



AQUACULTURE CRSP 22ND ANNUAL TECHNICAL REPORT

PRELIMINARY WORK ON SITE DESCRIPTION, EVALUATION AND DEVELOPMENT PLANNING: TANZANIA, GHANA, AND KENYA

*Eleventh Work Plan, Economic/Risk Assessment and Social Analysis Research 1 (11ERAR1)
Final Report*

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ABSTRACT

Requests for proposals under the Eleventh Work Plan encouraged the inclusion of new host countries and new researchers in Aquaculture CRSP activities. Ghana and Tanzania were proposed as potential new host countries in Africa, and as such, some preliminary work on site descriptions and updates were required. The activity verified the existence of basic institutional research capacities needed to make collaborative research viable. It also studied government policies to ascertain support for aquaculture, research, and extension. In Tanzania, a number of aquaculture projects funded by other non-governmental organizations including the FAO have been going on. A government aquaculture policy was obtained, which indicated a commitment to developing aquaculture. Two universities are engaged in aquaculture and fisheries research, University of Dar-es-Salaam and Sokoine University of Agriculture. In Ghana, the Kwame Nkrumah University of Science and Technology offers a degree program in aquaculture and has aquaculture research facilities. The government has a research center that is involved in aquaculture research called the Aquaculture Research and Development Center. The center is adequately staffed with aquaculture professionals and is well equipped. International agencies that are currently active in aquaculture development in Ghana include FAO, Danish International Development Agency, German International Development Agency, and the World Fish Center. Both Tanzania and Ghana are recommended to be included as new sites for Aquaculture CRSP research in Africa.

INTRODUCTION

The African expert-panel meeting in Nairobi, Kenya in July 2002 identified the need to expand CRSP activities beyond Kenya. Consequently, under the Eleventh Work Plan, collaborative effort with new host countries and researchers was encouraged. In response to the Eleventh Work Plan, a proposal was submitted that involved Gha-

na and Tanzania as new host countries in addition to Kenya. In Africa, Kenya is the only country actively involved in Aquaculture CRSP activities but under the Seventh Work Plan, Tanzania and Ghana were among countries that were evaluated for possible collaborating sites for Aquaculture CRSP activities. One of the conclusions from the site evaluation under the Seventh Work Plan included the existence of opportunities for collaboration at some

level in the future with Ghana and Tanzania.

The proposal submitted under the Eleventh Work Plan received positive reviews and was among the "Recommended for Further Consideration" category. Some preliminary work on site descriptions and updates were therefore required for Ghana and Tanzania, and any new locations in Kenya. Consequently, the objectives of this activity were to verify the existence of basic institutional research capacity needed to make collaborative research viable; to secure and study government policies to ascertain support for aquaculture, research, and extension; to determine the host government's interest in participating in Aquaculture CRSP programs and its willingness to make adequate commitments to support various research activities; to determine the interest and commitment of the host country PIs to Aquaculture CRSP programs and research activities; and to establish a mutual understanding of responsibilities and the expectations of Aquaculture CRSP from host countries. The activity was to ascertain compliance of the two potential new host countries with BIFAD guidelines and suitability as prime research sites.

METHODS AND MATERIALS

Site description, evaluation and development planning for Tanzania, Ghana, and Kenya were accomplished using the following guidelines and strategies:

- 1) Outlined important criteria and factors for consideration using BIFAD guidelines and input from the Management entity (June 2003);
- 2) Developed a template using information from (1) above (July 2003); and
- 3) Visited the three countries using the template in (2) for gathering information on each country (October 2003)

RESULTS

Tanzania

Institutional Research Capacity

Two universities are engaged in aquaculture and fisheries research; University of Dar-es-Salaam (UDSM) in Dar es Salaam and Sokoine University of Agriculture (SUA) in Morogoro. In UDSM, the fisheries curriculum is offered in the Faculty of Aquatic Sciences and Technology (FAST), which was established in 2002 after the Kunduchi Marine Fisheries Research and Training Institute was incorporated into the university of Dar es Salaam system. FAST offers a B.S. degree program in Fisheries and Aquaculture, B.S. in Aquatic Environmental Science and Conservation, and Diploma in Fisheries. The focus of the programs in UDSM is on marine and natural fisheries with limited attention to aquaculture. The university of Dar es Salaam has no earthen or concrete ponds for teaching and research. Much of the aquaculture-related fieldwork in the curriculum is performed at Fish Farm-

ing Centers operated by the Ministry of Natural Resources and Tourism, a government division.

On the other hand, SUA in Morogoro has 20 concrete tanks and 10 earthen pond of about 300 m³ each in size. There is a reservoir having a capacity of about 700 liters. Aquaculture research facilities at SUA are located within the animal science research farm, which includes facilities for research in dairy, beef, goats, pasture, and biogas. The university has enough land for expansion with the potential to add 10 to 20 more earthen ponds. The source of water supply to the animal science research farm is a river, about a half a mile way. The water is pumped into reservoirs, but treated water at the university is supplied to the entire university campus under gravitational force. Equipment on the farm is quite limited with few operational tractors. There are no aerators or any field equipment for production ponds. The Animal Science Department has a wet laboratory, which is poorly equipped.

At SUA, aquaculture and related aspects are taught either as electives or as components of other courses in the B.S. Animal Science and B.S. Wildlife program in the Department of Animal Science and Production. There are two faculty members involved in teaching aquaculture and fisheries. A new program begins in the fall of 2004 for a B.S. degree in aquaculture. There is a masters program in animal science.

In terms of communication facilities, the department has phones, computers and internet services. Transportation facilities are satisfactory with very few official vehicles for the department. Faculty members utilize their personal vehicles to a greater extent in performing their research and teaching duties without any compensation.

Government Policy on Aquaculture, Research, and Extension

The policy of the Tanzania government is to promote small scale, semi-intensive aquaculture systems with simple technologies and low capital investment. The government has published a National Fisheries Sector Policy and Strategy Statement, which outlines the government's determination to ensure the growth and development of the fisheries and aquaculture sector in a sustainable manner. In particular the Tanzania government seeks to partner with the private sector and NGOs for collaborative research and training so as to improve the efficiency of research findings, capacity building and extension services. Technical assistance and cooperation are needed in the development of the aquaculture industry. Poverty alleviation is one of the major goals of the government with the promotion of fish farming. There is a handbook for fish farmers published in the national language, *Swahili*, which outlines principles of pond construction, stocking, feeding, harvesting and general management of fish ponds. This is provided free to fish farmers and potential fish farmers.

The government has a number of National Fishing Centers located in various regions of the country. These centers offer training programs for farmers and fisheries officers. One such center is the Kingolwira National Fish Farming Center, in Morogoro where Sokoine University of Agriculture is located. The center has a fairly equipped laboratory, functioning production earthen ponds and concrete ponds for hatchery. There is the potential for collaboration between the government and the universities because the government has the facilities for research and teaching while the universities have the manpower to utilize the facilities.

Interest and Commitment of Government and Principal Investigators

There were a series of meetings with officials from government and faculty from Sokoine University of Agriculture and University of Dar es Salaam. The first meeting took place in Dar es Salaam, with subsequent meetings at SUA and UDSM. Since the government needs funding support for long-term development of its aquaculture and fisheries sector programs, officials from both government and the universities expressed strong interests and commitments to collaborative research with ACRSP. Tanzania has been involved in a number of aquaculture projects funded by other non-governmental organizations so partnering with USAID-ACRSP does not appear to be a new territory of collaboration to them.

Visit to Farm Sites

Tanzania has a considerable potential for developing the aquaculture sector because aquaculture will integrate well with other agricultural enterprises. The Tanzania Fisheries Research Institute estimates that only one percent of the aquaculture potential is exploited. In the Mkindo area for example, rice is the predominant commodity cultivated. The Mkindo dam is used extensively for irrigating the rice farms with water flowing by gravity. The area is very suitable for fish farming but very few farmers operate fish farms in the area. The Mgeta area is also a very suitable area for fish farming. Vegetable production is the predominant agriculture activity in the area. In 1998, FAO's Aquatic Resource Management Programme for Local Communities (ALCOM), conducted pilot fish farming projects designed to integrate fish farming into vegetable farming systems to increase food security and offer opportunities for income generation. The ponds were also used as means of water storage and water re-use and pond water was often used to irrigate vegetable crops or water livestock. Several vegetable farmers in the Mgeta area had been involved in the ALCOM project and they continue to operate their ponds for fish production.

Ghana

Institutional Research Capacity

The Kwame Nkrumah University of Science and Tech-

nology (KNUST) is the only university that offers a degree program in aquaculture. Other universities offer aquaculture as electives in the animal science degree program. At KNUST, the Institute of Renewable Natural Resources (IRNR) offers a B.S. degree. It's a 4-year program with about 34 students in the third year and 28 students in the fourth year. Four faculty members handle the aquaculture and fisheries program at IRNR. Aquaculture research facilities are located close to the university and include ponds, a farm house and a hatchery. The institute has 15 earthen ponds of various sizes ranging from about 200 m² to about 2500 m². The source of water supply to the research farm is a nearby stream. Equipment on the farm is quite limited. The institute has a wet laboratory, which is poorly equipped.

In terms of communication facilities, the institute has phones, computers and internet services. Transportation facilities are satisfactory with very few vehicles belonging to the institute. The vehicles are available to faculty members for the performance of their research and teaching duties.

The government agency that is involved in aquaculture research is the Fisheries Division of the Water Research Institute (WRI), under the Council for Scientific and Industrial Research (CSIR). The fisheries division has the mandate of increasing local fish production through participatory research and technology transfer in aquaculture and sustainable management strategies of inland and coastal water resources in Ghana. The division is actively engaged in research and has an established and well-equipped center, the Aquaculture Research and Development Center (ARDEC). The center is located very close to the Akosombo dam in the eastern region of Ghana and facilities include 2 office buildings, 20 ponds of size 0.2 hectare, 4 ponds of size 0.1 hectare, 20 ponds that are 200m² in size and 15 ponds that are 50m² in size. There are 44 concrete tanks as well. There is a wet lab that is well equipped, a glass aquarium and 10 automatic feeders. Other constructions are going on at the center including a darkroom for ornamental fish, a feed plant, a guest house and a dormitory.

ARDEC is located on a 5.5-hectare land supplied by a 5000-gallon water reservoir. The staff includes 5 researchers, 3 technicians and several auxiliary workers. The research focus is on tilapia, catfish, Nile perch and prawns and includes areas such as growth and reproduction, breeding, seed production, and feed/nutrition. There is collaborative research between the faculty at IRNR, KNUST and ARDEC that allows students from KNUST to conduct their thesis research at ARDEC. The Ghana government and international development agencies are the major sources of funding for ARDEC.

Government Policy on Aquaculture, Research, and Extension

The Ghana government is actively promoting small-scale, and medium-scale aquaculture systems. CSIR and KNUST are the research arms of the government and they are actively seeking partnerships with international development agencies for collaborative research and training so as to improve the efficiency of research findings, capacity building and extension services. International agencies that are currently active in aquaculture development in Ghana include FAO, Danish International Development Agency (DANIDA), German International Development Agency (GTZ), and the World Fish Center.

The government has a number of Regional Fishing Centers located in some of the ten regions of the country. These centers offer training programs for farmers and fisheries officers and conduct demonstrations to fish farmers. Each of the centers is fairly equipped, and has functioning production earthen ponds and concrete ponds for hatchery.

Extension services relating to aquaculture and fisheries are virtually non-existent. This is because the structure and focus of the extension service is primarily towards agriculture. Consequently, faculty at IRNR-KNUST performs some unofficial extension services because fish farmers often approach the university for technical assistance. In Ghana, the government agency responsible for fisheries is under the Ministry of Food and Agriculture. However, there are fisheries officers who have responsibilities for the natural fisheries.

Interest and Commitment of Government and Principal Investigators

Various meetings were held with officials from IRNR-KNUST, and WRI-ARDEC. There was much enthusiasm and the potential for collaboration with both government and the university. These institutions have been involved in a number of aquaculture projects funded by other non-governmental organizations so partnering with USAID-ACRSP was a very welcome proposal.

Visit to Farm Sites

In Ghana, fish farming occurs in several regions but farms are more concentrated in the Eastern and Ashanti regions. The main species raised are catfish and tilapia. Farm sizes vary across the Ashanti region. Some of the farms visited have small ponds of sizes 200 m² to 1,000 m² while others were as large as 5,000 m². Feed ingredients are mainly peanut husk, corn bran/meal, rice bran, and cassava bran. Both monoculture and polyculture are production practices on many farms.

Kenya

In Kenya, the focus of the activity was to study market

development strategies for the Eldoret area and recommend a framework for developing necessary capacity building and market organization for fish marketers.

The influence of the aquaculture and fisheries program at Moi University is promoting fish farming in the western region of Kenya. Much of the fish sold in the area market are from lake Victoria with a very small percentage coming from fish farms. Fish farmers currently do not have marketing problems because their supply supplements fish from lake Victoria. Fish farmers do not incur marketing costs because the market women travel to the farms to purchase the fish. Fish sold on the market is mainly tilapia and it is sold as whole and fresh as well as fried. In Kitali market, the price of whole tilapia ranges from about KS140 to KS200 per kilo (i.e., \$1.87–\$2.67/kg). The price that fish farmers receive is determined largely by the supply situation from lake Victoria, consequently fish farmers could be better off with higher prices with synchronized production and supply to the market at seasons when supply from lake Victoria is low and prices are high.

Recreational fishing is becoming a popular sport in the Kisumu region and as a result baitfish production is increasingly becoming a lucrative enterprise. A greater percentage of the baitfish used by anglers is imported and some fish farmers are engaging in the production of catfish fingerlings to sell as bait rather than raise them to food size. Fish farmers in Kenya have opportunities to make fish farming a relatively more profitable agricultural enterprise compared to other traditional ventures such as corn, sugarcane and vegetables.

CONCLUSIONS

Tanzania and Ghana offer a number of advantages as prime sites. In Tanzania, aquaculture is in the development stage with input from NGOs such as the FAO, the Heifer Project International, and the Environmental Management Program. Infrastructure exists for further development with the support and involvement of government and the universities. Similarly, in Ghana, CSIR is far advanced in its involvement in aquaculture research with the necessary facilities in place for continued research. Transportation and communication facilities are satisfactory for any collaborative research. Opportunities exist for the ACRSP Africa Project to move beyond Kenya into other regions across Sub-Saharan Africa. The continued allocation of resources and effort into collaboration with other sites will go a long way to establishing ACRSP presence in the Africa sub-region and making ACRSP to have an impact in the development of fish farming in the region.