

AQUANEWS

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Felicien Rwangano, left, is pictured here at the Symposium on Science in Africa: Achievements and Prospects in Washington, D.C. last spring. Rwangano, former Research Assistant on the Rwanda project, is working on his PhD. at Oregon State University. He was one of only 20 graduate students invited to attend the international symposium.

FROM THE DIRECTOR'S DESK

In these times of political buzzwords, the term *collaboration* runs the risk of overuse. However, no better word describes our efforts in Rwanda, where the CRSP is part of a team of professionals and students that extends beyond borders and institutional affiliations. The long-term investment of AID and other development agencies in aquaculture research and development has made this high degree of collaboration possible. The CRSP, in the past eight years, has built on Auburn University's earlier work in carrying out research in pond dynamics and successfully applying many of Auburn's experiences with aquaculture extension. With the 20% funding increase made available to the CRSP, we enter a new phase of research, integrating socioeconomic data with our technical knowledge base. The result should improve decision-making about aquaculture development in Rwanda.

Several new projects promise to enhance our understanding of aquaculture development in Rwanda. Each is part of an intricate web that

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Third High-Altitude Tilapia Conference Sponsored by CRSP

The Third Conference on High Altitude Tilapia Culture was held at the National University of Rwanda (UNR), Rwasave Station in Butare on 4-7 September 1991. The conference, organized by CRSP researcher Karen Veverica and funded by the PD/A CRSP and UNR, provided a forum for sharing information on the evolving tilapia culture practices used in high elevation (1000 to 2500 meters above sea level) tropical countries.

Researchers, station managers, exemplary farmers, Peace Corps volunteers, NGO representatives, and extension program organizers from Rwanda, Burundi, and Zaire were invited to participate. The program began with reports from each country, including an overview of the history and the present and future strategies in fish culture and extension. Technical reports provided details of production or research data on such topics as fingerling production, integrated aquaculture, composting methods, and some large-scale commercial operations.

Workshop sessions included demonstrations of the PD/A CRSP PONDCLASS expert computer applications, extension manuals, and other extension materials. Participants visited the Kigembe National Fishculture Station ponds and rural Muganza, as well as the Rwasave Station ponds. Discussion sessions addressed inter-university and ministerial collaboration, communications and dissemination of information, extension methodologies, and identification of research needs.

Proceedings and discussion sessions will be published by the CRSP, and a table of country statistics will be developed from the information presented at the conference.

PD/A FUNDING INCREASES

In a reversal of past years' trends, funding for the PD/A CRSP was increased this year by 20%. This increase allows the CRSP to fund studies addressing several existing research gaps. A call for proposals was made at the Ninth CRSP Annual Meeting in March. The Technical Committee Executive Panel and the Program Director evaluated the proposals and recommended action to the Board of Directors, using as criteria the

relevancy of the proposal to the goals of the PD/A CRSP and to sustainable agriculture and natural resource management, the proposal's technical merit, and the realistic expectation that the proposal's objectives could be met within the time and budget limitations. The ten proposals outlined below are now part of the *Sixth Work Plan*, which was implemented 1 May 1991; final reports for these projects are due 30 April 1992.

•**Socioeconomic Factors Affecting the Transfer and Sustainability of Aquaculture Technology in Rwanda.** Joseph J. Molnar.

This study will establish baseline quantitative information on fish pond operation in Rwanda, including why farmers discontinue fish culture and how farmers without contact with extensionists practice aquaculture.

•**A Preliminary Study of Women's Participation in Fish Culture Activities of Rwanda.** Revathi Balakrishnan, Pelagie Nyirahabima, Karen Veverica.

This study will document the successes and failures of integrating Rwandan women into aquaculture and of extending the technology to women in other countries in the region. This study will complement the other studies in Rwanda (see p. 1).

•**Conference on High-Elevation Tilapia Culture.** Evariste Karangwa, Karen Veverica.

The planning and implementation of this conference, as well as the publication of the proceedings, will be funded in part by the PD/A CRSP (see p. 1).

•**Evaluation of Soil-Water Interactions For the Control of Pond Water Chemistry.** Jim Bowman, Jim Lannan, John Baham.

This study will evaluate relationships between soil pH or percent base saturation and water hardness or alkalinity for different classes of soil.

•**Analysis and Evaluation of Reaeration Rates.** Raul Piedrahita, David Teichert-Coddington.

This study will develop an improved method for estimating reaeration rates in ponds and will test the method against those currently in use.

•**On-Farm Testing of PD/A CRSP Fish Production Systems in Honduras.** David Teichert-Coddington, Bart Green, Ricardo Gomez.

PD/A CRSP production technologies will be tested on farms in Honduras and Panama. The resulting data will be used to validate the PD/A CRSP Pond Management Guidelines. Short-term training for extensionists and fish farmers in Honduras will occur at the beginning of the study, and a seminar of all participants will be convened to review the field-test results and plan further on-farm studies.

•**Primary Production in PD/A CRSP Ponds: Refinement of the Free-Water Methods and Global Survey of Results.** James Szyper, Raul Piedrahita. This project will integrate information from ongoing work and perform new experiments addressing the problem of daytime respiration. A standardized method for calculation of primary production will be described and disseminated, and the trends in production during Work Plans I through IV will be described.

•**On-Farm Clarias gariepinus - Oreochromis niloticus Polyculture in Rwanda.** Evariste Karangwa, Lieven Verheust, Karen Veverica. Clarias-tilapia polyculture will be compared with mixed-sex monoculture of tilapia and monoculture of clarias at two elevations to determine the most advantageous stocking strategy on the basis of total fish production and comparative economic benefit. Results will also be compared with the results of related on-farm studies.

•**Regional Verification of Fertilizer Guidelines—Philippines.** Kevin Hopkins.

The PD/A CRSP fertilizer recommendations will be tested under Philippine conditions, and guidelines for using chicken manure/inorganic fertilizer will be refined.

Publications

The Data Reports series is finally complete! A Program Support Grant from OSU of \$7500 and a \$5000 grant from CIFAD allowed the CRSP to finish publication of the series. The total cost of the 20 volume series was nearly \$100,000. The last reports were mailed out in August. The ME is considering re-printing Volume I, General Reference, as supplies are limited and this volume is needed to interpret the rest. The following *Collaborative Research Data Reports* have been issued in the last year:

- *Thailand, Cycles II, III. V. 2: No. 2, 3*
- *Indonesia, Cycle II. V. 3: No. 2*
- *Philippines, Cycles I, II, III. V. 4: No. 1, 2, 3*
- *Rwanda, Cycle III. V. 5: No. 2*
- *Gualaca, Panama, Cycles I, III. V. 7: No. 1, 2*
- *Aguadulce, Panama, Cycles I, II, III. V. 8: No. 1, 2, 3*

The Eighth Annual Report and the List of Publications were also printed this year. This is the first time the CRSP has published a separate *List of Publications*, designed as a companion publication to the Annual Report. The Sixth Work Plan was published and mailed this summer. Thanks go to Bart Green, Auburn, for compiling the individual project work plans.

Director, Continued

stretches within and beyond the CRSP. Revathi Balakrishnan, OSU, is using her CRSP contribution to leverage funding from PPC/WID (AID/Washington), the Mission, and other sources to study women's participation in fish culture activities. Her study involves the efforts of Pelagie Nyirahabimana, National Fish Culture Project training coordinator, Karen Veverica, CRSP researcher in Rwanda, and Hillary Egna of the CRSP Management Office.

Joseph Molnar, Auburn, is building on his previous experience with the Auburn Fish Culture Project in Rwanda with grants from the Mission and the CRSP to document how fish farmers integrate fish culture with other aspects of their lives. Molnar's study dovetails with Balakrishnan's and other studies from Auburn University and the University of Arkansas at Pine Bluff (UAPB). UAPB researchers, Carole Engle and Ann Gannam, are using a two-year, Historic Black Colleges and Universities (HBCU) grant of \$99,904 to augment research begun with the CRSP. The economic component of the HBCU grant, which also supports

The following *Notices of Publication* have been issued in the past year:

- Hatchery techniques for egg and fry production of *Clarias batrachus* (Linnaeus), Chris Knud-Hansen, Ted Batterson, Cal McNabb
- Response of tilapia yield and economics to varying rates of organic fertilization and season in two Central American countries, Bart Green, David Teichert-Coddington, and Ron Phelps
- Techniques for assessment of stratification and effects of mechanical mixing in tropical fish ponds, Jim Szyper
- Nitrogen input, primary productivity, and fish yield in fertilized freshwater ponds in Indonesia, Chris Knud-Hansen, Ted Batterson, Cal McNabb.

CRSP researchers are reminded to contact Marion McNamara at the ME for a CRSP "accession number" (which takes the place of the old "CRSP contribution number") for each publication supported by the CRSP. In addition, each publication should acknowledge CRSP support in a title page footnote, in an "Acknowledgements" section, or both, as appropriate.

For ordering information on any CRSP publications, please contact Naomi Weidner at the ME.

a biological study on the effects of temperature on fish growth, involves Auburn University researcher Curtis Jolly and graduate student Nathanael Hishamunda, Rwandan Director of Aquaculture. Other studies that cross disciplinary lines from aquaculture to crop production also have relevance to Molnar's study. Alphonse Rubagumya, Louisiana State University doctoral candidate funded by the Rockefeller foundation, is examining group farming activities in fish culture. Dan Clay, a demographer from Michigan State University, is measuring land area and cropping patterns. Research by David Tardiff-Douglas, Cornell, and Marcie Brewster, UAPB, on crop production budgets will also be incorporated.

This "tangled web we weave" reflects the complexity and interrelatedness of our research agenda. We must simultaneously refine our technical models, and begin defining the sociological and economic variables that are part of the solution to the problem of world hunger. These studies in Rwanda enrich our core research and bring us another step closer to the solution.

Travel Notes

Despite the new world order, international travel remains challenging. Travel restrictions imposed because of the Gulf War and unrest in several countries have forced several PIs to change or cancel their plans. The Management Entity maintains a 24-hour (or less) turnaround policy on handling travel requests, but delays do occur in getting approval from the Missions and/or AID/Washington. We are working with AID to eliminate the "black holes"; meanwhile, please continue to send in travel requests *at least* 30 days prior to your travel. A travel summary for 1991 to date follows.

Revathi Balakrishnan traveled to Rwanda to plan the workshop on Women in Aquaculture.

Claude Boyd visited Honduras in January to conduct a pond reaeration experiment, and in August to present a seminar on water quality and to gather and analyze water and soil samples.

Hillary Egna visited the Honduras project and laid the groundwork for the CRSP to re-initiate the freshwater fish culture studies with the Panama Department of Aquaculture.

Bart Green traveled to Honduras in July to present an aquaculture training

course to 17 farmers and extensionists participating in the PD/A CRSP on-farm research trials. In addition, he met with various government and private industry officials to discuss on-farm trials, the development of enterprise budgets, and credit costs for fish culture activities.

Kevin Hopkins and Jim Szyper spent late May and early June in the Philippines. They finalized the Memorandum of Agreement between University of Hawaii and the Freshwater Aquaculture Center of Central Luzon State University and designed the first set of experiments. They also met with ICLARM to discuss incorporating the CRSP data base into ICLARM's FISHBASE. Hopkins' contribution to an ICLARM-sponsored book on multivariate methods in aquaculture and the proposed Handbook of Aquaculture Research Methods were also discussed. Hopkins was forced to return to the Philippines in August following the unexpected death of the FAC/CRSP PI, Mr. Rene Recometa. He briefed the new PI, and attended a scientific workshop organized by USAID's Board of Science and Technology for International Development (BOSTID) focusing on aquaculture and bilharzia control; a report will be printed by BOSTID.

Milestones

Several new PI's have joined the PD/A CRSP as a result of the 20% funding increase. They are:

Revathi Balakrishnan, Director of Women in International Development, OSU, co-Principal Investigator with **Pelagie Nyirahabima** and **Karen Veverica** for "A Preliminary Study of Women's Participation in Fish Culture Activities of Rwanda."

John Baham and **Jim Bowman**, OSU, co-PIs on "Evaluation of Soil-Water Interactions For the Control of Pond Water Chemistry." Jim Bowman

worked as a technical editor in the Management Office from January 1990 to June 1991.

Joseph Molnar, Auburn, PI for "Socioeconomic Factors Affecting the Transfer and Sustainability of Aquaculture Technology in Rwanda."

Milestones continues on page 5 with other news of the PD/A CRSP.

The following short courses and workshops will be presented in the coming year.

Asian Institute of Technology

Contact:

Division Chairman
Aquaculture Short Course
Division of Agricultural
and Food Engineering
Asian Institute of Technology
G.P.O. Box 2754
Bangkok, 10501,
Thailand

**•Integrated Aquaculture in Asia—
5 May-31 May 1992**

Course content to include: Concepts and development of integrated aquaculture in Asia; general principles of waste recycling and nutrient loading, nutrient cycling in aquatic and agricultural systems; economic and social constraints to integrated aquaculture; biology of major cultured fishes commonly used in integrated aquaculture; agro-industrial integration with aquaculture through the use of agro-industrial by-products, human excreta, and supplementary feeds as pond inputs; research and development in integrated aquaculture; integrated crop/livestock/aquaculture farming systems.

**•The Nile Tilapia: Techniques for
Mass Fry Production and Growout—
17 June-13 July 1992**

Course content to include: biology of the Nile tilapia; tilapia production in monoculture and polyculture; role of tilapia in both small-scale and commercial aquaculture; review of the full range of tilapia growout systems, including extensive, semi-intensive, and intensive systems; seed production, including open pond, hapa-in-pond, and intensive recirculated tank systems; techniques of tilapia population control including hormonal sex reversal, manual sexing and use of predators; design of appropriate and sustainable culture systems.

**International Center for Aquaculture
and Department of Fisheries and
Allied Aquacultures**

Contact:

Dr. William G. Deutsch
Department of Fisheries and
Allied Aquacultures
Auburn University, Alabama
36849-5419
USA

**•Aquaculture Training Program—
19 March-9 July 1992**

A comprehensive study of aquaculture intended for government fisheries technicians, officers, administrators, and those involved in aquaculture-related activities with private or voluntary organizations. Emphasis is placed on providing practical experience. Each participant will spawn several species of fish and grow one or more species in earthen ponds or tanks.

Milestones, Continued

Marco Ivan Rodriguez has left the Honduras CRSP to join his family. His fine talent and many contributions will be missed. **Ricardo Gomez**, former Honduran Research Associate, will assume the roles of PI for the Honduras CRSP and Chief of El Carao.

Chris Jones, PD/A Fisheries Advisor at AID, returned to Seattle, Washington for marriage and consulting work. Chris is a good friend to the CRSP, and promises that we have not seen the last of him.

Welcome to **Lamarr Trott**, who has taken on Chris Jones' responsibilities in AID. Like Jones, Trott is an NMFS employee on special assignment to AID.

Jim Diana, UM, has been elected president of the University of Michigan faculty senate.

The Board of Directors regretfully accepted the resignations of **Ken Chew** and **Herminio Rabanal**, External Evaluation Panel members. They have not, as yet, been replaced.

Short Courses

Meetings

11-16 November 1991—The Third International Symposium on Tilapia in Aquaculture (ISTA), Abidjan, Cote d'Ivoire
ISTA III seeks to promote interaction and cooperation among tilapia scientists and culturists through the sharing of information and discussions on future research and development strategies, to increase awareness of the potential for growth in the tilapia industry worldwide, and to publish the proceedings of the Symposium.

FFI: The Secretariat, ISTA III, Centre de Recherches Oceanographiques (CRO), 29, rue des Pecheurs-BP V 18 Abidjan, Cote d'Ivoire.

April 1992—International Symposium and Workshop on Rehabilitation of Inland Fisheries, University of Hull, England

The Symposium will bring together experts in the field of Fishery Rehabilitation to exchange knowledge among countries, review the methods employed, identify constraints to rehabilitation, and recommend guidelines for future rehabilitation projects. Topics will include over-fishing, river engineering works, habitat modification, pollution, biomanipulation, and socioeconomic constraints.

FFI: Dr. I. G. Cowx, Humberside International Fisheries Institute, University of Hull, Hull, HU6 7RX, United Kingdom

3-8 May 1992—World Fisheries Congress, Athens, Greece

The following themes will cover major aspects of fisheries and aquaculture: condition of major aquatic habitats; fisheries resource utilization and policy; protection of biotic diversity; international development projects; assessment methodologies and fisheries management; role of aquaculture in world fisheries.

FFI: Yanin Walker, World Fisheries Congress, American Fisheries Society, 5410 Grosvenor Lane, Suite 110, Bethesda, MD, 20814, USA. Tel: (301) 897-8616 FAX: (301) 897-8096

18-20 May 1992—PD/A CRSP Annual Meeting, Orlando, Florida

Registration materials will be sent in January.

21-25 May 1992—World Aquaculture Society, Orlando, Florida

The triennial meeting of the World Aquaculture Society, the National Shellfisheries Association, and the Fish Culture Section of the American Fisheries Society will include trade exposition and conference, special sessions, workshops and symposia on contemporary topics.

FFI: Terry Bosson, The Crest Organization, 940 Emmett Avenue, Suite #14, Belmont, CA, 94002, USA. Tel: (415) 595-2704 FAX: (415) 595-3379.

4-7 June 1992 Workshop on Social Science Research and the CRSPs, Location to be announced

This workshop will bring together social and biological scientists from the CRSPs to examine the strategic social science research agenda associated with the development and change of agricultural technology on farms.

FFI: Dr. John Yohe, INTSORMIL CRSP, The University of Nebraska-Lincoln, 54 Nebraska Center, Lincoln, NE 68583-0948

6-9 July 1992—Sixth International Conference of the International Institute of Fisheries Economics & Trade (IIFET), Paris, France

The conference will focus on recent advances in applied fisheries economics, international trade, and production systems and markets.

FFI: Ann Shriver, Executive Director, Oregon State University, Snell Hall 400, Corvallis, Oregon, 97331-1641, USA. Tel: (503) 737-6428 FAX: (503) 737-3447

26-30 October 1992—Third Asian Fisheries Forum, Singapore

Call for papers and preliminary registration. The forum will cover all aspects related to fisheries science, including: aquaculture, diseases, genetics, capture fisheries, nutrition, reproduction, and post-harvest technology. In addition, there will be a minimum of four symposia on specialized topics such as hormones in aquaculture, intensive farming systems, and molecular biology and biotechnology of aquatic organisms.

FFI: Chairman, Local Organizing Committee, c/o ITP Services Pte. Ltd., 994 Bendemeer Road, #04-03 Singapore 1233, Republic of Singapore

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