Training in African Aquaculture Development

RANDALL E. BRUMMETT

We have been doing so much with so little for so long that we are now qualified to do anything with nothing.

Relatively Recent Proverb

There appears to be a general misconception in the development community about what aquaculture extension agents need to know in order to perform successfully in the field. The theory seems to be that, since the systems with which poor, smallholding farmers produce their food rely on simple technology and few inputs, only simple training is needed to prepare extension agents for the task of helping these people adopt fish farming. Proponents of this theory include the donor agencies which finance short-term training opportunities and the production of "appropriate-technology" extension manuals, the governmental development agencies which use short-term training to prepare their volunteers for service in developing countries, and the major universities involved in development-oriented research and education which design and implement these courses.

Young farmers observe a fish harvest from a pond in Malawi. PHOTO BY CLIVE LIGHTFOOT

The techniques used in training either prospective volunteers or developing-country nationals are pretty much the same: experts in the various component fields of fish farming present lectures, supervise "hands-on" activities and lead field trips to local aquaculture installations. This training is generally crammed into a few weeks (the shortest course I know of lasts two weeks, the longest 16 weeks). To be fair, some agencies realize that it is impossible to teach someone everything they need in such a short time, so they design series of short-courses, each dealing with a discreet component of aquaculture technology. This is more effective ... and more expensive.

In industrialized countries, extension agents are very well trained (most hold an MSc or equivalent degree, and many have PhDs). All this education is to serve the needs of relatively well-educated farmers and investors who have at their fingertips all the necessary technology, capital and material inputs needed to do aquaculture "by the book". I suggest that rather than needing less training, extension agents and others who operate in the idiosyncratic world of the poor African farmer, need a far deeper understanding of fish culture (particularly the basics of pond dynamics and ecology) than do those who can take advantage of industrialized-country infrastructure.

If someone in the U.S., for example,

wants to grow some fish there are clear guidelines to follow. The Soil Conservation Service has a nice 51-page booklet that most farmers would have no trouble reading. Every farm community has at least one person who owns a bulldozer big enough to dig a pond. PVC pipe and cement are abundant and affordable. Every farmer has access to sufficient credit to buy the necessary quantities of the types of fertilizers or feeds. The latest information can be gleaned from the plentiful handbooks in the stores and libraries. If anyone gets in trouble, a well-educated country extension agent will drive to the farm upon receiving a phone call.

Compare this to the situation of the smallholder in, say Uganda, who wants to grow some fish. The information generally available on the subject of pond construction is so primitive that the information borders on being useless (Fig. 1), is written in a foreign language or contains too many foreign expressions (necessitated by the lack of suitable vocabulary in the local dialect). Even if the material was clearly presented in the local language, over half of the farmers in Uganda can't read anyway.

When the extension agent visits, his/her advice, based on a six-week training course, is to find the best site. Now since everyone knows that the pond **must** drain, it has to be situated on a slight slope. Unfortunately, the only site which is just right overlaps the farmer's house and most productive banana grove. The farmer is reluctant to tear down the house so the extension agent says "Sorry, no fish for you," and "Adios".

The urgency with which the need to improve agriculture productivity and sustainability in the developing world is viewed by the international community is, I suppose, primarily responsible for the insistence that results be obtained quickly. I suggest that this rush to save the world has been largely counterproductive. Rather than speed development, the provision of quick, and therefore simplified, training has retarded the uptake of new technology on smallholdings by failing to give extension agents the information necessary for them to respond flexibly and creatively to the diverse conditions on these farms. The often-heard question: "Why, after so many years and so much money, is aquaculture in subSaharan Africa still of so little significance?", I would respond that development of the human resource must precede the development of natural resources; the development community wants the latter so desperately that it has tried to push the former faster than is realistic.

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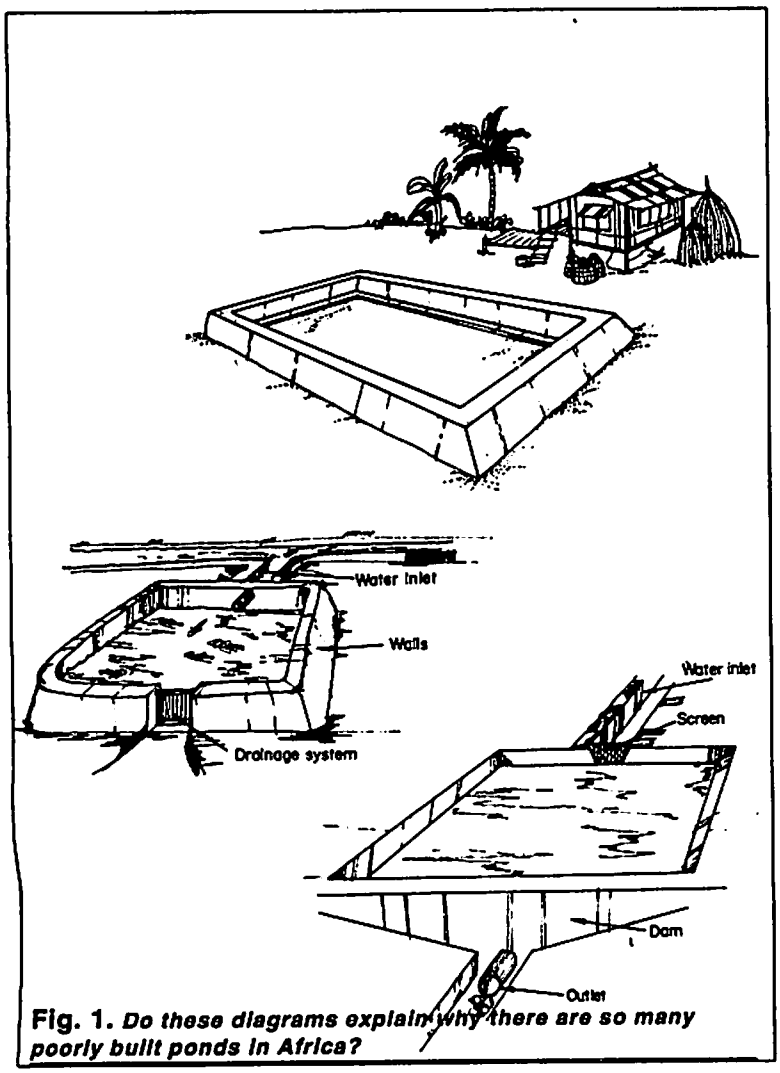

Fig. 1. ***Do these diagrams explain why there are so many poorly built ponds in Africa?***

Back to the Basics

To adapt the technology of aquaculture to the specific circumstances of individual smallholders, the chemical, physiological and ecological bases of fish production must be thoroughly understood. The traditional method of putting together "recipes" for how to build a fishpond with simple technology, how to transport fingerlings with simple technology, how to evaluate pond fertility with simple technology, etc. into a "cookbook" for use in the field has given extension agents (and lots of other people in the development community) the mistaken impression that so much is known about doing aquaculture with simple technology that it can be easily summed up in these terrifyingly brief manuals.

For example, some time ago a group of extension agents and I were discussing how much chicken manure would be needed to feed the brood ponds on their research station. I was told they needed about a tonne per week. I requested some calculations. This is what I got:

50 kg/pond every two weeks x 20 ponds = 1,000 kg

This is the rate that agents were given some years before by either a volunteer or the station manager (they couldn't remember which) and had been using ever since. I asked about sizes of ponds, about stocking rates, about species, about water temperature, about moisture content of the manure, about other fertilizers going into the ponds, about whether this was the same rate used in

growout. The answers to these questions were, to say the least, disappointing, coming from people who had all received at least one overseas training course.

So we got out the reference books and went through some calculations and learned that, at the current stocking density, average weight of fish, pond fertility and water temperature, we didn't need any chicken manure at all, just a little urea. Some time later, when the weather was warming up and plans were underway to stock ponds and put out the broodfish, I asked the extension agents how much chicken manure they were going to need for the season. "But", they responded, "you said we didn't need to put in any manure!"

This is just one example. Over the years, extension agents have told me that you can't do aquaculture unless your pond is rectangular, unless you have an aerator, unless you have a soil-testing kit, if your pH is other than 7.0, unless you have a fence around your pond, unless you tear down that thing you built and do it like this.

An enthusiastic trainee with mentor, Malawi. (Photo by C. Lightfoot)

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I would like to suggest that these misperceptions are the direct result of having given the practitioners of aquaculture extension the impression that everything they needed to know about growing fish could be put into a 200-page training manual and a six-week European vacation. There can be, in my view, no substitute for taking the time to provide the depth of training and experience necessary to understand the basic principles underlying fish production. I would begin with nutrient cycles for carbon, nitrogen and oxygen. From there proceed to basic aquatic ecology including the microbial, planktonic, and benthic communities and not just the fish. I would then try to define and describe the component parts of the concepts of carrying capacity, growth and yield. Only at this stage would I talk about fish, and what is known about how to grow them under prevailing conditions. Following would be an opportunity to actually grow some fish. Each student would be given a set of constraints and try to grow a crop of fish from fingerling to harvest in an individually assigned pond. This exercise would probably take a few months during which time a library research project might be assigned. At the end, each student would make a presentation and compare notes with the other participants.

I would do the whole thing gradually over the course of a couple of years as an in-service training program. I would get local instructors to do it in the local language. I would not take anyone out of the country on a study tour.

In response to demands from Fisheries Department extension agents for more training, and a series of meetings and discussions aimed at determining how best to meet this demand, we have started such a course here at the Malawi National Aquaculture Center. The material is presented during regular staff meetings in Chichewa (the local language) by a Malawian scientist. There is an extensive period of question and answer following the presentation which brings in examples drawn from local experience. The session takes three to four hours. The entire program is expected to take several years. This might sound slow and maybe boring, but we have had an encouraging beginning and very positive feedback from the participants. These are extension agents who have been, by their own admission, floundering around for years trying to piece together the puzzle of low-input aquaculture.

In a few years, we hope to see a team of extension agents working in Malawi who are able to analyze problems and create innovative solutions based on their understanding of the principles of aquaculture. In addition, they will have actually grown fish on their own and understand at least some of what faces the smallholding farmer when he or she undertakes the adoption of this new technology.

R.E. Brummett *is the Project Leader of the ICLARM/GTZ Africa Aquaculture Project, P.O. Box 229, Zomba, Malawi.*