



PD/A CRSP EIGHTEENTH ANNUAL TECHNICAL REPORT

AQUACULTURE TRAINING FOR KENYAN FISHERIES OFFICERS AND UNIVERSITY STUDENTS

*Ninth Work Plan, Adoption and Diffusion Research 3 (9ADR3)
Progress Report*

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ABSTRACT

Lack of technical training has been cited as a major reason for the low output of fish ponds in Kenya. The lack was observed at all levels, from the lowest level extension agent through university levels. The training program undertaken by the Africa Project in Kenya seeks to improve training and to provide a cadre of trainers who have extensive practical fish production experience.

This year the Africa Project has begun scholarship support for two MS students, one at Moi University's Chepkoilel Campus, Eldoret, Kenya, and the other at Auburn University, Auburn, Alabama. Small stipends for student research conducted at Sagana Fish Farm have allowed undergraduate as well as graduate-level university students to remain longer to complete projects and gain valuable field experience. A small research projects program for station staff has allowed them to further their professional development and carry out their own research, which can have a positive impact on station management.

The program of farmer education days developed during the first half of 1999 (Veverica et al, 2000) was followed this year by a series of four short courses for personnel of the Kenya Fisheries Department (FD). In this series of courses, more than 80 FD staff received two weeks of training in pond construction methods and pond management techniques. Additional farmer field days for approximately 50 farmers are also planned for later in 2000.

INTRODUCTION

Lack of technical training has been cited as a major reason for the low output of fish ponds in Kenya. The lack has been observed at all levels, from the lowest-level extension agent through university levels. The Africa Project's training program in Kenya seeks to improve training and to provide a cadre of trainers who have extensive practical fish production experience. This activity was originally planned to include training only for university students and Fisheries Officers at all levels, but has been expanded to include farmer training as well.

Objectives

1. To increase the pond management skills of fisheries personnel currently involved in aquaculture extension activities in Kenya.

2. To enhance the research and extension capabilities of Kenyan university students likely to be employed in the aquaculture sector.

Activities undertaken during the current reporting year include beginning full-scholarship sponsorship for two M.S. students, conducting a series of short courses in pond construction and management for Fisheries Department (FD) extensionists, and continuing to support undergraduate and graduate students conducting research at Sagana Fish Farm by providing guidance and mentorship by the US Research Coordinator stationed at Sagana as well as stipends for some students. The US Research Coordinator also continued to provide some guidance to Fisheries Officers assigned to Sagana who wished to develop their professional skills by conducting small research projects at the station.

TRAINING OF UNIVERSITY STUDENTS

Two MS students are now receiving full scholarship support from the CRSP Africa Project. Mr. Robinson Mugo began receiving CRSP support for his graduate program in the Department of Fisheries at Moi University (Eldoret, Kenya) in October, 1999. Mr. Mugo just finished his course work and will begin his research at the end of year 2000. He will be working on a project combining aquaculture and genetic diversity/systematics questions. Mr. Bethuel Omolo, selected last year by the Kenya Fisheries Department to receive training towards taking up the Department's new Research/Extension Liaison position, was accepted into an M.S. program in the Department of Fisheries and Allied Aquacultures at Auburn University, Alabama, and began his program there in January, 2000. Mr. Omolo's studies will focus on extension methods and programming and general aquaculture.

Of the three University of Nairobi MS students reported on last year (Gichuri, Izaru, and Mwau), Wilson Gichuri was awarded his degree during this reporting year. His thesis was entitled "Relative contribution of rice bran and inorganic fertilisers in semi-intensive tilapia (*Oreochromis niloticus*) and catfish (*Clarias gariepinus*) polyculture in Kenya." Paul Izaru and Patricia Mwau finally were given a date for defense a year after submitting their theses. Ms. Mwau successfully defended and is in the process of making corrections. Mr. Izaru must resubmit. All of these students conducted their thesis research at Sagana with supervision by the resident CRSP research coordinator, Ms. Karen Veverica.

Mr. Oenga is still writing and the going is slow given that he has been employed by KMFRI. He may run one more experiment at Auburn University in the Spring of 2001.

New MS students at Sagana this year include Enos MacWere and Robert Olendi, both from Moi University. MacWere received CRSP stipend assistance and did his thesis research on

commercial tilapia and *Clarias* production systems. He has completed his second thesis draft and will probably submit it in November. Olendi, who also received stipend support from the CRSP, did his research on the effects of suspended silt on primary production and fish growth. He finished his thesis research in May and will probably submit a draft by the end of the year. He was already employed as chief technician of the Moi University Department of Fisheries before entering graduate school, and will return to that job.

Two graduate courses in aquaculture were given at Sagana Fish Farm. One was for Moi University graduate students, given in February 2000 by Dr. David Liti. The second course was given for hydrobiology students of the University of Nairobi Department of Zoology; it was organized by Dr. Liti and included short talks given by a variety of Sagana station staff and students.

University undergraduates continue to come to Sagana to do "attachments," in which they learn the practical aspects of station work and often take on a special subject for an "Attachment Report." Those who can stay longer often also conduct "Senior Project" research, for which a report is due at the end of their senior year. Student stipends from the CRSP have made it possible for some students to remain at Sagana for the whole break between their junior and senior years, thus allowing them to complete a senior project. Three undergraduates from Moi University and one from Kenyatta University finished their junior/senior year attachment in September 1999 and returned to Sagana for December break. They graduated with bachelor's degrees in May 2000. Two other recently graduated Moi University students (Arthur Tuda and Charles Achuodo) worked at Sagana under the CRSP for one to four months and left to take jobs that they obtained as a result of their Sagana experience. They had already finished a senior project prior to arriving at Sagana. Names and senior project subjects for students are presented in Table 1. Although students handed in their reports to the station head, the CRSP

Table 1. University level training supported by the PD/A CRSP Africa Project in 1999-2000. All undergraduate students were finished by May 2000.

Name	University / Department	Project	Date started
<i>Undergraduates</i>			
Paul Wamwea Wabitah	Kenyatta Univ. Zoology	Attachment. Senior project in comparison of tanks and hapas for sex reversal of tilapia	May 1998-May 2000
David Mirera	Moi University Fisheries	Attachment. Senior project on primary productivity indicators	May 1999-May 2000
William Nyaga	Moi University Fisheries	Attachment. Senior project on treatments to enhance survival of goldfish larvae.	May 1999-May 2000
Cosmas Munga	Moi University Fisheries	Attachment. Senior project on <i>Clarias</i> larvae feeding strategies.	May 1999-May 2000
<i>Graduate students (M.Sc.)</i>			
Daniel Oenga Nyanchiri	Moi University Fisheries	Largemouth bass introductions and fingerling production	July 1998; continuing
Robert Olendi	Moi University Zoology	Effects of suspended silt on primary production and fish growth	October 1999; research finished May 2000
Robinson Mugo	Moi University Fisheries	studies on Kenyan killifishes	just beginning research
Enos MacWere	Moi University Fisheries	commercial tilapia and <i>Clarias</i> production systems	October 1999; research finished May 2000

Table 2. Summary of Fisheries Department (FD) staff and non-FD participants who completed two-week training programs in pond construction and management. A total of four programs were held between November 1999 and August 2000. Trainees came from all provinces except Northeast.

Designation	Male	Female	Total	Remarks
<i>Kenya Fisheries Department (FD)</i>				
Fishery Officer	2	1	3	Four additional FOs sat in on the course Three did not complete the pond management section
Assistant Fishery Officer	4	1	5	
Fisheries Assistant	52	9	61	
Fish Scout	9	1	10	
Subordinate Staff		1	1	
Total FD staff	67	13	80	
<i>Non-FD participants</i>				
KMFRI staff*	3		3	One Research Officer, two technicians Includes 13 from African Bulldozers Three were undergraduates; four were graduate students
private farmers	14		14	
university students	6	1	7	
Total others	23	1	24	
OVERALL TOTAL	90	14	104	

Dates:

Group A: 28 Nov.-3 Dec. 1999 at Moi University and 22-25 Feb. 2000 at Sagana.

Group B: 14-25 Feb. 2000 at Sagana.

Group C: 8-22 May 2000 at Moi University.

Group D: 13-26 Aug. 2000 at Moi University.

* Kenya Marine Fisheries Research Institute

was never provided a copy. Copies have been requested from Moi University.

Three additional undergraduate students were accepted for attachment by Dr. Liti for the year 2000.

TRAINING FOR FISHERIES DEPARTMENT PERSONNEL

A series of two-week short courses in pond construction and pond management was begun this year. Each course is designed to accommodate twenty participants. These courses are typically a collaborative effort between the Sagana CRSP/FD group and the faculty of the Department of Fisheries of Moi University. Some courses are held at Moi University's (MU) Chepkoilel Campus, in Eldoret (home of the MU Department of Fisheries), whereas others are held at Sagana. Moi University participants include Dr. Mucai Muchiri, Head of the MU Department of Fisheries, and Dr. Charles Ngugi, Professor in the Department of Fisheries.

The first course focused on pond construction and was held at the Chepkoilel Campus from 29 November through 4 December, 1999. Fifteen extension workers, four private pond contractors and one farmer participated. As part of their training, participants constructed two small ponds at the Moi University Department of Fisheries site near Eldoret. In February (2000) this group received an additional four days of training at Sagana, where they joined the second session to study pond management.

The second two-week course was held at Sagana from 14-25 February, 2000. This group included one Fisheries Officer, 19 Fisheries Assistants and Fisheries Scouts, and three workers from the crew of a private contractor. Oversight for this training session was provided by Judith Amadiva, Social Development Officer assigned to Sagana by the Kenya Fisheries Department. Both the first and second sessions (Eldoret and Sagana) were co-taught by Karen Veverica and Charles Ngugi of Moi University. Mr Enos MacWere,

a graduate student working with the CRSP, provided assistance.

A third course, involving 20 FD officers and another three private contractor crew members was held at the Chepkoilel Campus of MU from 14-27 May, 2000. This course also focused on pond construction and management. Dr. Charles Ngugi had the major responsibility for teaching this course.

The fourth and last training course of this type held under the CRSP was held from 13-26 August at Chepkoilel campus. Ms. Geraldine Matolla helped teach the course. KMFRI requested three spots in this training program. Their officers began constructing two new ponds themselves immediately following the training. A total of 104 individuals received hands-on training in these short-courses during this reporting year (Table 2).

Because the FD saw the training program as a way to advance the grade of their staff, and the PD/A CRSP considered the training to be a tool to aid in dissemination of correct information to farmers, the selection of trainees met with some disagreement. The CRSP wanted people who actually work with farmers. The FD wanted to train Fisheries Assistants, whether or not they were involved actively in aquaculture extension. We have been able to resolve the differences by allowing the FD to choose the people to be trained but with the stipulation that they assure us that those trained will be reassigned to positions where they can use their training.

A further effect of the training has been the creation of a cadre of individuals experienced in the teaching of pond construction and pond management. This team is led by Dr. Charles Ngugi of the Moi University Department of Fisheries. Enos MacWere, a graduate student from Moi University who has assisted with these programs, now has four training programs of experience. Dr. David Liti (MU Department of Zoology) and Geraldine Matolla (MU Department of Fisheries) have also obtained considerable experience in these programs. Moi

University now has six ponds for use in student research projects and/or future training programs. The team teaching technique that combines CRSP researcher K. Veverica, Moi University professors, and private pond contractors (African Bulldozers) has resulted in a very strong field-work oriented training program—the first of its kind for the Fisheries Department. Professors at Moi University and officials of the Kenya Fisheries Department and KMFRI have all independently reached the conclusion that Sagana is the best place to hold training of this sort.

Judith Amadiva, the Social Development Officer at Sagana and a valuable assistant to the training programs when they were held at Sagana, has developed a follow-up questionnaire to document the effects of the training on the job performance of the graduates. Trainees will be asked what changes they have made in their recommendations to farmers and some visits will be made to ponds newly constructed following the training program.

One more training program is planned for the ninth Work Plan: Fishery Officer training to be held in November 2000. The FD recently requested that the program be extended to three weeks instead of two weeks. It will be team taught by Moi University and CRSP researchers Veverica and Bowman, at a graduate student level. The course will form the model for other university aquaculture classes. Only 20 places for Fishery Officers will be available. There has been high interest in this course and we have been requested to allow other trainees to attend the course under sponsorship from other projects or private entities. Therefore an additional five places are being added for outside-funded trainees. One private business and one government department have taken all the open places.

During the first part of the reporting year the CRSP resident research coordinator continued to provide guidance for Fisheries Officers assigned to Sagana Fish Farm in conducting small research projects, giving advice on experimental design and some material assistance. These projects further the professional development of the officers and provide background information and experience for writing proposals for more detailed research. Some of the projects, such as those looking at *Clarias* fingerling production techniques, have immediate impact on station management. Two such projects were undertaken during the year, as shown in Table 3. However, no report has come from ANY of the small projects conducted by any Fishery Officer. This effort had to be discontinued in 2000, following the reduction of CRSP support for the US Research Coordinator to 0.25 FTE.

By the end of this reporting period, almost all of the Fisheries Officers at Sagana had been transferred. One obtained a scholarship to Belgium; some were transferred for disciplinary reasons. The newly transferred FO's who replace them have

little practical training in aquaculture but they had demonstrated good initiative and high interest. However, this means that further training is even more important.

The CRSP continues its support of Mr. James Karuri in a three-year diploma program in Applied Biology at the Muranga College of Technology. He began his first year in January 1999, and will finish by the end of 2001.

FARMER TRAINING

Last year we reported on a program of farmer education days that was developed in response to requests received from the farmers themselves. Under that program a series of five farmer education days involving 107 farmers and 40 extension workers was held during the first half of 1999. All districts in Central Province were covered and one district each from Eastern and Rift Valley Provinces was included. Only informal farmer training was conducted this year, through individual contacts when farmers visited Sagana or during farm visits. However, a considerable training effect is expected for farmers and the Fisheries Officers and extension agents who work with them as a result of the on-farm trials that are under way in Central Province. That activity is reported on separately (see 9ATR1, "On-Farm Trials: Evaluation of Alternative Aquaculture Technologies by Local Farmers in Kenya"). Field days for 100 additional farmers are planned as part of *this* activity, but these are scheduled to begin after August 2000.

Last year we reported that the water flow question appears to be the single most important issue in improving fish growth and production. This issue continues to be one of the most important to address. However, the biggest impediment to transferring water management understanding to farmers is, in fact, the extension service. Extensionists continue to advise what they were taught via hearsay (that flowing water through ponds is the preferred management approach), and they can only advise on subsistence level management. If subsistence level management is all the extension agents know, then aquaculture will not progress beyond the subsistence level.

ANTICIPATED BENEFITS

The Pond Construction and Management Training program has been included in the Moi University training curriculum and has been accepted as an official course by the FD. This means that those who have completed the program are eligible for promotion or they have an advantage over their un-trained colleagues when it comes time for downsizing of staff. This is why the FD elected to send mostly Fishery Assistants to the training. The FD is phasing out its use of Fish Scouts, so both the FD and the CRSP were hesitant to include many of these in the training. In fact, hundreds of fish scouts were retrenched in

Table 3. Fisheries Officers assigned to Sagana that have worked on their own research projects during this reporting year, with advice and materials provided by the PD/A CRSP.

Name	Project title	Status
Francis Mwonjoria	Cage culture of tilapias: trials using low volume/high density cages based on work done in China.	Began Nov. 1999; Officer lost interest as of Feb 2000. Coordinator examined data with him and made suggestions on reporting.
Raphael Mbaluka	<i>Clarias</i> fingerling production technologies: simultaneous fry growout with tilapia fry	Second experiment to began Aug. 1999. Worked up data and discussed with CRSP coordinator.

September 2000. So far, none of the staff who received a certificate have been retrenched.

This activity is providing university students, FD personnel (including those involved in extension efforts), and farmers with knowledge about proper pond construction and skills for improved fish handling and pond management. Short training courses are improving technical confidence and morale among Fisheries personnel involved in extension work. Linkages between research and extension activities in Kenya are being strengthened. Support and hands-on guidance of undergraduate and graduate aquaculture students will strengthen their degree programs and help promote productive and sustainable aquaculture growth in

Kenya and in the region by providing a cadre of trained staff for commercial aquaculture. Ultimately, better pond management by farmers will lead to increased fish production, increased farm income, increased amounts of fish available to communities and markets, and increased employment opportunities.

REFERENCES

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