PD/A CRSP Eighteenth Annual Technical Report

Identifying Goals and Priorities of Fish Farmers in the Peruvian Amazon

Eighth Work Plan, Adoption/Diffusion Research 1-3 (8ADR1-3)
Final Report

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Abstract

The Peruvian Amazon is in an advantageous situation for fish culture. Survey data from 146 practicing fish farmers show that they culture a variety of species, but regardless of the kind of fish they grow, farmers view fish culture in a positive light. While gamitana (*Colossoma macropomum*) is not the only Amazon fish to deserve special attention, it is the first species about which enough is known to both manage wild stocks and develop aquaculture. PD/A CRSP research at the Quistococha Station near Iquitos, Peru, focuses on this species. Most respondents grew a number of different species, planned to build more ponds, were content with growing fish, and felt the pond was the best use of the land it occupies. In addition, most felt that the pond was worth the work put into it. One of the most problematic aspects of owning a fish pond is the loss of inventory due to human or animal predation. The data show 58% of respondents indicating problems with people stealing fish; 75% of the tucanare (*Cichla ocellaris*) growers had this problem.

Introduction

The Peruvian Amazon surrounding the regional city of Iquitos has been subjected to large-scale commercial exploitation for the last two centuries (Barnham and Coomes, 1996). As Nauta, Tamishiyacu, and then Iquitos grew during the late 1800s, they became centers of urban consumption and international export. Petroleum-based tires have effectively ended the rubber trade in the northeastern Peruvian Amazon (Villarejo, 1988; Coomes, 1992a; 1992b).

The Amazon river fishery plays a fundamental role in the livelihoods and survival of rural populations in this region (Chibnik, 1994; McDaniel, 1997). Fishing is by far the most important source of animal protein in the Amazon Basin and the main generator of cash for people living along the river. Araujo-Lima and Goulding (1997) argue that fishing is the most promising means for increasing animal protein in the Amazon Basin with a minimum of environmental degradation. Aquaculture plays a unique and dynamic role in the forest- and river-based farming system of the Peruvian Amazon or the selva (Pinedo-Vasquez et al., 1992; Tomich et al., 1995).

The number of fish species in the Amazon hydrographic basin has been estimated at 2,000. Only about three-quarters of these have been described scientifically. These represent approximately 10% of the planet's ichthyofauna (Penn, 1998). Araujo-Lima and Goulding (1997) maintain that while gamitana (*Colossoma macropomum*) is not the only Amazon fish to deserve special attention, it is the first species about which enough is known to both manage wild stocks and develop aquaculture. Amazon's fishing potential, previously regarded as inexhaustible, was overestimated. Though most waters in the Iquitos area are brown, black- and clear-water rivers are poor in fish. It is foreseeable that sufficient fish supplies for the rapidly growing Amazonian population cannot be guaranteed for long. Management of fish for subsistence use or local consumption is done by the inhabitants of the areas around the lakes, whose interests in preservation conflict with those of the professional fishermen. The river people supplement fishing with subsistence agriculture activities, jute plantations, and extraction of wood and other products. Now aquaculture is widely perceived as a farm-based activity that complements traditional sources of food and livelihood.

Aquaculture in the Selva

There is no fish-breeding tradition in Amazonia. The aboriginal populations kept fish, manatees, and turtles in large corrals for periodic consumption, but no techniques for reproduction in captivity were developed. However, the efforts of government agencies, nongovernmental organizations (NGOs), missionaries, and others have led to a certain level of indigenous knowledge and interest in aquaculture.

There is a unique relationship between aquaculture and fisheries in many parts of the Amazon region (Hall, 1997). The abundance of large, rapidly growing fish species supports an extensive capture fishery in the Amazon, its tributaries, and a large number of oxbow lakes. The fishery, however, is cyclic, as fishing is more difficult during the high water period of December through March. At this time, fish prices for some species are as much as twice the low-water-period price. This

cyclical deficit in the supply of fish coupled with a widespread perception that river and lake fish stocks have declined and will continue to do so are the primary motivations for fish culture in the selva. Commercial-scale fishers using large-scale fishing gear have depleted fish stocks in many oxbow lakes, further encouraging pond-based fish production.

Abundant supplies of warm water, generally available pond inputs, and easily obtainable grow-out stock are some of the favorable conditions for fish culture in the Amazon River system. Fingerlings can be obtained through individual effort in rivers or oxbow lakes or can be purchased from fisherman.

The reciprocal relationship between fisheries and aquaculture in the Peruvian Amazon is further enhanced by the well-established patterns of fish marketing present in the region. Alcántara's (1994) study of fish landings in Iquitos documents the diversity of fish in the markets and the centrality of boquichico (*Prochilodus nigricans*) as the most heavily harvested species. Gamitana had a steady, albeit slightly declining, level of reported fish landings over the extended period of data that were available. Fish are a central part of the *ribereños*' diet, many species are accepted for consumption, and fish sales seem to be readily accomplished locally or at market centers.

In 1992, CARE/Peru began an effort to increase food security and raise incomes by targeting families in nine villages along the Napo River. Aquaculture is part of a broader strategy of community development, health education, and food security improvement. CARE/Peru also provides fingerlings, nets, small loans for pond construction costs, and continuing technical support for aquaculture. One aquaculture technician works with Napo river villages while five others provide technical assistance to the Tamishiyacu and Tahuayo river regions. When cultured fingerlings are available, ponds are stocked with gamitana. When cultured fingerlings are not available, farmers use wild-caught fry and juveniles or delay restocking until they can obtain seed stock. Most CARE/Peru ponds are operated by a single family, primarily for food security purposes. Many of these ponds have been built and are now only beginning to harvest fish. New technology for increasing the yield of current breeding techniques and expanding the period during which breeding is possible will provide clear and widespread benefits for aquaculture producers in the selva (Kohler et al., 1999).

METHODS AND MATERIALS

Sample and Data Collection

Fish farmers were identified in selected communities in the Napo, Tamishiyacu, and Tahuayo River systems, which combine to form the Amazon, as well as in the Iquitos-Nauta Road area south of Iquitos. Structured interviews were conducted with a sample of 146 fish farmers having accomplished at least one harvest in the previous two years (Casley and Krishna, 1988; Townsley, 1996). The sample was drawn from available subjects in selected communities that were provided technical assistance in aquaculture by CARE/Peru and several other NGOs.

The survey instrument was adapted from previous research conducted by Molnar et al. (1996) in five PD/A CRSP countries—Honduras, Thailand, the Philippines, Rwanda, and Kenya. The Peru survey, however, reflects the unique conditions and context of Amazonian fish culture, the diversity of species, and the singular relationship of aquaculture to the river fishery in the region. Ponds were identified in communities on three river systems north and south of Iquitos, as well as the Nauta Road area south of Iquitos. Data collection took place in early 1999 and was conducted by graduate students from the Department of Fisheries at Universidad Nacional de la Amazonia Peruana.

Analysis

The analysis portrays patterns of survey responses by type of species cultured. The responses are tabulated within the subset of those producers who said they grew a particular species. From this information, central patterns of comparison and difference in experience and expectation for fish production can be discerned.

RESULTS

In the survey, farmers were asked a series of questions about their experience with fish culture, its relation to other farm activities, and the overall role the activity played in their farming system. A selected subset of these questions is summarized in terms of the species that the producers reported growing in their ponds.

We asked farmers whether they grew each of a series of nine species. Figure 1 charts the frequency distribution of the number of species grown. Only 8% grew only one species of fish, 24% grew two species, and more than 50% grew between two and five species.

Other analysis shows that the most frequently grown combination of species was tucanare (*Cichla ocellaris*) and bujurqui (*Cichlasoma amazonarum*), undertaken by about 13% of the sample. About 5% grew yaraqui (*Prochilodus amazonensis*) alone, 3% raised a lisa (*Leporinus* sp.)-tucanare-yaraqui combination, and 3% grew all the species but gamitana. No other combination of species accounted for more than 3% of the respondents. There seems to be some specialization or focus of growers on yaraqui as a culture species.

Table 1 describes the goals and priorities fish farmers in the Peruvian Amazon have for their aquaculture activities. The data for each respondent are tabulated under each species the

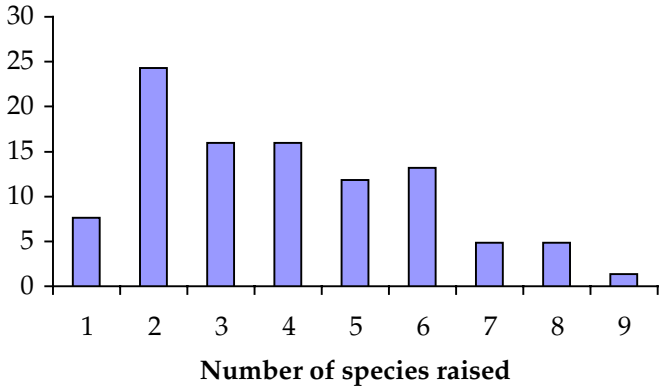

Figure 1. Number of species raised, Peruvian Amazon fish farmers, 1999.

Table 1. Goals and priorities for fish ponds by type of species cultured, fish farmers in the Peruvian Amazon, 1999.

Survey Item	Yes Responses by Species Cultured (%)									
	Boquichico (N = 109)	*Gamitana* (N = 92)	*Paco* (N = 87)	*Sábalo* (N = 71)	*Yaraqui* (N = 60)	*Bujurqui* (N = 55)	*Lisa* (N = 45)	*Oscar* (N = 28)	*Tucanare* (N = 16)	*All Species* (N = 143)
Do you have difficulty caring for your other crops because of your ponds?	1	2	2	1	2	0	2	0	0	1
Is it more difficult to take care of your family if you have ponds?	1	2	2	4	0	2	0	0	0	2
Have you had difficulty with other work because of your ponds?	3	3	3	4	3	4	7	4	0	2
Are there times during the year when the pond is too much work?	4	5	5	4	2	6	0	7	6	4
Have you had trouble getting enough water?	10	16	13	11	7	11	7	4	6	12
Have you had problems with people stealing your fish?	57	61	58	69	58	58	58	57	75	58
Is it easier to buy things for your family because of your ponds?	62	63	62	66	63	78	82	75	81	61
Have you had problems with birds or other animals?	70	62	60	66	73	64	62	71	75	64
Have you had trouble getting fingerlings?	62	61	63	62	65	56	44	43	25	65
Do you plan to build more ponds?	86	79	78	90	82	89	89	93	88	80
Is the pond more profitable compared to other activities?	89	90	90	88	86	86	91	88	100	87
Are you content with growing fish?	95	94	93	96	97	93	98	89	88	96
Is the pond the best use of the land it occupies?	96	98	98	96	93	98	98	93	94	97
Is the pond worth the work you put into it?	99	98	99	99	100	96	100	100	100	99

respondent reported growing. The columns (or species cultured) are also ordered in terms of the frequency that study respondents reported growing each type of fish.

Boquichico (*Prochilodus nigricans*) is the most frequently grown fish in the sample. A total of 109 of the 143 respondents reported growing this fish, about 76% of the total. It is easy to grow, fingerlings are readily obtained from the rivers, and it is popular as an ordinary low-priced food item among residents of the region.

Two-thirds of the sample raised gamitana in their ponds. This fish is the target of PD/A CRSP research in Peru. A fruit-eating species, it is a well-liked, high-value fish that is popular as a restaurant item.

Sixty-one percent grew paco *(Piaractus brachypomus*). About half the sample culture cultured sábalo *(Brycon* sp.), and 42% grew yaraqui. Almost 39% had bujurqui, 32% grew lisa, 20% grew oscar or acarahuazú (*Astronotus ocellatus*); at 11% tucanare was the least frequently cultured fish.

Table 1 shows the percent of respondents that said yes or agreed with each survey item. Few respondents reported difficulty taking care of other crops because of their ponds. No differences are notable across species. Similarly, few found it more difficult to take care of their family if they had ponds. Two percent reported difficulty with other work because of their ponds, and 4% said that there were times during the year when the pond was too much work. Nonetheless, 61% said that it was easier to buy things for their family because of the ponds, with over 80% of the lisa and tucanare farmers noting this advantage.

About 12% of respondents reported that they had trouble getting enough water to maintain their ponds, but gamitana farmers experienced this difficulty somewhat more often. One of the most problematic aspects of owning a fish pond is the loss of inventory due to human or animal predation. The data show 58% indicating problems with people stealing fish; this was highest among the tucanare farmers, of whom 75% had this problem. Similarly, 64% experienced problems with birds or other animals. Despite the extensive number of people engaged in at least casual fishing activity in this region of the Amazon, 65% of the sample said they had trouble getting fingerlings though only 25% of the tucanare growers noted this problem.

Eighty percent of respondents said that they planned to build more ponds, apparently basing their optimism on the premise shared by 87% that the pond was more profitable compared to other activities that might use the same land. Similarly, 96% indicated that they were content with the activity of growing fish, 97% felt that the pond was the best use of the land it occupied, and 99% believed that the pond was worth the work put into it. These findings show the central location of fish culture in the farming system of the Peruvian selva.

CONCLUSIONS

The Peruvian Amazon is in an advantageous situation for fish culture. The data show that farmers encounter few barriers to building ponds, obtaining fingerlings, feeding their fish, or marketing the product. Fruits and other forest-based fish foods are widely available to support extensive production systems. The natural cycle of the Amazonian river systems ensures a

market period of relatively high prices for farm-reared fish. The research agenda is appropriately focused on enhancing the availability of hatchery-reared fry of a popular, high-value species. Nonetheless, additional attention is needed on identifying and communicating technical insights that will reduce production risk and enhance the benefits of aquaculture for the many small- and medium-scale farms in the selva.

ANTICIPATED BENEFITS

The data presented here provide empirical specification of the needs and preferences of the actual intended beneficiaries of PD/A CRSP activities in Peru. As such, they provide a baseline or template for interpreting the cumulative impact of PD/A CRSP and NGO partner activities, as well as a starting point for identifying new directions and emphases that will help realize the promise of aquaculture for farmers and their families in developing countries. The data suggest that farmers are practicing diverse forms of polyculture that often feature the gamitana species, which is the focus of PD/A CRSP research in the region.

ACKNOWLEDGMENTS

We thank the several PD/A CRSP principal investigators, host country counterparts, and NGO colleagues who facilitated our work and advised us on the many problems and issues. In particular we are grateful to CARE/Peru's Juan Guerrero for his organization's help in obtaining the interview data. Without this assistance, our work would have been much narrower in scope.

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Cite as: [Author(s), 2001. Title.] In: A. Gupta, K. McElwee, D. Burke, J. Burright, X. Cummings, and H. Egna (Editors), Eighteenth Annual Technical Report. Pond Dynamics/Aquaculture CRSP, Oregon State University, Corvallis, Oregon, [pp. ___.]