

PN-AA4-229

XN-AA7-229-A

PN 5214 /

SOCIAL SOUNDNESS ANALYSIS

MANAGED FISH PRODUCTION PROJECT, USAID/PANAMA

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February 16, 1980

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INTRODUCTION

As of 1976 there were, in effect, no managed fishponds in Panama and certainly none whose principal purpose was to improve the well-being of nutritionally and economically disadvantaged populations. As of September 1979, the labors of the National Directorate for Aquaculture (DINAAC) had generated, in 22 districts and 107 different communities, a total of 192 fishponds. Seventy-two of these were defined as 'small' community ponds (size range 50m² to 40,000m²) Average size for the former is 302m², for the latter 3,748 m². The total area of these community ponds is 306,085 m². Project locations are listed in Table I and mapped in Figure 1 below. DINAAC estimates fish consumption at 158,085 pounds, with benefits to 19,438 persons per year./¹

1 Ministerio de Desarrollo Agropecuario (MIDA). ACUMULATIVO ACTUAL SEPTIEMBRE 1979: ESTANQUES CONSTRUIDOS PARA PECES Y SUS AREAS CORRESPONDIENTES. Santiago, Panama: Dirección Nacional de Acuicultura (DINAAC).

TABLE 1. LOCATIONS AND AREA (M²) OF SMALL AND LARGE COMMUNITY FISHPONDS.

District	1		2	
	Large/	Ponds	Small/	Ponds
	Number	Total Area (m ²)	Number	Total Area (m ²)
Las Palmas (V)/ ³	18	71,600.4	9	2,436.9
San Francisco (V)	5	18,745.6	13	4,536.1
Montijo (V)	2	8,400.0	--	-----
Atalaya (V)	1	4,288.0	2	325.7
Cañazas (V)	5	8,736.6	2	200.0
Santa Fé (V)	3	8,100.0	36	9,466.2
La Mesa (V)	2	2,999.3	10	2,665.7
Río de Jesus (V)	2	5,890.8	1	800.0
Calobre (V)	2	3,441.0	--	-----
Santiago (V)	14	91,716.0	24	6,929.1
Olá (C)	3	13,700.0	--	-----
Las Minas (H)	1	1,372.0	--	-----
La Pintada (C)	3	6,000.0	1	500.0
Panamá (P)	1	2,500.0	1	400.0
Antón (C)	3	8,000.0	1	700.0
Soná (V)	1	1,000.0	5	1,100.0
Penonomé (C)	4	7,800.0	10	4,575.0
Natá (C)	2	5,561.0	--	-----
Tolé (Ch)	-	-----	1	600.0
Chorrera (P)	-	-----	2	650.0
Ocú (H)	-	-----	1	200.0
David (Ch)	-	-----	1	150.0
TOTAL	72	269,850.70	TOTAL 120	36,234.7

Source: Ministerio de Desarrollo Agropecuario (MIDA). ACUMULATIVO ACTUAL SEPTIEMBRE 1979: ESTANQUES CONSTRUIDOS PARA PECES Y SUS AREAS CORRESPONDIENTES.

Santiago, Panama: Dirección Nacional de Acuicultura (DINAAC).

'Small' = 50 m² to 999 m². Largest pond in this category is 970.5 m².

'Large' = 1,000 m² upward. Largest pond in this category is 40,000 m².

V = Veraguas Province, C = Coclé, H = Herrera, P = Panama, Ch = Chiriquí

FIGURE 1. MAP OF DINAAC COMMUNITY FISHPONDS, BY SIZE, PRODUCTION MIX,
LOCATED BY PROVINCE AND DISTRICT

To be completed by J. Kwiatkowski

THE SETTING

Ten of the districts in which fishpond projects have been generated are in Veraguas, which as of September 1979 had 55 large (76% of the total of 72) and 102 small (85% of the total of 102) fishpond projects. In m², Veraguas had 83% (224,217 m²) of the total area in large ponds and 85% (28,456 m²) of area in small ponds. In total, Veraguas had 157 out of the 192 DINAAC community projects nationwide, or 85%, for a total area of 252,667 m², 83% of the 306,085 m² project total. Second, though far behind, was the Province of Coclé, with 27 projects, or 77% of the projects outside Veraguas. The provinces of Panamá, Herrera, and Chiriquí have 4, 2, and 2 fishpond projects, respectively.

The concentration of effort in Veraguas makes eminently good sense. The province as a whole has the highest incidence of extreme poverty, with 62% of its population below the poverty lines established in the CDSS for 1981-1985, 94% of whom live in rural areas. The upper poverty line marks the limit of income adequate to provide for a family's basic, minimal needs, calculated at B/304 per capita per annum for rural areas (based on consumption costs for 1978, adjusted by area). The lower, or extreme poverty line, marks conditions of serious vital deterioration and is calculated at B/160. Correspondingly, Veraguas accounts for the lowest share of the national income, 3.4%. Mapped by districts which fall below national averages on three key indicators of basic needs, the major concentrations of poverty emerge

1 USAID/Panama. COUNTRY DEVELOPMENT STRATEGY STATEMENT (CDSS) 1981 - 1985. January 31, 1979.

primarily in Panama's Central and Western regions, including all of the province of Veraguas and neighboring districts in Coclé, Herrera, Los Santos, and eastern Chiriquí. The numbers and percentages of the populations of that area under both poverty lines are presented in Table 2. The poorest districts so identified share the unhappy characteristics of poor soils, mountainous terrain, highly dispersed populations, lack of access roads, poor housing and sanitation, and limited access to potable water and health services. Population growth rates are only artificially low, due largely to the increasing tendency of the population to migrate out, especially to Panama City. Highest rates of such migration occur in Veraguas and Chiriquí. The synergy among great need, high dispersion, and difficult access are extremely resistant to most efforts at development in the area. Table 3, which lists key quality-of-life indicators for the poorest districts of Panamá, reflects the dimensions both of the problem and its potential for solution. It also suggests possible directions for the extension of the DINAAC program, an issue to be discussed below.

Beyond these characteristics, there is social fact that constitutes an additional limitation on development: the western districts of Veraguas and the eastern districts of Chiriquí have the nation's major concentration of the country's estimated 50,000 Guaymí Indians. 60% of the Guaymí live in Chiriquí, 10% in Veraguas, and 30% in Bocas del Toro, in an area designated as the Guaymí Comarca, whose boundaries are not firmly fixed by survey. /¹

1. The data on the Guaymí which follow are drawn from anthropologist Philip Young's social soundness analysis for the USAID/Panama Project Paper: GUAYMI AREA DEVELOPMENT, February 1979.

TABLE 2. ESTIMATED POPULATION (NUMBERS AND PERCENT)
BELOW POVERTY LINES IN FIVE PROVINCES

PROVINCE	ESTIMATED POPULATION						ESTIMATED POPULATION BELOW POVERTY LINE						ESTIMATED POPULATION BELOW EXTREME POVERTY LINE					
	TOTAL		RURAL		URBAN		TOTAL		RURAL		URBAN		TOTAL		RURAL		URBAN	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chiriquí	287,140	16	207,810	23	79,330	9	106,923	15	83,124	16	23,799	12	49,495	13	41,562	14	7,933	8
Veraguas	173,140	9	148,170	16	25,790	3	141,090	20	133,353	26	7,737	4	106,298	28	103,719	36	2,579	3
Los Santos	73,410	4	65,110	7	8,880	1	14,798	2	13,022	3	1,776	1	7,399	2	5,511	2	883	1
Herrera	83,490	5	54,730	6	28,760	3	46,939	6	38,311	7	8,628	4	19,195	5	16,419	6	2,876	3
Coclé	144,730	8	111,305	12	32,925	4	62,486	9	55,900	11	6,586	3	25,653	6	22,361	8	3,292	3

Source: USAID/Panama. COUNTRY DEVELOPMENT STRATEGY STATEMENT (CDSS).
1981 - 1985. January 31, 1979.

TABLE 3. DISTRICTS WITH LOWEST LEVELS OF SATISFACTION OF BASIC NEEDS

Province District	Total Pop.	Pop. Disp.	Annual Pop. Growth	Infant Mort.	Birth Rates	Illiteracy	Road Density	Houses w/o Elect.	Houses w/o approved H ₂ O Source	Houses w/o approved sanitary facili.	Houses n' Dirt Floors	Drs. per 10,000 Popula.	un-attended births	Econo. Active Popul. Devoted to Agr.	Farms w/less than \$500 in sales	Farms Receiving Agri. Credit	Farms Receiving Tech. Ass.
National Average:	-----	62.0%	3.1%	28.5	28.1	13.8	5.4	48.1	35.7	28.3	32.7	6.0	23.4	39.9	8.2%	17.5%	5.0%
Veraguas																	
Cañazas	15,590	90.7	1.5	30.9	35.3	61.5	0.8	96.5	92.0	89.0	94.5	0.6	77.3	93.1	94.6	6.9	1.1
Las Palmas	18,140	95.8	0.4	28.9	34.2	53.4	6.9	97.5	79.7	74.0	80.6	0.0	62.3	87.7	90.1	8.1	1.1
San Fco.	8,610	87.3	1.3	47.2	56.9	43.8	8.0	92.5	84.8	81.1	83.5	1.1	74.5	85.1	94.2	16.5	2.4
Sta. Fe	7,950	100.0	0.4	50.9	42.0	54.3	1.2	99.7	97.2	87.8	85.2	1.3	85.3	82.6	95.6	7.9	2.1
Calobre	12,040	94.6	0.7	15.1	33.0	35.1	5.0	97.2	86.7	76.0	89.9	0.8	70.1	88.3	84.4	20.3	1.4
La Mesa	11,340	91.8	0.7	21.5	32.7	31.9	11.9	94.6	79.7	79.2	88.3	0.9	51.2	90.1	95.6	4.2	2.7
Soná	25,520	79.5	1.6	20.7	32.2	47.4	6.9	89.8	74.2	74.0	83.7	0.7	71.6	76.3	90.5	13.5	6.5
Chiriquí																	
Gualaca	6,690	99.3	0.7	36.7	32.6	36.2	3.3	89.6	87.8	57.5	72.6	1.5	40.8	79.7	75.2%	21.1%	2.8%
Remedio	6,200	98.3	1.7	44.2	29.2	57.5	5.1	84.2	96.6	65.4	48.7	1.6	63.5	72.8	80.0%	15.5%	3.6%
San Félix	8,710	93.4	1.6	29.5	32.3	58.1	9.0	79.8	54.8	52.8	68.7	3.5	73.7	75.2	82.4%	19.9%	2.7%
Tolé	22,460	92.6	1.4	34.2	29.9	72.1	2.2	94.5	94.2	87.1	86.1	0.9	86.3	86.7	77.6%	17.1%	1.3
Renacimiento	8,730	98.6	1.4	37.2	33.9	19.4	8.6	98.6	71.7	65.4	75.3	1.2	41.2	87.5	62.2	33.9	2.5
Bugaba	44,142	33.4	2.0	31.7	29.3	12.3	31.6	55.6	70.2	35.7	37.5	0.2	22.5	58.5	78.3	23.9	4.3
S. Lorenzo	11,080	79.1	0.1	71.4	26.5	63.8	5.3	87.5	73.2	65.6	75.0	0.9	73.8	83.6	56.4	54.4	3.5
Coclé																	
La Pintada	18,054	85.9	2.0	39.3	29.6	18.0	3.0	94.7	79.3	77.5	80.1	0.6	66.9	80.1	94.1	5.5	1.7
Olá	4,911	100.0	1.3	47.6	34.2	50.7	2.5	99.7	92.7	92.3	92.7	0.0	79.0	89.3	87.0	15.8	0.9
Antón	29,557	60.3	2.2	36.0	31.0	6.7	14.5	88.9	45.7	35.1	57.4	1.3	43.9	59.1	80.6	10.7	11.0
Herrera																	
Las Minas	7,100	90.8	0.3	20.7	40.8	62.4	8.9	95.7	97.0	77.9	87.8	0.0	68.6	86.6	93.1	5.3	1.0
Los Pozos	8,740	93.2	0.9	31.7	25.3	41.8	3.8	96.8	89.3	73.5	80.2	0.0	64.2	86.6	87.9	9.7	1.7
Los Santos																	
Tonosí	12,790	91.6	2.8	36.3	19.4	29.1	4.5	95.9	79.7	73.6	80.6	0.8	52.8	83.9	72.4	25.3	4.3

Source: CDS 1981 - 1985, USAID/Panama.

The zone displays wide variations in elevation, from 350 feet above sea level to altitudes over 7,000 feet, with the Guaymí living at altitudes of up to 5,000 feet. Less than one-half of the comarca land is arable utilizing techniques that the Guaymí currently possess, and this land, mostly thin laterite with patches of volcanic soils, is agriculturally classified as 'severely or very severely limited' by the Ministry of Agriculture. Population density varies between three and 36 people per square mile, with an average of approximately 14 persons/mi.². Despite this dispersion, which is adaptive to ecological conditions and the technological demands of slash-and-burn agriculture, the small groups of scattered Guaymí are made effectively more cohesive through the influence of kinship relationships and traditional communications patterns. To the Guaymí, the existence of kinship ties far outweighs physical location or aggregation in determining community. Thus a house or group of houses located at a distance of several miles from a population cluster (community in the Latino sense) would be considered an integral part of that community if close consanguineous ties existed among occupants of those houses.

The residential nuclei that do exist are generally composed of two to six houses occupied by one kinship group of consanguineously-related males, plus in-married females and unmarried children. Recently, because of increasing population pressure on a reduced arable land base, in some places several kinship groups have been forced to reside in close physical proximity. Where these more dense groupings, usually 10 to 15 houses containing from 50 to 85 people, occur, Latinos and other non-Guaymí have given the population clusters place names and community status.

The Guaymí, like many of the Latinos in these poorest provinces, have been caught up not only in the problems of land scarcity but in changes in the economic structure of western Panama (the completion of the Pan-American Highway and increased opportunities for seasonal paid agricultural employment); like the Latinos, male Guaymí migrate temporarily as work is available, leaving to women much of the subsistence agricultural activity at home and correspondingly changing traditional patterns in division of labor. This movement into the market economy albeit marginal, in addition to geographical factors, have brought about more contact between the Guaymí and Latino populations in Veraguas than in the 'purer' Indian regions of Chiriquí and Bocas del Toro. Nonetheless, there remain important differences in self-image and community relationships between the two groups which appear to matter very much in the delivery of services and the transfer of technology.

METHODOLOGY

As a basis for the Social Soundness Analysis, 15 fishpond sites in 7 districts (41% of the 17 districts in which DINAAC has projects) were visited. These were, by district: San Francisco (Lagartero, La Mona, La Perdíz), Santa Fé (Paja Peluda), Las Palmas (Buenos Aires/Roble), Chumico, Cucurucha), Olá/Coclé (Las Huacas del Quije, Hijo de Dios), Cañazas (Palo Verde), Santiago, (Paso Las Tablas, Coloncito, Canto del Llano, La Normal), and Atalaya (Instituto Jesus Nazareno). Four sites, those in Las Palmas, are self and other identified as 'Indígena', lying within the admittedly vague boundaries of the Guaymí comarca. The rest were essentially Latino.

The sites visited ranged in accessibility, which was one of the criteria for site selection, as follows:

1. Easy Access (close to Santiago, paved road): La Normal, Canto del Llano, Coloncito, Atalaya, Paso Las Tablas.
2. Easy Access, More Distant (farther from Santiago, but paved road): Palo Verde ^{1/} Lagartero, La Mona.
3. Relatively Easy Access (more distant, some unpaved road): La Perdíz.
4. Difficult Access (distant, some paved road, plus long stretch poor, unpaved road): Buenos Aires/Roble, Chumico, Cucurucha, Paja Peluda^{2/}.

^{1/} Palo Verde itself is of easy access. However, it was visited to take advantage of a meeting of three communities, two of which (Las Huacas and Agua Amarilla) are at some distance by foot.

^{2/} While this site is not too distant from Santiago and road is paved, the last stretch involves a considerable walk and a river crossing by means of a long, swaying footbridge of dubious reliability.

TABLE 4. KEY CHARACTERISTICS OF FISPOND SITES VISITED

District/Site	Electricity	No. of Ponds	Area (m ²)	Construction	DINAAC Classification	Ownership	Level of Integration
<u>San Francisco</u>							
Lagartero	Latino	1	555	machine	small community	community	fish only
La Moná	Latino	1	870	hand+mach.	small community	community	fish plus garden
La Perdiz	Latino	21/	430	hand	small community	community	fish only
			60				
<u>Santa Fé</u>							
<u>Paja Peluda</u>							
	Latino	3	125	hand	small community	community	fish only
			130	hand	small community	community	fish only
			350	hand	small community	community	fish only
<u>Las Palmas</u>							
<u>Buenos Aires</u>							
	Indígena	2	6,114	machine	large community	community	fish plus pigs/ducks plus garden
			5,176	machine	large community	community	fish only (use manure from pigs in #1)
Reble	Indígena	2	3,840	machine	large community	community	fish only (had pigs/not operating)
			8,695	machine	large community	community	fish only
Chumico	Indígena	1	2,231	machine	large community	community	fish plus pigs plus garden
Cucurucha	Indígena	12/	3,230	machine	large community	community	fish plus pigs
<u>Olá (Coclé)</u>							
<u>Las Huacas del Quije</u>							
Hijo de Dios	Latino	1	2,000	machine	large community	"community" ^{3/}	fish plus pigs
	Latino	1	n.d. (est.2500)	machine	large community	community	fish plus ducks
<u>Santiago</u>							
<u>Paso Las Tablas</u>							
Canto del Llano	Latino	1	148	hand	small community	community	fish only
Coloncito	Latino	2	1,500	machine	large community	private	fish plus pigs(plus garden)(loosely integrated)
			349	machine	small community	private	fish plus ducks
La Normal	N.A.	1	1,274	machine	large community	private	fish plus ducks
			9,000	machine	large community	vocational school	fish plus pigs(pen constructed/no pigs yet)
<u>Atalaya</u>							
<u>Instituto Jesus Nazareno</u>							
	N.A.	1	4,288	machine	large community	agricultural school	fish plus pigs(plus garden)Plus methane bio-digester.
<u>Cañazas</u>							
<u>Palo Verde</u>							
	Latino	2 ^{4/}	100	hand	small community	private	fish only
			100	hand	small community	private	fish only ^{5/}

- 1/ Informants at this site said there were 5 more private, or family, ponds in construction, but no additional information was available.
- 2/ A 'natural' pond with some fish was also in use and was being considered for improvement.
- 3/ While fish from this pond was distributed to the community, management was effectively in the hands of MIDA and outside hired employees.
- 4/ Informants said there were 2 more private ponds; no other information.
- 5/ All ponds seen used polyculture, i.e., various mixtures of tilapia and carp (see technical analysis).

5. Extremely Difficult Access (distant, some paved road, plus very long stretch unpaved, terrible road): Las Huacas del Quije, Hijo de Dios.

In addition to the criterion of accessibility, sites were selected so that all the following variables would be covered; mode of construction (hand-dug/machine-dug, which correlated roughly with small and large size); ethnic group (Indian/Latino); harvesting method (continuous/non-continuous); and level of integration (fish only/ fish plus animals/fish plus animals plus gardens). Also included were ponds which were effectively at demonstration sites, such as ciclos básicos and agricultural schools, as well as privately-owned ponds. The sample was small, purposive, and utterly non-random in the statistical sense.

The original research design contemplated interviewing, at varying length, three community members in each site with community ponds: a project leader; a project member, preferably female; and a non-member. However, limitations of time and distance, in addition to the absence of a number of males due to the demands of the cash-crop harvest season, made that plan unworkable. Thus those interviewed varied from site to site, and included members and leaders of community groups responsible for fish-pond projects; ciclo básico and agricultural institute directors, managers, and laborers; private pond owners, and DINAAC personnel.

The semi-structured interview schedule included: basic community data; production and consumption patterns; project history, characteristics,

experience, and management; community organization and participation; role of service agencies, particularly DINAAC; involvement of women; economic aspects; spread effect; problems; and future hopes and plans. Table 4 lists the sites visited by district, ethnicity, number of ponds, area in m², DINAAC classification, ownership, and level of integration.

SITE CHARACTERISTICS

The topography of almost all sites, except for those near Santiago where the land is flatter, can best be described as ranging from somewhat to extremely broken, settlements were in general of dispersed type, or with some nucleation with a dispersed population tied by a variety of linkages to that nucleus; size of settlements with ponds (again excluding sites nearest to Santiago) ranged from extended family groupings as small as four households (eg., Paja Peluda) to as large as 80 households (e.g., Las Huacas del Quije).

Access to services was largely a function of distance. The most distant sites had a health post with an auxiliary nurse, but were essentially without care for grave illnesses or emergencies. Most sites had relatively easy access to a primary school, but little beyond that. Buenos Aires had a ciclo básico (junior high school) with an overburdened boarding capacity which drew on a number of extremely remote areas for its population. Except for Santiago and nearby paved-road sites, availability of markets was virtually nil. The majority of settlements with any nucleation had

potable water, but about one-third were dependent on natural water sources and carrying. In all sites, the majority of dwellings were said to have latrines, but several respondents indicated that 'having' did not necessarily mean 'using.' Finally, almost none of the sites had a usable community center and employed the local primary school as the most customary meeting place.

Landholding was a disconcerting mix of bits of land owned (terreno/ parcela propio/a) or loaned (prestado), or land without formal title but used as if belonging to the individual or community (derecho de posesión sin título/se considera de ello/s, cercado sin título). Almost invariably, the available land was seen as inadequate in terms of size, distance, dispersion and, principally, quality. There is, in effect, little faith in the land's capacity to produce sufficiently, especially without fertilizer or irrigation, a perception which could impinge on the potential success of MIDA/DINAAC to promote gardens as integrated fish-pond components.

The crops grown on this disappointing land were standard for the area: rice, corn, cane, yucca, and some beans, mainly frijol de palo, with some minor cultivation of sorghum and millet and seasonal availability in some areas of indigenous fruit. While almost all sites had at some point tried growing some vegetables (including peppers, tomatoes, cabbage, stringbeans, carrots, onions, chayote, and cucumber), few offered evidence of major success or any notable cash profit. Yet over half were disposed to try again and some were in various stages of seedbed preparation.

Without exception (schools and private Santiago pond owners excluded), meat was rarely consumed for lack of cash and availability ("cuando hay plata, no hay carne, y cuando hay carne, no hay plata"). Fish consumption was similarly rare except for an occasional river catch, cheese was unknown, and beans (porotos) increasingly infrequent although they are valued as the poor man's meat ("gallina rosada"). Individual livestock holdings (other than the asentamiento cattle projects in the comarca financed by the Banco de Desarrollo Agropecuario, and the DINAAC/Ministry of Health pig projects) are few and limited to an occasional cow, a couple of pigs, and ubiquitous but not regularly consumed chickens. About half the sites had had some experience with various supplementary feeding programs which were generally appreciated, with scattered complaints about random injustices.^{1/}

For more detailed data on consumption patterns in the fishpond areas, based on 24-hour recall investigation, see Annex _____, J. McGuire, NUTRITION RECONNAISSANCE AND EVALUATION MODEL, MANAGED FISH PRODUCTION PROJECT DEVELOPMENT, USAID/PANAMA, December 11, 1979.

THE FORMATION PROCESS

While there has been considerable variation in the details of how community fishponds have gotten started, there are some instructive consistencies which correlate roughly with the relative success of such projects. 'Success' is defined for purposes of this analysis as subsuming: continuation of project; amplification of project (e.g., expansion of pond, addition of another component such as pigs and/or gardens); and spread effect which, in turn, subsumes replication in the same community and/or in other, usually neighboring communities.

Factors or conditions which appear to favor such success are:

- 1) The positive effect and response to DINAAC promotion via radio, through the daily messages of Doña Duva, La Cholita del Tute, a quasi-campesina persona whose style and enthusiasm seem to strike a responsive chord in the transmission area.
- 2) Hearing about a nearby pond, going to see it and, most importantly, purchasing some of the catch.
- 3) An ongoing relationship with an active promoter of a governmental or private voluntary organization, e.g., Caritas, together with some previous community activity.
- 4) An extended-family settlement base. Private pond-building seems to be generated more by higher income levels, the elusive quality of entrepreneurship, and frequently, contact with the DINAAC director.

Factors which appear to conspire against success are:

- 1) Top-down, paternalistic promotional style.
- 2) Larger community size.
- 3) Very large pond size, machine-dug.

of these, only the first is sufficient in itself to reduce chances of success; however, in unison they almost guarantee what can fairly be termed 'failure.' 'Failure' is, obviously, the opposite of what has been defined above as 'success.' What is interesting is that communities do not seem, as a rule and for the present, to view technological problems as failures. Floods that wash out earthworks so that fish end up in the river, ponds that dry up or whose water level diminishes importantly in the dry season, small catches, or small-size fish, do not in themselves deter a committed community from continuing with the project. Perhaps because the technology of fishponds is relatively simple from the campesino perspective, such breakdowns are seen as temporary and repairable.

Furthermore, no matter what the size of the project, fishponds qua fishponds are not seen as a primarily economic activity and, even in communities which are now paying for fishfeed and the fingerlings initially provided gratis, the investment is not usually a large one. The principal perception of the fishpond activity is, consistently, that its main value is nutritional; to a standard diet that is poor in quantity and quality, a fishpond project adds, less frequently than is desired, an appreciated component. In fact, the valuing and enjoyment of fish as a food is another

though not sufficient, factor in project success. While infrequently consumed heretofore, campesinos like fish and, with one exception, feed it to their children from the age at which any solids are added to infant diet, with the bones carefully pulled out ("se pulga el pescado"). Fish is stewed, with or without vegetables; made into soup; roasted; dried, smoked, and salted; and, when oil is available, fried, the preferred preparation particularly for tiny fish which are then consumed whole, with perhaps some extra mineral benefits. Surprisingly, smaller fish are seen as offering a certain advantage, since they can be more easily distributed among family members. The feeling about fish was that any size was fine ("no importa; como venga") and only one respondent found larger fish were more attractive from a sales standpoint. Thus the whole issue of acceptability of fish to the target population is a non-issue, a red herring, if you like.

COMMUNITY PARTICIPATION AND THE DIVISION OF LABOR

Participation rates in fishpond projects, their formation, construction, maintenance, and expansion, ranged from 0% to 100% of the populations in the communities visited. In the main, projects which had been more or less imposed and were managed principally by government institutions or their representatives had zero to low participation rates (e.g., Las Huacas del Quije, Hijo de Rios, Roble). Projects which had arisen through a spontaneous community desire for a pond had the highest participation rates and fewer obvious organizational and collaborative problems (e.g., Lagartero, La Mona, Paja Peluda). Somewhere in the middle range were projects which had received what was referred to at one point as "helicopter" promotion but which involved communities small and concentrated enough so that it was possible for DINAAC to help them through what in some cases evolved into real social and technological stress (e.g., Chumico; Cucurucha). For self-starting communities, the accessibility factor did not seem to weigh heavily; communities which were not self-starters gave evidence of suffering more from any lack of frequent contact with extensionists and the supply of inputs. Sheer geographical distance and difficulty of access seem to weigh more heavily than any other single factor (such as ethnicity or mode of formation) in the steadiness and success of projects, but problems with the latter factors were not helped by inaccessibility.

One element that might have been expected to be a problem was the availability of pond land in areas already identified as land-poor. Nevertheless, the acquisition of appropriate land was, in none of the sites seen, an issue. The necessary parcel was either community, private, or national land which was donated for the fishpond project. This process may have been facilitated in some instances by community spirit and agreement on the desirability of pond. However, it is also likely, as the majority of respondents indicated, that the land was already some sort of natural water catchment of untillable slope and inappropriate for other agricultural purposes. Thus marginal or unusable land was reclaimed by the fishpond project, an undeniable benefit. Unfortunately, no data were gathered on any legal or quasi-legal transactions which might have been involved. Still, there is ample history in development annals on the fate of small-farmer projects which upgrade land and then are usurped or coopted by larger farmers, a history which suggests that the Project follow the practice adopted for SDA fishpond activities which require official title transfer for lands so used.

A number of questions were raised in the cable on the DAEC review of the fish production PID, concerning the community organizational base for the project. In the sample of sites visited, no clear picture emerged of any single community group that might serve as a consistent nucleus for the establishment of demonstration and new fishpond sites. All of the communities visited already had had some sort of community organization

prior to the fishpond project. Such organizations included: health committees (Comités de Salud); parent-teacher groups (Padres de Familia); community development groups (Grupos Comunes); CARITAS agricultural groups (Grupo Arado); cooperating kinship groups; and locally-selected, quasi-political governing bodies (juntas locales). Fishpond committees were in some cases coterminous with one of these groups, depending on the size and organization of the community, or draw part of their membership from such groups. All of the communities had had some experience with some sort of community enterprise, including road improvement, small livestock and garden projects, latrinization campaigns, school and community center construction and, for the asentamiento agglomerations, cattle-raising. It would seem that, while it may be important to project success for a community to have had some experience with group formation, no particular group type prevails nor is any one type more suitable by definition. Furthermore, while in the smallest settlements things go more smoothly if everyone, or almost everyone, participates in the work of the pond, communities seem to be able to manage with only partial participation, at least at the outset. This is especially true if the project is very small, if it is kinship-based, if it is selling fish at a higher price to non-members than it does to itself, and if the pond project is "fish only." The maintenance and harvesting demands of a simple fish pond are not seen as excessive, at most 15 minutes to a half-hour per day, and thus non-membership is a slight economic plus. Nevertheless,

as projects become more complex and labor demands greater, smaller populations evidence correspondingly greater need for more hands and fuller participation, primarily at peak periods of labor demand on or off-farm, and chafe more obviously when that is not forthcoming. It is at this point that community motivation and organization is crucial and where the skill of the promotor or extensionist is tested.

The institutional and community division of labor required by fishponds and any additional components is presented, for purposes of succinctness and clarity, in tabular form (see Table 5). It becomes clear that women have a major role in fishpond projects from the outset. In a number of communities women have, in fact, been the prime movers in such projects and, at least in Latino areas, are active in project-related community meetings. This is less the case in indigenous areas where, although women increasingly participate in agricultural labor, they do not yet function actively in the community decision-making processes.

Despite the pressures toward off-farm labor and the larger labor demands of more complex pond types, there are traditions of mutual labor in Panamanian^o rural society which can and do serve as a base for fulfilling fishpond work requirements. Young (op.cit.) found among the Guaymí that, although much of the^y work in indigenous communities was performed by households acting as independent economic units, certain tasks are customarily accomplished^t through the cooperation of kinsmen residing in different households and communities, as well as by non-kin groups. Festive labor,

Table 5. INSTITUTIONAL AND COMMUNITY DIVISION OF LABOR
ON FISHPOND PROJECTS.

<u>Task</u>	<u>Institutional Responsibility</u>	<u>Community Responsibility</u>
Promotion	DINAAC/MIDA	Individuals or community groups
Application		Individuals or community groups
Organization	DINAAC/MIDA	Community leaders/members
Construction		
Hand-dug pond		Men clear land; men, women, and children dig, using shovels, cans, digging sticks.
Machine-dug pond	DINAAC/MIDA REHARE Ingenio/1	Men may do some preliminary land-clearing. Men exchange labor on ingenio for tractor service. Women maintain own plantings as needed. Men, women, and children hand-finish excavation.
Finishing	DINAAC/MIDA may provide some technical assistance.	Men and/or women plant grass to restore, maintain pond banks. Men and/or women build any retaining walls, responsibility varying by type.
Fingerling stocking	DINAAC	
Provision, transport of fishfeed	DINAAC	Community purchases
Supervision	DINAAC	
Harvesting	DINAAC provides net, helps with harvest	All members of community fishpond project group; some communities may manage small, partial harvest themselves, depending on availability of net.
Sale/distribution		Managed by group leader and community women.
Maintenance pond		
Feeding pellets		Men, women, children/families take turns.
Feeding vegetable products (grass, leaves, leftovers, ricehulls, etc.)		Women usually gather, all take turns feeding.

Feeding manures		Men, women, children/families take turns gathering and feeding or washing down manure from pigpen.
Maintenance, pigpen		Men, women, children/families take turns washing pen, pigs feeding pigs.
Provision of piglets	DINAAC/Min. of Health	Community repays from pig sale
Provision of pig feed	DINAAC/Min. of Health	Community repays from pig sale
Pig Marketing	DINAAC/Min. of Health	
Gardens		
Technical Assistance	MIDA/Chinese Mission/Ciclo Básico	
Inputs	MIDA/Chinese Mission/Min. of Health/DINAAC	
Manual labor		Men, women, children/families take turns.

1/ The sugar ingenio (La Victoria) collaborates with DINAAC by providing tractor service at a cut rate of \$14.50 per hour (standard private rental rate approximately \$35.00), which is paid for by labor contributions by men in community fishpond group. One respondent estimated that 15 men working for 1 day could earn enough tractor time for a good-sized pond. This is difficult to calculate because of variables of distance and terrain, but the general feeling is that the arrangement is a fair one.

incurring little obligation by participating parties to repay labor invested, usually involves persons not related to one another. A subcategory of such labor, general festive labor, comprises activities based on mutual recognition of needs of a particular geographical areas (e.g., clearing a trail or building a school) and involves the formation of a leaderless work group composed of all members of the area regardless of kinship affiliation, each member providing his or her own food. Private festive labor, related to activities which will benefit one individual, family, or kinship group (e.g., house building) is organized by a leader or 'patrón' who supplies food and drink to those who assist; there is no formal obligation to repay such labor.

The second major labor form is exchange labor, which customarily involves individuals with kinship ties, incurs a strong obligation to reciprocate, and is most common during land-clearing and harvest periods. The patrón usually invites people of his kinship group to participate in exchange labor activities, asking as many people as he can reasonably repay in kind without jeopardizing the economic security of his own household. He provides food and drink, the latter a particularly strong incentive to participation. When the task is complete, the patrón will then owe an equal period of labor, usually one day, to each participant other than members of his own and his wife's households. Mutual labor forms are also found, to varying degree, in many rural Latino communities and are customarily referred to as participating in a junta (not to be confused with the junta local) or as haciendo peón (doing day labor).

The predominant form adopted for fishpond construction would fall under the rubric 'general festive labor.' The routine work of fishpond maintenance, however, has no indigenous parallel and is organized by whatever group happens to make up the fishpond committee or by its leader(s). The recurring, regularized, communal labor obligations involved in fishpond maintenance thus corresponds to no identified "natural" model, which may explain any difficulties encountered in establishing routines in non-kin-based communities which do not have more or less continuous fish harvesting as a persistent incentive.

Unfortunately, there is a sort of continuous harvesting that does act as another kind of incentive, that is, theft, colloquially termed 'la mano negra.' About one-third of the communities reported poaching but, except for one group which had confronted the issue in open community meeting, none had taken any strong measures to address the problem. DINAAC representatives reported that some other communities had dealt with the dilemma by arranging to have a community member sleep near the pond. However, none of the communities had found a way to deal with what, for some, was the biggest predator of all, Martin Pescador, a fish-loving and adept bird. No reliable estimates were available on the dimensions of loss from either invader.

The Role of the Private Sector

Individual entrepreneurs have been quick to take a try at fish-raising, the large majority on a small scale for private use and for distribution to

friends, neighbors, and workers. The smaller operations have been effective in generating an important amount of replication, not just by individuals but by community groups as well, whom some private entrepreneurs have helped with their own acquired technical capacity or at least with the lessons of experience.

Beyond this, there has been an exchange of technical expertise and support between some private-sector commercial fish production entities and DINAAC which has redounded to the benefit of both, although there is some question as to who has benefitted most. The ingenio tractor-for-labor arrangement constitutes another private sector contribution. Finally, until recently, poultry producers were giving away chicken litter (gallinaza) to be used for fish feed to whomever would carry it away. At least one producer has begun charging for this hitherto waste product, bringing into question the DINAAC supposition that rice-processers, for whom rice hulls present a major disposal problem (the estimated removal costs for Panama's 40 rice mills is approximately \$250,000 yearly), would be disposed to give it away to communities. It might be well for DINAAC to begin at once to formalize some contracts with major rice and poultry producers which would assure no cost to the institution at the very least, and perhaps even some cut-rate reimbursement for the favor of the haulage.

THE ISSUE OF EXTENSION

It also becomes clear in Table 5 that although outside institutions, especially DINAAC, have major and continuing responsibilities to fishpond projects as they are now constituted, responsibilities which increase as projects become more complex and entail ever-greater financial outputs, community contributions are substantial. However, the community input is primarily labor, and the weight of the financial burden continues to be borne by DINAAC, which also bears the load of timeliness and complexity of inputs, despite limited manpower, vehicles, and constraints on access.

As will have been observed elsewhere in this document, both DINAAC and MIDA suffer from serious limitations on their outreach capacity. The recent decentralization of DINAAC into regional MIDA offices is theoretically defensible, because it responds to current thinking about best rural development approaches, and pragmatically defensible because it should reduce the overload on DINAAC. This may be so, but the present picture is that both entities suffer from lack of vehicles, manpower, equipment, and adequate extension training. DINAAC, as a semi-autonomous institution, had a certain elan and mystique under the aegis of a dynamic, technically competent, and committed director which has been crucial in generating the fervor for fishponds. Unless appropriate cross-training occurs in both pisciculture and extension/community development, the momentum so quickly achieved could be ground down to a halt by the MIDA apparatus and variable commitment.

MIDA research and extension service has not, in recent years, been reaching most private producers, nor has it been very effective with its principal charge since the early 1970's, the 200 asentamientos which rely on it for help with titling, credit, technical assistance, and other services. The loss of direct control by DINAAC also exacerbates what was already a problem when it was an independent entity, that is, supervision: the orderly and consistent vigilance which impedes the growth of bad extension practices. Clients are aware of such practices and perceive them clearly as breakdowns in the delivery and supervisory systems. Inputs for special programs -- seeds, fertilizers, insecticides -- do not arrive on time; reseeding of ponds is slow, though improving; in some areas, communities are not advised about harvesting so that all interested members may be present; pig feed arrives late, or arrives frequently enough but the MIDA extension agent ignores the fishponds; nets are loaned and not returned and are insufficient in number in any event, so harvest may be delayed; small livestock projects are prefaced by insufficient campesino/a training and followed by failure and financial loss; the full implications of a given project, especially credit and money management aspects, are poorly explained to and understood by campesino groups, resulting in loss, disappointment and, in one case identified, outright fraud.

In all fairness, both entities are without an adequate number of safe and appropriate vehicles to carry out their various duties. The problem is exacerbated by lack of scheduling and rationalized "circuit-riding" which would partially alleviate the insufficiency of numbers and conserve time

and fuel. The constant flow of visitors and consultants through DINAAC, sometimes unscheduled and unbidden, further drains limited capacity.

Because there is a large volume of requests for fishponds -- DINAAC indicates 50 to 100 outstanding -- promotion activities by extensionists can be limited for the near future and may be largely covered by radio and natural multiplier effect. Communities seem to be able to get themselves started and maintain a pond that does not have major technological flaws. Nevertheless, as projects add components, become more complex, and move toward the stated goals of full integration and self-sufficiency, the need for extensionists who are committed to such projects, are technologically multi-skilled, and who are trained to competence in the various aspects of community development, will be acute. Community gardens, because they have not been eminently successful in the project area in the past, may be the most difficult to accomplish; there is still a residual unwillingness among older farmers to dedicate any arable land to crops that are not "real" food, i.e., grains and tubers, and one might anticipate resistance to any efforts at turning major plots into grass-land to support large stocks of herbivorous fish unless the land concerned were unsuitable for any alternative use. At least in the indigenous area, there is evidence of some question about what a vegetable is: plantain, yucca, and otoi, for instance, were sometimes identified as vegetables. An extensionist may have to begin at a very basic level or plan to add the most culturally acceptable and vitamin-rich garden produce to a base of traditional plantings, rather than attempt to diversify cropping at one fell swoop.

COMMUNITY DEVELOPMENT

There are three major community development issues, which are, of course, the other side of the extension coin: leader selection; understandings of the implications, positive and negative, of the cooperative mode of organization; and institutional weaning.

Leader Selection

At present, there are no standardized criteria or any established modus operandi in DINAAC for leader selection; the methods now used are idiosyncratic, personalistic, ad hoc, and, markedly in indigenous sites, culturally inappropriate. In one community meeting, where almost 60 people from three communities appeared on a Friday morning to follow up on their request for fishponds, an attempt was made at organizing a single directive for three quite separated communities; the attempt failed. The voting and nomination process for a representative from each community which followed, was carried out literally on command; a simultaneous secret ballot produced only a single mention of one name elicited on the floor in theoretically open forum, suggesting that at least some leaders named do not reflect true community preferences. Young (op.cit.) analyzes at length the Guaymí group meeting (congreso) and decision-making process, the principal characteristics of which are lack of direct ^{expression} ~~assessment~~ of opinion through open voting, no vocal disagreement and avoidance of overt verbal confrontations in large meetings, and the passage of some time between such forums during which gentle lobbying by proponents of issues occurs and leaders attempt to identify the majority position. Even in Latino culture, open rejection of

a candidate or overt statements often produce cultural discomfiture. Furthermore, in Guaymí areas, a careful balance must be maintained among the three power groups -- traditional chiefs (caciques), elected representatives (representantes), and kinship groups. Thus, extensionists must be educated not only to the sheer existence of the cultural factors involved, but to practical techniques for dealing with these in a way that is more likely to produce a durable community apparatus.

Cooperative Organization

Pollnac and Ruíz-Stout,^{1/} studying marine fishermen in Panama, found a great deal of variability in knowledge concerning the role and total meaning of the cooperative, variability which led to problems in instituting and maintaining this form of organization due to differing expectations among participants.

As indicated above, a good number of communities can manage the construction and maintenance of a simple fishpond in a cooperative way. Yet, for now, all of the projects seen which have added another component to basic fish polyculture have either:

1) had a continuing managerial presence that was not really an integral part of the community (e.g., Buenos Aires/Ciclo Básico staff and students; Las Huacas del Quije/RENARE and MIDA staff; and, to some extent, Chumico)

2) was part of an institution (e.g.; La Normal, Instituto Jesus Nazareno)

^{1/} R.B. Pollnac and R. Ruíz-Stout. "Perceptions of Fishermen's cooperatives by small-scale fishermen in the Republic of Panama." ANTHROPOLOGY WORKING PAPER No.7, Sociology-Anthropology Department, University of Rhode Island. 1976.

3) was privately owned (e.g., Canto del Llano, Coloncito)

or

4) had had problems (e.g., Roble, Chumico, Cucurucha).

There is testimony that communities, with patient and persistent understanding, can be helped through the process of moving to more complex levels of integration and necessarily more elaborate cooperative forms (e.g., Cucurucha). DINAAC has recently tried two different models, not mutually exclusive, for addressing this issue: the first was the hiring of an indigenous technician to provide assistance and supervision in the Guaymí area. The experiment failed in such a way that it is difficult to determine whether the crux was the salary/envy issue, personality factors, or the idea itself. Because the second factor was so obviously at play, *augmenting* the weight of the first, and because the idea seems on its face to be sound, DINAAC should try it again. Experience with the pilot Plan Guaymí has shown that unsalaried trained promoters do engage on their own, without outside assistance, in such activities as latrine-building and adult literacy. Because they must continue to support their own domestic units, they can only work part-time so that, although the promoter concept is feasible, it is limited, and some sort of monetary reward would be needed for a fuller commitment of time. Given the limits inherent in extension capability, two type of local-level workers may be needed: one a volunteer at a leadership level, with enough technical training to permit intelligent promotion and basic maintenance; another for more skilled assistance, e.g., horticulture, tilapia-sexing, and small-animal production (e.g., disease surveillance and injections).

The second experimental model was giving a community (San Bartolo) a course in cooperativism at the onset of the project. Since this community has just begun pond excavation, any judgment would be premature. In any case, the acid test appears to be an increase in project complexity. Cooperative motivation and training would therefore best be phased, with increments as appropriate which would deal with possible structures for economic and legal strengthening of groups, the potential and management of credit, decision-making processes, and so forth. A most important component of such training would be basic education in financial management, beginning with the simplest formula for feed: fish, sale price, profit, breaking even, and loss. Through a process of trial and error, a number of communities are learning at what price they can and must sell their fish. However, in none of the communities which had fish ponds/plus pigs were the members interviewed knowledgeable about the dimensions of the investment and profits that might be expected. Such data were in the hands essentially outside managers such as the extension agent, the ciclo básico director, or the cacique. The member stance with regard to profit or loss was, "We'll find out when all the pigs are sold." Certainly, the element of uncertainty is inherent in any business venture and experiential learning is a valid tool, but education to cooperativism should include some concepts of what reasonable, coarse-grained economic expectations might be. In the most fully integrated projects visited, both fish and garden produce were distributed gratis to the community, usually in return for labor; if such

projects were to shift to some cash payment for these items, the needed calculations would be even more complex and would require still greater educational activity. Even in the simplest projects, fish only, communities should understand the appropriate sale price for their excess production, i.e., a level within the reach of the consumer population which covers feed and fingerling costs and which is not so high as to depress consumption in search of financial gain.

Institutional Weaning

DINAAC is well aware of the dependency problem. At the same time, the achievement of a rapid spread and demonstration effect almost demanded a quasi-dictatorial and paternalistic first stage. DINAAC has already, as noted, decentralized itself into the MIDA regional offices, although this means only that dependency on outside agents for inputs, technical assistance, and marketing is transferred, not eliminated. The dependency cycle is hard to break for two reasons: 1) there is a well-documented heritage in Panama, as in the rest of Latin America, of patron-client relationships, reinforced by the impermeability of social and economic structures to substantive change, and ^{by} lack of control by campesinos of the factors of production. Campesinos cannot yet breed their own piglets or fingerlings; do not own trucks to receive inputs or market production, and are further constrained by poor or non-existent access roads; and cannot otherwise get credit.

These are the facts of rural economic life. For the foreseeable future, transport and credit will be out of the campesino's reach unless DINAAC/MIDA

and the MSP provide it; it would probably be well for AID to accept this reality and help DINAAC/MIDA to address it effectively and to devise ways for campesinos to absorb in some token way the related costs as projects mature, in order to gradually equalize the donor/recipient ratio. As for credit, to date DINAAC reports extremely low default rates in its informal credit system; as long as this continues, MIDA is disposed to continue to back the revolving fund, and the MSP pig project goes on, there may be no better way of providing small, soft loans to get projects started. If default rates were to rise, that would be another story. Lovshin^{1/} has suggested that a slight management charge be added to any loans and, indeed, the rural development experience has been that, in some contexts, low-interest loans are counterproductive. DINAAC could experiment with a tiny handling charge on loans to communities with longer project experience.

There are other micro-strategies which DINAAC could try out and, in fact, is already contemplating, such as some tariff per dressed-pound for pig transport, or a small increment per bag of fingerlings, similarly for transport. DINAAC should seek a more favorable price for commercial fish-feed from the producer to permit itself some profit margin without raising the price of feed to campesinos.

^{1/} L. Lovshin. FISH CULTURE DEVELOPMENT PROJECT FOR PANAMA. USAID/PANAMA and Auburn University. January 30, 1980.

SPREAD EFFECT AND BENEFIT INCIDENCE

In sheer numerical terms, there is, as observed at the outset, little question about the spread of fishponds, from zero in 1976, to 73 at end August 1978 ^{1/} to 192 by September 1979. During 1979 the number of beneficiaries was estimated at 7,562 persons who consumed 132,564 pounds of fish, or 17.5 pounds per capita, an average of one and one-half pound per month.

While an unknown proportion of this spread derives from DINAAC promotion, there is unassailable evidence of spontaneous multiplier effect. In its earliest phases, fishpond project activity responds to the three aspects Pollnac (op.cit.) cites as highly correlated with adoption of innovation; perceived complexity (fish culture is not now seen as complex); perceived trialability (the costs of obtaining a fishpond and its relative availability are not now seen as prohibitive, an argument for the DINAAC strategy of front-end loading); and perceived observability (a quantitative appraisal of the advantages of fishponds are possible with only casual observation). These factors explain the high rate of spontaneous requests for ponds (outstanding because of current limitations on DINAAC's capacity for response), and the occurrence in some areas of a natural satellite effect, of which the San Francisco, Santa Fé, and Cañazas sites provide ample testimony, if different in their manifestations. The first group -- Lagartero, La Mona, La Perdíz, and San Juan, plus a number of private ponds -- though variously motivated, have provided one another with a reinforcing effect and have generated purchases and interest in nearby

^{1/} R.O. Smitherman. EVALUATION OF THE PANAMA AQUACULTURE PROGRAM. Auburn Alabama: International Center for Aquaculture, Auburn University. September 2, 1978.

communities (e.g., El Gato, Gatú, San Francisco, Caravalí). The second group began with purchase at Las Quebradas and expanded to several ponds per community at Paja Peluda, Los Corotues, and La Montañuela, which have devised their own, if imperfectly systematized, rotation of harvests to permit purchase from one another at different times, thus increasing frequency and regularity of fish consumption. The final case spun off from the combined demonstration effect of the Cañazas ciclo básico pond and some small private-pond construction and elicited a joint request for ponds from three neighboring communities; Palo Verde, Las Huacas, and Agua Amarilla. Both "natural" and planned demonstration projects, then, can produce a multiplier effect; among the latter, the smaller-scale projects which entail some community participation appear to evoke more attempts at replication.

Because DINAAC has just begun to maintain records on harvests and community populations, it is impossible to calculate the probable consumption impact in any given nucleus; until such data are compiled on a regular basis, the global production and beneficiary population figures must suffice. And, since no economic data are accumulated by most communities, it is not possible to calculate the economic impact of projects in terms of either per capita cash income or imputed value of fish consumed, or to do even the most basic cost analysis. This makes it difficult to make anything more than an intuitive judgment about impact at the community level or to make decisions about which technological mixes are most effective economically and nutri-

tionally in practice. DINAAC has been able to refine its technological data base and calculations such as ^{ratio of} pound-of-fish produced ^{type of} to feed mix, but this has not been costed out by individual project so that relative success can be appraised.

There are other practical, technological, ^{and} economic issues that DINAAC also must confront. To produce one pound of fish, 1.3 to 1.5 pounds of commercial fishfeed at \$.14 per pound (plus any cost of fingerlings) are needed, a ratio which can be improved to 1.1 with the addition of carp and grass. For some communities, this cost has apparently been prohibitive; their purchases of feed occur in small, erratic amounts, which is logistically messy and results in low harvest yields.

The impact of pig projects is somewhat easier to assess, because records are maintained by "outside" managers in a more formal fashion than that characterizing fish production. The community of Chumico, as one example, had realized a net of B/416 from its first sale of pigs, which it used to buy more pigs. Since the community has ⁵ begun breeding its own piglets, it is reasonable to expect that the next production cycle would increase this net and permit some distribution of profits to project members (N = 14 households or, based on current net of B/416, close to B/30,00 per household in an area where the average family income does not normally exceed B/130,00 per annum). This community was also giving fish and garden products to members in return for project labor, another benefit but an unquantified one.

Evaluation of impact presents the project with a dilemma. In order to do any valid measurement, DINAAC/MIDA must keep or get careful records of amounts and costs of inputs per community, income from sales, yields, etc. With continuous harvesting, a primary technological goal, this will be harder to do and, indeed, even with quarterly harvesting it is hard enough. And, the very informal and community-participatory style which now characterizes numerous projects and represents one of the program's strengths, militates against more rigorous record-keeping. DINAAC will have to find a way of refining such activity without undue rigidity and without encouraging local-level petty dictatorship, perhaps as part of any promoter/leader/paraprofessional training. The intricacies of impact assessment will grow as individual projects accrue to themselves new, directly or indirectly related subprojects; about one-third of the communities visited, primarily those who had been self-starters, were beginning other projects -- more pond construction, pig projects, gardens, bee-raising, dam-building, and chicken and duck projects. An argument can be made either for a very simple evaluation indicators or some very elaborate ones; given the dimensions of the project, the former seems best suited. A combination of simple consumption indicators and some case studies of development path analysis and community participation in different project types selected according to criteria of accessibility, ethnicity, and age and origin of project, might be sufficient.

The issue of nutritional impact is addressed elsewhere in this document: McGuire (op.cit.) concludes, examining alternative forms of measurement, that the best single indicator is consumption of protein (fish plus meat) and vegetables. Such analysis should be disaggregated to assess

differential effects on mothers and children in key age cohorts. This research and McGuire's show that all family members, including children under age 1, eat fish, but this should be measured. Even considering that the project starts with a base of close to zero consumption of these items, at present the system of harvesting every three months, together with small pond size and some low yields, puts a ceiling on the consumption potential. DINAAC is well aware of this limitation, as are affected communities, who devise their own methods for raising consumption, e.g., poaching on own or other's pond, fishing more frequently than recommended, building more ponds, rotating harvests among neighboring communities, and eating the non-fertile tilapia hybrid fry. The resolution of this problem is largely a technical one and is discussed in the Technical Analysis. Because there is already awareness at the community level of this boundary and because taste and interest have both been aroused, a lack of resolution at the technical level could in itself constrain the endurance of the project.

SUMMARY OF ISSUES AND FINDINGS STRATEGIES AND RECOMMENDATIONS

The following summary of issues and findings, with accompanying suggestions for strategies and some general recommendations, includes some concepts DINAAC has already addressed itself to and which are already included in current plans. Others are items already discussed, by this author among others, with DINAAC staff and which have their concurrence. The final group emerged in the writing of this report.

Dependency

Recognized as a problem by DINAAC, which has decentralized. However, dependency only transferred, partly, to MIDA. At the same time, only these entities and the MSP can offer transport of inputs, marketing, easy credit, and technical assistance.

- While there can and should be no ^{retrenchment} ~~return~~ from decentralization, DINAAC should not be allowed to lose technical control of the program. Project support should reduce risk of that occurring.
- AID must accept fact that, at least until projects mature and community clusters can raise their own fingerlings and piglets, dependency will be a rural fact of life, diminishing if certain strategies are adopted to accomplish this. As campesinos can earn enough to pay for part of these services, dependency should become less of an issue.

- Among possible strategies are the following technological and economic solutions:
 - ° Reduced reliance on manufactured feed, using wastes (e.g., rice hulls), manures, foliage, and grasses.
 - ° Continuous harvesting, acceptance of lower yields in exchange for greater frequency, less dependency on DINAAC for help with large harvests.
 - ° Provision to each community of own small net, cost of which can be amortized with payment for fingerlings. Promotion of net-making artisan industry in Guaymas area where skill already exists, to reduce costs.
 - ° Assuming success with first seeding, payment for subsequent batches of fingerlings.
 - ° Small tariff per dressed-pound-sold for transportation provided by DINAAC/MIDA/MSP, increasing gradually as communities begin production own piglets.
 - ° Establishing hatcheries in sites strategic for communities. Will involve training for selected community workers.
 - ° Teach management of ponds stocked with male and female tilapia.

Expansion

Concern about DINAAC capacity for and implications of too rapid, haphazard expansion. Issues of quantity vs. quality, expansion vs. consolidation.

- Expansion should subsume both consolidation and gradual extension to other areas, and should be phased to accord with available manpower and logistical support. A plausible schema might be:
 - ° A consolidation and "polishing" in area of earliest and greatest activity, Veraguas, which now has 85% of all projects, building demonstration sites in incremental fashion in communities which have displayed spontaneous initiative in pond construction and subsequent search for add-on projects.
 - ° Limit expansion to areas roughly equidistant from Santiago/Divisa, beginning with recapturing and linking up of projects in Coclé, which has 77% of current projects outside Veraguas, perhaps tying sequence to labor-intensive road construction under AID loan. Concentrate on districts with highest indices of poverty and malnutrition.
 - ° Leave promotion in indigenous areas of Veraguas and expansion into Chiriquí to Guaymí promoters, taking advantage of funds available for training and fishpond development contemplated in AID Guaymí Area Development Project, with DINAAC providing technology and technical assistance on demand. First thrust should be into eastern districts of Chiriquí which have highest indices of poverty and malnutrition in Panama.
 - ° Next step would be Herrera, perhaps beginning with modest demonstration project. Los Santos would be left for last, depending on capacity.

- With regard to outstanding requests for ponds, these should be given priority; within that group, priority should be granted to projects which respond to the sequence outlined above.

Two concepts about outreach have been articulated by DINAAC direction and staff: 1) growth pole strategy, beginning with distant site and working back to center; 2) working incrementally out from center.

- Experience with distant sites suggests that growth pole strategy is high-investment, high-risk. An incremental strategy outward from the center appears more realistic and better suited to institutional capacity.

Criteria for site selection in general and for demonstration sites in particular.

- Should be developed as part of Project Paper.
- Suggested primary criteria:
 - Use communities which, as mentioned above, have displayed initiative and persistence,
 - Are strategically located geographically in relation to other communities and which may have already generated a multiplier effect,
 - And are reasonably accessible ^{so} that they will not suffer from problems of logistics.
- Decision as to basic strategy should be made centrally, not at the regional level.

Commitment of individual MIDA regional offices to the fishpond program and the quality of available personnel vary.

- Before directing its energies toward any given area, DINAAC should determine MIDA regional level of commitment and capacity, as well as openness to learning new technology and new dissemination techniques. Criterion becomes the same as for community selection -- spontaneous and shared expressed interest.

Continued limitations on numbers of qualified extensionists available to the program and continued problems of accessibility to distant sites.

Train two levels of local-level personnel:

- ° Volunteer leaders: enough technical training to permit intelligent promotion and basic maintenance.
- ° Village paraprofessionals with additional training in horticulture, tilapia-sexing, and small animal production (e.g., disease surveillance and injections). Some salary plus a community extra benefit, e.g., hatchery capacity, would help off problems of envy and conflict with ^{own} ~~own~~-household economic demands.

Community participation is not a major issue in small pond projects. It becomes crucial as projects expand in size and complexity, and does not respond to exhortation.

- DINAAC training of any extensionists should focus explicitly on the community development and participation needs and problems

entailed in the addition of each component on ^{the} road to full integration. Such an approach suggests a modular, problem-oriented, training style.

The limited amount of available land, the lack of faith in the quality of that land, limited success in growing vegetables in the past, indigenous concepts of what constitutes "real" food and what a vegetable is, imply the need for special help in this area, especially since a number of groups are now undertaking horticulture. Experience to date indicates that the best garden projects are highly managed by outsiders; the community contributes labor and does not seem to replicate its learning from that labor on its own land. More accessible projects depending on inputs and technical assistance from various institutions report mixed experiences and success.

- Vegetable projects should not be attempted unless 1) there is resident expertise available (in distant sites) or 2) there is easy and frequent access to technical assistance which is in turn dependable. An increase in number of vehicles and scheduling of their use should help. In the case of distant sites, community members working in garden projects should be taught as they labor so that they can ultimately manage the community plot with relative independence or, where feasible, start their own.

Extension

Logistical limitations, primarily vehicles, tractor.

- Project vehicle plan should be reviewed to respond to any revision in pace and scope of expansion and needs for flexibility of access. Decision on deployment should be made centrally.
- While private sector/community contribution aspect of current arrangements for tractor use in Veraguas has undeniable attractions, possibility of tractor purchase under project should at least be explored. It should be remembered that for most Veraguas families, ingenio work is the only source of cash, and any diminution of those earnings is important.
- Consider one small bus for transporting trainees ^{and} community members for training and visits to different demonstration sites.

Availability of extensionists, especially those with special training.

- Since first graduates of University intensive pisciculture training (carreras técnicas agropecuarias) will not graduate until approximately August 1981, special training for MIDA extensionists in pisciculture and community development should be offered as soon as possible.
- Since the number of students now in the University course who will accrue to DINAAC is undefined, the project should contemplate use of some technical assistance money to provide salary supplements for the first graduate year, so that more students will be attracted to DINAAC rather than be so quickly lost to the private sector.

MIDA's concentration during the decade on asentamientos, with less impact than was hoped for, indicates flaws in extension techniques. This research suggests a major lack of training in field outreach techniques and self-management, made worse by work overloads and vehicle shortages. Skills in leadership selection, understanding of community dynamics, and cooperative formation appear weak to variable.

- If the limitations of MIDA extension services and training have not been examined to see where the training contemplated under the Project should focus, they should be. This study concludes that, in addition to training in the new technologies involved, extensionists should get training in group dynamics, leadership selection processes, credit and economic aspects of project components, cooperative formation, rural culture and economics, development of campesi promoters and paraprofessionals, together with field practicum sessions oriented toward real problem-solving, as well as techniques of elaborating work schedules.
- Curriculum for University pisciculture students should be modified so that "extension methods," now scheduled for the last semester (beginning May 1981), be taught in the 4th semester (beginning September 1980), so as to precede the 2-month supervised practicum. The last semester should include a follow-up, problem-oriented workshop in the last semester.
- Assignments of extensionists should permit at least a 2-week period before beginning program activity, with no other demands

than getting to know communities in his/her area, with another 2 weeks for possible census and needs and achievements assessment.

Accessibility and the best technological mix.

- The project should contemplate exploration of which technological mixes (levels of integration) correlate best with remote sites as opposed to sites of relatively easy access.

Relative lack of success in Guaymí area (as defined by lack of active community participation and management, and the impact of this on technology).

- Use of Guaymí Development Project promoters to determine community needs in the area and promote fishponds etc. as appropriate, with DINAAC acting only as technical facilitator.
- Seminars for all extensionists responsible for providing technical assistance in the Guaymí area, in the basic components of Guaymí culture, social organization, economic life, and special needs, given by anthropologists/sociologists, technicians who have worked successfully with the Guaymí, and by the Guaymí themselves.

Lack of audiovisual materials.

- Given that fishponds are their own best advertisement, consider videotape rather than film for educating extensionists and communities, promoting program.
- Simple forms for extensionists to use for prescribing feeding regimes, schedules for purchase and harvests, sexing, etc.

Community Development and Participation

Projects arising from spontaneous community desire for a pond and organization to construct one show highest continuation rates and fewest organizational and collaborative problems.

DINAAC and MIDA should concentrate on spontaneous requests for ponds, beginning with requests now pending, particularly in the consolidation area and in any areas slated for expansion, e.g., Coclé. (See Expansion).

Demonstration and multiplier effects work if project not too big, elaborate, or obviously needing a lot of outside technical expertise and/or money to run.

- Keep scale of demonstration projects as small as technological feasible.
- Build on existing community success in consolidation area.
- Involve community which is site sponsor in operation (not just manual labor) of project.

No single organizational type provides a better basis for fishpond projects than any other type, although having had some other community project experience with even modest success helps.

- DINAAC should give preference to communities with some history of joint action if they have spontaneously sought help with a pond. However, a group which has newly formed for such a purpose and is persistent in its intent should be not rejected, if the situation is such (e.g., fair accessibility) that support could be easily gotten.

Projects which were more or less "dropped" on communities via a paternalistic promotional style, especially in large, dispersed communities, may be more visually impressive and more productive (though not invariably), but they appear to be vulnerable to failure if technical support diminishes or changes, and more likely to evoke community strains. The food-for-labor model is not necessarily bad; it is just, in this case, insufficient.

- The high-technology, imposed, showpiece model should be set aside for now. DINAAC should experiment with incremental models which educate communities to processes and to their potential to handle them. Campesinos themselves recommend that they be taught the technology, through on-and off-site training. Food-for-labor does not have to be discarded.

Low knowledge levels vis-à-vis more complex components of integrated projects such as penned pig-raising and horticulture.

- Special training programs for community-selected campesinos in key aspects of these technologies.

Ignorance of economic implications (costs and benefits in cash and kind) of project involvement, and proper pricing of products.

Inclusion of techniques for simple economic planning in extension training, for use with campesinos as a group, not just with leaders. Lack of understanding of cooperative forms and meanings, especially at increased levels of project complexity.

- Gradual education to implications, meaning, and value of cooperative form from beginning of project, increasing in detail as projects gains complexity. Should include assistance with acquisition of pre-cooperative status and personeria jurídica.
- Repeat pre-cooperative course for a limited number of other communities and informally evaluate comparative success against other projects started at same time to see if worthwhile. It may be that refresher training will be needed, particularly in area of economics.

Mixed success with leader ^uselection, problems with paid, local-level extensionist.

- DINAAC should establish criteria for leader selection, include training in processes of community selection of leaders, including possible use of secret balloting.
- Local-level promoters and paraprofessionals should be chosen in conjunction with the community and not simply appointed.

While there were no identified problems ~~about~~ ^{of} getting and keeping land provided for community ponds, without some legalization, problems could arise.

- DINAAC should adopt use of a simple transfer document similar to that used for AID SDA fishpond projects.
- In Guaymí areas, landholding and kinship patterns should inform structure of community participation. If land for pond is owned

(de jure or de facto) by kinship group, project participation may not extend beyond that; where land is communal and agreement is across kinship groups, a larger beneficiary grouping may be realized. Conflict of project needs with peak agricultural demands on-and off-farm.

Rationalize schedule for heaviest project-related workloads (drain-
ing, salvaging fertile silt, clearing gardens, building dams and
pigpens) for slack agricultural periods. Women can handle everything
else, and do.

- For this reason, program should encourage inclusion of at least one woman on project directivas.

Current radio approach works at community level.

- Program should be continued, perhaps expanding with some case studies and interviews which should be realistic as well as hortatory and laudatory; interviews with campesinos from communities which have had problems and solved them would be particularly persuasive.

Theft from ponds and gardens.

- While communities will have to be helped to evolve systems for dealing with this, siting of ponds close to residential nuclei should be adopted where feasible.
- Demonstration sites may have to include money for fencing.

Technology

Low yields, inadequate feeding, infrequent harvests, low consumption.

- Request special price for feed from producer, now selling to DINAAC at regular commercial price, request based on technical assistance provided to company by DINAAC in development of feed.
- Add pigs, chickens, ducks, grass as possible, recognizing dilemma of higher yields at higher cost from pellets.
- Experiment with different continuous harvest designs: large ponds with polyculture, male and female tilapia, double-pond systems, local breeding capacity, various levels of integration, and numerous smaller ponds in same area with rotating harvest pattern.
- Educate communities to importance of proper feeding and fishing techniques.

Evaluation

Lack of institutional knowledge of project history and effects.

- Systematize DINAAC records on projects and include data on: number of households and individuals benefitted, origins of project (spontaneous/promoted), criteria for community selection, key contacts/leaders/potential trainees, economic data (costs, harvest sizes, consumption, sales, proportion of consumption to sales, inputs, net income). Suggest use of modified Subproject Submission format used in Guaymí Area Development Project Paper. Record-keeping should be standardized across regions.

Difficulty of measuring nutritional impact.

- Restrict nutritional study to less costly dimensions and to measurement of consumption only, or maintain at same budgetary level but include aspects of community participation, spread effect, and benefit incidence (spin-off projects, replication). Nutritional assessment should provide disaggregation by key age cohorts. Sample should include different project types and communities selected according to criteria of accessibility, ethnicity, and age and origin of project.

MANAGED FISH PRODUCTION PROJECT

Interim Report

This interim report provides a summary of the modifications in the design of Project No. 525-0216 which have occurred since submission of the PID. The issues noted in the DAEC cable (STATE 278869) are addressed below and take into account the project design modifications made since the PID was drafted.

I. Project Design Status Summary

Project design is being adjusted to focus on the need to resolve, through this small pilot project, feasibility questions relating to development of a full scale Managed Fish Production Project. Technical, nutritional and social soundness analyses conducted subsequent to PID submission have raised additional questions about the roles which the Ministry of Agricultural Development (MIDA), particularly the National Directorate of Aquaculture (DINAAC) and the communities could and should play in the implementation of a long-term managed fish production program. Specifically, the analyses have highlighted the important role for extension in such a program, and have raised the issue of the degree to which the dependence of the communities on MIDA/DINAAC for many project inputs and for fishponds could and/or should be reduced. They have re-confirmed the Mission's earlier concern about the financial/economic and administrative feasibility of a managed fish production program. Hence, changes in project purpose and design are being made.

The revised project design will include new activities which are intended to resolve pending issues of program feasibility. It will also include those institution-building activities proposed in the PID which are necessary prerequisites for testing program feasibility. The major components of a revised project design include:

(1) Demonstration Ponds. A series of pond projects will be carried out under semi-controlled conditions. These pond projects, which will include various technological and institutional mixes, will provide basic data for a series of feasibility studies to be undertaken as part of the project.

(2) Feasibility Studies. These will include economic/financial, consumption impact, and program impact analyses. The economic/financial analysis will quantify benefits and costs for the participating communities and for individual families within those communities. It will also study the impact of integrated fishpond activities on the household budgets of participants. The consumption impact study will assess the magnitude and distribution of

increases in protein intake which may be expected from continual harvest fishponds. The program impact study will focus on the effectiveness of alternative types of linkages between MIDA/DINAAC and the community interest groups which carry out fishpond projects. It will especially focus on concerns such as extension services, credit availability and community dependency on MIDA/DINAAC. It will evaluate the results of a number of alternative institutional arrangements to be tested in the project.

(3) Training. The training component will now focus on training extension personnel and community leaders. Trained outreach personnel must be in place in order to test proposed alternative institutional arrangements for delivery of extension-type services.

(4) Technical Assistance. Two long-term U.S. experts will be financed under the grant. One will be a highly qualified expert in fishculture who will provide technical assistance in the areas of fish hatchery operations and will provide in-service training to DINAAC employees and MIDA production technicians. The other expert will be an experienced anthropologist or rural sociologist who will have over-all responsibility for coordinating the feasibility studies. This expert will carry out the program impact study and will supervise execution of the consumption impact and economic/financial analyses in order to assure their timely completion.

(5) Hatchery Expansion. The fish hatchery at Divisa will be expanded and equipped to permit increased production of fish. The current hatchery cannot meet current demand for fingerlings nor can it efficiently produce more than one species at a time. Hatchery expansion will facilitate implementation of poly-culture systems in the demonstration ponds.

The rationale for these adjustments in project purpose and design is more fully explained in the response to Issue B -- Project Strategy - Purpose Level.

II. Issues and Responses

A. Project Strategy -- Goal Level

1. Issues

"The project goal is to improve the nutritional status of the Panamanian rural poor. However, the PID does not clearly describe how the proposed project activities would achieve that goal. Whether the strategy is to improve nutrition through on-site consumption or as a result of increased income obtained from commercial fish production, that strategy should be clearly stated and explained, and the means for carrying out the strategy should be fully described. To the extent that the project contemplates commercial fish production, the subsidization of the costs of constructing and operating the fish ponds becomes questionable and any such proposal would have to be adequately justified."

2. Response

The sector goal is to improve nutritional status of the rural poor in Panama through a network of fresh-water fishponds in poor rural communities. The strategy to reach this goal is to improve nutrition directly through on-site consumption of fish. Commercial fish production, to be marketed outside the environs of the pond site and near-by communities, is not contemplated in the program. The fish will primarily be consumed by project participants, although part of the fish catch may be sold to other families in the immediate area as a means of generating cash to cover cash operating costs of the fishponds. This situation often occurs in existing fishponds where commercial feed is given to the fish. The integrated animal husbandry/fishpond operations will minimize the need to generate cash through the sale of fish, although the integrated ponds will require monetary outlays for the animal operations and the utilization of cash and/or credit cannot be avoided entirely.

B. Project Strategy - Purpose Level.

1. Issue

"The project strategy at the sub-purpose level should be clarified in the IR. Is it to increase GOP capacity to carry out a nationwide program of fish production, or to establish GOP capability to evaluate the need for and feasibility of such a nationwide program? The latter seems more desirable, but if Mission opts for the former the IR should contain ample justification. In either case the project components should reflect this strategy decision. Please note that the discussion on such project components is not necessary for review of the IR and may be held for the PP."

2. Response

As indicated in Section I, project analyses have raised additional feasibility issues which do not appear to be soluble in the normal course of project development. Hence, the project strategy at the purpose level will be to evaluate the need for and feasibility of a nation-wide program of managed fish production.

Although the Mission believes that a nation-wide program is likely to be successful, this small grant project is being proposed rather than a larger loan because there are a number of important questions of consumption impact and of economic, social, and especially administrative feasibility which can not be answered without further investigation. For example, there has been a recent shift in extension service responsibilities from DINAAC to MIDA's regional offices which might impinge upon

program success. Also, community interest groups are now highly dependent on the GOP for services related to fishpond operations such as the provision of fingerlings, the provision of nets for harvesting, the transportation of fingerlings and fishfeed, the transportation of piglets and pig feed to pond sites, and the marketing of the pigs. The Mission believes that the most effective means of resolving these feasibility questions is to implement a pilot project in which major issues of feasibility are answered through the development of carefully monitored field activities and in which institutional arrangements about which significant uncertainty exists are implemented on a limited scale.

The pilot project will test the technical and economic/financial feasibility of integrated animal/fish/garden operations. It will measure the consumption impact of such projects. It will also provide evidence on whether a NIDA extension program in aquaculture can be effectively administered through regional offices and whether community interest groups can be reasonably expected to become less dependent on NIDA/DIMEAC and other GOP entities for essential services related to fish pond operations. Specifically, an approach for supporting and strengthening the role of community interest groups engaged in fishpond activities will be tested in the project. This approach consists of (1) developing an evaluation process to select those communities most likely to effectively implement fishpond projects, (2) relying on other existing organizational and financial resources which can assist community interest groups to develop fishpond activities, and (3) experimenting with different organizational modes in order to find promising alternative institutional arrangements.

As indicated in Part I of this Interim Report, project components are being adjusted to reflect the revised strategy to achieve project purpose i.e., the monitoring mechanisms and studies which are necessary to gather sufficient data to provide reliable answers to unresolved questions of impact and feasibility are being incorporated into the project design, while institution-building activities are limited to those needed to test program feasibility. A complete discussion of the revised project components will be included in the PP.

C. Community Organizations

1. Issue

"The nature of the community organizations and the matter in which they would function has not clearly set forth in the PID. The interim report should treat these subjects in detail, answering such questions as the following:

(1) What kind of organizations are envisioned? What has been the experience with these organizations in other activities (including present fish pond operation)? How prevalent

are these organizations in Panama? What is the nature of their competence and capacity, and how will this be appraised in the selection process? What resources are currently available that could be used to strengthen the organizations? What will be the legal form of the organizations? What will be the responsibilities, duties, liabilities of their members? How are decisions made? Who may join? Is membership open to anyone who wishes to participate in the particular project? What about existing members who do not wish to participate? In the event the organization contracts credit, to what extent is an individual member liable for repayment, including any member who does not wish to participate in the project?

2. Response

This response is divided into three parts. The first part briefly summarizes the major findings and recommendations of the Social Soundness Analysis relevant to the issue of community organizations. This second part discusses the nature of existing fishpond committees in somewhat more detail. The third part discusses the approach which MIDA will employ on an experimental basis to support and strengthen the fishpond committees.

(a) Major Findings and Recommendations of Social Soundness Analysis

(1) The organizational basis of community interest groups which are operating fishponds is diverse.

(2) Successful projects are positively correlated with prior interest within the community but not with a specific organizational type.

(3) Existing community interest groups are highly dependent on GOP agencies for supervision and inputs for fishpond operation. This dependence cannot be completely eliminated, especially in the initial phases of a fishpond operation but measures can be tried which may somewhat reduce such dependency.

(4) Participation rates are variable but are positively correlated with the degree of community interest in fishponds prior to initiation of the activity. Participation is motivated by the desire to have an additional source of food, especially one which is highly esteemed such as fish. In a number of communities, especially in Latin American areas, women have been instrumental in implementing fish projects.

(5) The aquaculture program should focus on consolidation of efforts in the current program area (Veraguas province) and then expand into adjacent areas (Coclé Province and eastern Chiriquí province). Within these geographic limits new ponds should be limited to communities which have made spontaneous requests for ponds.

(6) DINAAC should not impose complex integrated projects but rather should experiment with incremental models which gradually add more complex technologies, e.g. animal husbandry and horticulture, to fishpond operations.

(7) Outreach by MIDA/DINAAC is constrained by work overloads and vehicle shortages. Other sources of outreach should be utilized where possible. Basic training in aquaculture, pig-raising and horticulture and in simple financial management, credit and cooperative management should be gradually provided to community leaders and local paraprofessionals as these communities move from simple fishpond operation to more complex activities.

(8) DINAAC must gather systematic data on fishpond project histories and impacts.

(b) Existing Fishpond Committees

(1) Number, Origin and Responsibilities of Fishpond Committees

By the end of 1979, 198 fishponds had been built in Panama of which 162 are currently active. Of these ponds all but 24 serve five or more households. While some ponds are organized as part of a formal organizational structure such as asentamientos campesinos (5 ponds) or on the basis of extended family relationships, the vast majority of ponds function on the basis of fishpond committees. These fishpond committees are cooperative organizations of community members established to build and maintain fishponds which operate on an informal basis much like health committees and parent-teacher groups.

The organizational basis and experience of the community interest groups which are implementing existing fishpond projects is diverse. No specific type of pre-existing community group serves as a consistent nucleus for the establishment of fishpond sites. A survey of twelve communities with fishponds was carried out as part of the project's social soundness analysis showed that all of the communities surveyed had some sort of pre-existing organization such as health committees (Comités de Salud), parent-teacher groups (padres de familia), community groups (grupos comunales), CARITAS' agricultural groups (Grupos Arados) and locally-selected quasi-political governing bodies (juntas locales). Fishpond committees generally have either the same membership as these organizations or draw part of their membership from them; although in some cases individuals within communities may promote fishpond activities. These organizations are common in most rural areas of Panama and the majority of rural communities have at least one of these organizations.

The type of the community organization is not identified by the social soundness analysis as a factor which has a critical impact on the success of existing fishponds. Successful projects (defined as those projects which continue to operate with high community participation rates, which have amplified their scope of activities, e.g. pond expansion, addition of a complementary activity such as pigs and/or gardens, and where ponds have been replicated) are more closely correlated to a high degree of prior interest within the community than to a specific organizational form. This prior community interest, is generated by factors such as radio promotion or seeing a near-by pond and, most importantly, by purchasing some of the catch. An on-going relationship with an active promoter from a governmental or private voluntary organization, e.g. CARITAS, together with previous community development experience and an extended family settlement base, also contribute to project success.

Despite the diverse origins of the fishpond committees their operation is similar (because it is largely determined by the task environment). Fishpond construction is carried out by the mutual effort of community members. Participation rates are high, with men, women, and children engaged in construction activities requiring hand labor (land clearing, excavation, planting grass banks).

At the fish production stage, families (men, women, and children) within the community take turns feeding the fish and, if present, caring for the hogs. This work is carried out on a rotational basis under the supervision of a management committee or leader appointed by the community at DINAAC's request. This committee or leader is also responsible for handling any funds used to purchase fish feed and/or pigs and pig feed.

At harvest time all members of the community interest group participate. The sale and distribution of fish is handled by the fishpond committee leader and women members of the committee.

(2) Nature of Capacity and Competence of Existing Fishpond Committees

Most existing fishpond committees are highly dependent on DINAAC and other Ministry of Agricultural Development (MIDA) personnel, particularly during the initial year of operation. DINAAC personnel supervise the site selection and construction of fishponds and provide technical backstopping to MIDA production (extension) technicians in the stocking, maintenance and harvesting of ponds. In the case of machine-dug ponds DINAAC usually assists the fishpond committees to make arrangements for pond excavation. In many instances DINAAC also

(c) Proposed Strategy for Supporting and Strengthening Fishpond Committees

On the basis of DINAAC's current experience with fishpond committees, the proposed strategy for strengthening these groups will be multi-faceted and incremental. The objective of this strategy, which will be tested in the project, will be to reduce the necessary initial dependency of the community on DINAAC's support by gradually transferring responsibility for major aspects of integrated fishpond management to the fishpond committees or to organizations which have a direct and on-going association with the community interest groups.

This strategy will consist of (1) developing a selection process which will allow DINAAC to identify those communities which are most likely to successfully implement fish pond projects, (2) utilizing existing organizational and financial resources to assist fishpond committees to undertake fishpond projects, and (3) experimenting with various organizational modes in order to identify efficient ways to supply technical advice and supporting services to fishpond committees,

(1) The Basis for Selection of Pond Sites

The current policy is, within the limits of available resources, to work with any formal or informal community interest group in DINAAC's present area of influence (primarily Veraguas Province) which manifests a strong interest in fishponds. No single standard formal organizational structure is required or expected. In view of the findings of the social soundness analysis that successful fishponds are positively correlated with the degree of community interest prior to pond construction but not with formal organizational structure, this policy is sound and will continue to be implemented by DINAAC. It provides a substantial degree of flexibility and encourages a dynamism not often found in government programs. Additional factors such as community initiative, as demonstrated by implementation of other community development activities, and accessibility, will also serve as community selection criteria.

There are currently 89 outstanding requests for fishponds. New ponds will be built in those communities or in other communities which may make such requests in the future if they are in DINAAC's current program area or in its planned expansion area (Coclé and eastern Chiriquí provinces), and if they meet the other selection criteria. Based on the recommendations of the social soundness analysis, the new ponds will be "fish only" ponds and MIDA/DINAAC will focus a major part of its near-term efforts on incrementally up-grading existing fish-only ponds. That is, successful single-harvest fish ponds will be converted to a continuous harvest basis, and animal husbandry and gardening

activities will be added where community interest groups demonstrate sufficient interest in and potential for these changes. This procedure will permit the development of integrated animal/fish/garden projects while minimizing the risk of failure.

The validity of this proposed incremental approach will be tested in the demonstration pond component of the Managed Fish Production project. Although some fish-only demonstration ponds will be built to ascertain the acceptance of fishponds in areas where no ponds currently exist, the majority of the demonstration ponds will be existing pond sites that are up-graded under controlled conditions in which a variety of technological/institutional mixes are tried. The Managed Fish Production project will provide adequate resources for DINAAC to carefully monitor and evaluate these demonstration projects and their related activities. This approach will provide ample opportunities to assess the economic/financial, technical, social, and administrative feasibility of different project activity/mixes and organizational/operational modes. The FP will fully describe the methodology which DINAAC will employ to monitor and evaluate the demonstration pond activities and will discuss the pond site selection criteria in detail.

(2) Public and Private Sector Resources Available to Assist Fishpond Committees

A number of governmental and non-governmental resources are available to help strengthen the community groups engaged in fishpond activities. The heterogeneity of organizational types means that certain resources may be available for all ponds but it also means that there are multiple resources to draw upon. These resources are currently insufficient to permit implementation of a large-scale managed fish production program but they do provide a means to extend MIDA/DINAAC's support for fishpond activities. In some cases, e.g. in MIDA regional offices and in the Guaymá Area Development project, the degree of future commitment to assisting fishpond activities is still uncertain. In other instances, organizations which are carrying out programs complementary to fishponds, such as the Ministry of Health through its community nutrition program, and CARITAS, have demonstrated a significant interest and willingness to promote fishpond activities.

MIDA production (extension) technicians operating out of regional offices will most probably be a key resource for the implementation of a large-scale managed fish production program. A recent policy directive of the Ministry of Agricultural Development has emphasized the importance of the regional offices in outreach activities and has limited central staff offices such as DINAAC to primarily technical backstopping

roles. The implications of this policy directive for a managed fish production program are of concern to the Mission and they will be fully explored during project development by a public administration specialist. In particular, the willingness and ability of MIDA regional directorates to devote resources to a program of managed fish production must be verified, given the severe limitations on their financial and human resources and on supporting services such as vehicles. Despite the short-run obstacles to an expansion of the fish pond activity which will apparently be created by this ministerial policy directive, the Mission believes that it may strengthen MIDA's operational capabilities and that it will be advantageous to a managed fish production program in the long run. In particular, it should promote the integration of fishpond activities with other agricultural disciplines and, since the technicians will have multiple responsibilities, it should result in a more efficient utilization of the limited resources which are available. The Mission recognizes the critical role of extension technicians in such a program and will assure that adequate extension support for a managed fish production program will be forthcoming before the project is authorized.

In the Guaymí Indian region, the Guaymí Area Development Project (525-0200), coordinated by the Directorate of Indian Affairs of the Ministry of Agricultural Development, includes fishponds among the agricultural activities eligible for financing with project funds. Requests for new fishpond construction or for up-grading of ponds to integrated animal/fish/garden projects in the Guaymí area will be channelled through the Directorate of Indian Affairs to be financed with Guaymí Area Development project funds. DINAAC's participation will be limited to the provision of technical assistance and technical training for Guaymí promoters, and to the provision of fingerlings. Currently, the Directorate of Indian Affairs is trying to improve the operation of existing ponds. The extent to which it will actively promote new ponds is uncertain; however, the Directorate has recently acquired bulldozer for, among other uses, the construction of fishponds in the Guaymí area. The Mission will strongly encourage the expansion of fishpond activities in the Guaymí project.

Another public sector resource is the Ministry of Health which has established a number of pig projects that are being financed by the community nutrition component of AID's Rural Health Delivery Loan (525-U-045). To date pig projects have been established in 33 communities. Fishponds have been built in conjunction with seven of these pig projects. Other communities with pig projects have requests pending for fishpond construction. In those communities where fish and pigs are raised together, the fish production is consumed locally, while most of the pigs are marketed outside of the community.

Several communities with fishponds have received assistance in the construction of their ponds from the La Victoria Sugar Corporation which has provided bulldozer services sufficient to excavate small ponds (approximately 1000m²) in exchange for fifteen person-days of cane cutting provided by community members. Another MIDA directorate, RENARE, has also provided bulldozer services to some communities. In these cases DINAAC makes the initial contact for the community interest group with the government agency and provides technical supervision of pond construction.

The major sources of private sector assistance are CARITAS and, potentially, the cooperative movement. CARITAS outreach personnel are working in more than 90 of the poorest rural communities in Panama. CARITAS, which is already working to develop a number of small fishponds, has informally agreed with DINAAC that its personnel will be trained by DINAAC and that it will incorporate fishpond promotion and extension activities into its workplan. DINAAC will provide on-going technical backstopping for these activities. An additional private sector resource, Panama's rural cooperative movement, is discussed in the following section.

(3) Testing of Alternative Institutional Arrangements

In order to significantly expand the managed fish culture program, either MIDA/DINAAC must substantially increase its staff or existing institutional arrangements must be adjusted to reduce the reliance of fishpond committees on the Ministry of Agricultural Development. A major objective of this grant project, which is consonant with the revised project purpose, is to test the extent and ways in which fishpond committees might be gradually be weaned from their necessary initial high degree of dependence on government institutions. To this end new institutional arrangements will be tested during the project.

A number of factors may affect the communities' ability to successfully manage integrated fishpond project on a relatively independent basis. These include not only such factors such as technical knowledge and coordination of community participation but, more fundamentally, credit use and availability.

Currently two sources of credit are utilized for community fishpond activities. These are DINAAC and the Ministry of Health. DINAAC provides informal credit for fish and fish feed, while the Ministry of Health provides funds for pig projects through the Rural Health Loan (525-V-045). In both instances inputs, i.e. fingerlings, feed and pigs, are provided in kind rather than through cash transfers to the communities. Under this informal arrangement, the government entities are themselves involved in the purchase and delivery of

fish feed, pigs and/or pig feed as well as in the sale of the grown pigs. These informal mechanisms appear to be functioning satisfactorily at current levels of operations; however, it is uncertain whether a larger program of integrated fishpond activities could be carried out with these arrangements.

The social soundness analysis recommends continuation of the informal credit system, if possible, since it has been effective to date, providing a significant amount of flexibility while experiencing low default rates. However, modifications such as introducing a service fee or charging interest could be gradually introduced in order to reduce the financial burden on the GOP implicit in this system. These modifications will be tested in the pilot project.

A possible alternative institutional relationship between MIDA/DINAAC and the community interest groups would be to work through the rural cooperative movement. This alternative which would relieve MIDA of the responsibility for credit supply will also be tested by DINAAC in the pilot project. DINAAC has already reached an accord with a large multiple services cooperative, the Juan XXIII cooperative, and with the community of San Bartolo, that the fishpond committee members will join the cooperative which would then provide credit for an integrated pig/fishpond activity. Active fishpond committee members will be co-signatories of the loan and the pigs will serve as collateral.

Should this experimental effort prove economically and administratively successful, the Juan XXIII cooperative, which has 1100 active members and 13 branches located throughout Veraguas Province, would be willing to enter into agreements with other communities. This relationship would be particularly attractive for a large number of communities in Veraguas because of the cooperative's relative accessibility to isolated communities and because the cooperative has its own animal feed-mixing plant that produces chicken, pig, and cattle feed. (Note: This cooperative has received three sub-loans for a total of \$450,000 through the revolving fund of the recently completed Rural Cooperative Development Loan 525-T-041, including \$150,000 for production credit and \$125,000 for working capital for the feed-mixing plant. A large percentage of the production credit has been allocated to pig projects.) This alternative has an additional advantage in that many functioning cooperatives such as Juan XXIII have well-developed education/ outreach programs. Community interest groups thus have the opportunity to receive instruction not only on the elements of.

cooperativism but also on the rudiments of cost accounting and basic financial management which are necessary prerequisites to the assumption of major management responsibility by the communities.

Another institutional adjustment which will be tested by DINAAC in this pilot project is the utilization of trained volunteer community leaders and local paraprofessional personnel. This mechanism is already being employed in the Guaymí Area Development Project. In this project local-level volunteers and/or paid workers will be trained in pond promotion and in basic pond operation and maintenance as well as in the rudiments of animal husbandry, financial management and credit use. These local-level workers will in turn provide outreach services, with backstopping from MIDA extensionists and DINAAC technicians, to communities in the areas in which they live.

The pilot project will support the trial implementation of these institutional innovations and will provide feedback on their potential long-term viability as elements of a large-scale managed fish production program.

D. Initial Environmental Examination (IEE):

1. Issues

"A review of the IEE submitted with the PID raised the following concerns over the project's possible impact on the physical and human environment: (1) infection of fish intended for human consumption by viruses and other pathogenic organisms from livestock wastes that may not be adequately composted; (2) damage to local ecosystems resulting from the introduction of exotic fish species; and (3) reduction in the quality of water in streams and rivers because of the pond draining and flushing. The Mission is requested to examine the possible impact of these concerns and submit its findings with the interim report. The IEE will be held in abeyance until these concerns are resolved".

2. Response

a. Infection of Fish by Viruses and other Pathogenic Organisms

Information available in the scientific literature at this time does not indicate that any significant health hazard might exist as a result of using untreated animal wastes to fertilize fish ponds. Long experience with ponds receiving untreated animal wastes in Germany, Hungary, Israel and several Asian countries has not produced documented evidence of human illness as a result of consumption of fish grown in these ponds.

Although some species of fish to be cultivated in Panama including the tilapia and the common carp will directly consume animal manure, this does not appear to pose a health problem. Evidence indicates that pathogenic bacteria are not found in the flesh of fish in ponds receiving animal waste water, but that they are found in the fish intestines. However, fish intestines are not consumed, and fish raised in ponds receiving untreated animal wastes are well cooked before eating. The cooking process would kill any parasites or other pathogens that might be found in the fish flesh. Non-organic contaminants, e.g. chemical wastes such as pesticide and mineral wastes, pose no problems in areas where fishponds might be built.

b. Damage to Local Ecosystems Resulting from the Introduction of Exotic Fish Species

Fish which might potentially be used in this project include several species of Tilapia: Chinese (silver, grass, big-head) carps, and common carps. Tilapia have been widely introduced throughout the tropical world. Tilapia mossambica and Tilapia rendalli were introduced to Panama in the 1950's. Tilapia do not become well established in stream and river environments. Neither Tilapia mossambica nor Tilapia rendalli has become established in the fast flowing streams of Panama. Tilapias, however, can become established in standing water environments such as lakes, reservoirs and estuaries. Although the reproductive potential of tilapias is substantial, expansion of the tilapia population is controlled in most standing water environments, where carnivorous fish populations are present. In Panama the native guapote tigre is an effective control on tilapia. In northeast Brazil where tilapia have been introduced into reservoirs, they have become established without harming native fish populations. No known ecological harm has occurred to date from the introduction of tilapia into Panama and there is no reason to believe that widespread use of tilapia as a culture fish will have a negative impact on Panamanian ecosystems.

Chinese carps do not spawn in standing water and require large rivers to successfully spawn and hatch their eggs. Panama has no rivers of sufficient size for Chinese carp to spawn. The few Chinese carp that may escape from hatcheries or fish ponds are unlikely to cause ecological damage.

The common carp, which can spawn in standing water, could become established in the local environment. However, in most of the world common carp is a widely accepted food fish and its introduction has been beneficial.

Reduction of Water Quality in Streams and Rivers because of Pond Draining and Flushing

Fish ponds can be viewed as oxidation lagoons. Wastes from animal husbandry operations are washed into ponds where bacterial decomposition breaks the wastes down into basic elements. During the decomposition process a high biological oxygen demand, BOD, will cause the lowering of dissolved oxygen levels. When organic wastes are released directly into natural waters, the decomposition of these wastes can lower dissolved oxygen concentrations to lethal levels so that in extreme cases, fish kills will occur. However, when the decomposition process takes place in an oxidation pond, high BOD levels are reduced in the pond and the BOD in the effluent from the oxidation pond is considerably lower and normally, not harmful to the environment.

In the decomposition process, bacteria break down manures into elements usable to aquatic microorganisms. Nitrogen, phosphorous, and potassium, not lost chemically in the bottom muds, are utilized to form high densities of phyto and zooplankton. Phytoplankton is beneficial to the oxidation of animal wastes by producing oxygen during the photosynthetic process which in turn is utilized by bacteria enhancing the decomposition process. Phytoplankton and zooplankton are also important fish food organisms. A number of fish species are able to feed directly on planktonic organisms. Thus, the microscopic organisms produced with the elements released during the decomposition process can be used to grow fish. Several species of tilapia and chinese carps consume plankton filtered from the water. The fish reduce plankton populations by continual cropping thereby stimulating additional plankton growth which utilizes more nitrogen, phosphorous, and potassium. Thus, the fish have a beneficial effect on pond water quality. It has been documented that for equivalent amount of organic wastes, the effluent from a pond with fish will be cleaner than the effluent from an oxidation pond without fish.

Although fish ponds are efficient oxidization ponds any system can be overloaded and care must be taken to provide only the amount of animal wastes that can be effectively oxidized in a pond without killing the fish or producing an effluent that will have an adverse effect on natural waters. However, with proper training of fishpond committee members system overload should not occur under production methods practiced in Panama. In the continuous harvest system which will be promoted in the Managed Fish Production project, ponds will be completely drained and cleaned at most once a year and generally only every 3 or 4 years. The limited frequency of complete draining, the slow rate of drain during pond operation and the oxidization which occurs in the ponds, greatly reduce the probability of significant reduction of water quality in streams and rivers.