

PROJECT ASSISTANCE COMPLETION REPORT

FISH CULTURE EXPANSION PROJECT

660-0080

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USAID ZAIRE

PROJECT STATUS

The Fish Culture Expansion Project, -660-0080, concluded activities on September 15, 1988, after ten years of implementation. Originally begun as a pilot project, it has evolved over ten years of implementation to include more than 300 Peace Corps Volunteers acting as extension agents and over 170 project employees in positions of administration and technical support. USAID involvement was concerned chiefly with the provision of funding technical assistance and commodities, as well as arranging some participant training in both the United States and in third countries.

The implementation of the project has been most successful, with a National Program for Family Fish Culture established by the Government of Zaire(GOZ) on August 29, 1988. This was the major purpose of the project, to institutionalize its operations. By creating a National Program, the GOZ met this objective and has now accepted national responsibility to provide funding for this new Program. Though this does not guarantee the continued success of the Program by itself, it does exhibit a determination on the part of the Government and also recognizes, by the creation of a Program smaller than the project, that it will be more able to manage and support the new program. Peace Corps will continue to support the Program for the next six years by providing volunteers as extension agents, as it has during this project. USAID, through its new Small Project Support Project(660-0125), will continue its local currency support to supply fuel, spare parts, some vehicles and training needs of the program.

The project has completed all its procurement. Over 100 motorcycles have been purchased which are used by Peace Corps Volunteers, as well as twelve pick up trucks used in all the regions of the project. The pick up trucks are used by the regional offices and for the mobile extension teams.. Office equipment has also been purchased, as has audio visual equipment to be used in training. Technical equipment has also been purchased, including nets, boots and scientific materials for use at the fish training centers and at project headquarters.

Construction of the training center at Gandajika was completed during the project. This was an objective of the original Project Paper. In the first amended Project Paper there was an objective to build five regional training centers, which has been accomplished. These were constructed in Bas Zaire, Bandundu, Kasai Oriental, Kasai Occidental and Kivu Regions. They include dormitories for farmer trainees, office space, kitchens and covered training areas.

Technical assistance was provided to the project in a number of methods. During the life of the project a technical consultant was provided to work with the Government counterpart organization, Project Pisciculture Familiale (PPF). This consultant worked with PPF technicians as well as with the Peace Corps Volunteer. This position was filled using a Host Country contracting mechanism. Additional technical assistance was provided in the form of two mobile extension team leaders, one for each of the two regions in which extension teams were implemented. These were former Peace Corps Volunteers who had worked in the particular region, knew its fish operations and the local dialects and customs. A third type of technical assistance was

employed to develop flip charts to be used by both the Peace Corps Volunteers on their regular post visits, and by the mobile extension teams. These charts were done in watercolors, and packed in a wooden case so that they could travel well and be protected from dust and rain during trips.

Training was not a major part of the project, but training was provided. The PPF Director was sent to Texas Tech for a course in development project management, as was a regional coordinator sent to the University of Pittsburgh for its Francophone Development Management course. At the end of the Directors course in the U.S., he was provided a trip throughout the southern United States to visit fish production facilities and universities involved with fish pond production. A visit to USAID and Peace Corps in Washington, D.C. was included in this trip. The Director of the project and several of the regional coordinators were also sent to Israel in the early part of the project to be trained in fish pond production, as well as to see new production methods. In an exchange program arranged by USAID/Zaire, five of the regional coordinators from the PPF journeyed to Ivory Coast for a two week visit to examine the FAO pond production project. In return, five Ivorians came to Zaire for two weeks to see and analyze the PPF project and exchange ideas with their Zairean colleagues. All technical staff of the PPF received yearly training sessions conducted by the technical consultant. The technical consultant also conducted courses in extension methodology for the extension staff of the project at least twice a year.

CONTRIBUTIONS:

	FOREIGN EXCHANGE PLANNED	FOREIGN EXCHANGE DELIVERED
U.S.A.I.D	\$1,650,000	\$1,300,000*
PEACE CORPS	<u>\$3,477,000</u>	<u>\$3,477,000</u>
TOTALS	\$5,127,000	\$4,777,000

\* Estimated pending final close out of all receivables.

	LOCAL CURRENCY PLANNED IN \$ EQUIVALENTS	LOCAL CURRENCY DELIVERED IN \$ EQUIVALENTS
GOVT. OF ZAIRE	3,395,000	4,249,000

PROJECT TOTALS IN DOLLARS

	<u>PLANNED</u>	<u>DELIVERED</u>
U.S.A.I.D	1,650,000	1,300,000
PEACE CORPS	3,477,000	3,477,000
GOZ	<u>3,395,000</u>	<u>4,249,000</u>
TOTAL	8,522,000	9,026,000

The following chart shows the GOZ Counterpart Fund contribution by year in local currency(Zaires) and the dollar equivalents.

<u>YEAR</u>	<u>ZAIRES</u>	<u>DOLLAR EQUIVALENT</u>
1978	500,000	500,000
1979	745,000	370,000
1980	1,500,000	500,000
1981	500,000	125,000
1982	6,500,000	1,100,000
1983	3,800,000	292,000
1984	11,000,000	305,000
1985	11,500,000	230,000
1986	20,200,000	330,000
1987	31,600,000	290,000
1988	41,500,000	207,000
TOTALS	2129,345,000	\$4,249,000

ACCOMPLISHMENTS

The project has attained several notable accomplishments. Conditions at the outset had fish production in a confused state, with some farmers following the old colonial system of pond production and others simply making dams and raising fish to capture as needed. The project was started following a three year pilot project funded by OXFAM, which proved that fish farming using improved varieties and better management could be successful.

The major accomplishment of the project has been the establishment of the National Program for Family Fish Production (PNPF). This has replaced the project entity, PPF. The Program has been established by a Ministry of Rural Development statute, and thus has the full backing and support of the Government of Zaire. The development of an institutional capacity to manage the fish project was the original purpose of the project. The new Program is an official institution of the Government of Zaire.

A second accomplishment has been the establishment of training centers in five regions of the country. First established as fingerling production centers, these have evolved to become training centers to which the project brought farmers for management and leadership training.

The training courses have been developed over the life of the project by Peace Corps and the several technical consultants who worked with the project. They are usually conducted for 20 farmers at a time and are held throughout the year. Only one of these fingerling production centers existed at the beginning of the project, and was to be renovated and used for training and research. During the project's life, the use of these centers has been changed from only fingerling production to now include training. The numbers have increased from one center to five which are now operating.

A third accomplishment of the project deals with the organization of farmer groups, which had not been foreseen in any of the project documents. During the ten years of implementation, as farmers became more conversant with fish pond production, they recognized a need to have some sort of informal groups in which they could exchange information. Fish farmer groups were formed with only little encouragement from the Project staff and Peace Corps Volunteers. These groups are not officially registered, require no dues be paid, and have meetings every three months for fish farmers within a specified area. All farmers within the area are welcome to join, with the meetings usually held at one of the better farmer's ponds. Discussions revolve around problems encountered, how to deal with the problems and planning for pond harvests and restocking. Project staff, the Peace Corps Volunteer assigned to the area, and the mobile extension staff attend these meetings to provide technical backstopping if needed. The staff also provide information of what is happening with other farmer groups, new ideas and generally listen to how the farmers are doing. These groups have proved their worth many times over in keeping farmers interested in fish farming, attracting new farmers and in helping farmers analyze the problems of their colleagues.

#### DESIGN CHANGES

The project was amended twice during ten years of implementation. The first involved the expansion of the project into two new regions of the country. The second amendment involved some design changes in the extension and training approach of the project. Originally the project was to do training at a center in the middle of the country. This center proved to be inaccessible by any form of regular transport. The second amendment then changed the fish production centers into regional training centers. This helped the farmers in that with the training centers established in their regions they could more easily attend courses. The regional training centers also represented more closely the conditions under which the farmers produced their fish.

A second change in the project design under the second amendment concerned the extension approach to be used. With the withdrawal of Peace Corps Volunteers from posts to which they had been assigned for six years, it became imperative to provide some type of follow up extension system (These posts are known as autonomous posts). Thus a mobile extension team was developed on a pilot program to be set up in one of the regional capitals, Kikwit, Bandundu Region. This team, composed of a technical consultant and two project staff, set up a circuit within the region by which they would travel to these autonomous posts and have regular meetings with the farmer groups. Usually the team would meet with the farmer groups during its monthly meeting. Several groups even changed their meeting times so that they could participate in the circuit of the team. This mobile extension idea was

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so popular with the farmer groups of the first region that it was expanded to a second region, Kasai Occidental. In this region it has also proved as effective, and the idea will be continued and expanded under the new national Program.

Another project revision by the second amendment was to change the administrative structure of the project. This entailed bringing in and training new staff to act in administrative and financial positions, which were weak. New assistant director positions were created and approved by the Government, which had also recognized that the project needed to be strengthened. To help in the reorganization, a local accounting firm was employed to audit the project and make recommendations for improvement. As a result of the audit Technoserve, a U.S. Private Voluntary Organization operating in Zaire, was employed to revamp the accounting and administrative systems. New manuals were designed and put into effect and have proved most helpful to the project.

The following table presents the planned versus actual outputs of the project.

<u>PLANNED OUTPUT</u>	<u>ACTUAL OUTPUT</u>
1. Gandajika station renovated as fingerling production and research center.	Station completely renovated as training and production center and in operation.
2. Forty extension posts will be in operation.	Sixty three extension sites have been placed in operation.
3. Four fingerling production sites will be in operation.	Five fingerling production centers are in operation as both production and training centers.
4. Project area expanded.	Originally planned for three regions, the project now works in five regions.
5. Revised administrative and financial structure staffed and established.	Two technical assistants in administration and finance placed and functioning, new accounting and administrative procedures incorporated.
6. Revised Fish Culture Extension program established.	Project now employs training centers, Peace Corps Volunteers and mobile extension teams, flip charts and self designed training courses for extension.
7. Establish mobile extension teams in each of the five regions of the project.	Two mobile extension teams have been established in Bandundu and Kasai Occidental at autonomous posts. Teams will be expanded to other regions as posts reach autonomy.

### PROJECT PURPOSE ASSESSMENT

The original project purpose was to establish a small farmer-oriented fish culture extension program in parts of three regions of Zaire (Bandundu, Kasai Occidental and Kasai Oriental). Two Project Paper Amendments revised this purpose to expand the original project area from three to five regions (to add Bas Zaire and Kivu), and to establish a mobile extension team in each of the five regions of the project.

The project has been most successful in attaining the original project purpose, and in meeting the amended purpose of expanding into five regions of the country. As previously mentioned, the Government of Zaire has created a National Family Fish Production Program to continue the purposes of the project. The Program is more streamlined than the project, but still works within the five regions of the country in which the project has been established. The project and its successor Program are both oriented to the small farmer, indeed, most farmers begin with one pond and increase the number of ponds over the years and as their means allow. The project has expanded to five regions from the original three proposed and has had continual success in producing fingerlings and in training farmers.

To date, only two mobile extension teams have been started, one each in Bandundu and Kasai Occidental Regions. The amended Project Paper of 1984 called for one mobile extension team in each of the five regions of implementation. The first team was established in Bandundu Region, which is the region of the greatest involvement in fish production. The second team was established in Kananga, Kasai Occidental, using lessons learned from the Bandundu team to assist it in its operations and planning. Bandundu and Kasai Occidental are two of the original project regions, and have experienced the most significant involvement of farmers interested in fish production. To date, only these two teams have become operational since these two regions are the only ones in which are located autonomous posts. The three other regions still have Peace Corps Volunteers at first and second assignment posts, and as these posts become autonomous mobile teams will be started in these regions. With Peace Corps Volunteers acting as extension agents in the three remaining regions, there is not now a need to begin the mobile teams.

Thus the original and amended project purposes have been reached and resolved. With the new National Fish Program coming into existence, the resolution of the original problem will continue to be addressed daily.

### FINAL ADJUSTMENTS

Toward the end of this project, several weeks of discussion were held with the Government of Zaire concerning the continuation of the project under Government of Zaire auspices. The result was the National Fish Program. Since its creation has continued the ideas, purposes and goals of the original project, there are no final adjustments in project design which are required. In these discussions, arrangements were made with the Government regarding the size of the program and several key headquarters staff positions were changed. The staff size of the fish training centers was also reduced to a more manageable number. There is no current need for any other adjustments.

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There are no remaining conditions or covenants which need to be acted upon to complete the project. All conditions and covenants have been met. As regards grantee reporting, an inventory of all materials of the project has been completed and received by USAID. The only outstanding report which is required is the third quarter Counterpart Fund Financial report, which is expected shortly.

#### CONTINUING RESPONSIBILITIES

Since PACD, there have been a number of commodities from PIO/Cs which have been delivered and are being processed for payment. The de-obligation of remaining funds is presently being processed with the Controllers Office. This de-obligation should be completed by the end of January, 1989. All PIO/Ts have been completed and the remaining funds for these are currently being processed for de-obligation.

Monitoring of the new National Fish Program will continue since it now receives support from the Small Project Support Project(660-0125). The General Development Office is now responsible to monitor this new Program. A Personal Services Contractor is working with PNPF until an institutional contractor is selected to manage the Small Project Support Project. It is anticipated that the contractor will be selected in February, 1989. Within the project is the position of Peace Corps Liaison officer, who will be responsible, in part, for the oversight and management of PNPF.

#### DATA AND EVALUATIONS

The project has accumulated an abundance of data concerning the production of the fish farmers associated with the project. However, these data have not been fully analyzed. They have been collected by the Peace Corps Volunteers at their posts, and recorded farmer names, dates of starting ponds, pond size, dates of harvesting the ponds and what was the size of the harvest. The PPF headquarters has issued Annual Reports which list total number of farmers involved, which is usually around 3,000 per year. It is estimated that over the life of the project over 8,000 farmers have participated at one time or another in fish pond production. For the project as a whole, average production has increased from less than 15 kilograms per are(100 sq. meters) to over 30 kilograms per are. Several farmers have recorded over 60 kilos per are, though this is exceptional. The area under fish production for 1987 was slightly over 8,000 ares, thus giving a total estimated production of over 240,000 kilograms of fish provided to the local economy. Current selling prices for fish range from 150 Zaires to 250 Zaires per kilo, thus providing the small, rural farmer with a continuing source of funds. At the end of PPF a computer and training programs were obtained so that staff could become computer literate and begin processing the data which had been accumulated. Since there is ten years of data to enter and process, this will take some time before final results are obtained.

In place of a final evaluation, a team composed of an economic anthropologist and a rural sociologist conducted an impact review of the ten years of implementation. The sociologist had also been employed at the PP stage of

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the project to do the Social Soundness section of the PP. His comparisons were invaluable to the impact review. Copies of the review are attached to this report. In brief, the team found that the impact of a farmer beginning and staying with fish pond production definitely benefitted the farmer, his family and even his area. Though nutritional data has not been collected during the project, it is evident during visits to fish farmers that their children are more robust and look healthier and fatter.

#### LESSONS LEARNED

There are a number of lessons learned which are noted in the Impact Review. In addition, there are two overall lessons which can be learned from this project. First, and what has been the most important idea of this project, has been to give the participants in the project total and immediate responsibility for their actions. A fish farmer could not become involved in fish farming until he had dug a pond. The project did not lend the farmer a shovel, a wheelbarrow or any funds with which to employ labor to dig his pond. It placed the total responsibility for his involvement and success upon him, and did so right from the outset of his interest. The project provided only technical assistance to farmers through Peace Corps Volunteers and PPF technical staff. If a farmer did not dig his pond as agreed to with the PCV, the PCV would not return to devote more time to that farmer until he had completed his pond. The farmers thus understood from the beginning that it was their work, their contributions in labor and time and their interest which kept the flow of technical assistance coming to them. They did not have to rely on outside funding sources, outside logistical supplies and outside promises of what would happen to achieve success. They created their own success, and learned from day one of their involvement that they were only answerable to themselves. This responsibility created pride in their work, pride in their farmer groups, and pride in their participation in PPF.

The second lesson learned involves simplicity in project design and implementation. As noted above, only technical assistance was provided to farmers. There were no loan funds, no machines to do the pond construction, no involved marketing schemes for the sale of fish. The project is perhaps the finest example that simplicity enhances project success. The only major commodity inputs were motorcycles for Peace Corps Volunteers and several pick up trucks for regional staff and extension teams. Farmers did not have access to any commodity or funding which could create difficulties in project implementation. Though this is not possible in new projects which involve areas of procurement and finance, the general idea of simplicity should be kept in mind during the design phase of new projects. If the designers can picture themselves as implementers they may design projects which are more simply and easily implemented.

**THINK FISH**

**THE IMPACT OF  
TEN YEARS OF FAMILY FISH  
CULTURE IN ZAIRE**

Prepared by

Professor Payanzo-Ntsono and Diane Russell  
under contract to USAID/ZAIRE, September 1988.

POPULAR SONG SUNG BY FISH FARMERS  
IN BANDUNDU

(KIKONGO)

Batata ke yufula beno banani?

Beto bansadi ya biziba

Bamama ke yufula beno banani?

Beto bansadi ya biziba

Batata biziba

Beno tina yo

Beno kuna yo

Beno sansa yo

Nsuka lufwa

Bamama Tilapia

Beno pepa yo

Beno simba yo

Beno lamba yo

Nsuka kudia

(ENGLISH Translation)

The men are asking:

Who are you?

We're makers of ponds

The women are asking :

Who are you?

We're makers of ponds

For we men ponds are

To be dug

To be stocked with fish

To be cared for

Until we die

For you women Tilapia are

To be fished

To catch

To cook

Then to eat

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## 1. EXECUTIVE SUMMARY

### 1.1 OVERVIEW

In 1978, Zaire's Department of Rural Development, USAID and the Peace Corps jointly launched the Fish Culture Expansion Project, known in Zaire as PPF (Projet Pisciculture Familiale). By 1984, a USAID evaluation team member reported that "In nearly every respect the Fish Culture Expansion Project is the most effective and successful Fish Culture project (and Agricultural Development Project in general) I've seen in Africa." The project has become a model, attracting visitors from many other African countries and continuing to expand within Zaire. The ten year anniversary of PPF offers an opportunity to report on the history of the project, to illustrate its economic and social impact and to examine the factors which contribute to its effectiveness.

PPF provides an extension service to fish farmers in five regions of Zaire: Bandundu, Bas-Zaire, Kasai Oriental, Kasai Occidental and Kivu. Building on a pilot Peace Corps project, PPF first received USAID funding in 1978 and in 1988 became a Zaire government National Program as part of the Department of Rural Development. Future plans include expansion into Shaba region and introducing concepts of integrated agriculture.

To prepare this report a team of two researchers visited Bandundu and Bas-Zaire, interviewing 71 Fish Farmers, Peace Corps Volunteers, PPF staff, and local authorities. A control group consisting of 23 non-participants and project drop-outs was also interviewed. General information on the project and about other regions was gathered from interviews and reports. The study team consisted of a sociologist and Professor at the Institut Pédagogique National (IPN) and University of Kinshasa who had participated in the planning of PPF in 1978, and an economic anthropologist who studied rural development in Zaire for a PhD dissertation and for USAID from 1986 to 1988.

During the fieldwork, the team was fortunate to be able to attend the opening of the fish fair celebrating ten years of PPF in Bandundu which brought together fish farmers, fish volunteers, PPF staff, U.S. and Zairian officials. At the fair the team contacted and interviewed many individuals who have contributed to PPF over the years. This report is thus the fruit of many people's efforts and is dedicated to the fish farmers of Zaire.

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## 1.2 FINDINGS OF THE STUDY

The goals of the study were to assess, in qualitative terms, the social and economic impact of fish farming in the two regions and learn about the history of the project as illustrated in the lives of individual farmers. The team was asked to examine issues such as investments made by fish farmers, differences in fish farmers' and non-fish farmers' households, the role of Peace Corps volunteers, the spread effects of the project, the formation and role of fish farmers' groups, and local authorities' perception of fish farmers and fish farming.

The major findings of the study can be summed up as follows :

- (1) Fish farming is well perceived by local authorities and other villagers. The successful fish farmer has prestige because he has an income, feeds his family, and especially because he sends his children to school.
- (2) Project fish farming spreads to other farmers not directly involved in the project and even drop-outs continue to use techniques learned from the project. Local merchants and missionaries have been influenced by PPF to build modern ponds.
- (3) Fish farmers interviewed had on the average more children, more fish farming households were polygynous, and more fish farmers owned a registered farm and cattle than the control group.
- (4) Fish farming can bring in a monthly revenue equal or superior to other possible income generating activities if the farmer has enough ponds and harvests regularly.
- (5) Some fish farmers have amassed considerable assets as a result principally of fish farming.
- (6) The selling price of Tilapia has kept pace with the costs of goods purchased by fish farmers.
- (7) Family members benefit from the fish farmers' income. Investment is made in wives' businesses; goods are purchased for wives; children are put into school; and family members receive help with hospital fees, funeral expenses, bridewealth and payment of fines.

- (8) Benefits to the individual farmer accrue from his increasing ability to manage his ponds and his accounts, contacts with other farmers, leadership opportunities and better health.
- (9) Fish farmers' groups provide an essential development function in rural areas almost totally lacking in support systems for the farmer. Their role is often expanded to include mutual aid, savings groups, and even pre-cooperatives or cooperatives.
- (10) The Peace Corps volunteer and the "équipe mobile" are the cornerstones of the project. Volunteer satisfaction is very high and PPF regional staff are dynamic and motivated. Flexibility in working with farmers is key to the growth of the project.
- (11) Some constraints to fish farming and to the successful implantation of the project were found. Some are structural, others situational or social. PPF staff are aware of these constraints. The following are the most serious :
  - a) Structural
    - 1) Poor roads and communications systems
    - 2) Forced communal work and heavy fines for absence
    - 3) Lack and high cost of quality tools
    - 4) Technical problems such as sandy soils, scarcity of animal waste, poor drainage
    - 5) Lack of space for additional ponds.
  - b) Situational - in some areas :
    - 1) Quicker and easier profits can be made by other activities such as trade or making charcoal
    - 2) Some posts suffered from a hiatus in volunteer placing and farmers were discouraged
    - 3) Harassment by local officials inhibits entrepreneurial activity.
    - 4) Manioc leaves feed the family as well as the fish ponds.
  - c) Social
    - 1) Stealing from ponds, especially by extended family members
    - 2) Witchcraft accusations against successful farmers
    - 3) Unfamiliarity with marketing or economic principles
    - 4) Inability to see long-term benefits
    - 5) Traditional land tenure prohibits some from access to land for ponds.

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## 2. GENERAL HISTORY OF THE PROJECT

September 2, 1988 was chosen as the celebration date of the tenth anniversary of the Projet Pisciculture Familiale (PPF). PPF was coming to an end on September 15, 1988, to be superseded by the new Programme National de Pisciculture Familiale (PNPF). Speeches and reports for the event stated the success of the project in the following terms:

- The center of research and training at Gandajika, Kasai Oriental, was restored and has been in operation since 1982.
- There were 63 fish-culture expansion posts functioning in 6 regions: Bandundu, Bas-Zaire, Kasai Occidental, Kasai Oriental, Kivu and Kinshasa.
- Five Regional Centers had been established with the responsibilities of training farmers and producing and distributing fingerlings at: Nzinda (Bandundu), Kasangulu (Bas-Zaire), Kitwishi (Kasai Occidental), Gandajika and Mudiba (Kasai Oriental) and Nyakabera (Kivu).
- In 1987 alone, a total number of 2,500 fish farmers were involved in the project; 3,500 ponds covering 8,504 ares were built; 89,400 kilograms of fish were harvested; and 1,500,000 fingerlings were distributed.

Fishing and fish eating were very widely spread in pre-colonial Zairian society, with fishing methods and techniques varying from one part of the country to another. There is no documented evidence of intensive fish farming, although in parts of the country there was a traditional technique which involved the damming of streams or marshes for immediate or later harvesting of fish. This explains to a certain extent the acceptance of PPF by the local population. Interestingly, it was women who harvested fish in this way, but fish farming is now almost exclusively a man's job.



The Belgians introduced a system of intensive fish-farming after the Second World War, 1949-1959, to combat increasing food shortages. By 1957, there were 93,500 fish ponds covering 4,000 ha. This fish farming system, like other paternalistic colonial endeavors, was compulsory. Each family in the implementing area had to work at least one fish pond. This program died after Independence in the 1960s, however, mainly for lack of sustaining funds and personal interest of the individual farmers. Furthermore, the turmoil that broke out in most parts of the country during the decade after Independence made it even more difficult for the program to continue.

Almost thirteen years after Independence, in 1973, the Government of Zaire showed a renewed interest in fish farming and sought help to organize a fish culture program from friendly countries and organizations. As a result a joint program between the Peace Corps and OXFAM was established.

In 1975, a pilot fish culture project, run by two Peace Corps volunteers, was set up in Kikwit, Bandundu where there were already hundreds of ponds remaining from the Belgian program. A new and prolific species, Tilapia nilotica, was introduced. Tilapia require less care than other species, especially when the pond has been enriched with compost and other fertilizers that quicken the formation of the needed plankton. The pilot project was a success.

In 1978, USAID decided to participate. The first agreement between the Department of Rural Development, Peace Corps, and USAID was signed on September 15, 1978 and Projet Pisciculture Familiale (PPF) was created. The objectives of the project were defined in the following terms: "...to establish a small farmer-oriented fish culture extension program in parts of three regions of Zaire (Bandundu, Kasai Occidental and Kasai Oriental).

The project had four components:

- Establishment of a research and training capability at the Gandajika fish station.
- Establishment and operation of four fingerling production and distribution centers.
- Creation of a system of fish culture extension, including the training of Zairian extension agents, their equipping and assignment in the field.
- Development of an institutional capability within the Department of Rural Development to manage the overall program."

In 1981, after an evaluation of all aspects of the project, the first amendment to these objectives was made. From September 30, 1981 the scope of the project was widened by adding two other regions, Bas-Zaïre, and Kinshasa, to the original three and increasing the emphasis placed on institutional development and rural development on a national scale.

Peace Corps support continued and broadened with the addition of the responsibility for on-the-job training of Zairian agents, while USAID continued support for commodities and equipment as well as for technical assistance. The Zairian government also continued its support for infrastructure and increased its contribution in the form of personnel and facilities.

The second amendment to the project was made in March 1984. The project became even wider and more national in scope by the inclusion of region of Kivu. The idea of a mobile extension team in all the five regions was introduced in order to involve nationals who would progressively be taking over supervision of farmers' posts from the PCVs. The amendment also gave the Regional Centers the responsibility for training fish farmers.

At the conclusion of the ten year program, there was a general agreement that a great deal had been accomplished but still more needed to be done if the benefits in the project regions were to be maintained. The need was also felt to expand into Shaba region and to introduce integrated agriculture to the fish farmers. In the light of this and the financial input and the manpower that had already been invested and the growing interest among farmers, it was felt that the project should continue but with a number of changes. As a result, a new agreement instituting Programme National de Pisciculture Familiale (PNPF) to follow in the footsteps of the old PPF was signed on August 29, 1988.

PNPF will continue to benefit from the assistance provided by USAID and the technical expertise of the Peace Corps although the latter will be gradually phased out over the next six years. The Zairian government is to take on even more institutional responsibility for the project at the national as well as the regional levels.

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### 3. HOW AND WHY PPF WORKS

#### 3.1. THE TECHNOLOGY

The technology of PPF is simple, but not necessarily easily mastered by villagers with very little experience in animal husbandry or farming for profit. Most rural peoples in Zaire are traditionally hoe horticulturalists and hunters, where men's work in the fields is limited to felling trees and burning brush. Stream fishing was traditionally women's work. In addition, many men migrated from the rural areas for long periods of time. Given this history and the very limited financial means of the rural Zairian, a project could only succeed if its basic principles were relatively easily mastered, and it required very little capital outlay.

Many project fish farmers in Bandundu already possessed an "authentic" pond or had seen one. The "authentic" ponds were remnants of the Belgian fish culture program. They are shallow ponds created by barring a small stream or source. Water continually flows through, carrying small amounts of organic matter and plankton, etc., which are the food source for whatever species are introduced. "Authentic" ponds are ordinarily stocked with any kind of fish, require little or no maintenance and are harvested at any time. The work of the fish volunteer then consist in upgrading these ponds. In other regions or in cases where the farmer has never seen a fish pond the fish volunteer uses visual aids to demonstrate the benefits of fish farming and how to build a pond. These visual aids include a flip chart, slide show and a booklet.

"Modern" or "project" ponds are deeper than "authentic" ponds and are, for the most part, built up from a gently sloping part of the valley floor. Dikes are formed using soil of high clay content which is compacted. Water is brought to the pond by the diversion of a small stream or source into a canal. Erosion is inhibited by planting grass around the pond. The grass is cut regularly to provide compost and discourage predators. Before fingerlings are introduced, the pond must get a plankton "bloom", from compost matter, upon which the fingerlings will feed. After the fingerlings are introduced, they are fed daily with a variety of feed, optimally including animal waste and fresh greens such as manioc leaves. After six months, the pond is harvested by draining and netting the fish. The harvest is weighed and recorded in a notebook.

For some, adoption of this simple technology is almost immediate. For most, it is essential to see a successful pond or be visited by a successful fish farmer who gives advice and encouragement. For those who have never seen a pond, it can take a long time to master the technology and grasp the benefits of fish farming. Often unsuccessful or partially successful attempts are made and the fish volunteer has to work with the farmer over a longer period of time.

Fortunately, Tilapia nilotica is a very hardy species which is resistant to disease and can survive even prolonged neglect. Thus, most fish farmers will have some fish to harvest even on their first attempts. For further details on the technical aspects of fish farming, refer to the booklet Comment Elever le Tilapia nilotica.

### 3.2 THE METHODOLOGY

#### 3.2.1 Organizational Structure

Each of the five regions currently participating in the project is divided into posts which serve a group of fish farmers. Posts are chosen on the basis of farmer interest and suitability of the terrain for fish farming. A post's membership can vary from between 10-50 fish farmers at any particular time. Often a new post is created as an offshoot of an older post whose membership has grown too large or too distant from one another.

Within each post the basic unit of association is the village or section. The section brings together all the fish farmers in the village or in neighboring villages and holds regular meetings to discuss matters and specific problems relating to their activities.

A number of sections form a post, run by a President, who coordinates activities and chairs meetings. The Vice-President of the post assists the President and there is a Secretary who takes notes and prepares reports and statistics for the post. New posts are ordinarily supervised by a Peace Corps volunteer who remains for two years.

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Ideally, the post remains active for six years, passing through three fish volunteers, after which it becomes an autonomous post. At that time, the fish farmers' organization runs the post with the support of the PPF "équipe mobile", or visiting team. This team visits autonomous posts on a regular basis, encouraging farmers and providing continued technical assistance. The visiting team was added on to the project in the last four years as the need was felt to maintain contact with autonomous posts.

Farmers also benefit from the PPF regional stations as a resource. Originally, these stations were set up primarily to reproduce fingerlings. As the project progressed and farmers produced and distributed their own fingerlings, the stations have been transformed into training centers where farmers, volunteers and trainers can learn new techniques and share problems and ideas. The feedback relationship among these project elements is illustrated below :

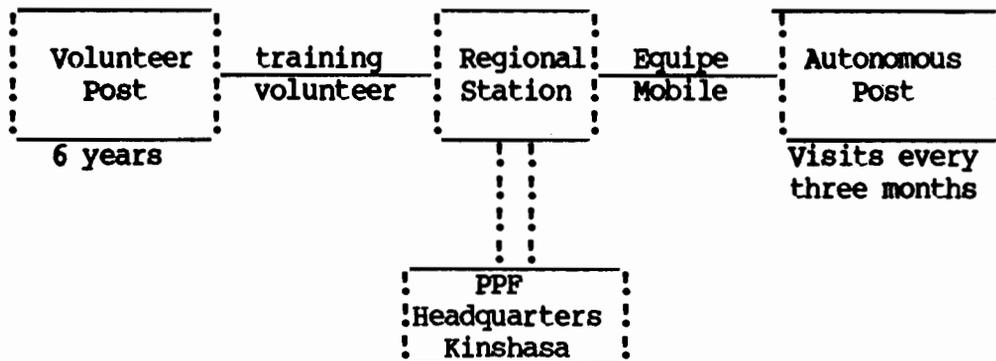


Figure 2. Feedback, Post, Regional Station and Headquarters.

Within each post, farmers hold a meeting once every two or three months. Through "pond critiques," periodic lessons given at the meetings and discussions, members of the associations have developed the spirit of working together and learn from each others' experiences. Associations have also become a part of the fish farmers' social life. During the reunion, they will spend the week-end together singing, dancing and consuming food and drinks made by wives. Fish farmers from one post have the opportunity of meeting their counterparts from different posts in the region to exchange ideas and experiences and to share friendship while together at the training centers or during special occasions like fish fairs organized by the regional coordinators of the project.

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In some posts, farmers' associations have initiated cooperatives for their members and in the others they have developed mutual aid organizations. Associations have also helped farmers learn new skills such as bookkeeping, public speaking, and community organizing.

Some posts have quickly adjusted to autonomous status; in others the transition has been more difficult. The presence of experienced and dedicated fish farmers in the group plays a large role in the continued functioning of the autonomous post.

### 3.2.2 Flexibility

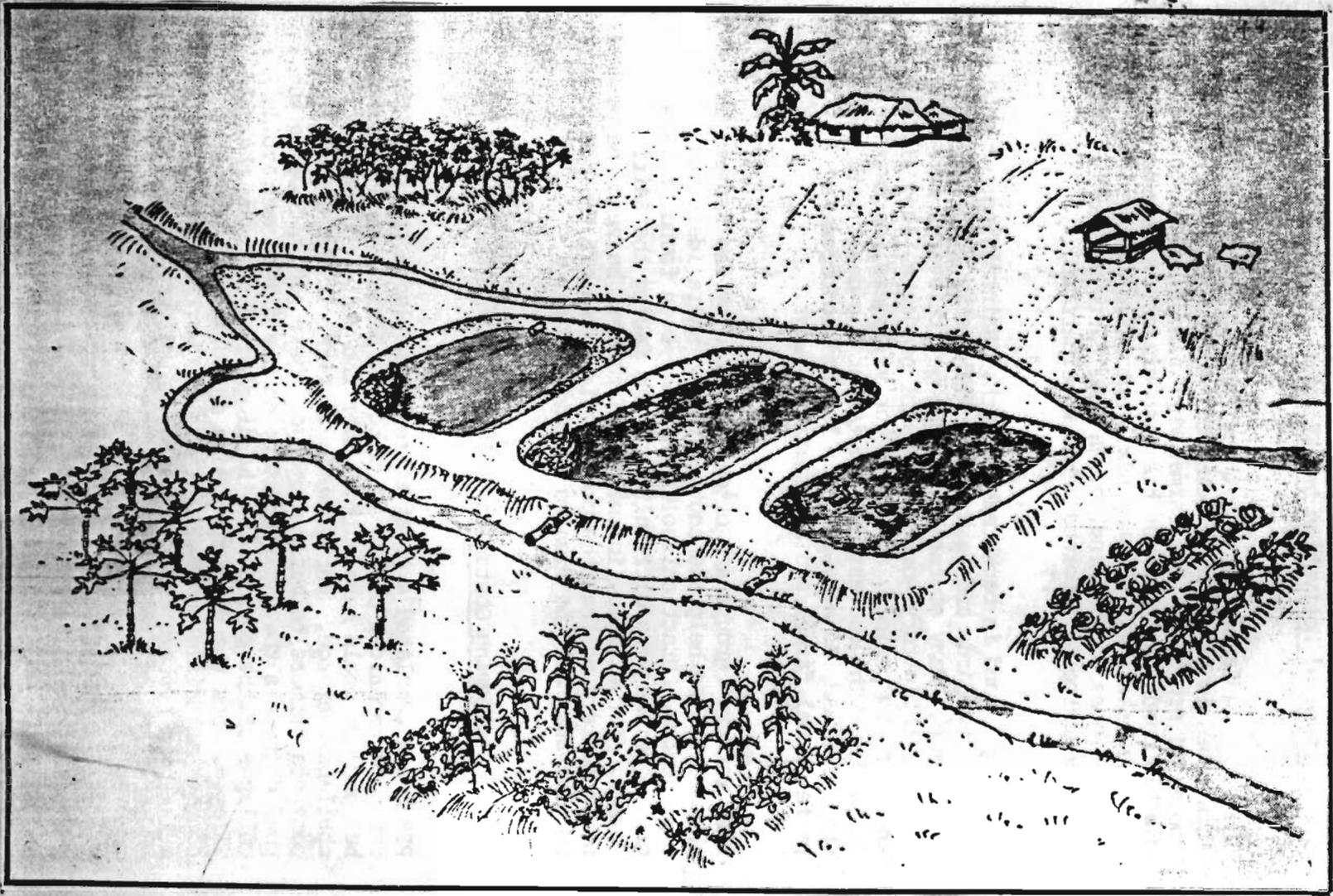
While the technique of fish farming has changed only slightly since its introduction, much has been learned about local conditions and problems and how to teach farmers as a result of farmers' experiments and constant feedback from pond to training center. In a different setting, the technology will, of necessity, be different. The guidebook Comment Elever le Tilapia nilotica, written by two fish volunteers, is the product of years of farmer and volunteer research. Even so, it has proved to be more applicable to Bandundu and Bas-Zaire than to other regions.

Peace Corps and PPF have maintained the flexibility necessary for growth. Volunteers may find a post unsuitable, may extend for an additional year, or may turn over the post to autonomous leadership a year ahead of schedule. Nevertheless, they are required to meet regularly with fish farmers and follow certain steps in making contact, choosing suitable farmers and working with the candidates. Standards are set for "project ponds."

Satisfaction was very high among all volunteers interviewed. The volunteers know they are providing assistance which will help people to eat better and to add to their incomes. They feel that they are rendering a professional service as part of a valued institution and they see the results of their work as modern ponds are built and farmers make a good harvest of Tilapia.

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Farmers' participation in the project is also flexible. Fish farming is not imposed on anyone. It is the farmer's choice to adopt the new technology and his choice to continue to follow project guidelines. Many farmers drop out but continue to use some of the project techniques. The study team visited one "drop out" with 18 ponds. Almost every farmer interviewed has authentic ponds as well as modern ponds. Farmers and their families have other activities as well, for example raising animals and crops. In short, the farmer decides to what extent he will participate in the project.



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Figure 2. Building a Fish Pond  
(Adapted from Martel J, and Narakas N,  
Comment élever le Tilapia Nilotica, 1984)

### 3.2.3 Farmers' Motivation and Efforts

The PPF fish farmer does have the support of the project, but this comes in the form of technical advice, not inputs. No tools are provided. The farmer must find a way to get tools, dig his ponds, and harvest his fish himself. Many borrow the tools to make their first ponds. One farmer interviewed had a side business of building wooden wheelbarrows which he sold for 1/10 the price of imported metal wheelbarrows.

Building a pond is backbreaking work. Maintaining the pond to project standards and feeding the fish daily requires discipline. Many obstacles can emerge: thievery, marauding animals, obligatory work on communal projects, long sickness and mourning periods, envy of other villagers, harassment by officials. The successful fish farmer has dealt with these obstacles and, as a by-product, learned to become a professional farmer and a community leader.

Fish farmers' groups are often organized by the farmers themselves, to help one another and to share ideas and experiences. Practical solutions have been found in these groups to the very difficult problems facing the Zairian farmer. For example, in one group, members harvest the pond of other members so that the pressure is taken off the pond owner to give away all the fish to family members.

### 3.2.4 Overcoming Obstacles

PPF has accumulated a great store of knowledge about how to overcome technical problems and how to achieve good harvests, but project goals have shifted over the years and new challenges emerge. For example, at first it was difficult to convince farmers to build slopes on their ponds. Sloping the pond decreases the water pressure on the dikes, and avoids collapse of the pond due to the digging of nests by the male Tilapia. Now the difficulty lies in collecting adequate compost materials and many farmers are working toward multi-pond systems and integrated agriculture rather than the construction of a single pond.

Not every farmer has the means to achieve an optimal harvest. For example, he may lack access to good quality compost materials or feed. In Bas-Zaïre and Kivu, shortage of good land for fish culture inhibits some farmers from expanding to a steady income-producing 5-6 ponds.

Individual farmers have conceived of innovative ways to overcome obstacles. One man, the first to adopt modern fish farming in his area, was unable to sell his first harvest because people would not eat fish which had consumed animal waste. He decided to hold a big feast and give away all the fish. People were pleased with the taste and now he is one of the wealthiest farmers in the project, and is selling his fish in bulk to nearby institutions.

Fish volunteers have provided innovative solutions to problems as well. One volunteer created a "piggy bank" to help farmers invest their profits and expand into integrated agriculture. Fifteen farmers bought a share of three pigs and help to feed and maintain them. As the piglets are born, investors will take them, starting with the first group member to invest.

### 3.2.5 The Result : PPF as an Institution

The goal of the Fish Culture Expansion Project was to create an institution, an extension network for fish culture throughout Zaire. This goal was formally achieved in 1988 with the creation of a national rural development program: Programme National de Pisciculture Familiale (PNPF).

At the ten year celebration of PPF, farmers clearly demonstrated their loyalty to the project and to fish farming. They were proud to be working for themselves. Many said they never again wanted to be in a position of looking for work or working for someone else. From now on, they say, we'll be hiring workers!

## 4. ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS

### 4.1 ECONOMIC CONDITIONS AND ECONOMIC CHANGE

For centuries, farmers have slashed and burned forests and grasslands for fields, plantations and hunting. There are thousands of square miles of vestigial primary forests that have been transformed into grasslands, aging palm plantations, fields, houses and roads. A traditional fishing method consisted of poisoning the stream to kill all fish and fingerlings in the vicinity.

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Traditionally, people depended for their protein intake on a few domestic animals, game meat, fish and many types of insects that were acquired at little or no cost. Hunting has become less and less profitable or feasible as forest land shrinks. And population increases in the past years, especially in urban areas, have led to an over-consumption of the existing natural resources.

PPF provides a service which meets the basic needs of rural Zairians. Protein scarcity and lack of income generating activities are major problems in the rural areas of Zaire. 70% or more of total caloric intake comes from manioc, a food virtually devoid of protein.

The economic and social environment in the project areas which the team visited has been undergoing tremendous change in the past two or three decades. For example, in Bandundu, specifically in the sub-region of Kwilu and to a certain extent in some parts of Bas-Zaire, palm oil industries that were once the largest employers have significantly reduced their activities. According to industry sources, the palm trees are aging and are no longer profitable. Soil has also been degraded and it is now economically unfeasible to consider planting young palm trees. This soil erosion and degradation is also a problem to those whose livelihood depends mostly on agricultural production. PPF ponds help to stop erosion and do not have a negative impact on the environment, according to USAID environmental impact studies carried out for the project paper.

In the past, when Plantations Lever au Zaire (PLZ) was more active, the company maintained distribution channels throughout the area where families could buy salted fish and canned food when needed. Now PLZ has closed most of these stores. Forests that once supplied game meat and insects have shrunk. Rivers and swamps have been overfished.

In Bas-Zaire, the introduction of the road that links the big cities, Matadi and Kinshasa, has brought change to the lives of many. There has been a proliferation of small towns, especially on the axis of Madimba-Kisantu-Inkisi-Mbanza-Ngungu-Lukala-Kimpese. The economy, even in rural areas, is focused toward trading. People produce crops and manufacture artifacts mainly for the purpose of selling to traders for Kinshasa and Matadi or other towns. Tourism, although still embryonic, is also beginning to emerge - more so in Bas-Zaire than in Bandundu region where travel is very difficult due to bad roads.

#### 4.2 JOB SECURITY AND INCOME GENERATING POTENTIAL

The rate of unemployment and underemployment is very high (one estimate put it at 80%). Salaried employment in urban areas is now very scarce. Until recently the palm plantations were the main employers in Bandundu. With the closing of many palm oil factories, opportunities for wage-earning have been severely reduced. Those who have jobs, in mission stations, around hospitals, with the few remaining palm oil industries or in trade, complain about poor wages. A 50cm<sup>3</sup> box of palm nuts pays between Z100 and Z200 to the palm cutter and his average monthly income is around Z2,000.

Some of the palm nut cutters who have been laid off have turned to traditional artisanal pressing, however this has been outlawed by local authorities as the artisanal pressers, *malaxeurs*, threaten the PLZ monopoly. They are able to sell a bottle of palm oil for Z30, the price demanded by PLZ is Z50. The state protectionism of PLZ has been justified by the fact that the company has been carrying out for the community some services that smaller traders cannot do, such as the maintenance of all the roads in their sector of activities.

When asked how they feel about the whole economic situation, the general answer of rural people is that "things are very difficult." This means that wages or income earned no longer meet the basic needs of existence: building an appropriate house; feeding the entire family; putting children through school; buying new clothes; taking care of medical or funeral expenses; not to mention savings.

In this situation of economic depression and protein scarcity, fish culture offers an attractive alternative. One fish harvest can net the farmer between Z3,000 and Z6,000, and provide him with protein for his family. He does not have to worry about being laid off one day because he is late for work or because the company is going out of business. Thus if he harvests once a month he can earn significantly more than a palm nut cutter and attend to other agricultural activities as well.

In our sample of 71 fish farmers all mentioned that the most important reason for joining PPF was finding a source of income that would give them enough money to buy food, clothes and put their children through school. Most had been to Kinshasa, not found work or had lost their jobs and returned to the village,

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As Jan Low put it in her March 4, 1984 report the Impact of Fish Pond Culture on Family Well-Being in Kasai Occidental, "the majority of all farmers interviewed cited the desire to feed their family as the primary reason for engaging in pond culture."

#### 4.2.1 Profile of the Fish Farmer

The study of 71 active fish farmers in Bandundu and Bas-Zaire allows us to draw a picture of the representative fish farmer, and compare him to a control group of 23 villagers chosen at random from the same areas.

The representative fish farmer has 5.7 children (ranging from 0-18). He is 39 years old and attained a level of education of one year post primary. 35% of the sample had more than one wife, 37% were owners of a registered farm, 33% have cattle and 16% have hired workers.

The villagers in the control group, on the average 37 years old, have attained 2 years of post primary education and have 4 children (range 0-15). 17% are farm owners, 13% own cattle, 4% have workers and 17% are polygynous.

There is, thus, a significant difference between fish farmers and the control group in ownership of land and number of wives and children. The slightly lower level of education of fish farmers can be explained by the presence of several older men who studied in the colonial era and served as apprentices or workers before becoming full-time farmers. In general, the successful fish farmer is either a respected land owning older man with 3 or 4 years of primary school education, or a secondary school educated entrepreneurial younger man. Both types tend to come from the village "middle class" of former salaried employees and traditional chiefs.

Village authorities mentioned that a large measure of the prestige attached to fish farming comes from the social responsibility of the successful farmer. Most importantly, he puts his children in school.

#### 4.3 SOURCE OF ANIMAL PROTEIN

Low's report stated that "it would be difficult and costly to try and assess if protein consumption within the [fish farmers'] household actually increased, or whether the family purchased fewer or other kinds of meat in the market as a result of having ponds." However, during the study team's tour, in five out of six places visited and where meals were served, Tilapia was the main dish. The only place game meat was served was at a non-fish farmer's house, a village chief. In the house of a second village chief, Tilapia was served. The team's visits, except on two occasions, were not previously announced so that the hosts would not have known to serve what was being studied.

Fish farmers and other villagers do eat Tilapia, and not only when there is a harvest. Some fish farmers explain that the reason for having authentic ponds along with project ponds is because they can harvest authentic ponds at any time and also they can stock them with other species of fish. By comparison, villagers who raise animals (cattle, goats, chicken) rarely, or just on special occasions, eat the products of their labor.

#### 4.4 INTEGRATED AGRICULTURE

In a situation where there is rapid soil degradation such as in most parts of the project area, one solution posed has been the alternation and diversification of crops. The other solution gaining ground is to integrate different but related agricultural activities in such a way, for example, that animal waste from the farms will serve in the gardens and fish ponds. Fish bones, scales and entrails can be used in poultry feeding and greens like manioc leaves and others can also be used to feed animals and fish.

Fish farmers are beginning to adopt the concept of integrated agriculture. Some successful farmers have started to grow irrigated rice, maintain vegetable gardens by the side of the pond, and keep chickens and ducks in houses built over the ponds so that their droppings fall into the water for fish feed. This technique also protects the birds from any attack of red ants, ticks and predators. Some of these fish farmers own, or will own, pigs, cattle and manioc fields, all of these fitting into what they consider their main activity, fish farming. The fish pond provides a focus for integrated agriculture which is hard to find in other settings in rural Zaire. Fish farming gives the farmer probably his first experience in raising livestock and putting to use animal wastes and garden compost. Pigs, chickens, and goats, are rarely penned in the village and are not regularly fed.

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#### 4.5 FISH FARMERS AND THE COMMUNITY

In this section we explore whether the community at large in the project areas has benefited from PPF. Has the project been detrimental to non-fish farmers or to the environment? In what way has fish farming influenced other sectors of life? To answer these questions we need to look into the following sets of relationships: fish farming and the family, fish farming and the general public, fish farming and local authorities, fish farming and the church, and fish farming and merchants.

##### 4.5.1 Fish Farming and the Family

Fish farming in PPF has been conceived of as a family activity, involving, at the outset, the man in the household who can then enlist his wife and children for help. In this period of economic crisis, it was necessary to find a full time occupation for men rather than give women another task in their already overloaded day. As it turns out women often contribute to daily feeding and participate in harvests as well as selling the harvested fish. Peace Corps volunteers have encouraged fish farmers to share the fruits of the harvest with their wives, to make it worth their while to contribute their labor. According to fish volunteers, women are more skilled in marketing than men. Some fish farmers have paid bridewealth for a second wife from the income of fish farming. Children benefit from fish farming by increased access to schooling as their families can afford to pay school fees. Many fish farmers interviewed had children in professional school and one farmer had even sent three children to university in Kinshasa.

##### 4.5.2 Fish Farming and the General Public

At the beginning the task of introducing the project was not easy. The first farmers to adopt the new technology were considered crazy by other villagers for wasting their time digging and building dikes for their ponds and especially by feeding fish with animal wastes. People didn't even want to buy the fish from their first harvests. This picture changed with time. Tilapia is being consumed now by everyone. Now there are feelings of jealousy and desire to emulate when villagers see fish farmers make money, feed their families and solve some of their financial and social problems. This success has branded them sorcerers in the eyes of the other villagers.

Nevertheless the public is now generally supportive of the fish farmers. They eat and buy fish and they also like the publicity that fish farmers bring to their villages which raises the village's status and gives them hope for the future. For example, the village of Kianga, Nko collectivity, was for five years cut off from the rest of the world by a deteriorated road. This road has been reopened by fish farmers who got together to fix it to allow access for their visitor's vehicles, especially PPF volunteers. Fish farmers still maintain the road on their own and other villagers appreciate this service very much.

The study team found no ethnic, religious or other differences in acceptance of the project or in the ability of farmers to work with the project, although a few conflicts over land rights were reported between ethnic groups and between those with rights to land and those who did not have rights to land in the village.

#### 4.5.3 Fish Farming and Local Authorities

Many fish farmers have enjoyed the support received from local authorities and have talked about this support with pride. For example, local authorities have allowed volunteers from PPF to live in the villages, have set aside valleys for fish farmers' use, have stopped other villagers from interfering with fish farmers' activities and have encouraged non-fish farmers to join the project in order to combat malnutrition. It should be noted too that many of the older fish farmers are traditional authorities, that is clan chiefs.

Another type of local authority harasses fish farmers to pay exorbitant fines which are rarely justified. This type of local authority thinks that fish farmers have a lot of money and can afford to pay any fine. When questions were posed about what fish farmers considered to be problems in accomplishing their objectives, in Bandundu the unequivocal response was harassment and unjustified fines from local authorities, while in Bas-Zaire and Kasai Occidental, the farmers did not see harassment as a problem. Nevertheless, in Kananga, Kasai Occidental, PPF workers were summoned to defend themselves to the local authorities against the unfounded allegation that fish ponds were breeding mosquitoes. It has been proven that well constructed ponds cannot carry mosquito eggs, since the larvae are good feed for the fish. In this case at least the harassment was a result of misinformation on the part of the authorities, while in many cases it is not.

#### 4.5.4 Fish Farming and the Church

The study team visited two Catholic missions in Bandundu, Kingandu and Kinzambi, and one Protestant mission in Bas-Zaire, Nselo, talked with the regional President of the Synode of the Church of Christ in Zaire at Kikwit and Protestant missionaries from Vanga.

In general, PPF has maintained good working relationships with the church to the extent that its technology has been followed by two mission stations that have built their own fish ponds at Kinzambi and Vanga stations. The Vanga missionaries would like more collaboration with PPF.

#### 4.5.5 Fish Farming and Merchants

The income generating ability and money making potential of fish culture as demonstrated by PPF have generated interest from merchants and businessmen who are always in search of profits. One well known merchant in Kikwit confided to the study team that he was inspired by PPF six years ago to build 9 fish ponds. He has been practicing integrated agriculture, keeping pigs and ducks and also cultivating rice and various fruit trees near the ponds. He remarked, "This project got off to a slow start and I somewhat neglected it. Now I have developed a new interest and have hired an agronomist to look after the fish ponds."

A second merchant, considered to be the most important in Kikwit, said that he has also been inspired by PPF. Since 1987 he has built three giant modern ponds and he also has four authentic ponds. He intends to build many more modern ponds and to establish a plant for cleaning and freezing fish for sale locally and in Kinshasa. He also practices integrated agriculture, raising cattle, chickens, ducks and growing different types of vegetables and fruit trees.

Another businessman interested in fish culture runs the most important bakery in the city of Kikwit. He established himself in Kikwit in 1982. In 1984, along with his other activities, with inspiration from PPF, he started fish culture on the right bank of the Kwilu, the other side of the city of Kikwit. With five giant ponds, he also practices integrated agriculture with pigs, chickens, ducks, as well as growing various fruit trees.

PLZ in Lusanga also developed interest in fish farming by hiring one of the first fish volunteers in the project to help set up 24 ponds with a total of 6 ha. These ponds are primarily designed to feed PLZ workers.

Thus PPF has been instrumental in the development of fish culture in the project areas, outside of its work with fish farmers and has set the stage for community development.

## 5. CASE STUDIES

Karen Kent, Bandundu Fish Station Technical Advisor, has carried out a detailed study of seven of the most successful fish farmers in Bandundu. Not surprisingly, she found that many of them were well situated to begin with, endowed with a farm and animals, or having exceptionally good land. Most were polygynous or had hired workers. Their wives and families helped out in pond maintenance. Another key factor in success was proximity of ponds and fields to dwelling. All of the factors mentioned above are important but not determinant to success.

### 5.1 PAPA N. AND PAPA M.

The study team visited one project "drop out," Papa N., endowed with all the elements for success - and more - whose farm was in very poor condition. He had 28 authentic ponds located at a short distance from his dwelling, a cement pig pen and a truck. He had received credit from a local institution and had two nephews working for him. Despite all these assets, his ponds had greatly deteriorated, there were no pigs in the stall and the truck was not running. Implements bought or given to him by a rich relative were rusting in the field.

This drop out's situation can be contrasted to that of Papa M., his close neighbor and one of the most successful fish farmers in Bandundu. Both Papa N. and Papa M. were among the first to adopt PPF technology in the region. Papa M. started modern fish farming in 1977 with Mark Orlic, the current Associate Peace Corps Director for Fish. Both are men of status within the village. Papa N. is a clan chief, Papa M. is the brother of the village chief and both are farm owners.

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Before starting modern fish farming Papa M. had authentic ponds and had worked at a palm oil plantation, as a shoe repairman, and a chauffeur. Papa M. now has 6 project ponds and 3 authentic ponds and is the president of the fish farmers' association of his (autonomous) post. He has invested in improvements on his house and bought a chicken incubator and three brick makers with money from fish culture. His farm has grown from 15 to 270 ha and he has two hired workers. He uses the cattle on his farm to plow fields.

In addition, he has been the driving force in a cooperative with other fish farmers which has ambitious plans to buy cattle for animal traction. Papa M. has a savings account, as does the cooperative. Papa N. was originally part of this cooperative but pulled out as a result of a dispute over where to build the cooperative office. The study team concluded that Papa N. was overextended (he owns a sawmill as well) and did not manage well the assets that he acquired.

#### CIT. A. AND CIT. W.

Cit. A. was very young - 20 years old - when he began modern fish farming. He had finished secondary school and inherited a farm from his maternal uncle, the most common form of inheritance in matrilineal Bandundu and Bas-Zaire. Another uncle is a traditional chief. Moving his residence down into the valley by his ponds enabled him to supervise the work closely. He married an educated woman who markets the fish for the family, and they work as a team in feeding and harvesting the fish. He has 9 project and 8 authentic ponds and has two hired workers.

He has 13 head of cattle and a coffee plantation at another location. Near the ponds he is raising three pigs and has 25 chickens, 10 ducks and 5 goats. With the profits from fish farming he has paid bridewealth for himself and an older brother and the complete expenses of four funerals.

Cit. A.'s neighbors thought that he was crazy when he began intensive fish farming. Now many would like to imitate him but they lack the skills. He has learned accounting and reads any literature he can find on farming. He speaks and reads French well. His goal is "to become a great farmer" and he says he has no desire to build a house in or move to the town. Cit. A's success has made him feared by some villagers and local authorities. They avoid now having problems with him and they comment: "He's got money and contacts. Don't mess with him."

With other fish farmers, he tried to start up a cooperative but the money they contributed was stolen. In contrast to Papa M., he has no confidence in the savings bank and wishes to invest in his own activities.

Cit. A's situation can be compared to that of Cit. W., a trader, artisan and bicycle repairman from a neighboring village. Cit. W. has also completed secondary school and is the nephew of the village chief. Cit. W., like many others, invested in chickens which were wiped out in a recent epidemic. He is the same age as Cit. A. but has not yet accumulated enough money to pay for bridewealth. His gross income is about \$15 a month, whereas Cit. A.'s income from his ponds alone is \$25 a month from which he pays his workers.

### 5.3 NSELO POST

Few fish farmers are as successful as Papa M. and Cit. A., and many non-fish farmers also make a good living, especially in Bas-Zaire where vegetable gardening, processing manioc and making charcoal for the Kinshasa market are profitable endeavors. There seems to be a correlation between interest in fish farming and lack of availability of other income generating activities which bring in cash more quickly (vegetable gardening, growing beans, making charcoal, manioc paste, or tapping palm wine). This correlation was confirmed in Low's (1984) study of three zones in Kasai Occidental within which PPF has operated. The poorest zone with the fewest opportunities was the quickest to adopt modern fish farming.

At Nselo post in Bas-Zaire, fish farming is one of many activities which can bring in income and feed the family. This situation contrasts with posts visited by the study team in Bandundu where fish farming was often the only, and certainly the major source of income.

Situated 120 km from Kinshasa and between 50-60 km from the main road, Nselo attracts many traders from Kinshasa. There is a busy market every Tuesday. A hospital has recently been renovated in Nselo village and is being run by Protestant missionaries and Santé Rurale (SANRU), a national rural health project supported by USAID. A few kilometers from the hospital there is a Catholic mission with a secondary school.

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Interviewing a group of men in Kimputu village near Nselo hospital revealed some of the different occupations in this area. One man, surprisingly, had four ponds and had started with the project many years ago. He did not continue with PPF because he wanted to harvest his ponds once a year, letting the fish grow big. The fish volunteer remarked that one of his large ponds looked well maintained though not completely up to project standards. This man had a few animals and was starting a fruit tree plantation. A former taxi driver in Kinshasa, he says he far prefers to live on his own "personal account" through farming.

Another relatively well-off villager is a stone mason, specializing in funeral crosses. Though his family lives in Kinshasa he remains in the village and is able to make up to \$50 a month from his business. Some of the men make charcoal to sell in Kinshasa, a profitable business but one which causes a great deal of deforestation and erosion. One man grows tobacco. Women in the village make and sell chikwangu or manioc paste.

The fish volunteer described Kinshasa as a vast vacuum cleaner that sucks out all the resources of the area. There is malnutrition which a health worker attributed to low incomes and selling off too much of family production. The poorest man encountered in the study lives in this village. A former restaurant worker in Kinshasa, at 48 years old he has never married and has no children. He estimated the income from his fields to be about \$10 a month.

There is a fish farmers' group of sixteen active farmers and a few novices at Nselo post working with a fish volunteer. Next year the post will become autonomous. The four fish farmers interviewed have other activities: one is a first aid worker and shoe repairman, another owns a small bar selling beer and soft drinks. Two studied agriculture in high school and all have fields where they grow manioc, corn, vegetables, peppers, rice, beans or peanuts for sale. The President of the group, Tata K., has an exceptional five ponds, including one which is a communal pond for use of members of the group in case of need. He also has 66 head of cattle. Before starting in fish farming he had a truck and was trading between the village and Kinshasa.

Interest in fish farming has been increasing lately because the price of competitive fish, frozen seafish, has increased. People eat fish and like it but local production had been low in part due to the low price of fish brought in from the

coast. Now it seems that coastal waters have been overfished and local fish will be able to compete successfully. The fish farmers complained, however, that land for fish farming is scarce and many cannot expand.

The four fish farmer and the "drop out" interviewed were very optimistic about fish farming and all saw it continuing to play a large role in their activities in the future.

#### 6. LESSONS LEARNED FROM PPF

1. Fish farming is adopted more readily in areas which lack other income generating activities and sources of protein than in those where cash crop farming or trade is profitable. The latter activities may take a shorter time to bring rewards than fish farming.
2. It takes several years to establish a successful extension program for fish farming and will take longer in areas where fish farming is a completely new activity. Farmers have to be able to see working ponds.
3. Efforts should be channelled into working with progressive farmers and should not be wasted on those who are reluctant to try fish farming. In the same vein, it is harder to work with farmers with very few resources as they will be less likely to take risks which might jeopardize their livelihood. The poorer farmers should be brought in at a later stage of the project once convinced that fish farming is an appropriate and profitable activity.
4. It is important to understand the social environment within which the project must operate, especially considerations such as land tenure, traditional rights and obligations to family and local authorities, and beliefs about success and increased production.
5. Nutrition education is an important addition as is encouraging farmers to share the benefits of fish farming with their wives. These efforts help to minimize the possibility that farmers will "invest" their profits in palm wine or conspicuous consumption items. Conversely, it was noted that the most successful farmers already achieved significant cooperation from wives and cared for the health of their families. Some of the younger farmers even discussed limiting the size of their families. It is necessary to study possible conflicts in labor time within the household and availability of feed for the fish which might conflict with family needs (e.g. manioc leaves).

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6. An extension program which relies on model farmers is preferable to one where inputs are given away to any farmer who applies. See Low's report for a comparison of a Belgian fish farming project with PPF. Providing inputs should be avoided.
7. Marketing of the fish must be assured at a price competitive to other products which a villager could buy.
8. An extension program which promotes farmer independence and self reliance is more apt to succeed in the long run than one in which the farmer is dependent upon a structure that has no guarantees for its own future.
9. Extension efforts are more successful in areas where adequate communication, follow-up and support are possible and provided regularly.
10. An institution such as PPF can help fish farmers from different ethnic groups and regions to develop a bond and a professional spirit.