the RCEs and DTAPs to synthesize findings across regions (RCE) and themes (DTAP) as well as synthesize data from leveraged activities such as Associate Awards. The CRSP Director offered nominations for Lead Coordinators on 14 May 2007. Further discussion of the nomination and responsibilities of the Lead Coordinators took place at the May 2007 meeting.

**B.2.1. RCE**

RCEs provide technical advice on emerging issues and gaps in the portfolio from a regional perspective. RCEs develop useful materials for USAID Missions, other regional stakeholders and end-users, and gauge opportunities for collaboration based on regional or national needs. Each center coordinates activities within a specified region: Asia, Africa, and Latin America and the Caribbean (LAC). The RCE for Africa will also coordinate, synthesize, and report on activities related to IEHA (President’s Initiative to End Hunger in Africa) goals. Additional RCEs may be added depending on the portfolio of projects funded through Associate Awards. Lead Coordinators (one for each center) take an active role in integrating Associate Award partners into the portfolio and in managing any Associate Awards that fall under its purview. Lead Coordinators also assist the ME in cases where a screening process is required in advance of an IEE.

RCE Lead Coordinators as approved with CTO concurrence at the May 2007 meeting:

**RCE-Africa:** Charles Ngugi (HC PI for Kenya)

**RCE-Asia & RCE Chair:** Remedios Bolivar (HC PI for Philippines)

**RCE-LAC:** Wilfrido Contreras-Sanchez (HC PI for Mexico)

**B.2.2. DTAP**

DTAPs provide technical advice on emerging issues and gaps in the portfolio from a thematic perspective. They are aligned with the four global themes (B.3.1 below) for the AquaFish CRSP’s *Technical Approach* and subsequent RFP. Lead Coordinators for each panel assist the ME

in integrating cross-cutting needs identified by USAID, but adding additional emphases on conserving biodiversity; preventing further degradation of aquatic ecosystem health; reducing poverty among small-scale farmers and fishers; maintaining and restoring capture fisheries productivity; developing IPM strategies; improving soil and water quality; and using biotechnology approaches cautiously. Their responsibilities also will include writing annual reports, assisting the ME in evaluating workplan changes, performing assessments, and working together to provide quality information for thematic synthesis and lessons learned reporting. The DTAP can recommend policies for technical hot topics, e.g., certification for organic standards, biotechnology applications, and toxics standards for fish consumption.

DTAP Lead Coordinators as approved with CTO concurrence at the May 2007 meeting:

**DTAP A: Improved Health and Nutrition, Food Quality, and Food Safety**  
Maria Haws (University of Hawai'i at Hilo)

**DTAP B: Income Generation for Small-Scale Fish Farmers and Fishers**  
Kwamena Quagrainie (Purdue University)

**DTAP C: Environmental Management for Sustainable Aquatic Resources Use**  
Jim Diana (University of Michigan)

**DTAP D: Enhanced Trade Opportunities for Global Fishery Markets**  
Bob Pomeroy (University of Connecticut – Avery Point)

### **B.3. PRELIMINARY GLOBAL THEMES, FOCAL AREAS, INDICATORS TO USAID FOR INPUT AND APPROVAL**

In response to the 23 November 2006 RFP, CRSP received 19 proposals with a regional focus as follows: Africa (3); Asia (10); Latin America and the Caribbean (5); Eurasia (1). One proposal was ineligible due to not meeting criteria for serving as a lead US institution. Six proposals with a total of 38 investigations were selected for funding with an average project allocation of nearly \$400K. Sub-awards were finalized by the ME in September and October 2007 after submission of proposal revisions by finalists through August 2007.

#### **B.3.1. Global Themes**

Research under the RFP is now being conducted in 12 Host Countries under the following Global Aquaculture & Fisheries Research Themes (Table II-3).

- A. Improved Health and Nutrition, Food Quality, and Food Safety
- B. Income Generation for Small-Scale Fish Farmers and Fishers
- C. Environmental Management for Sustainable Aquatic Resources Use
- D. Enhanced Trade Opportunities for Global Fishery Markets

Each sub-award project has one AquaFish CRSP theme as its primary focus, but addresses all four themes in an integrated systems approach. The global themes of the CRSP are cross-cutting and address several specific USAID policy documents and areas of interest.

#### **B.3.2. Focal Areas**

The AquaFish CRSP embodies the fundamental interconnectedness of water quality, soil, and adoption of responsible IPM/BMP with human health, income generation, and market access. To remain focused and achieve the greatest development impact, AquaFish CRSP is concentrating its research and outreach efforts on eight target and peripheral USAID Focal Areas (Table II-4).

Table II-3. Lead US Institutions awarded funding under the first AquaFish CRSP Request for Proposals, their project titles and Host Countries where investigations will be conducted

US Lead Institution	Global Theme	Project Title and Number of Investigations	Host Countries
North Carolina State University	B	Improved Cost Effectiveness and Sustainability of Aquaculture in The Philippines and Indonesia	6 Indonesia Philippines
Purdue University	B	Improving Competitiveness of African Aquaculture Through Capacity Building, Improved Technology, and Management of Supply Chain and Natural Resources	5 Ghana Kenya Tanzania
University of Arizona	C	Developing Sustainable Aquaculture for Coastal and Tilapia Systems in the Americas	8 Guyana Mexico
University of Connecticut – Avery Point	D	Development of Alternatives to the Use of Freshwater Low Value Fish for Aquaculture in the Lower Mekong Basin of Cambodia and Vietnam: Implications for Livelihoods, Production and Markets	5 Cambodia Vietnam
University of Hawai’i at Hilo	A	Human Health and Aquaculture: Health Benefits Through Improving Aquaculture Sanitation and Best Management Practices	8 Mexico Nicaragua
University of Michigan	C	Improving Sustainability and Reducing Environmental Impacts of Aquaculture Systems in China, and South and Southeast Asia	6 Bangladesh <sup>a</sup> China Nepal Vietnam

<sup>a</sup> USAID did not approve the Bangladesh project for funding due to Mission non-concurrence. See Table II-2.

Table II-4. Cross cutting relationships between AquaFish CRSP Target and Peripheral Focal Areas and Preliminary Global Research Themes.

Target Focal Areas	Global Research Themes <sup>a</sup>
Improving nutrition and health	A, B
Maximizing water and soil quality and productivity	B, C
Advancing integrated pest management practices	C, D
Broadening market access	B, D
Increasing incomes	B
Improving food quality, processing, and food safety	A, B, D
Peripheral Focal Areas	Global Research Themes <sup>a</sup>
Enhancing productivity and livelihoods in marginal areas	A, B, D
Mitigating post harvest constraints	A, B, C, D

<sup>a</sup>Global Research Themes: A. Improved Health and Nutrition, Food Quality, and Food Safety; B. Income Generation for Small-Scale Fish Farmers and Fishers; C. Environmental Management for Sustainable Aquatic Resources Use; and, D. Enhanced Trade Opportunities for Global Fishery Markets.

### **B.3.3. AquaFish CRSP Topic Areas**

The six sub-award projects have work plans (investigations) organized around a number of specific areas of inquiry called Topic Areas. Current projects contain between five and eight investigations. Projects focus on more than one topic area in describing aquaculture research that will improve diets, generate income for smallholders, manage environments for future generations, and enhance trade opportunities.

Each sub-award investigation is clearly identified as an experiment, study, or activity. Investigations provide a transparent means for evaluating different types of work under the CRSP, be they quantitative, empirical, biologically-based, qualitative, policy-based, or informal. Each project was required to include at least one *experiment* or *study*. Projects were also required to include outreach *activities* such as training, formal education, extension, and conference organizing to supplement the scientific research being proposed.

A systems approach requires that each CRSP project integrate topic areas from both *Integrated Production Systems* and *People, Livelihoods and Ecosystem Interrelationships*. USAID also encourages the CRSP to address biodiversity conservation and non-GMO biotechnology solutions to critical issues in aquaculture. Each overall project encompasses a comprehensive development approach to a problem, incorporating these core program components as identified by USAID:

- systems approach
- social, economic, and environmental sustainability
- capacity building and institution strengthening
- outreach, dissemination, and adoption
- gender integration

Topic Areas pertain to aquaculture and the nexus between aquaculture and fisheries. Some of the following topic areas overlap and are interconnected. Sub-award investigations identify a single topic area that best describes each individual investigation. The text under each topic area is provided for illustrative purposes and is not prescriptive. Fisheries-only issues were not funded with core EGAT funds per guidance from USAID.

#### **Integrated Production Systems Topic Areas**

- **Production System Design & Best Management Alternatives (BMA)**  
Aquaculture is an agricultural activity with specific input demands. Systems should be designed to improve efficiency and/or integrate aquaculture inputs and outputs with other agricultural and non-agricultural production systems. Systems should be designed so as to limit negative environmental impacts. CRSP research should benefit smallholder or low- to semi-intensive producers, and focus on low-trophic species for aquaculture development. Research on soil-water dynamics and natural productivity to lessen feed needs were fundamental to the Aquaculture CRSP; critical new areas of research may be continued. Interventions for disease and predation prevention must adopt an integrated pest management (IPM) approach and be careful to consider consumer acceptance and environmental risk of selected treatments.
- **Sustainable Feed Technology (SFT)**  
Methods of increasing the range of available ingredients and improving the technology available to manufacture and deliver feeds are an important research theme. Better information about fish nutrition can lead to the development of less expensive and more efficient feeds. Investigations on successful adoption, extension, and best practices for efficient feed strategies that reduce the “ecological footprint” of a species under cultivation are encouraged. Feed research that lessens reliance on fish meals/proteins/oils and lowers feed conversion ratios is desired, as is research on feeds (ingredients, sources, regimes, formulations) that result in high quality and safe aquaculture products with healthy nutrition profiles.

- Indigenous Species Development (IND)**  
 Domestication of indigenous species may contribute positively to the development of local communities as well as protect ecosystems. At the same time, the development of new native species for aquaculture must be approached in a responsible manner that diminishes the chance for negative environmental, technical, and social impacts. Research that investigates relevant policies and practices is encouraged while exotic species development and transfer of non-native fishes are not encouraged. A focus on biodiversity conservation, and biodiversity hotspots, as related to the development of new native species for aquaculture is of great interest. Aquaculture can be a means to enhance and restock small-scale capture and wild fisheries resources (Aquaculture-Fisheries Nexus Topic Area). Augmentation of bait fisheries through aquaculture to support capture fisheries is an area of interest, provided there are no net negative environmental effects.
- Quality Seedstock Development (QSD)**  
 Procuring reliable supplies of high quality seed for stocking local and remote sites is critical to continued development of the industry, and especially of smallholder private farms. A better understanding of the factors that contribute to stable seedstock quality, availability, and quantity for aquaculture enterprises is essential. Genetic improvement (e.g., selective breeding) that does not involve GMOs may be needed for certain species that are internationally traded. All genetic improvement strategies need to be cognizant of marketplace pressures and trends, including consumer acceptance and environmental impacts.

**People, Livelihoods, & Ecosystem Interrelationships Topic Areas**

- Human Health Impacts of Aquaculture (HHI)**  
 Aquaculture can be a crucial source of protein and micronutrients for improved human health, growth, and development. Research on the intrinsic food quality of various farmed fish for human consumption is needed—this might include science-based studies of positive and negative effects of consuming certain farmed fishes. Patterns of fish consumption are not well understood for many subpopulations. Human health can be negatively impacted by aquaculture if it serves as a direct or indirect vector for human diseases. There is interest in better understanding the interconnectedness of aquaculture production and water/vector-borne illnesses such as malaria, schistosomiasis, and Buruli ulcer and human health crises such as HIV / AIDS and avian flu.
- Food Safety & Value-Added Product Development (FSV)**  
 Ensuring high quality, safe, and nutritious fish products for local consumers and the competitive international marketplace is a primary research goal. Efforts that focus on reducing microbial contamination, HACCP controls and hazards associated with seafood processing, value-added processing, post-processing, and byproduct/waste development are of interest. Consumers and producers alike will benefit from research that contributes to the development of standards and practices that protect fish products from spoilage, adulteration, mishandling, and off-flavors. Certification, traceability, product integrity and other efforts to improve fish products for consumer acceptance and international markets are desired. Gender integration is important to consider as women are strongly represented in the processing and marketing sectors. (Aquaculture-Fisheries Nexus Topic Area)
- Technology Adoption & Policy Development (TAP)**  
 Developing appropriate technology and providing technology-related information to end-users is a high priority. The program encourages research that results in a better understanding of factors and practices that set the stage for near-term technology implementation and that contribute to the development of successful extension tools and

methods. Areas of inquiry can include institutional efforts to improve extension related to aquaculture and aquatic resources management; science-based policy recommendations targeting poor subpopulations within a project area, or more broadly (for example, national aquaculture strategies); methods of improving access to fish of vulnerable populations including children (e.g., school-based aquaculture programs); science-based strategies for integrating aquaculture with other water uses to improve wellbeing, such as linkages with clean drinking water and improved sanitation. Policy initiatives that link aquaculture to various water uses to improve human health are needed. Additionally, social and cultural analyses regarding the impacts of fish farming may yield critical information for informing policy development.

- **Marketing, Economic Risk Assessment & Trade (MER)**

Aquaculture is a rapidly growing industry and its risks and impacts on livelihoods need to be assessed. Significant researchable issues in this arena include cost, price, and risk relationships; domestic market and distribution needs and trends; the relationships between aquaculture and women/underrepresented groups; the availability of financial resources for small farms; and the effects of subsidies, taxes, and other regulations. Understanding constraints across value chains in local, regional, and international markets is of interest, especially as constraints affect competitiveness, market demand, and how to link producers to specific markets. (Aquaculture-Fisheries Nexus Topic Area)

- **Watershed & Integrated Coastal Zone Management (WIZ)**

Aquaculture development that makes wise use of natural resources is at the core of the CRSP. Research that yields a better understanding of aquaculture as one competing part of an integrated water use system is of great interest. The range of research possibilities is broad—from investigations that quantify water availability and quality to those that look into the social context of water and aquaculture, including land and water rights, national and regional policies (or the lack thereof), traditional versus industrial uses, and the like. Water quality issues are of increasing concern as multiple resource use conflicts increase under trends toward scarcity or uneven supply and access, especially for freshwater. Ecoregional analysis is also of interest to explore spatial differences in the capacities and potentials of ecosystems in response to disturbances. Innovative research on maximizing water and soil quality and productivity of overall watersheds is of interest. Pollution is a huge concern, as over 50% of people in developing countries are exposed to polluted water sources. Additionally, aquatic organisms cannot adequately grow and reproduce in polluted waters, and aquaculture may not only be receiving polluted waters, but adding to the burden. Rapid urbanization has further harmed coastal ecosystems, and with small-scale fisheries and aquaculture operations in the nearshore, integrated management strategies for coastal areas are also important. (Aquaculture-Fisheries Nexus Topic Area)

- **Mitigating Negative Environmental Impacts (MNE)**

With the rapid growth in aquaculture production, environmental externalities are of increasing concern. Determining the scope and mitigating or eliminating negative environmental impacts of aquaculture—such as poor management practices and the effects of industrial aquaculture—is a primary research goal of this program. A focus on biodiversity conservation, especially in biodiversity “hotspot” areas, as related to emerging or existing fish farms is of great interest. Therefore, research on the impacts of farmed fish on wild fish populations, and research on other potential negative impacts of farmed fish or aquaculture operations is needed, along with scenarios and options for mitigation. (Aquaculture-Fisheries Nexus Topic Area)

#### **B.4. REFINED MONITORING & EVALUATION CONTROL SYSTEMS DEVELOPED FOLLOWING FINALIZATION OF GLOBAL INDICATORS**

Work is underway on updating and formalizing the Monitoring & Evaluation Plan (M&E) as proposed in the ME's Application for the Aquaculture & Fisheries Leader Award (hereinafter Application). The May 2007 *Orientation Meeting & Pre-Synthesis Workshop* provided a timely opportunity for researchers, the USAID CTO, and the ME to refine project-specific indicators and benchmarks to measure program progress on development impacts within the proposed M&E framework.

##### ***B.4.1. Finalization of Global Indicators***

For the program-wide monitoring system, the ME will coordinate and report on all synthesis activities and lessons learned, measuring results and success against the four global research themes (as reported by the DTAPs) and the five program target areas discussed above.

Discussions during the peer-group training session at the May 2007 meeting stressed the importance of metrics for global theme and program target indicators under the preliminary M&E. The newly appointed DTAP Lead Coordinators led a workshop to develop a set of DTAP indicators to track with USAID impact-reporting language and objectives. Workshop participants (CTO, ME, and sub-award Lead US and Host Country PIs) worked in groups divided by theme to devise the following 12 DTAP indicators for reporting on development impacts at the project level:

##### **DTAP A: Improved Health and Nutrition, Food Quality, and Food Safety**

- *Number of aquaculture products developed that meet food safety standards*

##### **DTAP B: Income Generation for Small-Scale Fish Farmers and Fishers**

- *Number of new biotechnologies developed*
- *Number of institutions with access to technological practices*
- *Number of (people) trained in use of technological practices*

##### **DTAP C: Environmental Management for Sustainable Aquatic Resources Use**

- *Number of hectares under improved natural resource management*
- *Number of management practices developed to support biodiversity*
- *Number of management practices developed that reduce consumptive water use*
- *Number of people trained in practices that promote soil conservation and/or improved water quality*
- *Number of management systems developed that increase production by reusing aquaculture effluents & byproducts*
- *Number of IPM practices developed*

##### **DTAP D: Enhanced Trade Opportunities for Global Fishery Markets**

- *Number of new markets for aquatic products*
- *Number of aquatic products available for human food consumption*

Drawing from the project-level DTAP indicator reports as well as project deliverables and outcome mapping, the ME will report at a program level on impacts to USAID under USAID-EGAT EG5.2 Agricultural Productivity and partially under EG5.1 Enabling Environment indicators. For IEHA, reporting is under Output and IR (Intermediate Results) indicators. IEHA Output indicators correspond to the EG5.1 and EG5.2 sets.

##### ***B.4.2. Refined M&E Control System***

In developing the M&E, AquaFish CRSP addressed USAID strategic objectives, initiatives, and congressional earmarks that included IEHA (Presidential Initiative to End Hunger in Africa), the Congressional Earmarks on biodiversity conservation and biotechnology, and gender

initiatives. The preliminary M&E from the CA/LWA Program Description includes indicators and benchmarks that specifically measure impacts on each of these items.

As proposed in the Application, the M&E will incorporate four program target areas — (1) research, (2) capacity building, (3) information dissemination, and (4) IEHA. A fifth target area, “gender integration strategy” is both integrated into the other four program target areas and also highlighted independently. The AquaFish CRSP gender strategy is designed to ensure a strong programmatic commitment toward gender inclusion.

1. **Research Target:** Produce sustainable end-user aquaculture and fisheries research results that increase productivity, enhance international trade opportunities, and contribute to responsible aquatic resource management.

Indicators and benchmarks for this target area will include measures for impacts and accomplishments on the Congressional Earmarks of biodiversity conservation and biotechnology. For biodiversity conservation, impact measurement will focus on work to ameliorate threats to biodiversity and develop technologies and strategies to protect biodiversity habitat and populations. For biotechnology, it will focus on the use of appropriate research to develop biotechnologies that increase farm productivity.

At the May 2007 meeting, sub-awardee plans were reviewed for the following anticipated impacts to which the USAID environmental restrictions apply:

- Biotechnical investigations will be conducted primarily on research stations in Host Countries.
  - Research protocols, policies, and practices will be established prior to implementation to ensure that potential environmental impacts are strictly controlled.
  - All training programs and outreach materials intended to promote the adoption of CRSP-generated research findings will incorporate the appropriate environmental recommendations.
  - All sub-awards must comply with environmental standards.
  - CRSP Projects will not procure, use, or recommend the use of pesticides of any kind. This includes but is not limited to algaecides, herbicides, fungicides, piscicides, parasiticides, and protozoacides.
  - CRSP Projects will not use or procure genetically modified organisms (GMO).
  - CRSP Projects will not use, or recommend for use, any species that are non-endemic to a country or not already well established in its local waters, or that are non-endemic and well established but are the subject of an invasive species control effort.
2. **Capacity Building Target:** Focus AquaFish CRSP investments on building local capacity in aquaculture and aquatic resource management and ensuring long-term program impacts at local and national levels through strategic informal and formal training opportunities. Integrate items related to gender.
  3. **Information Dissemination Target:** Disseminate AquaFish CRSP research results to foster broad application of results among local stakeholders within governmental and non-governmental organizations, as well as for end-users.

4. **IEHA Country Involvement Target:** Expand AquaFish CRSP science and technology efforts in IEHA Host Countries to increase local capacity and productivity thereby contributing to national food security, income generation, and market access.

Indicators and benchmarks for this target area will specifically address the suite of issues identified in the IEHA strategy and agricultural growth investment plan. Indicators and benchmarks will measure impacts and accomplishments respectively in Kenya and Ghana where the Purdue University sub-awardee project is located.

5. **Gender Integration Strategy:** The AquaFish CRSP is dedicated to improving gender inclusiveness in the aquaculture and fisheries sectors, and in the CRSP arena. Gender Integration is implicit and interwoven into the above “target” benchmarks and indicators requested by USAID in its RFA. Additional explicit guidance, in the form of an improvement plan, was established for CRSP operations.

At the May 2007 meeting, discussion of the AquaFish CRSP gender improvement plan clarified gender integration targets. The following approaches were reviewed:

- Addressing implementation on an investigation level to best understand barriers and developing specific strategies for gender inclusivity.
- Incorporating women senior PIs as the best suited to serve as role models for bringing more women into science and extension.
- Linking with organizations with strong records of gender integration.
- Conducting preliminary surveys to include on-farm trials with female heads of households and to bring more women to non-degree trainings.
- Monitoring projects continuously for negative impacts on women.

Sub-awardees revised their proposals (submitted in June 2007), following guidance provided at the meeting by USAID and the ME, to incorporate gender integration strategies into their respective projects, which would ensure measurable impacts by the proposed M&E indicators and benchmarks.

The M&E framework will ensure that targets and benchmarks are adequately addressed across the global portfolio for facilitating feedback and continuous learning in order to improve processes and outcomes. For the report on Year 1 benchmarks, see subsection C.3.1. below.



## C. GLOBAL PORTFOLIO IMPLEMENTATION

With formal USAID approval of the revised proposals submitted in June 2007, subcontract negotiations were underway and completed in October-November 2007 (Table II-1). During this period, implementation was already underway for several projects.<sup>3</sup> Delays in completion of subcontracts at University of Arizona, University of Connecticut, and University of Hawai'i at Hilo led to project startup delays for those projects. Other types of issues also led to slow startup on several projects. For further detail, see the project startup reports in Section III.

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<sup>3</sup> Based on the USAID CA/LWA agreement, sub-award funds were available for work begun on or after 1 April 2007.

### C.1. ADDITIONAL PLANNING & ASSESSMENTS FOR PROJECT INTEGRATION

For the 2007-2009 award period, the 38 investigations have a distribution by systems approach of 16 within *Integrated Production Systems* and 22 within *People, Livelihoods, & Ecosystem Interrelationships* (Table II-5).

Table II-5. AquaFish lead research projects by systems approach and topic areas; from the first RFP 2007–2009

Systems Approach	Topic Area & Number of Investigations
<b>Integrated Production Systems</b>	
	Production System Design & Best Management Alternatives 4
	Sustainable Feed Technology 6
	Indigenous Species Development 4
	Quality Seedstock Development 2
<b>People, Livelihoods, &amp; Ecosystem Interrelationships</b>	
	Human Health Impacts of Aquaculture 5
	Food Safety & Value-Added Product Development 1
	Technology Adoption & Policy Development 3
	Marketing, Economic Risk Assessment & Trade 4
	Watershed & Integrated Coastal Zone Management 2
	Mitigating Negative Environmental Impacts 7
<b>Total Number of Investigations</b> 38	

### C.2. FINALIZING MOU NEGOTIATIONS

The Lead US institutions are responsible for negotiating MOUs and/or subcontracts with the HC and US institutions collaborating with their AquaFish projects (Table II-6). These instruments will provide the opportunity for other CRSP projects to function under the authority of the agreement and must provide for joint authorship of reports and site visits at the discretion of the ME. PIs will submit draft MOUs to the ME for review prior to signing.

Table II-6. US or Host Country Institutions with which US Lead Institutions will negotiate MOUs or subcontracts or other funding mechanisms

US Lead Institution	US or Host Country Institution	Country
<b>North Carolina State University</b>		
	University of Arizona	US
	Bureau of Fisheries & Aquatic Resources	Philippines
	Central Luzon State University	Philippines
	Southeast Asian Fisheries Development Center, Aquaculture Department (SEAFDEC/AQD)	Philippines
	Ujung Batee Aquaculture Center, Banda Aceh	Indonesia

Table II-6. (cont) US or Host Country Institutions with which US Lead Institutions will negotiate MOUs or subcontracts or other funding mechanisms

<b>US Lead Institution</b>	<b>US or Host Country Institution</b>	<b>Country</b>
<b>Purdue University</b>		
	University of Arkansas at Pine Bluff (UAPB)	US
	UAPB with SUA	US-Tanzania
	Virginia Polytechnic Institute & State University (VT)	US
	Kwame Nkrumah University of Science & Technology (KNUST)	Ghana
	VT with KNUST	US-Ghana
	Moi University	Kenya
	Ministry of Natural Resources & Tourism, Aquaculture Development Division	Tanzania
	Sokoine University of Agriculture (SUA)	Tanzania
<b>University of Arizona</b>		
	Texas Tech University	US
	Department of Fisheries	Guyana
	Universidad Juárez Autónoma de Tabasco	Mexico
	Universidad Autónoma de Tamaulipas	Mexico
<b>University of Connecticut–Avery Point</b>		
	University of Rhode Island	US
	Inland Fisheries Research & Development Institute (IFReDI)	Cambodia
	Can Tho University	Vietnam
<b>University of Hawai'i at Hilo</b>		
	Louisiana State University	US
	Research Center for Food & Development (CIAD)	Mexico
	Universidad Autónoma de Sinaloa-Culiacán	Mexico
	Universidad Autónoma de Sinaloa-Mazatlán	Mexico
	Center for Research on Aquatic Ecosystems (CIDEA)	Nicaragua
<b>University of Michigan</b>		
	World Wildlife Fund in Asia	US
	Shanghai Fisheries University	China
	Hainan University	China
	Huazhong Agricultural University	China
	Wuhan University	China
	Institute of Agriculture & Animal Science	Nepal
	University of Agriculture & Forestry	Vietnam

### C. 3. REPORTING

During the AquaFish CRSP's first year, program activities were largely focused on creating the framework for program-wide impact reporting. Project-level work was in the initial stages of startup (see Section III for project startup reports). Program progress to date is reported below.

#### C.3.1. Development Targets, Impacts, and Benchmarks for the AquaFish CRSP

The programmatic benchmarks set out in the preliminary M&E provide a means to explore different measures of performance than either the more quantitative thematic DTAP impact indicators, or the metrics captured by the USAID EGAT and IEHA indicators. For the Year 1 reporting period, the following benchmarks<sup>4</sup>, have been met:

#### 1. Research Target–Year 1 Benchmarks:

- a. Request for Proposals approved by USAID and widely advertised, and submitted proposals externally peer-reviewed: *RFP process through proposal finalist selection was completed on 31 March 2007.*
- b. Favorably reviewed proposals have activities initiated: *Project work began in May 2007 with attendance at the Presynthesis & Orientation Meeting, formation of the advisory technical panels, and training on indicators, IEE, gender, and POP (Program Operating Procedures).*

#### 2. Capacity Building Target–Year 1 Benchmarks:

- a. An additional year of the highly successful Host Country Principal Investigator Exchange Project continued to exchange information on cichlid aquaculture to additional countries including two IEHA countries: *Planning is underway for Phase II exchange visits to South Africa and Ghana (October 2007), Vietnam (December 2007), and Vietnam (February 2008).*
- b. The jointly funded NOAA Sea Grant Technical Assistance program continued: *The Director continued discussions with Jim Murray, Deputy Director of NOAA/Sea Grant about model cases in Korea and finalized an exchange visit for Paul Olin, Director of the California Sea Grant Extension Program to Bangladesh.*
- c. Gender integration strategies adopted within all sub-awards: *All six projects adopted a strategy consistent with the CRSP integrated approach; USAID (Julie Swanson) reviewed all six projects and met with PIs during the May 2007 orientation meeting.*
- d. Regional Centers of Excellence established to reflect the AquaFish CRSP regions for research activities (i.e., Asia, Africa, and Latin America and the Caribbean): *RCEs were established and the Director appointed, with USAID consultation, Lead Coordinators at the May 2007 orientation meeting.*
- e. Formal Memoranda of Understanding adopted between all US and Host Country partners: *MOUs and/or Subcontracts are in process.*

#### 3. Information Dissemination Target–Year 1 Benchmarks:

- a. Dissemination efforts have continued through *Aquanews*, EdOp Net, and a new searchable online publication database: *Publication services continued uninterrupted under the transition from the former ACRSP into the first year of AquaFish CRSP: quarterly issues of Aquanews (Vol. 22, Nos. 1-3 and Vol. 23, No.1); 12 monthly issues of EdOp Net; CRSP Notices of Publication for 22 peer-reviewed research reports by CRSP researchers.*

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<sup>4</sup> These benchmarks for the preliminary M&E plan were outlined in the Application under *Technical Approach* (pp 12–14. See also B.4.2. above.

- b. The importance of extension evident through integration of at least one outreach activity within each funded project: *Proposals were revised as necessary to include one or more outreach activities in projects.*
- c. Research adoption encouraged by prioritizing the use of on- and off-farm trials to conduct research: *On- and off-farm trials were included as appropriate within each project to promote research adoption.*

**4. IEHA Country Involvement Target–Year 1 Benchmarks:**

- a. Formal strategy initiated to maximize locally appropriate results in participating IEHA Host Countries: *The Purdue University IEHA project is designed to improve competitiveness by empowering small holders and developing local economies and markets through capacity building, improved technology, and management of supply chain and natural resources.*
- b. Sites selected and formal connections established with suitable research institutions and government departments within each IEHA Host Country: *The Purdue University IEHA project is currently negotiating MOUs and establishing linkages.*
- c. The Africa Regional Center of Excellence has representation from IEHA countries to design research and outreach activities: *The RCE Lead Coordinator is in the early stages of building linkages with other IEHA countries.*

**5. Gender Integration Strategy–Year 1 Benchmarks:**

- a. Require that all funded projects address gender inclusiveness within their planned scope-of-work: *Strategies for gender inclusiveness are incorporated into revisions to the proposals submitted in June 2007.*
- b. Seek out USAID review of projects’ gender inclusiveness plans and respond by improving plans prior to project implementation: *The ME submitted revised proposals with gender inclusiveness plans to USAID in June 2007.*
- c. Promote the participation of women in formal and informal education and training opportunities provided through the CRSP. The CRSP has set a 50% benchmark for training women in formal and informal education. In addition, the 50% benchmark applies to attracting and retaining women scientists and administrators in all CRSP activities, as project researchers, advisory group members, and managers: *Projects are committed to promoting the participation of women at all levels from target populations to top-level researchers: over 50% of the identified long-term trainees are women. Women are the focus of stand-alone studies which are included in the portfolio to reflect a gendered perspective.*

**C.3.2. USAID EGAT and IEHA Indicator Reports**

Since the AquaFish CRSP projects were just getting underway in the summer of 2007, there are no corresponding metrics to report.

**C.4. CONTINUAL IMPROVEMENT & LESSONS LEARNED ACTIVITIES**

The mindful sharing of project decision-making and respect form the core of CRSP. Projects foster linkages with organizations including US minority-serving institutions, non-governmental organizations (NGOs), national agricultural research institutions, other CRSPs, international centers, private businesses, and others (see Appendix H for a listing of planned partners). Projects that link Host Country researchers from one CRSP site to another CRSP site are encouraged. US and Host Country PIs share in budgetary decisions and overall priority setting for the project, as well as in other collaborative activities related to the CRSP. At least

50% of funds are required to be expended in or on behalf of the Host Country or region. Most projects, however, expend more than 80% of direct costs in Host Countries. Proposals, work plans, and project budgets are developed collaboratively between HC and US researchers. US Lead PIs actively establish an effective working relationship with the ME and other CRSP US and Host Country PIs and program participants.

### C.5. SYNTHESIS ACTIVITIES

The RCE and DTAP technical advisory groups have principal responsibility for synthesizing information across regions and themes, including data from leveraged activities (e.g., Associate Awards). Their activities translate to input for overall impact reporting at a program level. A competitively awarded Synthesis Project (SP) will also have responsibility for (1) metadata analyses that aggregate data for reporting on USAID's focal areas and (2) broad evaluative syntheses. The SP also will provide feedback to the program on minimum dataset sizes to reduce duplication and streamline data collection.



## D. IMMEDIATE CAPACITY BUILDING INITIATIVE IN HOST COUNTRIES

### HOST COUNTRY PRINCIPAL INVESTIGATOR EXCHANGE PROJECT: TILAPIA AND NATIVE CICHLID TECHNOLOGIES (PHASE II)

*Submitted by James Bowman, Outreach Coordinator*

In 2004, the ACRSP launched an innovative exchange project designed to facilitate more direct collaboration among ACRSP Host Country institutions in Honduras, Kenya, Mexico, the Philippines, and Thailand. The objective of the activity was to share successful tilapia production techniques among scientists and institutions in different countries and regions. The Host Country Principal Investigator Exchange Project (HCPI Exchange Project) involved visits to each of the participants' home countries, where tilapia culture information was exchanged through seminars, field visits, and informal discussions.

Feedback from all participants in Phase I of this project was overwhelmingly positive; so a second phase was undertaken under AquaFish CRSP, which continues the CRSP emphases on food security and poverty eradication. For Phase II, a novel mentored-training approach is being employed and greater emphasis is being placed on the entire value chain of tilapia production. During this reporting year, CRSP researchers from four new countries—South Africa, Ghana, Vietnam, and Brazil—began planning for their participation in Phase II of the Project (Table II-7).

Table II-7. HCPI Exchange Project Phase II Host Country Participants

Institutional Representative	Institution	Location
Steve Amisah	Kwame Nkrumah University of Science & Technology	Kumasi, Ghana
Lourens DeWet Khalid Salie	Stellenbosch University	Stellenbosch, South Africa
Nguyen Thanh Phuong	Can Tho University	Can Tho City, Vietnam
Maria Célia Portella	Centro de Acüicultura, UNESP	Jaboticabal, Brazil

As in Phase I of the project, each of the participating countries represents a unique combination of environmental and economic conditions and factors within which the culture of cichlids has developed. Regional and local differences with respect to climate, species, available inputs,

pond management protocols being practiced, and constraints to continued growth have all influenced the development of the tilapia farming industry in each country. These differences will allow close comparisons of what has been successful and what has not worked in each of the participating countries. Phase II of the project will continue to facilitate the sharing of information among its participants so that, where appropriate, the most successful practices can be transferred and applied at other sites and in other regions.

Following the approach of Phase I, participants in Phase II are expected to spend at least four days in each country, beginning with a seminar on the status of tilapia and native cichlid culture in that country and followed by a tour of the host institution’s research facilities. Two to three days of field visits will typically follow, including visits to hatcheries, small farms, larger, more-intensive commercial operations, other collaborating institutions, processing facilities, and markets.

**D.1. FINAL PROJECT PLANNING, DESIGN, REVIEW & IMPLEMENTATION**

This year constituted mostly a planning period for the Phase II exchange visits. The participants first met to discuss plans during the ACRSP Annual Meeting in San Antonio, Texas, in February 2007. Subsequent planning occurred via a lengthy series of emails, resulting in a proposed workshop schedule as follows:

South Africa and Ghana:	October and November 2007
Vietnam:	December 2007
Brazil:	February 2008

Although similar to Phase I in many respects, the following variations are being planned for Phase II of the project:

- The scope will be widened to include value-chain aspects of aquaculture (e.g., harvesting, transportation, processing, and marketing).
- A mentoring approach will be taken, whereby some participants from Phase I will be asked to participate in the Phase II exchange visits, using their past experience to assist Phase II participants, thus broadening the overall benefits of the project.
- Greater attention will be focused on Africa, and in particular on IEHA countries, by including participants from South Africa, Ghana, and Kenya.

**D.2. PROJECT LESSONS LEARNED AND OTHER OUTPUTS**

**Lessons Learned.** In Phase I of the HCPI project, we found that attending to the logistics of this type of project is extremely tedious and time consuming, and Phase II is proving to be no exception in this regard.

With regard to planning itineraries, finding travel dates that are acceptable to all parties for visiting even a single location is tricky, and planning for visits to four countries turned out to be even more difficult. The participants are all professionals with extensive duties at their home institutions, and in addition to their regular research and teaching loads, they are often involved in leadership roles in regional or international professional societies. As a result, many of them already travel a fair amount, making it a challenge to fit these exchange visits into their busy schedules. In this case, settling on travel dates for visits to the four countries took over a month of frequent correspondence to complete (March–April, 2007).

Obtaining VISAs for travel is also proving to be difficult, at least in some cases. Embassies or consulates are not present in every country, so applying for a VISA may require sending one’s passport away or even traveling to a third country where there is a consulate. At the least, this adds considerable time to that required to obtain a VISA, and at the worst, it may make it

impossible to get the VISA. Some of our participants are encountering some extra “hoops” to jump through, including having to get additional letters of invitation to go with their applications, undergoing police checks, and making numerous extra trips to consulates, sometimes at quite a distance. Some countries’ consulates appear to be making it particularly difficult for applicants to get the VISAs, perhaps as a result of a general intensification of security efforts worldwide.

As with Phase I, a lot of logistical support from ME staff has been required to make this project happen. Examples include writing letters inviting the HCPIs to participate in the project, coordinating travel plans, budgeting for the project as a whole as well as for the hosting costs in each country, getting funds to the HCPIs to cover their participation costs, writing letters of invitation in support of VISA applications, and coordinating reporting efforts. For the planned visit to South Africa in October 2007, where the HCPI Exchange Project visit is being scheduled in conjunction with a conference of the Aquaculture Association of Southern Africa (AASA), extra effort has been required to help our participants register for the AASA meeting, to prepare a project poster for presentation at the conference, and to coordinate travel within South Africa and onward to Ghana.

**Expected Project Outputs.** Following the conclusion of the planned series of site visits, participants are expected to hold “Echo-Seminars” in their home countries in which they will share new knowledge and information gained during their visits to other countries with students, farmers, government officials, faculty at their home institutions, and others. It is also anticipated that several articles will be written for publication and that one or more posters describing the activities of the project will be developed and presented.

**Expected Project Beneficiaries.** Many individuals and institutions are expected to benefit from this project, including:

- The participants themselves will gain valuable first-hand knowledge about institutions engaged in aquaculture research, aquaculture extension systems in use, and aquaculture technologies being practiced in other regions of the world, some of which can be transferred back home.
- Professional colleagues and students at participating Host Country institutions will benefit from interactions with the visiting PIs, from whom they will gain new knowledge and insights into cichlid culture in other parts of the world.
- Host Country fish farmers will learn directly from visiting PIs during farm and field visits, and will benefit indirectly in the future as the recipients of better extension and research services provided by their own countries’ research and extension personnel and institutions.
- The exchanges will provide opportunities for making new professional contacts as well as for strengthening existing linkages, leading to greater networking among researchers in CRSP and other Host Country institutions.

Participants in Phase I of the HCPI Exchange Project are already applying and disseminating knowledge gained through their earlier site visits. They have done this by conducting “Echo Seminars” to share knowledge gained abroad with fellow aquaculturists back home, and by including updated material in university courses, new research projects, and extension materials that they work with in their respective home countries. It is expected that Phase II activities will reach beneficiaries in the participating countries in similar ways.



### III. RESEARCH PROJECT STARTUP REPORTS

Project startup reports cover the period from 1 July 2007 to 30 September 2007. They are extracted from submissions by the US Lead PIs and are “printed as submitted” with minor formatting changes. All projects were in the early stages of startup during this reporting period.

Project personnel are listed in each report. For a personnel listing across all projects, see Appendix A. For details on student enrollment in long-term training programs, as well as distributions by student nationality, degree, and gender, see *Capacity Building* in Section IV.



#### A. US LEAD INSTITUTION: NORTH CAROLINA STATE UNIVERSITY

##### **Improved Cost Effectiveness and Sustainability of Aquaculture in The Philippines and Indonesia**

*Printed as submitted by Russell Borski, US Lead PI*

##### **A.1. INVESTIGATION PROGRESS REPORTS**

###### *Investigations 1–3*

1. **07QSD01NC:** Broodstock Seed Quality and Fingerling Production Systems Rearing for Nile Tilapia in The Philippines:
2. **07SFT02NC:** Feeding Reduction Strategies and Alternative Feeds to Reduce Production Costs of Tilapia Culture
3. **07TAP02NC:** Internet-based Extension Podcasts for Tilapia Farmers in The Philippines

Russell Borski and Chris Brown traveled to CLSU and met with HC PIs to discuss details of experimental design for the investigations on broodstock seed quality and feed reduction/alternate feed strategies. A portion of these studies has been initiated at CLSU and the GIFT compound on the CLSU campus. The MOUs between CLSU and NCSU is in progress. Investigation 3 is initiating podcasting to test the new approach to extension. A book on podcasting methodology has been obtained (“Podcasting and Blogging, by Williams, R. et al.) and a review of material for inclusion is underway.

###### *Investigations 4–5*

4. **07SFT03NC:** Alternative Feeding Strategies to Improve Milkfish Production Efficiency in The Philippines
5. **07MNE02NC:** Training in Sustainable Coastal Aquaculture Technologies in Indonesia and The Philippines

Russell Borski and Chris Brown traveled to Iloilo (SEAFDEC) in June 2007 to meet PIs, discuss projects, and give seminars. A preliminary tank experiment examining effects of different feeding strategies on the growth/survival of milkfish was begun and will run for 2 months. Kevin travelled to Aceh, Indonesia in July to visit the project site, and meet with farmers and colleagues at Ujong Battee. Seaweed is growing well in the ponds and additional farmers are requesting seaweed. MOUs between NCSU and SEAFDEC and Ujong Battee are in progress.

*Investigation 6***6. 07MER04NC: Implications of Export Market Opportunities for Tilapia Farming Practices in The Philippines****A.2. PARTICIPANTS*****North Carolina State University, Raleigh, North Carolina (US Lead Institution)***

Russell Borski, US Lead PI  
 Peter Ferket, US Investigator  
 Upton Hatch, US Investigator  
 Charles Stark, US Investigator

***Central Luzon State University (CLSU), Science City of Muñoz, Nueva Ecija, Philippines (HC Lead Institution)***

Remedios Bolivar, HC Lead PI  
 Wilfred Jamandre, Investigator  
 Emmanuel Vera Cruz, Investigator  
 Reginor Lyzza Argueza, Graduate Assistant  
 Sherwin Celestino, Graduate Assistant  
 Lourdes Dadag, Graduate Assistant  
 Laarni Germino, Graduate Assistant  
 Veronica Grande, Graduate Assistant  
 Marietta Hechanova, Graduate Assistant  
 Eddie Boy Jimenez, Graduate Assistant  
 Hernaiz Malanon, Graduate Assistant  
 Jun Rey Sugue, Graduate Assistant  
 Ravelina Velasco, Graduate Assistant  
 Michelle Zamora, Graduate Assistant

***Southeast Asian Fisheries Development Center, Aquaculture Department, Iloilo, Philippines (HC Institution)***

Evelyn Grace T. de Jesus-Ayson, HC Co-PI  
 Felix G. Ayson, Investigator  
 Nelson Golez, Investigator  
 Josette Gonzaga, Investigator  
 Anicia Hurtado, Investigator  
 Mary June Cabarles, Undergraduate Student (West Visayas State Univ)  
 Heysale Casalem, Undergraduate Student (West Visayas State Univ)  
 Joy MaeLedesma, Undergraduate Student (West Visayas State Univ)  
 Abigail Tauro, Undergraduate Student (West Visayas State Univ)

***Ujung Batee Aquaculture Center, Banda Aceh, Indonesia (HC Institution)***

Sugeng Raharjo, HC Co-PI

***University of Arizona, Tucson, AZ (US Institution)***

Kevin Fitzsimmons, US Co-PI  
 Cesar Hernandez, Graduate Assistant  
 Mario Hernandez, Graduate Assistant  
 Kyle Vanderlugt, Graduate Assistant

***Bureau of Fisheries & Aquatic Resources, Department of Agriculture, Manila, Philippines (HC Institution)***

Nelson Lopez, HC Co-PI

*United States Department of Commerce- NOAA, Milford, Connecticut (US Institution)*

Christopher Brown, US Co-PI

*GIFT (Genetically Improved Farmed Tilapia) Foundation International, Inc., Science City of Muñoz, Nueva Ecija, Philippines (HC Institution)*

Hernando Bolivar, HC Co-PI

**A.3. OUTREACH & COLLABORATIVE ACTIVITIES**

Category	Topic	Location	Date (dd/mm/yy)	Audience Type
Seminar	Tilapia Aquaculture	SEAFDEC AQD	07/06/07	40+ / Mixed
Conference	Integrated Shrimp/Seaweed	Bali, Indonesia	30/07/07	120+ / Mixed
Conference	Integrated Shrimp/Seaweed	Hanoi, Vietnam	05/08/07	40+ / Mixed

**A.4. CONFERENCES, MEETINGS & CONTACTS**

Russell Borski and Chris Brown traveled June 1-9, 2007 to Central Luzon (CLSU) and SEAFDEC (Iloilo, Philippines) to discuss aquaculture problems/opportunities and CRSP project design with HC students, PIs, and farmers. They gave two seminars. Kevin Fitzsimmons visited Indonesian project site, attended two conferences where HC partner presented.

During travels in the Philippines and Indonesia, the US PIs met with various farmers and industry personnel to discuss problems/opportunities of aquaculture generally and tilapia, milkfish, and integrated seaweed/shrimp culture specifically.

Chris Brown is now Chief of the Aquaculture & Enhancement Division of the US Department of Commerce. This involves a move to Connecticut and the establishment of a whole network of new professional contacts, from farmers to Washington US government personnel. Fitzsimmons met with SEAFDEC scientists at Iloilo in the Philippines.

**A.5. TRIP REPORTS**

Dates of Travel	Locations(s) of Travel	Purpose of Travel	Person(s) Traveling
June 1 - June 9	Philippines	Research, planning	Russell Borski/Chris Brown
July 22 - August 9	Indonesia, Vietnam, Philippines	Research, conferences, planning	Kevin Fitzsimmons

Travel to the Philippines (CLSU and SEAFDEC) and Indonesia for group meetings to discuss project goals and procedures; meet with industry and farmers; meet with students, research, and administrative personnel; and give seminars in Philippines and attend conferences where Indonesia HC PIs presented findings.

Kevin Fitzsimmons brought new aquaculture reference books to Ujong Batee.

**A.6. PRESENTATIONS**

Russell J. Borski. 2007. Catch-up Growth: Hormones and Mechanisms. Southeast Asian Fisheries Development Center, Iloilo Philippines

Russell J. Borski. 2007. Catch-up Growth: Hormones and Mechanisms. Fisheries and Aquaculture Center, Central Luzon State University, Science City of Munoz, Philippines  
 Jamandre, W.E. (2007). Economic Evaluation of Freshwater Aquaculture Technologies and Policies in Selected Production Systems. Philippine Department of Agriculture-Bureau of Agricultural Research, Diliman Quezon City, Philippines. August

#### **A.7. PUBLICATIONS**

Bart, A., Bolivar, R.B. Contreras-Sachez, W., Gitonga, N., Ngugi, C., Meyer, D., Yang, Y., and Bowman, J. 2007. Advances in aquaculture: the role of aquaculture CRSP-supported research, training and information exchange on the culture of cichlids in CRSP Host Country institutions (ACRSP website publication)  
 Jamandre, W.E., Marzan, E.G. Jr., and Velasco, C.V. (2007) Economic Evaluation of Freshwater Aquaculture Technologies and Policies in Selected Production Systems. Philippine Department of Agriculture-Bureau of Agricultural Research Report. 61pp. A Central Luzon State University Abstract under In-depth study at the Socio-economic Research Portal by the Philippine Institute for Development Studies.



### **B. US LEAD INSTITUTION: PURDUE UNIVERSITY**

#### **Improving Competitiveness of African Aquaculture Through Capacity Building, Improved Technology, and Management of Supply Chain and Natural Resources**

*Printed as submitted by Kwamena Quagraine, US Lead PI*

#### **B.1. INVESTIGATION PROGRESS REPORTS**

##### *Investigation 1*

1. **07MER02PU:** Developing Supply Chain and Group Marketing Systems for Fish Farmers in Ghana and Kenya

Identifying study target markets, and respondents in host countries, Ghana and Kenya. Students to be involved in project have been recruited. Developing MOUs and reporting/reimbursement guidelines from Purdue University to host countries.

##### *Investigation 2*

1. **07QSD02PU:** Development of Small-scale Clarias Fingerlings as Bait for Lake Victoria Commercial Fisheries in Western Kenya.

Development of farm clusters; preliminary visits to the fish markets in Kisumu and Busia districts, and four landing beaches to assess fish sales, marketing strategies and channels. Students to be involved in project have been recruited.

##### *Investigation 3*

3. **07WIZ01PU:** Characterization of Pond Effluents and Biological and Physiochemical Assessment of Receiving Waters in Ghana

Discussion between US Co-PI and HC PI and other colleagues anticipating to collaborate on the project. Students to be involved in project have been recruited.

##### *Investigations 4–5*

4. **07SFT06PU:** Development of Locally Available Feed Resource Base in Tanzania

5. **07MER03PU: On Farm Verification of Tilapia-catfish Predation Culture**

Phone conference of US Co-PI and HC Co-PI (UAPB and SUA) to discuss implementation of the research as soon as funding is received. Initial arrangements have been made to enable UAPB to send a subaward to SUA. SUA personnel have identified graduate students.

**B.2. PARTICIPANTS**

*Purdue University, West Lafayette, Indiana (US Lead Institution)*

Kwamena Quagraine, US Lead PI  
Jennifer Dennis, Investigator

*Virginia Polytechnic Institute & State University (Virginia Tech), Blacksburg, Virginia (US Institution)*

Emmanuel Frimpong, US Co-PI

*University of Arkansas at Pine Bluff, Arkansas (US Institution)*

Rebecca Lochman, US Co-PI  
Carole Engle, Investigator (replacing Alyoce Kaliba as of July 2007)

*Moi University, Eldoret Kenya (HC Lead Institution)*

Charles Ngugi, HC PI  
John Makambo, Investigator

*Kwame Nkrumah University of Science & Technology, Ghana (HC Institution)*

Stephen Amisah, HC Co-PI  
Paul Sarfo-Mensah, Investigator

*Sokoine University of Agriculture, Tanzania (HC Institution)*

Sebastian Chenyambuga, HC Co-PI

*Ministry of Natural Resources & Tourism – Aquaculture Development Division, Tanzania (HC Institution)*

Kajitanus Osewe, HC Co-PI

**B.3. CONFERENCES, MEETINGS & CONTACTS**

Interaction has been through phone conference and emails.

Continuing with the USAID Kenya BDS (Business Development Services Program) Project.

**B.4. PHYSICAL IMPROVEMENTS & TECHNOLOGY TRANSFER**

Preparations have been made for catfish propagation at Moi University, Kenya. Construction of four catfish fingerling holding tanks was started and a pond has been refurbished with leverage funds.

**B.5. TRIP REPORTS**

The Virginia Tech US Co-PI met with the HC-PI and prospective project personnel for project preparation. Field season and methods were outlined and clarified. Choices were considered for participating farms and field sites. A potential graduate student for the project was interviewed. This trip was largely sponsored by Virginia Tech as part of the cost-share agreement.



## C. US LEAD INSTITUTION: UNIVERSITY OF ARIZONA

### Developing Sustainable Aquaculture for Coastal and Tilapia Systems in the Americas

*Printed as submitted by Kevin Fitzsimmons, US Lead PI*

#### C.1. INVESTIGATION PROGRESS REPORTS

##### *Investigation 1*

1. **07BMA03UA:** Co-sponsorship of "Second International Workshop on the Cultivation and Biotechnology of Marine Algae: An Alternative for Sustainable Development in Latin America and the Caribbean"

Conference has been delayed. New plan is to hold conference in conjunction with WAS 2009 in Mexico. We have already been approved for special session by the conference committee and have one co-sponsor funding already.

##### *Investigation 3*

3. **07IND01UA:** Development of Snook (*Centropomus* spp) Seed Production Technology for Application in Aquaculture and Restocking of Over-fished Populations

Texas Tech is working on Animal Care and Use Committee permits. Work team is planning visit to Tabasco December 16-20, 2007.

##### *Investigations 2, 4-8*

2. **07SFT04UA:** Utilization of Local Feed Ingredients for Tilapia and Pacu Production
4. **07MNE06UA:** Elimination of MT from Aquaculture Masculinization Systems: Use of Catalysis with Titanium Dioxide and Bacterial Degradation
5. **07IND02UA:** Incorporation of the Native Cichlids, Tenhuayaca, *Petenia splendida* and Castarrica, *Cichlasoma urophthalmus* into Sustainable Aquaculture in Central America: Improvement of Seedstock and Substitution of Fish Meal Use in Diets
6. **07HHI02UA:** Food Safety Study of Leafy Greens Irrigated with Tilapia Farm Effluents
7. **07SFT05UA:** Local Ingredients Substituting for Fishmeal in Tilapia and Pacu Diets in Guyana
8. **07TAP03UA:** AquaFish CRSP Sponsorship of the Eighth International Symposium on Tilapia in Aquaculture to Be Held in Egypt

#### C.2. PARTICIPANTS

##### *University of Arizona (US Lead Institution)*

Kevin Fitzsimmons, US Lead PI

##### *Texas Tech University (US Institution)*

Reynaldo Patino, US Co-PI

Bibek Sharma, Research Assistant

##### *Delaware State University (US Collaborating Partner)*

Dennis McIntosh, Collaborating Investigator

##### *Universidad Juárez Autónoma de Tabasco, Mexico (HC Lead Institution)*

Wilfrido Contreras Sanchez, HC Lead PI

Gabriel Márquez Couturier, Investigator

Salomon Páramo Delgadillo, Investigator

Alfonso Alvarez-González, Investigator

Mario Fernández-Pérez, Investigator  
Arlette Hernández Franyutti, Investigator  
Ulises Hernández-Vidal, Investigator  
Rosa Martha Padrón-López, Investigator  
Alejandro Mcdonal-Vera, Research Assistant  
William Rodríguez-Valencia, Research Assistant  
Isidro Lopez Ramos, Research Assistant  
Beatriz A. Hernandez Vera, Research Assistant

*Universidad Autónoma de Tamaulipas, Mexico (HC Institution)*

Pablo Gonzalez Alanis, HC Co-PI  
Mauricio A. Ondarza, Investigator

*Instituto Sinaloense de Acuicultura, Mazatlán, Mexico (HC Institution)*

Roberto Arosemena, HC Co-PI

*Mon Repos Aquaculture Station, Department of Fisheries, Guyana (HC Institution)*

Tejnarine Geer, HC Co-PI  
Kalima Singha, Investigator

*BIOTECMAR, Caracas, Venezuela (HC Institution)*

Raul Rincones, HC Co-PI

*Central Laboratory for Aquaculture Research, Abbassa, Egypt (HC Collaborating Partner)*

Ahmed Said Diab, Investigator

*American University of Beirut, Lebanon (HC Collaborating Partner)*

Imad Saoud, Investigator



**D. US LEAD INSTITUTION: UNIVERSITY OF CONNECTICUT–AVERY POINT**

**Development of Alternatives to the Use of Freshwater Low Value Fish for Aquaculture in the Lower Mekong Basin of Cambodia and Vietnam: Implications for Livelihoods, Production and Markets**

*Printed as submitted by Robert Pomeroy, US Lead PI*

**D.1. INVESTIGATION PROGRESS REPORTS**

**Investigations 1-5:**

1. **07MER01UC:** Competition and Impacts Between Use of Low Value/Trash Fish for Aquaculture Feed Versus Use for Human Food.
2. **07MNE01UC:** Assessment of Diversity and Bioecological Characteristics of Low Value/Trash Fish Species.
3. **07SFT01UC:** Alternative Feeds for Freshwater Aquaculture Species
4. **07TAP01UC:** Feed Technology Adoption and Policy Development for Fisheries Management
5. **07FSV01UC:** Maximizing the Utilization of Low Value or Small Size Fish for Human Consumption Through Appropriate Value Added Product Development

**D.2. PARTICIPANTS*****University of Connecticut-Avery Point (US Lead Institution)***

Robert S. Pomeroy, US Lead PI  
 Sylvain De Guise, Investigator  
 Tessa Getchis, Investigator

***University of Rhode Island, Kingston, RI (US Institution)***

David Bengtson, US Co-PI  
 Chong Lee, Investigator

***Inland Fisheries Research & Development Institute, Phnom Penh, Cambodia (HC Lead Institution)***

So Nam, HC Lead PI  
 Prum Somany, Investigator  
 Hap Navy, Investigator  
 Kao Sochivi, Investigator  
 Chan Sokheng, Research Assistant  
 Eng Tong, Research Assistant  
 Hing Sopheavy, Research Assistant  
 Leng Sy Van, Research Assistant  
 Ngo Beng Bun, Research Assistant  
 Sim Thavry, Research Assistant  
 Soeun Norng, Research Assistant

***College of Aquaculture & Fisheries, Can Tho University, Can Tho City, Vietnam (HC Institution)***

Tran Thi Thanh Hien, HC Co-PI  
 Le Xuan Sinh, Investigator  
 Tran Le Cam Tu, Investigator

**D.3. CONFERENCES, MEETINGS & CONTACTS**

Presentations of Dr. So Nam (lectures and seminars, etc.)

<b>Category</b>	<b>Topic Title of course, seminar, etc.</b>	<b>Location</b>	<b>Date (dd/mm/yy)</b>	<b>Audience type</b>
Lecture	Overview of low value fish resources: trends in catch and abundance, utilization, and management	Royal University of Agriculture, Phnom Penh, Cambodia	- 21/07/07 - 25/08/07 - 08/09/07	M.Sc. Graduate students
Lecture	Socio-technological assessment of the utilization and importance of low value fish in Cambodia and other Mekong riparian countries	Royal University of Agriculture	- 21/07/07 - 25/08/07 - 08/09/07	M.Sc. Graduate students
Lecture	Catch and market chain of low value fish along the Tonle Sap River, Cambodia	Royal University of Agriculture	- 21/07/07 - 25/08/07 - 08/09/07	M.Sc. Graduate students

#### D.4. PUBLICATIONS

Von Phanith, 2007. Assessment of the status of supply and demand of low value/small-sized fish in Cambodia, BS Thesis, Royal University of Agriculture, Phnom Penh.



#### E. US LEAD INSTITUTION: UNIVERSITY OF HAWAI'I AT HILO

##### Human Health and Aquaculture: Health Benefits Through Improving Aquaculture Sanitation and Best Management Practices

*Printed as submitted by Maria Haws, US Lead PI*

#### E.1. INVESTIGATION PROGRESS REPORTS

##### *Investigation 1*

1. **07IND03UH: Spat Collection, Growth Rates and Survival of the Native Oyster Species, *Crassostrea corteziensis* at Santa Maria Bay, Mexico**  
Dates were tentatively set for the international workshop.

##### *Investigation 2*

2. **07IND04UH: Oyster-relaying and Depuration in Open-water Locations**  
Dates were tentatively set for the regional workshop.

##### *Investigations 3-8*

3. **07WIZ02UH: Determination of Carrying Capacity of the Boca Camichin Estuary in Reference to Oyster Culture**
4. **07HHI03UH: International Workshop for Aquaculture Sanitation**
5. **07HHI04UH: Regional Workshop on Shellfish Culture and Sanitation**
6. **07BMA04UH: Training in Best Management Practices for the Production of Molluscs in the States of Nayarit and Sinaloa**
7. **07HHI05UH: Microbiological Quality of Shellfish Growing Waters and Tissues**
8. **07BMA05UH: Intensive Training and Internship in Bivalve Culture and Shellfish Sanitation**

#### E.2. PARTICIPANTS

##### *University of Hawai'i at Hilo, Hilo, Hawai'i (US Lead Institution)*

Maria Haws, US Lead PI

Sharon Ziegler-Chong, Investigator

William Steiner, Investigator

##### *Louisiana State University, Baton Rouge, Louisiana (US Institution)*

John Supan, US Co-PI

##### *Universidad Autónoma de Sinaloa-Culiacán, Culiacán, Mexico (HC Lead Institution)*

Eladio Gaxiola Camacho, HC Lead PI

Ambrocio Mojardin Heraldez, Investigator

##### *Universidad Autónoma de Sinaloa-Mazatlán, Mazatlán, Mexico (HC Institution)*

Guillermo Rodríguez Domingo, HC Co-PI

##### *Center for Research for Food & Development (CIAD), Mazatlán, Mexico (HC Institution)*

Omar Calvario Martínez, HC Co-PI

*Center for Research & Development of Aquatic Ecosystems (CIDEA), Central American University (UCA), Managua, Nicaragua (HC Institution)*

Agnes Saborio Coze, Director, HC Co-PI

Nelvia Hernandez, Investigator

Erick Sandoval Palacios, Investigator

**E.3. CONFERENCES, MEETINGS & CONTACTS**

Sandoval Palacios, E. 2007. Microbiological water quality from collection areas for black cockles. Second National Congress of Universities, "Water is Life". Holiday Inn Hotel, Managua, Nicaragua.



**F. US LEAD INSTITUTION: UNIVERSITY OF MICHIGAN**

**Improving Sustainability and Reducing Environmental Impacts of Aquaculture Systems in China, and South and Southeast Asia**

*Printed as submitted by James Diana, US Lead PI*

**F.1. INVESTIGATION PROGRESS REPORTS**

*Investigations 1–6: We are in the planning and preparing stage for field work for all investigations.*

1. **07MNE03UM:** Impact of Introduction of Alien Species on the Fisheries and Biodiversity of Indigenous Species in Zhanghe Reservoir of China and Tri An Reservoir of Vietnam
2. **07MNE04UM:** Assessing Effectiveness of Current Waste Management Practices for Intensive Freshwater and Marine Pond Aquaculture in China
3. **07MNE05UM:** Determining the Ecological Footprint of Shrimp Aquaculture Through Life Cycle Analysis of Outdoor Pond Systems
4. **07HHI01UM:** Monitoring and Reducing Microcystins in Tilapias and Channel Catfish Cultured in a Variety of Aquaculture Systems
5. **07BMA02UM:** Polyculture of Sahar (*Tor putitora*) with Mixed-sex Nile Tilapia (*Oreochromis niloticus*)
6. **07MNE07UM:** Workshop on Aquaculture, Human Health and Environment

**F.2. PARTICIPANTS**

*The University of Michigan, Ann Arbor, Michigan (US Lead Institution)*

James Diana, US Lead PI

Barbara Diana, Research Assistant

Cao Ling, Graduate Assistant (China)

*World Wildlife Fund (US Institution)*

Flavio Corsin, US Co-PI

*Shanghai Fisheries University (HC Lead Institution)*

Yang Yi, HC Lead PI

Jiang Min, Investigator

Liu Liping, Investigator

Yang Xinwen, Graduate Assistant (China)

Gu Jinhuang, Graduate Assistant (China)

Qing Weilun, Graduate Assistant (China)

*Hainan University, Haikou, China (HC Institution)*

Lai Qiuming, HC Co-PI

Zhou Ling, Graduate Assistant (China)

Wang Jun, Graduate Assistant (China)

*Huazhong Agricultural University, Wuhan, China (HC Institution)*

Wang Weimin, HC Co-PI

Zhou Xiaoyun, Graduate Assistant (China)

Yao Rongrong, Graduate Assistant (China)

Liu Xiaolian, Graduate Assistant (China)

*Wuhan University, Wuhan, China (HC Institution)*

Song Biyu, HC Co-PI

Tan Fayu, Graduate Assistant (China)

Huang Juan, Graduate Assistant (China)

*Institute of Agriculture & Animal Science, Rampur, Chitwan, Nepal (HC Institution)*

Madhav K. Shreshtha, HC Co-PI

Rai Sunila, Research Assistant

Ravi Lal Sharma, Graduate Assistant (Nepal)

Kamala Gharti, Graduate Assistant (Nepal)

Hare Ram Devkota, Graduate Assistant (Nepal)

*University of Agriculture & Forestry, Ho Chi Minh City, Vietnam (HC Institution)*

Le Thanh Hung, HC Co-PI

Vu Cam Luong, Research Assistant

Nguyen Phu Hoa, Research Assistant

Tran Huong, Graduate Assistant (Vietnam)

Tran Van Man, Graduate Assistant (Vietnam)



## IV. PROGRAM-WIDE REPORTS: CAPACITY BUILDING AND ASSOCIATE AWARDS

### A. CAPACITY BUILDING

*Submitted by James R. Bowman, Capacity Building Coordinator*

#### A.1. INTRODUCTION

One of the key objectives of the AquaFish CRSP is to build and/or strengthen the capacities of the institutions and individuals with whom we collaborate. Capacity building under the AquaFish CRSP largely emphasizes human resource and organizational development in the form of trainings and outreach. Training supported by the program takes a number of forms, the most important being perhaps our short-term (non-degree) courses and our long-term (degree) programs. Gender inclusivity is a high priority in all aspects of these capacity building activities. AquaFish CRSP has a 50% target for training women and tries to actively promote the recruitment of women into training opportunities as well as into other program components.

Approaches for a strong capacity building strategy were outlined at the May 2007 *Orientation Meeting & Pre-Synthesis Workshop* as follows:

#### *Outreach and Dissemination*

- Holding workshops with an emphasis on hands-on instruction.
- Producing manuals as instructional guides for workshops and/or as publications to transfer the workshop experience to a broader audience.
- Encouraging participatory research, particularly at on-farm locations.
- Including extension officers and communication specialists in outreach planning and activities.
- Using local languages for short-term trainings and training manuals.

#### *Long-Term Training*

- Linking to HC universities to encourage student involvement.
- Designating specific funds for student training to cover tuition, travel, and other related training components.
- Involving students in publication preparation to engender enthusiasm for a professional future in either the private or academic sectors.
- Motivating students by arranging their participation in short-term trainings targeted at other audiences (e.g., farmers, extensionists, policy makers).
- Ensuring that degree programs (particularly MS) progress in a timely manner to make way for the next round of student investigators.
- Offering a variety of different training experiences for students to build their versatility and address their varying interests.

#### A.2. SHORT-TERM TRAINING

Short-term training is expected to occur most frequently as seminars, workshops, short-courses, and the like. The duration of these would typically be from half a day to two or three weeks, and the focus is usually on specific topics that are deemed to be of particular importance for one or more of the AquaFish projects. No short-term training events were conducted during this first year of the program.

#### A.3. LONG-TERM TRAINING

Long-term programs typically last at least nine months or longer—as long as it takes for a student to complete a BS, MS, or PhD program at an accredited university, either in one of the

#### IV. PROGRAM-WIDE REPORTS

Host Countries or in the US. Long-term training can also include training of nine months or more that leads to a technical certificate of some kind. As of the end of this reporting period, the AquaFish CRSP is supporting the long-term training programs of 73 students (Table IV-1). These students come from 13 countries: Cambodia, China, Côte d'Ivoire, Ecuador, Ghana, Guyana, Kenya, Mexico, Nepal, Philippines, Tanzania, Vietnam, and US ( Figure IV-1).

Table IV-1 Students identified by AquaFish CRSP projects during the 30 September 2006 – 30 September 2007 period.

US Lead Institution	No. of Females	No. of Males	Country of Origin	Institution Attending	Degree
North Carolina State University	5	5	Philippines	Central Luzon State University	BS
	5	3	Philippines	Central Luzon State University	MS
	2	-	Philippines	Central Luzon State University	PhD
	4	-	Philippines	West Visayas State University	BS
	1	2	USA	North Carolina State University	BS
	1	-	USA	North Carolina State University	PhD
<b>Total NCSU Students</b>	<b>18</b>	<b>10</b>			
Purdue University	2	-	Kenya	Moi University	MS
	1	-	Ghana	Virginia Tech	MS
	1	1	Ghana	KNUST	MS
	1	1	Tanzania	Sokoine University of Agriculture	MS
	1 <sup>a</sup>	-	Côte d'Ivoire	Purdue University	PhD
<b>Total PU Students</b>	<b>6</b>	<b>2</b>			
University of Arizona	1	-	Guyana	University of Guyana	BS
	-	3	Mexico	University of Arizona	PhD
	-	1	USA	University of Arizona	PhD
	-	2	Mexico	Universidad Autónoma de Tamaulipas	BS
<b>Total UA Students</b>	<b>1</b>	<b>6</b>			
University of Connecticut – Avery Point	2	1	Cambodia	IFReDI	BS
	1	1	Cambodia	IFReDI	MS
	2	-	Vietnam	Can Tho University	BS
	1	1	Vietnam	Can Tho University	MS
<b>Total UCAP Students</b>	<b>6</b>	<b>3</b>			

<sup>a</sup>Former Borlaug Fellow (LEAP: Leader Enhancement in Agriculture Program)

Table IV-1 (cont) Students identified by AquaFish CRSP projects during the 30 September 2006 – 30 September 2007 period.

Lead US Institution	No. of Females	No. of Males	Country of Origin	Institution Attending	Degree
University of Hawai'i at Hilo	-	1	Ecuador	PACRC/UHH	BA
	-	1	Ecuador	PACRC/UHH	MS
<b>Total UHH Students</b>	<b>0</b>	<b>2</b>			
University of Michigan	2	1	China	Hainan University	MS
	3	1	China	Huazhong Agricultural University	MS
	1	-	China	Huazhong Agricultural University	PhD
	-	3	China	Shanghai Fisheries University	MS
	1	-	China	University of Michigan	PhD
	2	-	China	Wuhan University	MS
	-	1	Nepal	Institute of Agriculture & Animal Science	MS
	1	-	Nepal	Institute of Agriculture & Animal Science	PhD
	1	1	Vietnam	University of Agriculture & Forestry	MS
1	-	Vietnam	University of Agriculture & Forestry	PhD	
<b>Total UM Students</b>	<b>12</b>	<b>7</b>			
<b>Total Number of Students</b>	<b>43</b>	<b>30</b>			

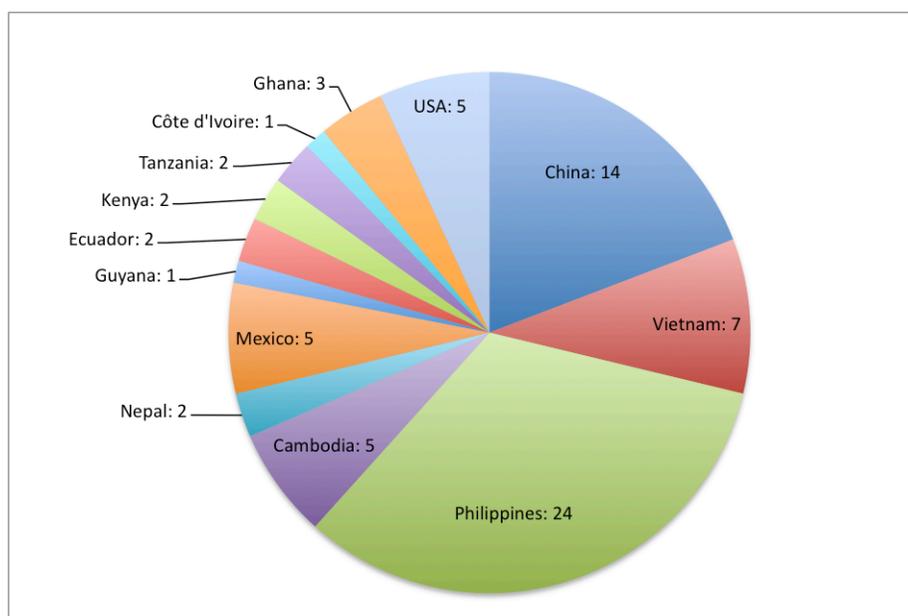


Figure IV-1. Number of students currently supported by the AquaFish CRSP by nationality. The greatest numbers of non-USA students are from the Philippines (24), China (14), Vietnam (7), Mexico (5) and Cambodia (5).

**A.3.1. Regional Distribution of Long-Term Students**

On a regional basis, 52 of the program’s long-term students (71.3%) are from Asia, 8 (10.9%) are from Latin America and the Caribbean, 8 (10.9%) are from Africa, and 5 (6.9%) are from the US. On a project basis, 28 of our students (38.4%) are engaged under the North Carolina State University project, 8 (11%) are with the Purdue project, 7 (9.6%) are sponsored under the University of Arizona project, 19 (26%) are sponsored by the project led by the University of Michigan, 9 (12.3%) are through the University of Connecticut, and 2 (2.7%) are with the project led by the University of Hawai’i at Hilo.

**A.3.2. Degrees Sought by AquaFish CRSP Students**

Degree programs currently supported under the AquaFish program are shown in Figure IV-2. Included are 26 students seeking bachelor’s degrees (35.6%), 35 students working towards master’s degrees (48%), and 12 students seeking doctorates (16.4%).

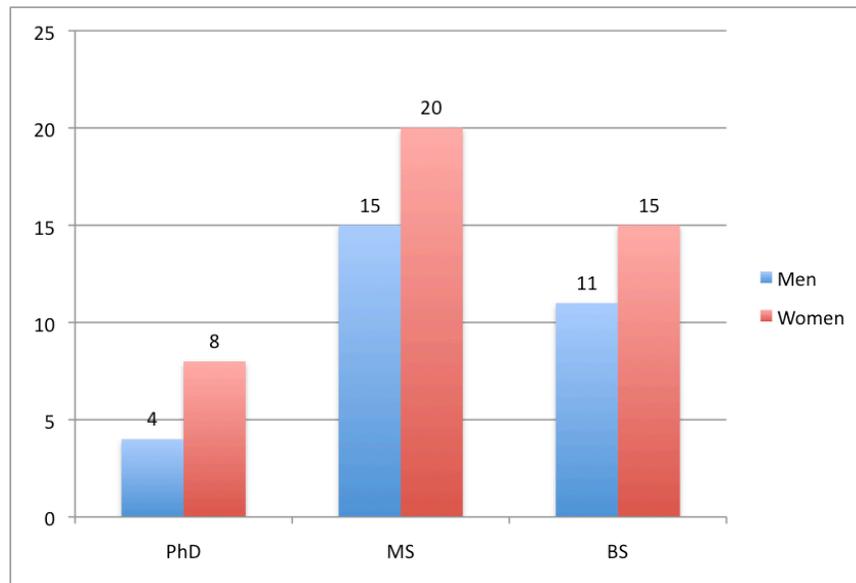


Figure IV-2. Numbers by gender of currently supported AquaFish CRSP students seeking BS, MS, and PhD degrees.

**A.3.3. Gender Distribution of Long-Term Students**

Of the 73 long-term students currently being supported under the CRSP, 43 are women and 30 are men (58.9% and 41.1%, respectively).

Among students seeking BS degrees, 11 are men (42.3%) and 15 are women (57.7%); among MS candidates, 15 (42.9%) are men and 20 (57.1%) are women; and among those seeking PhD’s, 4 (33.3%) are men and 8 (66.7%) are women (Figure IV-2).

With respect to students supported under each of the six AquaFish projects, 18 of 28 students (64.3%) sponsored through the NCSU project are women, 6 of 8 students (75%) supported by the Purdue project are women, 1 of 7 students (14.3%) supported through the University of Arizona are women, 6 of 9 students (66.7%) through the University of Connecticut are women, 0 of 2 (0%) of those supported through the University of Hawaii at Hilo are women, and 12 of 19 (63.2%) of those sponsored through the University of Michigan are women (Table IV-2).

Table IV-2. Number and percentage of long-term training participants who are women in the six projects of the AquaFish CRSP.

US Lead Institution	Total Students	Number of Women	% Women
North Carolina State University	28	18	64.3%
Purdue University	8	6	75.0%
University of Arizona	7	1	14.3%
University of Connecticut – Avery Point	9	6	66.7%
University of Hawai'i at Hilo	2	0	0.0%
University of Michigan	19	12	63.2%
<b>Total/Overall</b>	<b>73</b>	<b>43</b>	<b>58.9%</b>

#### A.3.4. Long-Term Training in IEHA Countries

Of the 8 long-term students supported under Purdue University's "Africa Project," 5 (6.8%) are from IEHA countries (Kenya and Ghana). Among these 5 IEHA students, 4 (80.0%) are women and 1 (20.0%) is a man. All are seeking MS degrees.



## B. MALI ASSOCIATE AWARD PROPOSAL

### AQUATIC RESOURCE USE AND CONSERVATION FOR SUSTAINABLE FRESHWATER AQUACULTURE AND FISHERIES IN MALI

*Submitted by Hillary Egna, Principal Investigator*

In September, 2007, the ME responded to a request from the USAID mission in Mali for assistance "to improve the productivity and income of the producers in targeted areas of Mali through facilitation of access to technologies and building the capacity of all actors involved in freshwater fish farming and capture fisheries management in target areas." OSU's proposal, submitted on 10 September 2007 entitled "Aquatic Resource Use and Conservation for Sustainable Freshwater Aquaculture and Fisheries in Mali," laid out a three-year project, beginning on 1 October 2007, and extending through 30 September 2010.<sup>5</sup>

Work to be undertaken in this project would focus primarily on these three Themes:

- Theme I: Pond Culture—Advancing Sustainable Freshwater Aquaculture Practices and Technologies
- Theme II: Rice-Fish—Promoting Sustainable Rice-Fish Aquaculture in Irrigated Systems
- Theme III: Fisheries Planning—Building Community and Consensus towards a Fisheries Management Plan

<sup>5</sup> In late October 2007, OSU was notified by USAID-Mali that the award had indeed been made, thus establishing the first Associate Award granted under the AquaFish CRSP primary award.

The AquaFish CRSP Mali Project will take a South-South approach to development, in which the scientific expertise and practical experience of former Aquaculture CRSP colleagues from two Kenyan institutions (Moi University and FishAfrica) and one Chinese institution (Shanghai Fisheries University) will be brought to bear on the three areas being addressed. Moi University collaborator Dr. Charles Ngugi will lead the Theme I effort on pond culture, Dr. Yang Yi of Shanghai Fisheries University will focus on Theme II (rice-fish culture), and FishAfrica's Director Mrs. Nancy Gitonga will lead Theme III's fisheries planning effort. Following selection of a suitable Malian counterpart institution, Malian counterparts will be identified to co-lead the three themes.

Initial activities will include a scoping visit to Mali, to be conducted by the three theme leaders. This visit will enable them to familiarize themselves with conditions and needs in-country, to work with USAID/Mali partners to identify a suitable host-country institution for the project, and to gather needed information for the development of budgets and work plans for the undertaking.

Work plan development will be the second key activity to be undertaken by project leaders. It is expected that the main activities undertaken to achieve project goals will be workshops, field trials and demonstrations, lake surveys, and stakeholders meetings.



## V. LESSONS LEARNED

*Submitted by Hillary Egna, CRSP Director*

Several lessons were learned within the projects and those are offered in the preceding pages, within the report submissions. In addition, the CRSP ME felt that running two CRSPs simultaneously was a challenge as there were fewer economies of scale than hoped. Labor was fully utilized on the ACRSP and could not easily be extended to the new AquaFish CRSP effort. However, probably most significantly is that periods of closedown and startup are incredibly labor intensive, and both require the use of trained staff with broad institutional memories. When there are no redundancies, labor is stretched thin and recipes for burnout arise.

Funding continues to be a challenge, with universities required to commit greater and greater matching contributions against shrinking State budgets. A corollary is not to underfund management efforts. The ME is relied upon for all manners of things from USAID, projects, and from the international aquaculture arena that require staff time and resources for travel. While expecting and achieving efficiencies by doing more electronically and on-line, the need for personal contributions was underestimated. Trained, knowledgeable staff are needed to answer non-routine questions from projects, USAID, and elsewhere. Indeed, the number and variety of questions coming from USAID has increased considerably over the past years, which is an occurrence that the CRSP Council has noted. In itself, the increased frequency and need for immediate communications with USAID is not a bad thing, and could indeed be a pathway toward better communication overall. But MEs need to build internal capacity and devote necessary resources to handle the upsurge.

Looking back, 2006-07 was a year of great challenges and promise, with new directions in research and new partners to assimilate. Having prior experience with training participants in the CRSP "way" of real collaboration, strictly involving HC colleagues in all choices and decisions, helped when integrating new partners under the AquaFish CRSP during Spring and Summer of 2007. The good fortune of having a mix of project finalists helped, two with a lot of prior CRSP experience, two with only a passing familiarity, and two newcomers. What was missing was the immediate sense of strong relationship bonds. One could readily observe those bonds in the old ACRSP. Indeed, the EPAC commented in Texas at the CRSP annual meeting that the sense of family was palpable and that the Director had achieved a wonderful goal of bringing together so much diversity harmoniously. The whole was much larger than the sum of its parts. In the new CRSP, we are continuing to strive to create that same strong sense of community, and we are confident that it will come.



## VI. FINANCIAL SUMMARY

### PROGRAM FUNDING

#### AquaFish CRSP

#### USAID Funding to date

Date of Award	Description	Estimated Grant Amount	Amount Obligated Core
29 September 2006	Original grant	8,900,000	900,000
18 September 2007	Modification 1		2,760,000
			<b>3,660,000</b>

These financial data are intended to supplement and not replace the official financial reports filed by the University with USAID. SF269 reports and other financial data are sent to the offices indicated in the CA/LWA on a quarterly basis. This section provides a snapshot of program funding through this reporting period.

Of the \$3.66 million awarded to CRSP for its first year of operation, through the end of this current reporting period, two-thirds was allocated to lead research projects. Another 20% went to central research and capacity building activities, and less than 14% went to management.

#### AquaFish CRSP Allocation Summary for the 2006-07 reporting year

LOCATION / PI	Projected end date for current contract	Approved (Completed) Budget
<b>Lead Research Projects</b>		
University of Arizona	30 September 2009	\$400,401.00
University of Michigan	30 September 2009	\$428,800.00
North Carolina State University	30 September 2009	\$339,828.00
Purdue University	30 September 2009	\$434,823.00
University of Connecticut	30 September 2009	\$458,441.00
University of Hawai'i	30 September 2009	\$300,000.00
Indirect on subcontracts less than \$25,000 paid for by ME on behalf of subcontractors		\$62,250.00
<b>Total Lead Research Projects</b>		<b>\$2,424,543.00</b>
Capacity Building and Host Country	30 September 2011	\$488,158.00
Synthesis Project	30 September 2011	\$240,000.00
<b>Total Central Research</b>		<b>\$728,158.00</b>
Management	30 September 2011	\$507,299.00
<b>TOTAL PROGRAMMED FROM USAID OBLIGATIONS</b>		<b>\$3,660,000.00</b>

**Anticipated IEHA Attribution from Inception through 30 September 2008**

Purdue Project (Kenya and Ghana)	\$354,927.00
Purdue Subcontract Cost	\$10,375.00
Apportionment of Central Projects/ Activities	\$247,573.72
Apportionment of Management	\$172,481.66
<b>Total More than meets the 25% goal</b>	<b>\$785,357.38</b>
25% of USAID obligations to date (\$3.66M)	\$915,000.00

Country level reporting shows attributions across the board. The idea is that all aspects of the program support the CRSP mission primarily in various countries, and secondarily to a much lesser extent in the US.

**Estimated Country-Level Allocations to be made by Lead Research Projects, as stated in their 2007-2009 Project Award Coversheets**

Mexico	\$527,171
Guyana	\$43,974
Egypt	\$31,564
Nepal	\$63,603
China	\$337,197
Vietnam	\$245,695
Philippines	\$299,023
Indonesia (split with Philippines)	\$40,805
Tanzania	\$79,896
Kenya	\$232,015
Ghana	\$122,912
Cambodia	\$242,746
Nicaragua	\$63,709
USA or unassigned	\$94,233
<b>Total</b>	<b>\$2,424,543</b>

**MATCHING FUNDS**

Each project supplies an additional 50% or more of matching funding from participating institutions. That translates to an additional 50 cents for every core research dollar supplied by USAID. Indeed, most researchers report even higher rates of leveraging when accounting for external sources of match not provided by their institutions. CRSP funds are not used to support US expatriate personnel, as the CRSP model is intended to build institutional networks and capacities. In furtherance of the Title XII initiative that authorizes all CRSPs, projects also demonstrate return benefits to the US. Under Title XII, CRSP has responsibility to provide mutual benefits and discoveries that can apply to the HC region and US and that will support future development of sustainable aquaculture and fisheries.



## APPENDICES

- Appendix A. Management Team & Program Participants
- Appendix B: Newspaper Coverage of USAID Award Announcement
- Appendix C. EIP Review and Comment on RFP
- Appendix D. Pre-RFP Release Notification
- Appendix E: RFP—Global Research, Capacity Building, and Institutional Development in Aquaculture and Aquatic Resources Management
- Appendix F: Checklist for Proposals
- Appendix G: Proposal Review Criteria
- Appendix H. Linkages
- Appendix I. Acroynms



## APPENDIX A MANAGEMENT TEAM & PROGRAM PARTICIPANTS

### MANAGEMENT TEAM, OREGON STATE UNIVERSITY, CORVALLIS, OREGON USA

Hillary Egna	Director
Karl Kosciuch*	Research Projects Manager
Jim Bowman**	Capacity-Building & HCPI Project Coordinator; RPM from April 2007
Dwight Brimley**	Office / Business Manager

\*from November 2006 to March 2007

\*\*part-time

### UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT, WASHINGTON, DC USA

Harry Rea	Cognizant Technical Officer
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### ADVISORY BODIES

#### *External Program Advisory Council*

Christine Crawford	Chair, University of Tasmania, Hobart, Australia
Jason Clay	World Wildlife Fund, Washington, DC
Nathanael Hishamunda	FAO, Rome, Italy
Marcia Macomber	CGIAR Challenge Program on Water & Food, Sri Lanka

#### *Development Themes Advisory Panel: Lead Coordinators*

Maria Haws	DTAP A	University of Hawai'i at Hilo
Kwamena Quagraine	DTAP B	Purdue University
James Diana	DTAP C	University of Michigan
Robert Pomeroy	DTAP D	University of Connecticut–Avery Point

#### *Regional Centers of Excellence: Lead Coordinators*

Charles Ngugi	Africa	Moi University, Kenya
Remedios Bolivar	Asia	Central Luzon State University, Philippines
Wilfrido Contreras-Sánchez	LAC	Universidad Juárez Autónoma de Tabasco, Mexico

#### *Ex-Officio Members*

Harry Rea	USAID
Hillary Egna	Oregon State University

## LEAD RESEARCH PROJECT PARTICIPANTS

<i>North Carolina State University</i>		
<u>Participants</u>	<u>Status</u>	<u>Country</u>
<b>USA</b>		
Russell Borski	US Lead PI	North Carolina State University
Peter R. Ferket	Investigator	North Carolina State University
Upton Hatch	Investigator	North Carolina State University
Charles R. Stark	Investigator	North Carolina State University
Kevin Fitzsimmons	US Co-PI	University of Arizona
Christopher Brown	US Co-PI	US Department of Commerce-NOAA
<b>Philippines</b>		
Remedios B. Bolivar	HC Lead PI	Central Luzon State University
Wilfred Jamandre	Investigator	Central Luzon State University
Emmanuel M. Vera Cruz	Investigator	Central Luzon State University
Nelson A. Lopez	HC Co-PI	Bureau of Fisheries & Aquatic Resources
Hernando L. Bolivar	HC Co-PI	GIFT International Foundation
Evelyn Grace T. de Jesus-Ayson	HC Co-PI	SEAFDEC-AQD
Felix G. Ayson	Investigator	SEAFDEC-AQD
Nelson Golez	Investigator	SEAFDEC-AQD
Josette Gonzaga	Investigator	SEAFDEC-AQD
Anicia Hurtado	Investigator	SEAFDEC-AQD
<b>Indonesia</b>		
Sugeng Raharjo	HC Co-PI	Ujung Batee Aquaculture Center, Banda Aceh
<i>Purdue University</i>		
<u>Participants</u>	<u>Status</u>	<u>Country</u>
<b>USA</b>		
Kwamena Quagraine	US Lead PI	Purdue University
Jennifer Dennis	Investigator	Purdue University
Rebecca Lochmann	US Co-PI	University of Arkansas at Pine Bluff
Carole Engle	Investigator	University of Arkansas at Pine Bluff
Emmanuel Frimpong	US Co-PI	Virginia Polytechnic Institute & State University
<b>Kenya</b>		
Charles Ngugi	HC Lead PI	Moi University
John Makambo	Investigator	Moi University

*Purdue University (cont)*

<u>Participants</u>	<u>Status</u>	<u>Country</u>
<b>Ghana</b>		
Stephen Amisah	HC Co-PI	Kwame Nkrumah University of Science & Technology
Paul Sarfo-Mensah	Investigator	Kwame Nkrumah University of Science & Technology
<b>Tanzania</b>		
Sebastian Chenyambuga	HC Co-PI	Sokoine University of Agriculture
Kajitanus Osewe	HC Co-PI	Ministry of Natural Resources & Tourism, Aquaculture Division

*University of Arizona*

<u>Participants</u>	<u>Status</u>	<u>Country</u>
<b>USA</b>		
Kevin M. Fitzsimmons	US Lead PI	University of Arizona
Reynaldo Patiño	US Co-PI	Texas Tech University-Lubbock
Dennis McIntosgh	Investigator	Delaware State University
<b>Mexico</b>		
Wilfrido Contreras-Sánchez	HC Lead PI	Universidad Juárez Autónoma de Tabasco
Alfonso Alvarez-González	Investigator	Universidad Juárez Autónoma de Tabasco
Gabriel Márquez Couturier	Investigator	Universidad Juárez Autónoma de Tabasco
Salomon Páramo Delgadillo	Investigator	Universidad Juárez Autónoma de Tabasco
Mario Fernández-Pérez	Investigator	Universidad Juárez Autónoma de Tabasco
Arlette Hernández Franyutti	Investigator	Universidad Juárez Autónoma de Tabasco
Ulises Hernández-Vidal	Investigator	Universidad Juárez Autónoma de Tabasco
Rosa Martha Padrón-López	Investigator	Universidad Juárez Autónoma de Tabasco
Pablo Gonzales Alanis	HC Co-PI	Universidad Autónoma de Tamaulipas
Mauricio A. Ondarza	Investigator	Universidad Autónoma de Tamaulipas
Roberto Arosemena	HC Co-PI	Instituto Sinaloense de Acuacultura, Mazatlán
<b>Guyana</b>		
Tejnarine Geer	HC Co-PI	Department of Fisheries
Kalima Singha	Investigator	Department of Fisheries
<b>Venezuela</b>		
Paul Rincones	HC Co-PI	BIOTECMAR
<b>Egypt</b>		
Ahmed Said Diab	Investigator	Central Laboratory for Aquaculture Research

APPENDIX A. MANAGEMENT TEAM & PROGRAM PARTICIPANTS

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*University of Arizona (cont)*

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<u>Participants</u>	<u>Status</u>	<u>Country</u>
		<b>Lebanon</b>
Imad Saoud	Investigator	American University of Beirut

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*University of Connecticut–Avery Point*

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<u>Participants</u>	<u>Status</u>	<u>Country</u>
		<b>USA</b>
Robert S. Pomeroy	US Lead PI	University of Connecticut-Avery Point
Sylvain De Guise	Investigator	University of Connecticut-Avery Point
Tessa Getchis	Investigator	University of Connecticut-Avery Point
David Bengtson	US Co-PI	University of Rhode Island
Chong Lee	Investigator	University of Rhode Island
		<b>Cambodia</b>
So Nam	HC Lead PI	IFReDI
Hap Navy	Investigator	IFReDI
Prum Somany	Investigator	IFReDI
Kao Sochivi	Investigator	IFReDI
		<b>Vietnam</b>
Tran Thi Thanh Hien	HC Co-PI	Can Tho University
Le Xuan Sinh	Investigator	Can Tho University
Tran Le Cam Tu	Investigator	Can Tho University

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*University of Hawai'i at Hilo*

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<u>Participants</u>	<u>Status</u>	<u>Country</u>
		<b>USA</b>
Maria Haws	US Lead PI	University of Hawai'i at Hilo
Sharon Ziegler-Chong	Investigator	University of Hawai'i at Hilo
William Steiner	Investigator	University of Hawai'i at Hilo
John Supan	US Co-PI	Louisiana State University
		<b>Mexico</b>
Eladio Gaxiola Camacho	HC Lead PI	Universidad Autónoma de Sinaloa-Culiacán
Ambrocio Mojardin Heraldez	Investigator	Universidad Autónoma de Sinaloa-Culiacán
Guillermo Rodriguez Domingo	HC Co-PI	Universidad Autónoma de Sinaloa-Mazatlán
Omar Calvario Martinez	HC Co-PI	CIAD

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***University of Hawai'i at Hilo (cont)***


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<u>Participants</u>	<u>Status</u>	<u>Country</u>
		<b>Nicaragua</b>
Agnes Saborio	HC Co-PI	CIDEA-UCA
Nelvia Hernandez	Investigator	CIDEA-UCA
Erick Sandoval Palacios	Investigator	CIDEA-UCA

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***University of Michigan***


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<u>Participants</u>	<u>Status</u>	<u>Country</u>
		<b>USA</b>
James S. Diana	US Lead PI	University of Michigan
Flavio Corsin	US Co-PI	World Wildlife Fund in Asia
		<b>China</b>
Yang Yi	HC Lead PI	Shanghai Fisheries University
Jiang Min	Investigator	Shanghai Fisheries University
Liu Liping	Investigator	Shanghai Fisheries University
Lai Qiuming	HC Co-PI	Hainan University
Wang Weimin	HC Co-PI	Huazhong Agricultural University
Song Biyu	HC Co-PI	Wuhan University
		<b>Nepal</b>
Madhav K. Shrestha	HC Co-PI	Institute of Agriculture & Animal Science
		<b>Vietnam</b>
Le Thanh Hung	HC Co-PI	University of Agriculture & Forestry

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## APPENDIX B NEWSPAPER COVERAGE OF USAID AWARD ANNOUNCEMENT

Newspaper coverage of the award announcement was carried locally and across the USA. Among the local articles was this 18 October 2006 story in the *Corvallis Gazette Times* [www.gazettetimes.com/articles/2006/10/18/news/community/4loc02osugrant.txt](http://www.gazettetimes.com/articles/2006/10/18/news/community/4loc02osugrant.txt):



Last modified: Tuesday, October 17, 2006 9:36 PM PDT

### OSU gets \$8.9 million grant for aquaculture, fisheries project

By Mark Floyd  
OSU News Service

Oregon State University has received a five-year, \$8.9 million grant from the U.S. Agency for International Development to lead a new research program designed to reduce poverty in developing countries by improving access to fish and water resources.

OSU will lead the Aquaculture and Fisheries Collaborative Research Support Program, partnering with other universities and institutions around the world.

"Poverty remains the single biggest threat to children's health today, and giving the poor better access to well-managed water resources can help toward the eradication of poverty," said Hillary Egna, an international aquaculture specialist in OSU's College of Agricultural Sciences and director of the new program.

"Our goal is to create global partnerships that develop sustainable solutions in aquaculture and fisheries for improving health, building wealth, conserving natural environments for future generations and strengthening poor societies' ability to self-govern."

Most of the grant money will be meted out to research teams from institutions around the world that will apply to the new center for funding, and competitive proposals for multi-disciplinary projects will be accepted beginning this fall. Roughly one-third of the research funds will target each of three regions in Africa, Asia and Latin America/Caribbean.

OSU has directed a Collaborative Research Support Program (or CRSP) in pond dynamics and aquaculture for years, Egna said. The new program will focus more on increasing access to water, and reducing the number of constraints to using aquaculture and fisheries to promote local economies.

"We've made a lot of progress over the last 20 years in increasing fish production through aquaculture," she said, "but challenges still remain in terms of pressures from global trade, environmental impacts, water use conflicts and the distribution of benefits."

Egna said the "capture" fisheries sector supplies a majority of the world's fishery products. Aquaculture is gaining market share and can generate a lot of money for developing countries. However, the profits from those export-oriented aquaculture enterprises don't always benefit local economies as much as they could.

Increasing the ability of developing countries to build their infrastructure and capacity through training and education is another primary goal, Egna pointed out.

"In one country, it might be access to fingerlings that is the critical roadblock to building aquaculture," she said. "In another area, it might be limited educational opportunities for women, where a community-based outreach model could be implemented.

"Ultimately, we want to give producers and other stakeholders in developing countries better options to help their people," she added. "Our goal is not to go in there and tell them what to do."

The U.S. Agency for International Development administers the U.S. foreign assistance program, providing economic and humanitarian assistance in more than 120 countries worldwide.



## APPENDIX C EIP REVIEW & COMMENT ON RFP

A conference call meeting with the EIP was held on 12 October 2006 (see meeting minutes below). During that call, the Director requested review and comment on the RFP by 26 October to be discussed in a follow-up meeting and incorporated in a White Paper. Since there were no substantive comments from the EIP on the RFP beyond concurrence with the RFP as written, the follow-up meeting was not held nor was a White Paper produced. ME revised the RFP following EIP comment.



### AQUACULTURE & FISHERIES CRSP EMERGING ISSUES PANEL (EIP) CONFERENCE CALL MINUTES October 12, 2006 1:00pm

#### *Participants:*

**Hillary Egna**, AF CRSP Director, OSU College of Agricultural Sciences  
**Flaxen Conway**, Extension Community Outreach Specialist, Sea Grant Extension  
**Richard Johnston**, OSU Agricultural Resource Economics Department, Emeritus  
**Gil Sylvia**, Superintendent of the Coastal Oregon Marine Experiment Station  
**Robert Lackey**, Special Assistant for Salmon Research, USEPA and Faculty OSU Department of Fisheries and Wildlife  
**David Noakes**, Faculty OSU Department of Fisheries and Wildlife and Senior Scientist and Director of the Oregon Hatchery Resource Center  
**Michael Morrissey**, Director, OSU Agricultural Experiment Station – Seafood Laboratory (joined at 1:25)

#### *Item one, Introductions:*

Hillary thanked the panel members for participating and asked panel members to introduce themselves. She named the members who could not participate in this call:  
 Aaron Wolf, Faculty, OSU Geosciences Department  
 Michael Campana, Director, OSU Institute for Water and Watersheds

#### *Item two, EIP overview:*

Hillary talked about the composition and scope of the Emerging Issues Panel (EIP). This new panel is composed heavily of people in fisheries because the existing Aquaculture CRSP has already made a lot of connections with advisors in Aquaculture, and there was a need to tap into expertise in fisheries. The older, established Aquaculture CRSP is operating concurrently with the new CRSP and Hillary is serving as Director of both programs. The Aquaculture CRSP is expected to be phased out through 2007. The new AF CRSP has a much heavier emphasis on economics, marketing, processing and community outreach. Hillary then read the description of the EIP from the RFP document and asked if there were any questions from the panel.

Hillary mentioned the other advisory panels: External Program Advisory Council (EPAC); AF CRSP's two internal advisory panels (Regional Centers of Excellence, Development Themes Advisory Panel); and Institutional Representatives (IR).

Hillary mentioned that USAID may be interested in seeking advice from panelists on a specific topic in Fisheries or Aquaculture, and that they may make a request, through her, to an EIP member for that expertise. Each member would have the option of taking advantage of those opportunities or not at their discretion.

***Item three, Conflict of Interest:***

Hillary initiated a discussion of conflict of interest. She stated that members of the EIP would not be eligible to apply for awards through the AF CRSP. Prior to calling for EIP members to review the AF CRSP Sample Solicitation, she asked that any EIP members who thought that they might be interested in applying for an award remove themselves from the conference call before a discussion of the Sample Solicitation so as to avoid any potential conflict of interest arising from having advance knowledge of the nature of the Sample Solicitation. Dick Johnston expressed a willingness to be involved in the review, but was concerned about the time commitment, and due date. Hillary clarified that SS would go out to the panel members today, and that she would need a response within two weeks. Dick asked about the scope of the review and the criteria that the panel would use to evaluate it. Hillary asked if any members who might want to apply for an award would recuse themselves before going into the details. David Noakes stated that he might want to apply, and recused himself from the conference call at this point.

***Item four, Sample Solicitation:***

Hillary gave a brief overview of the review process for the SS and the due date for receiving review comments (two weeks from today). She then went on to give a brief overview of how a CRSP worked, i.e. developing relationships with institutions and individuals in Host Countries, getting stakeholder input in design of research and outreach to best serve stakeholders, and in making use of cost sharing to leverage USAID funds. Hillary spoke to the differences between the ACRSP and the new AF CRSP. She stated that the RFP focused on Aquaculture and the nexus areas where aquaculture and fisheries meet, i.e. fish processing, developing markets, watershed management, etc. The two broad areas for the new program are “Integrated Production Systems” (classic aquaculture, including system design and best management practices, indigenous species development, sustainable feed technologies, and seed stock development) and “People, Livelihoods and Ecosystem Interrelationships” (human health impacts, marketing, economic risk assessment and trade, food safety and value added product development, technology and policy development, watershed and coastal zone management, and mitigating negative environmental impacts). It is expected that winning proposals would address both of these broad areas and a number of the topic areas (in parentheses). Hillary asked the panel to consider the most important emerging issues within each of these categories as they related to improving the position of poor people. Gil asked if an offshore marine fishery would qualify for a grant under this program, Hillary said, no, but a near shore fishery could if it had other components related to the program goals. Mike asked if shellfish were included in this program and Hillary said they were and plant cultivation could also qualify. Dick said that many of these issues have not been fully developed, and asked to what extent basic research on these topics was allowed. Hillary stated that the program is mostly concerned with applied theory, but that some basic research would be allowed as a subsidiary consideration, with clear deliverables and a focus on helping poor people would be required.

***Item five, Best use of EIP***

Gil asked if the list of emerging issues that the individual panelists were to give to Hillary would be shared with the group, and if there would be discussion among the group on the issues. He wondered what the best use of the group would be to assist the AF CRSP. Hillary said that she would distill the list of issues generated by the panel and that they could then go into a draft white paper that could be the basis of a discussion with the group. Gil suggested that the Panel get together and discuss the core issues that would affect emerging issues and the recommendations of the panel. The consensus of the panel was that a face-to-face meeting would be helpful. Hillary noted there would not be time to have a meeting prior to the first RFP, but that she could put out a White Paper based on EIP review comments, and it could be the basis for discussion at the meeting. The white paper could then be distilled into a briefing document for peer-review proposal panels. Hillary confirmed that there would need to be an

EIP for the life of the Award to deal with not only the first RFP but for subsequent requests such as the Synthesis Project.

Hillary asked for written comments within two weeks, by 26 October, and stated a meeting would be scheduled sometime after that. The meeting will be scheduled for an on-campus location at a time most convenient to all, sometime between November and late January.

*Item last, Wrap up.*

Hillary thanked the panel members and confirmed that she would send out the sample solicitation today and would need written comments within two weeks.



## APPENDIX D PRE-RFP RELEASE NOTIFICATION

The Pre-RFP Release Notification was sent out to multiple listserves including those of USAID, USDA, NOAA, CRSPs, CRSP Council, LaDon Swann, and IIFET. Given the size of these lists, the notice reached a potential audience of 100,000 people.

### **PRE-RFP RELEASE NOTIFICATION FOR THE AQUACULTURE & FISHERIES COLLABORATIVE RESEARCH SUPPORT PROGRAM (CRSP) [ISSUED 29 OCTOBER 2006]**

Oregon State University will release a Request for Proposals (RFP) in late November 2006. The RFP will invite 30-month proposals for the period of 1 April 2007 through 30 September 2009. Based on current budget projections, about 8 awards of approximately \$400,000 each will be made to eligible US universities or colleges to serve as Lead Partners. Eligibility will be specified in the RFP.

Awards made under the RFP will focus on aquaculture and the nexus between aquaculture and fisheries. Fisheries-only topics will not be addressed under this RFP. Projects are envisioned to comprise many partners in a multi-disciplinary, multi-institutional approach to solve a development problem. Lead Partners are expected to assume strong administrative and technical leadership for projects, be involved in advisory groups serving the overall program, and form collaborative partnerships through sub-awards to developing country institutions, NGOs, IARCs, private sector firms, and other US universities or colleges. Matching support (non-federal cost share) is required and will be specified in the RFP. Proposals will be peer-reviewed through an open and competitive process.

Applicants will select a USAID-eligible country for their base operations and are encouraged to involve satellite countries to broaden the potential impact of their results. Further information regarding eligible countries will be provided in the RFP. Prospective applicants will be explicitly informed of all requirements via the RFP and the RFP website, currently under development. Evaluation criteria, budget forms, reporting requirements, and other documents will be available from the website upon release of the RFP. The Director will also be available to answer questions and provide a matchmaking service once the RFP has been released. The Director can be reached at [acrsp@onid.orst.edu](mailto:acrsp@onid.orst.edu).

The Aquaculture & Fisheries CRSP is a brand new 5-year program awarded to Oregon State University on 29 September 2006 by USAID. CRSP funding is provided by USAID, OSU, and its partners. Activities under the concurrent Aquaculture CRSP can be viewed at [pdacrsp.oregonstate.edu/](http://pdacrsp.oregonstate.edu/). The goal of the new Aquaculture & Fisheries CRSP is to “develop more comprehensive, sustainable, ecological and socially compatible, and economically viable aquaculture systems and innovative fisheries management systems in developing countries that contribute to poverty alleviation and food security.”



## APPENDIX E RFP—GLOBAL RESEARCH, CAPACITY BUILDING, & INSTITUTIONAL DEVELOPMENT IN AQUACULTURE & AQUATIC RESOURCES MANAGEMENT

### AQUACULTURE & FISHERIES COLLABORATIVE RESEARCH SUPPORT PROGRAM

#### REQUEST FOR PROPOSALS:

GLOBAL RESEARCH, CAPACITY BUILDING, AND  
INSTITUTIONAL DEVELOPMENT IN AQUACULTURE  
AND AQUATIC RESOURCES MANAGEMENT



**IMPORTANT DATES**      Date of Release: 23 November 2006  
    Proposals are Due (10 weeks): 31 January 2007  
    Announcement of Selections: 31 March 2007

This Request for Proposals is issued by the Management Entity of the Aquaculture & Fisheries CRSP, Snell Hall 418, Oregon State University, Corvallis, Oregon, 97331 USA. Website: <http://pdacrsp.oregonstate.edu/afcrsp> Email: [acrsp@oregonstate.edu](mailto:acrsp@oregonstate.edu)

The Aquaculture & Fisheries CRSP (CRSP) Management Entity (ME) is inviting proposals for solving critical problems facing global aquaculture development and aquatic resources management in lower-income countries. The Aquaculture & Fisheries CRSP is managed by Oregon State University under a five-year award from the US Agency for International Development (USAID). This RFP is designed to attract proposals that will develop linkages between the United States and selected Host Countries for Global Research, Capacity Building, and Institutional Development. Proposals must target regions and themes in furtherance of USAID's goals, as described in this RFP.

A single US institution will be the Lead Partner Institution for each proposal. Eligible lead institutions include US universities, colleges, and minority-serving institutions (see shaded box for details). Lead Partners are expected to assume strong administrative and technical leadership for projects, be involved in advisory groups serving the overall program, and form collaborative partnerships through sub-awards to developing country institutions, NGOs, IARCs, private sector firms, and other US universities or colleges.

The total award period under this RFP will be 2.5 years, from April 1, 2007 to September 30, 2009. Proposals will ideally include the participation of other US institutions to be funded by the Lead Partner Institution by means of secondary subcontracts. Host Country (HC) institution involvement is mandatory and will be funded via the Lead Partner Institution's award.

The average funding level available for 30-month multi-institutional and multi-disciplinary proposals is \$400,000. The program's flexibility in the number of proposals that will be funded depends on the overall funding received from USAID. Under current funding projections, up to eight Lead Partner awards are anticipated to be made to eight different institutions. Funding is typically allocated on an annual basis. All allocations are contingent on the annual funding level obtained from USAID and on performance under subcontract provisions.

A successful proposal will focus on one theme (p. 2) in one or more geographic regions (p. 5). Each proposal will likely include multiple investigations that each target one of the identified research topics (p. 3 to 4). Investigations are discussed in this RFP in more detail under Technical Considerations (p. 6). Proposals must address how they will align with overall Program goals.

The goal of the new Aquaculture & Fisheries CRSP as stated by USAID is to "develop more comprehensive, sustainable, ecological and socially compatible, and economically viable aquaculture systems and innovative fisheries management systems in developing countries that contribute to poverty alleviation and food security." (USAID, May 2006)

#### Eligibility for Lead Partner Institution

*Based on Section 269(d) of Title XII of the Foreign Assistance Act of 1961, as amended, an eligible university or college is defined as: "... those colleges or universities in each State, territory, or possession of the United States, or the District of Columbia, now receiving, or which may hereafter receive, benefits under the Act of July 2, 1862 (known as the First Morrill Act) or the Act of August 30, 1890 (known as the Second Morrill Act), which are commonly known as 'land-grant' universities; institutions now designated or which may*

*hereafter be designated as sea-grant colleges under the Act of October 5, 1966 (known as the National Sea Grant College and Program Act), which are commonly known as sea-grant colleges; Native American land-grant colleges as authorized under the Equity in Educational Land-Grant Status Act of 1994 (7 U.S.C. 301 note); and other United States colleges and universities which – (1) have demonstrable capacity in teaching, research, and extension (including outreach) activities in the agricultural sciences; and (2) can contribute effectively to the attainment of the objectives of this title."*

**Eligibility for Additional Partners under the Lead:** Public and private entities such as other universities, colleges, minority-serving institutions, companies, international non-government organizations (NGOs), and others with resources and relevant experience for conducting research, training and outreach activities, and implementing research projects, are eligible to apply. For-profit firms may participate as sub-awardees but, pursuant to 22 CFR 226.81, it is USAID policy not to award profit under assistance instruments such as cooperative agreements. All reasonable, allocable, and allowable expenses, both direct and indirect, which are related to the program and are in accordance with applicable cost standards (22 CFR 226, OMB Circular A-122 for non-profit organization, OMB Circular A-21 for universities, and the Federal Acquisition Regulation (FAR) Part 31 for-profit organizations), may be paid under the CRSP. US Minority-Serving Institutions include those mandated as Historically Black Colleges and Universities (HBCU), Tribal Colleges and Universities, Asian American and Pacific Islander (AAPI) Serving Institutions, and Hispanic Serving Institutions.

This Request for Proposals is issued by the Management Entity of the Aquaculture & Fisheries Collaborative Research Support Program, Oregon State University, Corvallis, Oregon, USA, under Leader with Associates Cooperative Agreement No. EPP-A-00-06-00012-00. The ME will notify Lead Principal Investigators (PIs) of rankings on or around 31 March 2007. Lead PIs will be notified if the selection decision will be delayed. The ME reserves the right to modify this schedule as necessary to ensure that standards of fairness and accuracy are met. Actual awards are contingent on funding received by the ME. Assuming timely funding by USAID, projects are anticipated to begin 1 April 2007. As this RFP solicits 30-month projects, all investigations should be completed and all final reports submitted by 30 September 2009. All eligible institutions are encouraged to apply. Proponents with a demonstrable commitment to promoting and enhancing diversity are encouraged to apply.

*Disclaimer: Issuance of this RFA does not constitute an award commitment on the part of Oregon State University, nor does it commit the University to pay for costs incurred in the preparation or submission of an application. In addition, final award of any resultant sub-awards cannot be made until funds have been fully appropriated, allocated, and committed through internal OSU procedures. While it is anticipated that these procedures will be successfully completed, potential applicants are hereby notified of these requirements and conditions for award. Applications are submitted at the risk of the applicant. Should circumstances prevent award of a project, all preparation and submission costs are at the applicant's expense.*

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## GLOBAL THEMES

The four global themes of the CRSP are cross-cutting and address several specific USAID policy documents and guidelines, including the *Policy Framework for Bilateral Foreign Aid, Agriculture Strategy*, EGAT Offices of Agriculture and Natural Resource Management Strategic Objectives, and IEHA (Initiative to End Hunger in Africa). To see how these themes relate to USAID's focal areas and for additional information on these USAID documents, please refer to the CRSP RFP website: *USAID Goals and Guidelines*. The overall research context for this RFP is poverty alleviation and food security improvement through sustainable aquaculture development and aquatic resources management. **Proponents will identify one primary theme (goal) for their overall proposal.** Proposals must address all four themes in an integrated systems approach, but will primarily focus on one theme as it relates to producing positive development outcomes:

### Global Aquaculture & Fisheries CRSP Themes (Goals)

- A. Improved Health and Nutrition, Food Quality, and Food Safety
- B. Income Generation for Small-Scale Fish Farmers
- C. Environmental Management for Sustainable Aquatic Resources Use
- D. Enhanced Trade Opportunities for Global Fishery Markets

The CRSP will be managed in a manner that achieves maximum program impacts, particularly for small-scale farmers and fishers, in Host Countries and more broadly. CRSP overall program objectives address the need for world-class research, capacity building, and information dissemination. Specifically, the Aquaculture & Fisheries CRSP will strive to:

- Develop sustainable end-user level aquaculture and fisheries systems to increase productivity, enhance international trade opportunities, and contribute to responsible aquatic resource management;
- Enhance local capacity in aquaculture and aquatic resource management to ensure long-term program impacts at the community and national level;
- Foster wide dissemination of research results and technologies to local stakeholders at all levels, including end users, researchers, and government officials; and
- Increase Host Country capacity and productivity to contribute to national food security, income generation, and market access.

## AQUACULTURE & FISHERIES CRSP TOPIC AREAS FOR RESEARCH, OUTREACH AND CAPACITY BUILDING

Thematic proposals will contain implementation plans (investigations) organized around a number of specific areas of inquiry (called Topic Areas). **Proponents will identify one topic area for each investigation in the proposal.** Proposals may contain between one and ten investigations (see p. 9). Thus, proposals may focus on more than one topic area in describing aquaculture research that will improve diets, generate income for small-holders, manage environments for future generations, and enhance trade opportunities. Proposals should be formed around *core program components*, as identified by USAID:

- a systems approach
- social, economic, and environmental sustainability
- capacity building and institution strengthening
- outreach, dissemination, and adoption;
- gender integration

A systems approach requires that each CRSP project integrate topic areas from both *Integrated Production Systems*, and *People, Livelihoods and Ecosystem Interrelationships* (see below).<sup>\*</sup> USAID also encourages the CRSP portfolio (the sum of all funded projects) to address biodiversity conservation and non-GMO biotechnology solutions to critical issues in aquaculture. While not every investigation will individually address each element recommended by USAID, **overall the proposal must describe a comprehensive development approach to a problem.**

**Topic Areas** pertain to aquaculture AND the nexus between aquaculture and fisheries. Some of the following topic areas overlap and are interconnected. Select each topic area so that it best describes each individual investigation. Select a range of topic areas so that together they address the broader theme (goal). The text under each topic area is provided for illustrative purposes and is not prescriptive.

### RESEARCH AND OUTREACH TOPIC AREAS: INTEGRATED PRODUCTION SYSTEMS

#### • Production System Design and Best Management Alternatives

Aquaculture is an agricultural activity with specific input demands. Systems should be designed to improve efficiency and/or integrate aquaculture inputs and outputs with other agricultural and non-agricultural production systems. Systems should be designed so as to limit negative environmental impacts. CRSP research should benefit small-holder or low- to semi-intensive producers, and focus on low-trophic species for aquaculture development. Research on soil-water dynamics and natural productivity to lessen feed needs were fundamental to the Aquaculture CRSP; critical new areas of research may be continued. Interventions for disease and predation prevention must adopt an integrated pest management (IPM) approach and be careful to consider consumer acceptance and environmental risk of selected treatments.

#### • Sustainable Feed Technology

Methods of increasing the range of available ingredients and improving the technology available to manufacture and deliver feeds is an important research theme. Better information about fish nutrition can lead to the development of less expensive and more efficient feeds. Investigations on successful adoption, extension, and best practices for efficient feed strategies that reduce the “ecological footprint” of a species under cultivation is encouraged. Feed research that lessens reliance on fish meals/proteins/oils and lowers feed conversion ratios is desired, as is research on feeds (ingredients, sources, regimes, formulations) that result in high quality and safe aquaculture products with healthy nutrition profiles.

#### • Indigenous Species Development

Domestication of indigenous species may contribute positively to the development of local communities as well as protect ecosystems. At the same time, the development of new native species for aquaculture must be approached in a responsible manner that diminishes the chance for negative environmental, technical, and social impacts. Research that investigates relevant policies and practices is encouraged while exotic species development and transfer of non-native fishes are not encouraged. A focus on biodiversity conservation, and biodiversity hotspots, as related to the development of new native species for aquaculture is of great interest. Aquaculture can be a means to enhance and restock small-scale capture and wild fisheries resources (Aquaculture-Fisheries Nexus Topic Area). Augmentation of bait fisheries through aquaculture to support capture fisheries is an area of interest, provided there are no net negative environmental effects.

#### • Quality Seedstock Development

Procuring reliable supplies of high quality seed for stocking local and remote sites is critical to continued development of the industry, and especially of small-holder private farms. A better understanding of the factors that contribute to stable seedstock quality, availability, and quantity for aquaculture enterprises is essential. Genetic improvement (e.g., selective breeding) that does not involve GMOs may be needed for certain species that are internationally traded. All genetic improvement strategies need to be cognizant of marketplace pressures and trends, including consumer acceptance and environmental impacts.

<sup>\*</sup> USAID requires scientists to adopt a systems approach for understanding how their research relates to three elements: Livelihoods, Production Landscapes, and Market Forces. The correspondence of these three USAID elements to the Topic Areas above is: Livelihoods and Market Forces = *People, Livelihoods and Ecosystem Interrelationships*; Production Landscapes = *Integrated Production Systems*.

## RESEARCH AND OUTREACH TOPIC AREAS: PEOPLE, LIVELIHOODS, AND ECOSYSTEM INTERRELATIONSHIPS

### • Human Health Impacts of Aquaculture

Aquaculture can be a crucial source of proteins and micronutrients for improved human health, growth, and development. Research on the intrinsic food quality of various farmed fish for human consumption is needed – this might include science-based studies of positive and negative effects of consuming certain farmed fishes. Patterns of fish consumption are not well understood for many subpopulations. Human health can be negatively impacted by aquaculture if it serves as a direct or indirect vector for human diseases. There is interest in better understanding the interconnectedness of aquaculture production and water/vector-borne illnesses such as malaria, schistosomiasis, and Buruli ulcer and human health crises such as HIV/AIDS and avian flu.

### • Food Safety and Value-Added Product Development (Aquaculture-Fisheries Nexus Topic Area)

Ensuring high quality, safe, and nutritious fish products for local consumers and the competitive international marketplace is a primary research goal. Efforts that focus on reducing microbial contamination, HACCP controls and hazards associated with seafood processing, value-added processing, post-processing, and byproduct/waste development are of interest. Consumers and producers alike will benefit from research that contributes to the development of standards and practices that protect fish products from spoilage, adulteration, mishandling, and off-flavors. Certification, traceability, product integrity and other efforts to improve fish products for consumer acceptance and international markets are desired. Gender integration is important to consider as women are strongly represented in the processing and marketing sectors.

### • Technology Adoption and Policy Development

Developing appropriate technology and providing technology-related information to end-users is a high priority. The program encourages research that results in a better understanding of factors and practices that set the stage for near-term technology implementation and that contribute to the development of successful extension tools and methods. Areas of inquiry can include institutional efforts to improve extension related to aquaculture and aquatic resources management; science-based policy recommendations targeting poor subpopulations within a project area, or more broadly (for example, national aquaculture strategies); methods of improving access to fish of vulnerable populations including children (e.g., school-based aquaculture programs); science-based strategies for integrating aquaculture with other water uses to improve wellbeing, such as linkages with clean drinking water and improved sanitation. Policy initiatives that link aquaculture to various water uses to improve human health are needed. Additionally, social and cultural analyses regarding the impacts of fish farming may yield critical information for informing policy development.

### • Marketing, Economic Risk Assessment, and Trade (Aquaculture-Fisheries Nexus Topic Area)

Aquaculture is a rapidly growing industry and its risks and impacts on livelihoods need to be assessed. Significant researchable issues in this arena include cost, price, and risk relationships; domestic market and distribution needs and trends; the relationships between aquaculture and women/underrepresented groups; the availability of financial resources for small farms; and the effects of subsidies, taxes, and other regulations. Understanding constraints across value chains in local, regional, and international markets is of interest, especially as constraints affect competitiveness, market demand, and how to link producers to specific markets.

### • Watershed and Integrated Coastal Zone Management (Aquaculture-Fisheries Nexus Topic Area)

Aquaculture development that makes wise use of natural resources is at the core of the CRSP. Research that yields a better understanding of aquaculture as one competing part of an integrated water use system is of great interest. The range of research possibilities is broad—from investigations that quantify water availability and quality to those that look into the social context of water and aquaculture, including land and water rights, national and regional policies (or the lack thereof), traditional versus industrial uses, and the like. Water quality issues are of increasing concern as multiple resource use conflicts increase under trends toward scarcity or uneven supply and access, especially for freshwater. Ecoregional analysis is also of interest to explore spatial differences in the capacities and potentials of ecosystems in response to disturbances. Innovative research on maximizing water and soil quality and productivity of overall watersheds is of interest. Pollution is a huge concern, as over 50% of people in developing countries are exposed to polluted water sources. Additionally, aquatic organisms cannot adequately grow and reproduce in polluted waters, and aquaculture may not only be receiving polluted waters, but adding to the burden. Rapid urbanization has further harmed coastal ecosystems, and with small-scale fisheries and aquaculture operations in the nearshore, integrated management strategies for coastal areas are also important.

### • Mitigating Negative Environmental Impacts (Aquaculture-Fisheries Nexus Topic Area)

With the rapid growth in aquaculture production, environmental externalities are of increasing concern. Determining the scope and mitigating or eliminating negative environmental impacts of aquaculture—such as poor management practices and the effects of industrial aquaculture—is a primary research goal of this program. A focus on biodiversity conservation, especially in biodiversity “hotspot” areas, as related to emerging or existing fish farms is of great interest. Therefore, research on the impacts of farmed fish on wild fish populations, and research on other potential negative impacts of farmed fish or aquaculture operations is needed, along with scenarios and options for mitigation.

*Please note that specific fisheries issues will be addressed through subsequent Associate Awards involving USAID Missions, and not in the current RFP.*

### PROGRAM REGIONS

Proposals that focus on established Aquaculture CRSP Host Countries and overlap with emerging interest areas of the CRSP are encouraged. Strengthening existing countries' infrastructure builds on previous USAID investments. However, new host country linkages may be proposed (RFP website: *New HC Research Location Considerations*). Proposals will be evaluated based on the strength of linkages to host countries, among other criteria. **Your proposal must focus on one USAID-eligible country within a region, but activities are encouraged in nearby countries within the same region or across regions** Please refer to the RFP website for current countries included in USAID's *Country-Level Foreign Assistance Framework* and USAID's *Policy Framework for Bilateral Foreign Aid*. USAID requires that one-quarter of the overall Aquaculture & Fisheries CRSP portfolio focuses on countries included in the *Initiative to End Hunger in Africa* (RFP website: *USAID Links*). CRSP will focus primarily, although not exclusively, on Rebuilding Countries, Developing Countries, and Transforming Countries in the following regions:

- Central America
- South America
- Caribbean
- Africa
- South and East Asia
- Eastern Europe
- Central Asia



Current IEHA countries: Mali, Ghana, Zambia, Mozambique, Uganda, Kenya.  
 Additional IEHA countries under consideration: Malawi, Nigeria, and Tanzania.

Continuing relationships may be built on foundation work laid by the Aquaculture CRSP in the following countries. For established institutional partners under the Aquaculture CRSP, please see weblink: <http://pdacrsp.oregonstate.edu/>

#### AMERICAS

- Bolivia
- Brazil
- Colombia
- Ecuador
- El Salvador
- Guatemala
- Honduras
- Mexico
- Nicaragua
- Panama
- Peru
- Dominican Republic

#### AFRICA

- Egypt
- Ghana
- Kenya
- Malawi
- Rwanda
- Tanzania
- South Africa

#### ASIA

- Bangladesh
- Cambodia
- China
- Indonesia
- Laos
- Nepal
- Philippines
- Thailand
- Vietnam

### OTHER SITE CONSIDERATIONS

**USAID-Eligible Countries:** Several countries listed above are not identified in the USAID Country-Level Foreign Assistance Framework currently under development. It is unknown whether these unidentified countries are ineligible. If you are interested in a country not mentioned in the Framework, please contact the CRSP ME for additional information. Cautionary note: Proposed activities will require USAID country-level concurrence prior to award. Non-concurrence can mean that a project or investigation is not approved for funding. For a list of USAID-presence countries, please go to the USAID links from the RFP website.

**Memoranda of Understanding:** Upon award selection, the Lead Partner Institution will be required to enter into Memoranda of Understanding (MOUs) with institutions at Host Country sites. Subcontracting US institutions may also enter into MOUs with HC partners to strengthen institutional relationships and streamline administrative processes. MOUs between Host Country institutions are not discouraged but will not take the place of MOUs between US and Host Country institutions. MOUs must provide the opportunity for other CRSP projects to function under the authority of the agreement and must provide for joint authorship of reports and site visits at the discretion of the CRSP Management Entity. Draft MOUs must be submitted to the ME for review prior to execution (RFP website: *MOUs*).

**New Host Country Collaborating Institutions:** Proposals that add a new Host Country research location must include a response to the New Host Country Research Location Considerations (RFP website: *New HC Research Location Considerations*). Successful proponents may be required to prepare and submit full characterizations of new Host Country research locations during project negotiation. Descriptions of previous and current ACRSP research sites are available: [http://pdacrsp.oregonstate.edu/pubs/featured\\_titles/](http://pdacrsp.oregonstate.edu/pubs/featured_titles/)

**Fostering Respectful Partnerships:** Proposals that foster linkages with organizations including US minority-serving institutions, non-governmental organizations (NGOs), national agricultural research institutions, other CRSPs, international centers, private businesses, and others are desired. Proposals that link Host Country researchers from one CRSP site to another CRSP site are encouraged. US and Host Country PIs will share in budgetary decisions and overall priority setting for the project, as well as in other collaborative activities related to the CRSP. Proposals, work plans, and project budgets must be developed collaboratively between HC and US researchers.

US PIs must actively establish an effective working relationship with the ME and other CRSP US and Host Country PIs and program participants.

## TECHNICAL CONSIDERATIONS FOR AWARD OF A CRSP PROJECT

Research that generates new information should form the core of proposals. Proposals must also include institutional strengthening, outreach, and capacity building activities such as training, formal education, workshops, extension, and conference organizing to support the scientific research being proposed.

1. Proposals must be innovative, feasible, and demonstrate technical merit as assessed via peer review.
2. Investigations that generate new information should form the core of proposals. Each investigation must be clearly identified as an experiment, study, or activity, based on the following definitions:
 

*Experiment* A scientifically sound investigation that addresses a testable hypothesis. An experiment implies collection of new data by controlled manipulation and observation.

*Study* A study may or may not be less technical or rigorous than an experiment and may state a hypothesis if appropriate. Studies include surveys, focus groups, database examinations, most modeling work, and collection of technical data that do not involve controlled manipulation (e.g., collection and analysis of soil samples from sites without having experiments of hypothesized effect before collection).

*Activity* An activity requires staff time and possibly materials but does not generate new information like an experiment or a study. Conference organization, training sessions, workshops, outreach, and transformation and dissemination of information are examples of activities.

Investigations provide a transparent means for evaluating different types of work under the CRSP, be it quantitative, empirical, biologically-based, qualitative, policy-based, or informal.
3. Proposals must include at least one *experiment* or *study*. Proposals must also include outreach *activities* such as training, formal education, extension, and conference organizing to supplement the scientific research being proposed.
4. Proposals must identify intended beneficiaries, stakeholders, and end-users. To this end, each investigation must include a section on the *quantifiable benefits* that are anticipated (RFP website: *Quantifiable Benefits, and Outreach and Dissemination Plan*).
5. Proposals must provide a gender inclusivity strategy (RFP website: *Gender Inclusivity Strategy*).
6. Proposals that add a new Host Country research location to one of the CRSP regions must include a response to *New Host Country Research Location Considerations* and a plan for characterizing the new location (RFP website: *New HC Research Location Considerations*). Proponents may be required to prepare and submit full characterizations (*Site Descriptions*) of new Host Country research locations.
7. PI(s) will be responsible for fulfilling all ME and USAID reporting requirements (RFP website: *Reporting Requirements*).
8. Proposals must contain a plan for outreach and dissemination (RFP website: *Outreach and Dissemination Plan*). The CRSP seeks to build capacity of HC researchers, farmers, and other stakeholders through improved understanding of aquacultural technologies, including soft technologies such as best practices and knowledge-based systems, as well as hard technologies. Proposals must also briefly describe future plans for additional work in critical need areas, whether funded by CRSP or a different agency.
9. Successful proposals will address the following general *research priorities*:
 

*Priority Ecosystems*  
Freshwater and brackishwater ecosystems for aquaculture and aquaculture-fishery nexus topic areas; marine ecosystems are also included for the aquaculture-fishery nexus topic areas.

*Priority Species*  
Low-trophic level fishes; domesticated freshwater fishes; non-finfishes (e.g., bivalves, seaweeds); aquatic organisms used in polycultures and integrated systems; native species. Food fishes are a priority but species used for non-food purposes (e.g., ornamental, pharmaceutical) may also be included as a priority if they are a vital part of an integrated approach towards food security and poverty alleviation.

*Target Groups*  
Aquaculture farms (small- to medium-scale, subsistence and commercial) and aquaculture intermediaries, policy makers, and others in host countries.

*Key Partners*  
University, government, non-government, and private sector.
10. Successful proposals will consider the following USAID *environmental restrictions*:
  - Biotechnical investigations will be conducted primarily on research stations in Host Countries;
  - Research protocols, policies and practices will be established prior to implementation to ensure that potential environmental impacts are strictly controlled;
  - All training programs and outreach materials intended to promote the adoption of CRSP-generated research findings will incorporate the appropriate environmental recommendations;
  - All sub-awards must comply with environmental standards;
  - CRSP Projects will not procure, use or recommend the use pesticides of any kind. This includes but is not limited to algicides, herbicides, fungicides, piscicides, parasiticides, and protozoacides.
  - CRSP Projects will not use or procure genetically modified organisms (GMO); and
  - CRSP Projects will not use or recommend for use any species that are non-endemic to a country or not already well established in its local waters, or that are non-endemic and well established but are the subject of an invasive species control effort.

11. Successful proponents will be responsible for interactions with CRSP internal technical advisory groups. Each project will be assigned to one *Regional Center of Excellence* and one *Development Theme Advisory Panel*. These advisory groups will perform critical analysis and synthesis work for meeting USAIDs goals, and producing lessons learned materials.
12. Overall program goals will address USAID needs for meeting biodiversity conservation and biotechnology earmarks. Not every project will need to address these earmarks, but overall CRSP portfolio selection will be based on meeting USAID needs, as well as the needs of host countries and others.
13. Projects will be expected to participate in a global pre-synthesis workshop early in the project start-up phase – most likely in Spring 2007. During this workshop, indicators, benchmarks and targets will be developed for synthesizing information across the broad global portfolio.
14. Applicants must provide a statement of project vision. (RFP website: *Project Vision*)

### PROGRAMMATIC CONSIDERATIONS FOR AWARD OF A CRSP PROJECT

1. Proposals will ideally present a multi-disciplinary and multi-institutional approach to aquaculture research, development, and outreach in eligible Host Countries. Lead Partner Institutions and Lead PIs may submit more than one proposal, but award selection is likely to be limited to one proposal per Lead Partner Institution.
2. At least 50% of funds must be expended in or on behalf of the Host Country or region. (RFP website: *Budget Information*)
3. Proposals must be consistent with USAIDs strategic objectives, goals, and requirements. (RFP website: *USAID Goals and Guidelines*)
4. Applicants are asked to select a USAID-eligible country for their base operations and are encouraged to involve satellite countries to broaden the potential impact of their results. Information regarding USAID-eligible countries can be accessed via the RFP website under USAID links.
5. At least 25% of the overall program portfolio will be devoted to proposals targeting IEHA countries. Current IEHA countries are: Mali, Ghana, Zambia, Mozambique, Uganda, and Kenya. (RFP website: *USAID links*). It is anticipated that funds awarded under this RFP will be allocated as follows: 32% to Africa; 32% to Asia; 32% to Latin America and the Caribbean; and 4% to other regions.
6. Each applying US institution must provide US non-federal cost sharing as required by USAID. Proponents should target a 50% matching contribution for this project, with at least 35% of the match provided as non-federal cost share from the participating US entities (RFP website: *Budget Information*).
7. A key consideration for award of CRSP funding is that each applying US institution provide strong institutional support through cost-sharing PI effort. Salary support for US PIs will be limited (RFP website: *Budget Information*). US PIs charging any portion of salary to the CRSP award must also be serving in the capacity of major advisor to a graduate student working under an approved CRSP investigation.
8. Collaborative efforts that involve undergraduate students, graduate students, and post-doctoral fellows are encouraged. CRSP funds will not be used to support US expatriate personnel or consultants, as the CRSP model is intended to build institutional networks and capacities.
9. Proposals that leverage support from other sources in furthering the broad goals of the CRSP are desired. Leveraged support is support in addition to US non-federal cost sharing funds required for award of a CRSP project and in addition to the HC institutional match.
10. Familiarity with institutions in the proposed HC and region as indicated by past relationships is desirable, as is a successful institutional track record of work in the proposed country. A short statement describing institutional capacity and track record in the proposed host country or countries is required.
11. Proponents from diverse backgrounds are encouraged to apply. US minority-serving institutions are encouraged to apply.
12. Proposals must demonstrate return benefits to the US in furtherance of the program's responsibility to provide mutual benefits and discoveries that can apply to the HC region and US and that will support future development of sustainable aquaculture.
13. Funding is typically allocated on an annual basis. All allocations are contingent on the annual funding level obtained from USAID and on performance under subcontract provisions.
14. USAID concurrence for projects in host countries will be required prior to award. The ME will obtain concurrence on behalf of highly ranked applicants via USAID/Washington. Applicants may include letters of support from USAID Missions in their proposals, but these will not take the place of USAID concurrence to the ME.

**EVALUATION CRITERIA AND PROPOSAL REVIEW**

Prior to undergoing review, proposals will be checked for eligibility, completeness, and receipt date. Eligible proposals will undergo external technical peer review, which will be followed by programmatic review. Technical review will focus on scientific and intellectual merit, collaboration, and broader impact. Programmatic review will focus on overall portfolio balance among regions and themes; adherence to the RFP including the programmatic and budget sections; and adherence to the goals of USAID and needs of the host countries. (RFP website: *Proposal Review Criteria*)

**EVALUATION GUIDELINES** (excerpted). Please refer to the RFP Website for the complete review criteria.

**INITIAL SCREENING**

- Eligibility (institutional; RFP theme and topic area; country)
- Completeness
- Submission deadline

*Eligible proposals will proceed to the review phase. Ineligible or late proposals will not qualify for review and/or funding consideration.*

**I. TECHNICAL PEER-REVIEW**

**INTELLECTUAL MERIT (50%)**

1. Soundness
2. Innovation
3. Qualification of Researchers
4. Application of Research

**COLLABORATION, CAPACITY BUILDING, AND BROADER IMPACTS (50%)**

1. Education and Training
2. Inclusiveness
3. Human Health and Welfare
4. Networking and Institutional Development

**II. PROGRAMMATIC REVIEW**

**Part 1. RFP Adherence**

- Adherence to all Programmatic Criteria listed in the RFP
- Adherence to Budget Criteria
- Adherence to Requested information for compliance and institutional support

**Part 2. Portfolio Balance**

- Regional Balance Assessment
- Thematic Balance Assessment
- Area of Inquiry (Topic Area) Representation
- Technical Ranking within Region and Theme

**Part 3. USAID Compliance**

**USAID Eligibility**

- Does the proposal have Mission concurrence?
- Is work proposed for a USAID-eligible country?
- Does the proposal address key USAID goals and interests as defined in the RFP materials?

**Initial Environmental Examination Screening (problems may delay projects, or decline projects)**

- Assessment of whether there are any obvious environmental issues not raised by the technical review
- Screening process and findings
- Examination and review as necessary

### PROPOSAL ORGANIZATION AND FORMAT

- Format:**
- Paper Size: Standard (8.5" x 11")
  - Line Spacing: Single space
  - Minimum Page Margin: 1 inch on all sides
  - Minimum Font Size: 10 point (9 point for header or footer)
  - Each page of the proposal subsequent to the cover page must identify the Lead PI and proposal title (abbreviated if necessary) and the page number.

### CHECKLIST FOR PROPOSALS

A checklist is provided for assembling the proposal packet (RFP website: *Checklist for Proposals*). The research proposal narrative, item 3 below, **must not exceed 30 pages**.

#### Proposals must contain the following elements:

1. Cover Sheet Form with Institutional signature
2. Summary Page Form
3. Research Proposal Narrative (30 pages maximum)
  - a. Executive Summary; Introduction and Vision Statement (2-page limit)
  - b. Investigations (5-pg limit for each investigation; up to 10 investigations total; 26 pp total)
  - c. Outreach and Dissemination Plan (1-page limit)
  - d. Gender Inclusivity Strategy (1-page limit)
4. New HC Research Location Considerations (2-page limit)
5. Budget (with Institutional signature)
  - (3) single-year budgets for Lead. Include budgets for subcontractors and HC institutions (up to 9 single-year budgets)
  - (1) combined-year budget for Lead. Include the combined-year budget for subcontractors and HC institutions (up to 3 combined-year budgets)
6. Budget Justification for Lead, Subcontractors, and HC for each year (up to 9 forms)
7. Pending Funds Form
8. Conflict-of-Interest Form for each (Lead, US, and HC) PI
9. List of names of 5 reviewers (names, address and email, areas of expertise)
10. Letters of Commitment from HC PIs and from US and HC partners
11. Statement of institutional track record and experience in the proposed HC (2-page limit)
12. Lead Institution supporting information:
  - Animal Use Approval (or written waivers)
  - Human Subjects Approval (or written waivers)
  - NICRA for Lead Institution (Negotiated indirect cost rate agreement)
  - Institutional & Agency Certifications and Assurances (5 forms)
13. CVs of Lead PI and all US and HC Co-PIs (2-page limit per CV)

#### INSTRUCTIONS FOR COMPLETING THE DESCRIPTIONS OF INVESTIGATIONS ~ see Checklist: 3b ~

1. Individual investigation descriptions must not exceed five pages. All investigation descriptions within one proposal must not exceed 26 pages. Proposals may contain up to 10 investigations.
2. Each investigation must be described separately and include the following elements:
  - a. Title: below the title include the topic area (p. 3-4) to which the proposed investigation applies and specify whether the investigation is an experiment, study or activity (p. 6, item 2).
  - b. Lead PI and institutional affiliation; subcontracting co-PIs and institutional affiliations; HC PIs and institutional affiliation
  - c. Objective(s) [and null hypotheses for experiments]
  - d. Significance: Provide justification for conducting the proposed work, review similar and related work reported in the literature (include citations below under h.), and describe how the work relates to the priorities described in this RFP.
  - e. Quantified Anticipated Benefits: Identify target groups and direct and indirect benefits accruing from the research and outreach work. Benefits must be quantifiable (RFP website: *Quantifiable Benefits*).
  - f. Research Design or Activity Plan
    - (1) Location of work
    - (2) Methods
  - g. Schedule, indicating the start date (not earlier than 1 April 2007) and completion date (not later than 30 September 2009) of the proposed work.
  - h. Literature Cited

**PROPOSAL SUBMISSION**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Submit your full proposal via email to <a href="mailto:acrsp@oregonstate.edu">acrsp@oregonstate.edu</a> by 5pm Pacific Time on Wednesday, January 31, 2007. Also ten (10) printed copies and one (1) electronic copy on CD of each proposal must be received by Friday, February 2, 2007. The ME will acknowledge timely receipt of proposals via email to the Lead PI.</li> <li>2. Do not exceed the proposal narrative 30-page limit. Proposals exceeding the proposal narrative page limit will not be considered.</li> <li>3. Proposal packets must have the formal signed approval of the Lead Partner Institution.</li> </ol> | <ol style="list-style-type: none"> <li>4. Individual proposal parts (investigations) that will be carried out under subcontract from the Lead Partner Institution to another US institution must be affirmed by the formal signed approval of the subcontracting US institution. (<i>Attach a separate letter</i>)</li> <li>5. Mail paper and CD submissions to:<br/>Dr. Hillary S. Egna<br/>CRSP Director<br/>Oregon State University<br/>Snell Hall 418<br/>Corvallis, OR 97331-1643 USA</li> </ol> |
|---|---|

**PROGRAM OBJECTIVES AND FUTURE WORK**

The goal of the Aquaculture & Fisheries CRSP is to conduct research that contributes significantly to the removal of major constraints to sustainable aquaculture development and responsible small-scale fisheries management, thereby promoting economic growth, enhancing food security, and conserving natural resources in developing countries. CRSPs are funded by USAID under authority of the International Development and Food Assistance Act of 1975 (PL 94-161), and by participating institutions.

The Aquaculture & Fisheries CRSP is a new CRSP under USAID/EGAT's Office of Natural Resources Management. Oregon State University was awarded the Leader with Associates Cooperative Agreement (No. EPP-A-00-06-00012-00) for the Aquaculture & Fisheries CRSP, which will run until 2011. In 2010, the program will be evaluated for a possible 5-year extension. Two major work plans (each with defined annual implementation plans) will describe the specific research to be carried out under the CRSP's framework of general research priorities. This RFP is a call for the First Work Plan. A second directed RFP is planned for late Spring 2007, about 4 months prior to the end of work commissioned by this first RFP. The second RFP will focus on gaps and emergent areas of research. It will run for two years, from October 1, 2009 through September 30, 2011. For the second directed RFP, CRSP researchers with incomplete First Work Plan investigations will not be eligible to receive funding until all previous obligations are satisfactorily met.

Additional information may be obtained from the Aquaculture & Fisheries CRSP 5-year plan and the Aquaculture CRSP Annual Administrative and Technical Reports, which are available on the CRSP RFP website. <http://pdacrsp.oregonstate.edu/afcrsp/rfp>

~ AQUACULTURE & FISHERIES CRSP RFP ~

<http://pdacrsp.oregonstate.edu/afcrsp/rfp>

QUESTIONS ABOUT THE CRSP RFP ?

Consult the CRSP RFP website [pdacrsp.oregonstate.edu/afcrsp/rfp](http://pdacrsp.oregonstate.edu/afcrsp/rfp) for answers to **FREQUENTLY ASKED QUESTIONS**, a feature that will be added to over time.  
Send an email to [acrsp@oregonstate.edu](mailto:acrsp@oregonstate.edu) or call ~ 541.737.6426



## APPENDIX F CHECKLIST FOR PROPOSALS

### CHECKLIST FOR PROPOSALS RFP WEBSITE SUPPORTING DOCUMENTATION AQUACULTURE & FISHERIES CRSP PROPOSAL COMPLETENESS

This checklist is used by the ME to determine proposal completeness and mechanical adherence to RFP rules.

- 1. Cover Sheet Form
- 2. Summary Page Form
- 3. Research Proposal Narrative (30 pages maximum)
  - a. Executive Summary; Introduction; and Vision Statement (2-page limit)
  - b. Investigations (5-pg limit for each investigation; up to 10 investigations total; 26 pp total)
  - c. Outreach and Dissemination Plan (1-page limit)
  - d. Gender Inclusivity Strategy (1-page limit)
- 4. New HC Research Location Considerations (2-page limit)
- 5. Budget
  - (3) single-year budgets for Lead. Include budgets for subcontractors and HC institutions (up to 9 single-year budgets)
  - (1) combined year budget for Lead. Include the combined-year budget for subcontractors and HC institutions (up to 3 combined-year budgets)
- 6. Budget Justification for Lead, Subcontractors, and HC for each year (up to 9 forms)
- 7. Pending Funds Form
- 8. Conflict-of-Interest Form for each (Lead, US, and HC) PI
- 9. List of names of 5 reviewers (names, address and email, areas of expertise)
- 10. Letters of Commitment from HC PIs *and* from US and HC partners
- 11. Statement of institutional track record and experience in the proposed HC (2-page limit)
- 12. Lead Institution supporting information:
  - Animal Use Approval (or written waivers)
  - Human Subjects Approval (or written waivers)
  - NICRA for Lead Institution (Negotiated indirect cost rate agreement)
  - Institutional & Agency Certifications and Assurances (5 forms)
- 13. CVs of Lead PI and all US and HC Co-PIs (2-page limit per CV)



## APPENDIX G PROPOSAL REVIEW CRITERIA

### PROPOSAL REVIEW CRITERIA AQUACULTURE & FISHERIES CRSP RFP WEBSITE

#### INITIAL SCREENING CHECKLIST

(ALL Y/N; IF N, WHY NOT.)

ELIGIBILITY (INSTITUTIONAL; RFP THEME AND TOPIC AREA; COUNTRY)

PROPOSAL CHECKLIST COMPLETENESS

SUBMISSION DATE - DEADLINE MET

COMPLETE AND ELIGIBLE PROPOSALS WILL PROCEED TO THE REVIEW PROCESS. INELIGIBLE OR LATE PROPOSALS WILL NOT QUALIFY FOR REVIEW AND/OR FUNDING CONSIDERATION.

#### I. CRSP PROPOSAL EVALUATION CRITERIA: TECHNICAL PEER-REVIEW

*Much of the CRSP review process is based on NSF review guidelines, with permission from NSF.*

##### INTELLECTUAL MERIT (50%)

##### 1. Soundness

- The proposal presents a sound, multidisciplinary approach for scientific investigation of the subject.
- The approach, design, methods, and geographic scope are practical and consistent with state-of-the-art practices.
- The proposed project is relevant and important to research related to enhancing food security and the environment, alleviating poverty, and improving livelihoods.
- Sufficient technical, physical, monetary, and human resources are available for the project to be successful.
- The project can be completed in the scheduled time period.

##### 2. Innovation

- Results from the project can contribute to advances in scientific understanding in the field of aquaculture.
- The proposal builds on recent discoveries, reflects innovative ideas, and explores unique or ingenious concepts or applications.
- The project addresses more than one of the following criteria: improving the efficiency of aquaculture in the region; enhancing sustainability of the ecosystem; and benefiting the social and economic well-being of people.

##### 3. Qualification of Researchers

- The team of researchers is well-qualified for conducting research, and each researcher has an established publication and research record in the scientific field.
- The lead Principal Investigator (PI) is capable of serving as the administrator of the project, which will include participation by multiple institutions.

#### 4. Application of Research

- There are significant opportunities and a well-thought-out strategy for regional and global technology transfer, impact assessment, dissemination and near-term application.
- Plans to disseminate research results to the academic community (journal articles, books, conferences, etc.) are reflected in the proposal.
- The proposal presents opportunities for future synthesis with other CRSP and non-CRSP research.
- The proposed research is likely to return benefits to the US and be applicable on a regional or global scale.
- The proposed research is well within the scope of USAID environmental considerations as described in the RFP, and demonstrates broader application for improving ecosystem health.

### COLLABORATION, CAPACITY BUILDING, AND BROADER IMPACTS (50%)

#### 1. Education and Training

- The project promotes Host Country (HC) and US teaching, training, and learning.
- The project utilizes multiple methods of educational outreach (e.g., tuition support, publications, workshops, on-site training) to instruct farmers, extension agents, HC and US students, HC and US governmental and non-governmental employees, private sector and others.

#### 2. Inclusiveness

- The proposal identifies how diverse social groups (women, underrepresented groups, etc.) will be incorporated into the project.

#### 3. Human Health and Welfare

- The proposed project contributes to human health and welfare improvement in developing regions.

#### 4. Networking and Institutional Development

- The proposal builds on pre-established, strong relationships between HC and US researchers and institutions.
- The proposal describes strategies to develop and strengthen institutional research capacities via capable HC and US PIs who have equal intellectual control over the project.
- The project effectively strengthens “infrastructure” for research and education such as laboratories (CRSP funds are not to be used for construction of permanent buildings), instrumentation, networks, and partnerships.
- The proposed project is likely able to attract further funding from extra-CRSP resources.
- The project enhances development of local, regional, national, and global networks broadly related to aquaculture.

## II. CRSP PROPOSAL EVALUATION CRITERIA: PROGRAMMATIC REVIEW

*There are two consecutive tiers of review: technical and then programmatic. The programmatic review occurs after the technical review, and only for those proposals that received high rankings for technical merit.*

### Part 1. RFP Adherence

#### Program analysis of each proposal based on correspondence to the RFP

- Adherence to all Programmatic Criteria listed in the RFP
- Adherence to Budget Criteria, especially for match, HC funds, student support, PI FTE caps
- Adherence to Requested information for compliance and institutional support: cost share, letters of support, deliverables, schedules, etc.

### Part 2. Portfolio Balance

#### Regional Balance Assessment

- Objective is for regional balance of 2-3 awards for Asia; 2-3 awards for Latin America and Caribbean; and 2-3 awards for IEHA countries in Africa. Other countries in Africa will be most successful if linked with an IEHA country. Other regions, including regions not listed above, may get 1 award. (From RFP: anticipate 8 Lead Partner Awards of @\$400,000 each to 8 different Lead Partner Institutions)
- Technical review takes into account global application of results and efforts, but the programmatic review will further evaluate global and regional application.

#### Thematic Balance Assessment

- Objective is to balance the 4 themes across the portfolio.

#### Area of Inquiry (Topic Area) Representation

- Objective is to balance topic areas with about half in Integrated Production Systems and half in People, Livelihoods, and Ecosystem Interrelationships.

#### Technical Ranking within Region and Theme

- Objective is to fund the highest technically ranked proposal within each theme and region, provided it shows close correspondence to the programmatic objectives in the RFP.

### Part 3. USAID Compliance

#### (For Top Ranked Proposals following Parts 1 and 2 of the Programmatic Review)

#### USAID Eligibility (answers must be affirmative) - next steps for highest ranked projects

- Does the proposal have Mission concurrence?
- Does the PI propose work in a USAID-eligible country? Country preferences within a region will be considered under regional balance.
- Does the proposal address key USAID goals and interests as defined in the RFP materials?

#### IEE Screening (problems may delay projects, or decline projects) - next steps for highest ranked projects

- Assessment of whether there are any obvious environmental issues not raised by the technical review
- Screening process and findings
- Examination and review as necessary



## APPENDIX H LINKAGES

Institutions, NGOs, and organizations listed below are planned partners in the EGAT-funded AquaFish CRSP research projects.

### US PARTNERS

American Soybean Association  
 Cornell University  
 Delaware State University  
 Department of Commerce, NOAA  
 Fisheries Industry Technology Center–University of Alaska  
 Florida International University  
 Louisiana State University  
 National Oceanic & Atmospheric Administration–International Sea Grant  
 North Carolina State University  
 Oregon State University  
 Pacific Aquaculture & Coastal Resources Center–University of Hawai’i at Hilo  
 Pacific Shellfish Growers Association  
 Purdue University  
 Texas A&M University  
 Texas Parks & Wildlife Department  
 Texas Tech University  
 University of Arizona  
 University of Arkansas at Pine Bluff  
 University of Connecticut–Avery Point  
 University of Hawai’i at Hilo  
 University of Michigan  
 University of Rhode Island  
 University of Rhode Island–Coastal Resources Center  
 University of Texas  
 US-Mexico Aquaculture TIES Program  
 US Food & Drug Administration  
 Virginia Polytechnic Institute & State University  
 World Wildlife Fund

### INTERNATIONAL PARTNERS

Aquaculture without Frontiers  
 Australian Centre for International Agricultural Research  
 International Development Research Centre (Canada)  
 Lake Victoria Environmental Management Project  
 Network of Aquaculture Centers in Asia (Thailand)  
 United Animal Feed Producers  
 United Cooperative of Fishermen  
 United Nations Food & Agriculture Organization  
 USAID SUCCESS program  
 World Aquaculture Society  
 The WorldFish Center (formerly ICLARM)

#### *Brazil*

Centro de Acüicultura, UNESP

#### *Cambodia*

Fisheries Administration  
 Inland Fisheries Research & Development Institute (IFReDI)

***China***

Hainan University  
 Huazhong Agricultural University  
 Huiting Reservoir Fisheries Management Company  
 Shanghai Fisheries University (now Shanghai Ocean University)  
 Sichuan Aquacultural Engineering Research Center  
 Wuhan University  
 Zhanghe Reservoir Fisheries Management Company

***Costa Rica***

University of Costa Rica

***Ecuador***

Ecocostas

***Egypt***

Academy of Scientific Research & Egyptian Universities  
 Central Administration of Agricultural Foreign Relations  
 Central Laboratory for Aquaculture Research  
 Egyptian Society of Agribusiness  
 Ministry of Agriculture & Land Reclamation

***Ghana***

Fisheries Department, Ministry of Food & Agriculture  
 Kwame Nkrumah University of Science & Technology  
 Water & Sewerage Company

***Guatemala***

San Carlos University

***Guyana***

Department of Fisheries  
 Maharaja Oil Mill  
 Mon Repos Aquaculture Center  
 National Aquaculture Association of Guyana  
 USAID/GTIS Programme–Guyana  
 Von Better Aquaculture

***Honduras***

Zamorano University

***Indonesia***

Ujung Batee Aquaculture Center, Banda Aceh  
 Indonesian Department of Fisheries  
 Ladong Fisheries College

***Kenya***

Kenya Business Development Services  
 Moi University  
 National Investment Center

***Lebanon***

American University of Beirut

***Mexico***

Comite Estatal de Sanidad Acuicola de Sinaloa  
 Federation of Shrimp Cooperatives  
 Instituto Sinaloense de Acuicultura

Mariano Matamoros Hatchery  
Research Center for Food & Development (CIAD)  
Sinaloa Institute for Aquaculture  
Sinaloa State Fisheries Department  
State Committee for Aquaculture Sanitation of Sinaloa (CESASIN)  
Universidad Autónoma de Tamaulipas  
Universidad Autónoma de Sinaloa–Culiacán  
Universidad Autónoma de Sinaloa–Mazatlán  
Universidad Juárez Autónoma de Tabasco  
Women's Oyster Culture Cooperatives of Puerto Penasco

***Nepal***

Institute of Agriculture & Animal Science  
Rural Integrated Development Society

***Nicaragua***

Center for Research of Aquatic Ecosystems-Central American University (CIDEA-UCA)  
Nicaraguan Ministry of the Environment

***Philippines***

Bureau of Fisheries & Aquatic Resources (BFAR)  
Central Luzon State University  
Department of Agriculture  
Genetically Improved Farmed Tilapia (GIFT) Foundation International, Inc  
Southeast Asian Fisheries Development Center (SEAFDEC) AQD

***South Africa***

University of Stellenbosch

***Tanzania***

Kingorwila National Fish Center  
Mbegani Fisheries Development Centre  
Ministry of Natural Resources & Tourism, Aquaculture Development Division  
Nyegezi Fisheries Institute  
Sokoine University of Agriculture  
Tanzania Fisheries Research Institute  
University of Dar-es-Salaam

***Venezuela***

BIOTECMAR

***Vietnam***

Can Tho University  
Dong Nai Fisheries Company  
University of Agriculture & Forestry



## APPENDIX I ACRONYMS

### PROGRAM-RELATED

ACRSP	Pond Dynamics/ Aquaculture CRSP
A&F CRSP	Aquaculture & Fisheries CRSP
AquaFish CRSP	Aquaculture & Fisheries CRSP Collaborative Research Support Program
HC	Host Country
ME	Management Entity
MOU	Memorandum of Understanding
NGO	Nongovernmental organization
PD/ A CRSP	Pond Dynamics/ Aquaculture CRSP
PI	Principal Investigator
RFA	Request for Assistance
RFP	Request for Proposals

### GENERAL

FAQ	Frequently Asked Questions
KSh	Kenya Shillings
NB	Nota Bene, note well
PDF	Portable Document Format

### INSTITUTIONS, ORGANIZATIONS, GOVERNMENT ENTITIES & PROGRAMS

ACIAR	Australian Centre for International Agricultural Research
AIT	Asian Institute of Technology
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ATA	American Tilapia Association
AwF	Aquaculture without Frontiers, USA
BAU	Bangladesh Aquacultural University
BFAR	Bureau of Fisheries & Aquatic Resources, Philippines
BIOTECMAR	Cultivos & Biotecnológica Marina C.A., Venezuela
CESASIN	Comite Estatal de Sanidad Acuicola de Sinaloa (Sinaloa State Committee for Aquaculture Sanitation)
CETRA	Centro de Transferencia Tecnológica para la Acuicultura (Center for Aquaculture Technology Transfer), Mexico
CI	Conservation International, Mexico
CIAD	Centro de Investigación de Alimentos y Desarrollo (Research Center for Food & Development), Mexico
CIDEA-UCA	Centro de Investigación de Ecosistemas Acuáticos de la Universidad Centroamericana (Center for Research on Aquatic Ecosystems-Central American University), Nicaragua
CIFAD	Consortium for International Fisheries & Aquaculture Development
CIMMYT	International Wheat & Maize Improvement Center, Mexico
CLAR	Central Laboratory for Aquaculture Research, Egypt
CLSU	Central Luzon State University
CRC/URI	Coastal Resources Center/University of Rhode Island
CTU	Can Tho University, Vietnam
DASP	Department of Animal Sciences & Production, SUA
DA-BFAR	Department of Agriculture-Bureau of Fisheries & Aquatic Resources, Philippines
DPN	Direction Nationale de la Pêche, Mali
EGAT	Bureau for Economic Growth, Agriculture, & Trade (USAID)
EPA	US Environmental Protection Agency
EU	European Union
FAC	Freshwater Aquaculture Center, Central Luzon State University, Philippines
FAO	Food & Agriculture Organization, United Nations
FD	Fisheries Department, Kenya

FDA	US Food & Drug Administration
FDAP	Fisheries Development Action Plan, Cambodia
FiA	Fisheries Administration, Cambodia
FISH	The FISH Project (Fisheries Improved for Sustainable Harvest), Philippines
FIU	Florida International University
GESAMP	Joint Group of Experts in the Scientific Aspects of Marine Environmental Protection, FAO
GIFT	Genetically Improved Farmed Tilapia
GOP	Government of Philippines
GTIS	Guyana Trade & Investment Support Project
IAAS	Institute of Agriculture & Animal Science, Nepal
IARC	International Agricultural Research Center(s)
ICLARM	International Center for Living Aquatic Resources Management (= The WorldFish Center), Malaysia
IDRC	International Development Research Centre, Canada
IEHA	Initiative to End Hunger in Africa
IFREDI	Inland Fisheries Research & Development Institute, Cambodia
ISSC	Interstate Shellfish Sanitation Conference
ISA	Sinaloa Institute for Aquaculture, Mexico
ISTA	International Symposium on Tilapia in Aquaculture
KBDS	Kenya Business Development Services
KNUST	Kwame Nkrumah University of Science & Technology
LSU	Louisiana State University
MARENA	Nicaraguan Ministry of the Environment
MRC	Mekong River Commission
MSU	Michigan State University
NAAG	National Aquaculture Association of Guyana
NACA	Network of Aquaculture Centers in Asia, Thailand
NARS	National Agricultural Research System (of Host Countries)
NCSU	North Carolina State University
NIC	National Investment Center
NOAA	National Oceanographic & Atmospheric Administration (US)
NPRS	National Poverty Reduction Strategy, Cambodia
NSF	National Science Foundation, USA
NSSP	National Shellfish Sanitation Program
OSU	Oregon State University
PACRC	Pacific Aquaculture & Coastal Resources Center / University of Hawai'i at Hilo
RIDS-Nepal	Rural Integrated Development Society-Nepal
SEAFDEC/ AQD	Southeast Asian Fisheries Development Center / Aquaculture Department, Philippines
SEDPIII	Third Five-Year Socioeconomic Development Plan, Cambodia
SEMARNAT	Secretariat of Natural Resources, Mexico
SFU	Shanghai Fisheries University (now SOU: Shanghai Ocean University)
SUA	Sokoine University of Agriculture
SUCCESS	Sustainable Coastal Communities & Ecosystems (EGAT/USAID)
TIES	Training, Internships, Education & Scholarships Program (USAID-Mexico)
TNC	The Nature Conservancy
TTU	Texas Tech University, Lubbock
UA	University of Arizona
UAPB	University of Arkansas, Pine Bluff
UAS	Universidad Autónoma de Sinaloa (Autonomous University of Sinaloa)
UAT	Universidad Autónoma de Tamaulipas (Autonomous University of Tamaulipas)
UCA	Universidad Centroamericana (Central American University)
UG	University of Georgia
UHH	University of Hawai'i at Hilo
UJAT	Universidad Juárez Autónoma de Tabasco (Autonomous University of Juarez, Tabasco)
UJAT-CPSR	Cooperativa Pesquera San Ramón (San Ramón Fisheries Cooperative)
UBAC	Ujung Batee Aquaculture Center
UM	The University of Michigan

UNESP	Universidade Estadual Paulista (São Paulo State University)
URI	University of Rhode Island
US	United States
USG	United States Government
USAID	United States Agency for International Development
USEPA	US Environmental Protection Agency
VT	Virginia Polytechnic Institute & State University
WAS	World Aquaculture Society
WWF	World Wildlife Fund

### TOPIC AREAS

BMA	Production System Design & Best Management Alternatives
FSV	Food Safety & Value-Added Product Development
HHI	Human Health Impacts of Aquaculture
ISD	Indigenous Species Development
MER	Marketing, Economic Risk Assessment & Trade
NE	Mitigating Negative Environmental Impacts
QSD	Quality Seedstock Development
SFT	Sustainable Feed Technology
TAP	Technology Adoption & Policy Development
WIZ	Watershed & Integrated Coastal Zone Management

### USAID, PROGRAM & PROJECT TERMS

AOP	Advanced Oxidation Process
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BSE	Bovine Spongiform Encephalopathy
BW	Brackish Water
cDNA	complementary DNA (Deoxyribonucleic acid)
CFU	Colony Forming Units
CG	Compensatory Growth
DO	Dissolved Oxygen
DTAP	Development Theme Advisory Panel
EC	<i>E. coli</i>
EPT	<i>Ephemeroptera, Plecoptera &amp; Trichoptera</i>
EG	Economic Growth Indicators, USAID
EGAT	Economic Growth & Trade
FACT	"F" indicators database, Director of US Foreign Assistance–USAID
FCR	Food (Feed) Conversion Ratio
GIFT	Genetically Improved Farmed Tilapia
GIS	Geographic Information System
GLM	Generalized Linear Model
GMO	Genetically Modified Organism
GnRH <sub>a</sub>	Gonadotropin Releasing Hormone Analogue
HACCP	Hazard Analysis & Critical Point Control
HIV/AIDS	Human Immuno Virus/Acquired Immune Deficiency Syndrome
HPLC	High Performance Liquid Chromatography
HSD	Hepatosomatic Index
IEE	Initial Environmental Examination
IGF-I	Insulin-like Growth Factor-I
IPM	Integrated Pest Management
IR	Intermediate Results indicators, IEHA program
LAC	Latin America & Caribbean Regions
LC/MS	Liquid Chromatography/Mass Spectrometry
LCA	Life Cycle Assessment
LCCA	Life Cycle Cost Analysis
LST	Lauryl Sulfate Tryptose
MC	Microcystins
mRNA	messenger RNA (Ribonucleic Acid)
MT	17 $\alpha$ -Methyltestosterone

NL	Notochordal
PDI	Pellet Durability Index
PMP	Program Monitoring Plan
PRCA	Participatory Rural Communication Appraisal
RCE	Regional Center of Excellence
RIA	Radioimmunoassay
RRA	Rapid Rural Appraisal
SGR	Specific Growth Rate
SPE	Solid Phase Extraction
SL	Standard Length
SR	Sex Reversed
SS	Salmonella-Shigella
TN	Total nitrogen
TP	Total phosphorus
TSS	Total suspended solids
UV	Ultraviolet
XLD	Xylose Lysine Desoxycholate