PD BAS 241

OFFICIAL PROJECT DOCUMENT

# PROJECT EVALUATION SUMMARY (PES) – PART I

| 1. PROJECT TITLE | 2. PROJECT NUMBER | 3. MISSION/AID/W OFFICE |
|---|---|---|
| Fish Culture Expansion Project | 660-0080 | USAID/Zaire |

4. EVALUATION NUMBER (Enter the number assigned to this evaluation by reporting unit, e.g., Country or AID/W Activity Code, Fiscal Year, Serial No. beginning with No. 1 each FY)
84-2

☒ REGULAR EVALUATION ☐ SPECIAL EVALUATION

| 5. KEY PROJECT IMPLEMENTATION DATES | | | 6. ESTIMATED PROJECT FUNDING | | 7. PERIOD COVERED BY EVALUATION | |
|---|---|---|---|---|---|---|
| A. First PRO-AG or Equivalent | B. Final Obligation Expected | C. Final Input Delivery | A. Total | $ 5,043,000 | From (month/yr.) | 2/81 |
| FY 78 | FY 84 | FY 84 | B. U.S. | $ 950,000 | To (month/yr.) | 3/84 |
| | | | | | Date of Evaluation Review | 4/84 |

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

| A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate A.I.D./W or regional office action should specify type of document, e.g., cable, SPAR, PIO/T which will present detailed request.) | B. NAME OF OFFICER RESPONSIBLE FOR ACTION | C. DATE ACTION TO BE COMPLETED |
|---|---|---|
| RECOMMENDATIONS: | | |
| 1. That project activities be continued under a ten year follow-on project. | USAID/PC/GOZ | NA |
| 2. That the current and follow-on projects be restructured, with the development of two phases of project activities. The first phase would continue project activities as currently practiced, in an effort to introduce, establish, and popularize efficient fish culture practices in suitable areas of Zaire. This first phase would maintain the basic organizational structure (GOZ/PC/USAID) and methodology of the current project, including the clustering of Peace Corps posts, the emphasis on the development of a small, core group of model farmers, and concentration on the one primary project activity (fish culture). | USAID/PC/GOZ | 12/84 |
| The second phase, to be developed jointly by representatives of the GOZ, Peace Corps, and USAID, will be designed in an effort to meet the needs of those areas of Zaire which have benefited from extension services under the project and in which Peace Corps posts have been or will be closed. Particular attention will be paid, under the second phase, to meeting the needs of secondary adoptors of fish culture technology. One possibility to be explored during the design of this | | |

CONTINUED ON ATTACHED SHEET

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☒ Implementation Plan e.g., CPI Network
- ☐ Other (Specify)
- ☐ Financial Plan
- ☐ PIO/T
- ☐ Logical Framework
- ☐ PIO/C
- ☐ Other (Specify)
- ☐ Project Agreement
- ☐ PIO/P

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☐ Continue Project Without Change
- B. ☐ Change Project Design and/or ☒ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Cit. Longonge, Director, PPF
Mr. M. Billings, Agricultural Economist, REDSO/WCA
Mr. L. Torrens, Technical Consultant, Univ. of Arkansas
Mr. D. Atteberry, Project Officer, USAID
Mr. B. Steinwand, APCD/Fish, Peace Corps/Zaire
Mr. Gordon Mangel, Technical Consultant, Dept. of Agric.

12. Mission/AID/W Office Director Approval

Signature

Typed Name: Mr. Richard L. Podol, Director

Date: 9 May 84

AID 1330-19 (3-78)

RECOMMENDATIONS (continued)

| | | | |
|---|---|---|---|
| | second phase is the development of a mobile team of extension agents. | | |
| 3. | That USAID determine exactly what physical and/or human infrastructure, if any, should be left behind upon completion of project activities. The project restructuring, mentioned in Recommendation 2 above, should be consistent with this determination. | USAID | 12/84 |
| 4. | That a role in the project for various media be examined. This should include the possibilities for the development of posters and radio programs aimed at fish farmers. | USAID/PC/GOZ | 12/84 |
| 5. | That the role of the regional centers be examined, and a determination made as to what their future status should be. | USAID/PC/GOZ | NA |
| 6. | That the number of Peace Corps Volunteers working as extension agents under the project be limited to current levels (approximately 60), or perhaps reduced to about 50. | PC | NA |
| 7. | That the National Training Center at Gandajika be expanded into a comprehensive agricultural training center, with the project taking responsibility for the fish culture component. | USAID/PC/GOZ | 12/85 |

# FISH CULTURE EXPANSION PROJECT - EVALUATION

Contents

## I. Summary

USAID implemented the Fish Culture Expansion Project (660-0080) in September, 1978. The project is a cooperative effort between USAID, Peace Corps, and the Government of Zaire. USAID provides the essential logistical support, including transportation (motorcycles) and fuel. Peace Corps provides volunteers, currently about 60, who serve as extension agents. There are also four PCVL's (Peace Corps Volunteer Leaders) whose role is to coordinate and support the work of the PCV's within their regions. The GOZ's participation is through PPF (Project Pisciculture Familial), and consists of a National Director and support staff for the central office, regional coordinators who work closely with PCVL's, and staff for the regional fish stations. The project is currently active in five of Zaire's nine regions: Bandundu, Kasai Oriental, Kasai Occidental, Bas-Zaire and Kivu. All project regions except Kivu have government stations and training facilities at the National Center at Gandajika have been completed.

## II. Project Methodology

Project methodology revolves around the Peace Corps extension agents. They are posted in "clusters", with one volunteer's area of coverage overlapping with that of another. Sites for volunteer posts are selected on the basis of population density, topographic and agro-climatic conditions, possibilities for logistic support, and interest of the local population. Volunteers are trained to work with a limited number of highly motivated farmers, usually around ten. The emphasis is on quality pond construction and basic pond management, including stocking rates, feeding, and fertilizing. The goal is the development of a small core group of "model farmers", and not of high numbers of project participants. These model farmers then form a sound foundation for the involvement of secondary adaptors.

A Volunteer post is generally continued for about 6 years (three 2-year volunteers), after which that post is closed down and another post opened, usually in fairly close proximity to the first.

## III. Evaluation Methodology

This evaluation was carried out by representatives of the GOZ, Peace Corps and USAID, and with the assistance of two outside consultants: an Agricultural Economist from REDSO/WCA and a Fisheries Expert from the University of Arkansas/Pine Bluff. Both consultants provided USAID with reports of their findings and recommendations, which are included as Annexes 1 and 2. These reports were based on discussions with officials of the cooperating agencies, discussions with PCV's, and site visits in four of the five regions included under the project.

## IV. Conclusions

The overall impression of those involved in this evaluation was that the Fish Culture Expansion Project is enjoying considerable success, and that care must be exercised so as not to endanger this success when undertaking any changes in project design or implementation. This success was seen to be due to a number of factors. These factors are briefly outlined below.

A. The appropiateness of the project activity.

The activity promoted by the project, fish pond culture, is the ideal first husbandry activity for people who have no prior experience in animal management. The technology involved is simple and very tolerant of inexperienced and careless management. Capital inputs are minimal, the potential for profitability is high, and there is little risk involved.

B. Quality extension agents.

The quality of the extension agents is very high. REDSO's Agricultural Economist described the ideal agent as one who is "highly motivated, well trained technically and logistically supported, has adequate transport, is highly focused and regularly paid." Peace Corps Volunteers come close to this ideal.

C. Appropriate project orientation and viable extension methodology.

The project's emphasis on quality rather than quantity of farmers has given rise to a core group of farmers who then act as good models for secondary adopters. The clustering of posts has facilitated the opening of new posts, due to a "leap-frog" effect. New posts are generally opened in close proximity to former or current posts, thus allowing for continued contact with farmers in the area of former posts, as well as preventing extension agents from having to totally reintroduce fish culture technology every time a new post is opened.

D. The continued simplicity of the project.

Up to now the project has not deviated from its original goal: the introduction of fish culture techniques. During the course of the evaluation it was suggested that other husbandry activities might be added in an effort to build upon the foundation of fish culture. This idea was ultimately rejected, due to the importance placed upon simplicity as a principal reason for project success.

E. GOZ (PPF) Participation.

While the GOZ has not, for the most part, been directly involved in extension work, their role was viewed by the evaluators as essential, in large part due to the "legitimacy" which active GOZ participation provides to the project. GOZ representatives have been supportive of the project in general, and of the Volunteer extension agents in particular. The evaluators emphasized the importance to the individual fish farmer of knowing that he is involved in a project which is carried out in cooperation with and with the support of his government.

V. Recommendations

Refer to PES facesheet.

VI. Issues

Several issues were raised during the course of this evaluation. These are discussed below.

## VI. Issues

The principal issue raised by this evaluation is that of sustainability: will project-initiated activities continue after Peace Corps and USAID support has been withdrawn? Any discussion of the prospects for project sustainability must necessarily be preceded by a decision as to exactly what form "sustainability" should take in this case. What sort of human and/or physical infrastructure should be left in place following the termination of USAID and Peace Corps participation? Clearly, fish culture per se will continue to be practiced once this project is completed (though to what extent, techniques introduced under the project will still be employed is not clear). Thus, sustainability at a certain level will be assured.

Whether extension services will continue following the pullout of Peace Corps Volunteers, and whether or not they should, is a more difficult question, and one which has yet to be directly addressed. Certainly, none of the evaluators felt that it was realistic to expect GOZ extension agents to replace the PCVs who are currently filling that role. On a more basic level, it has yet to be decided whether a continuing extension presence will be either necessary or desirable following the completion of a follow-on Fish Culture project. This is a fundamental question which will have to be answered during any restructuring of the current project, and certainly prior to the design of a follow-on project. If there is to be a continuing role for the GOZ to play in the years following the project's end, then this role should be clearly defined as soon as possible, and the project should be designed and executed with this in mind.

More specifically, decisions must be made as to the future status of the various regional training and fingerling production centers, the role that the Farmer's Associations can realistically be expected to fulfill, the nature and amount of continuing support that these associations might need, and where that support is going to come from.

ANNEX 1

EVALUATION REPORT
FISH CULTURE EXPANSION PROJECT 660-0080

LES TORRENS., April 6, 1984

## I. DEVELOPMENT OF FISH CULTURE IN ZAIRE

### A) Colonial Era

Fish culture was first introduced to Zaire during the Colonial period. Motivated by the colonial mandate of forced cultivation, villagers constructed literally thousands of so-called "authentic" ponds-small, shallow, ground water ponds. While the government built many stations to produce fingerlings of Tilapia macrochir, and stocked most of the village ponds, there was no planned program of rural extension or farmer training. Predictably, nearly all of these ponds were abandoned soon after independance.

### B) Peace Corps Involvement

In 1973, Peace Corps examined the feasibility of re-introducing fish culture to Zaire. Based on a favorable report, two PCV's began fish culture extension in Bandundu Region as a secondary PCV activity. The Bandundu program was expanded to 8 PCV's in 1975, with volunteer support provided by the U.S. Ambassador's Self-Help fund. Additional support was subsequently provided by Oxfam. By 1978, there were 14 PCV's in Bandundu Region and the program was seen as being extremely successful. Expansion of the fish culture extension program to other regions of Zaire was seen as the next logical step.

### C) Fish Culture Expansion Project

USAID implemented the Fish Culture Expansion Project (660-0080) in September, 1978. Under this project AID provided the essential logistical support for the PCV's and government stations. Peace Corps provided volunteers to carry out the extension activities, and Regional Peace Corps Volunteer Leaders (PCVL's) to coordinate their activities. The Associate Peace Corps Director for fisheries is responsible for the over-all coordination and planning of the Peace Corps component. The Government of Zaire (GOZ), under the direction of the Department of Rural Development, created Project Pisiculture Familiale (PPF). PPF consists of a National Director and support staff for the Central office, regional coordinators who worked closely with the regional PCVL's, and staff for the regional fish stations. The basic objectives of the project were to create a national GOZ infrastructure (PPF), expand the extension program to other regions with high potential, renovate and maintain the regional fish stations and the National Center at Gandajika, and ultimately train Zairians to replace PCV's in the field.

The program subsequently expanded to Kasai Occidental (1979), Kasai Oriental (1980), Bas-Zaire (1983) and Kivu (1984). While the bulk of the program support came from AID and the GOZ counterpart funds, Oxfam provided additional funding in 1983. Currently, there are 17 PCV's in Bandundu Region, 21 in Kasai Occidental, 13 in Kasai Oriental, 7 in Bas-Zaire and 5 in Kivu. All regions have a PCVL, and all but Kivu have a Zairois PPF Regional

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Coordinator. All project regions (except Kivu) have government stations in operation, and training facilities at the National Center at Gandajika have been completed.

## II. CURRENT STATUS OF PROJECT

The purpose of my visit to Zaire was to, as a part of a team, assist in the evaluation of the Fish Culture Expansion Project 660-0080. I was to assess the current status of the project and, more important, evaluate the long-term growth and sustainability of fish culture in Zaire.

### A) Scope of Field Trip

During the past three weeks, I have been able to visit four of the five regions receiving project inputs (Bandundu, Kasai Occidental, Kasai Oriental, and Bas-Zaire). I met and travelled with both the PCVL's and PPF coordinators in those four regions, visited regional PPF fish stations at Katuishi (Kasai Occidental), Mudiba (Kasai Oriental), Kasangulu (Bas-Zaire), as well as the PPF National Training Center at Gandajika. I met 15 of the fish PCV's, visited seven posts currently managed by PCV's and several other posts from which PCV support has been withdrawn. I visited 23 separate sites or valleys and saw over 140 project ponds (in addition to hundreds of authentic or non-project ponds). I was able to interview 25 project farmers individually at their ponds, and dozens more in various group settings, I met farmers from eleven different fish associations, and full membership meetings of two associations. In addition, I was able to meet with the key management personnel from all three components of the project: AID (the Project Officer for DEO, the Fisheries Expansion Project Manager, and the AID:PPF liaison), Peace Corps (the country Director, the fisheries APCD and several other APCD's, and three of the Peace Corps Regional Representatives), and PPF (National Director Longange and the Kinshasa office staff, as well as the field personnel mentioned previously). I was also able to meet the Kasai representative from Oxfam, which is also providing financial support for some volunteers.

The fact that I was able to cover so much ground and see so much in the short time available is a reflection of the tremendous enthusiasm, dedication and effective working relationship displayed by all parties involved.

### B) Current Status

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 most visible examples of the project's success are seen in valleys containing both authentique ponds and "project" or modern ponds. Project ponds stand out as models of proper location, design and construction. They are larger (1-4 ares), deeper (1 meter in the deepend), and have levees heavy enough to preclude "blow-outs" during heavy rain. They are typically provided with water through a gravity-flow diversion canal which may supply a long series of ponds. All ponds are completely drainable and have no trees or stumps.

The real value of these project ponds is not merely the appearance, but the productivity. While the fish production from authentic ponds (if, in

fact, they are ever harvested) is less than 2-4 kg/are/year. Nearly all project ponds produce a minimum of 10 kg/are/6 months, or 20 kg/are/yr - a 5 to 10-fold increase over traditional production. This level of production is higher than that of any African country I've visited, but even higher yields are seen. Many farmers, with a more thorough understanding of the principles and practices, are producing 15-25 kg/are/6 months or 70-80 kg/are/yr. By comparison, most highly mechanized, intensively-managed catfish farms in the southern U.S. produce only 30-50 kg/are/yr.

Usually, the first harvest inspires a farmer to construct additional ponds. A true "model farmer" may have 6 ponds ranging in size from 1-5 ares. This allows for monthly harvests, and thus a steady, year-round income. While a portion of each harvest is consumed by the family, most fish are sold and the money used for childrens' school fees, food and clothing purchases, or other family needs. For those farmers, fish has become a truly important source of income.

Villages that have had several years of PCV input have large numbers (10-30 more) of project farmers (this is most common in Bandundu Region). Those farmers have typically formed "fish farmers associations". Member farmers sell fingerlings to each other and to non-project farmers as well, meet on a regular basis to discuss management, pond harvests and problems, they help each other with construction and harvesting, and provide advice to anyone that wants it. There are usually one or more individuals in each association that have taken up the cause, often travelling up to 40 km on foot, with no pay, to help other farmers requesting assistance. These associations are for real, the members are serious, and they provide a local, private infrastructure for fingerling production and technical assistance that few governments are able to do with even an unlimited budget.

It is unlikely that fish culture in the expansion regions will experience a growth rate identical to Bandundu - some regions will be better and some will develop much slower. This spectrum of potential may be seen even within a region. Kasai Oriental, for example, has areas that may be even better than Bandundu, and other areas that have already been dropped for a variety of reasons. However, the progression of development, if not the absolute time frame, should follow the Bandundu pattern if the area does have a real potential for fish culture, and of the criteria established by Peace Corps for new PCV posts is followed.

C). Organization

The basis of this project has been the individual Peace Corps Volunteer at his or her post. I've visited a lot of PCV posts in various African countries and was immediately struck with the isolation and relative hardships endured by most fish PCV's in Zaire. I saw the easy-to-reach posts. Many other PCV's are truly on their own, rarely, if ever, seeing another volunteer or (even more rarely) someone from Kinshasa or even the Regional Capital. While eating a single cricket or palm grub while on tourné may make for a great sotry in Kinshasa or the States, subsisting on such a diet for an extended period is not what most Americans would consider the good life. Yet these PCV's have, with very few exceptions, accepted the situation, adapted extremely well to the culture, and have managed to pull off a developmental success story in a country where success does not happen every day. Every one of them should feel proud to have been a part of this.

Supporting 60 PCV's in the field is a monumental task. The primary backstopping team consists of the Reginal PPF coordinator and a PCVL working together in the Regional PPF Office. Each has their own responsibilities, with other responsibilities shared. This arrangement has worked out exceptionally well. The Zairois coordinators are, without doubt, the best group of fisheries staff I have seen in Africa. They know their subject, they are hard-working, honest and really believe in the project. They know what's going on, not only in their office, but at the village level as well. They are enthusiastic about their job, helping out at farmers' meetings, coordinating new post selection, replacement of PCVs, logistical and technical support, as well as solving problems that Americans are not able to deal with. Thus far PPF has managed to keep good people in these key positions, and I hope that this trend continues. The major problem is the discrepancy in pay between the PPF coordinators and the PCVL's. They really should be rewarded for a devotion to duty rarely seen in Zaire.

The PPF Regional Coordinators also have overall responsibility for the management of the regional fish stations. These stations were renovated under the fish culture expansion project to provide fingerlings of Tilapia nilotica to the first project farmers in each area. As was expected, the demand for station fingerlings dropped as the private sector assumed the role of local fingerling distributors. Most stations are currently being operated as fish production centers, marketing their fish in the closest major city. While it is unlikely that these stations will operate at a profit (increasing labor, transport, and feed costs, coupled with an unavoidable low work output by the menial laborers) they are the best managed government stations I've seen anywhere. The emphasis is on basic fish culture (stocking, heavy fertilization and feeding, and routine harvesting) and production levels are generally quite high. Besides providing "hands-on" practical experiences to the station chefs, they have also been used quite successfully for farmer training workshops.

Training facilities (dormitory, dining area, laboratories, etc) have been constructed at the National Center at Gandajika. Training programs have been formulated and all of the PPF personnel (including office staff) have attended at least one traning program. The original project also called for training large numbers of Zairois extension agents to act as counterparts to PCV's, and eventually assume the PCV's responsibilities. Fortunately, this was never done. Rather than create an expensive, cumbersome, and relatively inefficient government infrastructure to provide technical assistance when Peace Corps "pulls out" of an area, what has been created instead is an effective, cost-free private infrastructure (farmers associations and public-spirited individual within those associations) to promote fish culture, produce fingerlings, and provide technical assistance to both new and existing farmers.

On a national level, the program is coordinated by Cit. Longonge, Director of PPF. It is doubtful that another man could be found that has his sincerity and interest in the program. When he joined me in Kasai Oriental, he went with me to visit several farmers' ponds. This is the first time a Director of fisheries has accompanied me to the field. He truly understands the program, his priorities use the work in the field, and he is doing an excellent job given the difficult circumstances.

The collaboration of GOZ (through PPF), Peace Corps and USAID on the Fish Pond Expansion Project is the most effective working arrangement on a

fish culture project that I've seen. Without the financial and technical support of AID it simply could not have happened. Peace Corps provides the skilled technicians that are the basis of the developmental plan, and PPF provides the coordination and official recognition necessary to make it work.

D). COST BENEFIT

Several cost-benefit analyses have been done recently and most show (on paper) that the project hasn't paid off - the total cumulative cost of the project is greater than the benefits of the fish produced. Not being an ag-economist I tend to disregard this exercise for several reasons:

1. The cost of the project has been significantly affected by the major capital investiment in the stations, particularly Gandajika, without a corresponding effect on fish production at the village level. Fish stations and training centers may be useful, but they are not essential to the development of a grass-roots industry.

2. In spite of the emphasis on record-keeping, not all project farmers record (or report) all of their production to the government. At the present time it is impossible to document the magnitude of the spread effect - fish farmers who learn from other farmers, and don't work directly with PCV's, or owners of authentic ponds who are beginning to practice some basic fish pond management.

3. More than one development project has shown a positive cost-benefit ratio, only to fold completely when the external funding stops. Our goal should not be short-term results to please people back home, but the development of an industry capable of survival and self-sustained growth. This will not happen in five years, but what I see in Zaire is the best start of any African country I've visited. There are the seeds of an industry growing in rural Zaire, and if the program continues to develop as it has thus far, Zaire will be a model for Africa. I see a time when fish culture will not only provide a significant portion of the protein to rural areas, but an acceptable alternative to urban migration to seek employment.

## III. REASONS FOR SUCCESS

There are some valuable lessons to be learned from Zaire. If we can understand why the program worked, and if Zaire is not a completely typical case, it should be possible to duplicate the success of the Zaire fish program in other african countries. Following are some of the reasons, as I see them, for the success of the program:

A). At least in some areas, people were pre-disposed to fish culture. They like tilapia, and fresh fish in general, having harvested and eaten the river fish for centuries. Although the colonial introduction of fish culture never caught on, many people at least knew what fish ponds were, and some maintained their authentic ponds to some extent. PCV's did not have to start from ground zero introducing a completely new crop.

B). Tilapia culture is ideal as a first form of intensive animal husbandry. Tilapia are extremely hardy, rarely dying from disease or mismanagement, and they reproduce in nearly every pond. Unlike chickens, which can die in a few hours if they don't have drinking water, tilapia can survive quite a bit of neglect (the first step in animal husbandry is merely keeping the stock alive, and tilapia are quite cooperative). Farmers have left their village on family business for weeks at a time, and returned to find not only that their fish survived, but had spawned. The risks are low.

Aside from the initial purchase of fingerlings, there is no actual capital needed to start fish farming. Ponds are dug by hand when labor is not needed for ocher crops, all management inputs are available locally (feed, organic fertilizer, and fingerlings for restocking) and even the fish are sold locally.

C). The Program started in an area of high potential, and there were solid criteria for PCV posting. Selection of the initial area, and individual posts within that region, was based on farmer interest in fish culture, high population density (to give a PCV enough work and to facilitate the "spread effect"), proper physical characteristics (soil, water, topography, feed and fertilizer availability), logistical support and lack of competition from other fish sources and other income generation activities. These criteria have proven valid. The program may have already expanded into most areas with reasonable potential, and further expansion at this time may yield disappointing results.

D). Overall, there has been excellent technical and logistical support of the PCV's in the field. Volunteers that aren't mobil can't work, and volunteers with little or no technical direction soon get "off-track", with every PCV promoting a different technical package and using a different extension approach. This, unfortunately, has been the case with many other Peace Corps Fisheries programs. The result is a chaotic program, frustraced PCV's, and little real progress toward the development of a fish culture industry. In Zaire there is a plan and direction, with capable leadership and supervision at several levels.

E). Volunteers set standards for "Project Ponds". While PCV's may start work with dozens of farmers, those that don't or can't meet the standards for quality work are dropped. Those that remain build high quality, model ponds that serve as a permanent example of proper construction.

Once these ponds are completed, and the first few harvests are seen, others rapidly copy the models and construct similar model, or "modern" 'ponds'.

The failure to set standards has been the major failure of other similar programs. Motivated by a sincere desire to help everyone that wants to raise fish, and emphasis on numbers as a measure of success, PCV's in these programs work with up to 50 or 100 farmers, most of which have a single authentic pond that they are trying to renovate or manage. The result is typically 50 to 100 low quality ponds that are generally unsuitable for intensive fish production. Unfortunately, these ponds then become the model for future construction in the area. Because of this approach, in some countries it is difficult to find even a single well-constructed pond.

F). Model farmers are produced. To be really successful, motivated and independant a farmer needs several ponds. This gives him a monthly income and the ability to provide his own (and surplus) fingerlings. By contrast, programs that are based on large numbers of one-pond farmers are probably doomed to failure. The reward of a single harvest every 6 to 12 months is rarely enough to motivate a farmer to care for his fish. Production falls even lower (due to lack of feeding) and large numbers of farmers give up. Those that remain (having only a single pond) are dependant on the government for fingerlings after each harvest. Most of these farmers also eventually give up because the government can't deliver fish to the thousands of scattered farmers when they need them.

G). Focus on management. While the mechanics of fish culture are very simple, and the risks considerably lower than with other forms of animal husbandry, the concepts are difficult to understand. The basic principle of stocking rate, feeding rate, growth and production are difficult enough for a farmer that has never raised an animal, let alone pH, oxygen cycle and fertilization to increase primary production.

The focus of the extension activities on management begins after the first pond is built and continued as long as there are project inputs to the post. The history of Bundundu has shown although farmers can come a long way in 6 or 8 years, they still have much to learn. While management at this point is good, by African standards, most farmers have not been in it long enough to really understand how or why it works. Those few that have really grasped the concepts typically produce 2-3 times more fish than their neighbors. We need to stay with the program long enough to see most farmers in this position - good farms, good management, high production and a thorough understanding of what's going on. This may mean a 10 to 20 year committment in a new area.

H). Development of a local infrastructure. One thing that the Zaire fish culture project has shown is that a massive government bureaucracy is not necessary for agriculture development to occur. From the start of the program in the early 1970's the focus has been on the individual farmer. As various agencies have given support to the program (AID, PPF, Oxfam). The focus has remained on the farmer, and how the program can best help him. By contrast, in programs in other countries "the tail wags the dog." The survival, growth and expansion of the government infrastructure becomes the goal of the project. No matter how large the infrastructure, there are never quite enough staff, or quite enough money, to get the job done.

Most of the services normally provided (or hopefully provided) by the public sector, are (in Bandundu Region) being provided by individual farmers and fish farmers associations, the local infrastructure. Fingerlings are being produced and distributed locally, experienced farmers advise new farmers on site selection, pond construction and management, and farmers meet regularly as a group to discuss management and problems they have. These groups formed successfully because there was no risk to the individual (they did not involve money as most co-ops do) and no cause for jealousy (there were not formed to received a cash or equipment subsidy which was fought over and divided). They were formed simply as a means to meet their individual needs for fish, encouragement, advice, and protection against theivery and extortion. The key is that they didn't form a group until they were already a group - PCV's begun using farmers as models and teachers, and numerous seminars, meetings and fields trips were held before there was ever talk of forming a group. Farmers got to know each other, and came to rely on one another for advice and assistance. A sense of trust and common cause developed. The result was a local private infrastrucure to take over many of the volunteer's responsibilities when the post was finally dropped.

I) <u>There was a long-term committment to individual posts.</u> Peace Corps began here with a general philosophy of "find a post with high potential, and keep volunteers there, and on track, until the farmers are independent". This has been expanded, and somewhat formalized into the "6 year model for post progression". Given that it's a model, and may be 4 years or 8 years depending on the post, I feel that its valid and probably has widespread application. The key point is that PCV input is eventually discontinued, not because the industry is fully developed and farmers no longer need further training, but because it becomes too frustrating for a new PCV with traditional training placed in a fairly advanced post. By this time the wave of construction is over, farmer associations have formed, and nearly all farmers are practicing (or talking) basic pond management. Farmers are somewhat "cocky" about their skill, and feel that they are teaching the PCV.

The fish culture expansion project in Zaire is breaking new ground. It is the first program in Africa to produce farmers with this level of expertise, so every thing that happens will be a first. The challenge is to duplicate the Bandundu story in the other regions, based on the proven approach, while promoting the continued growth and development of the industry in Bandundu, and other regions as they mature.coordination and official recognition necessary to make it work.

## IV. RECOMMENDATIONS

A). The Fish Culture Expansion project is the best example of a joint project I've seen. The present collaborative arrangement between USAID-Peace Corps-PPF should be maintained.

B). Based on the past success of the project, and the future potential, the project should be renewed for an additional ten year period.

C). The project should continue to stress quality rather than size. The present Peace Crops input of 60 PCV's should not be increased (for logistical reasons) and preferably stabilize at around 50 PCV's. It is unlikely that additional regions will be opened up in the near future, but new posts remain to be developed as PCV's are withdrawn from older posts in existing regions.

D). The present PPF staff (and occasional additions as deemed necessary) should be given the opportunity for further professional development in preparation for eventual withdrawal of U.S. personnel. This may include annual staff conferences to be held in different regions each year, in service training, various on-job experiences, and short trips to other African countries for review of programs or technical/managerial workshops.

E). The present regional stations should be maintained but additional stations or further expansions of existing stations is not necessary. The focus of work should remain basic, intensive fish production, the stations serving as permanent practical training facilities for the staff assigned there, or for new hires by PPF. The regional stations can be useful for farmer training workshops if the development of the infrastructure (dormitories, etc) can be kept to a minimum. It is unlikely that more than 6-8 short sessions would be held each year and this would not justify major capital investment.

F). It is unlikely that the National Training Center at Gandajika would ever be fully utilized for only fish culture training. It would be best utilized as a comprehensive agricultural training center with PPF accepting responsibility for the fish culture sector.

G). The National Center at Gandajika and the production station at Mudiba could conduct some applied research competable with their basic missions of fish production and training. Such research, however, needs to be well planned to be sure it does have application to the rural farmers at some point. The tendancy of fish culture research is toward the high technology on the impractical - this must be avoided. I would consider this a very low priority item in the near future.

H). The most challenging aspect of the program will be first seen in the Bandundu region. New approaches to extension education and technical assistance may be necessary in dealing with these "advanced farmers". Some possibilities include written materials, a quarterly newsletter from the PPF coordinator to the fish farmer associations, farmer training both at the regional station and in the village, radio shows, 3rd year PCV's assigned to older posts, new PCV's with specialized training in extension methods, regional extension agents and a mobile visual aids/extension education unit. The goal needs to be quality farmers with a thorough understanding of fish culture - farmers that will be the foundation of the industry capable of self-generated growth.

I). This is truly a model program, with potential widespread application. I would like to see small groups (including representatives of Peace Corps, AID and appropriate Ministry Officials) from other African countries tour Zaire with the intent of implementing a similar program.

ANNEX 2

EVALUATIC

## Economic Evaluation of Fishpond Culture - The Project Pisiculture Familiale Sustainability and Recommendations[1]


Summary:

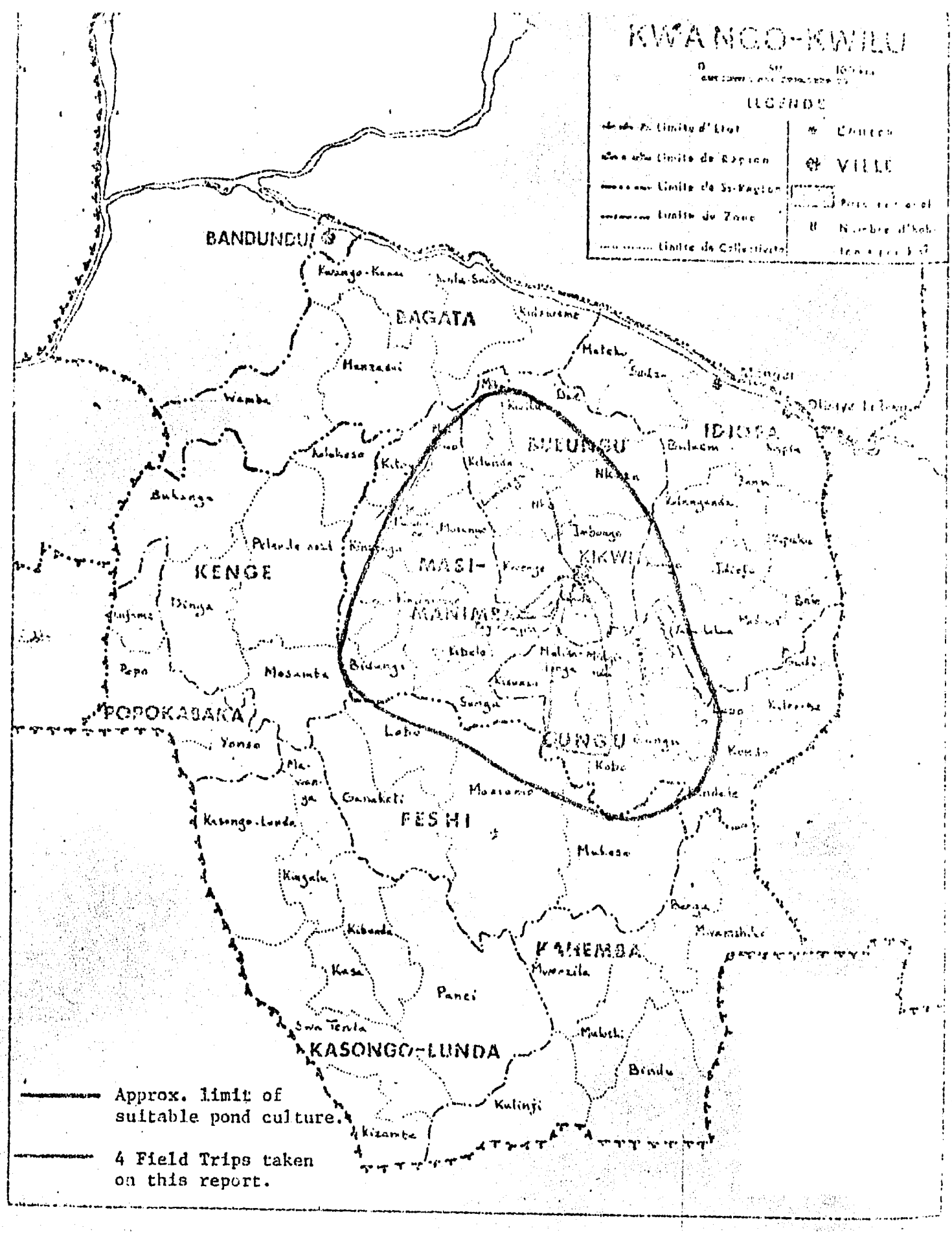
A small but growing fish pond sector has been brought into being (under project 660-0080) in Bandundu province since 1976; funded by AID and implemented by Peace Corps volunteers and the Project Pisiculture Familiale (PPF) (the host country agency). The evidence strongly suggests that the net number of producers are growing, that they are covering long-run average costs and that room remains for continued expansion. There is every reason to be optimistic the technology will survive an eventual PCV withdrawal. Demand for fish continues to remain unsatiated. On the other hand, many producers follow less efficient practices than those introduced by Peace Corps extension and these persons represent a very large segment of secondary adaptors, one who have copied established producers but who have not grasped the full range of necessary practices. They are likely the majority.

In four areas producers have banded together, crossing family, clan, village and even (in one case) tribal lines, to form associations. These groupings are beginning to plan an extension role, provide for mutual support and represent a front to authority where their interests are affected. For the first time it is paying farmers to be socially minded.

The project now covers about 2/3 of the potential pond areas in the province (defined as technically suitable land in areas where the population density exceeds fifty persons per square kilometer). Within five or so years the remaining 1/3 will have been reached. (See Map 1).

As the number of possible new entrants decline, and skills as a whole improve, there will be much less need for the intensive one-on-one extension effort made hitherto. It is recommended that : (a) a reduced number of PCV be retained in the province and these concentrated at the Nzinda training and demonstration center (Kikwit); (b) those persons provide training on a selective basis through the associations; (c) the training center be used to, (i) provide short-term seminars and demonstrations to trainees brought in from associations and (ii) train GOZ extension persons seconded to work with the project; (d) site the GOZ trainers, no more than a dozen, with the associations, where they can operate local demonstrations and do limited extension. Also they can provide a link in the feedback chain from farmer to center; and, finally (e) the terms of GOZ staff secondment to the project should include, (i) provision to allow the agent to be returned if unsuccessful and (ii) individual agents be able to keep the earnings from the demonstration pond(s) as an incentive in addition to regular salary.


[1] The farm level information used in the preparation of this report was gathered in the course of a seven day field trip to Bandundu (Kikwit region), March 1984, during which time three farmer associations and one cooperative, including 75 farmers, were interviewed. An individual profile was prepared for each farmer.



Benefits from the project include: (a) considerable extra protein in local diets, and this sufficiently divisible that even the poorest get a share; (b) capital formation among farmers, in the form of additional pools and investments, generated from the fish, in other productive activities and (c) gainfull employment where many had none or little. Beneficiaries are from the farmer class and the urban dwellers in Kikwit and smaller towns. By any standards these are among the very poor.

I. The Extension Program:

The principle implementation vehicle for this project remains the Peace Corps volunteer functioning as an extension agent. Taken as a group they have been very effective.

To be effective, an extension agent must be highly motivated, well-trained technically and logistically supported, have adequate transport, be highly focused and regularly paid. Few, if any, extension services anywhere fully satisfy all these criteria. The Peace Crops volunteer used as an extension agent, however, comes close to the ideal. Additionally, in the case of theis project PCV have worked on a one-to-one basis with farmers who have themselves approached a volunteer seeking assistance. Remaining two or even three years at a particular site, and frequently being followed by one or more volunteers, PCV have given a core of farmers intensive training in fish culture management for an unusually long period by normal extension standards. At the end of a PCV's tour he/she is usually working with about 30 farmers.

The typical pattern has been to let the farmers make their interest known to the volunteer who then provides direction as to siting and construction. If and when the pond is successfully completed by the farmer, an indication of committment, the volunteer assists in stocking and teaches pond management: composting, harvesting, etc. The farmer has done the work himself subject to close guidance. Once established, farmers have typically gone on to add more ponds, building upon their original stock, to reach as many as seven or even nine ponds, in some cases earning several thousand zaires annually from them. Farmers have subsequently played an extension role themselves, providing knowledge and stock to newcomers.

In at least three cases the volunteers have acted as midwives to the establishment of farmer associations which are now taking on an extension role in addition to representing the interests of pond operators in communities and the province at large. In a fourth example, a master farmer has taken the lead and grouped farmers from four neighboring tribes into an association which is now in the process of applying for status as a cooperative (each member has contributed Z650 toward the necessary Z26,000. Farmers traditionally operate as individuals, and normally ignore wider social consequences of their activities. This has been a particular problem in Africa where allegiances rarely include persons not in some manner related. To engage in linkages beyond a village is almost unheard of. Nevertheless in the case of Bandundu fishermen, common interest in a new technology and the need to present a united front with respect to social pressures of various sorts (extortion, envy, theft ect) has caused farmers for the first time to become socially minded.

Under the original program use of GOZ extension personnel, was planned trained at one of the three sites refurbished under the project. For a number of reasons qualified persons did not become available and PCV assumed the ertire burden. It is clear the GOZ personnel satisfied few if any of the above criteria. Poorly trained and supported, having no transport, infrequently and inadequately paid, their motivation and capability is well below the intensity required. These limitations persist and must be taken into account in any plan which presumes to make use of the GOZ cadre.

By way of illustration it is useful to consider the world as viewed by a GOZ moniteur or agronome (the functional extension corps). He (as it usually is) is likely to have a sixth grade education leavened by some technical training. His job includes animation rurale, imposition of mandatory crops upon farmers, crop reporting, technical assistance, in some cases tax collection, and actions 'pour encourager les autres' (as it was described to me). Not only is his mission diffuse, it is from the farmers point of view regulatory and even punitive. Each agent follows a circuit, on foot, which allows him to visit a particular village 2-3 days every two months. The farthest village may be 40 km from his home base. Salaries are often 4-5 months in arrears. If a GOZ extension person is to function in some manner in imitation of a PCV the style of operation, in its every aspect, must be radically changed.

## II. Technology:

Fish pond culture is a form of animal husbandry, although a simple one. Part of the appeal of this project lies in the essential simplicity of the technology and its extreme tolerance of inexperienced often careless management. Fish culture is an ideal first husbandry activity for people having no experience in animal management, which is the case in Bandundu. A second and equally important virtue is its independence from costly purchased inputs, such as feed, housing, equipment, etc. Thus it is ideal for very poor farmers.

It is worthwhile to note in passing that poultry, which is often attempted as an income and protein supplement activity with small farmers, commonly fails precisely because it is demanding of good management and is costly.

Fish pond culture has been known in Bandundu for forty years. The Belgians required that small ponds be built and stocked to enhance family diets. Often shallow, weakly built and almost totally unmanaged with almost no inputs, these little ponds can produce 1-2 kg per are every six months.[2] Thousands survive today and more of the kind are built all the time. Although not the basis for an industry the ponds did serve to make pond fish a familiar item and the concept of confined fish well-known.

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[2] The traditional Belgian land measure, the are, is used in Zaire.

1 are = $100m^2$
1 hectare = 100 ares.

The AID-promoted project has introduced a pond culture with real commercial potential within reach of all, the levels of production being entirely a function of individual effort. If the owner, on the one hand, opts to put in little or no food he will still gather a harvest in six months time of up to 4 kg per are. If on the other hand, he feeds intensively, 15 kg can be easily obtained. Yields of up to 25 kg are possible for the serious manager.

Our survey of 75 operators revealed that none had any difficulty building a pond due to lack of land, labor, tools or cash. In fact, almost no cash is usually required at all. Land is selected in a forested watered valley with suitable soil. The heavy cover must be removed (which can take up to 4-5 man months, and is consequently an important indicator of seriousness of intent). The pond is then dug and may be of any size, (this in part reflects the elastic interpretation of a meter, which is variously guessed to be knee, hip or shoulder high in distance. One man can move 1.5 to 2 cubic meters of earth an hour, so that a pond one are square needs about 50 hours work. Repondents reported the work did not conflict with any other activity and that they would have otherwise been unengaged. The marginal physical product of labor is consequently relatively high, but its interest price low. Land is essentially free. Tools, are for the most part, included in a farms' normal equipage.

Stocking of the first pond requires purchased fingerlings. If all goes well the operator may never buy more fish, natural reproduction replacing harvested stock. The recommended stocking rate under the project is one fish per square meter, so an are takes 100 fish. This number of fingerlings will produce 5,000 little fish in six months, at which time the pond is drained and the adults harvested. It is important to note, by way of contrast with other confined animal cultures, that pond fish experience little or no loss to disease, indeed, the fish variety which is used exclusively by project and Bandundu farms (tilapia nilotica), is remarkably hardy.

All producers follow more or less the same technology. Nevertheless considerable variation has been found among producers with respect to the efficiency with which they apply technology. This seems to be particularly evident between farmers who learnt their trade from a PCV and those who learned under less structured circumstances. Although all producers use the same fish, and tend towards the same stocking intensity, critical differences exist between the two groups. These include site location, quality of site preparation, size of pond and quality of composting.

Typically the poorer producers, usually those not trained by a PCV, build small weakly structured ponds, which are over stocked for their size (and consequently yield stunted fish), poorly located and under-supplied with food. There remains therefore considerable scope for higly focused extension aimed at improving this groups' practices.

The associations on their own may close the gap in considerable measure. Their monthly meetings are held at different members pond sites, during which a critique is held and recommendations are made. Members subsequently report on their individual progress in implementing recommendations.

Close coordination betwen the Nzendi training center, extension persons, associations and farmers should be able to identify particular problems and work out training and other technical actions to cope.

## III. Economics

The economics of pool culture fisheries are those of any small-scale enterprise. Farmers must in the long-run cover their average costs to stay in business.

An interesting dimension exists in that almost all of the costs must be imputed by the operator their being almost no monetized out-of-pocket expenditures. In the long-run, each producer must determine whether the effort made to produce fish is worth the value of returns, both self-consumed and sold. It is a difficult largely subjective calculation with few points of reference until some experience is accumulated[3].

Tools are part of the basic endowment of any farm, although wheel barrows are much in demand and are scarce. Adequate land is sufficiently abundant that no farmer has reported any difficulty finding a suitable piece vacant. This happy condition may well change in future years as vigorous population growth makes itself felt. Male labor has a very low opportunity cost and is under if not un-employed much of the year. Fish food does not compete with human needs.

The scale of operation can be expanded and contracted easily. In the last instance simply not managing a pond reduces imputed variable costs to zero for the remaining life of the stock in the water. Indeed many small ponds are kept as a form protein savings account, untended, and only harvested when particular need arises.

All this implies that the present physical plant could go on yielding fish for years even were all management withdrawn. Conversely, when extra production is needed the farmer need only intensify feeding and perhaps restock where the existing fish are in poor condition.

[3] Were a statistical cost function to be calculated, it could doubtless have huge standard deviation, reflecting inexperience.

Farmers report their greatest single problem, and most critical risk, to be theft[4]. It is reported that more than a few producers have been forced out of intensive production because of persistent and serious losses from theft. Often whole ponds are drained and their fish taken just before harvest. Almost all producers report some losses of this sort[4].

Whereas the effect on farmers is economic it is not clear the cause of theft is in every case economic. Envy may play an equal role with greed. Traditional societies, which have a great deal of close face-to-face contact among members are often very sensitive to changes in accepted norms and status. A fish pond, relatively speaking, represents a considerable increase in productive capacity and therefor wealth and status. It is by no means rare that owners may be attacked, often indirectly through vandalism and theft, to restore a status quo. In the African context mutterings of witchcraft may be added, with the implication that success has a supernatural even malevolent dimension.

More conventionally, a pond represents a stock of wealth which is often left unguarded, it being at some remove from the home compound (usually on a ridge above the valley-sited ponds). Farmers sometimes post guards, who themselves are not above temptation. Theft does not appear to be viewed as an anti-social act in this society, or, alternatively, what we view to be theft may be perceived to be a form of redistribution which does have traditional sanction. Unauthorized redistribution was controlled traditionally through supernatural rather than human agencies. Usually a fetish (a form of magical scarecrow) was posted in a conspicuous spot as a warning. Unfortunately, as beliefs have changed the power of the fetish to inspire fear has waned, but society has not yet devised compensating control methods. The well-entrenched traditional free-loading on the part of family members (or the needy) compounds the problem. An unclear line separates a gift and helping ones self. Consequently theft may well be done by ones relatives: brothers, sons, in-laws. Determined resistance by an owner against claimants is viewed as anti-social and can incite threats of poisoning or witchcraft. Even when caught in the act, the traditional local authority, the village chieftan, may be reluctant to apply sanctions.

Pond operators have found theft a critical problem with no easy solution. The associations may provide an answer. One of these has adapted the practice of watching members pools. When a thief is caught the entire membership does to the appropriate chief en mass to demand punitive action, asking retribution in the form of two goats and sometimes labor from the culprit (a goat is worth about Z500, the two being equivalent in value to the worth of stock in a typical pond). In five recent cases the thief has been compelled to pay.

On the income side, money plays a larger role. Rural people are protein starved. Wild game has been largely exterminated and animal husbandry is not widely practiced. River fish are highly valued but are unavailable in areas remote from water. Salted, dried and recently frozen fish are sold, but not in sufficient quantities to satisfy demand.

Given the choice, the market prefers fresh, dried and frozen in declining order of preference. Prices vary narrowly among these as there are no alternative meats available. The market will take any quantity presently offered. Fish in fact reach a wide spectrum of consumers being divided into smaller slices depending upon the needs of the market.

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4 With proper engineering flood is not a problem. Neither is fish disease.

There is some spatial variation in price, whereby farmers considerably removed from Kikwit charge Z10-15 less per kg for fish than in the city, (prices for fresh fish range from Z30-45) and this margin for transport is passed on to the consumer. In town fresh fish must compete with frozen mackerel brought up from the coast which sell for Z30/kg in places where cold boxes permit their commercialization. Traders must of course sell fresh fish quickly, the product being highly perishable and prices do tumble when a seller looks particularly vulnerable. Some producers have dried fish and one even smokes them, but competition is not yet sufficiently keen to make this a necessary tactic to move produce.

There is great commercial demand for fish; no cultural prohibitions seem operative. An exception, however, does exist where consumers fear manuer has been used as feed. A strong sentiment, if not taboo, is felt by consumers in this regard. Unlike southeast Asia it is presently impossible to use human waste as an input to confined fish. Use of animal waste, however, poultry and swine, for example can be attempted. In one recent case, a farm in an area which had not previously had pond culture, was unable to sell fish because would-be consumers knew that the stock had been fed animal waste. The farmer used the unsold fish to prepare a free public fish meal. Villagers had no qualms about trying a free good. Having discovered the taste was what they expected consumers were surprised to subsequently learn this was the pond fish which they had not bought. Their concern, appears to be one of effect upon flavour rather than uncleanliness, which was demonstrated not to be affected. We understand pondside sales are now increasing.

Pond culture appears to be a male preserve, at least in this region. No female operators were encountered, and their contribution may be limited to assisting in feeding and harvest. This could reflect the widespread unemployment of males compared to females, or fishing may be perceived to fall into the category of provision of meat, a traditional male preserve. If women now have higher productivity individually than men, being engaged in a variety of crop related activities, then it socially desirable for the underutilized men to be brought into productive activity.

Revenues from a pond can be, by rural standards, substantial. One operator, who gets 15 kg per are per harvest and sells at Z25/kg was able to realize Z 7500 last year from his 10 are farm ponds. In terms of cash this is almost all net margin and represents a very good return to management if opportunity costs to factors are very low or zero.

Operators were asked what they did with their earnings. Older, better established persons, financed school fees, bought medicine and then invested in capital formation; cattle, goats, paddy and additional ponds. The younger ones (who have preschoolage children) tend to buy consumer goods, clothes and radios, and trips to Kinshasa.

Fish pond culture has allowed otherwise unused land and unemployed labor to become productive. The principal barrier to entry seems to be only the willingness to make the physical effort to clear the land and dig the pond. With little additional effort a family can be fed animal protein on a regular basis. Where more sustained management is applied, and where theft can be kept within tolerable limits, a farmer can feed his family well and earn hundreds perhaps several thousand zaires annually. And this can be done with little extension effort once the basics of pool management have been mastered.

IV. Sustainability:

As a consequence of intensive extension efforts by Peace Corps in an area 200 km radius of Kikwit over seven years, in excess of a thousand farmers have been exposed to and trained in fish pond culture. Given the acute and growing shortage of protein, as traditional alternatives have disappeared, and given the relative ease and low risk of adopting fish technology any farmer can enter the business if prepared to make the initial effort with reasonable xpectations of success. Benefits are spread broadly among producers and consumers, and a pond can affect persons 10-15 km away,providing a continuing stream of cheap protein at a price, most can afford.

In isolated cases extreme theft has caused persons to either drop out or sharply reduce their activities. On the whole, however, producers seem to be continuing to operate their ponds and even expanding. The evidence in hand suggests that producers can be divided into two groups, those who learnt their trade first hand from a PCV and secondary adaptors. Average productivity varies between the two groups due to differing quality management. There is no technical constraint present which limits entry. And no purchased input, such as feed, whose shortage or price can directly affect production. Indeed the industry is remarkably buffered from fluctuations in the national economy. For all these reasons there seems every reason for confidence that pond culture will continue to expand, likely at a declining rate as the more densely populated areas are covered, for some time to come. And this with possibly less extension input.

Nevertheless, there remains considerable scope for improvements in production efficiency through selected extension action. Targeted extension can: a) increase total production and productivity in pond culture, b) increase the rate of capital formation among farmers both in pond culture and other on-farm enterprises and c) increase the marketable surplus of fish.

Extension can first of all narrow the difference between the two groups of adaptors, upgrading those farmers who learnt their technology second hand. And extension can help provide continuing technical critique and insights valuable to all producers.

Pond culture, a basic and simple form of animal husbandry, can be base upon which complementary enterprises can be developed, linking other confined species with ponds through use of by-products, symbiotic cultures (fish and paddy etc) or the use of pond sludge for high value crops, such as vegetables. Any or all of these are potential techniques, but all require adaptive research, demonstration, selective on farm trial and finally supervised extension.

The evidence outlined above argues that what has been established can sustain itself on both technical and economic grounds, that is to say the enterprise is typically profitable for farmers to engage themselves. Selective extension can improve it, and continued support based upon the regional fish center can broaden the potential latent in the technology.

V. Profitablilty:

The time allowed for this evaluation did not permit farm-level figures for production and costs to be gathered, thus partial budgets cannot be prepared to measure the profitability of individual enterprises. We assume that farmers over time are able to judge whether returns justify effort and ,

if so, average costs are being covered. It has been shown that virtually all costs are implicit, no purchased inputs being used that require out-of-pocket expenditures. The steady expansion of established enterprises and entry of new firms into the business is testimony that producers perceive profitability. The industry can be said to be justified from the point of view of the private investor.

Analysis normally includes consideration of public or social returns as well. In this case, where so little, not to say no, hard information is in hand, and assumptions can only be advanced cautiously, no economic rate of return can be produced. At least six assumptions would have to be made, all susceptable to serious challange: number of producers, scale of operation, size of yield, rate of spread, price, inflation etc.

It is possible, however, to attempt a crude benefit/cost analysis. Once again a number of strong assumptions are required[5]. These include:

a) 500 tons of fish will be produced by all producers annually from the fifth year. During the first two years 200 tons were harvested annually and 250 during the following three. PC records suggest that about 300 are currently being harvested, but this includes only farmers with whom PCV have worked. We add 200 to account for the secondary producers who typically are believed to produce at half the level. Given that PC trained producers rarely produce more than 100 kgs on their ponds annually, this production will require perhaps 5000 pond operators.

b) A price of one US dollar (Z30=1US $)will be charged per kilo of fish. Prices currently range from Z25 up to Z 50. Given the trend in production and the essential poverty of the public (it is unlikely per capita incomes in rural Zaire are much above $100 annually) it is likely the local market will be saturated in five more years. When fish are bid, consumers have purchased at Z45-50. Frozen fish, the nearest alternative, sell at a fixed price of Z30. We do not know at what point falling returns will reach the point where labor is indifferent between work and leisure, so we will use the price of the best alternative, as our only sure point of reference.

c)The cost of the project is $1,000,000 annually for five years, Four-fifths of which is PC input.

d) We use a discount rate of 25%, the current opportunity cost of freely lent capital in Zaire.

Using the above assumptions, a benefit/cost ratio of 39% is produced, well below the break-even point of unity (see Table I). In other words, at this discount rate the value of return is less than the value of investment. To reach unity, using this rate, as much as 1500 tons would have to produced annually, by as many as 15000 operators. An industry of this magnetude is not feasable for some time to come.

This low return must be interpreted cautiously. For one thing, no secondary benefits are included; the value of extra nutrition, the value to

[5] The production estimate is for Bandundu, with Kasais and Bas Zaire, being the areas affected by this project.

the rural production system of having a more modern enterprise added to it, the value to rural development of the presence of the new farmers associations, and the ultimate value of the improved training-extension system which will derive from the training centers built under the project. The primary benefit, fish production, certainly understates the case.

The figure does, on the other hand, underscore the relatively large cost of intensive extension, and signals that this approach is costly and has limited application for this reason. It is limited in the sense that by its very nature highly qualified persons restrict their work to a few chosen beneficiaries. Viewed at large, the intensive extension method can have few applications and these must be selected with care. From AIDs point of view, PC is additive, and its own contribution, less than a million dollars, is well spent. Peace corps is by definition an extension methodology, and has limited opportunities for suitable application. It may well be that fish pond culture is the best or one of the best possibilities available for a highly intensive extension activity.

VI Recommendations:

The central issue at stake is the need for a continuing PC presence and if so for how long? Linked with this question is that of the need for trained local persons; are they needed, how many, at what level of training and how managed? Finally, what role can the training centers now being brought into being under the project play in support of such extension as may survive and the numerous and widely dispersed pond operators?

The large Peace Corps presence can be reduced over time but not completely eliminated. Peace Corps maintains 17 corpsmen at 18 collectivites in Kikwit region. These persons support farmers in about two-thirds of the area suitable for fish culture. Over the next five years it is hoped that the last third will be covered and that support in areas which have been serviced the longest can be gradually phased out.

With the growth in numbers and strength of the farmer associations, which are beginning to take up part of the extension responsibility themselves, particularly in regards to new producers, the nature of the extension service is changing. PCVs are deliberately standing back and letting the associations take the lead. What is needed, and will continue to be needed, is a stream of highly focused technical support, in response to particular problems, rather than support across the board, which has been the case hitherto.

Furthermore, the training centers are coming into being. When fully in place they will be able to provide a multiple support role; demonstration, training and retraining of agents, farmer seminars, applied research (where new techniques are tried under local conditions) and monitoring of farmer needs in general. If and when a farm radio capability comes into being, these centers can provide an invaluable link between farmers and persons preparing programs relevant to current farmer needs and concerns.

Finally, it is highly desirable that a cadre of trained Zairois personnel come into being to supplement the remaining PCV in the area. It is very unlikely, indeed certain, they cannot replace or in any large degree imitate the sort of extension program undertaken by PC. They lack the necessary

training, support, narrow focus, to name a few of the more obvious differences. However, if PCV are available to provide technical support, and the center is present to provide ongoing training, and the associations are in place, then local extension persons specifically assigned to the project could become in time effective.

Recommendations:

1. That within five years, if not sooner (depending upon rate of expansion, ability of the associations to supplement PCV etc) the PCV presence in Kikwit be reduced by at least a half. And this rump be concentrated at the fishery center, but linked to the associations with which the PCV will work directly and indirectly through Zairois (see 3 below).

2. That a program of seminars be brought into being at the center, the curriculum identified jointly by the associations and PC extension to reflect current farmer needs, and selected farmers participate in these courses. Courses could be two to three days in length.

3. That selected Zairois extension persons (agronoms and moniteurs) be seconded from their home service for periods of one to two years, renewable depending upon individual performance, to work with the station-based regional service in support of fishpond farmers. These will be retrained in a series of highly-focused problem-oriented short-courses at the center and then located with the associations, likely on a one-to-one basis. At their sites, they will develope demonstration fish ponds the revenues from which they can keep as a supplement to their salaries. The ponds will additionally be used to site adaptive research and other trials under local conditions. Reviewed annually, agents who perform poorly will be returned to their home service. They will work under the direct supervision of a PCV based at the center.

4. The extension-PCV-center chain will provide a feedback loop for information among farmer, extension service planning and farm information services.

5. That, over time, additional technologies will be developed and introduced building upon pond culture to broaden animal husbandry and introduce new enterprises. These may include ducks, swine (linked to ponds through use of manure), paddy-fish, use of pond sludge for high value crops, intensive poultry, where feed is available etc. PCV can take a leading role in developing model adaptive research and demonstration projects using the center and association-based outreach network.

6. That, in the long run, associations be sensitized in the need to identify, articulate and work to support farmer needs. This includes a broader understanding of rules, laws, taxes, etc as these impinge upon farmer activities. They could also be a vehicle through which more sophisticated farm management methods could be introduced, basic record keeping and interpretation for example. And they could become an important source of farm level information directed upwards. Finally, in selected cases they could provide the nexus for real farm-based cooperatives. In all these activities a continued, highly focused but limited (in number) Peace Corps presence would be extremely useful.

TABLE 1

COST/BENEFIT OF THE FISH POND PROJECT

DISCOUNTED AT 25%

| YEAR | COST | TONS$ | NET BEN | DISC% | DIS NETBENDIS | BEN | DIS COST |
|---|---|---|---|---|---|---|---|
| 1 | 1000000 | 200000 | -800000 | .8 | -640000 | 160000 | 800000 |
| 2 | 1000000 | 200000 | -800000 | .64 | -512000 | 128000 | 640000 |
| 3 | 1000000 | 250000 | -750000 | .512 | -384000 | 128000 | 512000 |
| 4 | 1000000 | 250000 | -750000 | .409 | -306750 | 102250 | 409000 |
| 5 | 1000000 | 250000 | -750000 | .327 | -245250 | 81750 | 327000 |
| 6 | 0 | 500000 | 500000 | .262 | 131000 | 131000 | 0 |
| 7 | 0 | 500000 | 500000 | .209 | 104500 | 104500 | 0 |
| 8 | 0 | 500000 | 500000 | .167 | 83500 | 83500 | 0 |
| 9 | 0 | 500000 | 500000 | .134 | 67000 | 67000 | 0 |
| 10 | 0 | 500000 | 500000 | .107 | 53500 | 53500 | 0 |
| | | | | | -1648500 | 1039500 | 2688000 |

$$B/C = \frac{1039500}{2688000} = 39$$

ANNEX 3

April 11, 1988

Brian Steinmund, AFGD/Fish, Peace Corps/Zaire.

Fisheries Program Evaluation.

All sector heads, USAID/Zaire.

I have been asked to comment on the recommendations stated by Mr. Martin Billings' Economic Evaluation of Fishpont Culture - The Project Pisciculture Familiale Sustainability and Recommendations.

Enclosed, please find my comments on his recommendations. Be it positive or negative, these should be considered the final word on what Peace Corps feels it can implement and work with. His recommendations are listed one through six, and I shall follow this format here.

1. I believe that Mr. Billings is referring to the region of Bandundu and not Kikwit as mentioned. We will in fact be reducing the number of volunteers within the region, but I would hate to put a time frame down or quantify it at this moment. It should be sufficient to say that gradually numbers will be reduced as the need arises. We should allow sufficient time to study the flow and progress of each individual post and then implement the withdrawal at the most opportune time. As for concentrating remaining volunteers at the fishery center, this would not serve our purposes. With the long term approach that we have been using it will always be necessary to have some personnel out in the interior. This could take various forms but what is envisioned now would be a more mobile volunteer covering a rather large area. The focus would be to maintain contacts with viable fish societies and to assist in the creation of others. An important role here would be to encourage people to continue to work together and at the same time, be able to present them with a better extension package than we have been able to do in the past. This will consist of the visual aids that are currently being developed. The focus will shift from having a large number of volunteers working one on one with numerous farmers to a smaller more mobile number of volunteers working principally with groups. We will concentrate on record keeping, management and group organization vs site selections and construction.

Experience has shown that not much volunteer satisfaction is achieved by working at stations. I envision the possibility of keeping a volunteer at the training center for as long as the training option remains a viable one. In addition, it will be necessary to have a small number of volunteers out in the villages. By 1990, it should be possible to make this transition complete. By this time, volunteer numbers could be as low as 5 or 6.

2. This is essential and is one of our main priorities. It will take some time to create the infrastructure but it shall be done.

3. A very unrealistic suggestion at this time. As mentioned on page 2, paragraph 2 of his report, the inherent motivation factors found in Zaire still exist or as the case might be, not exist. In place of people that he recommends, these types of roles can be more effectively filled by a PCV, Regional coordinator or a regional extension agent, or any combination of the above. It might be worth our effort however to try on a very limited scale to train a few existing agronomes in modern fish culture techniques and see what results, if any, are produced. This could be especially

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beneficial in areas where we are not represented. The suggestion of having these people have "demonstration" fish ponds as revenue sources is completely unrealistic. Who will donate the land, who will do the construction, if this person is to have a full time job working and training with the groups, who will manage the fish ponds? Besides that, the fact remains that there would already be numerous examples of good fish ponds - those of the farmers themselves! If any new techniques arise as a result of research efforts, it is the farmers themselves who should do the experimentation. They have done very well up to now by trial and error, cause and effect. Let it continue that way.

4. I am not real sure of what it is that he is saying here. Yes, the macro picture of extension, group organization and training, seminars, formal training sessions and a system of continued encouragement must continue. All aspects must be incorporated into a viable working package in order to be able to continue and enhance information exchange. This will be a responsibility of project planners and not any individual PCV.

5. This has traditionally been a component of all fish PCVs training. While in Bukavu, each volunteer is introduced to and has hands on experience with agriculture and animal husbandry. Each volunteer is encouraged to get involved with and train farmers in those fields. However, it would be a serious mistake to try and institutionalize that integration. It took years of very intensive effort to get farmers to the point where they are raising fish as successfully as they are; to try and broaden their activities with other schemes would be asking too much and one would always run the risk of having over extended farmers with nothing working as well as it should be. Not every farmer has the interest or potential to do the types of things Mr. Billings mentions. One should look at the history of agricultural development in the U.S. Not every farmer diversifies. The large majority of them pick one crop to capitalize on and that remains their major endeavor. In the States, you see Catfish farmers of America, Trout farmers, cattle mans associations, cotton, soy, corn and other crop movements. Few of the U.S. farmers get extended to the degree that Mr. Billings requests. We should not ask the farmers of Zaire to expand either. Many of them have no interest to work with those other animals. They have found something that appeals to them and it is that that we should concentrate on. The fish job is not yet complete, much remains to be done. To dilute our efforts now by trying to introduce something new would be a horrendous mistake. Let's stay on track. Let's complete the job that has been started. Peace Corps will continue to train and give experience to volunteers in other technologies but the main focus must remain fish. The farmers are not yet ready to get involved with other activities. Another way to approach this subject would be to try and incorporate some of these ideas into the training module at the regional training centers. If the space, money and personnel were available at these centers, perhaps this would be a more appropriate place to talk with farmers about agricultural integration. It should not be done at the pond bank at this time. First let them be a success in raising fish before getting them to try something different.

6. No problem here. In the long run this will remain as one of our major focuses. Some of the more sophisticated farm management methods will have to wait until a better infrastructure exists in rural Zaire ie, a better stock of tilapia, or balanced feeds or the use of lime or chemical fertilizers, but these methods have been indentified and will remain a priority until the time is right for their inclusion to the program.

Amongst all the possible reasons for the success of this program, the one that stands out is the intense concentration of focus on one area - fish. This is what Peace Corps will commit itself to as long as existing cooperation continues. We have achieved a lot but the job is not yet complete. There is no "phase II", just a continuation of phase I. We are on track, dealing with something that works. Let's not lose sight of that. As the U.S. government said after entering Granada - "you don't argue with success".

ANNEX 4

ANNEX 4

Participating in the evaluation of the Fish Culture Expansion Project, conducted during March and April, 1984, were:

Mr. Martin Billings, Agricultural Economist, REDSO/WCA

Mr. Les Torrens, Technical Consultant, University of Arkansas/Pine Bluff

Citoyen Longonge, Project Director, PPF (GOZ)

Mr. David Atteberry, Project Officer, USAID/Zaire

Mr. Brian Steinwand, Associate Peace Corps Director, Fish Culture, Peace Corps/Zaire

Mr. Gorden Mengel, Technical Consultant, Department of Agriculture, GOZ

ANNEX 5

## Scope of Work for Dr. Les Torrens

The contractor will serve as technical consultant for the evaluation of the Fish Culture Expansion Project (660-0080). The contractor's primary responsibility will be to assist the evaluation team in its examination of the prospects for sustainability of project-initiated activities after the scheduled termination of USAID participation (PACD). In cooperation with the evaluation team, and under the immediate supervision of the team leader, the contractor will draw upon his professional training and experience to assess the following:

- The quality and appropiateness of the fish culture techniques promoted by the project.

- The quality and viability of extension services (Peace Corps and GOZ) provided under the project.

- Project personnel (numbers, training, experience, leadership and motivation).

- Project organization (charters, disposition and relationships of personnel, relations to other organizations).

- Financing (sources, adequacy, reliability).

- Progress towards the attainment of the End-of-Project-Status indicators and conditions.

- The continuing validity of assumptions upon which project success was initially predicated.

- Progress towards the achievement of planned outputs.

- The provision of programmed inputs by each participating agency.

In addition, and of particular importance, the contractor will undertake a comparative assessment of the Fish Culture Expansion Project, based upon his experience with similar programs, in other African countries.

The contractor will review the evaluation report prepared by Martin Billings, and will comment on Mr. Billings' findings and recommendations.

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The contractor will travel to field sites as necessary, while using existing information to the extent possible. The contractor will perform the indicated tasks over a period of no more than 20 work days, and will participate in the preparation of a final draft evaluation report, to be submitted to USAID before the contractor's departure. This report will include recommendations for any indicated redesign to better attain project objectives. The contractor will render to the evaluation team leader a written report, in English, specifically addressing the items enumerated above, as well as any others which, in his professional judgement, may be appropiate for inclusion.

# SCOPE OF WORK - ECONOMIC ANALYSIS

## FISH CULTURE EXPANSION PROJECT - EVALUATION 660-0080

I. BACKGROUND. This project was designed in 1978 and approved for AID funding in August of that year. The project is a joint GOZ-Peace Corps-AID endeavor to increase the level, availability, and nutritional value of food production for the low income majority in Zaire. In 1981 the project was extended for three years following an evaluation of the original project. The present purpose of the project is to establish a fish culture extension program, oriented toward village cultivators, in five regions of Zaire (Bas-Zaire, Bandundu, Kasai-Occidental, Kasai-Oriental and Kinshasa).

II. THE PROJECT. The project is designed to achieve the following objectives:

A. To establish a research and training capability at the Gandajika national fish culture training station.

B. To establish and operate five fingerling production centers.

C. To create a system of fish culture extension including the training, equipping, and deployment of Zairian field extension agents.

D.

The GOZ's contribution to the project includes facilities, construction, transportation, staffing, training, and materials. The Peace Corps contributes volunteers to work at field sites and USAID provides funding for technical assistance, vehicles, equipment, & training costs.

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## III. THE EVALUATION

A. METHODOLOGY. This is the second formal evaluation of the project. The evaluation will be conducted by a team composed of representatives of the participating agencies (GOZ, Peace Corps and AID) as well as one consulting U/S/ fish specialist and one representative (an economist) of AID's regional office (REDSO) in Abidjan. The USAID Project Officer will be the team leader and will be responsible for compiling the draft evaluation report. The evaluation team will visit the training center at Gandajika as well as selected project activity sites in other regions as time and logistical support permit. Knowledgeable personnel associated with the project at Kinshasa, Gandajika, and field sites will be consulted as will participating farmers and consumers of project-fostered production. The evaluation will be conducted during February and March, 1984.

B. EVALUATION REPORT. The evaluation report will be developed jointly by the team members under the tutelage of the team leader. It will be prepared in draft form by the team leader and will be submitted for USAID review by the end of March, 1984. The principal purpose of the evaluation will be to examine the prospects for sustainability of project initiated activities after the scheduled termination of USAID activities (PACD). In this context, the economic aspect of the evaluation will concern itself with three main objectives:

1) To determine the economic attractiveness, to the farmer, of fish culture as promoted by the project. This should include an analysis of the costs and benefits to the farmer engaged in this activity, and also a comparison of these costs and benefits to those that would derive from activities other than fish culture.

2) To determine the economic viability of this project from USAID's point of view. This should involve a comparative analysis of the inputs and outputs associated with this project.

3) To determine if the project is financially sustainable; i.e. will it be financially and economically possible for project initiated activities to continue after termination of USAID activities (PACD)? This would include an assessment of the Government of Zaire's capacity to carry on with project activities in the abscence of USAID participation.

The foregoing analyses will be based, to the extent possible, on existing data, with other information being gathered as needed.

ANNEX 6

Executive Summary

Fish Pond Evaluation 660-0080

1. This project addresses three problems: first, the very serious lack of protein in local diets; second, the pervasive offseason unemployment; third, the very low rate of capital formation amongst traditional farmers.

In recent decades wildlife has been practically exterminated. No husbandry tradition exists in the area. Consequently the population is dependent almost entirely upon insects, caterpillars and a very small supply of small wildlife for their protein. Given the traditional pattern of cropping seasons the rural population and in particular males are underemployed. Very few alternative jobs are available in any sector. Enterprises are needed which provide offseason employment.

Even when new opportunities are available, and if they require some cash, farmers are often unable to take advantage. An enterprise which produces cash, and which itself does not involve much risk, is easy to master and not costly to enter has much to recommend it. Such an activity can generate needed capital useful both to perpetuate itself and fund new activities.

2. Fishpond culture is a simple form of animal husbandry. This has two advantages for persons having no husbandry tradition: first, it is extremely simple to master, and is tolerant of careless management practices; second, it does not require equipment costly purchased inputs such as feed, housing, equipment, chicks etc. Feed is not competitive with human. New stock is cheap and can be grown in one's own pond from a starter lot. The fish are not disease-prone, and thus risk to operators is low. For some, successful pond operation can lead to more complicated demanding forms of husbandry, sometimes building upon the pond. Swine manue as an input to the pond for example. The pond can be built off season, when labor has a very low opportunity cost. During peak seasons the labor needs are sufficiently low as to present no conflict with regular cropping.

3. The enterprise is new and therefore the technology does not replace any, rather it adds to the farm's cropping program and is an addition to the farmers technical knowledge.

4. Farmers are adopting the new technology for severad reasons. First, since Belgian times, rearing of fish under confined conditions has been known, but on a very small uncommercial scale. Hence the concept of both rearing and use of pond fish is not new. Second, the cost of alternative protein is prohibitive. Third, the cost, risk and needed level of knowledge to build ponds of sufficient size to meet one's own needs and have a surplus left over to sell is acceptable to many. Fourth, the needed resources, land, labor and capital (mainly dols) are readily available. No credit is needed. A typical farmer who is diligent, can earn several thousand zaires annually from land and labor otherwise unproductive.

5. There are two groups of beneficiaries: producers and consumers. With respect to the first, the evidence suggests that the technology is open to almost all, the limiting factor seems to be willingness to do the work necessary to clear river or stream bottom land of heavy cover. It can take up to six months to create a few hundred square meter area. Then a pond must be

dug, which takes 50 house of work per hundred square metes. In the course of preparing this evaluation 75 fish farmers were contracted. None reported any problem finding land or labor and none had to borrow. The farmers do not appear significantly diffferent from non-adopters except in their willingness to clear land and otherwise make an effort.

Consumer beneficiaries are those who eat fish. Fish are sold in lots of thee at the pond. Retailers sell by the slice. As a consequence the protein is widely shared at prices most can afford. The families of pond owners report greatly reduced illness among their children.

6. There are two groups of adaptors. The first is the primary adaptors those who were directly influenced by the Peace Corps volunteers working as extension agents with this project. Each volunteer works with up to thirty farmers, but one farmer may work with a series of volunteers assigned to a particular post. Since 1976 perhaps as many as a thousand have been brought into the business this way. A large proportion of these have been successful and have influenced the second group, or the imitators. There appear to have been several thousand secondary adaptors. There is considerable difference between the two groups with respect to the quality of their management. Typically speaking secondary adaptors have more poorly sited ponds, smaller0ponds, more overstocked ponds, and do a poorer job preparing compost. This difference shows the need for more extension and extension with a particular focus.

7. The project illustrated a fundamental and continuing problem faced by activities which are dependent upon extension for their diffusion. The project has been successful in this regard because the agents have been highly motivated, well trained, well supported, promptly paid, sharply focused individuals who have reliable transport. None of these criteria are shared by the Zaire extension staff or extension services generally in poor countries. And the period of extension support has been prolonged over several years. Introducing a technology which is neither complicated or risky. The lesson is a cautionary one: extension to be effective is a costly tool, effective only under a limited range of circumstances.

It is very unlikely the methodology of diffusion can be imitated by the Zaire extension. The most effective means of spread seems to be imitation, supplemented by problem-oriented extension.

The evaluation recommends that use of a small number of Zaire extension persons, who will be supported by a core of residual PCV, sited at a spot near to their clients, backed up by one of a network of training-demonstration stations being brought into being under this project, working with leading farmers and farm associations to help secondary adaptors in particular.

8. In the absence of purchased inputs or a modern marketing system, this industry will very likely remain in the small holder sector. It is unlikely to attract much capital from external private enterprise, the markets are too diffuse and thin to support much more of a structure than that which presently exists. An exception may be in areas immediately around large cities.

9. The primary vehicle used to implement the project has been Peace Corp volunteers used as extension agents. The PCV have worked directly with a number of farmers who approached them for assitance. Of great importance, a

number of farmers associations have come into being, crossing family, clan, village and even (in one case) tribal lines. These groupings are beginning to play an extension role, provide mutual support among producers in the face of community problems (extortion, theft, envy) and represent a front to authority where their interests are affected. For the first time it is paying farmers to be more socially minded. At least one association is moving to become a cooperative on its own.

10. It has been explained above that the conventional technology delivery system, the extension service, is an inadequate tool and for the reasons outlined cannot be significantly upgraded.

A course of action has been outlined above by which significant shortcomings can be to some extent amerliorated. Even low unreliable pay can be offset by providing extension agents ponds of their own, which double as demonstration sites. But under the best of conditions one can expect only very modest progress with so weak a service. PCV will be needed for a long time, but on a reduced scale and in a different mode as associations strengthen and Zaire extension are able to supplement.