FISH FARMING IN THE LAKE BASIN, KENYA

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December 1993

CONTENTS

OVERVIEW

The study compares aquaculture development in Luapula Province, Zambia, with that in the Lake Basin area, Kenya. It considers the activities of the FAO/UNDP/BSF-supported project "Development of Small Scale Fish Farming in the Lake Basin Area, Kenya". The Luapula study resulted in a series of conclusions which form the focus of the report. These findings relate to the institutional context in which fish farming takes place, the motivations of fish farmers, the constraints to long term viability, and the effects of adoption.

The study considers the Kenyan project from two perspectives:

POLICY ISSUES, relating to the design of the project and the formulation of the project document.
ISSUES OF IMPLEMENTATION, under the direct influence of the project

I. POLICY ISSUES

Fisheries and agriculture

Fish farming is more closely allied to agriculture than it is to fisheries. Agriculturalists are not currently trained in fish farming. A major policy shift is recommended. The frontline extensionists for fish farming should be agriculturalists, supported by aquacultural expertise. Project evaluations lament the lack of integration of agriculture and aquaculture in project activities, but no provision is made in project documentation to support such integration.

Links between Department of Fisheries and LBDA.

The Department of Fisheries (DoF) and the project implementing agency, Lake Basin Development Authority (LBDA), fall under separate ministries. Poor coordination has led to a replication of activities and sometimes conflicting advice at the local level. While not within the capacity of the project to address DoF's numerous operational weaknesses, better coordination should have been established during project formulation.

Monitoring and evaluation

The project objectives focus on increased production of fish and the rehabilitation of fish ponds. These objectives have not been altered throughout the ten year history of the project, despite the fact that such data are virtually impossible to gather and meaningless because inaccurate.

Socio-economic concerns

At no point in the history of the project has provision been made to assess the needs, constraints and priorities, of the supposed beneficiaries. Similarly, no questions have been asked concerning the effects of fish farming on both adopters and non adopters.

11. ISSUES OF IMPLEMENTATION

Extension

The project has recognised the need to create a fish farming knowledge-base which outlasts donor assistance. To do this, widespread support through a specialised extension service is not feasible. The project has acknowledged this and adopted a new approach based on the training in groups of as many farmers as possible. Inadequacy in the communication of objectives to extensionists remains a weakness. As a result they continue to be attached to the old model. This should be a focus of extensionists' training.

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Pond inputs

Pond productivity is reduced by low availability of inputs,

EXECUTIVE SUMMARY

1. INTRODUCTORY

The study is part of a research project, funded by the ODA, which aims to assess socio-economic dimensions of aquaculture development in Africa. The main field work component of the research was based in Luapula Province, Zambia. The present study reconsiders the findings from Luapula in the light of a comparison with fish farming in the Lake Basin Area, Kenya.

Literature on aquaculture development in Kenya stresses weaknesses in managerial capacity, in planning, and in the functioning of extension. Many of these problems are similar to those identified in Zambia. In addition, aquaculture development has been constrained by the divergent agendas and priorities of donors and host governments.

The project "Development of Small-Scale Fish Farming in the Lake Basin Area, Kenya", has been beset by a series of false starts, poor donor-host relations, and misuse of funds. No attempt was made to assess or identify the needs of the supposed beneficiaries. Several evaluations have drawn attention to these problems over the ten years that the project has been operating.

The current phase of the project, September 1992-December 1994, has involved reorganisation and significant changes in direction. This is the focus of the study.

2. THE INSTITUTIONAL CONTEXT

The relationship between the involved institutions is described, both as it appears on paper and in practice. The FAO is the executing agency and Lake Basin Development Authority (GoK) is the implementing agency. Over the course of the project, the relationship has at times been strained. However, in the latest phase there is evidence of increasingly convergent agendas among senior personnel. The project has taken sustainability of activities as a central objective and has attempted to make donorsupported activities commercially viable.

There are significant difficulties in the relationship between the LBDA project and the Department of Fisheries (DoF). These result in replication of activities and poor advice in the field. Although noted in evaluations, the project has never been reformulate nor been given budgetary capacity to address these problems. Clarification and coordination of institutional roles has been left to the personal priorities of project staff.

The Luapula study stressed the importance of forging better links with agricultural departments. It is recommended that agricultural extensionists should be trained in fish farming. No provision is made in the Kenyan project document to influence policy in this way, although lip-service is paid to the need to integrate fish farming with other aspects of the farming system.

Project activities are outlined. These cover: the training of extensionists, the

operation of extension, farmer training, the credit revolving fund, and the supply of fingerlings.

Project management has identified the lack of feasibility in attempting to run a fully functioning extension service for fish farming. The new approach is based on the training of groups, a credit scheme to promote higher productivity, and support to private fingerling production. The extension service then focuses support on a limited number of farmers. This new approach still meets considerable opposition from extensionists who believe their role is being undermined. It is however, a sound response to prevailing conditions. Both the revised credit scheme and the approach to fingerling supply have a good chance of success

While generally supporting the direction the project has taken, a number of caveats are made.

-The central location of training has failed to take **into the needs of an important group of fish pond managers - the wives of fish farmers.**
-Relatedly, non-Kiswahili speakers may also be excluded from training.

-It is possible that insufficient attention has been given to the selection of credit recipients to ensure that those least in need do not monopolise limited services. The extent of this phenomenon is not clear
-In a drive to recruit credit recipients, some people are accepted to the scheme with inadequate knowledge of their obligations or of pond management. This problem is now

3. THE MOTIVATIONS OF FISH FARMERS

Unlike in Luapula, the primary motivation for digging and managing ponds is income generation. This is partially the result of a much more efficient and prevalent

Other motives for fish farming, such as household food, asset formation, and claiming land are not so significant in the Lake Basin area. In Luapula, the legacy of earlier development interventions has a significant effect on the way people respond to a new one, such as fish farming. This phenomenon also exists in the Lake Basin area, though apparently to a lesser extent.

The conclusion is maintained that success or failure of adoption by formal groups derives from the motivations which induce groups to form. Where the principal motive is income generation there are better chances of success than when it is grant or loan acquisition.

4. CONSTRAINTS TO LONG TERM VIABILITY

While having a similar background in fish farming, the knowledge of livestock management accompanying its development in the Lake Basin area is more favourable than

The clearest indication of the likely sustainability of fish farming in the Lake Basin area is visible evidence of pond management. Most ponds are well constructed, in

appropriate sites, well fertilised and obviously attended to. Exceptions were obviously found. Furthermore, farmers apparently have a good knowledge of the technology. Many also display a confidence in their ability to continue without assistance.

Ponds appear to be harvested regularly and farmers apply the concept of a production cycle to their pond management. Ponds are fed with purchased feeds (rice or maize bran) and manured regularly applied. The most commonly stated problem concerning pond management is availability of feeds to buy.

The project is only just beginning to promote techniques of integrated pond-farm

In Luapula, constraints such as drought/flooding and animal predation were significant. They were also related to pond location, construction, and management. Problems of predation also exist in the Lake Basin area, but apparently to a lesser extent.

Theft from ponds is a problem for some farmers in the Lake Basin area. The extent of this cannot be quantified in such a short study.

No evidence was found of "social control" mechanisms. It is not concluded that they therefore do not exist, merely that no simple assessment can be made, especially in the timespan available.

5. THE EFFECTS OF ADOPTION AND THE ADOPTION PROCESS

Fish farmers generally do not come from an elite within rural communities. This conclusion is possibly not so valid for credit fish farmers. No fish farmer could be classified as very poor according to local definitions. Almost all pond owners are men (though women take

Conclusions relating to intra-household aspects of fish farming are tentative and no substitute for more detailed study. No negative effects of fish farming could be found in terms of the diversion of male labour from more productive tasks. For both mere and women, one of the principle attractions of fish farming is the relatively small amount of time required for pond maintenance.

Wives play a significant role in pond management. The inattention given to them in training and extension is therefore shortsighted.

There is some evidence that with increased production and marketing, household consumption of fish may decrease. Paradoxically, for those households with lowest pond productivity, where the few fish produced are consumed within the home, the marginal nutritional benefits may be higher.

Regarding control of the product, marketing is generally in the hands of women. The destination of the money raised varies immensely.

While common property resource conflicts arising from fish farming were evident in Luapula, this is not the case in Kenya.

Fish farming is unlikely to make much of a difference to the wellbeing of the poorest people in a rural community, who do not have the funds with which to buy fish.

6. CONCLUDING COMMENTS

Many of the findings from the Luapula study are relevant and applicable to the Lake

-In order to create a sustainable knowledge base, it is necessary to move beyond the reliance on a specialised fish culture extension service. The project is attempting to do this. The training of as many farmers as possible, including in fingerlings supply is critical.

-The project -does not have the capacity to influence policy regarding the training of agricultural extensionists. This should be considered by policy makers in the future.

-The decision to support fish farming should take into account the prevailing socio-economic and technical environment, especially marketing and access to resources

-Overall increased availability of fish does not necessarily imply improved access for those most in need.

-Support for fish farming should ensure that there are not negative effects for non adopters and members of fish farming households.

-Basing project objectives on the production of fish or number of fish farmers is pointless where such information cannot be effectively gathered.

1. INTRODUCTORY

1.1 RATIONALE FOR THE STUDY

This report compares aquaculture development in Luapula Province, Zambia with that

Over the year 1991-2, a detailed study was undertaken of aquaculture development in Luapula Province. The study, funded by the ODA, was a response to a mounting concern that attempts to promote rural aquaculture in Africa had been less successful than had been hoped. Accompanying this concern was the belief that aquaculture development had for too long remained the province of biologists and technical specialists. Accordingly, it was felt that an approach combining both technical and sociological considerations would more effectively throw light on the problem.

A literature review on the socio-economics of aquaculture development provided a background to the research. The review argued that problems have partially been considered in terms of institutional failure: the inability of governments to sustain donorsupported projects on their departure. More commonly, problems are thought to be derived from rural communities themselves. Questions are asked concerning the appropriacy of introducing aquaculture to rural communities with little background in the technology. Such considerations are of course by no means limited to aquaculture development. Furthermore, while a number of studies relating to socio-economic questions had been undertaken in the context of development projects, none had involved detailed and prolonged fieldwork within rural communities. A need to understand the interaction between these communities and the promoters of aquaculture was identified.

The Luapula study took place in the context of activities carried out by a donor supported programme, Aquaculture for Local Community Development (ALCOM) and the Zambian Department of Fisheries. It involved residence by the principal researcher in two villages of ALCOM activity, combined with monitoring of the extension process from the provincial centre, Mansa.

The findings of the research can be divided into four main areas:

1. **The institutional context,**

The study described weaknesses in the Department of Fisheries in Luapula. These are unlikely to be unique, either to fish farming or to Zambia.

In addition, project/host relations were particularly strained in Luapula due to divergent expectations of stakeholders of each other's appropriate role. ALCOM failed to fully consider the ability and willingness of the Department to play its expected role.

Attempted government supply of fingerlings is not a sustainable strategy in Luapula, and has in fact restricted the development of a private market. The Department of Fisheries in unable to meet the demand it has partially created because of both transport problems and a non-functioning government fish culture

station.

In Luapula, support for aquaculture through the agricultural department is a possibility. This may not be the case elsewhere, but there may be greater opportunities for support to non governmental attempts to promote aquaculture.

2. The motivations of fish farmers.

The study identified the importance of earlier development interventions in influencing people's decisions over adoption.

Associated with this, the opportunities for income generation are limited in Luapula and the costs of adopting aquaculture are not perceived as prohibitive. In **this context, it is not possible to assume a simple cost-benefit motivation for the adoption of the technology.**

The study found that the motivation of food for immediate household consumption was as much about convenience as about overall availability. Given the technical requirements of aquaculture, it is likely that there will already be a supply of fish. This was found to be the case.

In addition, the study found that fish farming plays an important role for farmers' security and for asset formation. Luapula has particular forms of inheritance, land access, availability of land, and conflict over land use.

3. Constraints to long term viability.

Regarding pond management and farmer knowledge, problems in pond management can be largely attributed to gaps in farmer knowledge, especially regarding regularity of harvesting and feeding. There is a lack of a history of livestock management and extension does not fill this gap. As a result, productivity is low and ponds are swiftly abandoned.

The study found that drought and animal predation were significant constraints to long term viability, implying the critical importance of pond location. Human predators can also be important. In Luapula, it was found that levels of theft tend to be closely associated with village cohesion among other factors.

Although said to be important elsewhere in Africa, "levelling mechanisms" are not significant in Luapula. In other situations such mechanisms may be seen as either a disincentive to the development of aquaculture or as a means of ensuring an equitable distribution of the output.

Lastly, in Luapula, aquaculture became a source of conflict over land and water resources. The lack **of effective mechanisms for conflict resolution resulted in deadlock.**

4. The effects of adoption and the adoption process.

In Luapula, aquaculture has not resulted in the diversion of male labour from other, more productive, activities. Unpaid women's labour has been coopted into aquaculture only where they see such involvement as advantageous. This has generally been where a greater proportion of the harvest has been for home consumption rather than sale. The study suggests that these factors mainly reflect the current low level of prioritisation of aquaculture over other activities.

Similarly, while the Luapula study obviously describes a particular case regarding intra-household control over the resources for fish farming and the distribution of benefits, it is suggested that what is significant is the negotiability of that control.

Aquaculture adopters are primarily men, better off, and much more socially and politically active than others in the community. It is suggested that this is always likely to be the case, unless measures are explicitly taken in extension to avoid it.

These findings relate to aquaculture development in one, limited, context. The present study aims to reconsider their wider applicability. Clearly, the socio-economic and institutional circumstances for aquaculture development vary widely throughout the continent. The significance of the Luapula conclusions can be more firmly established through their comparison elsewhere.

The present report therefore compares the findings from Luapula with aquaculture development in Western Kenya. Specifically, it assesses the FAO supported project "Development of Small-Scale Farming in the Lake Basin, Kenya".

The study took place over one month in October 1993, following comprehensive literature review. It involved both consultation with project and host country personnel and visits to farmers in three districts: Kisii, Vihiga and Busia.

1.2 AQUACULTURE IN KENYA

As in Zambia, institutional weaknesses in national planning are identified in the literature (Balarin 1985; Satia et al 1985; Achieng et al 1993). The mission report to the FAO's Thematic Evaluation of Aquaculture (Satia et al 1985, FAO 1987) draws attention to a failure among donor funded projects to address a number of problems. While both Kenya and Zambia have received substantial external assistance for aquaculture, this assistance is not coordinated and there is very little cooperation between ministries, between these and donor agencies and between donor agencies themselves.

As a result, many projects are essentially agency ventures with very limited government support. The respective roles of donor and host institutions are often poorly understood and consequently contested by concerned parties. According to the mission report, governments have tended to accept any project proposal that contains elements of foreign exchange earnings or savings without necessarily looking at the consequences for the long term development of the technology.

In Kenya, although there is official support for aquaculture development, it is scarcely mentioned in planning documentation. The only stated strategy for aquaculture development in the National Development Plan (Rep. Kenya 1989) is the introduction of fish breeding farms for restocking and supplying fish farms. The rationale is similar to that in Zambia: to increase rural protein supplies, improve rural income and (to a lesser extent) promote exports. But the Department of Fisheries is not in a position to support such objectives. The Thematic Evaluation mission was of the opinion that a pre-requisite for successful development is strengthening of the host institutions in terms of structure., organization, and, importantly, managerial capacity. No donor supported project had attempted to do this. Rather,

> **Far too many projects revolve around scientists undertaking work that they enjoy, are interested in, without giving due consideration to other project aspects.. (Satia et al 1985,p.114)**

Given this background to aquaculture development, figures concerning its national importance are of dubious value. Such figures vary immensely, and those extrapolati productivity from number of ponds and numbers of farmers are particularly suspect. :.
on **fish ponds, farmers and productivity are not reported systematically and are anyv.** ay **notoriously hard to gather. To give an approximate order of magnitude, the FAO estimate that aquaculture constitutes less than 1 % of national per capita fish consumption in Kenya. The principal problems facing small scale rural aquaculture are poor pond construction and siting, loss of fish to predators and theft, inadequate feeding and management - all leading to low productivity and pond abandonment. A familiar story.**

Most donor support to aquaculture has concentrated on small scale rural fish farming, in line with concerns with directly assisting poorer farmers. Important past and present donor supported interventions are elaborated in Balarin (1985). Since this study, there has been a gradual reduction in donor assistance to aquaculture development, possibly reflecting a growing disenchantment with perceived results. In 1993, the only significant externally assisted programme was the FAO project in the Lake Basin Region. In addition, in the period 1979-1987 about 100 US Peace Corps volunteers have served as

fisheries officers with DoF.

The Thematic Evaluation mission took place eight years ago. Since then, an aquaculture sector study (Achieng et al 1993) pointed to similar problems and made similar recommendations. The authors note that their main strategy suggestions are very similar to those proposed by the National Council for Science and Technology in a 1980 paper. These suggestions relate to: the consolidation of technical base and upgrading of public sector effectiveness; the intensification of production of small-scale pond units; the extension of improved techniques to small-scale farmers. Among key suggestions are that results should be measured in terms of quality of production, not quantity of farmers/ponds, that links should be made with the agricultural service, and that government run demonstration farms should be avoided.

There is some consensus concerning the problems confronting Kenyan aquaculture. It is, however, not easy to address these because they are centred on institutional weakness and divergent agendas of external promoters and the government. In this respect, there are many similarities with Zambia.

1.3 THE **PROJECT, "DEVELOPMENT OF SMALL SCALE FISH FARMING IN THE LAKE BASIN"**

A number of evaluations and studies have been undertaken over the course of the ten-year project (or series of projects) (Satia et al 1985; Achieng et al. 1993; George et al. 1991). Almost without exception, they are highly critical. The exceptions are internally produced reports. From documentation and discussions in Kenya, it is clear that the project has been beset by a combination of false starts, inadequate consultation with the host government, institutional failure and - always - finding a reason to have another go. The reasons for the failure to fully take on board the criticisms can only speculated.

The rationale for the development of fish culture in the Lake Basin Region was essentially one of meeting the protein needs for the rural population. Western Kenya contains about 40% of the country's population on 8.4% of the total land area. Catches from the Lake were assumed to be reaching close to maximum yield. At the same time, the introduction of Nile perch had reduced catches of preferred indigenous species. Nile perch is mainly exported from the region. In this respect there are similarities with the Luapula case - a large natural fishery, the output of which does not reach the rural population. A key difference in the Lake Basin Region is that of population density. While in Luapula land for both farming and fish farming is generally perceived to be in abundance and is mainly still allocated according to customary procedures, most land around Lake Victoria has individual property rights attached. Land is perceived to be scarce and cultivation is accordingly much more intensive than in Luapula. At the last census, the population density of Luapula was less than ten persons/km^2, while in parts of the Lake Basin area, it rises to as high as 700.

In 1982 a UNDP/FAO mission reviewed the fisheries situation in the Lake Basin Region. It concluded that there was a need for assistance for the development of small scale fish farming. The mission recommended the rehabilitation of thousands of fish ponds which had been constructed but not maintained over the previous thirty years. Such assistance was to take place in collaboration with the Lake Basin Development Authority (LBDA), which had been formed in 1979 to coordinate and implement programmes for rural development and food production in the region.

The history of the project can be divided into four phases. A technical cooperation project (TCP) took place between April 1983 and October 1983. The TCP trained 54 fish farming extensionists and their supervisors. In addition a census of all fish farmers in Western and Nyanza Provinces was carried out. This was followed by Phase one (19846), Phase two (1988-1991) and the current extension of Phase two (due to end in December 1994).

The FAO/UNDP project "Development of Small Scale Fish Farming in the Lake Basin Area" began in April 1984, with major financial contributions from the Belgian Survival Fund. The project aimed to rehabilitate some 2000 rural fish ponds and to set up an extension service with support facilities such as fry production centres. The Project Evaluation Mission in 1985 noted that the original objectives of the project were too optimistic and could not be achieved in the time frame allowed. It therefore recommended a second phase in order to fulfil the objectives.

The Thematic Evaluation mission (Satia et al 1985), undertaken at the same time, was more critical. Although conceding that achievements had been made through extension contact, the mission draws attention to omissions, false assumptions and an unrealistic time frame in the project design. It suggests that the fact production benefits were reaching the target group was more by accident than design as no background studies were done before the project. No attempt was made to assess or identify the needs of the supposed beneficiaries. Major constraints to effectiveness included inefficiency and obstructionism on the part of the host institution, caused by internal structural weaknesses, and a wish on the part of the institution to undertake large, high-profile projects. The mission reports "gross misuse" of project and LBDA funds and points to several examples of such misuse. Furthermore, extensionists were distributed by the host government according to political requirements and not the needs of small farmers.

Sixteen months elapsed between the end of Phase I and the beginning of Phase 11. During this time, some UNDP funds were directly allocated to LBDA for the construction of a fry production centre. The project document for Phase II contains essentially the same rationales and objectives as for Phase 1. The main objectives of the project are expressed in terms of production and pond rehabilitation; to increase aquaculture production by small scale farmers from 120t/year in 1986-7, to at least 320t/year by 1992, and to rehabilitate at least 2000 ponds. Associated with this is the development of fry production centres for the distribution of fingerlings, training and facilities for extensionists, overseas training for senior staff, and the support of a credit revolving fund.

At no point in the project document is provision made for assessing the socio-economic characteristics of the "target population" or their needs. Neither is the problem of weaknesses in collaboration between LBDA and DoF, as described by evaluations of Phase I, addressed. Lastly, to intend to evaluate the project according to production figures which cannot be collected because of institutional weaknesses is senseless.

In September 1991, an evaluation mission (George et al 1991) catalogued a series of weaknesses within the project. These partly relate to personnel: the first Chief Technical Adviser (CTA) was asked to leave after only a month for reasons not connected to the project (a brief and critical report to FAO at the end of his short contract was not subsequently referred to). The LTA's replacement only arrived over a year later, at the beginning of 1990. Because of this delay, a Tripartite Review Meeting in March 1991 recommended an extension of the project until the end of 1992. The evaluation mission criticised the capacity of the second CTA to carry out his job effectively and recommended his contract should not be renewed. Although he left in December 1991, a replacement was not in place until September 1992. During the same period, the National Project Coordinator (NPC) and the Managing Director of LBDA were replaced. The project was then extended again to September 1993.

The 1991 evaluation also noted that the emphasis on the quantifiable expansion of ponds built and production fogged the importance of qualitative improvement in ponds and personnel. An emphasis on increased production from 1000 to 2500 kg/hect was said to be both unrealistic and unmeasurable.

Furthermore, no provision was made for the participation of the government

Department of Fisheries in the project;

> Marginalization of the role of DoF in project design left decisions on the cooperation and interaction between field operative personnel of DoF and LBDA to ad hoc arrangements, dependent and hostage to, harmony between personalities (George et al.p.9).

The only explicit role for the DoF was its position on a Consultative Committee. As this committee was never established, such a role was meaningless.

In May 1993, a mission from the Belgian Survival Fund was impressed by changes in project approach and direction. In order for these to be completed, it recommended extension to the end of 1994. This has now been accepted.

New Directions

Since October 1992 a number of major changes have taken place in project implementation. Project management has changed the focus towards sustainability after departure of the donor. As with any development project, sustainability is jeopardized by the simple fact that donor assistance is (usually) non profit making, and that governments are not in a position to continue with such an approach. Recently, greater attention has been paid to making projects economically viable without reliance.on government support. This is also now the case with the FAO project. Success of the approach can only be assessed by farmers continuing to farm fish after the departure of the project. Indicators are in current levels of knowledge and

The main planned activities of the revitalised project include training farmers *who* are to be recipients of credit, catfish production at the FPCs in order to ensure their longterm economic viability, the promotion of integrated farming, and training of both senior and junior staff. The development objectives of the project have remained the same, stressing increased production (from 120 tonneslyr in 1986-7 to 320 in 1994), pond rehabilitation, and extension training.

LBDA staff on the project were reduced from 186 to 89. They were also reorganised, with senior staff (technical officers -TOs) transferred to the seven fry production centres (FPCs). Extension was reorganised, with all staff based at the FPCs under the supervision of the TOs. The credit revolving fund was reformulated. The FPCs moved to production of catfish along with tilapia, while maintaining the objective of producing 785,000 tilapia fingerlings per year. Lastly delays in disbursement of funds and administrative problems were addressed.

No questions are asked concerning the rural population who are to be the beneficiaries of the project. No provision has ever been made for this. In a study conducted prior to the reorganisation of the credit scheme (Humphreys et *al* 1993), a page is devoted to the socio-economic benefits of the scheme. These are clearly tagged on as an afterthought rather than directly arising from the study itself. Socio-economic benefits are held to be positive because yields are expected to rise and many people are apparently interested in joining the scheme. Findings from Zambia concerning a general willingness to accept loans suggest caution in extrapolating conclusions from the latter fact. More importantly, evidence that increased production brings benefits to those who most need

them, is simply not present. There is sufficient evidence from elsewhere' concerning the negative intra-household effects of increased cash orientation to at least question the assumption.

These issues, combined with questions relating to the sustainability of the new project activities, form the basis of the present study. No attempt is made to answer them conclusively following such a short visit. Furthermore, many of the changes *in project* direction have only been in place for a matter of months. Nonetheless indications and pointers emerge.

[1]. A number of studies have shown that with increased commercial orientation, the amount of food available to the household actually falls (for example, Moore and Vaughan 1987). Sale of a cash crop does not necessarily make up the shortfall to members of the household who are not controlling the income. It is therefore critical to assess in particular locations the intra-household control over income and expenditure.

2. THE INSTITUTIONAL CONTEXT

2.1 THE RELATIONSHIP BETWEEN INSTITUTIONS 2.1.1 The relationship on paper

The government, LBDA, UNDP, and FAO are "jointly responsible" for the implementation of the project and realisation of objectives (FAO 1988). Officially, the LBDA is the implementing agency of the project, while FAO is the executing agency. Apart from the one expatriate adviser (CTA) and, during Phase II, three UN Volunteers, the project is comprised entirely of LBDA personnel. A national project coordinator (NPC) is the counterpart to the CTA.

The LBDA is expected to promote liaison and coordination with various government ministries. It falls under the Ministry of Regional Development, and is expected to coordinate with the Ministries of Finance, Planning, Cooperative Development, Tourism and Wildlife (within which DoF is situated), and Agriculture. Such coordination should take place through a Consultative Committee. No budgetary provision was made for the establishment of such a committee. The extent to which the CTA is also responsible for this liaison is not stated in the project document nor in his terms of reference, although FAO evaluations have stressed the need of for such responsibility to be taken. In particular, the need for better linkages with DoF has been stressed. The CTA manages all equipment provided from UNDP funds and is responsible for on-the-job training, especially of the NPC.

2.1.2 The relationship in practice

Over the ten year history of the project, relations between the FAO project and LBDA have been strained. As noted above, this is connected partly to conflicting views of what the project should be providing, with the LBDA favouring large scale and visible infrastructure. FAO also reportedly made mistakes in the selection of personnel. The absence of a CTA opened up numerous opportunities for misappropriation of funds as reported by the various

It appears that without the influence of the CTA, the project effectively ceased to function. For example, an FAO report in May 1992 concerning the first quarter of the year notes that since the departure of the CTA the previous December, the implementation of scheduled activities had "slowed down considerably" (Tacon 1992). The principle cause was said to be immobility of officers due to poor motorcycle maintenance and lack of fuel. Behind this was horrendous financial mismanagement. For six months before the arrival of the current CTA, salaries were not paid (this is an LBDA responsibility).

The structural relationship between the donor and the government is such that, despite what is written on paper concerning mutual responsibility, the donor regulates the functioning of the project through their greater financial input. When the donor makes mistakes, the project grinds to a halt. This is much more significant in the LBDA case than in Luapula Province, because the donor's role is so much greater. In such a context, it is then left to personnel in the government department to negotiate their own roles in relation to a mixture of personal requirements and assessments of the future of the project.

Nevertheless, it appears that in the current phase of the project, donor and host institution objectives are converging. This is partly the result of the reorganisation of personnel. An atmosphere of cooperation and consultation exists between senior LBDA project staff and the CTA. Similarly, the CTA and Managing Director of the LBDA have broadly congruent objectives. It is lower down the personnel ranks that divergent agendas and objectives become more obvious (see section 2.2.1 below).

2.1.3 Links with the Department of Fisheries.

The Department of Fisheries (DoF) is responsible for both Lake fisheries and fish farming. Although much better resourced than DoF in Luapula in terms of numbers of personnel, many similar problems exist. Some fish scouts were trained for six months at Naivasha Institute of Fisheries and Wildlife where fish farming was a tiny part of the curriculum. Recently, the fisheries training has been abolished at the Institute. Many went for training after little formal education but with significant field experience. Some have not even received this much formal training. Because the higher grades in the department (Fisheries Officers) are occupied by well educated people, often graduates, there is little scope for promotion. Effective monitoring of scouts is not in place and few have any transport.

Furthermore, many scouts have a role in policing the markets to check on the licences of fish traders. Although fish farming does not require licences, there is a strong possibility that the DoF scouts are seen to have a restrictive role. To compound this problem, some farmers continue to believe that the fish in their ponds are the property of the Department. During the 1970s and early 1980s, DoF distributed fingerlings for free and monitored harvests closely. It is reported that some took a proportion of the harvest for themselves. It is not surprising therefore, that a certain farmer wariness still needs to be overcome.

DoF extensionists are much more pervasive than those of LBDA. In Busia district there are about 40 fish scouts (4 LBDA) and in Kisii and Vihiga about 20 (also 4 LBDA). Any cooperation between LBDA TOs and District Fisheries Officers (DFOs) is entirely due to the development of personal relationships and the motivations of the officers concerned. The 1992 DoF annual report for Kisii district does not even mention LBDA. There is no formalised collaboration. Nor is there any attempt to avoid replication. Some farmers will be visited by both DoF and LBDA extensionists. Both DoF and LBDA supply fingerlings to farmers, but at a different price, the DoF price being lower. The extent of DoF actual supply of fingerlings is believed to be low, based on the state of their fry production centres and the absence of transportation. LBDA extensionists complain that they are competing with poor and contradictory advice from DoF fish scouts.

In Kish, the DFFE used to carry DoF extensionists with him on his motorbike for extension (the motorbike was later stolen). In **both Busia and Kisii, LBDA and DoF personnel are in close contact. There have however, been limited attempts from the centre to build on such cooperation as exists. In 1990, half of the 60 extensionists trained in Kisumu were from** DoF. **However, most left the, course early because it clashed with one being organised by their Department.**

While there are clearly problems in the relationship between DoF and LBDA, especially concerning antagonism over different levels of training and resources, ignoring these problems compounds field-level replication and poor advice. Although in the short time available to the current project extension it is not possible to fully address a deeply rooted situation, clarifying and coordinating institutional roles should have been attempted.

2.1.4 Links with agriculture

The Thematic Evaluation of Aquaculture suggested that fisheries extensionists should be trained alongside agriculturalists. This general recommendation broadly supports conclusions from Luapula: although having obvious technical differences, fish farming is much more closely allied to farming than it is to fisheries. Hence, to extend the recommendation, it is concluded that fish farming extensionists (rather than fisheries) should receive training with agriculturalists, while agricultural extensionists should learn fish culture.

In Kenya, DoF is under the Ministry of Wildlife - completely separate from the Ministry of Agriculture. LBDA is under the Ministry of Regional Development. At the local level, the only contact between the Departments is entirely coincidental: Fisheries officers suggest that there is little they can do to change this with the current institutional arrangements. In addition, without policy changes from higher levels, they claim they will meet obstruction from agricultural extensionists. With a much larger and better resourced existing agricultural extension service, this situation is far from ideal.

Shifting fish farming towards agriculture and away from fisheries is a major policy change which cannot happen overnight. Resistance from numerous quarters is to be expected. Although such a policy change cannot be initiated by one project, it is regrettable that no provision has ever been made in project documentation to address the question of links with agriculture.

2.2 PROJECT ACTIVITIES

2.2.1 Extension

The training of extensionists

A **key aspect of the project, in line with the focus on sustainability, is the training of**

Of the original 54 extensionists who were trained in 1982, 21 have now moved on to other jobs. All 1{? **DFFEs were trained in 1992, as were two of the current technical officers. The course covered both theoretical and technical aspects of fish farming. In addition training was given in rural extension techniques, including communication skills. It is generally acknowledged that training of a high standard was achieved**

Fisheries extensionists (FEs) have come to the project with varied backgrounds and have received equally varied training. Fifteen were trained on the course in 1982. Most of the remainder (about 25) joined the project with no knowledge of fish farming, learnt some on the job and later received in-service training, ranging from two months to a week-long refresher courses.

During the history of the project TOs and DFFEs have received overseas training. It was suggested by TOs themselves that some of this training was not really relevant to the conditions encountered in Western Kenya.

Currently, a training officer is responsible for the organisation of both staff and farmer training.

The operation of extension

The accepted model for most African aquaculture development has been fingerling production and repeated extension visits to farmers. This has not worked, mainly because the institutional support is not forthcoming on the departure of donors (or even before they go). In addition it has contributed to a view, perpetuated by farmers and extensionists alike,

The Lake Basin project is moving away from the model. It accepts the lack of realism and unsustainability of attempting to operate a fish farming extension service to reach all farmers. The cost simply does not justify the results. The project is also attempting to make the best of its own limited personnel resources. The approach now being taken from project headquarters is that direct training of as many farmers as possible, in groups, followed by selective follow-up is the only viable and sustainable strategy. There is substantial evidence to support the view.

During the reorganisation of the project in 1992, the staff was reduced by half. This involved the dismissal of numerous ancillary workers (watchmen, pond attendants etc) as well as extensionists. Since the reorganisation, the majority of extensionists were transferred from field postings to the seven fry production centres, under the direct supervision of TOs. There are 3-5 extensionists at each FPC, as well as a farm manager. Each TO has the use of a vehicle, while DFFEs mostly have motorbikes (theoretically - some are not in use). Fisheries extensionists have the use of bicycles.

The work of extensionists (FEs and DFFEs) involves a combination of visits to credit and non credit farmers for advice and fingerling distribution, and maintenance of the FPCs. At Busia, extensionists expect to go out to farmers about one day a week. In Kisii, extensionists have recently returned to the divisions after a few months of being posted at the centre.

A remaining weakness in the new system arises from a mixture of poor communication and possibly divergent interests. The extensionists and senior project staff have very different perceptions of the need for, and value of, the reorganisation.

Extensionists maintain that the new system means (or in Kisii, meant) that they are able to do much less extension than previously. They still believe that their role should be that of visiting farmers at their homes and that farmers will be unable to continue without such regular visits. Sceptics in headquarters suggest that extensionists are also unhappy about being closely monitored as it is now more possible to control their activities, giving less scope for those who choose to do nothing. Of course, scouts who do not want to work have a vested interest in reducing the amount they are monitored. On the other hand, those scouts that remain after the restructuring in 1992 are those who were thought

to be the most diligent.

If it is -accepted that some of the complaints arise from a genuine sense of grievance, it is important to look at the nature of this grievance and how it might be addressed. It is certainly true that the possibilities of extension to the field are reduced with greater centralisation of activities. However good the public transport system is, more time and effort is taken by going to visit farmers from district centres than from a base in the locations. The point is that extensionists still believe this is what they should be doing. No-one from headquarters has explained the rationale of the new approach to them. It is not surprising therefore that extensionists feel themselves to be undermined, ineffective and demoted, when they are forced to spend time at the FPCs, often doing what they see to be the tasks of labourers.

It is critical that in the forthcoming extensionists' training, adequate attention is given to explanation and consultation regarding the direction of extension. If it is to be expected that extensionists will act as farmer trainers, they need to be properly equipped to do this. This includes feeling actively and usefully involved and understanding the nature of their jobs.

Farmer training

Farmer training is now central to the project. Over its history, thousands of farmers have been trained. Since the project reorganisation, six courses have been held. One of these was for new credit farmers (60 farmers) and two for fingerling producers (also 60 farmers). Three courses were held for 180 members of women's groups. Two more courses for credit

All courses have been held in Kisumu. They last for four days. Farmers are provided with accommodation and food and their transport is paid by the project. The farmers are selected by extension agents from their knowledge of the activities of the individual farmers. With fingerling producers, a minimum of three ponds is a basic requirement. Training is conducted mainly by TOs and DFFEs either in a hotel or in a training centre constructed especially for the purpose. The cost is approximately $20 per farmer per day.

In part, the location of the courses in Kisumu is a response to certain practical difficulties. The courses are directed to new credit farmers. It is imperative that they are trained in both production techniques and details of the scheme as soon as possible. Currently credit farmers are scattered across districts, so locally organised courses could cover only a few farmers at a time, while being fairly logistically difficult to arrange. It is thus suggested by the CTA and NPC that in the time and with the resources available, it is better to bring farmers to Kisumu. It is also true that a training centre has been specially constructed, and there is understandable pressure to be seen to be using it.

Problems of exclusion exist. Firstly, the project area contains within it nine language groups. These are not dialects: they are completely separate languages. Although Kiswahili is the common language and the language of instruction in the courses, for many farmers this is not their mother tongue and they may not even understand it. As a result, either only the more educated farmers are coming to the courses, or those who do

come are only benefitting slightly. Observation of one training course indicates that the latter is not much of a problem; most people understand what is going on. Participants with language difficulties were assisted by fellow participants. Regarding non-participation of non-Kiswahili speakers, it is less easy to establish the extent of the problem.

Secondly, the location of the courses in Kisumu results in the probable exclusion of a particular group of fish pond managers: the wives of fish farmers. Few women own ponds in their own right. However the wives of fish farmers frequently play a significant or even the most significant role in pond management (see section five). Discussions with such women reveal that the transfer of information from husbands to wives may be inadequate and no substitute for direct training. For women, attendance at courses in Kisumu may be difficult because of resistance from husbands (according to both themselves and extensionists). Although women have attended some courses, these have been members of women's groups. The situation would be rather different for individuals.

The alternative to courses in Kisumu is to hold local training. It is more likely that women would be able to attend these, especially if invited with their husbands. Also, extensionists should be sensitised to check on who is managing ponds in individual cases in order to focus the support and advice appropriately. As in Zambia, extensionists carry with them a strong belief that all fish farmers are men, rather than just pond owners.

The possibility of holding locally based mobile training courses is now being considered. In this way groups (loosely defined - not necessarily formal groups) could define their own information needs, the courses could be adapted more closely to the knowledge of farmers, and women would be more likely to attend. Such training can be much cheaper than the $20 per farmer per day that they cost in Kisumu. It is, however, unlikely that these will take place for the credit farmers and as a result, pond management may suffer.

2_2.2 The Credit Scheme

The design of the scheme

The revolving credit scheme is a focal point of the revitalised project. Evaluation reports and an April 1993 consultancy suggest that in earlier years the scheme was a wholesale disaster. Cash was given for inputs which were not forthcoming, loans were not repaid, large amounts of

The scheme now focuses on credit in kind. No cash is given. Loans enable farmers to buy fingerlings from the FPCs (clarias and tilapia) and feeds such as rice and wheat bran from local stockists in order to increase productivity. Interest is charged at 18% with a 10% charge for overheads. It is charged from the day of first stocking. First repayments are expected eight months from stocking. The aim of the project is that between 10 and 15 % of fish farmers in the project area should be recruited into the scheme (there are about 3500 active farmers in the region). Including the pending approved applications, there are currently over 340 participants.

Credit farmers are selected by FEs and DFFEs on the basis of an assessment of their fish farming viability and likelihood to repay. There is a minimum requirement that farmers should have existing ponds of at least 300m'.

Assessment of the scheme's viability

Pond construction costs are assumed to be nil or negligible because farmers' own labour has been used. Labour costs for maintenance are also negligible.
For each 100m² **pond, farmers would buy:**

Fingerlings at 200 x ksh2 and 30 x ksh 2 (clarias) =ksh430

Feed (rice bran, wheat bran, or compound feed) =ksh1000

Assuming the production and sale of 40 kilos at ksh l5 per 200g fish, gross income to the farmers would be in the region of ksh2400 and net income after repayment would therefore be in the region of kshl000 per 100m'

The revitalized scheme has only been in operation for a few months. No ponds stocked through the scheme have yet been harvested. It is too early therefore to assess repayment rates. With feed prices rising swiftly, the viability of the scheme to farmers depends on the assumptions that 1) fish prices will rise equally swiftly, and 2) farmers have adequate knowledge to produce at least 40kg/100MZ pond.

The first assumption appears to be broadly justified: prices of feed are already somewhat higher than the calculation indicates, but fish are also selling for prices closer to ksh25 per fish rather than 15. **The prices for clarias are likely to be even higher. Farmers' expectations of yields and prices are far higher than those of the project (up to ksh40 per fish).**

Farmer knowledge and pond maintenance practices are also generally good enough to justify the second assumption (see section four). In addition, the majority of those interviewed had an accurate idea of their interest and repayment obligations. The problem of the lack of training or information for **the wives of credit farmers is a remaining weakness.**

The prospects for the scheme generally seem good. The approach has certainly addressed and overcome many of the pitfalls of the previous scheme and may contribute to higher and sustainable pond production.
A number of points of caution must, however, be made:

Firstly, a recent drive to enlist as many credit recipients as possible has led to the recruitment of some farmers who have inadequate ponds (size and quality) and knowledge level. Furthermore, their conception of interest repayment and obligations is sketchy to say the least. In the earlier phases of the project this was a much more significant problem in the credit scheme and serious attempts are being made to ensure that not many farmers slip through the net. It is therefore important to ensure that such farmers receive adequate training in the near future.

Secondly, little attention has been given to the needs of those receiving credit. As a result, in some areas, farmers with an unusually high socio-economic status (retired civil servants etc) have been enlisted. The extent of the phenomenon cannot be assessed from present evidence, but it should be addressed.

From the point of view of the project, the aim is to "demonstrate" the advantages of fish farming. If these farmers can produce successfully produce fish, they thus serve as a demonstration. This demonstration effect has not, however, been established. There is a possibility, given evidence from elsewhere, that ordinary farmers will feel the example is simply not relevant to them.

For the rich farmers, the value of receiving credit of a few thousand shillings is unclear, especially when one takes into account interest repayments. Possibly they expect to default. More likely, they are responding to the view that - for richer people at least - a loan is always desirable. The fact that such farmers complain that they should be given loans as cash rather than in kind indicates that they may want the loans for something other than fish farming.

As an aspect of the scheme is that credit recipients should now be the focus of extension visits, in addition to credit funds being possibly misplaced, scarce extension capability may be disproportionately directed to those who **may need it less. Again it should be stressed that the phenomenon was identified but not quantified.**

Thirdly, and related to the recent drive for more participants in the scheme, some farmers have been enlisted before the project is ready and able to supply the promised inputs (fingerlings). This problem is localised and being addressed. Input supply is a vast improvement over the previous credit scheme.

Fourthly, feed supply has not been entirely consistent. Again, it is felt that this problem will be overcome. Cases of feed supply problems are sporadic.

2.2.3 Fingerling Supply

In Luapula, fingerling supply and distribution were seen as an important role for the Department of Fisheries. Because DoF was completely incapable of doing this, expressed demand was not met, yet a culture of dependency continued to inhibit the development of a private market. In the Lake Basin area, the government and project has also in the past attempted to supply subsidised fingerlings to all farmers with limited success. Both production

The Lake Basin project is now making a serious attempt to move away from this approach to fingerling supply. Prospects are encouraging. While the project goal officially remains the supply of 785,000 fingerlings per year from the seven fry production centres, there has been a change in direction with support and encouragement to the private sector. Farmers have been trained in fingerling production and supplied with nets and fish cans at the same loan conditions as other credit farmers. Fingerling producers expect to sell their fingerlings at around ksh2 per fingerling which is slightly lower than the current LBDA price when transportation costs are included. It is intended that the FPCs will remain a

source of genetically sound tilapia for distribution to private fingerling producers.

As demand for tilapia fingerlings from the fry production centres is reducing', emphasis has changed to the production of catfish fingerlings. It is intended that sales of these should ensure the economic viability of the FPCs. Reportedly, demand for catfish fingerlings is high; their growth rate and market price is more attractive than that of tilapia and they are useful to control tilapia overpopulation. There is also a demand for catfish fingerlings as bait for the Lake Victoria fishery.

The success of the new approach depends on training being good enough for farmers to become competent fingerling producers. This has yet to be proven, as the first training took place less than a month ago. However, it is felt that the approach to fingerling supply is appropriate.

2, Reduced demand may be caused by either more private supply or the effects of less active extension. Capacity to produce fingerlings at the FPC has greatly increased in recent months.

The following three sections consider project activities from the perspective of farmers. The project has attempted to create a basis for sustainable fish farming through the training and encouragement of private individuals in both fingerling production and more intensive methods of feeding their fish. Two questions are addressed.

* **First, is this approach likely to achieve the stated objective?**

* **Second, if it does, what will be the effects on other members of the community and on those within fish farming households?**

These questions are considered following assessment of the reasons for digging and managing fish ponds.

The study involved discussions with fish farmers and non fish farmers in Busia, Kisii and Vihiga districts. The focus was a comparison of Busia and Kisii The districts display certain significant differences relating to population density, farming practices and the history of their contact with extension. Kisii district is the most densely populated district (more than 700 people km^2 as opposed to 170 in Busia). This has influenced the development of fish farming and farming practices.

3. THE MOTIVATIONS OF FISH FARMERS

3.1 INCOME GENERATION

Unlike in Luapula, the primary reason for both digging and managing ponds in the Lake

In Luapula farmers have dug ponds for a wide range of reasons. There is a perceived abundance of the resources required to start fish farming, a lack of obvious economic opportunities and a strong desire for fish. It thus makes less sense to ask "why adopt fish farming?" than "why not?". To support the conclusion it was found that few farmers had any idea of the likely cash income from their ponds, despite what they said about adopting for "profit". Where expectations did exist they were wildly unrealistic. Furthermore, very few people were gaining any cash income from their ponds.

The majority of the farmers in the Lake Basin area have a clear (though perhaps slightly optimistic) idea of the likely income from their next harvest. Many supported this with evidence from previous harvests. In addition, there is a willingness to invest cash in the enterprise based on calculations of profit. While in Luapula, the majority of ponds were dug using household labour, it is common for hired labour to be used for pond construction in the Lake Basin area. Farmers also buy feeds for their fish (see section 4).

The income generating motive is facilitated by the fact that marketing is relatively simple. Most farmers live at most a few kilometres from a local market, so do not have to rely on pond side sales. Thus, they are able to choose the time of harvesting to coincide with the most favourable market conditions. In Luapula, local markets scarcely exist and distances to the district centres can be as much as 100km with transportation both rare and expensive. Thus, although in both places the demand for farmed fish is theoretically high because of reduced availability of fish from natural fisheries, this demand is only clearly manifested in the Lake Basin area.

The significance of fish farming to adopters is revealed by their prioritisation of it in relation to other income generating activities. For those who had already been selling fish, all but one ranked fish farming as their second or third most important income generating activity. It generally came after activities such as tea growing, dairying and maize production. All farmers who were loan recipients predicted that with improved feeding, fish farming would be the most important income generating opportunity. Obviously some caution is warranted in paying too much heed to this last finding, given the theme of the questioning.

3.2 FISH FOR FOOD

Whereas in Luapula the most commonly stated reason for adopting fish farming is that of household food consumption, this is not the case in the Lake Basin area. In Luapula, the attraction of fish for food was less to do with increased overall consumption and more with the fact that the fish would be available when needed. Most farmers met in the Lake Basin area (more than 90%) claimed to only eat the fish from their ponds when doing complete harvests for sale

Evidence for this phenomenon exists in the adoption by certain farmers of the language of "development" ("community", "participation", "grassroots") - even if these were the only English words they know, by the fact that most fish farmers are also adopters of other externally promoted and assisted technologies, and by the frequent and insistent demands for loans and assistance.

In the Lake Basin area, farmers were questioned concerning their participation in other projects and development schemes, and on their perceptions of the role / appropriate duty of the LBDA project and DoF. In addition, examples were sought of farmers digging more or bigger ponds than they could ever manage, and of starting the next pond before finishing the last. From such a short visit, it is impossible to assert conclusively the pervasiveness of the effects of development in the Lake Basin region. Nevertheless, impressions emerge.

No examples were found of pond construction beyond the capacity for management. As noted above, most farmers seem to know what to put into their ponds and roughly what they will get out.

In general, donor-assisted schemes are less prevalent in the Lake Basin area than they are in Luapula, where almost half the provincial income was made up of a FINNIDA aid alone. In the areas visited in the Lake Basin, there is encouragement of agroforestry, bee-keeping, zero-grazing, and poultry-keeping by donor-assisted projects and government departments. However, no trend could be identified to indicate that fish farmers were participating more actively in these schemes than other members of the community.

On the other hand a legacy certainly exists from earlier promotion of fish culture by both DoF and LBDA. Because previously LBDA loans were given in cash rather than kind, some people were able to divert the loans to purposes other than fish farming. A **number of farmers were found who clearly thought of loans as something not necessarily to be repaid and therefore highly desirable. This phenomenon was most prevalent in Vihiga district and apparently least so in Busia. Others farmers maintain that fingerlings should be supplied for free as DoF used to do.**

On balance though, the number of farmers displaying an ability and willingness to continue without LBDA assistance probably offsets these trends. It is certainly much higher than it is in Luapula.

3.5 ADOPTION BY GROUPS

With aquaculture, as most development interventions, the advantages and disadvantages of supporting formal groups are regularly debated. On the one hand, it is felt that for some people, most notably women, groups provide an opportunity to overcome the constraints they face as individuals. On the other hand, these groups may become dominated

Success or failure of group approaches to aquaculture arise from the motivations which induce groups to form. Problems invariably arise when formal groups are created in expectation of assistance such as loans or grants. In Luapula, a women's and a youth's

fish farming group existed mainly as conduits for passing loans and grants. Very few fish were produced. In the "youth"" group, acrimonious debate raged over the destination of the grants.

In the Lake Basin area, as elsewhere in Kenya, "women groups"' are a popular form of organisation. Many of these groups have been established for as much as 20 years. Success or failure seems to be directly correlated with the degree to which the primary motivation for formation was income generation or grant acquisition. The groups are also active in fish farming. Most women who have received training from the LBDA project have done so as part of a women's group. Fish farming is usually one among a range of other activities undertaken by the group.

Three women's groups were visited during the study. All three appeared have well managed and currently successful ponds. From such a small sample, it would be unwise to generalise further. It is also impossible to draw conclusions regarding group dynamics and the control of funds from these visits. The disputes in Luapula only became apparent after several weeks residence in the village.

[3]. Most members were over the age of 30.

. Most have several male members. 23

4 CONSTRAINTS TO LONG TERM VIABILITY

4.1 THE EXISTING KNOWLEDGE BASE

In Luapula, a fundamental problem constraining fish farming was knowledge. People dug ponds with inadequate knowledge of how to manage them. The extension service scarcely functioned, so was unable to fill the gaps. Key weaknesses revolved around farmers' sketchy ability to apply the concept of a production cycle to fish farming. Fish farmers tend to treat the fish in their ponds in much the same way as their livestock: left to fend to themselves and slaughtered (harvested) more frequently to meet a special need than because of any concern with

In both Luapula and the Lake Basin area, fish farming is a relatively new development and in each place has followed a similar pattern. Introduced by the colonial government, abandoned after a peak in the early 1960s, and revitalized over the last 5-10 years with external support. In the Lake Basin, through the LBDA, this support has been of rather longer duration, although sporadic. In addition, the government extension service was marginally better resourced. In both places, most farmers have only been farming fish for a few years. The few exceptions who began in the 1960s and 1970s generally had a period when their ponds were abandoned. All of these blamed poor knowledge of how to look after the fish for the lapse.

In the Lake Basin area, evidence of the consolidation of knowledge is apparent. This is uneven, but on the whole the quality of knowledge regarding pond management, especially that of timing of harvesting and feeding, is hopeful. This can partially be attributed to the very different conditions under which fish farming is adopted (see section three on motivation).

In all three districts visited, there is visible evidence of similar livestock management practices to those in Luapula: small livestock, especially goats, are left to roam around. As in Luapula, animals also play an important role as insurance against contingencies and large expenses such as medical or school fees. Chickens may well be saved and slaughtered as a mark of respect for a visitor. Nonetheless, more intensive and controlled management practices are also apparent. In Kisii district this trend is most advanced. Here, high pressure on land has led to virtually all animals being fenced (and hence more carefully fed). A few farmers have been experimenting with zero-grazing cattle with assistance from the livestock department. Furthermore, levels of livestock ownership overall, particularly of cattle, are higher than in Luapula.

Critically, livestock in the Lake Basin area are used in a way that is rare in Luapula Province. Animal manure is applied as fertilizer to vegetables and maize by virtually all farmers met. In Luapula, belief in the efficacy of chemical fertilizer alone is firmly entrenched. In addition, people like to drink cow's milk and several farmers are making a good income from dairying. This was never encountered in Luapula. The only dairying undertaken was for an aid project which supplied the urban population.

In summary, while having a similar background in fish farming, the knowledge of livestock management accompanying its development in the Lake Basin area, is more

favourable than it was in Luapula. This is evident in better management practices, as detailed below.

4.2 MANAGEMENT PRACTICES

Harvesting

Of the farmers met in Busia district, all had harvested or were planning to harvest, at regular 6-10 month intervals. The reason given was "that is when the fish are grown". Variation was partly accounted for by the state of the market. Thus, people would crop when they saw prices were high because of shortages. In Kisii, a few farmers were uncertain about the growing time of their fish. In Luapula, it was not uncommon to find farmers who, after

In Luapula, farmers also had problems finding efficient methods of cropping. The extension service was not in a position to help. In the Lake Basin area, there is a strong expectation from farmers that they will be assisted in harvesting by the project. Each district has a net which it is prepared to hire out to farmers. Concerns about the dependency created by such practices are offset somewhat by evidence of farmers beginning to form their own societies for the purchase of nets (which they hire to members and non-members). In Kisii district, there are still farmers who believe they cannot harvest their ponds without the participation of a member of LBDA or DoF. This is partly a legacy of the earlier restrictive role of DoF.

Few farmers practice intermittent harvesting of their ponds for household consumption. Rather, the farmers report that ponds are completely harvested at the end of the production cycle and restocked. Obviously the truth of these statements cannot be ascertained. What is important is that the farmers interviewed apparently possessed a well developed concept of a production cycle.

Feeding and fertilizing

An aim of the credit scheme is to increase pond productivity through the use of higher quality, purchased feeds. This builds on the existing knowledge of the need for inputs. Both credit and non credit farmers tend to use at least some purchased feeds in their ponds. Unlike in Luapula, reliance on vegetable wastes and leaves alone is rare. This reflects the overall difference in investment in the two areas: in Luapula, the adoption of fish farming is not perceived as a cost or a risk, but inputs are accordingly restricted. In the Lake Basin area,

The types of feed used vary according to area. In Busia district, rice bran is locally available and recommended as a fish feed. In Kisii, people rely on a wider variety of feeds which are on the whole less readily available.

The most commonly stated problem regarding pond management in both Kisii and Busia is access to feed. A network of private feed suppliers has been established through the project to address the problem. The scheme currently has teething problems. In particular, feed suppliers are apparently reluctant to supply to non credit farmers. A number of farmers complain that they have to pay bicycle couriers as much as 30% of the

cost of the feed in order to collect it for them. In Kisii, rice bran is not available. Farmers use maize bran and buy ***omena,*** a small cyprinid fish from Lake Victoria. Omena is also used as human food, so the decision to use it as a fish feed may indicate relative affluence of the fish farmer (see section five). On the other hand, the project suggests that spoiled omena is used, which may be deemed unfit for human consumption.

Prices of feeds vary enormously and are constantly rising. It is therefore impossible to provide a precise statement of expenditure. To give an indication, a 70kg sack of rice bran is about kshl50 in Busia, and ksh240 in Kisumu. Other processed feeds sell for as much as ksh600 a 50kg sack. With rice bran, the amount applied is around 1 kg per 100m? per day.

In Luapula, application of manure was sporadic at best and frequently non existent. This partly reflects the low levels of livestock ownership but was also caused by poor knowledge of the value of manuring ponds. In the Lake Basin area, the majority of ponds seen had well filled compost cribs. A question arises concerning the trade-off between manure use for fish farming and that for other crops. As noted, farmers are not so reliant on chemical fertilizer for their maize and vegetables as they are in Luapula. They prefer to use cattle manure because chemical fertilizer is so expensive. Most suggest the conflict is minimal because manuring of field crops is done on a once-off basis.

In the 1991 evaluation of the Lake Basin project the lack of promotion of techniques of integrated management is lamented. At the level of the FPCs this is beginning to take place with the introduction of sheep and chickens. Two thousand chickens are ordered for both the FPCs and farmers. Among farmers currently, apart from the use of cattle manure in ponds, few examples were identified of integrating ponds with other aspects of the farm. In a few cases, ducks were swimming on ponds. One farmer claimed to use mud from the ponds on his vegetables. A notable exception is a farmer in Vihiga district who has constructed a $25m^2$ pig and chicken house over his pond which will be stocked with eight piglets.

4.3 DROUGHT/FLOODING AND ANIMAL PREDATION.

In Luapula, a serious impediment to the long-term viability of fish culture were "natural" constraints such as animal predation, drought, and flooding of fish ponds. Though to some degree unavoidable, these problems also arose through poor pond siting and maintenance. Animal predation is a plausible explanation for the lack of large fish in a pond when the real reason may relate to management. Badly slashed grass and shallow ponds encourage birds, otters and snakes. In one area, many ponds dried completely towards the end of the one long dry season. Farmers had not adapted them to seasonal production and were apparently taken by

In the Lake Basin area, problems of predation certainly exist, although reportedly not on the scale of Luapula. No examples were found of ponds drying up. This is partly attributable to the more even annual rainfall distribution than in Luapula (2 rainy seasons). Also, most ponds are located in valley bottoms with perennial supplies of water rather than in dambos with less reliable springs and groundwater. In Busia, some ponds are adapted to seasonal production.

4.4 THEFT

As with predation, theft by humans is a plausible explanation for low productivity. It is also closely related to pond location: clearly the closer the pond to the house, the less likely it is

Farmers in the Lake Basin area also complain of theft. It is impossible however, to quantify the problem or relate it in this case to social control or degree of integration of settlement. Several farmers said they did not hook fish for household consumption because they believed it would encourage others to do the same from their pond. One man said he helped some young boys dig a pond to discourage them from stealing from his. Although people are able to identify with villages, settlement in the region, particularly around Kisii, is virtually continuous. The high density of settlement may possibly discourage theft.

4.5 "SOCIAL CONTROL"

It would be impossible in a study such as this to conclusively identify (or dismiss as absent) the "levelling mechanisms" which are supposedly impediments to aquaculture development throughout Africa. From Luapula it was concluded that a simple distinction between "traditional" and "modem" societies misrepresents the complex ways in which people interpret social phenomena. Furthermore, no evidence was found of either a wish to avoid social obligations on the part of fish farmers, or the operation of "levelling mechanisms" such as witchcraft to specifically control them. Although witchcraft and jealousy were prevalent,

In the Lake Basin area, no evidence of social control or levelling was found in relation to fish farming (or any other method of wealth accumulation).

4.6 CONSTRAINTS TO LONG-TERM VIABILITY: CONCLUSIONS

The clearest indication of the likely sustainability of fish farming in the Lake Basin area is visible evidence of pond management. The majority of ponds seen were well constructed in ponds is either slashed or kept short by grazing animals. Furthermore farme-s have a good knowledge of the technology. More importantly perhaps, the farmers displayed a confidence in their ability to continue without assistance. Where this was in doubt, requests for training in more technical aspects of fish farming such as sexing of fish, were prevalent.

This generally positive conclusion is mitigated slightly by the difference between Busia and Kisii districts. In Kisii, extension has either been less efficient or is coping with a more damaging legacy from earlier promotion attempts. Farmers with poorly managed ponds were encountered who claimed they were waiting for free DoF fingerlings (as in Luapula). The DFFE assesses that only half of the farmers would continue without assistance while many of the rest still believe that the fish in their ponds do not really belong to them. The balance between the two causes - poor extension or the earlier legacy - cannot easily be assessed in so short a visit. What is clear is that in both places the beneficial effects of extension based training and information rather than gifts are

beginning to be seen.

5. THE EFFECTS OF ADOPTION AND THE ADOPTION PROCESS

Throughout the history of the project, no consideration has been given to the effects of adoption on both adopters and non adopters. The assumption is made that increased production of fish is a good thing. As it seems likely that the project may succeed in meeting this objective and may even create a sustainable basis for fish farming in the region, this is examined. Given that fish farming is justified on the basis of the needs of supposedly disadvantaged groups, it is important to find out:

1) Does fish farming benefit such groups?

Part of this analysis involves acceptance that not all members of a household will benefit equally from any activity. The understanding of intra-household decision making and control of resources obtained from a limited study such as this will be correspondingly limited. Conclusions are therefore highly impressionistic and no substitute for more detailed study.

5.1 WHO ADOPTS?

In Luapula, fish farmers tend to be slightly better off than others in the community in terms of asset and livestock ownership. They are also slightly better educated and much more likely to be active participants in social and political activity than non fish farmers.
They are overwhelmingly men. Women tend to be excluded through problems in access to land, to

This trend is broadly replicated in Kenya. Wealth ranking exercises revealed that fish farmers could not be identified as coming from an "elite" within a community. Notable exceptions exist (see section 2.2.2 above) but generally they fall within middle rankings. No **fish farmer was found who would be classified as very poor according to local definitions (unable to feed or educate children/forced to do regular piecework/with inadequate land). Even more than in Luapula, few women have fish ponds in their own right.**

5.2 INTRA-HOUSEHOLD LABOUR EFFECTS OF AQUACULTURE ADOPTION Also as in Luapula, no negative effects were identified in terms of the diversion of male labour from possibly more productive tasks. In fact, as ponds are more likely to be constructed using hired labour than in Luapula, there is less of a chance that pond construction will conflict with other activities. Pond maintenance takes up a relatively small amount of time and did not present a significant burden to either men or women. Indeed, for both men and women, one of the principal attractions of fish farming is the relatively small amount of time required for maintenance.

As in Luapula, the wives of fish farmers take an active part in pond management. On **average, more women than men took overall responsibility for pond management, especially feeding. In polygamous households, it is common for one wife to be designated as pond**

manager and for her husband to only participate when it comes to sharing of the product. Given the significant role that women play in pond management, the inattention given to them in training and extension is shortsighted.

In Luapula, there was variability in wives' willingness to participate in fish farming activities, depending on their own perceptions of vested interests. Where a greater part of the product was marketed, wives took a less active role. This phenomenon was not apparent in Kenya, where in most cases, fish is intended for market. On the other hand, the fact that women tend to do the marketing (which is not the case in Luapula) supports the overall conclusion that women will contribute labour when they see this to be in their interests.

5.3 CONTROL OVER RESOURCES AND DISTRIBUTION OF BENEFITS. Income to a household does not necessarily benefit all household members. Furthermore, household structures vary. For example, in Busia district, polygamy is common. It is often the case that one wife will manage the fish ponds and the sharing of benefits is then negotiated. More information is required on how this works in practice.

There is some evidence that with increased production and marketing, household consumption of fish may actually decrease. Humphreys et al (1993) reported that among credit fish farmers, only 18151 continued to consume fish after their loan, while 33 stopped altogether. Of those who continued, 12 reduced their fish consumption. These findings are in line with discussions with credit fish farmers, nearly all of whom reported that they no longer take fish from the pond for household consumption. On the other hand, such farmers usually continue to buy fish from the market. Fish are eaten from the ponds only when they are harvested for market. Paradoxically, therefore, for those households with lowest productivity, where the few fish produced are consumed in the home, the marginal nutritional benefits may be higher.

The intra-household effects of fish farming depend partly on who controls the harvest and the resulting income. In most cases, women take the fish to market (or intend to do so if the pond is not harvested). The destination of the money raised varies immensely. On the whole it is reported that it is reinvested in farming activities. Frequently it is used for school fees. In only one case did a farmer report that he simply banked the money.

5.4 COMMUNITY LEVEL EFFECTS

5.4.1 Community resource conflict

in Luapula, fish farming was the source of a range of conflicts arising from use of common property resources. Fish ponds were constructed in areas which had alternative uses for non fish farmers. In particular, conflicts arose over drinking water sources and cassava soaking holes. In Kenya, where all fish farmers have ponds on land to which they have individual title,

5.4.2 Nutrition and food security

consumption. This is just a bonus. The majority of farmers met were already able to buy fish in the market on a weekly basis, which was not affected by the adoption of fish farming. Only one person obtained fish from the river.

For the poorer people in the community, who to not have the funds to buy fish, fish farming is thus unlikely to make much of a difference to their wellbeing. Cultured fish sell for higher prices than those from the Lake. Production is unlikely to be sufficiently high to affect these prices. Omena from the Lake is a valued source of protein and sells for half the price of tilapia. It is thus more likely that this is what the poorer people will eat, rather than cultivated fish.

6. CONCLUDING COMMENTS

Many of the findings from the Luapula study are relevant and applicable to the Lake Basin project. Significant differences exist in terms of project organisation, the circumstances under which fish farming has developed, and the likelihood of long termterm viability. Nonetheless, certain general conclusions emerge.

1. *If fish farming is to be viable in the long term, a knowledge-base must be created for sustained productivity. Widespread extension support through a specialised fish culture service is not feasible. Alternatives must be found.*

In both Kenya and Zambia, there has been an attempt to support fish culture through extension and accompanying support services such as fingerling supply. This has proved to be unworkable due to institutional constraints which projects acknowledge but fail to address. Its greatest effect is to create an expectation of assistance among fish farmers, and a view of farmer dependency among extensionists. The Lake Basin project has made significant steps to transcend this problem through the direct training of farmers in fingerling supply, an attempt to ensure the commercial viability of fry production centres, and the introduction of a credit scheme designed to boost productivity rather than encourage the digging of fish ponds. If the plan of training groups of people locally is fulfilled, this will contribute to the overall objective.

Weaknesses in the current project arise in two main areas. First, there is a failure to pay adequate attention to who are benefitting from the credit scheme. The training needs of the wives of fish farmers, who are most often the main pond managers, have not been fully taken into account. Both training and extension need to be sensitised to this. Also, it is not clear how much better-off farmers could betaking advantage of the limited extension support available.

Second, there are weaknesses in institutional relationships which are not really within the control of the project as it stands, but should have been addressed in planning. Little or no attempt has been made to offset the problems in the relationship between the Department of Fisheries and LBDA, leading to replication and occasionally undermining of the LBDA work.

2. *In neither Kenya nor Zambia has adequate attention been given to the training in fish farming of agricultural extensionists.*

The location of fish farming under the Fisheries Department rather than Ministry of Agriculture neglects its closer relationship to farming than to fishing. Agricultural extension is far better resourced than that for aquaculture. Fish farming expertise should therefore serve as advice to agriculturalists rather than maintaining a niche within fisheries.

3. *The decision to support fish farming should take into account the prevailing socio-economic and technical environment. Key issues are the dynamism of the local economy, marketing, and access to resources.*

In Luapula, many of the problems in fish farming arose from poor pond location and inadequate management. These in turn were partly caused by the fact that perceived abundance of land and limited income generating opportunities meant that the adoption of

fish farming was not a decision under weighed constraints. The situation in the Lake Basin is very different. Pressure on land is much higher and marketing is well developed. Under these conditions it is more likely that farmers will adopt for reasons of income. Their management practices are accordingly more highly motivated. In both places, the phenomenon of people adopting fish farming because of associations with assistance is present. It is less obvious is the Lake Basin area.

4. *"Success" in fish farming is assumed to mean increasing and sustained production of fish. This does not necessarily coincide with a common rationale for fish culture: the improved nutrition of those with insufficient protein intake. Overall increased availability does not imply improved access for those most in need.*

In Luapula, very little fish was being produced by fish farmers. Many adopters were people who were already obtaining significant quantities of fish from elsewhere. The less "successful" fish farmers (in terms of productivity), were those for whom the few fish consumed within the household made more of a difference. In Kenya, higher levels of knowledge, reinforced *by* **a strong market orientation for fish farming, endorse this conclusion. More fish may enter the market, but this does not imply they are eaten by those without access to other sources of fish.**

5. *Given the above, support for fish farming must ensure that there are not negative* ***effects*** *for non* ***adopters and members*** *of fish farming households.*

Key issues to determine relate to intra-household labour use and the control over the products of fish farming. It appears that in both Kenya and Zambia, labour contributions to aquaculture are not sufficient to be an impediment to the well being of household members other than the pond owner. The control of the products of fish farming is highly variable. Increased commercial orientation of fish farming may lead **to decreased household consumption of cultured fish. This is offset somewhat by the fact that fish farming households already buy fish (Kenya) or catch it in rivers (Zambia).**

In Zambia, common property resource control is an important consideration in aquaculture development. This is not the case in the Lake Basin area.

b. Basing project objectives on production of fish or number of fish farmers is pointless where such information cannot be effectively gathered.

In both Luapula and the Lake Basin area, data relating to pond productivity is acknowledged as likely to be wildly inaccurate. Although a database was set up in the Lake Basin area, its maintenance is a costly and time consuming job with debatable benefits. It is probable that records are distorted by both extensionists and farmers. Immediate objectives should relate to the training of agricultural extensionists and the holding of adaptive, appropriate, training for farmers. In addition, careful monitoring should take place of who those farmers are. The long-term objective of creating a knowledge-base which outlast projects and assistance can only be assessed well after the departure of the assistance.

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