

"MY POND HAS NO FISH": AQUACULTURE DEVELOPMENT IN LUAPULA PROVINCE, ZAMBIA.

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PREFACE

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This report presents findings from the ODA supported research project R4681, Socio-Economic Dimensions of Aquaculture in Africa. The project was funded through the Institute of Aquaculture, Stirling, and carried out jointly by the University of Sussex and the Institute of Aquaculture. The research team consisted of Jock Stirrat and myself at Sussex, and James Muir and Alan Stewart at Stirling.

The aim of this research was to identify those factors influencing the success or failure of aquaculture projects. An earlier project consisted of a comprehensive review of published and unpublished material on aquaculture in Africa. This resulted in the identification of a series of hypotheses and areas of research interest which formed the basis of the present research.

The literature review had revealed that the majority of earlier studies tended to have a more quantitative and broad focus, with corresponding paucity of depth. The research therefore involved the intensive study of aquaculture development in one particular area and in the context of one project. After surveying possible areas for detailed research it was decided to focus on the ALCOM project and its activities in Luapula Province, Zambia. Over the period of a year, I lived in two villages of ALCOM activity in Luapula Province, while also visiting the ALCOM headquarters in Harare, and the Department of Fisheries/ALCOM in Mansa. Alan Stewart from Stirling provided technical advice in the early weeks of the field work.

Following the Zambia study, two pieces of comparative fieldwork were carried out in Kenya and Malawi. The findings from all three studies are combined in a summary report which should be read in conjunction with the main Luapula study. This summary report also provides guidance for future aquaculture policy.

Numerous people have facilitated the research. I would particularly like to thank: in Harare, Arne Andreasson and Boyd Haight; in Mansa, Andreas Jensen and Jerrick Maluti; the fish scouts; my research assistants Mabel Konde and Katherine Mwape; and of course the farmers of Monga and Chibote.

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EXECUTIVE SUMMARY

Chapter one: Introduction and background

The report is concerned with donor aided aquaculture. It arises from a generalised sense among donors that aquaculture has failed in Africa. The report questions the assumption of project failure and examines what constitutes this failure. It also aims to illuminate the processes of aquaculture adoption at the household and intra-household levels through detailed, village-based research.

A literature review conducted during 1990/1 provided the background to the research. The literature on socio-economic and socio-cultural aspects of aquaculture development has tended to focus on problems of adoption and sustainability within rural communities. Less attention has been paid to the relationship between these and institutional factors.

The present study examines the process of aquaculture development in Luapula province, Zambia. Research was carried out in the context of activities carried out by a donor supported programme, Aquaculture for Local Community Development (ALCOM) and the Zambian Department of Fisheries (DoF).

Luapula has seen a rapid spread of small holder fish farming over the last five years. A wide range of people have dug ponds, often with little advice or assistance. There are more than 700 fish farmers in the province and about 1900 ponds. Though production has not been accurately documented, it is believed to be low.

The study has four principal objectives:

1. To develop an understanding of the reasons why people dig pond and subsequent determinants of their management practices.
2. To assess the intra-household and community level impacts of aquaculture adoption.
3. To examine the context and practice of aquaculture promotion by DoF and ALCOM
4. To assess the response of farmers in rural communities to aquaculture development activities.

These objectives were met through a range of research methods, both qualitative and quantitative, involving residence by the principal researcher in two villages of ALCOM activity.

Chapter two: The context of field work.

Luapula province has been described as a typical rural backwater. For most of the twentieth century it has been a source of male labour for the mining industry. Main economic activities are agriculture and fishing. The principal cash crop grown is maize, while Luapula's fisheries, centred on Lakes Mweru and Bangweulu, provide approximately 40% of Zambia's fish. Almost half of the provincial population of 500,000 are thought to be dependent on fishing for their livelihoods.

The majority of the people of Luapula follow a matrilineal system of kinship and social organisation. There has been considerable debate about the extent to which this has been eroded by the penetration of the market and values of individualism. This debate is pertinent to fish culture inasmuch as "traditional levelling mechanisms" are frequently thought to be impediments to aquaculture development.

An important force for social change over the last two decades has been the activities of a wide range of aid agencies. Luapulans have become accustomed to associating both aid projects and government departments with an expectation of assistance.

Fish farming is estimated to produce about nine tons of fish a year in Luapula, compared to some 24,000 tons from natural fisheries. Despite the overall provincial significance of natural fisheries, there are a number of justifications for support to aquaculture development. Principal among these is a nutritional/protein deficiency rationale: the majority of fish produced from the lakes leaves the province, while there are still pockets of protein malnutrition, especially in the plateau areas. Other rationales centre on income generation and the diversification of rural livelihoods. Historically, aquaculture has been promoted from outside the province, first by the colonial government, later by the Catholic missions and ALCOM.

Village based research took place in Monga area, Mansa district, and Chibote area, Kawambwa district. The principal differences between the two areas in terms of agriculture and income generation arise from Monga's much closer proximity to Mansa, the provincial capital. Monga has a higher population density than Chibote, and few people still practice *citemene* slash and burn cultivation. More people grow hybrid maize with inputs in Monga than do in Chibote. In Monga there is also a greater tendency to grow European vegetables for sale. These factors reflect the marketing problems faced by farmers in Chibote, which is 80km on ungraded road from the district centre and 300km from Mansa. Farmers in Chibote have historically been dependent on the Catholic mission for marketing of agricultural produce. Other sources of income are brewing beer and trading.

The most common household form in both research sites is of a married couple with their dependent children, and an average household size of four people. Nonetheless, because of the transitory nature of many marriages, it is often the case that not all children are the product of that particular marriage. Similarly, today's nuclear household may not be identical with tomorrow's. Slightly less than a third of households are headed by women alone.

Fish culture in both Monga and Chibote is a recent development. Both places are thought to be suitable for extensive aquaculture because of low levels of livestock ownership and the demands of other farming. Aquaculture was introduced by Chibote by Catholic priests and spread rapidly with their encouragement. The White Fathers left in 1988, and by 1991 enthusiasm was already waning and ponds were being abandoned. In Monga, a small group of farmers sought the advice and assistance of DoF. Following their receipt of a grant from the Ministry of Youth and Sport, there has been a rapid expansion of fish ponds.

Chapter three: Digging ponds

Questions of motivation

In Luapula, there is an perceived abundance of the resources required to start fish farming, a lack of obvious economic opportunities, and a strong desire for fish. It thus may make less sense to ask "why adopt fish farming?" than "why not?".

The legacy of previous development interventions has a profound influence on the way that rural communities respond to the latest one. Within rural communities, individuals have created their own interpretations of "development" and respond to those interpretations in a strategic manner. The process of aquaculture development should be seen as part of this response. People in both of the research sites have learned to adapt their behaviour in anticipation of where they see potential benefit, particularly in terms of the perceived priorities of donor agencies and government departments.

One aspect of the legacy of development is the hope for and expectation of loans with little or no relationship between size of loan and potential capacity to repay. The fact that some people adopt fish farming according to an assessment of how this will be viewed by others is significant because it influences subsequent management and sustainability of fish farming.

Few people currently gain cash incomes from their ponds. Though this is not an indicator that this was not an initial motivation, closer examination of local views of "profit" are required. Small scale fish farmers in Luapula do not make calculations based on likely inputs and outputs to their ponds. Most have little, if any, conception of likely yield or potential markets. Use of the terminology of "profit" and "business" is however closely related to self-identification by fish farmers as being "progressive" in development jargon.

All farmers acknowledge that European vegetables bring in more money than fish farming, and in a shorter period of time. Fish farming has the advantage of having lower cash costs, requiring less labour after pond construction. Critically, it also potentially provides a convenient source of a more appealing relish than vegetables.

The most commonly stated reason for adopting fish farming is that of household food consumption. Fish is always ranked among the three favourite "relish" ingredients, along with meat and chicken. This ranking is inversely proportional to the frequency with

a problem than security of tenure is.

Success or failure of group approaches to aquaculture are determined by the pre-existence of practices of collective or communal organisation. Aquaculture promoters may implicitly assume the existence of such practices before they are empirically established. In both Monga and Chibote, a distinction can be made between informal groupings of friends and relatives for a particular productive process, and those which are formed in response to a particular external influence. Numerous examples were found of people failing to organise around supposedly mutual interests. Those clubs which were formed largely in response to external influence have been characterised by failures of cooperation. Members and non-members usually had very different ideas about reasons for the group's formation and the rights and obligations of the executive.

Chapter four: Managing ponds

Monitoring of case study households revealed that lack of knowledge or unwillingness to use certain resources in fish farming were often more significant constraints to management than absolute unavailability of inputs. In Luapula, where control of certain resources is not restricted to individual farming households, quantification of resource availability can only be indicative at best. The required resources for fish farming are generally not perceived to be in short supply and formalised (eg financial) mechanisms for access are not the most prevalent.

In Chibote, a private market for fingerlings has failed to develop, partially because farmers continue to expect that they should be supplied with fingerlings by either DoF or the mission. There is a great disparity between subsidised DoF fingerling prices and those selling privately in Monga and Kawambwa. Where fingerlings have been available from DoF, this results in a dependence on the department which is not currently in a position to meet. Because of these factors, stocking rates in all areas are generally lower than those recommended by DoF and ALCOM.

Variations in frequency and type of pond feeding reflect both availability and a combination of other demands on labour and knowledge about appropriate feeds. Most farmers expressed worries about shortages of feed during the dry season. Farmers are very keen to feed maize bran to their fish. Maize bran is not widely available, but there are persistent demands that DoF should supply at least transport to those farmers who are willing to buy it. Ideas about the likely cost of the maize bran are far from the reality of market price.

Frequency of pond feeding is determined by the fact that it is invariably an activity which is fitted in around other demands, both social and agricultural.

Ponds are generally underfertilised. A principal cause of this is limited knowledge of possible uses of animal manure. Although livestock ownership influences the extent of pond fertilisation, it provides no guarantee that manure will be used in ponds. Furthermore, there is no evidence that when livestock is owned and manure not applied to ponds, that this is because the manure is being used for other purposes. Non-ownership of

livestock is not necessarily an indicator of no access to manure for pond fertilisation.

Regarding harvests, there is an enormous disparity between the two research sites, Monga and Chibote, in terms of frequency of pond harvests. Between November 1991 and August 1992, while no farmers in Monga had taken no fish from their ponds, 41.3% reported no harvest in Chibote. A further 16% of farmers had effectively abandoned their ponds in Chibote. Of those managing their ponds in Chibote, less than 9% sold any fish at all. More than 50% were selling at least some fish or fingerlings in Monga area. Most households harvested for relish between one and three times in the period November 1991 to August 1992.

Farmers' reluctance to harvest their ponds is partly the result of poor knowledge of the growth and breeding patterns of the fish, combined with the tendency to treat the fish ponds as assets and savings banks. There are similarities between the view concerning the fish in ponds and those concerning small livestock which are generally left to fend for themselves. Hence the fish are not managed and harvested according to a production cycle. Harvesting failure is also caused by deficiencies in the techniques used to capture the fish.

The principal stated reason for abandonment of ponds is animal predation. In Monga, animal predation has arisen following the drying of fish ponds during the dry season. In Chibote, predation is more closely associated with distance of ponds from houses and overall levels of maintenance (for example, grass around ponds is not slashed).

Although theft from ponds is a significant problem, a certain amount of what is viewed as theft includes animal predation, and is a plausible explanation for the results of poor management practices. Complaints of theft from ponds and theft generally are much higher in Chibote centre than in the outlying villages or in Monga. The reasons for this relate to opportunity and social control: ponds in Chibote are generally located further from the houses, so are less easy to guard; in Chibote, people are more likely to shift away from their usual home both in search of work and for citemene during the dry season; social control mechanisms are much looser in Chibote centre, partly because of the size of the place and the frequent to-ing and fro-ing of strangers.

The potentially inhibiting role of norms controlling reciprocity, accumulation and appropriate behaviour, has been widely noted. However, a simple distinction between "traditional" and "modern" societies misrepresents the complex ways that people interpret social phenomena. In Luapula, accumulation as such is not socially condemned. Jealousy and suspicion may arise if the accumulation is not easily explained. More important though, is that people should not step outside conventions concerning boastfulness and deviousness. The need to meet social obligations is not avoided by fish farmers and is not a significant constraint to pond harvesting, as it is seen by some extensionists. No evidence was found of fear of witchcraft as a disincentive to aquaculture adoption. This is both because of the unprovenness of the activity (fish farmers do not separate themselves from the rest of the community), and because water is regarded as a poor conductor of magic.

Chapter five: The impacts and effects of aquaculture adoption

The chapter focuses on intra-household as well as total household effects of aquaculture development.

With each harvest for relish, the fish farming family could expect to eat two-three meals. No evidence was found of preserving fish and considerable amounts were given away to friends and relatives. Compared to overall availability of fish to the fish farming household, from both fishing and purchase, cultured fish make up a small proportion of the diet. Furthermore, those who harvest most frequently for relish are also often obtaining significant quantities of fish from elsewhere. The nutritional impact on such households is therefore felt less strongly than that on those who, though less successful in fish farming, are without access to other sources of fish.

At low levels of production, where there is insufficient surplus to be marketed, the nutritional benefits of fish farming are felt by all members of fish farming households.

Regarding sales, in Chibote area, less than 9% of those managing their ponds in August 1992 had sold any fish at all since the previous November. In Monga, though more than half of the households had sold at least some fish, incomes were low with the majority reporting incomes of between 100 and 500 kwacha. Despite its low overall significance compared to other farming activities, fish farming income may come at a time when other income generating opportunities are limited.

At current levels of production, the income from fish farming contributes to the well being of members of the fish farming household other than the pond owner. There are indications that the higher levels of production become, the more likely it is that fish farming income will be diverted to other, less directly beneficial areas.

The study considered the effects of aquaculture adoption on both male and female labour. Male seasonal labour peaks are interspersed with considerable periods of low (agricultural) labour demand. A conflict between pond construction and other agricultural activities is therefore by no means necessary, because pond construction is generally fitted into other tasks rather than the other way round. However, in households where farmers have constructed several ponds, there is some evidence that this encroaches on other agricultural activities.

Women and children spend substantial amounts of time on pond management activities, most frequently when they are in households where a smaller proportion of the product is marketed. Where the expected destination of a pond harvest is household relish, women are more likely to have an active decision making role. Participation in pond management activities by women partially reflects their own perceptions of their vested interests.

Community level resource control effects of aquaculture adoption were explored. Generally people perceive there to be an abundance of the resources required for fish farming: land, water, pond inputs. However, as the value of such inputs alters under pressure from both expansion of fish ponds and other socio-economic changes, competition and conflict over resources becomes evident. In Monga area such conflict is manifested in disputes over drinking water sources and places for women to soak cassava.

Chapter six: The department of fisheries.

The potential for warm water fish farming in Zambia is thought to be good, due to favourable physical and institutional characteristics. Government rationales for aquaculture tend to focus on its nutritional role: the potential to contribute to the narrowing of a protein gap originating in reduced capture fisheries production and rising population. To some extent, government promotion of aquaculture has also been donor-led. In 1987, foreign investment in Zambian aquaculture was projected to be some 36% of total investment. Between 1979 and 1988, more than US\$7,400,000 was allocated to aquaculture in Zambia.

Though government and donor rationales for aquaculture development are broadly in line, there are particular areas of disagreement. One area lies in the extent to which donor money should support government fish culture stations.

Fish farming has been promoted since the 1940s, initially by the colonial government. The colonial introduction of fish farming resulted in the proliferation of rural ponds.

Fish culture was estimated (in 1987) to contribute approximately 5% of total supply of fish. There are thought to be approximately 2000 fish farmers in Zambia, but records are poorly kept and this figure is at best a rough estimate.

The 19 fish culture stations in the country are supposed to be the national backbone for aquaculture development, offering advice and provision of fingerlings. Many of these are in a poor state of repair and, according to the government, only those receiving foreign donor assistance are capable of meeting their task. Training facilities consist of a Fisheries training centre for fish scouts at Kasaka near Kafue and a training centre at Mwekera. Fish scouts undergo a one year training in general fisheries, of which fish culture is only a small component.

Given weaknesses in extension for fish culture, and the more widespread nature of the agricultural extension service, it makes sense for there to be greater integration of agricultural and aquacultural extension. Some agricultural assistants have been trained in the rudiments of fish culture. However, attempts to integrate training are still in their infancy.

In Luapula, the main DoF objective is "maximisation of fish production through rational exploitation of fish stocking". This focus reflects the fact that Luapula is the principal producer of fish in Zambia through two major lakes, and faces declining yields. A major role for DoF is that of policing natural fisheries to prevent use of illegal gear and over exploitation of fish stocks. Away from the lake areas, people have only limited access to fish. This, combined with evidence of protein deficiency, and physical features which justify fish farming are the common justifications for support to fish culture in Luapula.

Due to resource constraints, relations with donors are critical to DoF. Donor collaboration can provide important funding for smoother running of the department. It

may also absorb time and staff with questioned benefits. ALCOM and DoF objectives and target areas were not entirely coinciding. Although the programme appeared as a donor in the province, tangible benefits to the department were not immediately obvious.

DoF resources include two government fish farms in poor states of repair and one vehicle. The majority (about 30) of fisheries assistants are allocated to natural fisheries. In 1991-2 there were eight fisheries assistants working directly with aquaculture, of whom three were posted in the provincial capital, Mansa.

Fingerling supply and distribution is seen as an important role for DoF. Lack of transport and the poor condition of the government fish farms mean that the department is unable to meet expressed demand.

DoF does not provide credit for fish farming. However, some farmers have obtained loans from the Lima Bank. Because the loan procedure is fairly complicated and requires that farmers have title deeds to land, it is unsurprising that those farmers who have obtained loans are markedly richer and better educated than other members of the community.

Fish scouts vary in pre-training educational achievement and in level of training in aquaculture. Younger ones who attended the course in Kasaka have effectively only a few weeks background in aquaculture technology and little no knowledge of extension techniques. Some fish scouts have serious problems communicating in ciBemba, which is not their mother tongue.

Fish scouts complain of poor promotional prospects, unclear terms of reference, and a lack of the means to do their jobs (principally transport). Correspondingly, other aspects of their jobs are more significant, particularly those relating to salaries and the payment of allowances.

Fish scouts are concerned to impart knowledge to farmers. It is felt that farmers who do not successfully produce fish are lazy and/or incompetent. A significant exception to the belief that all farmers can become fish farmers that women are seen to be weak, powerless, and incapable of adopting the technology.

Fish scouts were uncertain about the reason for ALCOM's presence in the province. The project was thought to be "just research", particularly during its early stages.

Although at a national level there have been attempts to institutionalise links between DoF and the Department of Agriculture, this is still poorly developed in Luapula.

Chapter seven: The promotion of fish culture

The potential for integrating fish farming with other aspects of the farming system in Luapula was already being expressed more than fifty years ago. Colonial officers were keen to promote fish farming for the rural population for the same reasons as it is promoted in the 1990s. Colonial support to aquaculture involved the construction of demonstration fish farms for research and fingerling production. It was thought that adoption by the rural population would be through cooperatives.

In Luapula, Fiyongoli fish farm ran into management problems from the beginning. The problems faced are similar to those described in the 1990s. This was a combination of researchers keen to see their technology working, with scant consideration given to extension to rural adopters, and poor motivation and working conditions of those charged to carry out the work.

The most recent support to aquaculture in Luapula has come from ALCOM. ALCOM was formed in 1986 to elaborate strategies, policies and methodologies for aquaculture development. It is funded by SIDA and Belgium and executed by FAO. The programme operates in the SADC region of southern Africa. Early interim evaluations noted a possible inconsistency of goals between the donor countries who saw ALCOM as principally a research and methodology development programme and host governments expecting more tangible support.

During 1990-93, there has been an expansion of ALCOM staff, including associate professional officers (APOs), with the majority allocated to headquarters in Harare. The expansion has been accompanied with problems of deployment.

ALCOM has operated with a range of "target areas". Within each target area there is one or more pilot project. Some of these constitute studies, while others are more "interventionist". ALCOM displays the ability to take an iterative approach to aquaculture development, adapting and modifying objectives and the means for their achievement. More negatively, this could be seen as a reflex to the programme's own rapid expansion.

Gender is specified as a separate target area. The treatment of gender issues within the programme arguably illustrates the programme's response to donor pressure. A series of activities have been carried out, including studies and international meetings. However, these are at the margins of ALCOM's work, and mostly end up reducing women to a homogeneous group, rather than addressing how - or whether - gender relations are relevant in aquaculture development.

Within the programme, there has been considerable debate about the nature and definition of its "target group". This has been particularly heated over the extent which ALCOM devotes resources to extension materials or to its own self-publicity.

ALCOM project activities in Luapula began in 1989. They can be divided into two distinct phases: 1989-March 1991, and July 1991-mid 1993. These phases coincide with personnel changes and represent shifts in overall project direction.

Over the two phases, a total of 24 separate activities can be identified, of which half were studies, and half a combination of trials, training, and extension activities. The bulk of the extension activities took place during the second phase. Few of the results of the numerous studies were incorporated into extension activities. Indeed many were never even made available in Mansa. The project started in relation to an available body of knowledge, but not in relation to the resources available in terms of staff, expertise, or money.

During the first phase of the project, the ALCOM aquaculturist APO found himself in a position of having to respond to a range of demands and practicalities. Relations between DoF and ALCOM were strained.

There was a gap of three months between the departure of the first APO aquaculturist and the arrival of the second. Of his two years in Luapula, therefore, a significant amount of time was taken up in adjustment to the legacy of the previous phase. Despite backstopping from Harare, the APO had a wide scope to develop his own agenda for the pilot project. This involved increased training of both fisheries assistants and farmers with funding from FINNIDA. The change in direction away from studies and trials resulted in a reformulation of the pilot project document during 1992, with greater attention being paid to the institutional needs of DoF. As it turned out, the reformulation was irrelevant as the APO decided to transfer from Mansa at the end of his two year contract. ALCOM's physical presence in Luapula therefore ended in mid 1993 with the departure of the APO aquaculturist.

Plans have been initiated for a new pilot project to support the further integration of fish culture with agricultural extension in Zambia. It is suggested that Luapula is one area which will receive support for this initiative. At the time of writing, the pilot project had not started.

The Catholic missions have been the other main promoters of fish culture in Luapula. Their efforts have had mixed results. Two main problems are identified: the missions have tended to create a dependency among farmers on externally supplied inputs; and the quality of the technical advice given has been dubious. Mission promotion of fish culture has always been with DoF assistance.

Chapter eight: Extension in practice

There is a knowledge gap among fish farmers which, if bridged, could result in improved practices. The chapter explores how the two main institutional actors, DoF and ALCOM attempted to assist in consolidating farmers knowledge, and villagers' responses to extension.

DoF policy is that the target group for fish farming extension should be all fish farmers, without specification of socio-economic background. In practice, limited availability of transport and personnel has meant that over the last five years, extension for aquaculture has concentrated on areas which have also received development support from ALCOM and other donors. Consideration of DoF extension therefore centres on Chibote, Kawambwa and Monga.

A fish scout was posted to Chibote area with financial support from FINNIDA. His workplan was developed in cooperation with ALCOM. Because of recognised knowledge gaps, training and visits by the fish scout were an important part of proposed activities. Other priorities included the rehabilitation of breeding ponds, census of fish farmers in the area, the scout's supervision of the construction of his own house, and the distribution of fingerlings.

Visits to farmers were sporadic at best, but predominantly non existent. The most significant characteristic of the most regularly visited farmers was that they were also ALCOM contact farmers. Women fish farmers heading households alone were least frequently visited. Interviews with ten supposed motivators revealed that only two of these realised they held this role.

Problems in extension in Chibote arose from poor support to the extension worker, misplaced expectations among farmers, and individual characteristics (including training) of the extension worker. The fish scout to a large extent defined his role in relation to the priorities of the ALCOM aquaculturist, who was the main means of access to resources in Mansa

In Kawambwa, the fish scout also complained of lack of support from headquarters and facilities with which to carry out his work. The quality of maintenance of fish ponds in the area varies according to the regularity of visits by the fish scout. Those in distant areas, which can only be visited infrequently, are in a much worse condition than those which are accessible to the scout on his broken bicycle.

Fish farming in Monga area has spread without regular extension visits from DoF. ALCOM is recognised as the main agent of extension in the area, though activities have centred on on-farm trials and have been limited to a few fish farmers. The majority of fish farmers in the area do not receive extension visits.

The uneven nature of extension support in all areas is accompanied by great variety in pond management practices. The one factor that the more productive fish farmers have in common is the frequency of their contact with the extension service and/or ALCOM. The problem in specifying the direction of the causal relationship between better

management and contact with extension lies in the fact that the farmers selected for most regular contact are also those who are deemed to show most "promise".

Another extension tool has been training courses, organised by DoF and ALCOM. Courses during the second phase of the ALCOM pilot project were financially supported by FINNIDA. Three one day courses, training about 100 fish farmers, were held between 1989 and 1991. Little evidence remains concerning the nature and content of the courses.

In the dry season of 1992, 12 two day courses took place with financial support from FINNIDA. A total of 302 fish farmers were trained. The courses took place in villages and were conducted by the ALCOM aquaculturists and up to four DoF fish scouts. Course participants were selected either by fish scouts, or the local agricultural assistant. The only criterion of selection of participants was that 50% should be women. No course came close to this (17% on average). Apart from the gender imbalance, the participants could be said to be broadly representative of the population as a whole.

No follow-up of the courses is planned. It is therefore impossible to make systematic comment on impacts. The courses were not always ideally designed for the existing knowledge level of the participants, which can partially be attributed to the ad hoc nature of their selection. The courses adapted to changed perceptions of participants' needs. They also served an important training function for extensionists.

ALCOM undertook various other activities which can be construed as being on the borderline between research and extension. Both on-station and on-farm trials were developed. Their dual aim was the consolidation and development of farmer knowledge, and (from the point of view of ALCOM), the discovery of answers to certain technical problems. Trials were conducted on stocking densities, feeding with crotalaria, growth of different fish species, single sex stocking, duck-fish and rice-fish culture. Trials were also carried out on alternative harvesting gear.

Farmers conducting trials frequently were bemused or uncertain about the reasons for them. They were willing to participate, but saw the trials as essentially something under the control of ALCOM. There is no evidence, at least in the short term, that the trials served as demonstrations to other farmers.

Logbooks kept by 30 farmers were seen as both a mechanism for monitoring pond inputs and outputs and as a tool for the farmers to assist in improved management. Though the logbooks were filled in, the ALCOM aquaculturist maintains that the information derived is of dubious value. Furthermore, ALCOM's rationale for the logbooks did not coincide with the farmers' perception of their purpose.

In 1991-2 three fish farmer exchanges took place, in which selected farmers were transported to visit for three days, the ponds of other farmers in the province. The farmers taking part in the exchanges appeared to benefit from the discussions and information sharing and a certain amount of changed practice, particularly with the farmers from Chibote, was noted. However, transporting a few farmers over such large distances (300km) is not practicable as an extension tool. In addition, there are dangers of creating a "clique" of fish farmers who always take part in such activities.

Within the villages, innovation and transfers of knowledge continue to take place regardless of the interventions of outsiders. Examples of innovation relate to both pond shape and to structures within ponds to give shade to the fish.

The tendency for extension to be directed towards male household members assumes a degree of information exchange which should not necessarily be taken for granted. Within the household, marriage is no guarantor that knowledge concerning fish farming will be passed on. At the same time, intergenerational transfers of knowledge are important. Outside of the household, information about fish farming is transferred in a fairly ad hoc manner.

Though contact farmers, in the sense used by ALCOM, do not have an explicit responsibility for transferring knowledge to others, some take on this role voluntarily. Frequently, no "demonstration effect" takes place because other villagers believe that those who are frequently in contact with ALCOM are also being assisted in some way. Because the number of contact farmers with which ALCOM has been working is very small, the impact of the activities can be construed as low rather than negative.

Chapter nine: Conclusions and implications.

The study illustrates that in assessing success and failure in aquaculture development, as with many other development interventions, consideration should be given to the divergent expectations of different stakeholders concerning what a project should achieve and how. In the case of this study stakeholders are farmers, donors, ALCOM personnel, government planners, and DoF personnel in both Mansa and the villages. Before accepting that a project is not working, it is therefore important to assess in whose terms it is not working. This implies a need to move beyond conceptualisations of development projects as neat, bounded entities with straight lines from policy to outcomes. Rather they are arenas of negotiation for both groups and individuals.

In practice, while recent discussions have advocated the abandonment of projects entirely, and their replacement with a flexible, "process" approach, it is likely that donor assistance is likely to take the form of projects for some time to come. With these points in mind, certain lessons emerge from the Luapula study:

-External promoters of aquaculture need to give greater consideration to the motivations and interests of their institutional partners. Weaknesses in government departments are often cited as problems in fish farming projects, but in many cases these might have been predicted.

-Attempts to create a large and properly functioning extension service specifically for aquaculture are impractical. On the other hand, in Zambia, at least there is considerable scope for improving the training of those extensionists that do exist, especially agricultural extensionists.

-Decisions also have to be made concerning extension approaches. Unless measures are explicitly taken to avoid it, adopters and those having most attention from extension are more likely to be relatively resource rich, politically active and male. The benefit to these farmers of adopting the technology is not as great as it is to poorer people. A decision to avoid the tendency towards support for better off farmers implies significant intervention in existing political and social arrangements. This may be neither desirable or feasible. Nevertheless, extension training should include sensitivity to options which are differently available to men and women, and to more and less articulate members of rural communities.

-Training should focus on three main technical areas: pond location, fingerling supply, and the application of the concept of a production cycle to fish farming.

-Monitoring should focus on the activities of extensionists rather than on measuring pond productivity. It should also provide an account of who is undertaking fish farming.

-Consideration should be given not only to who adopts the technology, but to non adopters, both within and outside of adopter's households. Key areas to consider relate to the control of land and to the gender division of labour within fish farming households.

SECTION ONE

CONTEXT

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1. PROJECT SUCCESS OR PROJECT FAILURE?

This report is concerned with donor aided aquaculture: the operation of projects in which aquaculture is a component, whether principal or secondary. It arises from a generalised sense that aquaculture development projects in sub-Saharan Africa have "failed", and that this contributes to the overall insignificance of African aquaculture in world production. Between 1972 and 1985, aquacultural production in Africa reportedly fell by 10%, despite an input of over US \$150m from international donors over the same period (King 1990). Such aggregate statistics may disguise as much as they reveal: without knowledge of what the money was spent on - the balance between research and production related activities, the level of support for different types of aquaculture - or the constituents of the production data, it may be all too easy to draw simple and inaccurate conclusions. The figures do however, contribute to a perceived need to explain the "failure" of African aquaculture development efforts. Accompanying this is the view that aquaculture has for too long remained the province of biologists and technical specialists. Can project "failure" be modified or reduced by identifying and understanding socio-economic characteristics of rural communities which are so crucial in project progress? In other aspects of development planning, sensitivity to the needs and objectives of the beneficiaries of the project has long been a key part of planning rhetoric (if not practice). This is equally, if belatedly, now the case with aquaculture.

The research on which this report is based questions the initial assumption of aquaculture project failure. What does this "failure" involve? In most examples of project documentation, overall objectives and the criteria used to measure their achievement or non achievement are not necessarily closely related. For example, achievement of broad development aims such as improved household food security or increased rural incomes cannot be extrapolated from indicators such as numbers of fish ponds dug or even estimates of production. These are, however, the conventional measures of project success. In these terms, investments of thousands of dollars to produce a few tons of fish are ridiculous. It would make much more sense to simply import the fish and distribute them. Of course, such suggestions are anathema to those concerned with building self-reliance and rural people's capacity for self determination. The point is that what is measured may have little to do with what it is supposed to be an indicator of.

At the same time, very little is known about the processes of aquaculture adoption at the household and intra-household level. This report aims to illuminate such processes. While the principal rationale for many aquaculture development projects is household food security or improved nutritional status, the beneficial effects (to the farmer) of having a fish pond will be felt in more complex ways than simply the production of fish. They may include effects arising from improved water management, or more nebulous effects in terms of reduced vulnerability. How and should such effects be measured? If project planners are concerned principally with production of fish, they should stop talking in terms of household food security. On the other hand, if household food security is the issue, then closer attention needs to be paid to who is adopting the technology and how.

1.2 SOCIO-ECONOMIC DIMENSIONS OF AQUACULTURE DEVELOPMENT

In 1986-7, a major review of aquaculture development activities was undertaken by the United Nations Food and Agricultural Organisation (FAO) - (FAO 1987). Country studies in four countries in sub-Saharan Africa (Central African Republic, Cote D'Ivoire, Kenya and Zambia) presented a pessimistic picture. The Thematic Evaluation of Aquaculture drew attention to the lack of socio-economic background in project preparation, and the inability of donors to monitor project impacts. It was noted that few donors had a well-articulated policy for their technical assistance to aquaculture which was occasionally reflected in "hasty and uncritical" attempts to transfer technology often not suitable to the needs of the recipient country.

Failure to incorporate socio-economic considerations in project planning does not mean that no attempts have been made to understand the socio-economic dimensions of aquaculture development in Africa, and a substantial literature now exists documenting such dimensions. The literature takes the form of surveys, of project appraisals, and of more general discussions of technology transfer. This literature is critically examined in a review which provided the background to the present research (Harrison 1994). In essence, problems of aquaculture development are considered to exist in terms of adoption (people are apparently unwilling to adopt the technology) and sustainability (even when they do, more often than not ponds are abandoned following departure of donor-supported projects). Recently, more attention has been given to the latter problem. It appears that many projects do not have too much trouble inducing people to dig fish ponds. The problem is that of the technology becoming something farmers persist with without external assistance. For as long as this is not the case, farmers continue to rely on government support which is only forthcoming when accompanied with donor aid. No studies were found which examined this political and social context of donor supported interventions themselves. While shrouding themselves in the language of technical planning, and of limited and controllable objectives and outcomes, this context can drop out of the picture.

Early studies identified factors likely to be important in the adoption of aquaculture. These included resource allocation factors such as wetland management, with its implications for common property resources, the availability of labour and land, seasonal work habits and intra-household destination of the product (eg Peterson 1982). A few studies have also explored the role of "culture" in the adoption and sustainability of fish farming (Hayward 1987; Grover et al 1980). This term covers a wide range of issues, from cultural taboos about the eating of fish, to rules about production, distribution and inheritance. There has been a tendency to construe "culture" as a barrier to be overcome, that either rural communities need to be re-educated or that is necessary to identify those individuals who apparently illustrate sensitivity to "modern" values. The weaknesses in such an approach are elaborated in the report. Nevertheless, understanding the nature of existing mechanisms of control and decision making and the material conditions in which they are rooted is important as part of any examination of the process of technology transfer. Some studies have addressed this from the perspective of particular, identified groups of potential adopters. Among these, the needs and constraints of women have received particular attention (Trottier 1987; Woodford Berger 1987; ALCOM 1991a).

Two programmes of research and methodology development have made substantial additions to knowledge about social and cultural aspects of aquaculture development in sub-Saharan Africa: Aquaculture for Local Community Development (ALCOM), based in Harare, and the International Center for Living Aquatic Resource Management (ICLARM), which has a project based in Malawi. ALCOM in particular has been responsible for the production and dissemination of a wide range of reports looking at diverse aspects of the aquaculture development process, from factors contributing to adoption to intermittent harvesting methods, to surveys of practises and beliefs relating to fish farming. As a donor funded project, with a presence in most of the Southern African Development Community (SADC) countries of southern Africa, ALCOM's mandate of research and methodology development has been continually under pressure to respond to the needs and priorities of host governments (see chapter seven). Accordingly, less attention has been paid to the institutional context of aquaculture development. ICLARM has been working directly with small scale farmers in Malawi with the aim of developing aquaculture technology appropriate for rural Africa. While the programme thus yields valuable information regarding the fit of aquaculture into farming systems, questions regarding dissemination and indigenisation of the technologies are not addressed. The role of institutions external to the farmers, the need for and possibilities of extension are also critical.

This institutional context remains a key aspect of the development process and one which has as yet been overlooked in most discussions of social and cultural aspects of aquaculture development, particularly those which focus only on rural communities. This is despite the fact that the Thematic Evaluation noted in 1987 that, while few projects were seriously faulty in terms of design and sequencing of activities, several were hampered by failures of government to provide the counterpart contributions. Furthermore, most projects implemented during the 1970s and 1980s were essentially based on the same premises which justified support for aquaculture in colonial times. Attempts have been made to re-establish and rehabilitate what already existed, in terms of both infrastructure (hatcheries etc) and personnel. There was scant examination of the reasons for the collapse of the earlier efforts. The implication is that a wider approach to social and cultural aspects of aquaculture development is required; one that encompasses not only the dynamics of rural communities, but also the relationship between these and institutional constraints and potentials.

1.3. THE LUAPULA STUDY.

The present study addresses the above issues through an examination of the process of aquaculture development in Luapula Province, Zambia. Field work was carried out during 1991-2 in the context of development activities executed by the Zambian Department of Fisheries (DoF) and a donor funded project, ALCOM. ALCOM and Luapula were chosen because, on first impressions at least, Luapula represented a success story; plenty of people were digging ponds. Also, the technical and socio-cultural conditions were apparently all favourable (there was plenty of water, available resources, people like fish).

ALCOM has, since 1989, supported DoF activities in fish culture in Luapula Province, Northern Zambia. The ALCOM programme is designed to identify and address the problems facing small scale aquaculture through both research activities and the development of pilot projects. It is financially supported by a range of donors, principally the Swedish International Development Authority (SIDA), and executed by FAO.

The environmental and technical conditions for small-scale aquaculture are basically good in the province. There is abundant and year-round availability of water and limited competition for on-farm resources. The type of aquaculture practised is extensive culture of tilapias in small stagnant or flow-through ponds. Fish are fed with locally available plant material such as cassava leaves and by-products such as kitchen waste. Where available, cattle, chicken and goat manure is used to fertilise ponds - occasionally added to a compost crib, but more often just thrown in. Indigenous tilapia are grown in the ponds, obtained from DoF, from other farmers, and from other promoters of aquaculture such as the Catholic missions. A few farmers obtain their fish directly from rivers.

In Luapula, a wide range of people have dug fish ponds, often with little advice or assistance. Statistics concerning numbers of adopters are of dubious value, partly because they do not reflect levels of activity, but also because current infrastructure for monitoring is unlikely to accurately keep up with the spread of new adopters and contrasting pond abandonment. Nevertheless, ALCOM estimates that there are more than 700 fish farmers in the province and about 1900 ponds, of which 24% are unstocked (Haight 1992). Table 1.1 illustrates the scale of fish farming by district, according to DoF figures. Of the five districts in the Luapula one (Nchelenge) is not represented. This is a lakeshore district and no fish farmers have yet been identified.

Table 1.1: Number of fish farmers and ponds in Luapula Province by district, end 1991.

District	Fish farmers	Stocked ponds	Unstocked ponds	Total ponds
Mansa	179	604	131 (18%)	735
Kawambwa	437	690	183 (21%)	873
Mwense	62	101	108 (52%)	209
Samfya	47	25	22 (47%)	47
Total	725	1420	444 (24%)	1864

(source: Haight 1992)

The spread of fish farming has apparently taken place over the last five years, partly as a direct response to an intensification of extension activity, partly "spontaneously" - farmers copying the activities of their neighbours. However, the promotion of aquaculture in Luapula dates back to at least colonial times. The government fish farm at Fiyongoli near Mansa was constructed in 1952. The recent spread of aquaculture can also be attributed to promotional activities undertaken by the Catholic missions, particularly in the area around Chibote mission (Kawambwa district).

Though overall production has not been accurately documented, it is believed to be low, based on clear water conditions, sporadic feeding, and the fact that some ponds have never been completely harvested. Thus, though there is no problem in encouraging people to dig ponds, doubts exist about the sustainability of this adoption.

A limited number of aquaculture adopters in Luapula are not solely farmers. They are people who have other sources of income, usually from urban employment. Their aquaculture is not simply one among a range of complementary farming practices. As with smallholder fish farmers, the degree of intensity of the operation varies. Some are aiming towards more intensive aquaculture, involving purchased inputs including labour, and aspiring to produce principally for the market. Even with this orientation, for none of these fish farmers is their aquaculture the main source of income.

The majority of adopters are mainly self-provisioning smallholders for whom fish farming is at most a secondary activity. It is one among a range of available options. The amount of any crop which is marketed or consumed within the household varies immensely within this category. Similarly, the aquaculture practised varies in degree of market-orientation and inputs.

Elsewhere (for example Zambia's central province, Zimbabwe, Kenya), there are a number of examples of commercial fish farming ventures. The economics and socio-economic effects of these operations require consideration. The focus of this report is however, smallholder fish farming. The central concern of the research is to examine the process of technology transfer and development, the linkages and interfaces between

developers, in this case the project and DoF, and the people with whom they work. In Luapula Province, such linkages operate principally at the level of smallholder fish farming. ALCOM and DoF have also provided support to the fish farmers whose level of operation is intended to be well above self-provisioning and who have shown themselves willing to invest money in inputs and the construction of several fish ponds. Their larger scale of operation leads them to be categorised by the developers as "emergent" fish farmers. The role of these fish farmers is therefore also considered (see appendix 5).

1.4 STUDY OBJECTIVES AND METHODS

The study had four principal objectives. These were:

1. To develop an understanding of the reasons why people dig fish ponds and subsequent determinants of their pond management practices.
2. To assess the intra-household, household and community level impacts of aquaculture adoption.
3. To examine the context and practice of aquaculture promotion by the Government Department of Fisheries and ALCOM.
4. To assess the response of farmers in rural communities to aquaculture development activities .

These objectives were met through a range of research techniques, involving both quantitative and qualitative analysis. The principal researcher was resident in two villages of ALCOM activity in Luapula over a period of one year, and also attended ALCOM planning meetings in Harare. Technical advice and support was provided by an aquaculturist from the Institute of Aquaculture, Stirling University. Research methods included a household profile of approximately 200 households, and detailed case study observation of 24 households selected following the household profile. In addition, formal and informal interviews were undertaken with both project and Departmental personnel. The details of the research methods are outlined in appendix 2.

CHAPTER TWO

THE CONTEXT OF FIELD WORK

The purpose of this chapter is description. It provides a picture of the context in which aquaculture development has taken place.

2.1 LUAPULA PROVINCE

Luapula has a total population of 526,000 people and a population density of 10.4 people per km². The population is concentrated along the Luapula river valley and around the lakeshore areas. In the Luapula valley, an almost continuous thread-like settlement has followed the construction of a tarmac road between Mansa and Nchelenge in the late 1980s. The province was established as a separate administrative unit in 1958. It comprises five districts: Mansa, Samfya, Kawambwa, Mwense, and Nchelenge. Mansa town is the administrative headquarters of the province.

An ILO mission to Luapula in 1977 emphasised rural decline and apparent increasing dependency on government support. A number of key indicators of social well-being suggest that Luapula is among the poorest of Zambia's nine provinces. For example, its infant mortality is the highest at 112.12 deaths per 1,000 live births as compared to the national average of 98.67 (Gould 1989). Female life expectancy is the lowest in the country and that of men is the second lowest. Luapula has abundant natural resources. Gould argues that the relative poverty of the province's people can be blamed largely on the extremely convoluted and lopsided nature of the regional economy. In particular, Luapula's dependence on the export of fish and labour has led to vulnerability to vagaries of supply and demand outside the control of people within the province.

For most of the twentieth century, the province has been a source of male labour for Zambian and Zairean mining. It has been described as "typical of the peripheral rural provinces in Zambia" (Jiggins 1981), with its highly skewed age and sex distribution. Between 1963-74, it was the only province in the country to experience an absolute decline in numbers. The effects of such outmigration on the people who stayed behind, particularly the women, and their adaptations to a shortage of male labour, have not been documented. During the 1980s, there has been a marked return migration, as opportunities in the mines become fewer. As a result, the sex ratio of Luapula has become slightly less skewed, moving from 91.1 (females per 100 males) to 93.5 between 1980 and 1990 (GRZ 1991). The population growth rate between 1980 and 1990 was 2.2%, well below the national rate of 3.2%. The effects of in-migration are also not yet documented.

Natural features

Luapula province is situated in the north east of Zambia. It is bordered on three sides by Zaire, and on one by Zambia's Northern Province (see map 1). The land surface area of the province is about 30,600km² of which 11,600 is arable (Gould 1989). The province contains two major water areas, Lake Mweru in the north-western and Lake Bangweulu in the south eastern corners. The Luapula river forms the eastern boundary of the province and flows into lake Mweru. On the eastern edge of the Luapula river valley

the Muchinga escarpment rises up to the plateau area within which Kawambwa district falls. The altitude of the province varies from 900 to 1,323 metres above sea level, the highest point being at Kawambwa, and the lowest in the Luapula river valley.

Climatically, there are two distinct seasons - the dry season lasts from about April to the return of the rains in November. The length of the rainy season varies from approximately 140 days in the south of the province to as much as 190 days in Kawambwa district. Rainfall levels are high, reaching as much as 1500mm/annum. Soils in the province are generally thought to be poor. In most areas of the province, soils are acidic, which reduces the potential for agricultural productivity.

Fishing

Fishing has traditionally been a main economic activity in Luapula, based around the two main lakes and the Luapula river valley. As much as half of the provincial population are thought to be dependent in some way on fisheries for their livelihoods. Fishing is principally artisanal with numerous individual producers operating separately but cooperating on an ad hoc basis. Luapula fisheries have supplied the urban markets of Zaire and the Copperbelt throughout the twentieth century, with traders coming from both within the province and outside. Fish has been sold at the lakeside in dried form. Recently, a donor-supported scheme to rehabilitate a defunct ice-plant at Kashikishi on Lake Mweru has begun to take advantage of improved marketing possibilities through the construction of the Mansa-Nchelenge road.

Agriculture

Agricultural activity within Luapula varies according to ecological and marketing opportunities. Agricultural activity is a combination of *citemene* cultivation (a form of slash-and-burn shifting cultivation, producing cassava, groundnuts and millet), which is associated with hoe production on semi-permanent gardens, and the use of introduced technologies, particularly the growing of hybrid maize using chemical fertiliser. These different agricultural strategies cannot be closely associated with one producer group or another. A dichotomy between subsistence and commercial production in the case of Luapula would obscure the fact that all crops produced are in some degree marketed.

In the *citemene* system lopped trees are burned to enhance soil fertility. *Citemene* supports the cultivation of a wide variety of crops. It has been consistently discouraged by both colonial and post-independence governments on the basis of both its reportedly negative environmental effects and because of the policy of maize promotion. *Citemene* requires the clearing of large areas of trees. It can thus only support a relatively sparse population. In the context of abundant land, however, it is an efficient system enriching poor quality soil. When population density increases, as has happened in parts of Luapula, *citemene* cultivation is abandoned for more settled forms of crop production.

Maize makes up about 90% of officially marketed crop production. Such official statistics miss the informal sale of beans, groundnuts, and cassava within villages and to traders from Mansa and the Copperbelt. Nevertheless, maize represents the main cash crop and growing maize has associations with being "progressive", as it was initially promoted by the government. The government has sought to make the production of

maize more attractive through extending the availability of credit and providing a state marketing infrastructure. Recently, the collapse of state marketing and uncertainties connected with maize pricing have led to it being a less attractive crop to farmers. "Traditional" crops such as cassava are accordingly being paid greater attention by government research and development bodies.

Livestock breeding is not a significant part of the rural economy. Historically Luapula has suffered from tsetse fly and cattle ownership has been accordingly low. In 1990, estimated livestock populations amounted to 8550 cattle, 18080 goats, 9009 sheep and 2481 pigs (GRZ 1990). Most livestock including poultry, for which there are no records of ownership levels, are not systematically reared. Rather they are left to roam free, occasionally cooped at night, and slaughtered only for special occasions (see chapter four). FINNIDA has sponsored a Cattle Development/Animal Draught Power programme within its aid programme to the province. This has the aim of increasing both skills and the area of land cultivated using oxen ploughs. It involves the supply of oxen and the training of small scale and "emergent" farmers in their use.

Social organisation

Present day Luapula society encompasses a nebulous and shifting balance between norms and behaviour which could be construed as "traditional", and those which are more easily identified with "modernity" - with the market, wage labour, individualistic production. The dichotomy is valid in so far as it is one actively adopted by many Luapulans. Individuals may be keen to stress that "this is our traditional way" or "I am a modern farmer". The reality behind it is considerably more complex because the meanings of tradition and modernity are continually being renegotiated. Nonetheless, a few points can be made about "traditional" social organisation and its incorporation to the economy and values of Luapula in the 1990s.

While ciBemba is the dominant language in the province, the people are not Bemba, the ethnic group predominating in neighbouring Northern province. According to Gould (1989), Luapula is inhabited by three clusters of culturally and historically inter-related ethnic groups: the Lunda of Mweru-Luapula valley; the Bena Chishinga-benaNg'umbo-baUnga cluster of the mid province plains and lake Bangweulu; and the Aushi-benaKabende cluster in Mansa district around the provincial capital. In addition to such "indigenous" groups there are migrants from the Copperbelt, Northern Province and Zaire. With the exception of the Lunda aristocracy, kinship and inheritance have followed a matrilineal system. Children are identified and inheritance rights determined through the maternal line. Accordingly, a son is not heir to his father but to his mother's brother. Accompanying this system of inheritance, marriages are traditionally uxorilocal, with a husband going to reside in the village of his wife's parents and doing bride service for them for periods of up to three years.

A frequently-posed dichotomy in studies of African rural development contrasts the persistence of indigenous social relations and values against the penetration of market forces and "modernity". Luapula is no exception. The persistence (or lack of it) of matriliney in the face of such forces has formed a central theme for a number of writers. Karla Poewe's work on matrilineal ideology in the province (1978a, 1978b, 1981) has

explored the theme in the context of fishing communities in the vicinity of Lake Mweru. She argues that the "central structural contradiction inherent in matriliney" involves a conflict between the forces and relations of production - as she puts it, between productive individualism and distributive communalism. The penetration of a market economy into the province during the twentieth century has led some people (most often men), to adopt alternative ideologies which support individual accumulation and limit distribution to the nuclear household.

It is certainly true that many of the external manifestations of matriliney, most obviously the practices of uxori-local marriage and extended bride service, are declining. With this, the role of the matrikin, the group of kinspeople related through one common female ancestor, is less clear. In the 1950s, Cunnison wrote about the importance of the matrilineage - the *cikota* - and clans - *mukowa* - as basic units of social organisation:

Lineages are the focal point of individual interest as regards such valued institutions as succession to office, inheritance and exogamy, but kinship extends out from them to clans and other lineages through bonds of perpetual kinship. (Cunnison 1959;242)

Cunnison, and others, maintained that for Luapulans, ethnic categories of "tribe" such as Chishinga and Aushi, have less significance than clan affiliation, which is primary, and historically precedent to such notions as tribe. A clan is a grouping of lineages. Economically, it is an institution of distribution in as much as somebody from the same clan is classificatory kin and entitled to hospitality and respect. In present day Luapula, clan identity is still important. Throughout field work, it was impossible to find people who could not identify their mother's clan and father's clan and the joking relationships between these and other clans. Obligations of hospitality to clan members are still held to be important. On the other hand, while clans remain important socially, there is a growing tendency for the primary unit of economic identification to be the more restricted nuclear family.

The evidence for Poewe's suggestion that, following capitalist penetration of a matrilineal society, men and women adopt parallel (and occasionally competing) economic strategies is more dubious - at least for the whole of the province. Her field work was carried out among fishing communities on the shores of lake Mweru at a time of great expansion of the fishing industry. Opportunities for accumulation were thus significantly higher than they have been at other times and in other parts of the province. Furthermore, the protestant religions, especially Seventh Day Adventism and Jehovah's Witnesses which, she argues, constitute a competing ideology adopted in place of matrilineal ideology, are not as prevalent in the province as a whole. In fact, membership of these religions is concentrated in the lakeshore region and in Mansa. This combination of conditions, combined with a division of labour in which men and women have clearly separated opportunities to accumulate (men in fishing, women in cassava growing and fish trading), are more conducive to such economic separation and ideological competition. Elsewhere in the province, particularly in the central regions, where the economy is almost entirely reliant on small holder agriculture and opportunities for accumulation are few and far between, the "structural contradiction" is not obvious.

Regarding the pervasiveness of "individualism", as opposed to social arrangements based on communalism or collectivism, it is probably accurate to say that such values co-exist, with varying degrees of balance. There is tension between the demands of the wider family and the smaller productive and reproductive unit of the nuclear family. Furthermore, within this unit, men and women do not always have coinciding strategies and priorities, including those in relation to their kin. More pervasive than individualism is the spread of an ideology of "modernity", especially among the young men of the province, many of whom have spent a few years away in the urban areas. Thus ties of kinship are not disputed or undervalued but, for such men, identification with the process and language of "development" are more important.

"Development" in Luapula

Gould (1989) argues that the neglect of Luapula by the pre World War II British administration pushed the province into a position of being the supplier of food and labour to the mining sector. Later, rural development efforts failed because of inadequate resourcing and because their aims were poorly aligned with the economic and political realities of the rural population. For example, the Intensive Rural Development Scheme of 1957-61, which was marketed as a new approach to rural development, involving the mobilisation of the initiative and resources of "progressive Africans" was a "dismal failure" (ibid; p.147). It nevertheless had lasting effects:

"It made legitimate both the expectation that the central government had a responsibility to assist in the development of the rural areas, and the complaint of neglect" (Baylies 1984; p.168).

From 1964, rural development in Luapula has been closely connected with foreign assistance. Large bilateral donors have combined with smaller NGOs and sector-specific projects in a range of schemes. There have been some sizable capital investments (roads, the Kawambwa Tea Estate, maize mills) and the devotion of agricultural research and extension to the production of maize. From the mid 1970s, Lima (learned improved methods of agriculture) schemes, which had originated in Zambia as a response to the national concern for food security, were the principal medium of rural development and extension in Luapula.

In 1992, a wide range of donor funded projects was operating in the Province. The biggest of these (financially) was funded by FINNIDA. The FINNIDA programme included an animal draught power/cattle development project; agricultural extension and training programme; support to the cooperative movement, and support to the provincial planning unit. The programme began in the province in 1980 and was phased out at the end of 1992.

Another province-wide donor project was the SIDA funded Integrated Rural Development Project (IRDP), which was also phased out in 1992. The project has focused on small scale community development enterprises such as wells, primary school rehabilitation and clinics, and local bridges. In addition, IRDP has attempted to develop the capabilities of district councils through courses and training.

Other donors active in the province include the International Fund For Agricultural Development (IFAD), which supports extension services through the Smallholder Services Rehabilitation Project. This project also supports, through a development fund, a range of sub-projects. UNICEF have a Community Based Child Survival Development Project, which is an adaptation of an earlier project focusing on support to women's groups. It supports eight community groups in Mansa, Samfya and Mwense districts. Though it is reported that implementation is hampered by the fact that the government counterpart budget is woefully inadequate, the project plans to expand to all districts of the province. The Dutch Development Organisation, SNV, operates in joint ventures with IFAD, FINNIDA, World Wildlife Fund, Department of Fisheries and Ministry of Health. In Kawambwa district, the German Development Organisation, GTZ, supports an Integrated Rural Nutrition Project. In addition to ALCOM, FAO supports a programme for the prevention of vitamin A deficiency in the Luapula valley. Non-governmental organisations working in Luapula include World Vision, Water Wells Trust (UK), and the World Wildlife Fund. Lastly, volunteer agencies from Finland, UK, Denmark, Norway, Belgium, Japan and Germany all have personnel working in the province.

No conclusions are drawn about the impact of this plethora of aid agencies in Luapula in terms of their own objectives: strengthened rural livelihoods, improved health standards and so on. Nor is it suggested that such a diversity and quantity of assistance is unusual. A glance at the numbers of donors active in other provinces in Zambia, and other countries in sub-Saharan Africa, tells a similar story. Whatever the measurable benefits of these activities, one thing is clear: the mass of the population of Luapula are now swift to associate white people with money. The prevailing view that it the government has responsibility for "development" is modified by the knowledge that, with economic retrenchment, the government is increasingly reliant on external support. For Luapulans, both urban and rural, it thus becomes crucial to secure access to A Project.

In connection with this, concern has been expressed about the failure of the different organisations to coordinate their activities, to avoid overlap and overkill. Stories of more than one agency setting up operations in the same area without consultation or even awareness of each other are common. Recently (the last three years), attempts have been made towards better coordination. Representatives from the various agencies meet in Mansa to discuss their programmes and collaborative projects have been initiated. Unfortunately, the practical realities of each project needing to implement an agenda and fulfill objectives mitigate against such efforts.

2.2 THE CONTEXT OF AQUACULTURE DEVELOPMENT IN LUAPULA

Although fish farming has spread rapidly in Luapula over the last few years, its magnitude when compared to natural fisheries is miniscule. Comparisons are difficult because data refers almost entirely to marketed production. Nevertheless, reports of production in the order of 24,000 metric tonnes from capture fisheries in 1987 (Republic of Zambia 1988) are of a very different magnitude to the estimated 9 tons produced through fish farming (Wijkstrom and Wahlstrom 1992). Furthermore, while there are in the region of 1000 fish farming households, it has been estimated that about 150,000 people are dependent on capture fisheries for their livelihoods (Gould 1989).

The potential significance of fish farming, despite its small magnitude relative to natural fisheries, lies in a number of areas. First, there may be a direct food security effect for fish farming households: areas of greatest concentration of fish farming are those furthest away from the natural fisheries of Lakes Mweru and Bangweulu. Though provincial fish production overall is high (contributing 40% of Zambia's fishing income in 1984 - Gould 1989), much of this is marketed outside of the province. It has been suggested that little reaches the plateau areas in Kawambwa district. The nutritional and food security rationales for aquaculture development are frequently given priority by those concerned to promote the technology. For example, ALCOM's justification for the Luapula pilot project was:

Luapula province has the land and water resources to support small-scale fish farming. Farmers are interested in fish farming and could benefit from improved protein in their diets (ALCOM 1989).

More ambitiously, DoF, in putting forward a proposal for donor funding in 1992 aspired to:

..improve the nutritional level of the people of Luapula by aquaculture, supplementing the natural fish production so as to raise the per capita fish production in the areas concerned from as low as 3.5kg to 8kg. (DoF 1992).

Second, aquaculture may provide an important seasonal supplement to rural incomes. Wijkstrom (1991) argues that the areas in which aquaculture is developing in Luapula can be seen as stagnant economies in which any addition to rural income will be of significant benefit to the local population.

Third, aquaculture may be important as a livelihood strengthening strategy when integrated with other aspects of farming, such as vegetable and rice growing, or the raising of small livestock. Recent promotion of fish farming in both Luapula and elsewhere¹ has included a recognition that aquaculture should not be regarded in isolation from other aspects of farming.

Fish farming has been promoted in Luapula by the colonial government, by the Catholic missions, by the department of fisheries and, most recently, by ALCOM. In all cases the expectations for fish culture were broadly based around these rationales. Improved household food security and nutrition, increased rural incomes, and diversified

and strengthened livelihoods are explicitly stated as the expectations for aquaculture development. The rationales are derived from a perceived problem and need which did not however, come directly from the intended beneficiaries. A further rationale is also implicitly at work: that developers want to see their technology working and this seems like a good place in which to try it.

In order to see this particular technology working, it is necessary to show that people are producing fish from their ponds and they are likely to continue to do so. A recurring problem in Luapula is that, though there appears to be no problem in getting people to dig ponds, abandonment and low productivity are swiftly established. A cursory glance at fish farming practices in the province reveals tendencies that are arguably common in other parts of sub-Saharan Africa.

Furthermore, while promoters such as the colonial government and donors (less so the missions), are keen to see their technology working, they are also implicitly reliant on support from Zambian institutions to "extend" the technology. Despite the rhetoric of support to government departments, advocacy of fish farming came initially from outside. In Luapula, the department of fisheries allocates personnel to fish culture and has arranged training courses for fish farmers. Between 1988 and 1993 it responded to and worked with, ALCOM. But there are other fisheries priorities (centred on capture fisheries), among which the desire to see aquaculture working is not paramount. ALCOM entered the province with the aim of strengthening DoF support to small scale farmers, and thereby promoting the integration of small scale fish farming into the existing farming systems practised by small scale farmers. It assumed that DoF cooperation would be forthcoming, despite institutional weaknesses in the department. This assumption proved to be unfounded.

2.3 MONGA AND CHIBOTE

Village based research took place in two areas, Monga area in Mansa district and Chibote area in Kawambwa district. The sites were chosen because they have both been a focus of ALCOM/DoF activity. They have however, had rather different experiences of aquaculture development and exhibit different socio-economic characteristics. The rapid initial spread of fish farming in Chibote had been one of the motivating factors in ALCOM's initial interest in Luapula Province. Fish farming started later in Monga area, but its proximity to Mansa (only 30km - Chibote is about 400km from the provincial capital) has meant that recently it has become a centre of attention. In Chibote, a resident fish scout had been posted to support existing aquaculture activities. This was not the case in Monga.

Physical and infrastructure

Monga

Monga is located approximately 30 km east of the provincial capital, Mansa (see map 2). The boundaries of the research area are formed by the Loshi stream to the east and the Mansa river to the north. Most settlement in Monga area is strung out close to these water sources. Though a generic name, Monga, is given to the cluster of settlement along the Loshi dambo, three distinct though contiguous villages, with different headmen, can be recognised, of which Monga is the largest village. A further six villages (or hamlets) are frequently construed as part of "Monga": along the Loshi river lie the villages of Chapa, Monga, Kaseke and Fipatauko. Along the Mansa river are Ngombela, Kalaliki, Kalasa, Mponda and Kapoko. Away from the main clusters of settlement, there exist a few "farmers", individuals who have moved in search of new land for cultivation, who still profess allegiance to a particular headman, though physically distant from the village.

Most of the landscape is characterised by miombo woodland of varying density, interspersed with more or less permanent fields of cassava intercropped with beans and groundnuts, maize, and vegetables. Houses are mainly located on the margins of the dambo, a low lying, perennially wet area centred on the stream. Numerous springs on the dambo serve as the main drinking and washing water supply. Fish ponds and vegetable cultivation are the most visible agricultural use of the dambos.

The focal importance of Monga village arises from its possession of a primary school, a fact which has led to its recent expansion in recent years. At the time of my residence in the area, Monga village comprised 69 households, whereas none of the other villages had more than 25 households. Kaseke village, where I lived, contained 22 households.

Monga area is 10km, along a dirt road, from Chief Mabumba's village, which is on the main tarmac road from Samfya (on the shores of lake Bangweulu) to Mansa. It is thus within easy reach of the main trading and administrative centres of the province. At Mabumba, there is a rural health centre, a basic secondary school, a small market selling goods such as soap and salt, a local court (in addition to the traditional Chief's court), and an agricultural camp where extension staff live. From Mabumba, transport to Mansa is

easily available, though expensive (the equivalent of £1 in September 1992). Many people prefer to walk the 20km.

Chibote area

Like Monga, "Chibote" area refers to more than one identifiable village. In this case, Chibote covers the various villages which have grown up around the Catholic mission. Chibote is located 80km from the district centre of Kawambwa, which in turn is about 200km north of Mansa. Chibote centre comprises a group of villages, each under a separate headman and, as in Monga, physically contiguous. Kafola's village is the largest (about 80 households) and Mr Kafola, headman, is considered the senior headman. The other villages in Chibote centre are Bule 2, Katongo, Sakaria and Muma. The total population of Chibote centre is just under 700 people

The boundaries of the research area are formed by the principal area of work of the fisheries and agricultural extensionists who are posted in Chibote centre. The area covers some 32 villages. Within this area, the villages chosen for enumeration in the 1991 survey cover the villages of Chibote centre plus a number of outlying villages, chosen after consultation with the fish scout to reflect varying degrees of "success" and "failure" in fish farming (see map 3).

Chibote area is characterised by much denser woodland than is the case in Monga. Immediately surrounding Chibote centre, semi-permanent gardens of maize, cassava and groundnuts predominate. Moving towards the outlying areas where citemene is still widely practised, fields dominated by cassava are found interspersed with the surrounding bush. Chibote centre itself is not situated on the margins of a dambo as is the case in Monga. Rather a number of small streams criss-cross the villages. These provide the main source of drinking and washing water for the population. To the east of Chibote centre, near to the Catholic mission, the majority of fish ponds are located along the banks of a perennial stream. Throughout the area, numerous small water sources abound.

The road from Chibote to Kawambwa, the district centre, is predominantly ungraded and frequently impassable during parts of the rainy season. The only regular transport available over the 80km distance is the Ox Training Centre (OTC) vehicle which travels weekly to Kawambwa and charges for goods and passengers. Prices are tied to actual petrol and maintenance costs, but this is beyond the budget of most people. Accordingly, there are few opportunities for marketing produce outside of the area. The state marketing organisations, Luapula Cooperative Union (LCU), and Lintco, do reach Chibote, but there are complaints about regularity and reliability of the service.

The Catholic mission has been located in Chibote since 1910. The church serves as a central social focus for most members of the community, in addition to providing casual employment for as many as 10 labourers. Chibote also possesses a rural health centre, a primary and basic school, the cooperative society headquarters, a grinding mill, and an OTC, run with support from Danish volunteers and through the Diocese of Mansa. The OTC trains farmers in cultivation with oxen, in addition to assisting a number of farmers with fertiliser and seed for maize cultivation. Under the auspices of the OTC, a small, twice weekly, shop, sells basic farming goods such as seeds, as well as soap, sugar, salt,

and other household goods. The OTC is also the most important employer of casual labour in the area, employing as many as 20 at any one time. With teachers, clinic workers, agricultural workers, priests, and OTC workers, the total salaried population of Chibote is in the region of 30 people. Thus, despite its relative (compared to Monga) isolation from the main provincial trading and administrative centres, Chibote centre is itself an important focus for the surrounding area.

Agriculture and income sources

The two research sites have many similarities in economic organisation. The predominance of small holder agriculture with cassava as the main food crop, supplemented by beans, groundnuts and maize, and the restricted alternative opportunities for gaining a cash income, are characteristic of both places. The proximity of Monga to the provincial capital and greater population density has, however, led to some marked differences.

Monga area

For most households, the principal source of income is farming. Maize and vegetables are the only crops grown primarily for sale, but all crops may be sold, depending on requirements for cash and availability of surplus. Other, non-agricultural, activities include trading, brewing local beer, building work, artisanal work, charcoal burning, and fishing.

In Monga, increased population density combined with government pressure to adopt more permanent forms of cultivation, have led to a reduction in the amount of *citemene* cultivation practised. Most fields are within a few minutes walk of the houses rather than the long distances characteristic of *citemene* which are the result of a search for fresh trees to burn. The reduction of *citemene* cultivation has been closely associated with a rise in the amount of cash crop maize grown, again largely as a result of government encouragement. Government policy since independence has been based on the principle of the rural population producing enough maize to supply the growing urban areas. Accordingly, the cultivation of hybrid maize, which is heavily dependent on government provision of both inputs and marketing facilities, has been a mainstay of agricultural extension.

A limited number of people within Monga area still practise *citemene* at some distance from their villages. The principal crops grown are finger millet, with subsequent crops of cassava intercropped with groundnuts, beans, and various relish ingredients such as pumpkins. The majority of my informants said that they could no longer practice *citemene*: "we have chopped down all of the trees".

More common now in Monga is cultivation on fields known as *mabala*. These fields are closest to the village. Soil fertility is maintained through the construction of mounds and the use of legumes such as beans and groundnuts in between the cassava. Further away from the villages, on poorer soil, are areas of reserves of cassava with less intercropping, except for a few sweet potatoes.

Cash crop maize tends to be grown either on *mabala* or on fields in which the initial grass covering is dug into the soil during land preparation, again a measure to enhance fertility. Maize fields are distinguished from others as *mafarms*. Following extensionists' instructions regarding measurement of fields and crop spacing, they tend to be rectangular in shape rather than the irregular shapes associated with other crops. The decision and ability to grow maize is determined by access to supplies of seed and fertiliser and to marketing opportunities. A number of farmers in the 1991-2 season were not growing maize because, they claimed, there were not sufficient loans available with which to buy inputs. Of the women growing maize, all were doing so following grants of seed and fertiliser from Unicef.

In addition to the crops grown in the bush land close to the villages, there has been a recent increase in the cultivation of "European" vegetables such as tomatoes, onions, cabbage, and rape on the margins of the dambo, or using furrows from streams. Dry season irrigated vegetable growing can provide an important source of income as well as supplementing reduced dry season relish availability. As dry season vegetable growing generally takes place with the use of inorganic fertiliser and purchased seed and is locally perceived to be difficult, it is not surprising that those farmers who grow vegetables also have a history of maize cultivation. In other words, they are more likely to be farmers who are able to (and inclined to) access both knowledge and inputs from the extension service. These farmers also tend to be fish farmers, a point explored in detail below.

Trading is undertaken sporadically, depending on access to cash or goods to trade. In a study of economic activities in Mabumba, near Monga, Allen (1988), notes the importance of trading in the local economy. The majority of trading involves the purchase of household goods or cigarettes in Mansa, and their resale within the village at a small profit. A few people (usually women heading households) travel further, to the markets at Samfya and Chinsanka, where roasted cassava is traded for fish from lake Bangweulu which is then returned to the village for sale. In the 1991 survey, some 30% of households interviewed contained at least one individual actively engaged in trading. Cash profits from such ventures are generally small compared to farming incomes, especially if the time and effort taken to collect goods from Mansa is taken into account.

Brewing of local beer is a centrally important part of the local economy. Three types of beer are made: *katata*, *katubi* and *munkoyo*. They are different - in taste and appearance, in the required ingredients and in the social meanings attached to them. *Katubi*, the favoured beer in Monga area, is made from millet alone. It is sold in calabashes and drunk through a straw with the addition of hot water. Beer has historically been used to hire labour, especially for tasks such as land preparation. It was also an important means of payment for cutting of branches in *citemene* cultivation. Now, cash and commodities are more regularly used as a means of labour payment. Nevertheless, women heading households alone still tend to brew in order to pay for labour. The majority of the beer produced is sold within the village. In addition to beer brewing, which is done by women, both men and women occasionally make "wine": a combination of yeast, sugar, water, and whatever flavouring is available - usually tea. One man in Monga area was making wine in the dry season of 1992. He used the income from his maize to buy initial ingredients, converted his house to a tavern, and claimed to be making as much as 4000 kwacha in a week. With the onset of the rains, reduced

availability of cash in the village, and increased demands in terms of farming activity, he closed down the tavern.

Though Luapula has for much of the last century been a source of migrant labour for the Copper Belt and mines of Zaire, the current economic importance of remittances from migrant family is not easy to specify. A high proportion of adult men in the area have, at one time or another, worked away in the towns. The proportion increases with the age of the men. Opportunities for such labouring are now sufficiently reduced that it makes more sense to stay at home. Most people agree that the rate of new migration has decreased. Nevertheless, some 20% of the households in the November 1991 survey contained at least one absent worker. These people were generally sons, some of whom had been absent for some years. In a few cases, daughters were absent as wage workers. No de facto female headed households were found which were such because of a migrant husband.

Building work, artisanal work and charcoal burning are undertaken almost entirely by men. Most houses in Monga are now built from burnt bricks, the making of which is usually undertaken by male heads of household. Bricklaying itself is a more specialised task and this aspect of house construction is usually done by a few individuals for cash. Other aspects of house building such as making the roof, kitchen and pit latrine, are also done by the house owner, though it is common to hire a work party with beer for thatching the roof. Women heading households alone invariably use this means to construct a new house. Artisanal work includes making mats and repair work to shoes, bicycles, radios and watches. Not many people are involved in these activities: there is a limited market and the work requires possession of tools and knowledge which few people have. However, artisans can make a substantial income. One man specialised in mending farming implements and bicycles, having learned metalworking in Kitwe. For re-spoking a bicycle wheel, he could earn 2000 kwacha - at the time the equivalent of one goat or ten days agricultural labouring. Agricultural labouring is a source of income for both men and women, paid for either in cash, or in goods.

Lastly, fishing is carried out by both men and women, particularly in villages which are closest to the Mansa river and Loshi streams. Most fishing is undertaken for household consumption, as catches rarely justify sales. Nevertheless, during 1992, four households were identified for whom fishing from the river was a regular source of income. All of these households were possessors of fishing nets. More common methods of catching fish are the use of hook and line (men) and using baskets and fish poison (women). Most fishing activity takes place during the late dry season (August-October), when water levels are low.

Chibote

This description of economic opportunities in Monga has similarities in Chibote, where small holder agriculture is the main source of income for most people. Marked differences arise in the persistence of *citemene* cultivation, and the effects of fewer marketing opportunities.

Most households in Chibote area continue to practice *citemene* cultivation. Distances to the fields are however, increasing, with people walking as much as one hour to their *citemene*. A number of households in Chibote centre shift temporarily to grass huts in the bush during the dry season when branches are lopped and stacked prior to burning. As in Monga, the extensive land requirements of the *citemene* system have led to more permanent types of cultivation closer to the villages.

For most people the main source of cash income is derived from the sale of beans and groundnuts. The extreme dependency on the mission is noteworthy: the vast majority of people selling beans and groundnuts during the 1992 farming season, did so to the mission. These beans and groundnuts were then transported to the drought-stricken regions of southern Zambia. With no market in Chibote, it is unlikely that the farmers selling to the mission would have had an alternative if the Fathers were not willing to buy. Some people sell produce to traders who are passing through (often Zaireans), or exchange beans and groundnuts for clothes and blankets. These opportunities are, however irregular and unreliable.

As in Monga, maize is grown principally as a cash crop, for sale to government marketing facilities and to brewers as an important ingredient in *katata*, the most favoured local beer in Chibote. A number of people grow small areas of maize without inputs for sale locally. Overall fewer people grow maize in Chibote than in Monga, and they are much less likely to use inputs. In the 1991 survey, while almost 44% of maize growing households were using more than one bag of seed and fertiliser, the figure was less than 10% in Chibote. Furthermore, by August 1992, very few households which had grown maize found themselves able to sell it. The change in government, the uncertainty surrounding the future of the Luapula Cooperative Union (LCU) and Indeco, the state marketing channels, meant that Chibote farmers were sitting with granaries of maize and no idea of how to get rid of them. The cost of hiring the OTC vehicle, given the limited number of bags it could carry, was prohibitive. Only those farmers who were growing maize with OTC-supplied inputs had a guaranteed market.

Unlike Monga, few farmers in Chibote area grow vegetables for sale (less than 14% in the 1991 survey). Along the river bank in Chibote centre, a few young men have vegetable gardens, with tomatoes and cabbages. These are sold to the better-off and salaried workers. Away from the centre, such vegetables are very rare. As with maize, people claim nobody would be interested in buying them and the high price of seeds (available through the OTC) is a disincentive. In the village of Alex 2, seven kilometres from Chibote centre, a group of brothers have an extensive garden of chinese cabbage and rape, virtually all of which is fed to their fish.

Aside from agricultural activity, trading and brewing are the main sources of income. Trading takes two forms: the purchase and resale of goods locally - women in

Muombo near Chibote centre, travel to Mukoli, 8km away, to buy bananas for resale - and, for those with more capital and/or a bicycle, trade in household goods from Kawambwa. In the dry season, young boys regularly travel to the "harbour" at Katota, where they buy dried and fresh fish to sell at 100% profit in Chibote. Lastly, traders from as far away as Zaire occasionally appear in Chibote centre. They sell second hand clothes, soap, and blankets, or exchange them for beans and groundnuts.

Brewing is a key economic activity. Most women in Chibote centre report that they brew at least once a month, depending on availability of ingredients. The preferred beer in Chibote, *katata* is made from a combination of millet and maize. Whereas in Monga, brewers tend to those women who grow millet and few people buy their ingredients, in Chibote, many brewers buy at least the maize.

There are important social differences between *katata* and *katubi*. *Katubi* is drunk by a group from a shared calabash, and the process of drinking is imbued with complicated rules of etiquette. Although it is now sold, *katubi* drinking and gifts of *katubi* are intimately connected with mores of respect and appropriate behaviour. For example, the provider of the *katubi* must be the first to drink from the straw to show that the straw had not been poisoned. Anybody may join a group gathered around a calabash of *katubi*. *Katata*, on the other hand, is sold in plastic containers or cups. Though there may be a sociability connected with *katata* drinking inasmuch as a group of men may share a container, there are few rules or conventions surrounding its consumption or sharing. One man may buy a container and drink it alone in his house. It would not be respectful to pay a work party with *katata* and *katubi* is still reserved for important social occasions such as funerals. *Katata* is made for sale, and no other purpose. And in Chibote, plenty is sold. Women from outlying villages prefer to travel to relatives in Chibote centre to do their brewing because of the much bigger market there. On a Sunday afternoon (after church), it is possible to gain the impression that every single man in the village (and some women) is completely drunk.

Chibote presents a paradox. Despite its limited marketing opportunities outside of the area, and lack of visible productive economic activities, there is apparently no shortage of cash (at an aggregate if not an individual household level). The turnover at the OTC shop is regularly in excess of the equivalent of £150 a day. Possible explanations for this lie with the availability of salaries from the mission and OTC. In addition, Chibote contains a number of returned migrants who are visibly better off than other members of the community: their houses are furnished, they may have glass in the windows. These may account for some of the cash circulating in the village.

The household economy

In Monga and Chibote, households are neither homogeneous in structure, nor in intra-household dynamics (the sexual division of labour, decision making, control over resources).

The most common household form in the research sites is that of two adults and their dependent children, with an average household size of four people (source: 1991 survey). Slightly less than a third of households are headed by women alone and a few consist of single men. Only one incident was encountered (in Monga) of a divorced man living with his children. Most older people with adult offspring will identify themselves as a separate household in that they sleep under a different roof from the nearby son(s) or daughter(s). It is unlikely that they will also maintain separate domestic arrangements such as food preparation.

This broad description disguises the shifting nature of household form: unstable marriages and frequent temporary migration mean that within the overall picture, changes take place. Though the most common household is that of two adults and their dependent children, it is often the case that not all of the children are the product of that particular marriage. Thus, the household of one man (given that households are identified by the male adult, if present) is likely to comprise different individuals from one period of time to the next. Marriage and divorce are, after the first marriage, fairly straightforward procedures (though divorce can be very costly). Initial marriage requires the performance of bride service and payment of a small sum to the woman's parents. Subsequent marriages are said to have taken place simply by the act of an individual going to live with a different man or woman. Poewe (1981) noted that in Kashikishi area, men may have several different "wives" along the valley, while women may have several visiting "husbands". A similar situation exists in Monga and Chibote. This is not to say that such arrangements are simple and undisputed; merely that today's nuclear household may not be identical to tomorrow's.

The transitory nature of many marriages implies that many men and women will adopt separate economic strategies, or at least ensure possibilities for independence in the event of changes in marital status. On the other hand, the influence of Christianity's prioritisation of the nuclear family unit, combined with the fact that of course such units do exist, mitigates against this. The result is an identifiable sexual division of labour according to certain tasks and a flexible and varied control over the products of labour according to the nature and apparent stability of the marriage tie. A tendency was found whereby a shift towards greater separation in farming activities, especially that of women taking exclusive control of particular fields, was often a precursor to marital breakdown.

An overview of agricultural and income generating strategies indicates a number of tendencies in the sexual division of certain activities; women are invariably brewers of local beer, though men may make wine. Men are generally responsible for craft work such as making mats and repairing gadgets. Men fish with nets while women fish with poison and baskets.

In agriculture, the division of labour tends to be according to task rather than crop as long as the crop is not grown principally for cash. Most frequently, cassava, the main

food crop, is farmed on "joint" fields. Men are in principle responsible for land preparation, women for planting and weeding, while men and women both harvest. Where *citemene* is still practiced, men climb and chop down trees, while women pile up the branches for burning. Where crops are farmed for cash, there is a greater likelihood that men and women will control separate fields, making all decisions relating to planting and harvesting, though possibly assisted by the spouse for certain parts of the productive process. In both Monga and Chibote, the majority of households had some degree of separation of fields and decision making, though very few had complete separation of both control and labour.

None of this division of agricultural tasks, with the exception of those relating to *citemene*, is immutable. Women prepare land, men weed. Some (often younger) husbands and wives choose to work side by side on their fields. As the household reaches a later stage in the development cycle, there are likely to be able bodied children of both sexes. It is then more common to find that women will go the fields with their daughters, men with their sons.

Domestic work is one facet of the sexual division of labour which unsurprisingly is less flexible. Women and girls are responsible for all aspects of domestic labour apart from house building and repairs, which only takes place during the dry season. The day to day provision of cooked food, water, firewood and clean clothes is entirely the job of female household members. On rare occasions it is possible to see a man "helping" his wife carry firewood. Men are proud to be seen to be playing with their children. Such contributions take up a minor part of the domestic workload. In both Monga and Chibote, food preparation and cooking is the single most time consuming domestic task, largely because of the enormous amount of time required in cassava preparation: following harvesting, it has to be peeled, soaked, chopped, dried, and pounded, before being made into *ugwali* - the staple without which no meal is complete.

In a study of time allocation in Mabumba, near Mansa, Allen (nd) remarks on the enormous disparity in activity levels between males and females. The domestic workload (and low level of domestic technology) is the single most important reason for this. Nearly a quarter of the average woman's daylight time is spent primarily on preparing food, on firewood and water collection, and on keeping the house clean. Of clearly productive activities (that is, excluding "resting", leisure, school, sickness and meetings) women contribute 77% of the work. Allen concludes:

The extent of men's inactivity is truly astonishing. Male humans in Mabumba are basically dependent on females for their food and succour from the cradle to the grave. It is true that men do engage in some productive activity on a very selective basis but the only thing they do which women do not, is climb trees and chop them down. (Allen nd; 43)

Broadly, the division of labour allocates to men activities which are construed as requiring strength (cutting trees, cultivation) whereas women undertake work which is more reliant on stamina. Though it is undoubtedly true that women spend more time working, men tend to engage in brief, intensive periods of activity. Digging, including the digging of fish ponds, is thus assumed to be a male activity.

Households without adult men

The absence of adult males in the household is a significant constraint on cultivation. Inevitably, the absence of male household labour means the woman head of household must rely on her own labour or that of nearby kin, or hire labourers. Limited access to cash and/or inability to cultivate a large enough area, can result in inadequate food production. Nevertheless, no simple equation between female-headedness and poverty or vulnerability should be made. Undoubtedly there are a number of women heading households alone who barely eke out a living. There are others who, it appears, are better off without a husband.

In Monga especially, there are a number of older, divorced, women who have chosen not to remarry, having built up an adequate economic base and who realise the value of pursuing an independent strategy. Where they can rely on the assistance and support of kin in the village, and have adult children who are more of an economic asset than a drain, not having a man to support is seen as a positive advantage. Those female headed households who are in a vulnerable and impoverished situation are of two types: older widows living alone and young unmarried mothers. The former are in a more critical situation because their destitution is unlikely to change, whereas the latter have the possibility that they may remarry and begin to establish an economic base. In both Chibote and Monga there are a number of old women who are entirely reliant on the charity of neighbours. They are too weak to farm and possess no assets. The seriousness of their situation depends entirely on the extent to which they have matrikin living nearby.

Village politics and religion

As in the province as a whole, Monga and Chibote illustrate a balance between "traditional" social and political arrangements and those of more recent introduction. Villages are under the authority of headmen, a position achieved either through succession or through becoming the "founder" of a new village. In both Monga and Chibote centre, there is more than one recognised village, though they are not physically separated. In Chibote, Mr Kafola is recognised as the senior headman by virtue of the prior founding of Kafola's village. He adjudicates at the traditional court and is the first point of contact for instructions from chief Chama.

In Monga, seniority is more disputed. Mr Kaseke, as eldest headman in the area, is generally recognised as senior. He receives messages and instructions from Chief Mabumba and is accorded appropriate respect. At the same time, Monga village is now the focus of "development" and of external intervention as this is where the primary school is located. As a result, there are suggestions that the headman of this village should be recognised as senior. Historical norms for classifying seniority are being counterbalanced by more recent influences.

At the traditional headman's court, disputes relating to marriage and to cases such as livestock damaging crops are most commonly heard. Witchcraft accusations are also heard within the headman's court, but there are heavy fines for being a false accuser. In both Monga and Chibote, crimes are more and more often referred to the police and to the local magistrates. Thus, the headman's role is more one of local dispute resolution and less one of controlling misdemeanours.

A significant difference between Chibote and Monga lies in the religious affiliation of the populations. In Chibote, the influence of the mission has ensured that more than 90% of people profess themselves to be Catholic, with the remainder either claiming no religion and a tiny proportion (2%) being members of the Mutima church. The religious make-up of Monga is much more diverse, with the majority (some 35%) being Catholics, followed by roughly equal proportions of Christian Missions in Many Lands (CMML), New Apostolic Church, and Jehovah's Witnesses. In addition, there are a few Seventh Day Adventists (source: 1991 survey) It is noticeable that in Monga area, whole villages tend to "belong" to one church or another. For example, Chapa's village consists almost entirely of Jehovah's Witnesses (who do not fit Karla Poewe's (1978) description of better-off and more market oriented entrepreneurs separating themselves off from the main village).

Religion plays an important role in both places, but the strength of the Catholic church in Chibote is understandably more noticeable. The church fulfills an important social and economic function for most people, being the main focus for villagers to meet and public announcements. Part of this role is that of social control: for example, it is not permitted for beer to be sold before the church service on Sunday. An outlying village in which the headman had called in a *shinganga* (witch doctor) because there had been sickness in the village, was temporarily "delinked" from the church. As was noted above, it also plays a major role as marketer of produce and employer of labour.

In Monga, church groups are also a focus for meeting and discussion, though less monolithic than in Chibote. It appears to be more feasible in Monga for Christian religions to live in relative equanimity with older beliefs and practices relating to witchcraft and magic (see chapter four). This is possibly because the various religious groups have a less significant economic and social role than they do in Chibote.

The conditions for aquaculture, and its development in Monga and Chibote.

According to ALCOM aquaculturalists, soil and water conditions in both Monga and Chibote are appropriate for aquaculture. Furthermore, there is apparently abundant land on which fish ponds can be sited - land which does not currently have alternative uses.

Low levels of livestock ownership indicate that only very extensive methods of culture will be appropriate. Livestock ownership levels are similar in Monga and Chibote. Households in Chibote are slightly less likely to have no livestock at all or only a few chickens than those in Monga. In the 1991 survey, while 52% of households in Monga had at the most ten chickens, the figure was only 39% in Chibote, with the rest having more chickens or even goats. On the other hand, more households in Monga own cattle (18% as opposed to 12% in Chibote). About 8% of all households in both places could be said to be "livestock rich" in as much as they owned a combination of cattle and other large livestock such as sheep and goats. Ownership of livestock is not a conclusive indicator of propensity and ability to use manure to fertilise fish ponds. On the other hand, restricted overall availability of manure from livestock will ultimately be on a constraint to sustainability if the technology is widely adopted.

Fish culture in Monga and Chibote is a recent development. In Monga, only two farmers were found who had started their fish farming before 1986. The majority dug ponds during 1988-1990. The main spread of fish farming took place after four farmers dug ponds during 1988. They bought their fingerlings from Fiyongoli fish farm and were instructed in the rudiments of pond construction and fish culture by an extensionist from DoF in Mansa. Following this, the group formed themselves into a club and received a grant of 8,000 kwacha from the Ministry of Youth and Sports. During the following three years, a great number of fish ponds were dug, some with advice and assistance from DoF, but many with no advice. Fingerlings were predominantly supplied by fellow farmers. In the dambo immediately adjacent to the settlement of Monga-Kaseke-Fipatauko, there are approximately 140 fish ponds, including one pond belonging to a women's group, two belonging to the school and one unfinished "communal" pond. There are about 40 individual pond owners in this area.

Ponds in Monga which are located on the margins of the dambo suffer from occasional water shortage, partly as a result of poor construction. According to an ALCOM Rapid Rural Appraisal conducted in 1990, principal constraints facing fish farmers are those of water shortage (ponds may dry up at the end of the dry season so the production period is shorter than it might be), and shortage of feed and fertiliser for the ponds. These factors combine to make yields low. The assumption that yields are low is based on observation of pond conditions rather than quantified data.

In Chibote, aquaculture developed following extension efforts by priests from the mission. In addition, an extension worker from DoF was posted to the area. One of the rationales for posting the fish scout was the apparently rapid spread of fish culture activities, combined with an obvious need for advice and support to fish farmers. At the time of field work, the number of fish farmers in Chibote centre was about 30, with a further 70 identified in villages within the research area. Ponds in Chibote are on average smaller than those in Monga area, most being only about 120m², while in Monga they are slightly larger than 200m². Most ponds are supplied by water from the water table and few are drainable. As in Monga they are located in wetland areas such as dambos and close to streams, but the density of ponds is visibly lower. In Chibote, optimism about the future of fish culture was already waning in September 1991. A number of ponds were abandoned and levels of management were apparently poor: many ponds were in a poor state of repair, with grass not slashed and clear, underfertilised water. Farmers complained about predation from otters, about theft, and about a lack of support from both the priests and the resident extensionist.

The detail behind these broad characteristics is elaborated in the chapters which follow. They introduce a "view from the village" of the process of aquaculture development.

Notes

1. See for example Lightfoot and Noble 1992, Molnar et al 1987.

SECTION TWO

VIEW FROM THE VILLAGES

SECTION TWO

VIEW FROM THE VILLAGE

The chapters in this section present an analysis of the process of aquaculture development from the perspective of rural communities.

Chapter three explores the reasons why people dig ponds, and the constraints of those who choose not to. From a broad description of key distinguishing characteristics of adopters, the chapter goes on to consider their motivations. Better understanding of why people choose to dig ponds will aid in explanation of management practices once the ponds are dug.

As noted in the introduction, sustainable adoption of fish farming requires more than that many people dig fish ponds. ALCOM observations suggest that poor management practices are leading to poor pond productivity, and that eventually this leads to abandonment of fish farming. Chapter four takes a closer look at these management practices. It describes what people actually do and assesses the determinants of this. The importance of the various constraints to sustainability are assessed. The chapter aims to ascertain what makes for sustained aquaculture adoption and to answer the question of whether a more successful fish farmer can be identified in advance.

Chapter five assesses the impact of fish farming adoption within the household. Aggregate production figures may disguise the use and destination of the product. They may also draw attention away from labour and time-allocation effects of the adoption of a new technology. These are both considered. Lastly, the effects of aquaculture development on the community as a whole, including non adopters, is reviewed.

CHAPTER THREE

DIGGING PONDS

3.1 INTRODUCTION

For the promoters of fish farming, a common indicator of project success is that people dig fish ponds. Quantified figures in project documentation tend to concern a combination of numbers of fish farmers and extrapolated figures on production. It is widely suggested that the principal factor signifying the success or failure of any extension programme or project is the extent to which it is adopted and supported by the "target" population (Engle and Stone 1989).

In the case of Luapula, the extremely rapid spread of aquaculture over four-five years indicates that persuading people to dig ponds is not a problem. Obviously though, adoption alone does not imply sustained management. That fact that an individual or group digs a fish pond does not necessarily imply that they then become fish farmers. In order to understand why adoption of fish farming in Luapula has only occasionally been accompanied by sustained management, it is important to consider the background to the adoption process.

This chapter considers the adoption of aquaculture through its two critical aspects: ability and motivation. In practice, these aspects are intimately connected. Resource availability and socio-economic background of individual farmers influence both perceptions of the potential benefits of fish farming and capacity to adopt the technology. Farmers may also wish to adopt aquaculture and find they are constrained - or be in a position to in terms of resources and unwilling.

In the first section, fish farmers' motives for adoption are considered on the basis of both farmers own reports of their motivations and on observed behaviour. Evidence shows that for many fish farmers, returns in terms of production of fish are low (see chapter five). Nonetheless, some fish farmers express a willingness to continue despite such low returns. This suggests that the farmers themselves do not perceive benefits to be insufficient, possibly because their initial motivation for adopting aquaculture was not exclusively related to the production of fish in the short term.

Wijkstrom (1991) argues that fish culture is solely undertaken for the purpose of increasing household income and that "...Other purposes for engaging in fish culture are entirely subsidiary in nature and can be forgotten by the public planner and international aid official" (Wijkstrom 1991; p.4). The observation is based on the statements of existing fish farmers when asked why they decided to adopt the technology. However, few respondents would be likely to answer in terms of the conceivable less obvious grounds for adoption: to claim land, as a long term asset or security, or as a signal of being more "developed" and thus gaining access to project and government funds and assistance. These motives are not subsidiary. Their existence has a major effect on the way in which the technology develops and its sustainability. An assessment of these less overt and less frequently reported motives for adoption is therefore also important.

The chapter centres on the motivations and ability of individual fish farmers. However, because there also exist a number of examples of group adoption of fish farming, these adopters are also considered.

Having established some of the principle reasons for adoption, the second section outlines the principle characteristics of those who choose to dig ponds, and how they may be distinguished from non adopters. It assesses the reasons for non-adoption of those who do not dig ponds.

3.2 QUESTIONS OF MOTIVATION

** A farmer in Kawambwa district has 32 fish ponds, all of which have clear, flowing water and no evidence of management. The ponds are of diverse shapes and sizes, spreading randomly into the dambo. He claims to have dug them all single-handedly over a three year period (literally: he lost a hand in a mining accident). A few were stocked with fingerlings from DoF. He has never harvested any fish.*

** A farmer in Chibote who feeds the fish in his pond regularly, but equally frequently loses them to a predator, persists with his fish farming. He explains: "It's my hobby".*

** A woman fish farmer also fails to harvest her pond: "It is ornamental". She is among the most resource-poor of the heads of household in her village.*

These examples are extreme. They are not intended to indicate that all, or even most, people who dig ponds do so for obscure reasons. They do show that understanding of motivation for adoption requires more than narrowly based cost-benefit analysis. Less quantifiable, but nevertheless significant influences exist. Moreover, in the context of Luapula, where, for most people, there is an perception of abundance of the resources required to start fish farming, a lack of obvious economic alternatives and a strong desire for fish, it makes less sense to ask "why adopt fish farming?" than "why not?". The question of why not? is closely tied to issues of ability: despite generalised lack of competition for resources, there are seasonally-determined shortages and stresses which are felt most by vulnerable groups such as older women heading households, the sick, those with few assets. Such vulnerable groups are seldom adopters of fish farming.

In this section, the decision to adopt is viewed in the main in isolation from its consequences, which are elaborated later. Thus, the reality of whether fish farming brings people more money, or better availability of relish or any other expected benefit is considered separately from the initial incentives which encouraged them to start.

The Legacy of "Development"

Aquaculture development activities are not introduced into a vacuum, into communities which have in some way been isolated from external influences. The legacy of previous interventions, whether colonial or government or donor supported development projects, has a profound influence on the way that local people respond to the latest one. Such institutional interventions combine with changing market conditions to effect adoption practices - and people's behaviour once they have adopted a new technology. In the previous chapter, the history of intervention in Luapula was outlined. From colonialism through to the 1990s, there has been a profusion of schemes and projects which have aimed to enhance the well being of the Luapulan population and to ensure sustainable development.

One of the effects of all these schemes is that within rural communities, individuals have developed their own interpretations of "development" and respond to those interpretations in a strategic manner. Such responses are not necessarily in line with the stated objectives of the developers. In particular, while developers speak in terms of self-reliance and imparting knowledge, villagers recognise projects as a source of resources to be used to meet immediate needs. Villagers may also perceive themselves as powerless in relation to the developers, especially when those developers are *musungus* (white people): they accurately identify where control of material assets lies and some prove themselves capable of adapting their behaviour to get a share. This situation is of course by no means limited to Luapula.

Monga and Chibote have had different experiences of development, but the responses of local people have many similarities. To some extent, the process of aquaculture adoption must be seen as part of this response. Partially because of its proximity to Mansa, residents of Monga area have seen an enormous variety of different agencies, projects and development schemes. Government extension has used Monga area as a focus of its activities: the Adaptive Research Planning Team (ARPT) is based in Mabumba, only a few kilometres away and a number of farmers in the Monga area are contact farmers for ARPT. FINNIDA has trained Lima farmers in maize growing. UNICEF has funded a women's farming project, also promoting maize growing, and a new, ostensibly poverty focused, vegetable growing group is being assisted with maize and fertiliser. The ALCOM vehicle is regularly seen down at the fish ponds.

Chibote's experience of development has been strongly influenced by the Catholic mission, which has been in the area since 1910. As noted in chapter two above, the mission has played an important role in many people's lives: before the White Fathers left, it served as one of the main marketing and distribution channels for the area. Since then, though people complain that the mission no longer assists them adequately, it has remained an important purchaser of beans and groundnuts. The mission and the OTC are the only owners of vehicles in Chibote area. They are recognised as powerful and influential. Other influences have also been felt though: IRDP has supported the rehabilitation of the clinic house and the establishment of a nutrition project. Over four years, DoF and ALCOM have been regular visitors to the area.

People in both research sites have learnt to adapt their behaviour in anticipation of where they see potential benefit. Many villagers understand that outsiders have control

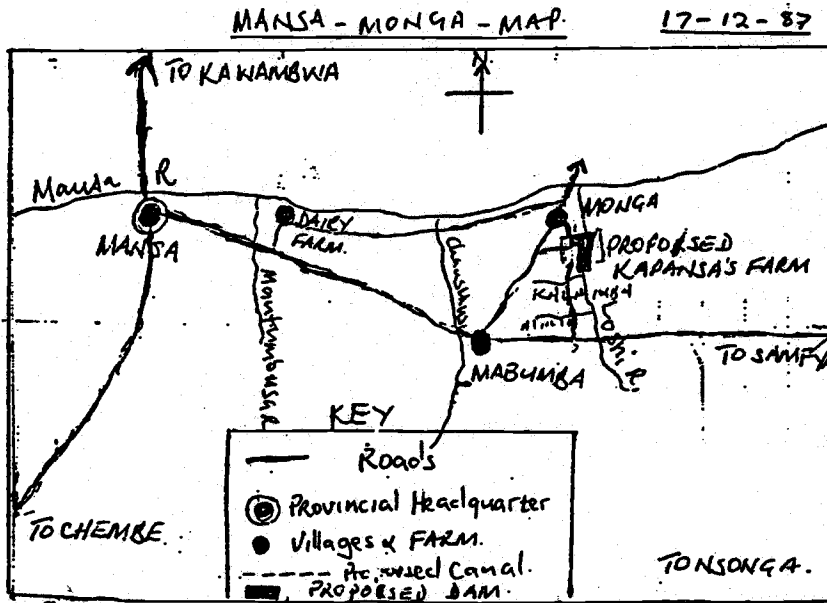
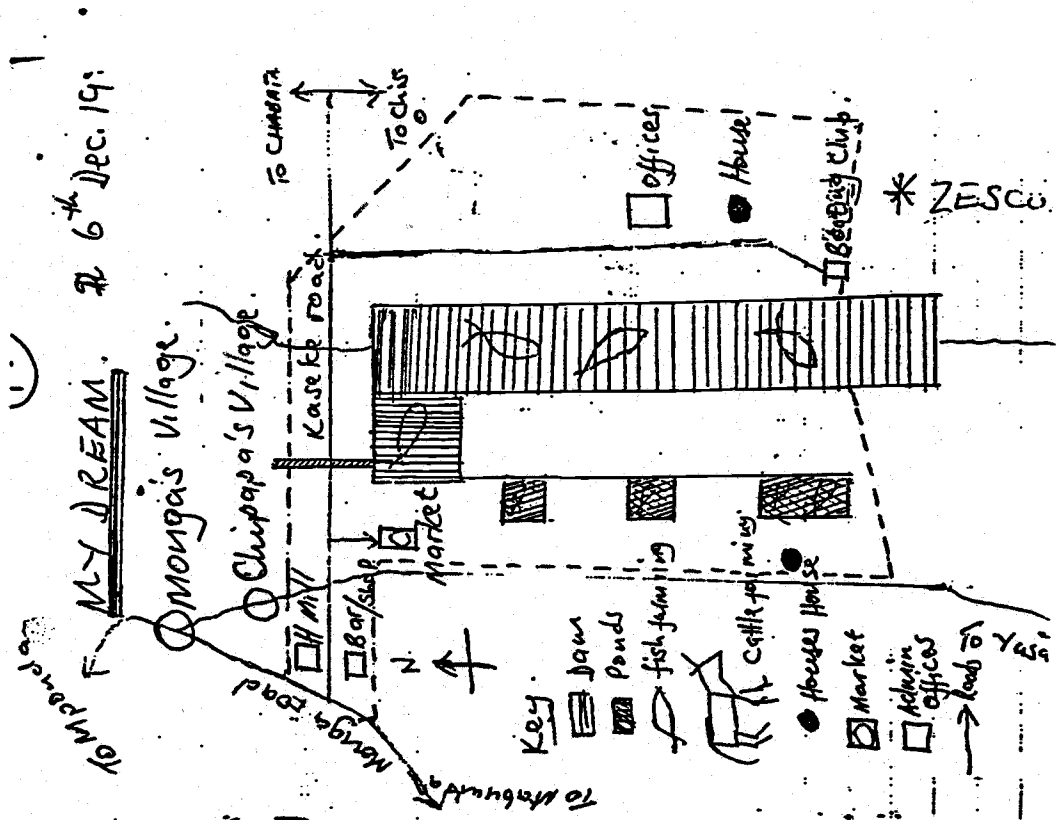
over goods and services which would otherwise be inaccessible. Some become adept at manipulating those outsiders, especially through adoption of the language of "participation". At an obvious level, the legacy of development is felt through consistent (and indignant) requests for assistance, loans, fingerlings, inputs. Farmers, understandably, feel themselves to be heavily dependent on the state and donors and are particularly disenchanted by threats that such inputs may no longer be forthcoming. More subtle however, is the way that some farmers have learnt to give what they see the developers want - so far as they are concerned, fulfilling their half of a bargain.

Over the past few years in both Monga and Chibote, there has developed a belief that it is important to be recognised as a club and to be operating as a "good community" in order to receive inputs. In Monga area, when word got around that UNICEF was now going to be diverting resources away from the women's clubs and towards education, there was a sudden scramble for places on the executive of the Parent Teacher's Association. Four women fish farmers in a village near Chibote insisted that they be registered, because unless they were formed as a club, they were unlikely to get assistance.

A farmer in Monga, the possessor of a large vegetable garden which was partially financed by a sponsor in Mansa, took visitors from the Ministry of Youth and Sport to visit the garden. He proudly explained that "this is our community vegetable garden". He was fully aware that if the well-cultivated and prospering garden was seen as the result of active and harmonious community participation, then development assistance might flow. This man was also in the special position of being contact farmer for ALCOM, UNICEF, IFAD, FINNIDA, and Research (ARPT) - and Chairman of the women's club! Others farmers complained that he was only successful because he was receiving so much support.

An extreme example of an individual adopting such development language is that of the "dream" of Luyton Kapansa. (fig 3.1).

Figure 3.1
Luyton Kapansa's dream



Luyton Kapansa was acknowledged to be the richest, most highly educated man in Kaseke village. He had worked as a college lecturer in Serenje, was the owner of a hammer mill in Mansa, and had been politically active under UNIP. His "dream" involved the complete redevelopment of the dambo adjoining Kaseke village into all manner of enterprises which he had seen promoted elsewhere: cattle ranching, fish farming, a recreational boating lake!. In the plans he listed the necessary facilities for the market: cold room, fish store room for dried fish, a market masters office, cashiers office, security officer's office. The dam was to be 400metres wide by 2km long by 10 metres deep. He was still in search of funding for the unlikely scheme in 1992. When questioned about the implications for the current residents of the village of the complete loss of their farmland he explained: "But it is all right. It will be a community project".

The subtlety with which farmers learn to adapt to new messages is manifested in a conversation following a visit from a potential loan disperser to the Monga fish farmers' club.

A: "We must learn to show that we are a good community to get these loans"

B: "No, that is not what is important now. They are interested in individual farmers now. We must each show that we have a good plan. Then we will get the loans"¹

In Monga and Chibote, fish farming was supported by outsiders. In Monga, the fish farming club was given a grant with no specification of how it should be spent. In Chibote, the mission assisted initial adopters with tools and fingerlings. Farmers in both places associated adoption of fish farming with possible assistance and material benefit beyond the likely yield from the ponds. Anger with the executive of the Monga fish farming club (see chapter four) largely revolved around the belief that a few individuals had taken money which should have been a gift to anyone who dug a fish pond. Recurrent examples were also found of farmers adapting their behaviour and responses to questions once having dug their ponds. For example, a farmer was reluctant to harvest his pond until DoF were there so that he could "prove" how well he was doing. In Chibote, a farmer was embarrassed about me attending his pond harvest because the grass around the pond had not been slashed. A common response to poor harvests, problems of predation, and shortage of water was "but I will dig another pond".

The role of loans and credit

One aspect of the legacy of development is the hope for and expectation of, loans. The rationale for giving credit usually lies in its function of easing bottlenecks in an otherwise economically viable enterprise. At current levels of productivity, it is unlikely that fish farming is viable in this strict economic sense. Therefore, the potential ability of farmers to repay loans is very low. Nevertheless, requests for loans are rife. This is explained by the underlying belief that loans are not something which has to be repaid. This in turn is the legacy of "development" in the province, where loans have been equated with modernity, with being progressive. Farmers perceive that to take out a loan is part of being developed -and that loans themselves are of considerable benefit. At interest rates of 10%, with inflation running at more than 150%², loans seem like a very attractive proposition. Of eight farmers in Monga, each applying for loans of more than 150,000 kwacha from the Ministry of Youth and Sports, only one had had an income of more than 6,000 kwacha from his fish farming during the previous year, and none had any idea of likely yields the following year (or even what they might spend the loan

money on). The rationale from the Ministry was that the money could be used to buy equipment such as shovels and wheelbarrows. The farmers themselves recognise that loans for fish farming are in reality a cover for other activities. By getting a loan as a fish farmer, money might be invested in other activities (seed and fertiliser for vegetables) which would then go some way towards loan repayment.

The "development effect" is widespread. It is influential in decisions about the adoption of fish farming and subsequent behaviour. It is only one among a range of motivations for adoption, and is most evident among those who have had greater exposure to external funding and support. The fact that some people construct and manage their fish ponds according to an assessment of how this will be viewed by others, rather than because of any intrinsic advantage of fish farming, is significant because it influences subsequent management and potential sustainability of fish farming. When expected support is not forthcoming and competition for resources increases, such farmers are more likely to abandon fish farming in favour of more profitable enterprises.

Fish farming as an income generator

"Fish culture is clearly undertaken for the purpose of increasing household income" (Wijkstrom (1991);p.4) Based on surveys in three provinces in Zambia, Wijkstrom (1991) argues that for most small scale fish farmers, fish farming is viewed as a "economic" activity. For many, it is also viewed as a "commercial" activity in that farmers expect to - and do - sell a part of the fish produced (according to the survey). Wijkstrom's definition of household income includes both fish that is consumed within the household and that which is sold. The focus of this section is the commercial use of fish farming - both as an immediate source of cash and as a commodity to barter for goods and labour.

In Luapula, some farmers continue to rear fish in the face of low returns (yields are low and few ever sell their fish). This leads to doubts about the simplicity of the survey conclusion. Of course, that few people are gaining cash incomes from their ponds is not evidence that this was not their initial motive for adoption. Nevertheless, closer examination of local views on "profit" is required. The discussion above concerning some people's sensitivity to the appropriate use of language indicates that the economic motivation is not as straightforward as it initially appears.

For fish farming adoption to be the result of a calculation of costs and benefits in terms of cash, the farmer would need knowledge of likely yields and potential markets and be able to weigh these against the alternatives. Small scale fish farmers in Luapula seldom, if ever, make such calculations - at least not in relation to their fish ponds alone. The ponds are only ever part of a wider farming system, within which the diverse benefits cannot necessarily be quantified in financial terms. This is not to say that farmers will not report that they expect to see a cash profit from their ponds. In fact, "profit" is viewed principally in cash terms. Thus, a farmer explained (in English) that:

With only one pond I cannot see a profit. That first pond is for consumption, but later I will dig more and then I may begin to see profit. One day the ponds will be for business and then I will keep one for the house which will not be for business³

This farmer had at the time harvested one basket (about 10kg) from his single pond, but was not able to predict what he might get, in either cash or fish terms from the ponds he intended to build. He thought he would sell fish, but said that he was not certain who to, especially as most people in his village went fishing in the river.

Among small scale fish farmers, not all have no idea of likely cash gains. Those that do often have unrealistic expectations. One farmer in Kaseke village had applied for a loan of 30,000 kwacha for buying fingerlings, maize bran and cement. He said the loan would have to be repaid at the rate of 8,000 kwacha a year, but that would be no problem with five ponds, each yielding 20 kg p.a which would be sold for 2000 kwacha.

Certain elements of this calculation are not implausible. In Mansa market, hand-sized fish sold at the time for approximately 100 kwacha/kg. Without the facilities to transport fish to Mansa, the farmer would have to have sold from the pondside. Village prices were though, much more negotiable and influenced by availability of cash and customers on any one day. Moreover the estimated yield is unlikely; too many other factors enter the equation. At the time of the discussion, he had gained a total income from his five ponds of 100 kwacha. The majority of his earlier harvests had been given away (see chapter five) in the hope that later his friends would "remember" him. Problems of over-production of fingerlings meant that much of his harvest consisted of very small fish, which would fetch a lower price.

This example is not isolated. Many farmers were encountered who spoke of fish farming as a "business" but for whom the reality could not be described as "business" in terms of financial costs and benefits. Either they were expecting this transition to "profit" to occur through expansion, or they explained that temporarily they were had obligations to other people ("the ones who are feeding me with cassava are the ones who are eating my fish"). They would then shift to "being more businesslike" (a local use of English) in future years. This use of language reflects a more general distinction, in which certain characteristics are identified (particularly by their possessors) as being symptomatic of being more or less "developed". In wealth ranking exercises, individuals readily put at the top of their classifications, those who were known to be "farmers"; that is, they were people who grew maize for sale, with the use of purchased inputs. Others were merely "growing for subsistence". The former were people who would also be more likely to be labelled "progressive" by developers. For some, though not all, self-identification with such progressiveness is important. It may provide both status and material benefits (giving access to development assistance). When farmers speak of being "more businesslike" in Monga and Chibote, they specifically mean that they will get financial gains from their ponds. The use of the terminology of "profit" and "business" was much more prevalent in Monga area than in Chibote. Monga has also had heavier exposure to the agents of development, both government and aid agencies.

Assessment of the alternatives for cash income: vegetable growing.

Fish farmers devote to their ponds, time, labour, and occasionally money which have alternative uses. Among these are income generating strategies, which are potentially more financially profitable than fish farming, for example the growing of "European" vegetables such as chinese cabbage, tomatoes, and onions or the rearing of small livestock (poultry, rabbits). In deciding to adopt aquaculture, farmers are obviously not necessarily rejecting such strategies: they may be complements as much as alternatives to aquaculture. In particular, the integration of vegetables with fish farming can be beneficial for both activities as vegetable leaves are fed to the fish, pond mud fertilises the vegetable garden, and water from the pond is used to irrigate. Other examples of integration abound, and have been experimented with elsewhere,⁵ but few of these have been used by farmers in Luapula. Though attempts have been made by the agriculture department to encourage farmers in small livestock production, examples of where this has occurred are so few as to make assessment of the pros and cons impossible.

This section considers the decisions made by farmers to prioritise either pond or vegetable production. It illustrates that the decision making process involves a range of calculations other than that of financial gain. In almost all cases, vegetables outweigh fish farming in this respect. Nevertheless, farmers continue to devote a certain amount of their energy and land to fish farming where it could have been used to grow vegetables for sale. It is important to understand the background to this prioritisation

The financial advantages of vegetable production over those of fish farming are variable, depending on marketing opportunities. In Chibote area, especially away from Chibote centre, there are only restricted opportunities to sell European-style vegetables as there is only a small local market (most people preferring to eat the traditional vegetables they grow themselves), and transport costs to Kawambwa are prohibitive. In Alex 2 village, a group of fish farmers was growing chinese cabbage, but this was almost entirely to feed to the fish because (they explained) nobody would be interested in growing it locally.

In Monga area, the situation is very different. Proximity to Mansa market and a local familiarity with eating tomatoes, onions, chinese cabbage and rape, has ensured that there is a large and growing market for vegetables, especially those produced through irrigation in the dry season. Furthermore, trials initiated by the Adaptive Research Planning Team (ARPT) in the dambo area around Mabumba have been extensively copied. A large number of farmers, many of them also fish farmers, are turning to vegetable growing as a reliable source of dry season income. Financial returns vary, depending on quality of the land, and amount of (chemical) inputs used, but a farmer with a lima (1/4 hectare) vegetable garden could expect to raise anything from 7000 - 10000 kwacha during the 1992 dry season, of which expenditure on inputs would be around 2-3000 kwacha⁶. Other, non measured, inputs include the time to be devoted to weeding and watering.

So far as farmers are concerned, vegetables are acknowledged to bring in more money than fish farming. No farmer (in Monga) said anything to the contrary. Furthermore, vegetable growing is a relatively fast way of getting money: time from planting to harvest is considerably shorter than it is for fish farming. One farmer made an

farming was not yielding him a cash income, but the fact that he was prepared to divert resources with a recognisable cost to him suggests the need for consideration of other, even more "commercially" oriented fish farmers; those who have mainly or entirely constructed their ponds using hired labour and who are prepared to purchase inputs. The activities of three of these are considered in appendix 5.

Fish ponds for relish.

Among both case study and survey households, the most commonly stated reason for adopting fish farming was that of household food consumption. This motivation stems from the facts that fish is a highly favoured food, and that, although available, such availability is unpredictable and unreliable.

Ranking exercises carried out with members of case study households revealed that fish was always among the first three favourite relish (*umunani*) ingredients, along with chicken and meat. Gathered relish, such as cassava leaves and pumpkins leaves, were generally ranked last, while cultivated vegetables such as rape or cabbage were better, but not much better, than the gathered alternatives. Few people specified a preferred type of fish. The important thing was that it should not be "leaves".

These rankings were inversely proportional to the frequency with which people consumed meat, chicken, fish or gathered vegetables. Over the year, regularity of consumption of different foods varied according to availability (market and gathered) and economic status of household. For some households, the fact that plenty of fish was available to buy in August and September was irrelevant because they did not have the cash with which to buy it. During the rainy season, in both Monga and Chibote, there was a greater variety of foods available to be gathered: mushrooms, caterpillars, *cikande* ("African prawn"), in addition to leafy vegetables. In the dry season, particularly towards the end, (August/September), households without access to fish had an increasingly monotonous diet of dried leaves.

Observation revealed minimal consumption of meat (goat or cow) or chicken during the research period. The majority of people may go for several months without eating any meat at all. This is partially due to availability: livestock holdings are limited, and opportunities for hunting are now virtually non-existent. In Chibote, two people were known to have guns and both occasionally went hunting. On only one occasion did either of them catch anything (an impala). In Monga, hunting was unheard of: "all of the animals are killed now".

Availability of meat is a factor in its low consumption, but this is exaggerated by accepted practices concerning the slaughtering of animals. Animals, particularly larger animals, will only be killed for special occasions such as a funeral, or if diseased. When hiring a labouring group, it is expected that they should be fed at least chicken, but preferably goat. If unexpected visitors arrive, it is important that the host is in a position to "show respect" (*umuchinshi*) by slaughtering an animal. Because of the social importance of killing animals, people are unwilling to do so, "just for relish". A widow in Chibote area complained that she was tired of eating mushrooms every day for weeks, so tired that she almost had no appetite to eat at all. I asked her why she did not slaughter a

chicken for variety, as she possessed about twenty. She explained:

I could not just kill one. They might get all used up, and then what would I do if I really needed one?⁸

For many, the attraction of a fish pond for relish is parallel to that of owning livestock: it is not so much that it will increase overall consumption, but that the fish will be there when needed. Reliance on marketed fish and on rivers is unsatisfactory: fish may be available to buy when there is no cash, or fish may be required to show respect to a visitor when it is inconvenient to go to the river. When combined with the attraction of being able to eat fish when cassava leaves have become too monotonous, the potential of fish as a source of food is clearly attractive.

Fish ponds as assets and for security

The section above indicates that fish ponds have a significance to farmers as a form of asset or security which may be greater than their immediate usefulness as a source of fish for food or cash. In this respect, they are more attractive than, for example a vegetable garden. In communities where possession of material assets is limited, such security, whether real or imagined, can be very important⁹. This significance takes two forms: the fish in the pond may be important to meet contingencies such as those described above, and the pond itself may be regarded as an asset.

Several farmers, when asked about their refusal (after as much as four years) to drain their ponds had justifications along the lines of:

"I don't want to lose the fish - I am saving them for an emergency".

That emergency might take many forms: an unexpected visitor or a funeral, or slightly more predictable "special events", such as the need to buy school uniforms for children. In one case, a fish farmer drained a pond to raise the money to pay his fine in an adultery case. In another, the pond was harvested after three years to celebrate the return of an estranged wife. The failure to understand that after some time, the fish left for such emergencies would be stunted and therefore of less value, is related to the general attitudes to breeding and slaughtering of livestock described above.

The fish pond itself also serves as an asset. In both Monga and Chibote, the phenomenon of people digging more and more ponds before seeing any benefit from the first one has been described. For many, the fact of current lack of income is less important than potential, possibly many years in the future. A farmer in Monga, has nine ponds, but complains that because he has no livestock or vegetable garden, he is unable to feed the fish properly. Nevertheless, he explained that it is better to dig now, while he is strong: "the food for the fish will come later, but it may not be so easy to dig a pond later". Other farmers speak wistfully of their ponds supporting them in their old age and of having something permanent to leave to their children - "Our African pension".

Such views of fish farming as involving the creation of an asset to be used far in the future or left to children are closely associated with people's perceptions of their own security of tenure. In the Central African Republic, a reported impediment to aquaculture development is the impermanence of villages: because people shift every few years, they

may be less inclined to dig ponds (Moehl 1989). In Ian Cunnison's (1959), study of the Lunda of the Luapula valley, the continual fission and fusion of villages is noted. George Kay (1964) observed the same tendency in Chief Kalaba's village, in Mansa district (near Monga). Though the traditional pole and dagga huts were being superseded by burnt brick and iron structures, the life cycle of the villages still involved a process of splintering and reforming in which within each village there were potential new villages under section heads.

In Monga and Chibote most houses are now constructed of burnt brick, indicating greater permanency. Of the case study households, three lived in pole and dagga houses, and all of these spoke of plans to build more permanent structures. Older people are unanimous that "people do not shift around as they used to" because "they are becoming farmers". What this means is that they have adopted more permanent forms of cultivation. On the other hand, the composition of villages is continually changing, with a constant movement of people in search of new economic opportunities. In addition, though it is true that burnt brick houses can last as long as 20 years, it is also the case that they are relatively quick and inexpensive to construct. Use of costly iron roofing sheets is extremely rare.

In both Monga and Chibote areas, examples of incipient village disintegration were found. The process surrounding such disintegration was similar in both places, and was caused largely by inability of the resident headman to command respect, coupled with unexplained disaster. In both Kalaliki village in Monga area and Bule village in Chibote area, bouts of disease and death had led substantial numbers of people moving away to join other villages. In Kalaliki, there were no fish farmers. Several people explained (independently of each other) "we are not well settled here". Furthermore, villages exist which have been formed recently, following a split from the original village. Thus Busuku village in Chibote area, was formed by a group of people moving away from Chibote in search of new farmland. Though the village has a headman, it is barely recognised as a separate entity in Chibote. People in Busuku maintain strong ties with those back in Chibote.

The significance of the continuation of village disintegration and formation is unlikely to be great so far as fish farming is concerned. Security of tenure derived from inheritance practices is. The tendency to move less frequently, to give up travelling in search of fresh bush to clear, is associated with changes in inheritance practices: there is apparently more reason to leave something permanent and tangible for children. Procedures in the case of divorce and inheritance practices in Luapula partially account for the reluctance of women to adopt aquaculture. They are equally relevant to the keenness with which men dig fish ponds.

As noted in chapter two, in both of the research sites, marriage is a fairly fragile tie; of 24 case study households, 13 included at least one adult who had been previously married. In the case of divorce, it is often expected that a woman will return to her parental home. This depends partially on the age of the woman; younger divorcees are more likely to return to their home village than older women who will have greater independent resources, supplemented by the assistance of adult sons and daughters. With the shift away from uxorilocal marriage, there is more chance that the home village will

be at some distance from her present home. There is thus a much lower incentive for women to commit time or money to an asset which is not transferable. On divorce, women carry with them household utensils such as cooking pots. They also have rights to the growing crops to which they contributed labour. One man explained his low groundnuts harvest by the fact that they had belonged to his ex-wife. In fact she had not returned to harvest them, but came later and initiated a quarrel with the new wife, who she accused of "stealing" her groundnuts. The land on which the crop grew remained the property of the husband and his family. A number of wives of male fish farmers explained that if they were to have a pond, it would have to be "in my own place". Men agreed - two men told me that they had plans to construct a pond for their wives on land belonging to the wives' parents.

A similar insecurity is associated with widowhood. The principle of matrilineal inheritance has traditionally meant that on death the wealth accrued by a person becomes the property of their matrikin. Accordingly, it has in the past not been in the interests of wives and their children to contribute to the heritable estate of their husbands/fathers. A number of cases were found of the relatives of a man arriving at the house of his recent widow and stripping it of all possessions, taking control of all livestock and even throwing her out to find a new house. This practice is in the process of being eroded; there is a reduction in the real influence of the matrikin of both men and women. In Chibote area, several of the female pond owners had inherited them from a husband who died. Nevertheless, both men and women stress the need to divide assets and specify their ownership to ensure that dispossession does not take place. For women, it remains a threat which limits their incentive to adopt aquaculture.

For men, these insecurities are less important. A number of studies have reported that in matrilineal and matrilocal systems of kinship, men will be less willing to contribute to permanent structures or assets because of the conflicting interests of themselves and their wives' matrikin (Lampport Stokes (1970), Ruddle (1991). In Poewe's (1981) work on matrilineal ideology in Luapula, she describes how, under matriliney, male interests are frustrated because they are unable to accumulate and because women control land. In the research sites, no evidence of this insecurity was found. Inheritance practices reflect a combination of "traditional" conventions and their adaptation to influences such as increased commoditisation of the rural economy, the effects of education and migration, and pressures from the government and churches. Hence, the conflict between widow dispossession, described above, and attempts by men to ensure that their wives/children will not suffer such a fate if they die.

For men, death of a wife does not signify loss of material assets. For women, there is more chance that it can, but this danger is reducing. Currently, older systems of inheritance co-exist with modern adaptations. In the case of fish farming, the majority of male pond owners stated that they expected their pond to be passed on to their children. Some had taken measures to ensure this by writing wills, and even by taking out insurance policies with ZSIC (Zambia State Insurance Company). Thus, despite the persisting importance of kinship in people's lives, its role as an economic determinant is not as significant as might be expected.

3.3. CHARACTERISTICS OF AQUACULTURE ADOPTERS

This section describes the socio-economic characteristics of people who have dug fish ponds in Monga and Chibote. It identifies in which ways they are different from the rest of the rural population. A range of socio-economic characteristics may be relevant in distinguishing likely adopters of fish farming from non adopters: gender, age, education, membership of political or religious organisations. These are intimately connected with one another and to some extent causally associated: in Luapula better educated people tend to be men, more politically active people tend to be older. In isolation from their material accompaniments, such characteristics are not determinants of ability to adopt. They do however provide pointers towards who, in current circumstances, is likely to adopt.

Age

Given that most ponds are constructed by the owners, without the use of hired labour, it is not surprising that the majority of pond owners are in the 20-39 years category (see table 3.1) This fact is further influenced by the fact that extension efforts in the Chibote area were directed towards younger men.

Table 3.1 Age and Sex Profile of Pond Owners in Chibote and Monga

	Male	Female
Less than 20	5	
20-29	34	7
30-39	24	4
40-59	14	5
50-59	5	4
60-69	4	1
More than 70	3	

Source: 1991 survey.

"Wealth"

The technical requirements of fish farming are such that in theory no member of the rural communities is precluded from adopting. Nevertheless, possession of material assets such as livestock and tools may make adoption easier. If fish farmers are in any sense "wealthier" than non fish farmers, this could represent a combination of an ease of adoption with (possibly) attitudes which accompany accumulation: such people may be in a better position to invest resources in new technologies and may be more inclined to do so. Possession of assets may lead to reduced vulnerability and a greater sense of security. It may also provide a means for further income generation.

Regarding stocks of assets, fish farming households are markedly better off than

non-fish farming. The assets measured in table 3.2 were selected following discussions of indicators of wealth.

Table 3.2 Percent of fish farming and non fish farming households owning selected assets, Monga and Chibote

	Bicycle	Sewing machine	Radio	Fishing nets	Plough
Non fish farming households	22.2	7.4	18.5	34.2	2.7
Fish farming households	35.2	12.5	31.8	36.4	5.68

Source: 1991 survey

Fish pond owning households also tend to be rather better endowed with livestock than non-fish farming households. While the majority of households overall are clustered around the low livestock owning categories (10 chickens or less, or none at all), the weighting is much more heavily in this direction with non fish farming households. The reverse is the case at the other end of the scale (see table 3.3). This better endowment reflects the higher overall wealth of fish farmers relative to non fish farmers, rather than a belief that ownership of the livestock themselves is a prerequisite to aquaculture adoption.

Table 3.3 Livestock status of fish farming and non fish farming households.

Livestock status	Percent of fish farming households	Percent of non fish farming households
None	5	16
1-10 poultry only	28	40
More than 10 poultry only	19	19
1-5 goats/sheep	18	15
More than 5 goats/sheep	10	2
1-5 cattle	9	1
1-5 cattle and goats/sheep	10	4
More than 5 cattle	1	3

Source: 1991 survey.

Access to knowledge - entering the culture of development

The adoption of fish farming is dependent on the belief that it is a feasible option. This belief is the product of ideas of appropriate behaviour and knowledge about the technology. Access to extension is influenced by gender, by education and by "political" connections. Because fish farming is locally perceived as something which comes from outside, but which can be learned, adopters realise the importance of tapping in to that knowledge. It seems likely that those who are able to access the fisheries extension service will also have adopted other "new" crops which are partially dependent on outside advice and assistance.

In rural Luapula, maize and vegetable growing are both closely associated in people's minds with "being developed". The reason for this is largely that these crops have been promoted by the government and donors, who, from the perspective of villagers, control immeasurable resources (more so for maize, but in Monga, trials with vegetables have been extensively copied). Fish farming is similarly - though at a much lower level - associated with outside interests. While there exists considerable cynicism about the benefits to be derived from maize farming because of dependence on inputs which are usually delivered late and uncertain marketing opportunities, aquaculture is as yet untried. This people who are already within the "culture" are more likely to be fish farming adopters.

The suggestion that fish farmers are already participants in a culture of development is borne out by the fact that they are much more likely to be maize and vegetable growers than the rural population as a whole. While of non-fish farming households, 12% grow vegetables for sale, the figure for fish farming households is 31.4%. In Chibote area, the growing of vegetables for sale is rare. If Chibote survey households are removed from the calculation, the tendency for fish farming households also to be vegetable growers is even more marked. A tendency to grow maize, particularly to grow maize with the use of purchased inputs is also found to be stronger with fish farming rather than non fish farming households. In the 1991 survey, growing more than ten bags of maize was invariably associated with the purchase of chemical fertiliser, whereas those with lower yields were not necessarily purchasers of inputs other than seed.

Table 3.4 Production of maize, fish farming and non fish farming households.

Number of bags	Percent of non ff households	Percent of ff households
None	57.4	26.4
Less than ten	27.8	37.9
More than ten	14.8	35.7
Total	100	100

Source: 1991 survey

"Fish farmers are men"

In Luapula, as in most of sub-Saharan Africa, by far the majority of pond owners are men. The 1991 survey revealed 19.1% female pond owners to 80.9% male. These figures disguise to some extent the considerable management of fish ponds that women undertake, especially when the ponds are principally for household consumption (see chapter five). As a consideration in fish farming, gender relations become particularly significant when related to this management function. The issue of women as fish farmers is possibly less important than the repercussions for gender relations of the adoption of the technology. Nevertheless, there is an overwhelming association of fish farming with men.

Mbozi (1991) and Woodford-Berger (1987) have both considered the role of gender as a factor in fish farming adoption. Both argue that women are constrained by a combination of material constraints, particularly those relating to labour and time, and by the attitudes and perceptions of those promoting aquaculture. These views largely support the findings of the Luapula study. It should also be recognised, however, that women do not form a homogeneous category and that all women are not equally disadvantaged by shortages of time, limited access to household or outside labour, or a low view of their own capabilities. The form that gender relations take is influenced by other factors, particularly age and education.

In Chibote, aquaculture was promoted through the Catholic church as an activity for young men, and the belief that it is not an activity for women has prevailed. Nevertheless, at least a few women in Chibote area have adopted the technology. In Monga, where aquaculture has spread with less outside encouragement, there is only one female fish farmer - and she is the wife of a male fish farmer. The view that aquaculture is not an activity for women, comes as much from men and women within the village as it does from external interveners. It can be correlated with the associations often made between men and "progressive development"; men are also maize farmers, vegetable growers, rice growers. Attempts to override these associations are made, for example, by the formation of women's clubs which receive grants to grow maize or vegetables. In Monga, few if any men would say that maize farming is not an activity for women. They are however, satisfied by the explanation that "they are just not interested"

Education

In ALCOM's 1988 survey (Wijkstrom and Wahlstrom 1992), the average head of a fish farming family is considerably better educated than the average head of a household in the province. For the province as a whole, 31% of males 15 years and above lack formal education, but only 3% of fish farmers lack education. Only 47% of the population as a whole have attended primary school while 61% of the fish farmers have attended primary school and 50% report that they know how to read and write a second language.

In the 1991 survey, the heads of fish farming households emerged as slightly better educated than others. Among fish farmers as household heads, 13.1% have had no education at all. The figure for non fish farming heads of household is 23.5%. Of non fish farmers 66.3% are educated to primary level and below and 10.2% are educated above primary level. Of fish farmers, 17.9% are educated above primary level and 69.0% to primary or below. The difference in educational achievement is made less significant by the fact that only fish farmers as head of household are taken into account.

Social standing: political activity

Having a "high profile" in terms of political or religious activity may indicate both a greater propensity to adopt a new technology - and a greater ability. In Monga area especially, there exists a tension between traditional authority structures revolving around the headmen and the chief in Mabumba, and the bureaucratisation of village life by which the holding of an office in a local organisation is part of being "modern" -and all that entails in terms of potential assistance. Political involvement in terms of membership of either of the two parties, MMD and UNIP, is of lessening significance.

In Kaseke village, relationship to the headman is no indication of either wealth or social standing. Most individuals could in any case claim either a blood or a marriage relationship and to be on good terms with the headman's house was not necessary to embark on new farming activities. Though it was possible for the headman to organise members of the village to work together on a job in which they all saw benefit (such as clearing the path to the drinking water source), he was less powerful in the case of disputes. One farmer expanded his fish ponds in such a way that the sons of the headman (his mother's brother) were unable to get access to water. In October 1992, the situation was still in deadlock; the headman professed himself unable to control the activities of the younger man, the two households were not on speaking terms, it was clear that the authority of the headman was weak. Though officially there exists a Village Justice Committee under the control of the headman, in reality it appeared impossible for it to meet.

In other villages in both Monga and Chibote area, the influence of headmen is becoming increasingly peripheral. In all cases, people stress the need to respect him, but in reality there are limitations to how far this will go. Such limitations are not always in conflict with the existence of other social forms of organisation: the headman in Chibote centre was an active member of several groups in the Catholic church and a member of MMD. But neither are they in close association; other members of MMD did not join to follow the headman's lead - in fact he confessed himself joining as a result of pressures from others.

Before the emergence of MMD in 1990-1, political patronage was an important aspect of many people's strategies for personal advancement; office holding in UNIP was accepted as a common means to ensure access to loans or other benefits (Gatter 1990). Luapula is the home province of Frederick Chiluba, leader of MMD. Almost everybody met in the months surrounding the October 1991 election professed themselves supporters of MMD. Despite this, and the euphoria surrounding MMD's victory, the significance of party politics in most people's lives was minimal. Office holding in a political party was not a means of access to other benefits and the initial euphoria diminished with the confusion surrounding provincial marketing and extension and lack of fast, visible, benefits.

Though there was general apathy towards party politics (except in so far as some people wished to distance themselves from earlier UNIP connections) the status of being an "office holder" nevertheless emerged as important. As one man explained: "it is important to have a post - like now, I am choir secretary. It is good to have a post because then you can go to meetings and be a leader. You have more respect as a top

leader"

Organisations in both Monga and Chibote took diverse forms: from church based working groups, to clubs arising out of external assistance (such as the UNICEF group in Monga), to school parent teacher associations, to groups formed for mutual assistance. What they all had in common was their strict bureaucratic structure: a group had to be properly constituted with elected office holders and a committee. An extreme example existed in Kaseke village where in a mutual farming group, there were seven office holders (Chairman, vice chairman, secretary, vice secretary, treasurer, organiser, trustee) - and one member. What is interesting about this stress on the importance of bureaucratic organisation is its derivation from outside influences such as the government and aid organisations, and the fact that it has now been internalised as a key part of village life - for some. The office holders in one group often appear as office holders in another - and all of them are those who in some sense identify themselves with modernity and "being developed".

This ideological identification has close links with practical benefits where fish farming is concerned, particularly in relation to the church. In those areas of Luapula where the Catholic church is highly influential, and where fish farming is promoted, church activity may provide direct access to extension and assistance. This is borne out by the examples of Lubwe (in Samfya district) and Chibote, both of which have Catholic missions which promoted fish farming. The Chibote study and a profile of the participants at an aquaculture training course in Lubwe reveal the high social (especially church) activity of adopters.

In the 1988 ALCOM survey, similarly high participation in the affairs of the community is recorded, with almost half of the respondents being office holders in organisations of various kinds. This tendency is supported in the 1991 survey, where the level of social activity of fish farmers is in marked contrast to the rest of the community (see table 3.5)

Table 3.5 Group membership of fish farming and non fish farming household heads, Monga and Chibote

Group membership	Percent of non ff households	Percent of ff households
None/citente group only	68.9	37.9
Office holder/member of local organisation*	31.1	62.1
Total	100	100

* This includes, office holding in political parties, cooperatives, church organisations, and women's clubs.

Source: 1991 survey

3.4 CONSTRAINTS TO ADOPTION

Characteristics such as gender, education and age affect people's ability to gain access to the requirements for starting fish farming. The way this is related to two critical requirements - labour and land - are considered below.

Labour

For just under a quarter of households with no fish farmer present at the time of the 1991 survey, lack of labour or money to hire it was stated as the most important reasons for not having adopted aquaculture. Labour availability is the single greatest resource constraint for potential adopters. Labour requirements for fish farming involve both the time needed for pond construction and that for general maintenance. The availability of labour depends on either the existence of household members willing to work on fish farming, or the capacity to hire outsiders.

Most fish ponds in Luapula have been constructed without the use of hired help (76.9% in the 1991 survey). Most commonly a man will dig the pond alone or assisted by a relative. Ponds are dug mainly during the dry season and time taken ranges from a week to a month depending on the size of the pond and the intensity of the activity. Digging a fish pond is generally thought to be hard work, and ability to dig a pond seen by many people as a sign of "power". Nevertheless, it is also done at a time when there are relatively few alternative uses of labour. Thus, for men who dig ponds, the cost of time foregone is principally in terms of leisure.

Given that so many ponds are constructed using only household labour, the stage in development cycle of the household is potentially a key determinant of ability to adopt aquaculture. Fish pond construction is principally a male activity (see below). Therefore presence or absence of able bodied men is likely to be related to ability to adopt. This hypothesis is strongly supported by the survey evidence, which shows that fish farming households invariably had at least one adult male present, and were more likely to be especially well endowed with male labour. The definition of adulthood used here is that of the respondents.

Table 3.6 Adult men in fish farming and non-fish farming households.

	Percent of fish farming households containing:	Percent of non fish farming households containing:
No adult men	0	22.2
One adult man	71	56.5
Two adult men	18.6	16.7
Three adult men	3.5	3.7
Four adult men	7	0.9

Source: 1991 survey

No fish farming households had no adult men present. Women pond owners may also be the heads of households, which presents an apparent anomaly. The explanation lies in the fact that within these households, the adult male present was an older son. There is a prevailing belief, supported in part by the extension service and by both men and women, that the digging of fish ponds is not an appropriate activity for women. This view is tied to the sexual division which allocates to men the heavier, land clearance tasks, requiring relatively brief and intensive bouts of activity. Fish pond digging is seen as similarly hard work. This sexual division of labour is not immutable though. In practice, women also take on land clearance tasks - and dig fish ponds. Of the 21 female pond owners interviewed in the 1991 survey, 4 reported that they had dug at least some of their pond with their own labour. The remainder used either hired labour (8) or the pond was dug by a husband or other relative (9). The strength of the current belief is strong however: the few women who have shown that they can dig fish ponds are viewed as aberrant in their behaviour.

Extra-household labour

If there is insufficient labour within the immediate household to dig a pond, obtaining either the free or reciprocal labour of others or using hired labour are options. Ability to command extra-household labour is influenced by reciprocal arrangements, and by gender, age and wealth.

Stromgaard (1985) has noted a tendency in Luapula for "farmers" (that is, larger producers of maize) to separate themselves from the rest of the community and to live where they have few obligations of kinship. As a new technology, it might be thought that the same processes would occur for fish farming - and that fish farmers' access to reciprocal labour, especially from members of the extended family, would be accordingly limited. Fish farmers are not however, different from other members of the community in their possession of kinship ties to a wide range of people and hence in their potential access to extra-household labour. The nature of this access in practice depends on the operation of reciprocal obligations, and on residence patterns.

Traditionally, one of the most important sources of extra-household labour has been that arising from the obligation of sons-in-law. Because uxorilocal marriage arrangements are no longer the norm in either Chibote or Monga, the legal right of a man to the services of his son-in-law can no longer be guaranteed. A young married couple may shift temporarily to the home of the woman's parents, but once the bride service is completed, they are likely to return to the man's home. In many cases, the two places are within a few kilometres of each other. It is still accepted that a man has an obligation to work for his wife's parents on a specified job: for example, he is given a "portion" to hoe, but the amount of time entailed is reduced from three-to-four years to a month or less. Furthermore, young men who have been to town to make money may employ somebody else to do their bride service for them or send money to the parents in law. No occasions were found in which the bride service labour of a son-in-law was used to dig a fish pond.

In both Monga and Chibote, reciprocating labour arrangements with members of the extended family are ad hoc and rare. While obligations concerning distribution of

resources are complex and plentiful, those relating to production are not: production is essentially individualistic or at least restricted to the unit of husbands, wives, and their children. Respect and courtesy dictate that a request for assistance should not be refused if it does not conflict with other demands. This is particularly the case if the request comes from an older person. Alternatively, divorced or widowed women may be assisted by brothers or adult sons. People may assist each other in times of seasonal increase of workload providing the timing is convenient for both parties. For example, in Chibote, many people have a reciprocal arrangement for planting millet. This appears to be the only crop and activity for which such an arrangement exists though. Although people may respond to individual requests, there is little formalisation of this. Time allocation information for case study households over the period November 1991-August 1992 showed that in a third of the households, no member of the household had been to do agricultural work for another member of their *ulupwa*.

Outside of the kinship group, there are two principal ways of gaining access to labour: to hire individual pieceworkers, or to hire a group who may work for money or for payment in beer and food. In Chibote, the latter form of labour organisation is much more common than it is in Monga, probably because of the influence of the Catholic church in promoting local organisations.

A limited number of ponds were dug using at least some paid labour (23.1%). The majority of hirers of labour are women, which is understandable, given the belief that they are not strong enough to construct ponds. The ability to adopt for women is therefore much more closely tied up with alternative use of inputs than it is for men. The rates paid vary depending on the size of the pond, and are not limited to cash payments: people will dig ponds for goats, fishing hooks, beer, groundnuts. Payment of 1 or 2 goats for a pond is quite normal. In August 1992 a goat was worth between 2000 - 2500 kwacha. For women choosing to hire labour to construct a fish pond, brewing beer is assumed to be the most obvious way of financing this, either through sale of the beer, or through direct payment of beer to labourers. For digging one 10 by 20 metre pond, a group of men would expect to be paid 120 litres of beer. In August 1992, the sale value of this would be 3000 kwacha. This figures can be compared to a pieceworking rate of between 100-200 kwacha a day.

The labour required for pond construction is a significant limitation for some potential fish farmers. Evidence indicates that the labour required for pond maintenance is not such an important consideration: fish farmers fit their pond maintenance activities around other priorities. Even the few female heads of household who had adopted fish farming did not find that it represented a significant additional labour burden.

Land

Adequate access to land and water is obviously an important prerequisite for the adoption of fish farming. It is generally thought that in sub-Saharan Africa, land scarcity is not a significant constraint to aquaculture development, because it is carried out on land with few alternative uses (Grover et al. 1980). In Luapula, for only very few non-adopters (4% in the 1991 survey) was scarcity of land stated as a significant constraint. Furthermore, fish farmers do not control larger areas of land for other farming than do non fish farmers. For most, the area of land cultivated is determined more by labour availability than it is by access to the land. However, as fish farming spreads, localised pockets of shortage of appropriate land begin to appear, especially in Monga area.

In Chibote, there is a perception of abundance of land and questions regarding problems in access for different groups are generally responded to with surprise and bemusement. In Monga, such abundance is more obviously being eroded and there are increasing disputes over control of land. Though land for fish farming is apparently plentiful, good land is not necessarily so. Good land not only holds water, but also is fairly close to the home so as to minimise theft. Furthermore, because fish farming requires an investment in labour, security of tenure is also important in the ability to adopt.

The formalisation of land access

Customarily in Luapula, as elsewhere in southern Africa, people have use rights rather than ownership rights to land. Such rights are acquired through the act of clearing a particular area, through historical precedent (the fact that a father or mother had once cleared it), and through requesting permission from the chief through the headman. A distinction is made between "bush" land which is cleared for *citemene* and for maize farms, and dambo land, on the margins of which both fish ponds and vegetable gardens are situated. With bush land, prior cultivation by an ancestor is a much more important indicator of rights to the land than it is on the margins of the dambo.

As such arrangements are becoming modified, traditional tenure becomes combined with legal title and ownership rights. Gatter (1990) notes that in Mabumba village (close to Monga), an increase in maize production has been associated with a new boundedness of land. For the agricultural department, precise measurements of the size of a plot to be planted with maize is important, largely connected with the need to monitor and evaluate yields. At the same time as demand for land becomes stronger, it becomes increasingly important to have formalised rights. In Monga area, a number of farmers expressed worries that the government would give land to "strangers" from the towns. Though there was at this time no evidence of this happening, rumours were rife about the government plans to favour "commercial" farmers growing wheat and rice.

Some people have decided to preempt the problem by the acquisition of "papers" giving such rights. In addition to the worries about outsiders, for many loan giving organisations, legal title to land is a criterion for selection. Access to land for different members of the community then becomes affected by the ability to fill in forms and to speak English. Education, political standing, and experience of urban living may be important.

Women's access to land

There is no formal dictate that women cannot own land: the concept itself is hardly meaningful in an area where "my land" means "my land to use". Women do however, tend to get access to land more frequently through their husbands (if married), than through any other relative. This has replaced the earlier allocation practice, associated with uxorilocality, where a man was dependent on his wife's parents for access to land.

Even where there is still little formalisation of land access procedures, ability to gain control of the "best" areas, for example, for fish farming, then becomes affected by other factors. In one village in Chibote area, a number of women, both married and single, decided to become fish farmers. They were only given land on the far side of the dambo, because it was argued that the men needed that closer to the village. These women explained that they abandoned fish farming because they had no way of controlling theft of their fish.

Although access to land as such is not significant as a constraining factor for many women, security of tenure is. There is a greater possibility that women in the later stages of the life cycle will be in a better position to adopt aquaculture. This suggestion is supported by the evidence that women adopters tend to be older on average than men. In both of the research sites, there are a number of older women heading households alone and with no intention of remarrying. An opposing influence here is that older women heading households alone are likely to be of lower educational standard than men of an equivalent age. They are hence less able and less likely to approach extension services. Furthermore, many older female adopters are less well endowed with material assets such as livestock and less likely to have accumulated capital through farming activities.

3.5. ADOPTION BY GROUPS

This report has concentrated on individual fish farmers because of their greater numerical significance. In both Monga and Chibote, fish farming has also been undertaken by groups of people. The functioning of these groups is considered below.

The justifications for group adoption depend very much on the rationale and form of group. The degree of collectivity may vary from fully shared inputs and profits to co-operative management of certain aspects of the production process. Group aquaculture might involve group assistance with the construction of individual ponds or collective ownership of one or more ponds. Benefits include not only the mobilisation of scarce resources (often thought to be particularly important for women's groups) but the possibilities of getting better access to credit or grants. In some circumstances, collective adoption might justify government support which could not be afforded on an individual basis (Espinoza 1982).

Elsewhere in sub-Saharan Africa, evidence suggests that group adoption has had mixed success, at least in terms of continued maintenance of fish ponds. In Tanzania, 95% of the ponds in a fish farming development project were owned by private individuals. Among the 5% that were group owned, levels of continuity and success were

reportedly significantly lower (Murnyak 1988). In the Ivory Coast, a central component of the programme for the development of rural fish culture was the production of fish through schools. This was assessed to have been a failure for a range of reasons: poor siting; lack of management outside of school time; distance between the ponds and the school; a lack of interest among those who were meant to be motivators (L'Heureux et al. 1990). Another study found that in West Africa there was no evidence that communally organised fish culture projects had succeeded (Grover et al. 1980). A study conducted for Alcom (Mbozi 1991), showed that in Chibote area, women were only interested in working in groups to mobilise certain requirements, especially labour. Worries were expressed concerning the likelihood that people would fail to pull their weight, the more that things were collectively managed.

Success of group organisation for any productive purpose depends, among other things, on individual perceptions of fair a distribution of benefits. Willingness to contribute arises from either an expectation of appropriate benefit or from an acceptance of other social pressures for participation. As a result, success or failure is partially determined by the existence of norms and practices of collective or communal activity and the pre-existence of forms of cooperation. It may be the case that promoters of group adoption or management of aquaculture implicitly assume the existence of such norms and practices. However their existence has to be empirically established.

In Monga and Chibote, people form groups for certain productive activities, as well as for political and religious reasons. The influence of the Church is felt particularly strongly in Chibote, where groups which are formed for prayer and discussion are also used as a source of labour for agricultural activities. In Bule village, which had been delinked from the church, everybody claimed that they worked alone because there was no Church guidance. Overall, production is individualistic and limited to relatively small nuclear family units. Group labour may be summoned by the headman for specific activities: in Kaseke for the clearing of the water furrow; in Chibote for re-roofing the school.

In both places a distinction can be made between groupings that are made between friends or relatives, and usually for a particular productive purpose, and those which are formed in response to external influences. For example, three brothers in Alex 2 village in Chibote pool their resources with their father, and jointly manage a large maize farm and 15 fish ponds. Many of the ponds were initially constructed by individual brothers as an enterprise for themselves, their wives and children. The decision to pool resources, particularly management labour, only came afterwards. In Monga, there is a grouping of eight (male) friends who take it in turns to work on each others fields for specific aspects of the productive process.

Apart from these examples of cooperation, numerous failures were found in attempts to organise around supposedly mutual interests. For example, in Chibote, it is in all women's interests to regulate the timing of their beer brewing. If many women brew on one day, the chances are that they will be unable to sell everything. Furthermore, women complain that men can then travel from house to house, tasting but never buying the beer. Despite this, two attempts during 1992 to agree a rota for brewing collapsed almost immediately: "If a woman wants soap or salt on any one day, then she will brew".

Women explained that attempts to enforce the rota always failed because brewers were ready to take the risk that they had not chosen the best time to brew. Similarly, the price of beer is fixed by the headman and elder men. All brewers complain that it is artificially low and does not reflect the cost of inputs. (This calculation is based simply on the cost of cash inputs for maize and/or millet. It does not take into account the heavy labour requirement of carrying firewood and water). Brewers discussed going on strike to have the price raised, but were unable to reach agreement.

The examples illustrate the complexity of motivations for group organisation. Even where mutual interests exist, cooperation cannot be assumed. This is especially the case where groups are formed in which the objective or rationale is in part dictated or influenced by outsiders. The fish farming clubs in Monga and Chibote are a case in point.

Monga fish farmers club (formally known as "Matambusa Youth Fish Farming Project") was formed in 1989. Its chequered history is the subject of much gossip and acrimony in Monga. The original members of the club were the first fish farmers in the area. They cooperated with each other in the construction of their initial fish ponds and in the purchase of fingerlings from the government hatchery at Fiyongoli. Subsequently they began to receive increasing numbers of visitors; people from government ministries as far away as Lusaka, who were impressed with the apparent entrepreneurial spirit of the fish farmers. The fish farming club was formed partially as a vehicle for the distribution of a grant (of 8000 kwacha) from the Ministry of Youth and Sport (hence, Youth Fish Farming Project - none of the original members were below the age of 30). According to the original members, the grant represent recognition and appreciation of their good work. Other, later, members argued that this money was to be used to assist new fish farmers with purchase of tools. No word is available on the intentions behind the grant from the donor.

Following the official constitution of the club, work was started on a communal pond. Some of the grant money was used to buy tools for this pond, which, it was suggested, would be used as a village hatchery. The pond was started in 1990. By September 1992, it was still not finished. The 50 x 50 metre site was dry and unused. Meanwhile, in 1991, a further 5,000 kwacha grant had been received by the club. Acrimonious disputes revolved over the use of both sums of money, the extent to which the executive or original members might have appropriated the money, and who was or was not allowed to join the club.

The reasons for the failure of the club to operate smoothly are fairly straightforward. Most importantly, members and non members alike had very different views as to why it was formed, and what rights or obligations the executive had. The initial group of farmers managed to cooperate over their limited aims of pond construction and stocking. Once development money entered the scene, misunderstanding proliferated.

Two other group fish farming operations exist in Monga area: the school's and the women's group's. The school ponds were dug by the children in grades five, six and seven, during 1990. They are managed according to a rota. The aim of the ponds is both to educate the children in fish farming and to provide money for the Production Unit¹⁰. The latter aim has certainly not yet been reached because many of the fish were killed

when vegetable leaves covered in insecticide were fed to them in late 1991. The effectiveness of the former was not evaluated.

The women's group was formed in response to loan opportunities provided by Unicef. Individual women were given loans for growing maize and vegetables, but the fish farming enterprise involves group management of one pond. The pond was dug using hired labour paid for from group funds. The origin of these is uncertain, and mixed explanations were given. As with the school pond, no harvest of the pond has yet taken place, though it was constructed and stocked in 1990. Nonetheless, there is evidence (slashed grass and signs of feeding) that it is still managed. Suggestions were made that this management is the work of one woman only. Prospects for future group management are reduced by the fact that the direction of Unicef policy has shifted so the existing women's group is no longer the recipient of assistance. A new group has been formed, ostensibly with a poverty focus. The old group now exists on paper only.

In Chibote, no formal organisation of fish farmers existed before the formation of a fish farming club to manage the community hatcheries. DoF and ALCOM were concerned that the hatcheries, constructed with DoF financial support, were perceived by local people as being the property of the resident fish scout. It was thus agreed that they should formally become the property of "the community" who would then manage the ponds to supply fingerlings to the whole area. The club was only formally constituted in April 1992, so conclusions about its prospects are tentative.

Initial attempts to form the new club were met with apathy: announcements in church failed to induce people to attend the first meeting. Subsequently, the fish scout identified twelve men from both Chibote centre and the surrounding villages, who were to form the new committee. A pair of men was to manage each of the six ponds, but no harvesting decisions could be taken without the agreement of the executive. The selection of the club members was made by the fish scout on the basis of the people he knew. The other fish farmers in Chibote and the surrounding area, view the community fish farming project with a combination of ignorance and lack of interest. Of the fish ponds, by September 1992, three were visibly still managed and one had been used to supply fingerlings to farmers in a neighbouring village. The other three had clearly not been attended to for several months.

The observed characteristics of group attempts at fish farming -suspicion, mismanagement, misunderstanding, and apathy - arise mainly from the fact that there were considerable differences in people's perceptions of objectives. These differences originated in the communities themselves and between members of the community and those who encouraged the formation of groups from outside. Some people believed groups to be for an exclusive elite, therefore irrelevant. Others believed them to be ideally for everyone as a source of extra funding, but that the purpose had been misdirected by a few. The divergence is made harder to identify in practical terms because of the adaptability of certain members of the community to the language of community development. Women in Chibote believed that they could not begin fish farming until their names had been "registered", though it was impossible to discern what the registration was for, beyond ensuring access to funds. Their belief is understandable, given the view that among essentially abundant resources, the scarce ones are advice

and/or assistance.

With school ponds, the issues are somewhat different. Their function is not only the production of fish. Nevertheless, as a learning tool, non-production of fish is of dubious value. School ponds in Lukola told a similar, though worse, story to those in Monga. The ponds had been constructed under DoF guidance, and had been visited by a range of people from ALCOM over a three year period. As in Monga, they had never been cropped. The teacher in charge of the ponds blamed the fact that some of the other teachers had been transferred, and the children would not maintain the ponds without guidance. Nobody in charge of the ponds felt that they had a particular interest in them and village-based cooperation did not operate in this sphere.

3.6 CONCLUSIONS

This chapter has focused on the critical role of earlier development interventions in shaping people's responses to aquaculture. Not all farmers who adopt aquaculture do so in expectation of assistance, be it a loan or a gift. This expectation remains however, a key motivating factor in a stagnant economy where the government and donor activity have for many years represented a (albeit unreliable) source of funds. New projects do not enter into virgin territory as far as local people are concerned; there is a local memory of interventions through which people adapt both their behaviour and their language. People are prepared to make an investment such as dig a fish pond, but an important part of their calculation of benefits involves this response to development. That calculation should not however, be characterised as any simple assessment of costs and benefits. Many of the benefits to be gained from ownership of a fish pond, particularly those relating assets to be used for contingencies, cannot be easily quantified.

The fact that some of the spread of fish farming in Luapula can be attributed to people's response to earlier interventions and expectations of inputs, has implications for the future sustainability of aquaculture. If people rush to dig ponds with inadequate or partial knowledge of the technological aspects of fish farming, the chances are that pond management will be less than optimal are high. This has indeed proved to be the case in Luapula, as is described in the next chapter. Effective extension then becomes doubly important, if fish farming is not to be abandoned in favour of the next technology apparently advocated by the government or donor agencies.

Fish farming is also adopted because it potentially supplies a welcome supplement and variation to the diet of rural households. Fish is a particularly favoured food, and desire for fish is apparently significantly higher than that for alternatives such as vegetables. The role of fish farming as a source of relish is less derived from overall consumption benefits, than from its potential to meet contingencies and to provide relish for special occasions. The technical preconditions for fish farming ensure that it can only be undertaken in areas where there is likely to be at least some fish available. The unreliability of this availability is seen as more of a problem than absolute shortage. The fact that fish ponds are thought of by some fish farmers as a source of special occasion relish which they are reluctant to harvest in much the same way as they are reluctant to slaughter a chicken or a goat, is a contributing factor to low pond productivity. Fish are

left in the ponds for too long, and stunting results.

To the extent that fish culture supplies fish which might otherwise have been purchased, and/or provides additional income, and to the extent to which motives such as increased security, reduced vulnerability and claims to land can be given a value, aquaculture could be said to have "economic" rationales for small scale farmers in Luapula. Such rationales cannot however, be neatly correlated with the acquisition of cash income. For one thing, most farmers have very little conception of the kind of income they might expect from fish farming from a given level of inputs. For another, local definitions of "profit" as much illustrate the adoption by certain individuals of a particular discourse, as they do western economic meanings of the term. The discourse such farmers are adopting is that of modernisation and development, which they can clearly recognise as having positive associations. Thus it is only possible to have a "profit" with several ponds, not with one.

Although no simple causal link can be made between the possession of particular social and economic attributes and the ability to adopt fish farming, the Luapula study reveals various differences between fish farmers and non fish farmers, which are likely to be contributory factors in the adoption process. No attempt is made to prioritise the importance of any one of these factors, and to some extent they will reinforce each other.

Fish farmers are on average economically better off than other members of the community. They have higher levels of asset and livestock ownership. This average should not disguise the fact that there do exist adopters who are among the resource poorest in the community. Being richer is not a precondition to being able to adopt aquaculture, as adoption does not require investments beyond what is available to most households. On the other hand, richer people are more likely to adopt the technology.

Fish farmers have other characteristics which differentiate them from non fish farmers: they are more likely to be men, to be better educated, to be more politically active (including in religious organisations). These characteristics are important in as much as they influence perceptions of ability and willingness to take advantage of extension. The ability to get access to advice/extension is an important part of ability to adopt. Certain people understand better than others how to go about this, and the prevalence of beliefs about for whom fish farming is appropriate is perpetuated. These findings broadly support those derived from the survey carried out by ALCOM in 1988 (Wijkstrom 1992), in which it was also noted that fish farmers seem to belong to an "elite", from both the educational standpoint and because of their high levels of participation in the affairs of the community.

Examples of cooperation from Chibote and Monga illustrate the importance of people mobilising their own networks for a clear and limited purpose. When groups are formed largely in response to real or perceived external pressures, they function less well. The examples of groups formed for fish farming in Luapula do not give rise to optimism about the long-term prospects for group adoption or management.

Notes

1. Translation of a conversation overheard after a meeting at which a representative from the Ministry of Youth and Sports gave out loan application forms, 17/9/92.
2. These are the interest rates charged by the Ministry of Youth and Sports for the loans in Monga. Lima Bank (in Oct 1992) charges 46%.
3. Source: conversation with fish farmer (Mwewa Laimu, Chapa's village), December 1991.
4. Source: conversation with fish farmer (John Masuwa, Fipatauko village), March 1992. This farmer was a returned migrant, though originally from the village (his father was headman). His wife frequently received gifts of cassava from his family as their own cassava fields had not yet matured. These relatives took fish from his ponds on several occasions.
5. Most instances of the integration of fish farming with other aspects of the farming system occur in Asia. For discussion of these see Little and Muir (1987) which describes how animal and crop wastes are used as fish feed or fertiliser, or fish are raised with an irrigated crop such as rice. In Malawi, ICLARM has been undertaking experimental work with farmers on the development of fish-rice culture.
6. The exchange rate at this time was about 400k/£, so this represents an income of £17-25
7. At the time 34,000 kwacha was the equivalent of £280
8. Source: Elizabeth Mwila, 20.2. 1992
9. Chambers (1986) elaborates the importance of assets possession and the reduced vulnerability to contingencies that this implies. He stresses the importance of self respect as a factor in people's own assessments of their well-being.
10. The Production Unit is the "self-help" enterprise operated by the school, through which activities such as vegetable or maize farming are used to raise money to buy school equipment.

CHAPTER FOUR

MANAGING PONDS

4.1 INTRODUCTION

The previous chapter has described complex motivations for aquaculture adoption. Such motivations will not necessarily lead to fish pond owners becoming fish farmers. This chapter examines the determinants and nature of fish farming once the pond(s) is dug. It assesses the conditions for sustainable aquaculture development.

The concept of sustainability implies a concern with the overall fit, congruity, and lasting incorporation of an innovation into a socioeconomic system (Molnar et al. 1991). Sustainability in the context of this research is defined as the likelihood that adopters will continue to farm fish in a way that is compatible with other aspects of their farming and with decreasing reliance on external assistance. The chapter is concerned both with the sustainability of the individual fish farming enterprise and with the overall sustainability of fish farming in the province: can a knowledge-base be created which will eventually remove the need for external assistance? Factors influencing sustainability include resource control and knowledge of the farmer, extension perceptions, and natural constraints such as drought, theft and social control.

The ability to continue is determined by ownership or control over sufficient of the resources required for pond maintenance and by the possession of knowledge about how to use them. In addition to such knowledge there must be a belief that there are not better options for the use of the resources. Key resources include feed for the fish, manure for fertilising the pond, harvesting equipment, and labour for all pond management requirements. The chapter therefore elaborates the pond maintenance practices of the case study fish farmers: their resource availability and use, the decision making process for the use of resources, and the knowledge/beliefs behind the practices.

Continuance of fish farming is not only determined by resource availability at the household level. Other constraints may exist, both "natural" and human. Principal among natural constraints to the sustainability of fish farming are problems of water shortage and theft of fish by predators such as otters and birds.

It is often hard to differentiate between theft of fish by animals and theft of fish by human beings. Both lead to fish farming being abandoned in Luapula, although there are marked differences in the extent to which different areas suffer from the problems. The reasons for these differences are examined because they have important implications for recommendations concerning pond location and likely sustainability of aquaculture development in any one area.

Theft by humans has been seen as possibly one manifestation of social control mechanisms within rural communities. Much of the literature on socio-cultural factors affecting the sustainability of aquaculture development refers to the persistence of

"levelling mechanisms" in African societies¹. These are seen as social norms and practices, including witchcraft, through which individuals who have moved outside an established role or status are brought down. It is suggested that as a new technology involving opportunities for accumulation and personal aggrandisement, fish farming may be particularly subject to such levelling mechanisms. This chapter considers their significance to aquaculture development in Luapula.

4.2 MANAGEMENT PRACTICES

Resource assessments.

Fish pond management practices are determined by availability of resources (principally pond inputs and labour) and by decisions that are made about how to use what is available. Such decisions are based on knowledge and alternative uses of resources. Observation and monitoring of case study households reveals that a lack of knowledge about how to use resources is often a more significant constraint to management than absolute unavailability of resources. This generalisation is however, subject to seasonal variation. At the level of the community, limited availability of inputs exists, particularly during the dry season.

Furthermore, in a rural economy such as Luapula, where control of certain resources is not restricted to individual farming households, quantification of resource availability for any particular fish farming operation will be only indicative at best. It is misleading to view fish farming households as bounded units, or their fish farming operation as part of a "system" which can be clearly differentiated from other systems. It is theoretically possible to model the available inputs to an activity such as fish farming, and hence its viability and fit with other activities carried out by the same individual or household. Such a model could then lead to appropriate recommendations regarding, for example, pond size and stocking density. Leaving aside for the moment the very real problems in measuring resources, such models are likely to be dangerously far from reality if they do not consider the particular varieties of access to and control of resources - including those from outside of the immediate household. This is especially true in a situation where the required resources are not perceived to be in short supply, and formalised (eg. financial) mechanisms for access are not necessarily the most prevalent.

The diversity and complexity of resource availability for the case study households is illustrated in appendix 4.

Stocking

Access to fingerlings depends on their availability and on the means with which to buy them. These in turn are influenced by farmers own perception of where his or her fingerlings should come from, particularly perceptions of DoF or other outsiders' responsibilities.

A small proportion of fish ponds are dug and never stocked. The majority of these are in Chibote area, where expectations for assistance are highest. Farmers in Chibote area have learnt to expect assistance from the mission, not only for fish farming, but with marketing for beans and groundnuts. In particular, the Fathers had assisted fish farmers with a supply of cheap fingerlings. With the departure of the White Fathers in 1990, DoF was seen as the natural supplier of fingerlings. This belief was compounded by the numerous promises made by the fish scout. As a result, a private market for fingerlings failed to develop. According to the 1991 survey, not one fish farmer made money from sale of fingerlings.

Closer to Kawambwa, the majority of farmers received their initial fingerlings through DoF. The extension worker maintained that one of the greatest constraints for all intending fish farmers in the area is availability of fingerlings. Currently, a few farmers have begun to supply others with fingerlings, but the disparity between the DoF price and that on the private market increases dependency on the government sector. Privately, fingerlings sell for as much as 10k each. DoF supplies heavily subsidised fingerlings for roughly a tenth of this price. Understandably, farmers wait for DoF deliveries from Fiyongoli fish farm. Unfortunately (as both the extension worker and the farmers complain), such deliveries are sporadic and unreliable.

In Monga a private market for fingerlings has developed. For a small number of farmers, their income from selling fingerlings is considerably higher than that from selling fish from the pond. Prices are extremely variable, but consistently higher than those charged by DoF - or at least those that would be charged by DoF if the fingerlings and transport were available. The variability in prices (from 1k/fingerling to 10k/fingerling in the same month) is caused by both supply and demand factors, and by the effects of networks of reciprocity. In terms of supply and demand, though some farmers specifically harvest fingerlings to sell (and have previously agreed a price with another farmer), others find that they harvest fingerlings as a by-product and are prepared to take any price offered. For example, one farmer drained his pond to avoid theft by birds (the water level was getting low). The harvest included 450 fingerlings which were sold for 220 kwacha. He explained that nobody was available to buy at the time, so the price had to be low. Equally important, however, was that the buyer was intending to eat rather than breed with the fingerlings. The farmer explained that; "I knew what he was going to do from the way he was carrying them; he did not care about keeping them alive. I cannot charge high prices to my friend when he is only going to eat the fish" The price here was partly determined by the relationship of the seller to the buyer and possibly illustrates a longer term investment in reciprocity.

There is a great disparity between subsidised DoF prices for fingerlings and those of farmers selling privately. This is important to the extent that high prices exclude certain

people from adopting the technology. This in turn is determined by both ability to pay the private price, and willingness to buy arising from perceptions of the alternatives. Thus where fingerlings have been available from DoF, this results in a dependency on the department which it is not currently in a position to meet. Many farmers continue to believe that they are being denied a "miracle fish" from the government fish farm. This seems to them an obvious explanation for the failure of their fish to grow. In areas such as Kawambwa where DoF has supplied farmers, private suppliers are still able to charge high prices because of the current rapid expansion of fish farming relative to the government ability to supply fingerlings. Nevertheless, the private market has not developed as fully as it has in Monga, where government deliveries have not been forthcoming.

Partly as a result of the price of privately supplied fingerlings, initial pond stocking densities are generally much lower than those recommended by DoF and ALCOM (2 fingerlings per m²). In addition, those ponds in Chibote stocked with assistance from the mission were also stocked low densities. It is not uncommon for ponds to be stocked at a density of 0.5 per m² or even less. Very few² farmers practice selective breeding and restocking through the use of a pond set aside for this purpose. Nevertheless, it is common for farmers to explain their reluctance to harvest in terms of waiting for the fish to breed. Farmers can see the "nests" in their ponds, and are unwilling to disturb them.

Pond feeding

DoF and ALCOM recommend that ponds should be fed at least once a day, assuming sufficient feed is available. Observed practices among case study households vary from twice daily feeding to a few times a month at the most. A wide range of feeds are used, the most popular being cassava leaves, but including termites, household left overs, vegetable leaves, and sunhemp (crotolaria). Fig 4.1 illustrates the variety of feeds used by one diary-keeping farmer. The variation in frequency and type of feed reflects both availability and a combination of other demands on labour and knowledge about appropriate feeds.

Fig.4.1 Excerpt from translation of the diary of Geoffrey Nkandu

<u>Date</u>	<u>Type of food</u>	<u>Quantity</u>
18/3/92	Rape	1 plate each pond
19/3/92	Beans leaves	"
20/3/92	Grass	a heap
21/3/92	Banana leaves	4 leaves, one pond
22/3/92	Grass	a heap
23/3/92	Pumpkin leaves	one heap each pond
24/3/92	Bean leaves	a heap
25/3/92	Sensele grass	a heap
26/3/92	Cabbage leaves	1 plate each pond
27/3/92	Sensele grass	a heap
28/3/92	Sweet potato leaves	a heap
29/3/92	Sensele grass	"
30/3/92	Cassava leaves	"

The ALCOM aquaculturist also collected information from farmers on feeding practices, using a log book in the period from December 1991 to October 1992 (see chapter eight). His results support those from the case study diaries. He adds that green matter is rarely cut into pieces, is not dispersed in the fish pond, and the volume is often far beyond what the fish can eat, before the waste becomes a big pile of rotting organic matter.

Except for those who had integrated their fish ponds with irrigated vegetable cultivation, most farmers expressed worries about shortage of feed for the fish during the dry season. The favourite feed for fish, cassava leaves, becomes less available during the dry season. On the other hand, farmers claim that the water in the ponds is cold, at least at the beginning of the dry season. They therefore do not believe that the fish need so much food.

Sunhemp

Sunhemp has been promoted by ALCOM and DoF as a possible addition to available feeds. ALCOM has carried out on-station and on-farm trials with sunhemp and found a range of benefits. It grows easily near fish ponds on poor soils, is useful as green manure for other crops, has high nutritional content for the fish, and can also be used as an animal feed. Furthermore, once established, the plant re-grows after the leaves have been cropped. As yet though, sunhemp has not been extensively established as a feed for fish. A few farmers in both Monga and Chibote grow the crop but the majority claim either ignorance or lack of seeds.

In January 1990 (according to ALCOM files), ALCOM/DoF distributed seedlings and seeds of sunhemp to the contact farmers for five groups of fish farmers in Monga area. Each contact farmer was supposed to share out the sunhemp between the other members of his group. Discussions with both contact farmers and group members in mid 1992 revealed that only two people were continuing to grow sunhemp. The reasons given included complaints that the seeds were never distributed to claims that they didn't grow well, suggestions that the fish didn't like them, and simple "I didn't get around to it". A similar picture arises in Chibote, where a few contact farmers of the fish scout have grown sunhemp, but the majority profess ignorance and lack of interest.

Underlying the failure of sunhemp to become an integral part of the fish farming system are three factors. First, the benefits of sunhemp are by no means obvious to the farmers. Even in Chibote, where there is a resident fish scout, sunhemp is not being grown near the fish ponds to create a demonstration effect. Second, farmers have limited knowledge about the crop. Some believe that it is complicated to grow and profess that this is a reason for not adopting. Lastly, it is not clear to many farmers that sunhemp has uses other than that of feeding fish. Though the labour inputs to plant a few rows of sunhemp are minimal, some farmers see this as unnecessary additional work. This is more the case in Chibote than in Monga, where dry season shortages of leafy matter are less serious.

Fish farming has been promoted as a technology that does not require purchased inputs. Nevertheless, a number of farmers are keen to obtain maize bran, and to pay for it if necessary. This eagerness is based on a (locally untested) belief that maize bran is a

superior fish feed to anything else available. The origin of the belief lies in reports carried back by people who have seen fish farming in other parts of Zambia, and to some extent in advice given previously by DoF and the mission through which maize bran was promoted as a wonder feed. As very little maize in either research site is processed within the household (it is taken to grinding mills or sold unground), maize bran is not readily available within fish farming households in Luapula. It can be purchased from the grinding mills or the state milling company, Indeco. Two farmers in each of Monga and Chibote claimed to occasionally buy maize bran. The rest merely suggested that if DoF/ALCOM provided transport, then they would be prepared to buy. Of these, ideas about what the likely cost would be appeared to bear absolutely no relation to reality - or at least assumed heavy subsidies.

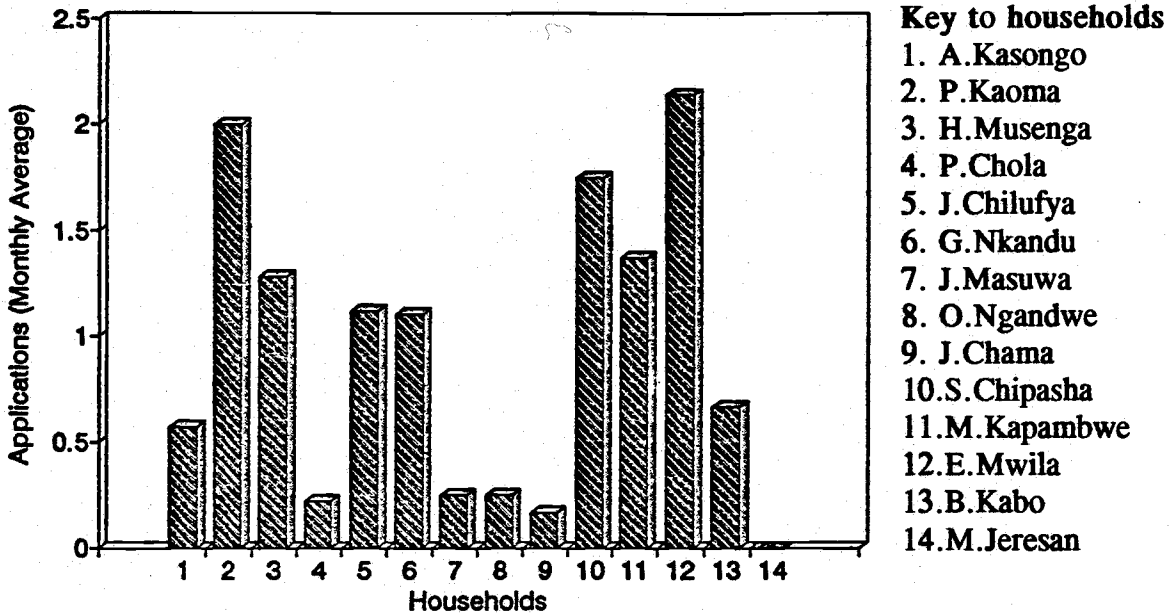
Frequency of pond feeding is not only determined by the availability of inputs but by household composition (hence labour availability), by pond location, and by other demands on labour. Without exception, pond feeding is undertaken as an activity which is fitted around other activities. In households where the pond is owned by a married man (the most common scenario), wives may, and usually do, take over pond management activities from their husbands if the men go away, for example to attend a funeral or to go to town to trade. But if the women are unable or unwilling to, there is no indication that the men would stay at home to feed the fish. In female headed households, pond feeding similarly varies with other demands, both agricultural and social.

To attempt to identify seasonality of peaks and troughs in pond feeding practices over the limited number of case study households would be wrong. Too many other influences enter the picture in addition to agricultural labour peaks. This illustrates the subsidiary nature of the fish farming operation for most fish farmers. For example, the pond feeding by one man in Monga dropped off dramatically during April because he was frequently in Mansa following marriage problems. Another was ill during the whole month of January and again, the pond maintenance suffered. In Chibote, a fish farmer went visiting relatives in the Copper Belt for all of August. His wife and he both owned ponds, but she claimed she was too busy with other work to feed the ponds. Another (divorced) man went away to be trained as a Village Health Worker. For the three weeks he was away, his ponds were not fed. On the other hand, those farmers for whom other obligations did not arise, and who were living within a minute or two walk of their pond, were able to feed the fish twice a day. In Alex 2 village, Chibote area, three brothers with jointly managed ponds were the most consistent in regular feeding, as each of the brothers took it in turns to attend to the ponds.

Pond fertilising

The fertilisation of fish ponds with animal manure is, like feeding, determined by availability of inputs. Knowledge (or rather the lack of it) has a greater influence on practices than it does in the case of pond feeding. At the same time, labour requirements are less important. In almost all cases in Monga and Chibote, ponds are under-fertilised and compost cribs are seldom used. Of the 14 case study households keeping diaries, only one never applied any manure to their pond in the period January-September 1992. A further two only applied (chicken) manure once. For the rest, rates of application varied from almost weekly to less than once a month (see figure 4.2).

Figure 4.2: Frequency of manure application of case study households

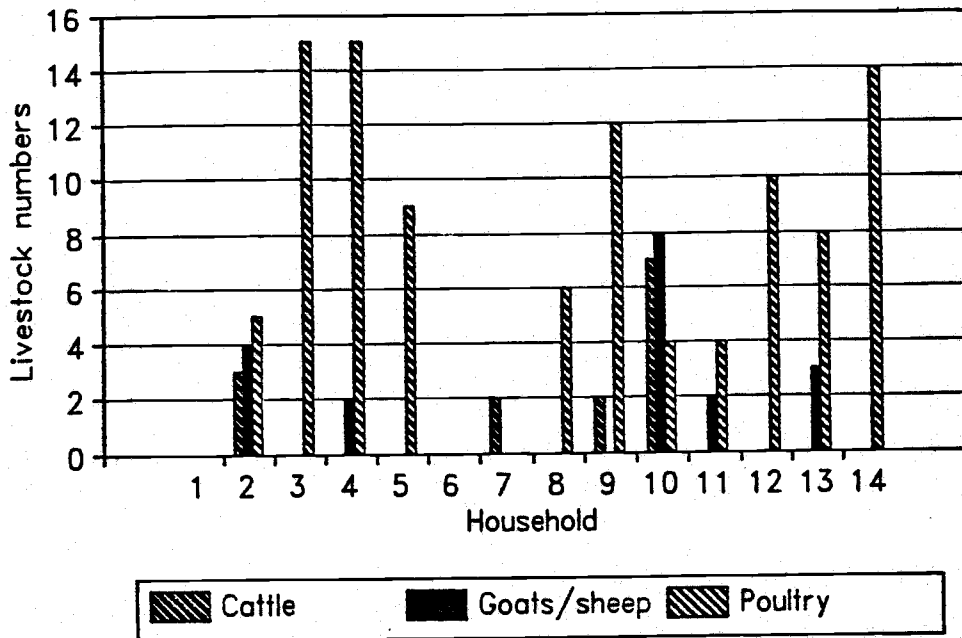


These data support other data gained by the ALCOM aquaculturist, suggesting that inputs other than green matter are applied in a haphazard matter, often in big batches with months of no application in between (Jensen and Mugala 1993). When this happens, big pulses of nutrients to the pond system will create massive shorter blooms of plankton. This creates short periods of abundance and long periods of starvation.

An obvious factor in manure availability is livestock ownership. In the previous chapter it was shown that fish farming households are better off than non fish farming households in terms of livestock ownership, but that overall levels of ownership in both research sites are low. Figure 4.3 shows the livestock ownership of each of the case study households for whom information on manuring is available.

Fig 4.3 Livestock ownership of case study households, Monga and Chibote

Key to households:
as above



Ownership of livestock does not however, strictly determine the use of manure in ponds. For those who own livestock, the extent to which they are kept in at night, and knowledge about the usefulness of manure for fish ponds are also important. Four of the case study households were cattle owners. Only two of these kept their cattle in kraals close to the house, thus giving easy access to the manure. The others were grazing in neighbouring villages under the management of relatives. Goats were more extensively kept in at night close by the house. This is reflected in the more regular use of goat manure in fish ponds. Chickens were the only small livestock owned by virtually all case study households. All but two of these kept the chickens cooped at night.

Willingness to apply manure depends on other factors than availability: time, knowledge, perception of alternative uses. A woman pond owner with many chickens never put their manure in her ponds because, she claimed, she did not know that it had any value. Meanwhile, she was borrowing cattle manure from a neighbour to fertilise the ponds. Similarly, two cattle owners in Monga never used the manure for their ponds. They both said they didn't have the time. A few people are less willing to add manure to their ponds because it makes the water murky, so they can no longer see their fish. At the same time, people are happier to add green matter to the ponds regularly because they can have the satisfaction of seeing the fish feed.

Where livestock were owned and manure not applied to the ponds, there is no evidence that this was because the manure was being used for an alternative purpose, for example fertilising another crop. This in turn was the result of lack of knowledge of composting techniques and a reticence to use manure on field crops because it is said to

produce weeds. The Adaptive Research Planning Team (ARPT) has, in the last five years, started working with farmers on trials with organic fertiliser. Predominantly however, extension messages have centred on the use of chemical inputs for the production of maize, vegetables or rice. Some farmers express an interest in learning how to make compost. Others are even conducting their own experiments. There are signs therefore that current demands on manure for fish farming will alter with increased knowledge.

There is a correlation between livestock ownership and ability to apply manure to ponds (those farmers with fewer animals generally apply less manure). The example of the woman above, and others, illustrate however, that non-ownership of livestock is not at the present time, necessarily an indicator of no access to manure. In both Monga and Kaseke, people are free to gather the manure of their neighbours for use in the fish ponds. In August 1992, one example was found of a cattle owner charging money for a barrow-load of manure. This, along with mounting knowledge about alternative uses for the manure, indicates that such access may be short-lived.

For the application of manure to fish ponds to increase productivity of the fish ponds, there is a further prerequisite: that it should not be quickly washed out again. Unfortunately, in many of the ponds in Luapula, there is little control of water flow through the ponds, so nutrients are quickly washed out. In this situation, manure will not increase production and it is only the growth from feeds that is realised. Observation of many ponds confirms that they tend to be completely clear and the fish are subsisting on waste and green leaves only.

Harvesting.

In the survey conducted in the dry season of 1992, farmers were asked about the pond harvests in the period since they had first been questioned: October/November 1991 - August 1992. The most striking point emerging from this survey is the enormous disparity between the two research sites in extent of harvesting and pond management.

In Chibote 9 (16%) of farmers had effectively abandoned their ponds since the initial survey (11.8% in Monga). Of these, three had given up waiting for fingerlings and they had never started fish farming. The rest complained of theft, both human and animal. Of those still managing their ponds, none had taken no harvest at all in Monga and 19 (41.3%) reported no harvest in Chibote.

In Chibote, by far the majority of harvests were for relish only. Of those managing their ponds, less than 9% sold any fish at all. More than 50% were selling at least some fish or fingerlings in Monga area. The stated number of harvests for relish is given in table 4.1.

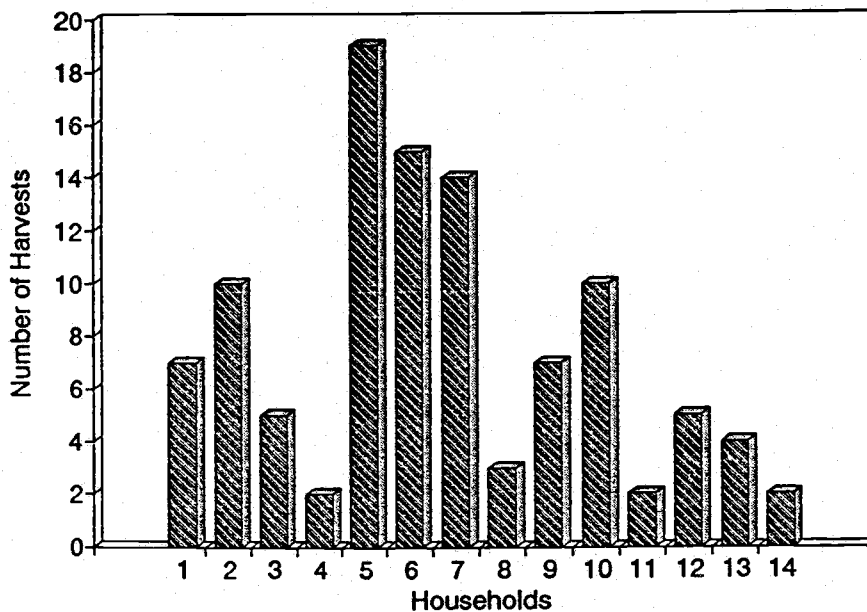
Table 4.1 Harvests for relish of those still managing fish ponds

Harvests for relish Oct 1991 - Aug 1992	Monga		Chibote	
	No.	%	No.	%
None at all	4	13.3	19	41.3
1-3 times	12	40.0	21	45.7
4-10 times	8	26.7	5	10.9
More than 10 times	3	10.0	1	2.1
Unclear	3	10.0	0	0.0
Total	30	100.0	46	100.0

Source: 1992 survey

Total number of harvests for relish between October 1991 and the following August for the case study households keeping diaries are recorded in figure 4.4

Figure 4.4: Total number of relish harvests of case study households, October December 1991-September 1992



The harvests represent both intermittent harvesting where only relish was taken and draining of the ponds, where fish were taken both for sale and for household consumption. Most regular harvesting can be loosely correlated with ownership of several ponds. However, the sample size is too small for these figures to be statistically significant. Furthermore, by August 1992, the majority of ponds in Monga were no longer holding water or fish. Harvests for relish represented taking out the last of the fish before ponds completely dried up.

The disparity between the two research sites markedly contradicts the optimistic prospects suggested for Chibote by ALCCOM's 1988 survey, (Wijkstrom and Wahlstrom 1992, p.26). At this stage, most ponds had not yet been harvested, no unstocked ponds were encountered and

...generally, fish farming seemed to be a flourishing activity (Wijkstrom 1992, p.).

In the 1988 survey, though the balance between intermittent and complete harvesting was recorded, it appears that no account was given of non-harvesting.

In 1992, the stated reasons for failures to harvest were (in order of precedence) animal theft (6) "the fish are too small/I'm waiting for them to grow"(4), human theft (4), the fish were washed away (3), problems with harvesting (2). The question of theft, both human and animal, is considered in more detail below. Though this is clearly a real problem for many fish farmers, it is also likely that theft is a plausible explanation for what are in fact the results of poor pond management.

The most striking point in discussions with farmers concerning their reluctance to harvest, is the incompleteness of knowledge concerning the growth and breeding times of the fish in their ponds. In Chapter three, the importance of fish ponds as assets or "savings banks" was noted. When this motivation for owning a pond is combined with ignorance of the processes which lead to fish stunting, it is hardly surprising that farmers are still waiting for their fish to grow after four years.

An important consideration for many farmers in not harvesting their ponds is that of not "losing the fish". This view is associated with those surrounding ownership and management of livestock. Many fish farmers in Luapula have much the same approach to the fish in their ponds as they do to chickens and other small livestock. Rather than see them as a crop to be managed and harvested according to a production cycle, they let them look after themselves (though throwing them food when convenient, as with the other small livestock). In 1939, Audrey Richards noted the lack of a tradition of animal husbandry among the Bemba of Northern Province:

All of these domestic animals are called *ifitekwa* or "things kept", but in no case are *ifitekwa* kept primarily for meat or bred for that purpose....Hens run about the village and lay their eggs wherever they please, and some of these sittings are finally hatched. But each new brood is regarded, with some justification, as separate piece of good fortune for which the owner is not responsible, and which he is never certain will be repeated..(Richards 1939, p.63).

And regarding goats:

...these people are as ignorant of methods of rearing stock as they are of poultry breeding. They lack completely any pastoral tradition, and the way in which goats, for instance, are treated, makes it little short of miraculous that any survive....A man buys a goat or a sheep as a sort of gesture, probably because he wants to acquire possessions, and he puts it in a shed, but he never seems to have any idea of building up a herd or relying economically on the sale of meat. The milk is never used. (Richards 1939, p.64).

Sufficient examples of ad hoc livestock management exist to justify a hypothesis about the links between these and fish pond management. All individuals in case study households were questioned about their reasons for holding livestock, and their attitudes to breeding and slaughtering. A large majority said that animals were for special occasion relish only, and that if a chicken or goat was to be killed it would be a big one, regardless of age and often regardless of sex. Goats were tethered to prevent them straying onto neighbours gardens and causing quarrels, but this was frequently the limit to management.

The exceptions to these rules are, unsurprisingly perhaps, the few farmers who have also begun to adopt systematic harvesting methods for their fish ponds. The three brothers in Alex 2 village keep and breed goats and cattle, to provide fish pond manure, to hire labour for farming, to sell and for food.

Harvesting failure is also caused by deficiencies in the techniques used to catch the fish. A number of harvests were attended in which the catch only amounted to a handful of fish largely because of a combination of incompetence and intrinsic difficulties in the method itself. Owners of fishing nets are obviously at an advantage, but these are few in both Monga and Chibote. More commonly, people harvest their ponds with hook and line, with large fishing baskets, with floating grass mats (onto which the fish are forced to jump), or by draining the ponds and scooping out the fish with buckets and pans. Unsuccessful harvests are accounted for by explanations such as "the fish are too clever today".

Two women attempted to harvest a 10 x 20m pond with two big fishing baskets. They waded up and down, muddying the water and chasing the fish - who sensibly disappeared to the bottom of the pond. After two hours, they had caught three fish of about three inches long (see plate 4.1).

A male fish farmer sat beside his pond with a rod and line for three hours, catching nothing. He explained that the fish were not hungry on that particular day.

Many farmers are reluctant to drain their ponds because they are worried (with reason) that fingerlings will die, and that by draining the pond, they will effectively be cashing in their asset in one go. Only two farmers were found who knew how to (and did) construct holding ponds for temporary storage of fingerlings. In Chibote area, some ponds are not drainable because of their location and construction.

4.3 CONSTRAINTS TO SUSTAINABILITY

The previous section has described less than optimal pond management practices, resulting in apparently poor gains from fish farming and a tendency towards pond abandonment. Other factors mitigate against sustainable pond management however, and are considered below.

Animal predation and water loss

The principal stated reason for abandonment of ponds is animal predation. In Monga area, this is closely associated with water shortage. When the water in ponds becomes low, the fish are much more vulnerable to birds of prey and otters. During the dry season of 1992, the vast majority of ponds in the Monga area dried up completely. The loss of fish to birds was a daily subject of complaint.

In Chibote, problems of ponds drying up are less significant, but complaints regarding predation are equally, if not more prevalent. In this case, the level of pond maintenance and the distance of ponds from houses are important considerations. For example, in Bule village, where all ponds are located in a dambo several minutes walk from the village, and grass around these ponds is not well slashed, all fish farmers complain that an otter has been stealing their fish. Some farmers do take practical measures to deal with problems of predation: they put branches in the ponds to prevent otters, hunting expeditions are undertaken, they set traps and even put down poison, but there is little that can be done if the ponds are located so far from the home as to be impossible to guard.

The problem of water shortage experienced in Monga area can only partially be blamed on drought. There has been a small reduction in annual rainfall levels, but issues of pond location and construction are more important. The ponds in the Monga dambo are competing for use of the localised supplies of underground water. In the dry season this is simply not sufficient to supply all of them. Sustainability is therefore dependent on better management of existing water resources and on control of the location of pond construction. This is discussed in more detail in chapter five.

Theft from fish ponds

"There is no point in digging a fish pond; people will just come to steal the fish".....

"I no longer go to my pond; all the fish have been stolen"

Theft from fish ponds is often mentioned as a factor retarding the development of fish farming in Southern Africa. This is also the case in Luapula. Reports of theft from ponds should however, not always be taken at face value. To some extent there is a tendency to mistake predation by birds and animals for predation by people. Also, in seeking an explanation for low pond productivity, some people may suspect theft when in fact the cause lies in poor management practices. If, after a couple of years, the fish in the pond remain small, it may make sense to assume that the big ones were taken by a thief. Finally, a certain amount of theft should be seen as "redistribution"; farmers talk about members of their immediate and extended family harvesting from the ponds without permission. Although this is referred to as theft and it is certainly an inconvenience, it is also viewed as unavoidable and, up to a point, accepted.

Theft from ponds is mostly random and unsystematic - the opportunistic hooking of fish by young boys. This is not however, always the case. A man returned from a visit to the Copper Belt to find all his ponds drained and the fish stolen.

There are marked differences in levels of theft between Monga and Chibote areas. These differences point to factors influencing sustainability in both areas. Within Chibote itself, reports of theft are considerably more frequent in the centre (those sections immediately surrounding the mission) than in the outlying villages. Theft of fish by people is hardly mentioned as a problem at all in Monga area. Moreover, theft in general is rare in Monga: "we do not have thieves here³". In Chibote, people complain about, not only theft from ponds, but of crops from fields, millet from the granary, chickens from the house.

In the 1991 survey, while 80% of households in Monga area said they had experienced no theft at all in the previous year, the figure was only 54% in Chibote. Furthermore, while 8% of fish farming households in Monga had suffered theft from their ponds, 36% of those in Chibote complained of theft of fish.

The higher incidence of theft in general in Chibote is striking. People sometimes claim that the tendency to steal is a congenital defect; that people come from families of thieves. But other influences are also at work, which relate largely to opportunity.

Obviously, the closer one's pond is to the house, the less likely that people will find opportunities to steal. At the level at which fish farming is practised in Luapula, farmers are not going to invest money in hiring guards, so any protection is from farmers and their neighbours watching over ponds. In Monga, most ponds are less than five minutes walk from the houses. One group of fish farmers has shifted their houses to be nearer the ponds. This is, they claim, for ease of management, but an additional effect is that theft from the ponds is non-existent. In Chibote centre, ponds tend to be located much further from people's homes. Rather than being strung out along a dambo, houses

are centred on the mission.

Having one's pond close to the house is one way of limiting the opportunities of would-be thieves. But that pond needs to be visited regularly as well. In Chibote area, there is a greater tendency for individuals and households to shift from their usual home for a month at a time, especially during the dry season of June-September. There is much more temporary migration from Chibote area than from Monga. Men, especially, tend to travel in search of employment in other parts of the province, or to visit relatives in urban areas (who may be an important source of money as well). During the dry season, after *citemene* cutting is finished, there is little agricultural or income generating work for the men to do, so many leave, not returning until the rains come. In Monga, this phenomenon is much more rare. Being only 30km from Mansa, people are able to go in search of other sources of income without actually moving away from home. In Chibote, several of the reports of theft were accompanied by "when I was in the Copper Belt on a visit" .

"Social control"

The issue of theft as a mechanism of redistribution is closely associated with wider questions of social control in aquaculture development. The potentially inhibiting role of existing rules controlling accumulation, reciprocity and appropriate behaviour has been widely noted (Ruddle 1991, Nash 1986, Hayward 1987). It is suggested that:

...in many societies worldwide, levelling mechanisms are fundamental in controlling the individual and in functioning to maintain social status ranking. (Ruddle 1991, p.12).

In the case of developing country or "traditional" societies, such mechanisms are expected by these writers to be particularly influential: an individual who invests too much time and energy in economically productive activities as opposed to meeting their social obligations is regarded as a deviant who must bear social costs. The nature of the costs will vary from theft, to social ostracism, to witchcraft accusations. The net result is the same though: reluctance to adopt new technologies, and inability to continue after adoption. Aquaculture, with its potentials for accumulation and image of modernity, is thought to be subject to such pressures. The most frequently cited example is that of Malawi where apparently belief in witchcraft is so strong that small scale farmers, including fish farmers, dare not produce more than their peers for fear of being bewitched.

Underlying these concerns are two questions: whether fish farmers perceive an obligation to redistribute as a problem, and whether the operation of social controls in fact inhibits their activities. To answer the questions, a closer examination of the traditional/modern dichotomy implied in the focus on levelling mechanisms is necessary.

A simple distinction between "traditional" and "non-traditional" or "modern" societies misrepresents the complex ways in which people interpret social phenomena. It is this kind of distinction which leads to accounts of "cultural barriers" as something to be overcome in the development process - or alternatively incorporated into planning. Particular beliefs and behaviour are presented as internal to the village and in opposition

to those from outside. This picture is misleading because it presents beliefs and behaviour as if they stood independently of people's interpretation and use of them. Traditions seldom have much historical depth; they are constantly being changed. For this reason it makes less sense to counterpose "traditional" and "modern" values than to ask why particular beliefs or actions are labelled by actors as traditional or modern in particular situations. Although in any one place there may be an apparent consensus as to what are traditional practices, or appropriate norms for behaviour, these are in fact negotiable and changing.

For example, the Chief in Monga area, Chief Mabumba, attempted to use "tradition" to legitimate his authority. He had become Chief in May 1992 following the suspected murder of the previous Chief Mabumba. During the dry season of 1992, he held a series of meetings in the area, at which fines were imposed for non-attendance. The meetings served as a forum for the new Chief to stress the need to return to "traditional values", including that of *umulasa* or tribute labour. Every able bodied man and woman was expected to carry poles to Mabumba village to assist in the construction of a new school. In Monga village, complaints about the Chief's edicts focused on the way in which he was using tradition to emphasise his power, but that he was being selective in what he was calling tradition.

Although in Luapula, certain forms of respect are adhered to, these are not fixed roles and social statuses. Their variability encompasses the ways that particular individuals identify themselves with tradition or modernity. For example, it has been noted that a number of people are eager to define themselves as progressive or modern, particularly in their approach to farming. They wish to be part of a culture of development, partially because of likely material gain, but also for other reasons such as the effects of education and peer pressure. Among such people are many fish farmers. Identification with modernity does not, however preclude the incorporation of beliefs which are construed by others as traditional (witchcraft, magic). These beliefs are not seen by progressive farmers as existing in opposition to their modernity.

Obviously, in different contexts, different types of behaviour are socially sanctioned or condemned. In Luapula, accumulation as such is not a problem. Nevertheless, jealousy and suspicion may arise, especially if the accumulation is not easily explained. Furthermore, behaviour and attitudes accompanying accumulation may be subject to scrutiny by others.

Concentrating on economically productive activities does not necessarily imply that people ignore obligations to others. Within both Monga and Chibote, there exist "farmers" who are noticeably better off than the majority, manifest in their ability to hire labour. The means for their accumulation are widely known and accepted. For instance, they may be returned migrants or they may have been assisted by a relative. They are respected for their ability to distribute largesse rather than assumed to be hoarders. Where jealousy exists, it is unlikely to be manifested as more than talk unless other codes of behaviour are transgressed. These include the requirement to avoid boastfulness and being quarrelsome.

The need to meet social obligations is only occasionally seen by "farmers" as a problem: obligations are not necessarily conceived of in opposition to modern farming.

Some extensionists (and ALCOM) have argued that reluctance to harvest ponds is a result of anxiousness to avoid giving away fish. If this is the case, it is certainly rare. Obligation may be thought to be inconvenient but it is seldom avoided. Diaries kept by case study fish farmers revealed that their ponds were seldom, if ever, prioritised over social obligation activities such as attending funerals or the sick. Indeed, one of the attractions of fish farming is its capacity to be fitted in to such activities.

When people become selfish in their behaviour, or attempt to separate themselves from the rest of the village - economically, socially or geographically, they are more likely to be subject to what are construed as levelling mechanisms. Such a separation is by no means a function of adopting fish culture, or other potentially accumulative technologies. The low level at which fish farming is currently practised, and its tendency to be a diversification rather than a primary activity, make it less likely to be subject to jealousy or demands for sharing. On the contrary, many fish farmers are pitied by others within the village for wasting their time.

To the extent that levelling mechanisms exist, they serve to draw attention to (and reduce) socially inappropriate behaviour, rather than accumulation as such. One supposedly key levelling mechanism is witchcraft.

Witchcraft may function as a levelling mechanism in either of two ways: provoking fear of witchcraft may induce people to alter their behaviour; accusations of witchcraft serve to drum up group hostility to the person concerned. The group may then feel justified in adopting punitive measures, such as banishing an individual from the village. Even this is not straightforward though: some people are able to use rumours that they practice witchcraft to enhance their own social standing, especially if they are already economically or politically powerful. Rumours about the witchcraft practised by the headman in Kaseke village abounded. They served to inflate rather than reduce his standing.

The term "witchcraft" covers a number of practices, not all of which are construed as bad. Of critical importance in both of the research sites was not so much the knowledge of magic, but the use to which it was put. Thus, in Kaseke, a farmer used both inorganic fertiliser and *umuti* (herbal medicines, used to refer both to those used for sick people and those to help crops grow) on his maize. He explained that this was good magic, and could work alongside the fertiliser. On the other hand, people suspected of *cishibilo* (*cibungu* in Chibote) were said to use witchcraft to induce the crops of others to enter their fields. Such accusations might be made to explain apparently abnormally high yields. They were not however, common in either Chibote or Kaseke. Lastly, people might be suspected of using witchcraft to bring direct harm to others, including death. Such accusations are more common in Monga than in Chibote. The Catholic church in Chibote has been influential in making witchcraft unmentionable: Bule village was delinked from the church after the headman called in a *shinganga* (witch doctor) to identify a witch. Such a delinking has material consequences for the village which discourage willingness to talk about witchcraft.

In material terms, a fear of witchcraft can have disastrous effects. The cost of hiring a *shinganga* to discover and justly accuse someone who is practising witchcraft can

be exorbitant. A young farmer in Kaseke suffering from unexplained illness called in a *shinganga* to identify and exorcise the person who was, he assumed, bewitching him. The cost of the *shinganga* was 12,000 kwacha, which was half of the money he had just earned from a maize harvest.

No evidence was found that fear of witchcraft accusations discouraged adoption of fish farming in either Monga or Chibote area. This might be related to the point made above, concerning the relatively low importance of aquaculture, and the fact that fish farmers do not necessarily separate themselves from the rest of the community. The novelty and unprovenness of the activity of the activity are also important: several people explained that it would be hard to tell if somebody was using *cishibilo* because a fish pond is not like a field; it is not so easy to count the fish. More importantly water is generally regarded as a poor conductor of magic. A fish farmer was banished from Fipatauko following witchcraft accusations (none of which were related to his fish ponds). Following this, his "charms" or "tools" with which he supposedly practised witchcraft were thrown in the fish ponds in order to neutralise them.

As noted, although accumulation as such is not necessarily condemned, accompanying behaviour may be. For example, a fish farmer in Monga was distrusted by his fellow villagers because of his ability to manipulate and mobilise the resources of a wide range of aid agencies (he was contact farmer for ALCOM, Unicef, ARPT, and FINNIDA). The resentment which abounded concerning his activities did not derive specifically from his diverse economic enterprises. Rather, the boastfulness and deviousness which were said to accompany them were unacceptable. The resentment towards him was partially based in the suspicion that he was controlling money, resources and information which should have been available to everyone. When an opportunity arose to take him down a peg or two, many people in the village were positively gleeful about taking it. He was accused (justly) of adultery. This is a common enough occurrence and fines are seldom of more than 20,000 kwacha. The fine eventually settled was of 100,000 kwacha - an impossibly large amount even for this relatively rich farmer. His benefactor from Mansa was threatened with witchcraft and his two employees chased away from the village. He drained his fish ponds and stripped his vegetable garden in order to pay some of the fine. Once sufficiently humbled and apparently taught a lesson, his erstwhile enemies rallied around to assist with the rest of the fine and to defend him against the husband of the woman he had "stolen".

In conclusion, there are few indications that in Luapula the sustainability of aquaculture will be reduced by social levelling mechanisms. This is both because accumulation per se is not socially condemned and though there are many reasons for jealousy, ownership of a fish pond is not one of them. On the other hand, there is a need for the agents of development to be sensitive to how, in any particular setting, deviant behaviour may be defined. In the case of the farmer described in this chapter, extreme and manipulative contact with ALCOM and DoF among others backfired.

4.4 CONCLUSIONS: MANAGING PONDS

Several factors mitigate against the productivity of many fish farms in the province. Resource access is not currently a significant problem, but input and management levels reflect a combination of inadequate knowledge and low incentive to look after ponds. The absence of a history of animal husbandry and the tendency to treat fish ponds as stored assets are aspects of this.

As established in the previous chapter, early adopters of fish farming are slightly better off than other members of the community. Being predominantly men, they are less constrained by the principal prerequisites for adoption: adequate land and labour for pond construction. They are also more likely to have the confidence and ability to tap into the limited advice and assistance available from the extension service. A significant body of literature supports the idea that such farmers are in a better position to take risks and are more likely to base their decision making on "economic rationality" (see for example Hayward 1987, NORAD 1989, Ruddle 1991).

An alternative way of looking at the adoption of such relatively resource-rich farmers is that for them *digging a fish pond does not constitute a risk*. This view is supported by the evidence of the low priority given to pond management, and the fact that people are prepared to dig fish ponds with only a hazy view of what they might get out of them and under what conditions. Correspondingly, it can be hypothesised that fish farmers with more restricted resource access are more likely to have made a more realistic calculation of the costs and benefits of aquaculture adoption, and may be more likely to carry out sustainable management practices.

The causes of productive or unproductive pond management are, however, more complex than this. Are there characteristics of more productive fish farmers which can enable the promoters of aquaculture to identify them in advance? In the survey of fish farmers in Luapula province, Wijkstrom and Wahlstrom (1992), ask if it is possible to identify the characteristics which lead to the "successful" fish farmer. "Successful" is measured by the stated and observed desire to continue, expand or abandon the activity. They conclude that there are no significant factors which could be identified in advance. Relative success, it is argued, has little to do with the education, public service, assets or source of income of those who decide to engage in fish culture. This is interpreted to mean that the activity can be mastered at the level which it is commonly carried out by most of those who try.

These findings are broadly supported by the present research. Most of those who dig fish ponds come from a limited and identifiable sector of the rural population. However, beyond this it is not easy to find one common factor distinguishing the productive from the unproductive fish farmer. Because of the dangers of theft and animal predation, pond location and construction are important. The better managed fish ponds are invariably close to the house of the owner. Both location and construction can be influenced by appropriate advice prior to pond construction. Also significant is the degree of contact the more productive fish farmers have had with external sources of advice. In Luapula, the outstanding characteristic of the few farmers with better management practices was the regularity of their visits from ALCOM aquaculturalists.

The weaknesses in current farmer knowledge about fish farming make this phenomenon unsurprising. What is more interesting is the sustainability of the better productivity. Will improved management practices be continued in the absence of support and attention from outsiders? This question is pursued in chapter eight which focuses on the practice of extension.

Notes

- 1. See for example Ruddle (1991), Grover et al (1980).**
- 2. In one year in Monga and Chibote, only one farmer was encountered who had a pond specifically allocated to breeding fingerlings.**
- 3. This comment was made by the headman on my arrival in the village, but reiterated by others throughout my stay. In Chibote, there was an active concern that I should be very careful to lock away all valuables.**

CHAPTER FIVE

IMPACTS AND EFFECTS OF AQUACULTURE DEVELOPMENT

5.1 INTRODUCTION

This chapter critically examines the effects of fish farming on both adopters and non adopters. The previous chapter has considered success and failure in aquaculture adoption in terms of management practices and production of fish. Implicitly it accepted the promoters' assumption that more productive fish farming will lead to improved household security, and to more sustainable livelihoods. In these terms it is obviously crucial that pond management practices are those which produce more fish. The difference that fish farming actually makes to aggregate and seasonal income and to household food security has, however, to be empirically established.

A further assumption is generally made: that all members of a fish farming household will benefit from the enterprise. In this chapter, the assumption of joint household benefit from fish farming is scrutinised. Increased availability does not necessarily mean increased entitlements¹ to food. At the level of the household, this depends on intra-household control over resources, the bargaining position of individuals², and accepted practices controlling distribution of food. Such practices extend beyond the immediate fish farming nuclear family.

Wijkstrom (1991) suggests that it is important to consider "consumption effects" of fish culture. This refers to the increased production of goods and services which a person will achieve as a result of better consumption. For example, increased income from fish farming may afford either better medicines leading to improved health or better tools for agricultural production, leading to a higher output. Consumption effects might be predicted from data referring to current production. However, they could not be directly measured.

More importantly, the assumption of an individual consumption effect should not be simply extrapolated from the activities of households in which all individuals do not necessarily have coinciding interests. Although one individual tends to be considered the "fish farmer", the rest of the household influence and are influenced by decisions about the operation. There is sufficient evidence from other parts of southern Africa and from Luapula itself to suggest that joint household utility cannot be taken for granted³. The operation and significance of conflicting or divergent interests therefore requires consideration.

The possibility of negative effects of aquaculture adoption are also considered. Unanticipated and less visible effects of aquaculture adoption may operate both within and between households. Of course, what is experienced as a positive effect by one individual or household may be negative for others.

Deleterious intra-household labour impacts for some individuals within fish farming households may occur (Woodford Berger 1987). These may take the form of the diversion of male labour away from other productive activities which have greater benefit to women and children within the household. In Luapula, the digging of fish ponds takes

place predominantly during the dry season, from June to September. This is a time during which men have normally been responsible for land preparation. Is the area of land for staples such as cassava reduced? Alternatively, does the workload of women increase as a result of taking up activities previously carried out by men or because they are directly assisting with fish farming activities?

Community level impacts are associated with resource control and possible environmental impacts. Fish farming at the level at which it is currently practised might be thought unlikely to have negative implications for control of resources such as farm by products or land. Most fish farmers perceive their inputs to be of low or zero cost to themselves and with few alternative uses. However, questions need to be asked concerning the value of those resources to other potential users, and the way that values may change as their importance to fish farming becomes more significant.

Environmental effects are closely linked with these issues. Environmental change induced by fish ponds may be significant to non adopters. Possibilities to be considered include increases in diseases, such as malaria and schistosomiasis, and effects on availability of water for other purposes than fish farming (eg. soaking cassava and drinking water). All of these aspects of aquaculture adoption contribute to an assessment of the current or potential role of aquaculture in changing not only the material conditions within rural communities but also social relations underlying such material conditions.

5.2. EFFECTS ON FISH FARMING HOUSEHOLDS

Food security effects for adopters

This section considers the food security effects of fish farming for adopters. Because of the complex range of factors contributing to food security (diet, workload, health and medical facilities), and the fact that fish consumption is only a small part of diet, statements of direct causation between fish farming and food security cannot be made. Most adopters give improved relish availability as a primary reason for starting fish farming. It is at least possible to assess the extent to which this is attained.

In the previous chapter, the overall irregularity of pond harvesting was noted. Of those case study households who did harvest for relish, the quantities harvested varied, but were almost invariably of enough fish for two or three meals. Substantial amounts were also distributed to kin. Nobody reported preserving the fish: if they did take more than the family could easily consume before the fish went off, it was distributed to friends and relatives. The goodwill and obligation entailed by such gifts obviously cannot be quantified; nobody said that they expected anything specific in return. To avoid obligations of reciprocity would be virtually inconceivable for most people, even though some complain.

On a few occasions, the quantities of reported harvests were specified. Quantification ranged from the numbers of fish harvested ("10 small ones") to containers ("a small pot, a bucket") to, very rarely, specification of kilogrammes. As attempting to work out precise quantities from these imprecise measurements would give figures of dubious accuracy, a more complete picture of household food security effects is gathered by looking at consumption patterns, assuming that each harvest represents two-three meals. Relevant factors here include the availability of fish/protein from other sources, the seasonality of harvests, and intra-household distribution.

The significance of farmed fish: other sources of fish.

The direct food security effects of fish culture will be felt most strongly where pond fish either supplement that obtained from other sources or free income which would otherwise have been spent on purchasing fish. Overall, pond production accounts for a much smaller proportion of household fish consumption than that from other sources. In the August 1992 survey, only 11.7% of respondents in Monga and 16.7% in Chibote had neither bought fish nor caught it from the river in the previous month. In Chibote, 31% reported buying fish four or more times in the previous month. In Monga, this group was much smaller (10%), but more (23%) caught fish from the river four or more times. The differences between the two areas can be attributed more to access to rivers than to availability of fish to buy. In Monga area, proximity to larger markets meant that fish was obtainable - at a cost which many were not prepared to pay while rivers could supply the need. In Chibote, more of the people interviewed were not within what they deemed easy access to a river. Ability to catch fish from the river is also dependent on ownership of nets. More people own nets in Monga area than in Chibote.

The purchase of fish constitutes a significant proportion of food expenditure for almost all case study households. The range is great, from 14 to 100 % of total food

expenditure. The proportion of total expenditures on fish to that on food for diary-keeping households the period Jan-Aug 1992 is given in table 5.1. With higher levels of productivity from fish farming, it might be assumed that there is scope to release this money for other purposes. However, there is little evidence that as yet people change their fish purchasing as a result of fish farming.

Evidence from both the 1992 survey and the case studies indicates that the fish farmers who harvest most frequently for relish are often already obtaining significant amounts of fish from elsewhere. Occasions of fishing from rivers are also recorded in table 5.1. The nutritional impact on such households is therefore felt less strongly than that on households which are, though less successful in fish farming, without access to other sources of fish. The fish farming households with fewest alternative sources of fish are those headed by women. This is both because they are less likely to fish in the river (no women were found to own fishing nets and though some women fish with baskets, this is relatively rare), and because they tend to have a lower disposable income with which to buy fish. For this reason, the few fish gained from the pond of a resource poor female headed household are likely to be of greater significance to the household than those from a male owned pond.

Table 5.1: Case study households: alternative sources of fish

Name	No. of relish harvests	Exp. on food (k)	Exp. on fish (k)	Fish as % of food exp	Occs fishing from river
J. Chilufya	19	1070	350	32.7	0
G. Nkandu	15	-	-	-	38
J. Masuwa	14	2675	420	15.7	0
S. Chipasha	10	4230	2150	50.8	0
P. Kaoma	10	3682	1425	38.7	12
A. Kasongo	7	370	370	100	3
J. Chama	7	310	180	58.0	29
H. Musenga	5	8965	1260	14.0	0
E. Mwila	5	520	500	96.1	3
B. Kabo	4	1615	1050	65	5
O. Ngandwe	3	1050	320	30.4	1
P. Chola	2	6590	2960	44.9	9
M. Kapambwe	2	1160	1000	86.2	14
M. Jeresan	2	1380	200	14.4	3

Source: Farmer diaries and recall interviews.

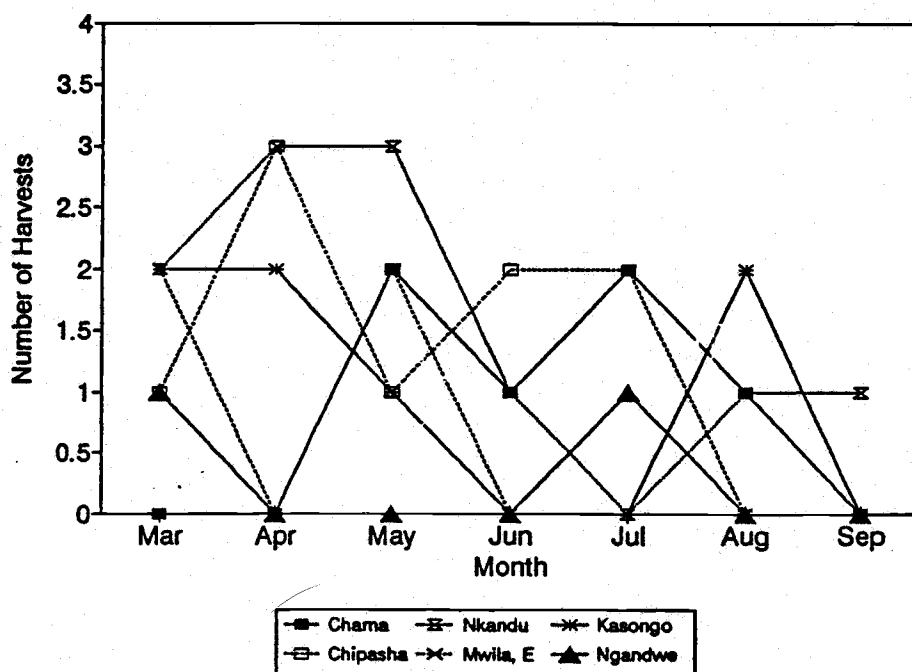
Seasonality of harvests

The food security effects of aquaculture are also related to the potential of the fish produced to fill seasonal relish gaps. The seasonality of relish shortages varies greatly according to the socio-economic status of the respondent and whether or not they have access to lakes or rivers.

In broad terms, the wet season from November to March is considered to be difficult for staple food consumption (cassava takes longer to dry), and the dry season from April to October is worse for relish as leaves dry out and less wild food is available. However, there are enormous variations within this description: for those who have fishing nets or sufficient cash income, September is an excellent time for relish, because they can eat fish regularly. Those without such income or other access to fish complain that September/October is worst, because the beans leaves dried during the rains have run out and there are few other sources of relish. On the other hand, such people say that during the rains, there is plenty of relish and it is of greater variety. People who are used to eating fish complain about the problems of obtaining it in January and February because there is so much water in the river.

Partly because of these disparities, pond harvesting patterns of the case study households are neither regular nor predictable (see figure 5.1). The decision to harvest may be determined by a shortage of relish, or boredom with one particular type of relish. It may equally be in response to a special occasion such as receiving visitors or, as in one case, a marriage reunion. Overall, although the ponds may represent a useful supplement to available food, no clear links to seasonal relish shortages can be established.

Figure 5.1: Monthly relish harvests of selected case study households



Intra-household distribution.

Intra-household distribution depends both on who manages the harvest and on eating practices. In none of the fish farming households headed by women was any fish sold or used to hire labour, so the fish harvested can be assumed to have been consumed either within the household or within neighbouring households receiving gifts. Consumption patterns are also affected by accepted practices of distribution according to age, as well as gender.

The majority of fish farming households have an adult man as pond owner. In line with the prevailing ideology of male dominance characterising gender relations in Luapula, male control over harvesting decisions is stated as the norm by men. Women also say that they would not take fish from the pond without consulting their husbands. However observation of the case study households shows that in fact, approximately half of the harvests were undertaken by women on their own initiative. Women also frequently go to harvest the ponds on instruction from their husbands. Furthermore, men report that they have harvested because their wife was complaining that there was no relish. This indicates that where the ponds are harvested principally for relish, both men and women are active in decision making. A number of men said that for as long as the pond was only harvested for relish, not cash, their wives could decide. If cash was to be earned that had to be an entirely male decision. The non-harvesting reported in Chibote might partially reflect male restriction on their wives' harvesting while they were "waiting for the fish to grow", but it is more likely to be a case of apathy and disenchantment with the fish ponds.

Audrey Richards (1939) reported that among the Bemba speakers of Northern Province, men and women eat apart. In general there was one main meal, though the time of serving it depended very much on the current agricultural activity. Food (*ugwali* and relish) was prepared by women and divided into pots, one for the women and children, and one for the men. Eating practices were restricted by established rules of procedure: it was important to get the proportion of relish to *ugwali* that was appropriate to one's status. The principal determinant of that status was age, though gender was also important. On the rare occasions that a husband and wife ate together, the amount of relish she may take was circumscribed and she was expected to "merely dip her porridge in the stew like a child" (Richards 1939:76). This was the case until she reached middle or old age, when all sex disabilities apparently disappeared.

This picture is very close to observed practices in Monga and Chibote today. Because women prepare the food, they are also responsible for distribution. This means sharing the relish and *ugwali* into pots for both the men and women in the household, and for visitors or food to be sent to other households. It can be assumed therefore that women maintain considerable control over consumption patterns within the household. It is up to them to decide the size of portions allocated to each pot. This decision making does not however take place in a cultural vacuum where women make allocations according to a purely nutritional assessment of their and others' needs.

In both Monga and Chibote, men and women tend to eat separately. Children eat with their mothers and as boys reach puberty, they are more likely to sit with their father or brothers. A number of women explained that they are happier to eat alone, because

men eat too fast. This practice is not immutable though: in all of the case study households, men and women occasionally ate together. In two (those without children) the husband and wife always ate "from the same plate". The most common reason given for people eating together was lack of relish: "when there is not enough relish, it is better not to divide it". This comment suggests that there is not overt prioritisation of certain members of the household when there is limited food. Nevertheless, etiquette still dictates that younger people (and to a lesser extent, women) should take less of the relish than their seniors. On those occasions where relish is in short supply, it is considered normal that adult men should take a larger portion.

There is a counterbalancing tendency (also noted by Richards), that the demands of young children are indulged. Thus, in one household, the only person to benefit from a meagre pond harvest of three small fish, was a two year old "who needed some different relish". In this household, the pond owner was the wife, which may have influenced decisions regarding destination of the harvest. She was in a stronger position to decide to give the fish to the child than she might have been if she was merely harvesting her husband's pond. This prompts the question of whether nutritional benefits from female controlled ponds are likely to be higher than those from male controlled ponds. Because there are so few female pond owners, this is hard to assess. Group interviews with men and women who claimed to be "intending" to start fish farming did however reveal that while men expected to harvest their ponds once a year, women thought they would take fish for relish once every two weeks.

Conventions controlling intra-household food consumption operate most significantly whenever there are perceived shortages of relish. Shortages of relish are however sporadic, not lasting. Furthermore, people also have access to food prepared outside of the immediate household: prepared food is sent to relatives who are known to be short of relish on any particular day, people spend a considerable time visiting, during which it is normal and expected that they should be fed. Children will spend the day travelling from house to house within the village, and may be fed several times a day (or not at all).

Income related effects

Income related effects of fish farming are clearly closely connected to food security effects. Chapter three showed that the potential of fish farming to produce cash income is an important assumed motive for adoption. Wijkstrom (1991) states that

Farmers want to earn an income from fish ponds. They see their ponds as a source of cash, and try to maximize their cash balance by keeping down their spending on pond culture (Wijkstrom 1991; p.vi).

This section considers the extent to which this is this currently being achieved, and the significance of the cash earned from fish culture compared to that from other activities. In addition, it looks at how money from fish farming contributes to the well being of members within the fish farming household.

Income from fish farming

The August 1992 survey showed that in Chibote area, very few farmers were getting any cash income from their fish ponds: less than 9% had sold any fish at all since the previous November (see chapter four). Possible reasons for this lie either with lack of markets or with insufficient production of fish from the ponds. Evidence and observation concerning poor management indicate that the latter explanation is more likely.

In Monga area, more than 50% of respondents had sold at least some fish or fingerlings. Reported income was however low, with the majority reporting an income of between 100 and 500 kwacha. These findings are presented in table 5.2

Table 5.2. Cash income from fish farming: Oct 1991 - Aug 1992

Income from fish farming, Oct 1991 - Aug 1992	Monga		Chibote	
	No.	%	No.	%
None	14	46.6	42	91.3
100-500k	9	30.0	1	2.2
500-1000k	2	6.7	0	0.0
1001-2000k	2	6.7	2	4.3
2001-5000k	2	6.7	1	2.2
5001-10000k	1	3.3	0	0.0

Source: 1992 survey.

Of these, all farmers in Chibote who gained an income from fish farming did so through sale of fish, not fingerlings. In Monga, three fish farmers also had sale of fingerlings as a component of their total fish farming income.

Detailed information on cash income from fish farming is available from the case study households. When compared to overall income from farming, fish farming can be

seen to generally constitute a small proportion of that income (see table 5.3).

Table 5.3: Income from fish farming as percent of total farming income, case study households

Name	Fish farming income	Total farming income	Fish farming as % of total
J. Chilufya	8200	31490	26.0
G. Nkandu	400	-	-
J. Masuwa	450	85650*	0.5
S. Chipasha	1500	13840**	10.8
P. Kaoma	0	3360	0
A. Kasongo	100	4080	2.4
J. Chama	775	2515	30.8
H. Musenga	5350	69630	13.0
E. Mwila	0	1020	0
B. Kabo	0	3920	0
O. Ngandwe	790	125430***	0.6
P. Chola	320	7020	4.5
M. Kapambwe	0	850	0
M. Jeresan	0	1610	0

Notes:

* This figure is unusually high for this farmer because it includes 80,000k for the sale of two cattle.

**This farmer is a large maize farmer who had not sold his produce by September 1992. Potential earnings from a 1/4 share of 150 bags of maize are therefore not included in the figure.

***The high income attained by this fish farming household is predominantly made up from the income of the wife (116,600k), who farms maize at her parental home, where the only private tractor in the area is owned.

Source: Farmer diaries.

The control and use of income from fish farming

This section is principally concerned with the disposal of fish farming income in situations where the pond owner is a married man. Though wives of fish farmers are able to make decisions regarding harvest of ponds for relish, if the harvest is primarily for cash and with relish as only a side-benefit, men invariably make the decision. The intra-household effects of fish culture then depend on the way that the money is spent.

There is a considerable literature documenting how a larger proportion of male controlled income is spent on "personal discretionary" rather than general household expenses than that controlled by women. The evidence drawn upon is frequently then a rationale for income generating schemes for women which entail their greater control over household income. However, in the case of fish farming, there is little evidence to support suspicions that, because the money is controlled by men, benefits will invariably go only to the pond owner himself.

The use of income from fish farming can only rarely be determined. In general, such money enters the fund controlled by men. It may not be spent immediately and thus cannot be easily distinguished from other sources of income. However, on a number of occasions, the pond was specifically harvested to meet a particular income requirement. These range from buying basic household needs such as salt and soap to buying school uniforms and equipment for children and paying the fine incurred in an adultery case. In the instance of the only case study farmer in Chibote area who made money from his fish farming, this represented a small part of overall income.

At current levels of production income from fish farming can, in an equivalent way to fish harvested for relish, contribute to the well being of members of the fish farming household other than the pond owner. However, there are indications that the higher levels of production become, the more likely it is that fish farming income will be diverted into other areas. The evidence for this is only suggestive: it is based on people's reports of what they would do with more money from their fish farming. The majority of male pond owners who were currently selling any fish said that higher levels of income might be used to open a bank account or to buy assets such as a bicycle. Individual accumulation of assets or income does not necessarily end up reaching other household members because of the division of assets commonly associated with divorce and death/inheritance.

Incidental income related benefits of fish farming.

Among the motives for adoption discussed in chapter three, the crucial importance of adoption as a means of access to "development" in terms of external financing emerged. On the whole, real benefits in both Monga and Chibote, have been limited. However, for a few fish farmers on the "inside" in Monga area, their adoption of the technology has led to indirect gains. Grants to the fish farming club were shared among the members of the executive. All of the eight farmers applying for loans during August 1992 saw their ponds as a means of access to the money, not the end as such. Alternative uses of the loan money included vegetable and maize growing, through which it was expected that the loans would be repaid.

Fish farming to hire labour

A limited number of fish farming households have used fish from their ponds to hire labour which contributes to other farming activities. In the 1992 survey this represents 10% of households in Monga and 8.7% in Chibote. More say that they intend to use their ponds for this purpose in the future. Among the case study households, four (two in each of Monga and Chibote) used pond fish to hire labour in the period between November 1991 and September 1992.

By far the biggest hirer of labour with pond fish was a semi-commercial maize farmer in Chibote. On two occasions during the time under review ponds were drained to supply fish for labourers on the maize field. In January, 30 labourers were hired to weed the maize and in July, approximately 50 people were hired over a two week period for the harvest. On each occasion, labourers were paid in fish with an equivalent market value of approximately 50k. The maize to which this hired labour contributed had not been sold by September 1992, largely because of the non-operation of the provincial marketing cooperative. The farmer was expressing worries about his ability to repay the loan incurred in buying fertiliser and seed to finance the venture. In this case therefore, the use of fish the hire labour has not yet any positive effects on the fish farming household.

The three other hirers of labour did not use the labour on solely cash-oriented crops. In these cases, labourers were taken on to assist with *citemene*, and to take part in the weeding and harvesting of groundnuts or hoeing of beans on jointly (male and female) managed fields. Male pond owners decided to use fish from the ponds in this particular way, but the benefits are likely to have reached the household as a whole.

Intra-household labour impacts

The diversion of male labour during pond construction

Most fish ponds are dug single handedly by male heads of household. The process of digging a pond takes anything from ten days to a month, depending on the size of the pond and the extent to which pond digging is done as a full time activity. For a number of households, low production from the pond means that tangible benefits for individuals within the household are limited. This matters more if there are simultaneously negative impacts through the diversion of male labour away from potentially more productive activities. In particular, pond digging might result in reduced time spent by men on land preparation, with corresponding effects of reduced production of other foods, either for cash or income.

Evidence concerning intra-household labour impacts is derived from observations of current practices and from reports by both male fish farmers and their spouses. During the research period, few new ponds were constructed by case study individuals, but to the extent that they were, the time spent on this has been recorded. Many of the ponds in the research sites were dug during 1989/90. Impacts of reduced cultivation for the staple crop cassava would thus be felt from 1991 onwards (cassava takes from two-three years to mature).

This section initially considers only agricultural labour peaks. The central concern

is potential conflict between fish pond construction and agricultural productivity. Furthermore, definitions of periods of time as "leisure" have both conceptual and methodological difficulties. What may be construed as leisure in one cultural context or even by one individual may be necessary or productive social investment in another. For example, attendance at social functions such as weddings, funerals and village meetings is taken for granted as a necessary social obligation, over which few other obligations should take precedence. They also represent opportunities to relax, drink, exchange news and so on. Moreover, measurement of time taken on any activity which is not directly productive is notoriously difficult; any day will be interspersed with such periods of time.

Observation and case-study time allocation information show that, for most men at least, there is a significant amount of time not directly spent in agriculturally productive activity. Seasonality of male labour peaks differ in Monga and Chibote because of differences in agricultural activity. Nevertheless, in both places there is both a strong perception among farmers and observed evidence of a considerable amount of "spare time". This finding is supported by a study of male/female time allocation in Mabumba in Monga area (Allen 1988) and by the ALCOM surveys which included Chibote (Wijkstrom and Wahlstrom 1992). In the Mabumba study, the relative inactivity of men compared to both adult women and female children is noted. For both men and women, the time that nobody can account for ("resting") is the single most time consuming "activity" by a very wide margin (Allen 1988. p.12). From the ALCOM surveys it is argued that many farmers in the Chibote area are essentially "underemployed".

In both Monga and Chibote, male labour is required for specific periods of intensive activity. In Chibote, most households still practice *citemene*, so men are active in cutting trees for *citemene* during the dry season, from June-October. However, though *citemene* work may take place at any time during this period, the time spent on it seldom expands beyond two weeks, working mornings only. Another labour peak occurs at the beginning of the rains during land preparation for a range of crops, and a third during May/June for the groundnuts and beans harvest.

Land preparation is not as strictly a male task as the cutting of trees for *citemene*. Poor female heads of household will "cultivate" (the term used to translate the Bemba *ukulima* and broadly referring to breaking up the top soil ready for planting) but none would cut trees. It is, however, considered more of a male task than a female one. Time taken to prepare land ready for planting varies, depending on the amount of land available the energy of individual farmers, and the crop mix chosen in any particular year. It seldom, if ever, takes up both morning and afternoon of any day.

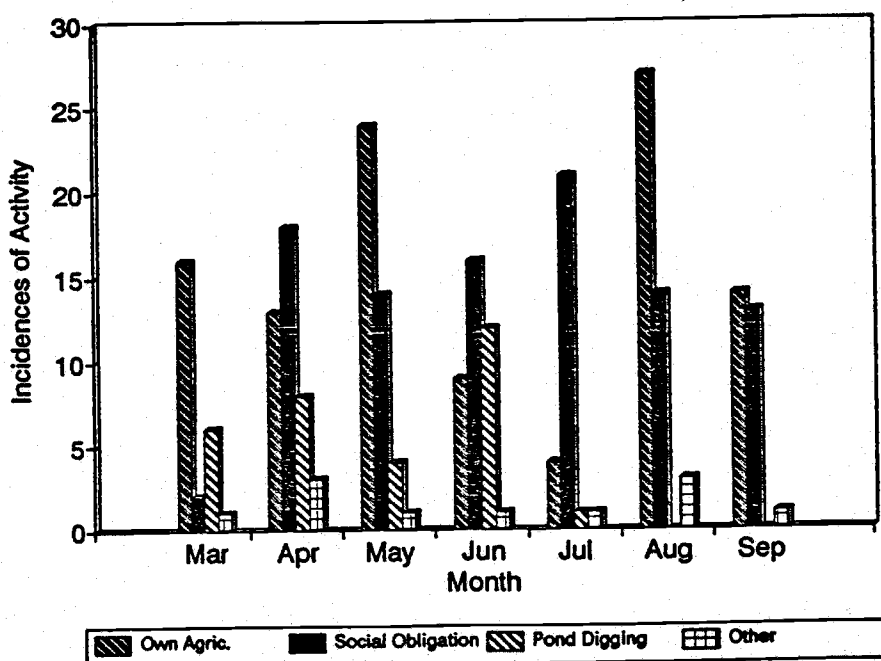
In Monga, few households continue to practice *citemene*. Land clearance takes place at the end of the rains (April) and cultivation for the next crop takes place once the rains have started again in October or November. In the intervening period, male work involves a brief, intensive, period of harvesting (groundnuts, beans, or maize) and on occasions the cultivation of irrigated vegetables. Towards the end of the dry season, there is very little agricultural work to do and increasing amounts of time are spent on either house repairs or social activity.

The ALCOM surveys (Wijkstrom 1991) suggest that when a farmer ventures into

fish culture, he does not let it affect his other agricultural or livestock activities. This is largely supported by reports from case study households about the fit of pond construction into the demands of agricultural labour, and by the observations above about time allocation in general. It would seem that a conflict between pond construction and agricultural activity is by no means necessary. However, the evidence for this is not entirely unequivocal.

When a farmer constructs only one pond, it is reasonable to assume that this can be accomplished without negative effects on other activities. Indeed, both men and women were consistently surprised by questions regarding alternative uses of the time spent digging the pond. The most common responses were "drinking" or "resting", and suggestions that "there is plenty of time in the day for all things". Where pond digging activities were undertaken during the 1991-2 season, (by nine of the case study households), it was found that they would be sporadically abandoned as other farming tasks became of greater priority. For example, one farmer was working on a new pond for three days in March, six in April, three in May and twelve in June. In amongst these spells of pond digging, he was weeding maize, harvesting groundnuts, cultivating vegetables, clearing land for cassava - and attending funerals. The activity profile is given in figure 5.2. Furthermore, there is little evidence to show either that quantities of land under cassava have been reduced, or that women took over their husband's agricultural work to ensure that there was no shortfall.

Fig.5.2: Peter Chola, time allocation March - June 1992.



The evidence concerning households where several ponds were constructed is not so straightforward. In Monga area especially, a limited number of farmers have more than eight fish ponds. In all cases these were constructed over a two year period. In only one case was labour hired to assist with pond construction. Even with apparent excess time, and the boundless energy and "power" they profess, it seems more unlikely that these farmers were not encroaching on other agricultural activities by their pond digging. Discussions with wives and evidence of the size of cultivated areas supports this suspicion.

One farmer in Monga area owns 15 fish ponds. Six of these were dug in 1990 and six of these in 1991, without the use of hired or household labour. The farmer himself said that he had previously grown more maize, but that had decided to reduce this anyway because of difficulties in getting loans. However, cassava production also suffered: in the 1990/1 season, no new cassava was planted. Another fish farmer with nine ponds admitted to reducing his cultivation of cassava, but argued that it didn't matter because the family then inherited some already planted fields from his mother.

Increased workloads for women ?

Two questions underlie the issue of whether the workloads of wives are increased by their husbands adopting fish farming. Does it occur? Does it matter? A substantial literature rightly points to the tendency of much development policy and planning to be blind to the unpaid labour of women⁴. The results can be negative for women themselves. Moreover, where projects rely on such labour without finding out under what conditions women will be prepared to give it, project failure may ensue⁵. However, rather than just asking whether unpaid labour is contributed, it is important to understand why and under what conditions.

In chapter four it was suggested that once the fish pond has been dug, management activities are not very time consuming. People tend to fit the requirements of their fish ponds into the rest of their lives - not the other way round. Fish farming is only one among a range of agricultural, income generating and social activities.

The amount of time spent on pond management by both men and women depends on practical considerations, such as the location of the fish pond: if it is very close to the house, there is a greater possibility that women will throw household left-overs to the fish. Similarly if it is close to the main drinking water supply such as a spring, women are more likely to combine fish feeding with domestic labour. In one case, the fish pond was located far from the house, but close to where the husband had his own maize and vegetable fields. He invariably took care of all work on the fish pond. But the balance between male and female labour for fish farming also depends on individual choices based on perceptions of control, ownership and vested interests.

Women certainly spend time on pond management activities, as do children. The extent of this appears to vary according to how much women feel they have a vested interest in the fish farming operation. This in itself is a function of the degree to which they are involved in decision making. The division of labour for pond management activities varies greatly by household, but a tendency exists whereby the more

"commercial" the fish farming operation, the less likely that wives will be spending time on fish feeding or pond maintenance.

Of the case study households, 17 comprised fish farming households with both a husband and wife present. Of these, the majority (10) operated a flexible division of labour in which both men and women contributed to fish farming, depending on their other priorities. In two, the wife clearly did the majority of the pond work (in one of these, the wife was the pond owner). In the remaining (5) households, men took control of all aspects of pond management. The interesting point is that four of these five households represent the more cash-oriented fish farming operations of the case study sample.

A tendency has been noted that with male owned ponds, wives make decisions about harvesting only when the expected destination of the harvest is household relish. Among the case study households, those with the greatest annual income from their fish farming activity were those in which wives were apparently taking a much less active part in pond management generally. In such households, women were also taking more independent strategies with regard to the production of other crops; farming maize or groundnuts independently. The separation of activities and budgets was partially a function of greater cash orientation of production generally. Thus, even where pond location might suggest female participation in feeding or pond maintenance, this was observed not to occur in practice.

On the other hand, those households for whom no fish sales at all were reported showed a higher activity level for women in pond maintenance. No strict division of labour was adhered to, but women were fully prepared to take over all aspects of pond maintenance if, for example, their husbands went away. This indicates that the women saw participation to be in their own interests. Certainly none expressed the opinion that it was an unwelcome burden.

This section has focussed on the labour of women as the wives of fish farmers. An additional comment should be made about the extent to which many fish farming households also rely on the labour of their children, especially for feeding the fish. In all instances, case study households reported occasions where children, both male and female, fed the fish. In a few, this was on a regular basis. Again, perception of ones interests appears to be significant. In a household where the daughter invariably looked after the fish pond, she explained that she really saw the pond as her own and was planning to have another constructed in the following year. The pond was nominally owned by her mother.

In the case of fish farming, it appears that additional labour/time burdens for women are not a significant problem. It is also clear that in Luapula, the unpaid labour of women in pond management cannot be taken for granted. The fact that women do take such an active part in pond management has implications for extension which are addressed in chapter eight.

5.3 EFFECTS IN THE FISH FARMING COMMUNITY

Changes in community level nutrition, income opportunities, and resource control associated with the spread of fish farming have impacts on both adopters and non adopters of the technology.

Food security and income effects in the fish farming community.

In both of the research sites, relatively little cultured fish is sold and, compared to what is available in rivers and on the market, the quantity of cultured fish is tiny. Furthermore, those who are short of fish because they do not go fishing and do not have the cash to buy fish, are equally unable to buy cultured fish. The most significant effects of fish farming beyond the immediate fish farming households currently lie in the giving of fish as gifts and the labouring opportunities generated by fish farming.

Invariably when there is a pond harvest, some fish is given away to those who assist with the harvest or is sent to friends and relatives. One fish farmer in Monga harvested 12kg through draining one of his ponds (he had borrowed a scale). He was assisted in the harvest by a group of small children who were "given their share". The rest of the harvest was distributed as follows: 3kg to restock three other ponds; 1.5kg to his mother, 1.5kg to the headman; 2kg to his grandmother; 1.5kg to his mother in law; 1kg to a friend; and 1.5 for home consumption. On a second occasion, of approximately 250 fish harvested, 100 were used for home consumption, 50 were sold (for 100k as they were very small) and the rest were given away to his brother in law. The fish farmer explained: "We are many here. I should be helping my friends. They may help me one day but I will not be reminding them". The gifts were however possibly more strategic than he allowed: the brother in law was a richer farmer who was considering loaning money for vegetable seed to the fish farmer.

The beneficiaries of such gifts cannot be identified as being necessarily in greater or lesser need than anybody else. People speak of sending pond fish to parents because "they were complaining about relish", but equally it would be inconceivable to harvest the pond without sending fish to parents if they lived nearby. The delivery of cooked fish to other households is not viewed as sharing: that would only be the case if the fish was in uncooked form.

A few fish farming households benefit from the activity by using the fish from their ponds to hire labourers. The other side of this equation obviously concerns the benefits to the households of the pieceworkers. Such benefits depend on whether the fish is given as part of the meal for a group of labourers or whether it is taken home. It is normal for hired groups to be given a meal at the end of their morning's work. This meal should have at least some meat or fish in it. The benefits in such a case obviously do not go beyond the individual doing the work. The uncooked fish given to individual pieceworkers (a more common practice) is generally likely to be shared between all members of the immediate family of the worker. Both men and women equally take part in piecework sporadically, but women are more likely than men to do work for which they are paid in kind rather than cash. This tendency is confirmed by observation of pieceworkers working for fish who were predominantly women.

Lastly, there are a limited number of labouring opportunities for people who dig ponds for others. These labourers are invariably also fish farmers on their own account. Payment for pond construction depends on both the size of the pond, on the relationship between the labourer and hirer, and on what is available to be paid. There is no fixed price. Reports of payments for digging ponds vary from 500k, to 2000k, to fifty fishing hooks, to a goat for three ponds. In both Monga and Chibote, the rush to dig ponds has now, however, subsided, so it is unlikely that this aspect of fish farming will be much of an income generator in the future.

Community level resource control and environmental effects

Fish farming relies on resources which are generally perceived either to be abundant or to have few alternative uses to either the fish farmer or the non fish farmer. These resources are land, water, plant by-products or household left-overs, manure, and labour. However, households cannot be viewed as isolated units. The resources to which they have access often have alternative uses for other members of the community.

Overall in both research sites, people believe land to be abundant. A cash market for land and disputes arising out of scarcity have not developed. This is especially the case in Chibote area, but in Monga, incidents of conflict over land and water indicate that this picture is only partially accurate: under conditions of environmental and economic change, previously underutilised land resources acquire a new value. Higher population density and the end of *citemene* cultivation have led farmers in Monga area to search for new opportunities and locations for farming.

The potential of the dambo areas for new farming activities has only relatively recently been recognised, not only for fish farming, but for growing dry season vegetables, for rice, and for wheat. The dambos form a vast and underutilised resource in the province, and for this reason, it might be expected that conflict and competition are a distant prospect. However, there is already evidence of localised scrambles to claim land in the dambos. They might cover a large area overall, but people want to farm close to their villages, especially when growing crops which are vulnerable to theft like vegetables and fish. In Chibote, land and water title deeds were virtually unheard of, but in Monga a number of farmers (especially fish farmers) were in the process of applying for land and water rights during the dry season of 1992. The area of potential human use of the dambos is considerably more limited than their overall size might initially indicate.

Does this new interest in dambo based cultivation, and the corresponding privatisation of areas newly farmed, disadvantage existing users in any way? Though the dambos have only recently been used for farming activities, they have traditionally had a range of other functions as a common property resource for all members of the communities living on their margins (Kokwe 1991). They are a source of thatching grass and drinking water, women soak their cassava in pools and springs on the dambos, livestock are grazed on them. Rights to use of the dambo are ostensibly open to all people living there: the dambo is *cinkumbawile* - public property. However, there is evidence that for some people, the exercise of those rights has become more difficult.

In the dry season of 1992, many of the ponds in Monga area dried up completely

(see chapter four). This had also occurred in 1989 and was blamed by the local people on reduced rainfall. It is true that rainfall during the 1991/2 rainy season had been lower than that in the previous year. In fact, the rainfall had been steadily reducing over several years. However, the overall shortage of water was exacerbated by the spread of fish farming. In all three villages along the dambo in Monga area, disputes arose in which women complained that the springs from which they collected both drinking and washing water were drying up as a result of their diversion to supply fish ponds. In the space of three years, approximately 140 fish ponds have been constructed on the Monga dambo. Many of these rely on a system of furrows to supply them with water, and the farmers are always in search of more and more reliable sources to feed those furrows.

A similar problem is associated with the soaking of cassava. Normally, women soak cassava in a series of pools along the edge of the dambo within easy access of the village. With the spread of fish farming, a number of women complain that their cassava soaking area has been taken over by fish ponds. The ponds may be dug over sources previously used for soaking cassava. This is apparently not a problem for the wives of fish farmers who say they can soak their cassava in their husbands' ponds. However, a number of incidents revealed that fish farmers are often unwilling to let anybody else put cassava in their ponds because they are worried that it may poison the fish.

With both the diversion of drinking water and reduced availability of places to soak cassava, the significance of the problem in terms of numbers of people affected is not clear. Completely benign effects in terms of resource access can however not be assumed. In the case of the conflicts arising in Monga area, individual fish farmers occasionally showed willingness to ameliorate the effects of their activities by, for example, digging new furrows. The problem could be attributed to a lack of initial consideration as much as to an absolute conflict for resources.

With regard to inputs to fish farming such as manure and vegetation for feeding the fish, no negative impacts at the level of the community as a whole could be found. It has been noted that overall livestock ownership in both Monga and Chibote is low. Furthermore, many fish farmers obtain manure for fertilising their ponds from outside of their immediate household resource base. On the other hand, people do not use manure currently applied to fish ponds for other purposes. Both because of lack of knowledge of composting techniques and because of a belief that using manure as fertilizer leads to increased weeding demands, manure is freely available to those who are prepared to collect it. In Monga area, because of the increased tendency to integrate fish ponds with vegetables gardens, partially as a source of food for the fish, and partly for cash reasons, fish ponds are in fact likely to represent a net benefit in terms of availability of vegetative matter.

The evidence from Monga indicates that as the value of inputs changes, there are increased possibilities that the interests of specific groups may come into conflict. The value of inputs may change both because of the spread of fish farming itself and because of other pressures such as rising population density causing an active search for fertile land. When this begins to occur, the ability of disadvantaged groups or individuals to articulate their interests, and the functioning of mechanisms for community-based cooperation become increasingly important. In Monga area, there exists a tension between

"traditional" mechanisms of regulation, specifically the power invested in the headman, and other, more individualistic influences. Thus, the headman's ability to control the activities of people in the villages is reduced. At the same time, fish farmers meeting to discuss the water problem were unable to see it as anything except a difficulty which would have to be solved by government assistance. In between these two influences is the important and generalised belief about the need to avoid overt conflict. Meetings were held in Monga to discuss the water shortage for fish ponds and the issue of women's loss of cassava soaking places. On one occasion, representatives from DoF and ALCOM attended a meeting and were greeted with complex plans to dam the Loshi river. No women were present at the meeting.

5.4 THE IMPACTS OF FISH FARMING: CONCLUSIONS

Because fish farming can only be technically viable in areas of sufficient water, it is likely that alternative sources of fish will be available. These alternatives are unequally available to different households because of both purchasing power and access to fishing skills/gear. They are also erratic in their availability, depending on seasonal marketing and climatic factors. Adopters of fish farming are often people who are in a position to take advantage of such alternative sources of fish. As a result, for the majority of adopters, farmed fish currently represent a small part of total fish consumption. For resource poor female adopters having more limited alternative sources of fish, the benefits may be more significant.

The adoption of fish farming in Luapula neither represents a significant addition to provincial fish production, nor does it account for an important part of fish consumption or income at the level of the individual fish farmer. Adopters of aquaculture are seldom the most nutritionally vulnerable and people are prepared to adopt the technology even where they already have access to fish for household consumption. As a constituent of overall farming income, the income from fish farming is also insignificant. However, as an addition to the farming system requiring (to most farmers) low investment in time and resources, aquaculture is clearly valuable.

That fish can be harvested throughout the year, that low labour inputs are required after initial construction and that on-farm resources can be used, can make fish farming an attractive proposition. Less tangible effects such as increased security are also important. Where the inputs to fish farming begin to have greater cost, it is likely that at current levels of production it will become a less attractive option to farmers.

Fish farming potentially has a more significant food security effect when adopted by those with poor access to other sources of protein. Among the few female heads of household who have managed to enter fish farming, the little fish they produce is more important because of a lack of purchasing power on the market and poor access to fishing technology.

Within fish farming households, at current levels of production, all members of the household will benefit from aquaculture. As production becomes more commercially oriented, it is less easy to see direct benefits to other members of the household. Fish farming also relies on the labour of household members for pond maintenance activities. In the main, such labour is given where household members are also more active in decision making, both of which occur at less cash-oriented levels of production. This fact potentially has implications for extension depending on the extent to which extension messages assume that the fish farmer is male and how this fits with the reality of pond management.

Within the wider community, the adoption of fish farming has limited nutritional or income generating effects. However, under conditions of increasing resource competition, the rapid spread of fish ponds can have negative side effects which, though not inherent to the technology, are nevertheless significant for non adopters. The ability of communities to regulate such activities, and to control the use of land and water by fish

farmers, depends on the relative strengths of values of community obligation and deference to traditional control (the headman), and those involving legal title to land and "modernity". These two sets of values are not in absolute opposition, but their amalgamation can in effect result in impasse.

Notes

1. The concept of entitlements is developed by A. Sen (1981). He argues that the mere presence of food in the market does not entitle a person to consume it. The sets of alternative bundles of commodities (for example, food) over which a person can establish command are called this person's "entitlements".

2. The notion of bargaining positions also grows out of the work on entitlements and intra-household resource allocation. It is suggested that individuals within households hold bargaining positions for access to resources which are determined by a range of factors, for example perceived contribution to household welfare, or the ability of some members to exercise coercion, threat or violence over other. Such bargaining positions are not conceptualised as "stand-off" positions, because they involve a negotiated "co-operative conflict". See for example Folbre (1986), Sen (1984), Kabeer (1991)

3. See for example Evans 1989, in which the concept of household utility as developed by "New Household Economists" such as Becker is critically examined.

4. See, for example, Buvinic 1981, Dixon 1982.

5. A much-quoted example is a rice project in the Gambia in which women's non-cooperation in the devotion of unpaid labour for which they could see no justification resulted in project failure (Dey 1981).

SECTION THREE

"INTERVENTION"

In the previous section, aquaculture development was viewed from the villages. The section aimed to elucidate the motivations and practices of fish farmers, and the effects of fish farming on them and the rest of the community. It was seen that an important factor in aquaculture adoption is the hope of assistance from government departments and donors. This hope is partially a legacy from other schemes for rural development, and partially the continuing result of the interaction between farmers and outsiders. But these outsiders do not form a monolithic entity. The aspirations and expectations for fish culture of different institutions, and the personal priorities of individuals within these institutions, are immensely varied. This section describes this variation and assesses its influence on intervention. There is an identified weakness in the knowledge base of fish farmers which indicates a potentially important role for extension. How does this extension work in practice given institutional divergences?

A purpose of the section is to elucidate both similarities and divergences of institutional agendas - and of individuals within these institutions. Within and between institutions, differences in motivation, in knowledge, and in power of different individuals create and influence practice. But aggregate differences in institutional agendas can also be identified. Commonly, discussions of development policy exclude or undervalue such differences. Technical and formalised approaches to planning make the different priorities and perceptions of the different stakeholders invisible.

From different institutional contexts, projects may be seen in different ways. From the headquarters of a donor agency, reports and infrequent, short, visits constitute project reality. Priorities may as much be determined by funders as by understanding of the project area. Similarly national planners' priorities may diverge from both the donors' and those of its own locally posted personnel. The fact that different institutional agendas will exist is not of itself a problem. It is also not surprising. All too often though such differences are assumed-away in the planning process. When this happens, enormous room for misunderstanding is created.

The following chapters describe the institutional context within which aquaculture has developed. Chapter six focuses on the Department of Fisheries. It discusses priorities and perceptions from the perspectives of different levels within DoF, from national planners to village based extensionists. Chapter seven assesses donor supported intervention, in particular that of ALCOM. Chapter eight brings together an analysis of the activities carried out by these people with an assessment of the response from the villages.

The section is not an evaluation of either ALCOM or DoF. Regarding ALCOM, an attempt to assess the progress of all the numerous pilot projects has not been made. The focus of the research has been on what actually took place in Luapula, rather than an assessment of the whole programme. Objectives and decisions taken in Harare have, however, influenced the direction of the Luapula pilot project. At the same time, the events in Luapula over the last five years has affected ALCOM's reformulation of objectives.

SECTION THREE

INTERVENTION

CHAPTER SIX

THE DEPARTMENT OF FISHERIES

This chapter considers the Zambian department of fisheries (DoF), both in terms of overall objectives and in its functioning at the local level in Luapula.

6.1 AQUACULTURE IN ZAMBIA.

Background

The prospects for aquaculture development in Zambia are thought to be good (Aase and Mumba 1987). The basis for this judgement is principally technical; the climate is suitable and there are abundant water resources. In addition, there is a well established, if crumbling, infrastructure.

The rationale for aquaculture development from the point of view of the government is the provision fish for food and income. A per capita decline in fish consumption from 16kg in 1972 to just over 8kg in 1989 was seen in the Fourth National Development Plan (FNDP) as reason for greater attention to be paid to both optimisation of capture fisheries and the promotion of fish farming (GRZ 1989). Declines in fish consumption are blamed on rising population, low technology inputs and restrictions on fish imports.

In addition to these reasons, government promotion of aquaculture has to some extent been donor-led. In 1987, foreign investment in Zambian aquaculture was projected to be some 36% of total investment (Aase and Mumba 1987). During the late 1980s, four large donor funded projects were operating in Zambia: the Fish Culture Development Project, financed by the Netherlands and operated by DoF and FAO; the ICARA project in North Western Province, funded by the US Agency for International Development (USAID) through the International Catholic Migration Committee; a Norwegian funded Fishculture Development Project in Northern Province; and ALCOM. Between 1986 and 1990, ALCOM was based in Zambia, operating pilot projects in Eastern and later Luapula Province. Between 1979 and 1988, more than US\$7,400,000 in foreign aid assistance was allocated to aquaculture in Zambia (SIDA 1989).

Zambian government rationales for the promotion of aquaculture are broadly in line with those of most donors: improved nutritional status, diversified rural incomes and so on. These kind of rationales are the same as are stated in most planning documentation. They are unproblematic because so general. The means towards their attainment are not necessarily the subject of such agreement. One possible point of contention is the extent to which funds should be committed to infrastructural investment such as the rehabilitation of government fish culture stations. In the FNDP, while it is suggested that K6.2 million will be devoted to the reorganisation of the extension service, the amount going to fish farm rehabilitation is K11.6 million and to a National Aquaculture Centre is K28.8 million (FNDP 1989). The departmental view concerning fish culture stations is fairly straightforward: they are needed in order to meet a gap in fingerling supply and as training centres. In the FNDP, a key proposed project is the rehabilitation of fish seed production and distribution centres, including the rehabilitation of Fiyongoli fish farm.

Until recently, there has been little or no questioning of this basic premise. As far as donors are concerned, the benefits from such support are less clear. Although most recent project aid to aquaculture¹ has involved the rehabilitation of fish culture stations and fingerling supply as a component, the cost-effectiveness and sustainability of such expenditure is now questioned. The Thematic Evaluation (NORAD 1987) noted that many governments had failed to liberate themselves from the task of supplying fingerlings while not being in a position to do this effectively.

During the late 1940s and early 1950s British colonial officers had been keen to promote fish farming for apparently much the same reasons as are being advanced in the 1990s. The Chief Fisheries Adviser visited Northern Rhodesia in 1946 and, in discussion with local officials, advocated the construction of a demonstration fish farm at Chilanga, near Lusaka, to be run by a fish culturist trained in Palestine. The principal rationale was one of supplying food for the rural population, because of...

The powerful attraction of the industrial areas of Rhodesia and the Congo which can and do pay high prices. Therefore the bulk of the fish in the case of Northern Rhodesia and a high proportion in the case of Nyasaland, do not go where it is wanted, namely the African native population (Hickling 1946,p.138)

The colonial introduction of fish farming resulted in a proliferation of small rural ponds, and by 1966, 1231 ponds producing 88t of fish were recorded. Such statistics are likely to be of dubious accuracy however, given the largely self-consumed nature of the product. Recent figures suggest that the number of pond owners stand at more than 2000 with over 4000 ponds. Some 70% of private fish farmers are small scale producers (GRZ 1989). Production records are poorly kept and, until recently, no proper records were maintained by the Fisheries Department extension service. Nonetheless, it is estimated that total aquacultural production is well under that targetted by the government (in 1984 it was thought to be 750t as compared to a target of 2000t (GRZ 1989).

Since the 1980s, commercial fish farming has grown and now accounts for 570t of the estimated 750t produced through aquaculture (Aase and Mumba 1987). There are commercial fish farms in North Western, Copperbelt, Lusaka and Southern Provinces. In the Fourth National Development Plan production targets of 350t, 150t and 1500t were decided for small scale rural, government and commercial farms respectively. This amounts to about 5% of the total fish supply.

Extension and training

Zambian aquaculture is managed by the department of fisheries (DoF) within the Ministry of Agriculture, Food and Fisheries. The department has a headquarters at Chilanga with a library, research station, boat-building section and fish farm. It controls 19 government fish farms, distributed throughout the nine provinces of the country. These fish farms are supposed to be the national backbone in the promotion of fish farming in terms of both advice and fingerling supply. According to government sources, only those benefitting from allocations from foreign donors are able to offer satisfactory training and extension services. The DoF also runs two training centres, one for extension workers - fish scouts - at Kasaka near Kafue, and one for fish farmers at Mwekera Fish Farmers Training Centre.

The Fisheries Training Centre at Kasaka runs courses for fish scouts at irregular intervals when DoF needs new staff. These courses are of one year duration and are mainly geared towards the needs of capture fisheries. Aquaculture is only a small part of the curriculum. Although the government strategy for aquaculture development has ostensibly centred on direct extension to farmers, supported by fingerling distribution from government hatcheries, most people within and outside of the Department recognise that this has not been effective. Monitoring mechanisms (of extension activity as much as of fish farming activity) are so poor that attempts to quantify levels of activity are probably wildly inaccurate. The FNDP claims that 57% of targetted numbers of fish farmers were trained in the 1987-89 period (GRZ 1989). However, a National Workshop on Improved Fish Farming Practices, held in March 1993 collected information from each of the nine provincial departments which ranged from 13 to 1642 extension visits with three provinces not reporting any data. Complaints about a lack of transport and lack of trained staff indicate that on the whole extension activity has been at a low level. Attempts, at a national level, to monitor the effectiveness of what activity does take place have not been undertaken. Only where a donor supported project has introduced monitoring databases (in Northern and Eastern provinces), is an estimate of such effectiveness available.

Links with agriculture

The election of the new government in 1991 had not brought about a significant change in policy regarding aquaculture during field work. The effects of administrative reformulation and staff retrenchment were being felt in DoF as much as in any government department. With a reduction of staffing levels and an attempt to "rationalise" resources, there were hints that there would have to be a change in the way the department operates, especially regarding fish farming. One possible change is that agricultural extensionists are trained in fish culture and the existing extension service for aquaculture is scaled down.

There are shortages of extension personnel in DoF. Rural aquaculture is undertaken by people who are principally farmers, not fishermen. Fish ponds are a potentially valuable addition to farming activities, but not as an alternative to fishing. It therefore makes sense to increase the capacity of the Department of Agriculture (DoA) to include fish farming in its extension messages.

The DoA also falls under the Ministry of Agriculture, Food and Fisheries. It aims to reach farmers through the training and visit (T&V) system of agricultural extension. T&V emphasises the "delivery" of a package to contact farmers and regular training sessions for field staff. Clear management principles are expected to dictate the activities and evaluation of the agricultural assistants. From the early eighties until very recently, this has in effect meant the promotion of hybrid maize which requires inputs of seed and fertiliser. Agricultural assistants, each located in an agricultural camp, undergo regular training and are then expected to relay their knowledge to communities via their contact farmers.

Weaknesses in the approach exist. Firstly, for the system to be effective, resources need to be available to support the activities of the agricultural assistants. These have

often been lacking. Secondly, the appropriateness of the focus on hybrid maize has been questioned from a range of angles: household food security, economic rationales and ecological sustainability (Sharpe 1987). While national policy for extension supports T&V, Zambia also has a series of Adaptive Research Planning Teams (ARPTs), which attempt to bridge the gap between research and extension and, so far as is possible, to utilise farmers' own knowledge and experience. Despite the problems in the operation of the system of agricultural extension, it is currently much more widespread than that for aquaculture. For example, in Luapula Province there are 128 agricultural assistants - compared to 6 fish scouts working in aquaculture.

At an administrative level, linkages between DoA and DoF do exist. For example, the Director of Fisheries is a member of the National Agricultural Research and Extension Committee (NAREC), which is responsible for coordinating overall research and extension policy. The National Extension Action plan is supported by a World Bank financed project, Zambia Agricultural Research and Extension Project (ZAREP). ZAREP currently supports extension in five provinces and is intended to expand throughout the country. A recent World Bank mission specifically recommended that aquaculture be covered within ZAREP as a specialised crop. In early 1993, ALCOM were initiating a new national pilot project to support this integration of agricultural extension. In planning documentation, the inclusion of fish farming in farmers' training courses is recommended (GRZ 1989)

Nonetheless, attempts to formally integrate training in aquaculture and agriculture are still in their infancy. Some agricultural assistants have been trained in the rudiments of aquaculture at Mwekera fish culture station. Ad hoc collaboration between DoA and DoF staff has taken place at Provincial and District levels. However, for the majority of agricultural assistants, knowledge of the techniques of fish farming and its potential integration with other aspects of farming is paltry.

Donor pressure to integrate aquacultural extension within agriculture is also unlikely to be wholeheartedly welcomed at the Provincial and District levels. In an economic climate in which different government departments find themselves competing for scarce funds, it is in the interest of Provincial fisheries officers to maintain a separate aquacultural extension service, requiring a separate budget.

6.2 THE DEPARTMENT OF FISHERIES IN LUAPULA PROVINCE

Provincial Priorities and Capacity

Priorities

The main DoF objective in Luapula is:

"maximisation of fish production through rational exploitation of fish stocking" (DoF 1990). The objective says nothing about small-holder food security or rural income increase. This is not surprising given the fact that the province is the principal fish producer of Zambia and faces declining yields. Luapula has three major fishing grounds; those in and around Lake Bangweulu, the Luapula River and Lake Mweru. According to Gould (1989), approximately half of the population of the province is "somehow involved" in fishing.

During the 1980s, Luapula fisheries were responsible for about 40% of all fish marketed in Zambia. Over the last ten years, the natural fisheries have suffered from both competition from Zaire and a decline in production. In Lake Mweru, there has been overexploitation to the extent that certain species are now virtually extinct (for example *mpumpu* or Luapula Salmon). In Lake Bangweulu, there has also reportedly been a decline in the number and quality of species caught. Diminishing catches have increasingly led fishermen to use nets with small meshes, which have the effect of catching immature fish, thus further constraining productivity. Legislation is in force to contain over-fishing and the use of small-mesh nets. Accordingly, DoF's main role in relation to natural fisheries is that of policing the waters, checking on and restraining the use of illegal gear, and ensuring that people do not go fishing during the closed season². In addition, work is undertaken to monitor catches and the use of gear. Given the enormous area covered by the natural fisheries, and their relative importance in the provincial economy, the role is held to be very important. Total fish production in 1986 from Mweru and Bangweulu was estimated to be over 24,000 metric tonnes (GRZ 1987).

Despite the overall provincial importance of fisheries, it is generally acknowledged that away from the lakeshores and the Luapula valley, people have only restricted access to fish. Because a considerable proportion of fish leaves the province for Zaire and Zambia's Copperbelt, those people living in the more isolated plateau areas or without adequate sources of income are unable to obtain fish (Gobezie 1984). This fact, combined with evidence of protein deficiency in the plateau areas and physical features which favour fish farming, are the common justifications for external support to aquaculture in Luapula

These rationales for fish culture are not necessarily in line with DoF objectives of greater overall, and measurable, fish production. It could make as much sense to concentrate on improving marketing facilities and management of existing fish stocks. Nonetheless, DoF had been supporting aquaculture within the province before the arrival of ALCOM, albeit at a low level. According to the 1990 annual report, DoF is constrained by shortages of cash, by non-availability of fuel, and by low morale among staff who are seldom paid their allowances on time.

Relations with donors

Because DoF itself is under-resourced and, according to the Provincial Fisheries Development Officer (PFDO), suffering from shortages of both personnel and the means for them to work, relationships with donors are particularly critical. From the point of view of DoF in Mansa, donor assistance is a potentially useful way of enabling the smoother running of the department. In neighbouring Northern Province, a donor-supported project provided considerable expenditure for the rehabilitation of infrastructure, which was then matched by government commitment of extension staff. As a result, the department as a whole was strengthened, however temporarily. Donor assistance also carries with it the danger that staff time will be used, and policy directions changed away from predetermined lines.

DoF has received financial support from The Swedish funded Integrated Rural Development Project (IRDP) to rehabilitate the government fish farm at Fiyongoli and to assist extension. The department has also received money from FINNIDA, via ALCOM, as well as from the Dutch Development Organisation (SNV) for assistance to a fish stock assessment survey in Lakes Mweru and Bangweulu. Around Lake Bangweulu a project financed by the World Wildlife Fund aims to conserve and promote sustainable use of the wetlands natural resources.

Money was allocated from FINNIDA to support fish culture development in Chibote area, Kawambwa district. This allocation involved the construction of a staff house at Chibote, the provision of a motor bike for the fish scout, the construction of demonstration ponds, and assistance to training contact farmers. With this financial back-up, DoF was to supply the fish scout, and ALCOM the technical and logistical support. What actually happened with extension activities in Chibote are documented in chapter eight. FINNIDA later, again through DoF with technical support from ALCOM, funded a series of training courses, and the production of an extension pamphlet in ciBemba. This pamphlet was a translation of one which had earlier been developed by ALCOM and DoF in the course of a pilot project in Eastern province. The pamphlet was originally produced in Nyanja and ALCOM arranged translation into ciBemba. No money was available however, for the printing of the pamphlet for a wider audience, which is why FINNIDA money was used.

ALCOM itself was in a less clear role as a donor. The pilot project appeared as a donor-financed operation, with stated objectives concerned with fish production. At the same time, the project provided only a vehicle for its own use and staff time over which DoF had no control. Simultaneously, DoF was to allocate its staff to ALCOM, the benefits of which were not initially apparent.

Furthermore, ideas about suitable target groups for development activities (in this case meaning participants rather than necessarily indirect beneficiaries), did not converge. ALCOM's focus has been on the fish farming activities of small scale, mainly self provisioning farmers. Richer, semi-commercial or more intensive fish farmers, particularly those with an urban base, were not such appropriate subjects for development assistance. DoF's stated target group is all fish farmers in Luapula, without specification of size or nature of the operation. Lying behind this policy statement is a view that assistance and extension advice should be given to "knowledgeable and progressive

people" - who might then be able to supply the rest. This approach is in accordance with overall departmental objectives, in that it centres on the possibilities for overall increased fish production. It is not in accordance with ALCOM philosophy - at least not as it first appeared in Luapula. Without commenting at this stage on the justification of either view, it is worth noting their divergence. The tendency has been noted elsewhere; Crehan and von Oppong (1988) describe a development project in North Western Zambia. They quote an angry politician:

"You promote *small-scale* farmers, *small-scale* equipment, *small-scale* industries...small! small! small! You have grown big and you want to keep us small! Worse than the colonialists!" (quoted in Crehan and von Oppong 1988;p.126)

Parallels can be drawn with the feelings generated by ALCOM. From the point of view of DoF, the project entered with potential clout (which was not translated into tangible gifts), but with too many pre-conceived ideas. Practically, DoF, as is the case with other government departments, is forced to rely on donor assistance to carry out its plan of work. Where objectives do not coincide, this can appear a very mixed blessing.

Capacity: infrastructure and personnel

There are two government owned fish farms in Luapula. Fiyongoli, near Mansa, was constructed in 1952 and Mwenda in Mwense district was constructed in 1972. By the late 1980s, both fish farms were in a state of disrepair (ALCOM 1989). Fiyongoli fish farm has 20 ponds covering 3.4 hectares. Of these, 11 were stocked in April 1988. The remainder were unstocked, and two were abandoned. In 1989, 12 people were employed at the farm: an aquaculturist, three fish scouts, two pond operators, one night guard, four labourers and one driver.

In 1988, IRDP agreed to finance the rehabilitation of Fiyongoli fish farm and to assist with the distribution of fingerlings. In 1990, some of the work had been undertaken, but numerous technical problems with the fish farm remained. DoF reports that during 1991, 31,870 fingerlings were distributed to 76 fish farmers (IRDP 1991). Nevertheless, several of the ponds still suffer from water shortage problems, partly because (it is reported), people from the nearby village diverted the water from the dam for their own purposes. In October 1992, the main breeding ponds were completely dry and fingerlings were "rescued" to nearby private semi-commercial fish farms.

The department owns only one vehicle. This is based in Mansa and is occasionally used for fish culture use. It also has to serve the needs of the fisheries sector. In addition to this, the fish scout in Chibote has a motorbike, funded by (FINNIDA), and other fish scouts have bicycles in various states of repair. None of the fish scouts have equipment such as nets or buckets.

The DoF in Luapula is headed by a Provincial Fisheries Development Officer (PFDO), based in Mansa. He is responsible for the coordination of DoF activities throughout the province, and reports to DoF headquarters at Chilanga. DoF personnel are allocated to both capture fisheries and aquaculture. The PFDO does not however, have control over staff allocations which are determined largely by who is supplied via

Chilanga. The PFDO can then decide where to allocate people and whether it is to fisheries or aquaculture. The composition of staff is regularly changing because of transfers, death and retirement. Since the change of government in 1991, the policy of "pruning" in the government sector has meant that vacant posts are not filled.

The department has a clearly established hierarchy. Below the PFDO is a Provincial Fish Culturist, followed by fisheries assistants, fish scouts and various ancillary workers. The distinction between fish scouts and fisheries assistants is based on initial educational level before training and does not reflect progression within the department. The distinction does not operate in practice and was officially abandoned during 1992. In March 1992, there were two fisheries assistants and one fish scout based at Fiyongoli fish farm. Fish scouts were also posted in Chibote (Kawambwa district), in Kawambwa district, at Mwenda fish farm, in Chembe, and in Nchelenge and Samfya. The latter two postings also took responsibility for capture fisheries. In the department as a whole, there were 39 fish scouts, the remainder of whom were entirely occupied with capture fisheries

DoF as a fingerling supplier

In chapter four, the question of fingerling supply was discussed in relation to trade off between government supply and the development of a private market. It was suggested that the belief among farmers and extensionists that DoF should supply fingerlings has inhibited the development of a private market in some areas. Nevertheless, the department is, practically, not in a position to fill the gap.

A number of options are open to the fisheries department regarding fingerling supply. Production and distribution from Fiyongoli and Mwenda fish farms could be improved in order to meet the expressed demand. This would take the form of either supplying directly to fish farmers, or supplying village/community hatcheries. Alternatively, the department could withdraw from fingerling production activities to concentrate on extension, thus allowing the further development of a private market.

The first option has both immediate practical and long-term strategic problems. Fiyongoli fish farm itself requires substantial rehabilitation. Since IRDP has now ended support to Luapula, any further rehabilitation of Fiyongoli would require support from another donor. Even if the fish farm was able to supply the provincial need for fingerlings, a more significant problem remains; that of distribution, both how and to whom. The lack of departmental transport means that the majority of fingerlings supplied from Fiyongoli have gone to those farmers who are in a position to supply their own transport (especially a semi-commercial farmer near Mansa). This ability is no indication of likelihood of sustainable fish production. As the fingerlings are sold at a heavily subsidised price, such a tendency could only be justified on the basis of future supply of fingerlings to other farmers or beneficial labour market, fish production, or income generating effects within the province. No evidence of such effects has yet been found.

Where DoF has transported fingerlings to more distant farmers, they have been at a subsidised price. The development of a private market has been inhibited partly because of this price differential and partly because of the entrenchment of the view that fingerlings from the government somehow produce "better" fish. At present the private market for fingerlings is limited by this factor. If the government role of fingerling supply were removed in theory as well as in practice, farmers would be more likely to take advantage of existing stocks. It is not clear that currently existing stocks are sufficient in all areas where fingerlings are needed. This contributes to high prices and low stocking densities. However, given the breeding speed of tilapia, such a situation will not last.

The option of government supply to village hatcheries appears to cover the middle ground between the complete unleashing of market forces and unsustainable government intervention. Problems remain in bringing the theory into operation. Village hatcheries have been constructed (or at least started) in the province - in Lukola in Mansa district and in Monga. In Kawambwa, the fish scout has drawn up plans for the construction of five hatcheries, but they have not had departmental support yet. It is thus too early to predict how such village hatcheries will work; only the one in Chibote has even been stocked. A number of factors will be important determinants. The two most critical are: The real level of demand (in Monga, it is unlikely that the community hatchery will ever be finished, partly because there are now sufficient numbers of fingerlings available

privately); the location and control of the hatchery (in Lukola, the hatchery constructed is on the land of the most "progressive" fish farmers in the area, which itself is some 4km from the main village)

Credit provision

The department of fisheries does not provide credit for fish farming. However the Lima Bank has provided loans and in Monga, the Ministry of Youth and Sports gave two grants totalling 13000 kwacha to the fish farming club. In Kawambwa, the Lima Bank has been reluctant to give loans to fish farming following the non-payment of a 30,000 kwacha loan to a local semi-commercial farmer. He constructed 12 fish ponds using bulldozers, but the water supply was inadequate and the loan did not stretch to the diversion of the Kawambwa stream. In 1992, all but two were completely dry. In Mansa, the Lima Bank loaned 50,000 kwacha to another semi-commercial fish farmer. In 1992, he had cleared the interest (38,000 kwacha), but had still not repaid the capital.

In late 1992, a decision was made by the Ministry of Youth and Sports to allocate loans amounting to as much as 200,000 kwacha per individual in the Monga area. Visitors from Lusaka had been impressed by the rapid spread of fish farming, by the obvious effort which had gone into pond digging. It was agreed that initially eight loans should be given to the "best" farmers. Among farmers, particularly those who have been used to receiving credit for other activities (usually maize growing), requests for loans are plentiful (see chapter three).

Given that the provision of credit is more likely to constitute a grant than a loan in current circumstances, the procedures for the disbursement of such credit require examination. Lima Bank loans require that the applicant has title deeds to land. The process of getting title deeds is fairly complex and involves both the expenditure of money and sending forms to Lusaka. Very few farmers know these procedures and the tiny number of farmers who do have title deeds tend to have urban political as well as educational advantages. They are often people who have been involved in politics at a district or provincial level while maintaining connections to the home village. They understand and have better access to the mechanisms for getting title deeds³ No other requirements are specified.

The loans given by the Ministry of Youth and Sports only require a guarantor (who is a husband or father in the case of a woman, but anybody in the case of a man). However, no measures are taken to ensure that loans are not solely taken advantage of by the already experienced loan applicants. Application forms are written in English and refer to "facilities available to the proposed business: telephone, transport, electricity, offices". In general, the equation of credit with modernity is perpetuated. Thus in Monga, the eight loan applicants included all of the executive of the fish farming club. There were of course no female applicants (none attended the meeting at which forms were distributed).

Fish scouts: perceptions and priorities

Training and background

The fish scouts vary in pre-training educational achievement. The younger ones (five of the scouts are younger than thirty), came to DoF after achieving at least grade 10 at school. They all attended at least the one year course in Kasaka, near Kafue. This course was not, however, specifically concerned with aquaculture. The scouts estimate that no more than four weeks of the course was devoted to fish farming. A large proportion of the course was concerned with capture fisheries, because, in entering DoF, it is not specified whether new recruits will be posted to fisheries or aquaculture.

Three of the fish scouts are nearing retirement age. Their training history has been a mixed combination of short courses and refreshers, some concerned with aquaculture, some with capture fisheries. The older scouts all have a lower level of pre-training education than the younger ones (no more than primary in one case). Though a number of the fish scouts have attended training and seminars concerned with extension, none claimed to have ever learned specifically about aquaculture extension.

Because of the departmental policy of posting people to different parts of the country as and when they are required, not all of the fish scouts speak ciBemba as a first language. Indeed three had serious difficulties communicating in ciBemba and prefer to use English or their mother tongue. Only two of the eight fish scouts concerned with aquaculture come originally from Luapula Province. Both of these are nearing retirement.

Perceptions and priorities.

The following comments are based on discussions over the space of several months with fish scouts based in Mansa, Kawambwa, and Chibote.

Views concerning the potential and constraints of aquaculture development (and capacity to have any impact on it) depend on personal characteristics, training and position within the departmental hierarchy. The fish scouts are at the bottom of the hierarchy. They are at the same time, theoretically the main point of contact between the department and farmers.

Most fish scouts express a feeling of powerlessness in relation to their superiors and ability to make changes within their jobs. Following training, choice of posting is up to DoF, though scouts may state a preference. Similarly, the decision concerning whether they will be involved in fish culture or capture fisheries is only partially influenced by their own preferences. The training ensures that fish scouts should be able to take on any aspects of DoF work.

On arrival, the scouts are not provided with clear job descriptions. What is actually done is determined by a combination of the scout's individual motivations and the limitations imposed by availability of equipment and transport. Thus the three fish scouts/assistants located at Fiyongoli fish farm say they thought they were to be doing extension, but possibilities for this are limited to when a vehicle is available. As a result, they respond to farmers who actually call at the fish farm for fingerlings, but mostly stay

at Fiyongoli. The situation is rather different for the three, older fish scouts, posted away from the provincial capital. Their terms of reference are clearly centred on providing extension to farmers. The problems for them are also those of lack of equipment, though neglect and isolation from headquarters are also a source of dissatisfaction.

The attainment of a post as fish scout means (or until recently has meant⁴), a high level of job security. Once within the department, people tend to stay there for the whole of their working life. This job security is however, accompanied by few prospects for promotion. The only way to get promotion is to undergo further training, preferably abroad. Opportunities for such further training are seldom presented to fish scouts.

Limited promotion prospects and impermanence of postings, make other possible benefits of the job more significant: housing, a regular salary, allowances, and (possibly) job satisfaction. All scouts complain about their conditions of employment. Salaries are paid, but are too low, housing is provided but is sub-standard (they would be financially much better off receiving housing allowances), and allowances are seldom paid on time. Allowances for staying overnight on field work or lunch allowances, may constitute a critical part of the fish scout's income. In September 1992, when the basic monthly salary was in the region of 7,000k, lunch allowance for one day was 1,000k. At a seminar for fish scouts organised through ALCOM in 1992, many of the scouts threatened to leave when they discovered that they were not to be paid allowances as food and lodgings were already provided. They felt they had been misled and complained that they would not have come if the situation had been clearer. These sort of incidents are common in any context where government salaries are insufficient, and allowances become the mainstay of income.

During this particular incident, the organisers expressed disappointment that the scouts were not attending the seminar for the sake of improving their skills within their jobs or even articulating problems related to those jobs. It was agreed that this motivation reflects the scouts' generally poor views of their own capabilities to initiate change. This does not mean however, that the scouts are all apathetic and unconcerned about the substance of their jobs. Their perceptions of fish farmers, and their own roles in relation to them are therefore important.

These perceptions are shaped by peer "knowledge" and by experience. All fish scouts saw themselves in the position of imparting knowledge to farmers (even those scouts who in practice were not able to take part in extension). The scouts were unanimous in the belief that a fish farmer would only be "unsuccessful" if he/she was lazy: "Some people just do not want to listen to our advice". The scouts also emphasise that farmers are dependent on them for assistance. A principal aspect of this is the belief that DoF should be responsible for the transportation of fingerlings to farmers. This view of farmer dependency is the result of both national departmental policy which stresses fingerling supply, and the scouts' response to the demands of farmers which of course perpetuate the cycle. Farmers learn to expect that DoF should supply fingerlings, DoF attempts to do so (inadequately), farmers continue to expect. Signs of the development of a private market for fingerlings in several parts of the province indicate that supply from Fiyongoli is perhaps not essential for the sustainable development of fish farming.

Fish scouts are also eager on occasion to draw attention to the "unsystematic" or "unscientific" nature of rural fish farms, but not always in a way that would make sense to the farmers. A farmer was corrected for having uneven shaped ponds, not for any reason associated with difficulties in harvesting such ponds but because: "it is hard for us to measure your ponds". Educationally, fish scouts are not of a significantly higher standard than many of the farmers with whom they deal. Despite this (or perhaps because of it), the scouts are generally concerned to find ways to assert their difference. A stress on "correct" systems and approaches is one means for doing this. There are undoubtedly significant gaps in farmers' knowledge about the rudiments of fish culture. On the other hand, it is easy for the scouts to mystify the technology, so that farmers' are less inclined to believe that they can do it without assistance.

As far as scouts are concerned, the exception to the rule that anybody can be a fish farmer if they work hard enough is the prevailing view concerning women as fish farmers. Without exception, fish scouts adhere to the view that women's "inferior status" and "powerlessness" in Luapulan society are responsible for the fact that very few women adopt fish farming, and that those who do have unproductive, badly maintained ponds. This view prevails regardless of the sex of the fish scout (it was equally strongly maintained by the one female fisheries assistant). As seen in previous sections, gender relations are more complex than this in Luapula (as anywhere); the relative social positions, decision making capacities, and control over resources of men and women are negotiated. They vary by age, marital status, and education. At the same time, there is an element of truth in the view. As with other new technologies it is assumed, both within rural communities and outside, that men will be early adopters. At no point in the training of the fish scouts is there an element in the course dealing with gender issues. Such consideration as does exist is limited to the question above, asking why women do not dig fish ponds.

The fish scouts have a fairly restricted view of the potential of fish farming. They do not see it as a major income generator for farmers, or as a likely improver of provincial fish production. Rather, they recognise the potential of fish farming as a useful diversification for some people - as an addition to or complement to existing food and income generating activities.

All of the fish scouts were slightly bemused about ALCOM's role in the province. Because the pilot project was not a "project" as normally understood (something bringing tangible goods such as transport, with its own clearly defined objectives), the reason for the programme's presence was unclear. Most scouts believed the project to be for "research", particularly during its early stages (see below).

Links with Agriculture in Luapula

Although at a national level, there have been attempts to institutionalise links with the Department of Agriculture, this is still poorly developed in Luapula. In 1990, there were 128 agricultural assistants in Luapula, distributed roughly evenly throughout the province. Agricultural extension in the province has been supported through a FINNIDA-funded Agricultural Extension and Training Project (AETP) in two districts and the IFAD's Smallholder Services Rehabilitation Project (SSRP) in the remaining three districts. The DoA is highly dependent on the assistance from these projects as illustrated in the 1990 Annual Report under the heading "staff morale":

Morale among personnel under the Department was fairly high particularly in Mwense, Nchelenge and Samya where the T&V system of agricultural extension is being implemented under the support of the IFAD project (SSRP). In Kawambwa and Mansa, morale of staff fluctuated depending on available incentives during the season" (GRZ 1990; p.16)

In 1992, FINNIDA withdrew the bulk of its support to Luapula province. The effects of this as far as agricultural extension are concerned have not been assessed but it can be safely predicted that DoA is likely to undergo the same retrenchment as other government departments. IFAD's support is due to terminate in 1996, after eight years.

Although agricultural assistants are posted throughout the province, few have any knowledge about techniques in aquaculture. DoF expresses a willingness to train agricultural assistants in the rudiments of fish culture. Indeed agricultural assistants are invariably invited to attend DoF farmer training sessions. However, any formal and regular training of agricultural assistants would of course require financial support which is not currently available.

ARPT in Luapula

The Adaptive Research Planning Team (ARPT) is a Department of Agriculture research and development team, principally concerned with conducting farming systems research and extension with farmers. The central research station of ARPT in Luapula is located about 10km from Mansa. Research and extension activities are carried out with farmers in Mabumba, Mansa district, Makunta, Nchelenge district, and Mabu area, Samfya district.

As part of trials on dambo utilisation, and in collaboration with ALCOM and DoF, ARPT constructed a trial pond of 180 sqm during 1989. This pond and associated vegetable garden is shown to farmers during semi-annual field days. Cropping takes place during the field days. A cropping during 1990 revealed a 38% survival rate of fish. Poor survival was caused by mortality after stocking, predation, theft, and poisoning by acacia leaves.

6.3 CONCLUSION

Despite official commitment to aquaculture, the department of fisheries is as constrained as others in Zambia by its dependency on external assistance. This dependency partially results in donors being able to dictate the means and direction of aquaculture development.

As a major supplier of fish to the rest of Zambia, DoF in Luapula has priorities relating largely to capture fisheries. The majority of departmental personnel are trained in fisheries, and though experience in extension is growing, there could not be said to be a functioning extension system. Personnel and material constraints are significant. The frontline extension workers, the fish scouts, suffer from both limited training and poor personal incentives. They also do not have the basic means with which to carry out their rather ill-defined jobs. Given increased cut-backs in government spending, the options are of either of constantly reducing planned activities or of increasing reliance on international donors. This increased reliance carries with it the trade-off that the nature of departmental work must adapt to the priorities of donors.

In the following chapter, these priorities and rationales are elaborated.

Notes

1. Major projects which have included a component of fish culture station rehabilitation are the NORAD supported project in Northern province, and the FAO National Fish Culture Project through which ponds at Chilanga were rehabilitated.

2. In 1992 and 1993, there was no closed season, a governmental policy which members of the provincial fisheries department felt to be seriously misguided, given its likelihood to encourage overfishing when fish were breeding.

3. Of the three farmers in Monga area known to have title deeds, all three had strong political connections; one had had a brother who was provincial secretary, the other two had both been ward chairmen.

4. Job security within government departments is considerably reduced following measures introduced by the new government during 1992. The "pruning" policy has included redundancies among older members of departments, especially those who have been in the service for more than 25 years.

CHAPTER SEVEN:

THE PROMOTION OF FISH CULTURE

7.1 Historical perspectives

The potential for integrating fish farming with other aspects of the farming system in Luapula was already being voiced almost fifty years ago.

Mon July 1st. I reached Kawambwa at 17.30 and rested in the DCs garden until he arrived at dusk. His name is Thompson and he made me welcome. We had a long talk about the possibilities of fish farming. He is an expert on proteins and commented on the possibility of supplying a balanced diet as follows. A combination of fish farm, taking rice crops every few years in turn from each pond and using the waste water for irrigating terraced citrus groves. (Hickling 1946, p.122)

It was considered that demonstration fish farms could undertake research on technical aspects of fish farming, produce table fish, and serve as examples for rural fish farmers. Recommendations suggest that fish ponds should be managed by "peasant cooperatives" under supervision from fisheries officers. Though a number of demonstration fish farms were built, including the one at Fiyongoli near Mansa, and the number of rural fish ponds expanded, there is no evidence of the development of peasant fish farming cooperatives.

Unfortunately, records of the nature of attempts to extend the technology beyond the demonstration farms do not exist. However, because these early schemes for fish farming fell under the Commonwealth Development and Welfare Act (CDWA), certain suggestions can be made. It seems likely that fish farming extension faced much the same problems of other, better documented schemes. The CDWA was championed through the British parliament by Labour MPs in 1945. These MPs, mostly members of the Fabian Colonial Bureau, had the rather contradictory objective of employing a progressive socialist approach to a colonial regime. Under the CDWA, £120,000,000 was allocated to development schemes -a 250% increase over the 1940 allocation. These schemes were influenced by a conviction that "development" of impoverished and backward Africans could only take place through their practical involvement in cooperatives and unions, under the supervision of colonial officers. The rural development schemes envisioned under the CWDA were undermined through a combination of irrelevance to the rural population, the inefficiency and poor motivation of colonial officers, and settler opposition to investment in African agriculture.

The available evidence is too scant to state conclusively the reasons for the apparent early failure of fish farming to establish itself in Luapula, or even to be sure to what extent it did not become established. Although by far the majority of ponds in Luapula have been built since 1987, a few isolated examples of farmers who had

constructed fish ponds as far back as the early 1960s indicate that there was some response to early promotion. The evidence that does exist concerns the development (or lack of it) of more measurable achievements, such as the work at Fiyongoli. Here, the picture is familiar. On the one hand, a number of research scientists were keen to see aquaculture working at a technical level. On the other, there was little idea of how, or when, this might be done by rural farmers (who nonetheless remained the principal justification). Meanwhile, the practical ability of those charged to actually carry out the work, was circumscribed by both their own motivations and a range of physical constraints.

The fish farm at Fiyongoli ran into management problems from the beginning. By 1956, the farm had still not been used for research, most of the ponds were unstocked, and it was reported that the (expatriate) farm supervisor was unsatisfactory (Hickling 1956). The farm also suffered from the same "natural" problems that are complained about in the 1990s. In 1958, the farm experienced severe water shortage and suffered heavy predation from otters and cormorants. A series of experiments suffered in consequence of having to be repeated (UK Colonial Office 1958). In 1960, research was being carried out, but the majority of the ponds were still unstocked. Nevertheless, the farm managers had plans to extend the farm into a mixed farm with sheep and pigs, despite an acknowledgement that all fisheries workers were overworked and were unable to give much time to Fiyongoli.

Meanwhile, the early promoters of fish farming were becoming more pessimistic:

The impression persists among those without experience that fish in some wonderful fashion can grow on their own, without any trouble. This is not the case. Fish, as with any other form of grown produce, must have the wherewithal to grow and can no more flourish without the proper conditions and attention than livestock, plants, or poultry (Northern Rhodesia Government, 1951)

7.2 ALCOM, HEADQUARTERS

Principal donor support to aquaculture in Luapula since the late 1980s has come from Aquaculture for Local Community Development (ALCOM). The Luapula pilot project was one among a range of activities carried out by the programme throughout the SADC region.

ALCOM was initially formulated to:

Elaborate effective strategies, policies and methodologies for assisting rural people in improving their quality of life through the development of aquaculture either in conjunction with land-based farming or as an alternative to fishing (FAO 1986).

The programme was developed partially in response to a conclusion in the Thematic Evaluation of Aquaculture which suggested that limited sustained impact of fish culture projects was due to a lack of understanding of the socio-cultural and socio-economic motivations behind small scale farmers decisions to adopt fish culture. ALCOM publications all stress the importance of adopting a "participatory" and "people centred" approach to fish culture development, and learning from the mistakes made by earlier "top down" models of technology transfer.

Initially the programme was funded by SIDA and executed by FAO. Subsequently additional financial support has been forthcoming from other donors: Belgium, Norway, Japan. The 1993 workplan was based on an anticipated budget of US\$ 900,000 core funding from Sweden and US\$ 425,000 Belgian funding for a sub-project on the Utilization of Small Water Bodies.

The programme was established in 1986 in Lusaka. A preparatory phase ran from this time until October 1990. Although initial activities were limited to a series of studies, the establishment of pilot projects, and the analysis of the findings from such activities, other pressures led to a diversification of activities. Through the steering committee, other SADC countries became more actively involved, leading to requests for activities taking the needs of all these countries into consideration. According to an evaluation undertaken by SIDA consultants, there existed a possible inconsistency of goals between the donor countries, who saw ALCOM as principally a research and methodology development programme, and host governments who expected more tangible support for their existing infrastructure (SIDA 1989);

The donor, FAO, and the project must convince the recipients that this is indeed not a normal development project which may provide resources and other benefits in the near future, but a research programme whose tasks/objectives are chiefly to carry out research and experimental pilot activities (SIDA 1989;p.4)

It is noted that the original objective was modified and expanded to include the testing and subsequent dissemination of the methodology developed, perhaps in response to these concerns.

Following ALCOM's shift of headquarters to Harare, Zimbabwe, there was an

enormous expansion of staff and pilot activities. The most significant cause of the expansion was the increase in Associate Professional Officers (APOs) joining the programme. The APO scheme aims to give "young professionals" training and work experience in various aspects of international development. Their direct cost to ALCOM is limited to allowances and operational expenses, while salary costs are met by the APO's country of origin. APOs have come from a diverse range of backgrounds; aquaculture and biology, economics, socio-economics, anthropology, nutrition, ecological sciences. In late 1992, there were six APOs based in Harare, and a further five posted to pilot projects throughout the region.

The expansion of staff numbers created problems of deployment, especially for APOs based in Harare. Each has a workplan within their own area of expertise. These have included studies and visits to pilot projects. Each APO is supervised by a relevant senior staff member, all of whom are based in Harare. Nonetheless, APOs express doubts about the usefulness of all of their activities, for as long as these remain desk studies in Harare.

Those who are posted individually to pilot projects have the effective freedom to make of the pilot project whatever they are inclined towards. A monthly and quarterly reporting procedure is closely followed and outposted APOs attend the six-monthly meeting at headquarters. But the day to day running of project activities is obviously beyond the control of supervisors. In this situation, some APOs will find themselves isolated and lacking guidance, while others will get on with their own interpretation of their workplan.

APOs are on contracts of two years, renewable to as much as four years, but more frequently they will shift to another FAO project at the end of the first two years. This inevitably makes for a lack of continuity and consistency within pilot projects, as will be seen in the case of the Luapula pilot project.

In 1990-92, ALCOM organised its activities by "target areas" of which there were nine:

1. Aquaculture and farming systems
2. Utilization of small water bodies
3. Environmental aspects of aquaculture
4. Extension/training methods
5. Aquaculture and human nutrition
6. Gender in aquaculture development
7. Development support
8. Information services
9. Management/administration.

Within each target area there were one or more pilot projects, making a total of sixteen. In target area one there were five pilot projects including Aquaculture and Integrated Rural Development, Luapula Province, Zambia (AIR/LPZ). Of the pilot projects, only four (Luapula and Eastern Provinces, Zambia, Mozambique, and Angola) were directly concerned with aquaculture extension. The latter two had objectives of training technicians rather than direct involvement with rural communities. The remainder

of the pilot projects have comprised research and "methodology development".

The evaluation at the end of ALCOM's preparatory phase had expressed the concern that host governments were becoming disenchanted with a failure in the programme to "come up with the goods". With the expansion of ALCOM, this concern has increasingly been voiced, both within and outside the programme. A 1992 article in ALCOM News addressed the problem in terms of a question: "When do you start the action?" (ALCOM 1992). An enormous amount of information has been collected, but there has been no formalisation of how it might be used - or by whom, assuming the programme was not going to support major extension programmes. For people who were concerned that support to aquaculture should ultimately result in the production of fish, money and effort spent did not apparently match up to outcomes.

The programme's aims and plans for action continue to be reformulated to adjust to new information, new perspectives and demands. This can be viewed positively: ALCOM illustrates an ability to take an iterative approach, to avoid being constrained by earlier assessments of needs and correct approaches for aquaculture development. Thus, at a recent meeting to establish a working group on the future of ALCOM, the earlier focus on methods development with small farmers shifted somewhat. It was felt that if aquaculture was to make an impact on the standard of living among producers, it should be upgraded from subsistence to semi-commercial levels. This is a far cry from the early objectives, which centred very much on small holder production. It reflects a trend among governments in the region to shift towards more market oriented policies.

On the other hand, it is possible that the iterative approach represents less of a response to new information or ideas, and more of a reflex to the programme's own rapid expansion, especially of personnel. Simultaneously, the programme illustrates a tendency to respond as much to the demands of its sponsors, the donor community, as to those of the farmers. A key area in which this has taken place, and one which deserves special attention is the treatment of gender issues within the programme.

ALCOM and the gender agenda

In ALCOM's initial preparatory phase, "women and youth" was identified as a separate target area. No specific budget was allocated "...as ALCOM has always stressed the need for a multi-disciplinary approach" (ALCOM 1991a, p.77). The aim of this target area was, through literature and studies, to identify options and activities to be included in project activities. Among general desk studies, research was commissioned to explore gender issues in fish farming in Chibote area, Luapula Province (Mbozi 1991). In December 1990, ALCOM sponsored a workshop on Gender Issues in Fisheries and Aquaculture Development (ALCOM 1991a).

At the 1990 workshop, a principal recommendation was that information must be made available on gender concerns before policies are made and projects planned and implemented (ALCOM 1991a). In response to this call for the disaggregation of data ALCOM, with funding from Japan, commissioned field and desk studies on "women" in Tanzania, Zambia (Luapula province) and Zimbabwe. These studies were not undertaken

in the context of project activities. The Luapula study, for example, was concerned with lake fisheries. Little guidance was available from Harare about what the studies might be used for. There is no evidence that as yet they have been used for anything at all.

Meanwhile, other activities have been undertaken. An issue of ALCOM News was devoted to women and fish farming in Luapula Province. In this issue, a photo-essay describes the roles of women as fish farmers and the wives of fish farmers. The essay was based on a four day tour to Luapula by the ALCOM information officer.

Fish farming hasn't ushered in a blue revolution. It has in fact meant a dawn-to-midnight grind for some rural women. But it has given them another income alternative. It has stimulated an upbeat spirit in them, a new hope for tomorrow (ALCOM 1992, p.9)

This document was intended to fulfill a publicity role for ALCOM. It provides a response to those who question the tangible benefits of fish farming, and express concern that it is so manifestly a technology taken up primarily by men. The results of the study of gender issues in fish farming are summarized (Mbozi 1991). The problems faced by women in terms of access to land, labour, equipment and knowledge are elaborated. But this summary of the study is overshadowed by the more positive and optimistic stories in which, with ALCOM's help, women become happy fish farmers. The emphasis is on "family harmony in fish farming".

The essay is, however, a mixture of simplification and outright fictions. These arise from a combination of wishful thinking, misinformation, and journalistic licence. ALCOM News needs to present a positive picture, and there is neither the time nor the inclination to check the validity of the stories which are relayed. For example, an account of one exemplary fish farming couple in Chibote is elaborated. The number of ponds owned is exaggerated by nine, from two to eleven¹. The complexity of the intra-household division of labour is simplified to: ' "my wife helps me with everything" says Stanislaus proudly' (ibid,p.8).

Pictures of women smiling and happily holding huge fish do not mention that these fish were purchased for the purpose of the photo².

The effects of such promotional activity should not be underestimated. For those who are to be satisfied that this is gender (read women)-friendly development, the essay meets certain needs, without challenging the rest of ALCOM's work. Equally importantly, the effects among the villagers are significant. Few read ALCOM News (a few copies have made it to Monga via the ALCOM aquaculturist). But within the villages, the message about The Project's concern with women comes through loud and clear. Hence the eagerness following the ALCOM visit to form even more women's clubs.

The most recent ALCOM contribution to gender sensitivity (also funded by Japan) is a set of guidelines for "meeting information needs on gender issues in inland fisheries, small water bodies and aquaculture" (ALCOM 1993). These were drafted by ALCOM personnel and consultants and reviewed at a meeting in Harare. It is intended that the guidelines should be used by planners in both the SADC region and elsewhere. They are

aimed to be useful for sectoral planning, project formulation, evaluation and monitoring concerning gender issues in fisheries and aquaculture.

The guidelines begin from the premise that there has been little change in sectoral planning regarding gender issues because there is insufficient information available on such issues and planners are not certain where or how to obtain such information. This premise is never justified and apparently belied by the bulk of the text which makes regular generalisations regarding both men and women. For example:

Since women do not have secure access to or control over land... (ibid, p.6 emphasis added)

Sexual division of labour in most households is clear (ibid p.14)

The text does not attempt to address other reasons causing planners to fail to consider gender issues, particularly those associated with motivation. Neither does it explain why and under what conditions issues of gender may be important.

Section two illustrated that in the context of Luapula, aquaculture plays a marginal role in most people's lives and that questions relating to gender-specific control over resources, especially within the household, are not currently critical. This is not to say that with greater intensity of fish farming, issues of control over land, or of women's and men's time allocation, will not become important. Furthermore, the promotion of aquaculture has tended to foster an association, within the minds of both rural people and extensionists, of fish farming with "development" - and with men.

The conclusions from the Victoria Falls meeting included the statement there is a tendency in fisheries and aquaculture development to assume that women are a homogeneous group which can be isolated and acted upon (ALCOM 1991). This was acknowledged to have been caused by pressure from donors to include a "women's component" in projects. Nevertheless, the gender target area appears at the margins of ALCOM's plan of work. Activities are undertaken, but they are mostly reducible to questions of "women" as a homogeneous group, rather than any integrated assessment of how - or whether - gender relations are relevant in aquaculture development. Beyond the "women" activities, the rest of the programme can carry on regardless.

ALCOM and its "target groups"

The role of ALCOM - whether it should be principally concerned with extension support, with institution strengthening, or with information exchange - is continually being re-assessed in Harare. A repeated area of concern has been how the programme identifies and addresses its "target groups". Confusion has arisen partly because of a lack of clarity about what the programme means by a target group. In addition, there have been differences in opinion about the degree of specification that should accompany target group identification.

A session during one of the six-monthly staff seminars attempted to identify and make sense of the various different approaches to target groups encapsulated within the programme. Each of the pilot project documents has a slightly different definition of who the intended target group is, largely because of a lack of clarity over whether target groups are participants in the development process or beneficiaries, or a combination of the two.

For example, youth are defined as a target group, partially on the basis that they are expected to be in a better position to adopt aquaculture (physical strength, willingness to take risks). As a result, aquaculture production through their activity will supposedly, be greater. However, there is no reason to assume that such people are particularly in need of the potential nutritional or financial gains from fish farming. Women, on the other hand, are also specified as a target group from an entirely different perspective. The sub-text in identifying them as a target group concerns their supposed need (and that of their children) for protein, increased income and so on. In this sense, women are a target group as beneficiaries, though it is unclear whether that also means they should be participants.

In response to these confusions around target groups, ALCOM has made attempts to streamline and clarify definitions. This has the effect of raising again the question of whether the programme should be directly involved in extension activities - and of how to turn the results of all the studies into something tangible. Obviously, concern with specified groups within rural communities is rather meaningless if the mechanism through which they should be reached is unclear. This point emerged as particularly germane through discussion of the Luapula pilot project, which had, it appeared, overstepped the boundaries of methodology development, by moving more towards extension. In particular, concern was expressed about the extent to which ALCOM was funding (or rather not funding), the production of extension materials for use by farmers and fisheries departments. While a significant proportion of the budget was allocated to information in terms of ALCOM's self-publicity, including the production of a glossy sketch-book, conspicuously little was available for these extension materials. Debate centred about who the target population really were: small scale farmers or the donor community.

7.3 ALCOM AND THE LUAPULA PILOT PROJECT

Genesis and development

The generation and development of ALCOM's pilot project in Luapula were discussed at a synthesis meeting held in Harare in September 1992. An attempt was made to identify what exactly happened over the pilot project history and why, so as to be in a position to formulate the future of the project. The Luapula synthesis divided the project into three main phases: a pre-project formulation phase, phase one between October 1989 and March 1991 when the first two APOs were posted to the province, and phase two, since the posting of their replacement. The number of separate activities undertaken in a four year period amounted to twenty four, of which twelve were purely information collection activities. The remainder ranged from trials to training and extension activities (see appendix 6).

Phase one

The genesis of the pilot project is with visits made by ALCOM personnel to Luapula in 1987 and 1988. These, combined with preliminary results from the 1988 survey led to the conclusion that the province might be an ideal site in which to support aquaculture. There had been a rapid and apparently spontaneous spread of fish farming but various technical difficulties were already emerging: fish production was low in relation to surface area and fish pond management was not at optimal levels. At the same time, the IRDP was showing interest in aquaculture development, as was the Adaptive Research Planning Team (ARPT) and FINNIDA, so collaborative possibilities existed.

The objective of the project was to take advantage of an already-existing momentum, to improve rather than introduce fish farming. Specifically, the focus was on improved fish production and the resulting increased income and household food security. From the beginning it was stated that the project would be implemented by DoF with technical assistance from ALCOM. Thus, according to the original pilot project document, the roles of the participants in the pilot project were as follows:

- DoF: technical support, seed production, operating funds for support activities, policy, planning.
- Farmers: Farming ideas, on-farm inputs, fish production
- IRDP: Integrated planning, development funds.
- ALCOM: Technical support, development funds.

Furthermore:

The pilot project will exploit these roles in carrying out its activities such that the DoF and farmers' roles are strengthened and those of IRDP and ALCOM are absorbed by DoF. (ALCOM 1989).

The decision to send APOs to Luapula was taken in 1988. A formulation mission in 1989 drew up terms of reference for the two APOs, an aquaculturist and a socio-economist, who were eventually posted in October 1989. The terms of reference for the APOs centred on four main areas:

- 1) Strengthening of DoF. This component involved funding from IRDP for the rehabilitation of the government fish farm at Fiyongoli, the training of fish scouts, seed production, and extension with farmers
- 2) Development of improved techniques. This involved principally the carrying out of on-station and on-farm trials.
- 3) Developing extension strategies. By using research results, to develop and implement extension strategies.
- 4) Special studies. It was intended that these should cover such things as the potential for village hatcheries and the technical studies on relieving acidity.

Retrospectively (at the Harare synthesis), it was suggested that ALCOM's focus in this first phase was intended to be principally on (2). For this to be possible, it was necessary that the first component was operating: on-station trials for example could only be carried out if the ponds at Fiyongoli held water. ALCOM was relying on both IRDP support and commitment from DoF to make this happen. Ironically, all of the studies which had been carried out focused on characteristics of small scale fish farmers, their motivations and constraints. No assessment was made of the motivations, constraints and potentials of the supposed institutional partners in the development process. The project started in relation to an available body of knowledge, but not to the resources available in terms of staff, expertise, and money. In particular, the weaknesses in DoF were not taken into account. It was assumed that Fiyongoli fish farm would be up and running by September 1990. According to the ALCOM aquaculturist, in 1992 it was still not suitable for carrying out on-station trials due to water shortage.

The APOs posted to Mansa were supplied with a vehicle, an office at DoF, and these rather general terms of reference. IRDP were to pay for the rehabilitation of Fiyongoli, and FINNIDA agreed to fund extension activities in Chibote in Kawambwa district. DoF was also expected to supply a counterpart and allocate labour time to ALCOM-inspired activities.

The Chibote sub-project is described in chapter eight. Broadly, FINNIDA met its financial commitment, but problems in the disbursement of funds, and in the motivations of the scout who was posted, have never been surmounted. IRDP provided funds for the rehabilitation of Fiyongoli fish farm, transport for fingerling distribution, and local training courses for Fish Scouts and farmers. IRDP support was phased out with the ending of the programme in 1992. Again, it is not clear how much of the allocated money was actually spent or on what.

Most importantly, relations between DoF and ALCOM were strained. ALCOM's objective of methodology development did not fit happily with DoF constraints concerning personnel and infrastructure

The APO aquaculturist found himself in the position of having to organise a great number of practicalities, such as the housing of the scout at Chibote, and transporting materials to Fiyongoli. Other activities were undertaken, including training courses and trials. Some of the trials took place at Fiyongoli fish farm, others were initiated on farms in Monga. The trials were developed following the rapid rural appraisal, in which farmers problems concerning feeding and seasonal water shortages were identified. For example a



trial with the growing of sunhemp (crotolaria) to feed the fish was initiated. Three farmer training courses were undertaken in addition to the various extension visits to Monga and Chibote areas.

The APO socio-economist took part in a farming systems study which led to the identification of several female fish farmers in Chibote area. This was followed by the study of gender issues in fish farming (Mbozi 1991). Some confusion exists concerning the nature of follow-up activities. Within the village there is discussion about a "club which was promised but they never came back". In Mansa and Harare, there is no concrete evidence of any women's fish farming club being initiated.

No formal evaluation was made of this phase of the pilot project, certainly not in relation to any effects it might have had on rural aquaculture. It is evident however that the official statement that the project should be implemented by DoF with technical assistance from ALCOM is not reflected in the various participants' perceptions of their own roles. DoF was not in a position to implement a programme it had never requested in the first place, either in terms of personnel or equipment. ALCOM activity was seen as just that - ALCOM activity - rather than as technical support to DoF activities. The APOs were caught in the middle of the conflict between ALCOM and DoF objectives.

Phase two

In March 1991, the APO aquaculturist left Mansa (the socio-economist had gone in August 1990). The aquaculturist's replacement arrived in July 1991 (just at the start of this research project) and attempted to pick up the threads of the pilot project. Inevitably, because there was no possibility of a hand-over period, the early weeks of his posting involved an adjustment to the legacy of the previous phase.

At this stage, the initial terms of reference for the APO were broadly the same as they had been at the beginning. To a large extent, the development of the pilot project was dictated by the particular interests and motivations of the person concerned. He arrived to a situation with a history of conflict and tension between the various people involved. It was up to him to find means to resolve or by-pass the conflict. Though backstopping took place from Harare, it is impossible to exert much control from another country when communications are poor. The aquaculturist himself felt isolated from headquarters, but as a result, he also had enormous scope to develop his own agenda.

The second phase saw a shift in focus away from studies and trials, towards more systematic extension and monitoring. Most of this work centred on a few, more visible, farmers some of whom were apparently adopting recommendations regarding fish stocking and feeding. None of it was carried out with reference to any of the preceding studies, the majority of which are not even available in Mansa. The activities undertaken in phase two are elaborated in chapter eight. They included:

- The initiation of monitoring of fish farmer inputs/outputs using a logbook. This involved 30 fish farmers.
- Preparation of a slideshow on improved management
- Preparation of a manual on nutrition and aquaculture

- Extension visits to Chibote, Monga and Musungu areas
- Initiation of fish farmer exchanges to farmers in Chibote, Monga and Musungu
- Initiation of on-farm trials on all male and fish-cum-duck culture and stocking densities
- Manufacture of local harvesting gear using maize bags and grass mats.
- Mobile training courses for 300 farmers
- Agro-ecosystems mapping exercise.
- Initiation of rice-and-fish trials.

Of these activities, the nutrition work, the agro-ecosystems mapping, and the fish-and-rice trials were not initiated from within Luapula. The work on nutrition was part of a sub-project financed by NORAD and was carried out by a Zambian National Expert in association with ALCOM. The fish-and-rice trials and agro-ecosystems mapping were initiated from Harare and carried out by a Harare-based APO-agronomist.

In March 1992, a Zambian counterpart was posted to Mansa to work with the ALCOM aquaculturist. In the dry season of 1992, FINNIDA funding was secured to finance mobile fish farmer seminars and the production of extension material.

The second phase also saw a shift in focus towards providing better support and training to the extension workers. The fish farmer training courses were in themselves an opportunity for the fish scouts to modify their extension techniques and to work directly with farmers. In addition, opportunities were provided (again with FINNIDA funding) to send extensionists on study tours to other fish farming projects.

The fish scout seminar, mentioned in chapter six above, was also intended to be an occasion for increasing fish scouts' interest in and sense of personal control over their own posts. Fish scouts were asked to present papers on their views concerning constraints to fish farming and encouraged to use a problem-solving approach to addressing those problems. The difficulties arising from non payment of allowances have already been mentioned. In addition, the openness of the seminar was limited by the very clearly defined boundaries of expression of "inferiors" in relation to their "superiors". Notions of group decision making and problem-solving are alien in the context of hierarchical institutional structures such as DoF (in this case, ALCOM personnel were clearly associated with the top of the departmental hierarchy). From one point of view, it was repeatedly stressed (by their Departmental superiors) that fish scouts are not involved in planning, that their job is simply the collection of data and teaching farmers. On the other hand, the scouts themselves were unwilling to venture opinions on possibilities for improved aquaculture development other than those relating to the provision of items of equipment.

In early 1992, the pilot project document was reformulated to take into account these changes and some of the lessons learned from the previous phase. For example, the target group of the pilot project was re-specified. The overall target group (practising small-scale fish farmers) remained the same. They were, however, to be the indirect beneficiaries through services provided by DoF staff who were to be the direct beneficiaries of the pilot project.

The new pilot project document recommended to DoF that a second fish scout should be assigned to Chibote area, that the newly assigned counterpart should work closely with the APO aquaculturist, that funds should be allocated to operate the motorbike in Chibote after FINNIDA funding ended. ALCOM's responsibilities were to be limited to making available to DoF reports on all completed pilot project studies, to limit visitors to Luapula to those directly involved in the pilot project, and to carry out intermittent harvesting activities.

At the Luapula synthesis in Harare, there were criticisms of the lack of overall coordination and direction in the pilot project. Though it was conceived of as a collaborative effort, the different partners appeared unable to carry out their roles. As a result, ALCOM personnel felt they should take on other activities to make the project work. In response to this, ALCOM reformulated project objectives in Harare. It was agreed that the overall development objective of the project should be "increased income and household food security". The intermediate objective would be "increased fish pond production", and the immediate objective that of "DoF operationalising extension guidelines". The activities to be undertaken reflected an awareness of ALCOM's dependence on other donors for funding. They included the identification of funding to strengthen DoF extension services, the formulation of relevant extension packages, the training of extension agents in ALCOM extension guidelines, and the development and testing of indicators for monitoring fish farming.

All of this planning and reformulation is now irrelevant as it was decided that ALCOM's physical presence in Luapula would end with the termination of the aquaculturist's contract in April 1993. Like other APOs he decided to transfer to a different project. The removal of the aquaculturist also meant the removal of the vehicle, and presumably cessation of the activities initiated through ALCOM.

A national project on Improved Aquaculture Extension Services for Zambia is in the process of preparation by ALCOM staff in collaboration with DoF and the Department of Agriculture. The objective of this is to incorporate fish farming into the agricultural extension services in Central, Eastern and Luapula provinces. Main project staff will be based at DoF headquarters in Chilanga, near Lusaka.

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7.5 THE PROMOTION OF FISH CULTURE: CONCLUSIONS

Fish farming has been promoted in Zambia and Luapula since at least the 1940s. There are indications that early colonial attempts to introduce fish farming were hampered by similar problems to those faced by ALCOM: incomplete consideration of the capacity and inclination of the people on the ground to carry out the work, compounded by constraints such as drought, flooding and predation. The chapter has outlined expectations and priorities in aquaculture development of external donors which diverge from those of department of fisheries personnel. Although the end result - producing fish - might coincide for all institutional actors, the means and reasons for doing this do not.

The government favours international aid for the support of costly fish culture stations, in order to supply fingerlings, but also because such injections of foreign capital are welcomed. Furthermore, there is something easy and known about building such infrastructure. Not all donors are now prepared to support government stations, especially given the increased concern with participation, and community involvement in development. Although, in the case of ALCOM, there was no evidence of small-scale farmers' direct involvement in the project planning process, the programme maintained an interest in direct contact with the farmers, rather than infrastructural investment. From the point of view of ALCOM, institution building can take place without necessarily investing in physical infrastructure. From the point of view of the host government, this is less plausible.

The case of Luapula illustrates the unspoken dependence of a project on convergent institutional aims and capacities. Where they diverge, and physical resources are unavailable, the (apparently) best designed project is likely to misfire. What actually happened with extension in practice is reviewed in the next chapter.

The pilot project was conceived and developed in Harare. Discussion between the various collaborators took place in Mansa, but from unequal positions - or at least that was how it was seen from the point of view of DoF. The language of cooperation permeates all planning documentation. The fact that the pilot project should be the property of the department with "technical assistance" from ALCOM is also stressed. The realities of who is able to make decisions based on who commands the money are thus disguised. There was only one DoF representative (from Chilanga, not Mansa) at the Harare synthesis meeting. IRDP and FINNIDA, the other donor-funded collaborators, were in the process of withdrawing all support from the province.

In Luapula, a considerable amount of time has been devoted to collecting information on the social, economic, and technical characteristics of aquaculture development, in so far as they can be identified at the level of the village. The results of these studies were only partially integrated to project activities. Virtually no time was spent in examining the institutional constraints and possibilities. Examination of such constraints of course provides no easy solutions; the poor motivation of extension workers and the lack of departmental infrastructure (for example) cannot be simply wished away. When ignored, they may constitute insurmountable obstacles.

Notes

1.I personally knew the couple described.

2.This incident was reported to me subsequently by the Chibote fish scout.

CHAPTER EIGHT

EXTENSION IN PRACTICE

8.1 INTRODUCTION: THE NEED FOR EXTENSION

The previous two chapters have described the institutional context within which aquaculture development has taken place in Luapula: the priorities and capabilities of the principal institutional actors in the intervention process. This chapter aims to bring together this picture with the "View From The Villages" of Section Two.

Section Two argued that farmers' responses to intervention are strongly influenced by their experience of earlier projects, not just those promoting fish farming. Within Luapula, farmers have become conversant in the language of "development", and for many fish farming is part of this. The decision to adopt fish farming has much to do with an expectation of assistance, in combination with a possibility of other gains (food, income, and security). Because most people who dig fish ponds do so at low or zero perceived cost to themselves, they can do so with only a hazy perception of technical aspects. The ponds are frequently not well sited and farmers do not know how to look after the fish.

Nonetheless, some farmers are both producing fish and using their ponds in combination with other farming activities. Evidence from chapter four indicates that the characteristic distinguishing these farmers from "less successful" adopters is the extent of their contact with extension. Furthermore, though currently adopters of fish farming are seldom the most vulnerable in terms of either food security or income, fish farming may represent a significant addition to the well being of more vulnerable households if existing knowledge is consolidated.

There is a gap in the knowledge base of many fish farmers - a gap which, if bridged, could result in more productive practices. The failure to harvest ponds, the frequent comments about "waiting for the fish to grow" indicate a poor understanding of the application of concept of a production cycle to fish farming. A limited tradition of animal husbandry in Luapula has already been identified. When combined with complex motives for adoption of the technology, the need for a broadening and consolidation of the knowledge base becomes evident.

Such an argument sounds extremely "top-down", apparently implying limited scope for learning from farmers. This is in the nature of aquaculture development; it is a new technology. This fact does not of itself prescribe the form that extension should take, which may be more or less sensitive to the needs of farmers.

This chapter explores both how the two main institutional actors, ALCOM and DoF, attempted to assist in consolidating fish farming knowledge, and villagers' responses to extension.

In the previous two chapters, a separation between DoF and ALCOM was made in order to gain a picture of divergent agendas. In practice of course, the extension activities

taking place in Luapula are not clearly separable into "ALCOM activities" and "DoF activities". ALCOM did not claim to be directly responsible for implementing extension activities; this is officially the role of DoF, albeit with technical and logistical support from the project. Nevertheless, in the project documents for both phases of the pilot project, the development of extension strategies was stated as an objective (ALCOM 1989, 1992b).

Before the arrival of ALCOM, DoF carried out training and extension activities, though reportedly on a very limited scale. IRDP's interest in aquaculture had led to support to Fiyongoli fish farm, and training courses were occasionally carried out. No documentation from these exists. With the arrival of ALCOM, there was a further boost to extension and training. This involved negotiating the funding for training courses, and the posting of the fish scout to Chibote.

The ALCOM aquaculturists have undertaken a series of activities which can be seen as being on the borderline between research and extension. They involve the collection of information to be used in ALCOM's objective of methodology development. However they also have effects, both on the contact farmers themselves and on the wider community. The activities are farmer managed trials, farmers' logbooks of their fish farming activities, and the transport of fish farmers to visit others in different areas.

In chapters six and seven weaknesses in DoF extension services and ALCOM's minimal field level intervention were described. These are elaborated in more detail below, but they also pose a problem for any attempt to explore the operation of an extension system. Can it be done where extension is scarcely operating at all? On balance, the problems faced by government extension are common in other areas to a greater or lesser degree. There are no reports of a fully functioning extension system in Southern Africa. Nevertheless, within a flawed system, functioning aspects can be identified. It is from these that lessons for policy can be learned.

8.2 DOF EXTENSIONISTS AND FARMERS.

At the last count there were 725 fish farmers in Luapula province (Haight 1992). DoF has six fish scouts posted outside the provincial capital. Of the total number of fish farmers 437 were in Kawambwa district. Two scouts cover this area. From such figures there is obviously little value in attempting to analyse the provincial impact of direct extension in the villages. However, the local importance can be monitored where there is some interaction between the department and the farmers. This analysis of DoF extension focusses on Chibote, with its village-based extension worker, on Kawambwa, with an urban based extension worker covering a number of villages, and on Monga, without direct extension support, but in close proximity to Mansa and DoF headquarters.

As noted in chapter six, fish scouts are at the bottom of the departmental hierarchy, they have poor promotion prospects and it is not within the capability of the department to monitor closely the activities of those posted away from Mansa. Scouts may feel neglected and marginalised. The nature of activities carried out will therefore also be partly a function of the personal motivations of individual scouts. Their position within the village is also rather ambiguous. In some ways, the scouts assert their difference as salaried workers for the government, in others they are intricately part of village life.

One important aspect of the local perception of fish scouts is that historically DoF has been seen to have a restrictive rather than an extension role¹. Extension for fish culture has only taken place over the last few years and a significant amount of departmental work still involves the policing of natural fisheries, the prevention of fishing with illegal gear or during the closed season. Even in areas without natural fisheries such as Chibote, this view of the department persists among many members of the community. Hence, people may be unwilling to give accurate information about their pond harvests. A number of farmers were even unsure about whether the fish in their ponds were really theirs, especially if they had started fish farming with any assistance from the department.

Chibote - proposed activities.

In 1990, a fish scout was transferred to Chibote with the aim of consolidating and improving the knowledge base created by the White Fathers during 1986 and 1987. By this stage, the survey conducted by ALCOM (Wijkstrom and Wahlstrom 1992) had already identified that in Chibote there was less of a problem of encouraging people to dig ponds and more one of them being able to manage them correctly. The Fathers had initially intended that fish farming should be promoted as an activity for young boys. In fact, the range of ages and backgrounds of those who were able to take advantage of the loans of shovels and cheap fingerlings was very wide. At the training course organised by the department of fisheries in 1987, the majority of participants were over the age of 35.

The development and spread of fish farming was initially very closely tied to areas which had a church and hence in which the mission was already active. Farmers who started under the guidance of Father Angelo therefore had a head start in terms of access to assistance, but it is more questionable whether they benefitted from a greater technical knowledge (see chapter seven). Later adopters had neither the benefit of assistance in pond construction or knowledge about how to look after their ponds. Because of these recognised knowledge gaps, training and visits to farmers were an important part of the proposed activities of the fish scout. However in the initial months there were also other priorities: the rehabilitation of breeding ponds to be used as community fingerling hatcheries; the carrying out of a census of fish farmers in the area; the supervision of the construction of his own house within Chibote centre; the distribution of fingerlings whenever the ALCOM vehicle was in the area.

In Chibote centre, disused mission fish ponds were to be rehabilitated using pieceworkers. The intention was that the then inactive fish farming club would take over the ponds once they were stocked with breeders (planned for June 1990). In addition to these, a number of hatcheries were to be constructed by farmers themselves in villages with concentrations of fish farmers. These hatcheries would then be supplied with fingerlings from either Chibote centre or from Fiyongoli fish farm. The census of fish farmers was intended to provide a clear picture of the number of farmers owning ponds, the number of ponds and the level of management. It would serve as a baseline from which to monitor the effects of the Chibote programme. Because the scout was to be resident in the village for at least two years, it was deemed necessary to construct a house for him. This required the transportation of building materials from Mansa during ALCOM/DoF visits. It was anticipated that the house would be finished by August 1990. In the interim, the scout and his family (including seven children) were to live in a local rented house of three rooms.

In his initial workplan, the scout was to:

visit all fish farmers on a regular basis. During these visits questions about fish farming will be answered, problems will be discussed individually or in a group meeting. More formal trainings will be given when the need arises.. In each village one farmer will be selected who will function as contact farmer. (DoF 1990,p5).

In the workplan, the criteria for selection and functioning of contact farmers were

not elaborated.

All these activities were to be monitored by DoF and ALCOM staff on regular twice monthly visits to the area. The visits would also provide an opportunity to transport equipment and fuel for the motorcycle as well as fingerlings, depending on the success of the use of plastic bags and oxygen. The supervisory trips were also to include training of farmers through group meetings in those villages where fish ponds were located.

Chibote - what happened

By October 1992, the fish scout's house was still incomplete and the landlord of his village house was complaining about non-payment of rent. From the Chibote side, complaints were about non-delivery of materials. From Mansa, the perception was more that materials were disappearing into a bottomless pit. Whatever the truth, the issue of building his house became increasingly important and time consuming for the fish scout.

The community fish ponds in Chibote were finally stocked with breeders in December 1991. By this time, there was a prevailing view within the village that these ponds were the property of the fisheries department alone and that they were the sole concern of the fish scout. The genesis of this view is not easy to identify, but it is most likely to arise from the observation that the fish scout spent more time visiting these ponds than anything else. This he blamed on poor transport facilities for other extension activities. In January 1992, the banks of two of community fish ponds collapsed, releasing all of the fish. The scout said they were broken by the villagers so that they could be employed to rebuild them. Others (in Mansa) blamed poor construction.

From the scout's point of view, maintaining the village ponds in Chibote was an additional burden which took up too much of his time. He was not supplied with sufficient money to hire labourers for manuring etc, and complained that he was fact working as a labourer himself. In April 1992, the Chibote hatcheries were officially handed over to the newly formed fish farming club, comprising 12 members (two managing each pond). One delivery of fingerlings was made in September, with the assistance of the ALCOM vehicle. Meanwhile the village hatcheries constructed in Bule, Bruno, Mukoli and Fikatwe villages remained empty. Faith in the fish scout rapidly diminished and shifted into resentment about unfulfilled promises.

Visits to fish farmers over the two years were sporadic at best, but predominantly non existent. Of the fish farmers surveyed in October 1991, only 29% had been visited more than once, while 52% said they had never received an extension visit. The most significant characteristic of those more regularly visited farmers was that they were also contact farmers for the ALCOM aquaculturist. Women fish farmers heading households alone were visited least frequently of all. All but one of them said they had never been visited in the previous year. The one exception was the one female contact farmer for the ALCOM aquaculturist. Those female fish farmers who had been regularly visited by the extensionist had also had regular visits from ALCOM because their husbands were contact farmers. Behind the fewer visits to female fish farmers lie two facts; their invisibility to the scout, and their own unwillingness to seek advice. The scout was ignorant of the existence of a number of female pond owners who were in turn reluctant to come

forward. This can be partially attributed to the segregation inherent in gender relations in the area, but probably equally to a low opinion of the likely benefits to be derived from an extension visit. Farmers complained that they were only "visited", that this of itself was of no value. Given the predominant belief that the department should be "delivering" something (more than advice), this negative impression is hardly surprising. Expectations were high and unfulfilled.

According to the design of the scout's programme of work, motivating farmers were to be located in each of the contact villages, spanning an area of approximately 930 km². The motivators were expected to relay farmers' problems to the fish scout, to hold meetings, to pass on technical information. Interviews with ten supposed motivators revealed that only two of them even realised that they held this role. The majority had been on the training course held by DoF in 1987, but had had little contact with the department after this.

What lessons - if any - can be learned from this apparent catalogue of disasters? The problem lies in a combination of poor support to the extension worker, misplaced expectations among farmers, and individual characteristics (including training) of the extension worker. This last factor will always be an influence in extension, and it should be incorporated while attempting to minimise its likely impact.

There is no question that the expected back-up to the scout was lacking. Because of lack of departmental transport, visits to Chibote were restricted to whenever the ALCOM vehicle was going. Occasionally this was on a monthly basis, but it could be much less frequently. At the same time, a range of ALCOM "visitors" came to Chibote in the period from June 1990 on². The scout then had to act as tour guide:

"They are just taking pictures and people don't know why, they don't mind but they don't benefit. They bought a fish from a farmer and gave it to a woman so they could take photographs"³.

He also complained about practical difficulties, especially those relating to spare parts and fuel for his motorbike, which he spent an enormous time searching for. He said that nobody read his monthly reports.

The fish scout to a large extent defined his role in relation to the priorities of the ALCOM aquaculturists: though employed by the department, with additional funding from FINNIDA, ALCOM was his main link to resources from Mansa. Hence, the two farmers with whom ALCOM were doing trials were his main focus. He said that these were model farmers, "that they understand easily, and we want to work with those who understand, then others will copy". He professed bafflement at those farmers who apparently failed to understand or follow advice. Women could never be model farmers for others to follow because of their "powerlessness" in the community⁴. The approach to work reflects both personal characteristics and a recognition of position in relation to a very clearly defined hierarchy in which, if personal motivation was already lacking, little was likely to engender it.

Kawambwa

Kawambwa, the district centre, is some 80km from Chibote. In 1989, a scout was transferred there to undertake extension activities in both the centre and surrounding villages. He had specifically requested a transfer to fish culture away from fisheries regulation work on Lake Bangweulu. This area was not a focus of ALCOM activity, though one mobile course was held in 1990 and two more in 1992.

As in Chibote, the scout complained of lack of support: that he was never visited - even when Mansa personnel were passing through Kawambwa, that his bicycle was virtually unusable. He also believed that his reports were not read and that if he chose to do nothing, this would not be noticed. Unlike Chibote though, he was working in an area with almost no established aquaculture and little knowledge or expectations of the department of fisheries. In the space of just over under three years, the number of fish farmers in Kawambwa central had risen to over 100.

In a series of visits with the fish scout during August 1992, a sample of 25 fish farmers (all men) and their wives were interviewed in depth, concerning the background to and progress of their ponds and their relationship with DoF. No female fish farmers were identified in the area. Just under half (11) of these had been regularly visited by the extension worker. The rest had never, or very seldom, received advice.

The extension activities of the fish scout have centred on a combination of advice about pond construction and the supply of fingerlings, but because of a lack of transport, these activities have been concentrated in a limited area within three hours walk of Kawambwa. There is a striking difference between the quality and maintenance of the ponds of those farmers who had received advice, and those who had not. Farmers further away from Kawambwa tended to have the same characteristics as those in Chibote: weedy and ill-maintained ponds, little or no harvesting. In a village only 8km from the town centre in which aquaculture had started purely following extension visits, ponds constructed in the previous year were already producing fish. Many were constructed with compost cribs obviously in use. The majority were also integrated with vegetable gardens. Information on yields is not available but reported management and the condition of the ponds indicates that they were likely to be significantly higher than in Chibote.

Should all of the differences be attributed to the beneficial effects of extension? Other influencing factors might be the socio-economic background of the farmers, the legacy of previous interventions, and the availability of markets. The farmers in Chaba Tinka (the village close to Kawambwa) could not be clearly distinguished from other adopters in socio-economic terms such as livestock ownership, age, migration history, or land access. Most adopters were principally subsistence farmers, although growing a little maize and vegetables for cash. In fact the two Kawambwa central farmers with the least productive ponds were also semi-commercial in other activities - livestock husbandry and maize production. This indicates that experience of other aspects of development is not necessarily an indicator of likely success in fish farming. Though vegetables grown in Chaba Tinka and integrated with fish ponds were marketed in Kawambwa, fish production was still sufficiently low that none was being sold, even within the village. Furthermore, farmers did not claim to have expectations of selling their fish in Kawambwa.

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As noted, individual female fish farmers could not be identified. The scout suggested that women would wait to see if the men would get anything from their ponds before devoting resources. This view was supported by discussions with women themselves. As in Chibote however, this decision was partially influenced by the perception that fish farming is an activity only for men. Nevertheless, a number of women clearly took part in the management and decision making related to fish ponds. Discussion of technical issues with the fish scout was not perceived to be a problem for either party.

Monga area

Monga area has not had consistent extension support to aquaculture. Visits have been made to the area, frequently by ALCOM staff, and less frequently by people from DoF. Of those interviewed in the initial survey, 65% had not been visited by the extension service. Those that had received regular extension visits were all contact farmers for the ALCOM aquaculturist. They were predominantly those farmers located in the immediate vicinity of Fipatauko village, who had been the early adopters of fish farming. The later adopters, those who had received less direct advice on pond location and construction, were also those with visibly less productive pond management. This state of affairs is hardly surprising, given the fact that there is no resident extensionist in the area, and DoF staff were reliant on ALCOM for transport.

The proximity of Monga to Fiyongoli fish farm meant that early adopters were able to collect fingerlings for themselves. They also approached the provincial offices directly for advice about pond construction and maintenance. Since 1991, requests to DoF for advice have tailed off as the department is increasingly identified with ALCOM - the people with the vehicle and obvious potential as a supplier of inputs and/or assistance. On the other hand, DoF is not, in the eyes of the farmers, neatly distinguished from the ALCOM project. So far as people in the village are concerned, all are from "Fisheries", in much the same way that all officials working with crop or livestock farming, whether from ARPT, DoA, or donor supported projects, are part of "Agriculture".

The uneven nature of extension support in Monga area is accompanied by great variety in pond management practices. This is also the case in Chibote area and in Kawambwa. To what extent can a causal relationship between the two phenomena be argued? In ALCOM's 1988 survey, it is suggested that those who will become "successful" fish farmers cannot be identified at an early stage (Wijkstrom 1992). This view is supported by findings from the present study (see chapter four). Nevertheless, the one factor that the more productive fish farmers have in common is the frequency of their contact with the extension service and/or ALCOM. Access to external support is likely to lead to more sustainable management practices. The problem in identifying the direction of the causal relationship is that while observed practices of those farmers who are most regularly visited suggests beneficial effects of those visits, it is also the case that the farmers selected are those who illustrate most "promise". That "promise" may be derived from factors such as existing pond location or structure, or apparently progressive attitudes. Ability to display such attitudes are in turn the product of both education and an understanding of how the extension service works.

8.3 ALCOM/DOF TRAINING COURSES

An alternative or complement to regular extension activities by fish scouts with individual farmers is that of holding training courses with groups. ALCOM have collaborated with DoF in the organisation and running of mobile courses. These can be divided into two phases: one day courses in the period 1989-91 organised with the assistance of the first ALCOM aquaculturist, and financed by the IRDP; twelve two days courses in the dry season of 1992, which were financially supported with a grant from FINNIDA.

Description of courses

Little evidence of the earlier courses remains. During the three one-day sessions, approximately 100 farmers were trained in Kawambwa, Lukola and Monga. They were given information on site selection, pond construction and maintenance, stocking density, and leaflets in Bemba supported classroom discussions. The courses were mainly theoretical in content. No information is available about the selection and background of course participants.

The mobile courses held during 1992 were devised by the ALCOM aquaculturist and his counterpart from DoF. FINNIDA paid for diesel, food for the participants, and the printing of a ciBemba version of the ALCOM Eastern Province extension pamphlet. The cost of each two day course for 25 farmers was the equivalent of US \$220. A total of 302 farmers attended the courses. The training took place within the villages, usually in a local school, except in two occasions, when they were based in missions. The trainers (up to four DoF scouts and the ALCOM aquaculturist) stayed in local accommodation for the duration of the course. A secondary aim of the courses was that they would provide training in extension techniques to the DoF scouts.

Two types of course were developed. One was aimed at those who were just beginning fish farming and concentrated on pond construction and basics of pond maintenance. The other was designed to address the management problems experienced by those farmers who had had ponds for some time. In particular, the course aimed to fill the already identified knowledge gap concerning ideas of a production cycle, and pond harvesting. Both courses involved alternation between classroom discussions and practical sessions (digging a pond, constructing a holding pond and a compost pit, testing harvesting gear). On the evening of the first day, a slide show was given, projected onto an outside wall of the school, or other suitable building. The slides portrayed other fish farmers in Luapula and were designed to illustrate some of the messages covered during the day. The courses were held in ciBemba. Contributions in English from the ALCOM aquaculturist were translated.

The participants were selected by either the local agricultural assistant, by the fish scout operating in the area, or by a contact farmer. The only specified criterion for selection was that 50% should be women. Given the shortage of female fish farmers and the sex of the selectors, it is hardly surprising that none of the courses even came close to this. A profile of the participants was made based on a sample of five of the courses, or approximately 40% of all participants. This showed that 83% of participants were men,

and that only 16% were aged less than 25. The participants also tended to be noticeably active as church (40%) or political (20%) officer holders. In addition to this high level of social activity, the participants were better educated and better endowed with livestock than the overall population and other fish farmers. Of all participants, 35% were educated to at least primary level. Of the fish farmers in the 1991 survey, only about 18% had this level of education. Among the adult population of the province, some 10% are educated above primary level (Gould 1989, supported by findings from 1991 survey). Regarding livestock, while 48% of fish farming and 26% of non fish farming households in the 1991 survey owned larger livestock (goats and/or cattle), the figure was more than 60% for course participants. Most farmers grew some maize, 62% reporting that they grew between one and ten bags.

Evaluation and impacts of training courses

No systematic follow-up of the first series of courses has ever been undertaken. Farmers in Lukola said that they felt they had benefitted, though this was in fairly abstract terms. In Monga also, though farmers had a positive view of the course, few could say what they felt they had learnt, and none said they had altered their practices as a result. Similarly positive comments came at the end of each of the 1992 courses in the wrap-up open forum; all sections were useful, all sections were understood. Negative comments tended only to focus on the quality of the food; there was not enough bread provided at tea time and FINNIDA usually give Coca Cola!⁵

The real test of the impact of such courses is in the extent to which "information" becomes knowledge which farmers are prepared to act on and/or pass on to other farmers. Unfortunately, however important for encouraging participation, the on-course evaluation is constrained by mores of politeness. The FINNIDA-supported courses were completed in September 1992. It is thus too early to assess impacts. In fact, as no follow-up has been designed, it is unlikely that any evaluation will be made on impacts on either course participants or the wider communities. However, observations about the nature of the courses, their fit to village needs and perceptions can be made.

In many ways course participants were self selected; they were those who were most visible to the local extension workers. Although the courses were designed to cater for 20-25 people, when extras turned up, they were not turned away. As a result, two of the courses had more than 30 participants. In the course held in Kawambwa central, more than 35 initially presented themselves, but several then dropped out when they discovered that the course was not connected with loan possibilities.

The profile of participants shows that they were slightly unrepresentative of the communities and fish farmers as a whole, especially in terms of gender bias. Though there are many fewer female than male fish farmers, this imbalance is important; women have an important management role in fish farming, and evidence also shows that information transfer from men to women concerning farming is limited. The lack of women's participation can be attributed to a combination of lack of knowledge that the course was taking place, and a belief that it was "for men". At a practical level, and only relevant to areas where *citemene* is still practiced, the courses took place at a time of year when men have finished cutting branches, but women are still busy piling them up for burning (*fibula*).

The courses were not always ideally designed for the knowledge level of the participants, which can be partially blamed on the ad hoc nature of their selection. Thus, at the course in Lubwe (which was the elementary one concerning pond construction), most farmers already had ponds and were interested in finding out about externally purchased inputs and where they could get loans. Several of the participants had already been on fish farming trainings elsewhere, reflecting the tendency for the same people to attend courses over and over again.

The courses aimed to involve farmers as much as possible; this was an important objective behind the practical demonstrations, which relied on farmer participation for their success. All farmers remarked positively on the novelty of this aspect of the courses, though the perceived value was of the variety they brought to the course rather than "participation" as such. So far as the farmers were concerned, the "teachers" should be accorded respect and shown appropriate deference. The ALCOM aquaculturist's notions of "learning together" remained alien.

Though the course content was entirely designed in Mansa, this followed from fairly detailed knowledge of farmers' needs. Furthermore, the content was adapted during the course as some concepts and approaches appeared to make more sense to farmers than others. For example, an analogy between a fish pond and a groundnuts field was particularly appealing and became an integral part of the courses.

The courses served an important training function for extension workers. For those who were normally restricted by lack of transport and therefore unable to get out to farmers, the fact of actually "doing some work" was important. The need to overcome problems faced during the practical demonstrations and the explanation of technical issues during classroom sessions caused considerable discussion in the evenings.

8.4 FARMER MANAGED TRIALS

Awareness of the potential importance of farmers' own knowledge in technology development has led to a shift away from research station-based experimentation, towards farmer managed trials. The idea is that farmers themselves are the most appropriate people to develop new management practices. This shift has also taken place in aquaculture development. However, as Lightfoot and Barker (1991) point out, such trials may be conducted with farmers but few, if any, are designed and tested by them. This was largely the case with the fish farmer trials in Luapula.

From the point of view of ALCOM in Harare, trials needed to be carried out to find answers to certain technical problems - and to make sure those answers were appropriate in the context of Luapula. It was considered that the recommendations given by the extension service were based mainly on assumptions rather than experience. A rapid rural appraisal identified some of the factors causing low yields in Monga area and recommended trials to test possibilities for improvement of feeding and fertilising practices (ALCOM 1991). A further aim was that the trials should serve as an extension tool, by presenting to selected farmers a range of possible production strategies.

During the first phase of the pilot project, trials were carried out both at Fiyongoli and on farms in Monga. These trials focused principally on feeding with sunhemp and stocking densities. In the second phase, there was a stronger focus on working directly with farmers, in anticipation that active farmer participation combined with a demonstration effect would stimulate discussion about improved pond management possibilities. The ALCOM aquaculturist aimed to create a "model situation": in no place were ponds well managed, so he wanted to, by working through selected key farmers, initiate imitations. Trials at Fiyongoli were limited to those on comparative growth performance of three strains of *T.rendalli*. Eighteen on-farm ponds were drained and stocked for trials: two with ducks, nine to monitor feeding and fertilizing, six to monitor ordinary production and one to monitor the effects of all male stocking density.

In addition to these trials, experiments were carried out with alternative harvesting gear, following complaints about shortages of nets. Nets originally developed by fish farmers in Eastern Province Zambia and Malawi, and constructed from local materials (mealie meal bags, grass mats) were made. They were both tested on the fish farmer training courses and with contact farmers in Chibote, Monga and Musungu.

The trials with ducks involved lending ducks to two farmers who had built suitable duck houses. When these bred, the farmers would be allowed to keep the offspring. Other trials farmers were selected on the basis of the quality of their existing ponds; did they appear to be likely to sustain a trial over several months? Were the farmers themselves "good" farmers in that they had already shown "interest and commitment"? In reality they were also selected on the basis of their visibility; they were the farmers "known" to ALCOM.

The impacts/effects of the trials can be seen from two angles; the value of the information derived (to ALCOM/DoF) and their impacts within the communities, both in terms of impacts on local perceptions of development and in terms of their usefulness to farmers.

All of the trials at Fiyongoli fish farm were eventually abandoned for mainly technical reasons, most importantly lack of water. All but one of the on-farm trials initiated in the first phase of the pilot project were also abandoned in the three month gap between the departure of the first aquaculturist and the arrival of the second.

The experiments with locally made harvesting gear provoked discussions among farmers. However reservations were expressed: however good the nets were, they were not more efficient at catching fish than commercially made nets. Inevitably therefore, some farmers asked why they were being "denied" proper nets. They were told they were free to go and buy such proper nets. Others complained that they did not have sufficient mealie meal bags to make a net and that the nets themselves took too many people to operate. The importance of these constraints is debatable: they partly reflect the resentment mentioned above about the departmental failure to provide. Evidence of cooperation in other areas has shown that people will organise together for a limited purpose - which is theoretically feasible for the making and use of harvesting gear. Not all responses were negative though; some people were impressed that the nets had been invented by farmers similar to themselves. From ALCOM's viewpoint the testing of the

nets provided an opportunity to discuss departmental and project responsibilities and potentially to inspire farmers to invent their own gear. By October 1992, no evidence of this had been identified, though this is too short a time within which to draw definite conclusions.

The data gained from on-farm trials in the second phase has been partially analysed (Jensen and Mugala 1993). Results show an average productivity from the trial ponds of about 1,000 kg per hectare but with a range from 200kg to more than 3000kg per hectare. Those ponds showing the best results are those whose ponds are located very close to their houses. Certain aspects of the findings from the trials were also used as part of the training courses in response to questions about likely yields with given feeding and fertilizing. Farmers were impressed that the information was derived from farmers in the same position as themselves.

The farmers conducting the trials frequently were bemused and uncertain about the reasons for them. They were willing to participate (more so when fingerlings or ducks were being brought in from outside), but saw the trials as something essentially under the control of ALCOM. Despite concerted attempts to involve them in adaptation and modification of trials, to encourage participation, the farmers appeared to remain passive. This was not in fact what was happening below the surface. They took part in the trials but not in the way planned by ALCOM. In Alex 2 village, farmers involved in a trial of intensive manuring were impressed to see how much their fish grew with heavier applications of manure. However, so far as ALCOM were concerned, the trial was not successful because when it came to measuring the improved yield, it was found that the farmers had already taken out the larger fish. The objectives of the different stakeholders in the trials did not coincide. When farmers could not see any point in doing the trial (as in Monga with single sex trials), they were abandoned. In fact most of the trial ponds in Monga suffered from the dry season water shortage, so monitoring of results was not possible.

The hope that the trial ponds would act as demonstrations to other farmers depended on two factors; that the farmers conducting them were sufficiently representative of other fish farmers, and that those other fish farmers perceived them as such; that they believed emulation to be a possibility for them. Though they were chosen in a fairly ad hoc manner, according to visibility and apparent ease of working with, the trial farmers were not all significantly different from other fish farmers in terms of resource availability or socio-economic status. Among trial farmers were those who owned few livestock, had no off-farm sources of income, and had low educational attainment. The trials farmers in Chibote area did, however have far greater income and livestock holdings than average. One of these was a semi-commercial fish farmer (see appendix 5); another was the group of farmers in Alex 2 village, who have already been mentioned. They not only had several large livestock, but were the largest maize growers in the area, and had access to a tractor for cultivation. None of the fish farmers taking part in trials were women. This is partially a product of the fact that none of the women fish farmers could be construed as "successful" in terms of having well constructed ponds.

More significantly, there is as yet no evidence, at least in the short term, that the

trials served as demonstrations to other fish farmers. On the contrary, group interviews in the village next to Alex 2 revealed that the farmers regularly visited by the vehicle were thought to be the recipients of assistance. The time pressures of attempting to monitor trials at such a distance from Mansa meant that on the way to the trial farmers, the vehicle did not stop to discuss with others. Though there was not enormous resentment or jealousy, the farmers who were not involved thought that whatever was going on was not just not relevant to them. Resentment was more actively expressed in Kaseke, the village adjoining Fipatauko in Monga where people complained that "they just go to visit their friends". Such problems are partly the result of the nebulous ground that is entered when arriving in an area to do trials which are of no obvious benefit to the people (who are expecting extension), when the extension back-up is not present.

8.5 LOGBOOKS

A complementary activity to the farmer managed trials was the development of "logbooks", with which farmers were expected to keep records of the inputs to and outputs from their ponds. From the point of view of the introducers, the rationale for these was essentially two-fold: for ALCOM and DoF as a mechanism for monitoring pond management and input to extension material development; for the farmers, as a tool to help improve farming practices. Though the data in the logbooks was to be extracted for ALCOM/DoF purposes, they would remain the property of the farmers. The logbooks were partially a response to the awareness that in the past too many surveys had taken place which merely extracted information: there was a need to reverse the flow back to the farmer in a form that would be useful for him/her. Furthermore, it was acknowledged that the information derived from such surveys was also of dubious value. It was also anticipated that they would serve as an item to raise the "prestige" of the fish farmers, to make them feel the members of an exclusive club.

The logbooks comprised a booklet with two sections: a section of information to the farmer as well as one on fish pond data to be filled in by the farmer for every first week of the month. Initial drafts were circulated to 30 farmers, 10 in each of the target areas of Chibote, Monga and Musungu. The logbooks were in English, though it was intended that they would be translated into ciBemba once they had been tested. The translation has been undertaken, but with the withdrawal of ALCOM from the province, it is now unlikely that they will be produced in the ciBemba version. Farmers chosen for logbooks included those who were taking part in trials as well as others identified with information arising from this research. One of these was a woman. In each case, the ALCOM aquaculturist visited the farmers, gave them the booklet and explained its purpose. Farmers were then regularly visited and after nine months the logbooks were collected for analysis.

The majority of farmers did in fact fill in the data section of the logbooks. Those who did not either failed to understand what was expected of them (the female fish farmer) or were unwilling because they did not see the point. The ALCOM aquaculturist maintains that the information collected is, however, of limited value. For one thing, the weekly recall once a month misses pond management activities. Furthermore, the reporting on the quantities of manure and feed applied used such variable measures that aggregation becomes very difficult. The problem is even more difficult when attempting

to assess pond outputs. Nonetheless, an attempt was made to extract some of the information from the logbooks, and the information was presented at the 1993 National Planning Workshop in Mansa (Jensen and Mugala 1993). The conclusion is reached that though the logbooks succeeded in getting some information despite the inherent problems in quantification, most of the identified management problems were confirmations of impressions from earlier extension visits.

As a tool for the farmers, the logbooks were highly praised, at least concerning the fish farming information section. The drawings of fish farming integrated with vegetables and livestock production stimulated discussion; the increase of farmers growing vegetables alongside their ponds during the dry season of 1992 has already been noted. This awareness of their value as a source of information on management activities had its corresponding knock-on effect in the villages: the logbooks became a subject of rumours and speculation. Once again, it seemed that a few people were being singled out for special treatment. Though some realised that the initial 30 were only testing the logbook, the knowledge within the village was that those who got them later would have to pay.

As with the trials, the ALCOM rationale for the logbooks did not coincide with farmers' perceptions of their purpose. They were intended to be participatory, to be something to assist the fish farmer in the control of his/her own operation. At the same time however, they were designed to have a function of teaching and information collection which would be of use to the project (and to a lesser extent DoF) in its own self-justification. An extension worker complained that "these farmers, they just do not understand the importance of record keeping; they are just interested in keeping fish"⁶. Out of approximately 250 fish farmers visited during 1991/2, only one was, of his own volition, keeping a record of inputs to his pond. This farmer was a trainee teacher. The majority of logbook farmers could see the their value in terms of information, but in all cases they were referred to as "Jensen's logbook", not "My logbook". This fact cannot be blamed on any failure to explain to the farmer that the logbooks were now their own property. It is more the product of the farmers' assessment of their own relationship to the project. Participatory rhetoric cannot necessarily overcome this state of affairs.

8.6. FARMER-FARMER EXTENSION

In 1991-2, the ALCOM aquaculturist initiated three "fish farmer exchanges". The aim of these exercises was, by taking selected farmers to areas which were similar to but different from their own, to increase discussion and learning about fish farming. The exchanges were to involve little intervention from ALCOM or DoF, except in provision of the vehicle.

The first exchange involved the transfer of farmers from Monga to Chibote, the second from Chibote to Monga, and the third from Chibote to Musungu (some 40km away). In each case, the host area was expected to provide accommodation and food for the visitors (though this was subsidised by ALCOM), and ALCOM provided transportation. Each exchange lasted three days and the timetable of events was devised by, but not controlled by, the ALCOM aquaculturist. In general these involved visits to the ponds of various fish farmers, illustrating different problems and possible solutions to

them. In Musungu, DoF scouts were on hand to demonstrate alternative cropping nets. The expectation was that the availability of plenty of unstructured time (particularly the beer drinking sessions in the evening) would encourage discussion of issues arising during the day. On each exchange, numbers were limited to one land-cruiser full of people (between six and seven).

Selection of participants was ad hoc. However, most were people with whom some contact had already been established. An effort was made to include female fish farmers, with the result that there was one on the first exchange, and two on the second. A certain amount of disorganisation in the Chibote-Musungu exchange meant that the fish scout was looking for women to take at a few hours notice. Unsurprisingly, most female fish farmers were not in a position to abandon other activities with so little preparation. Participants at the host end were entirely self-selected; anybody who wanted to take part could. In practice, the Chibote-Monga exchanges were very much focussed around the two villages where ALCOM trials were taking place; Alex 2 in Chibote and Fipatauko in Monga.

Transporting six or seven farmers over a distance of 300km for a three day visit is an expensive way of doing extension⁷. As with training courses, the benefit would be in the consolidation of knowledge, in the sharing of ideas, and in the improved practices which might then be emulated. The possible disbenefit would be in the consolidation of a "clique" of fish farmers who others believed were especially privileged by their contact with ALCOM, and in the transference of bad as well as good practices.

The long-term effectiveness of the exchanges cannot be ascertained. In the short term, changed practices certainly resulted from the Chibote-Monga exchange. The farmers in Alex 2 were very impressed with the systems of furrows in Monga and within two weeks of their return had constructed a furrow to all of their ponds, thus stopping the flow-through of water. The female fish farmer from Chibote centre spent the following week redigging her pond. In Monga, the farmers claimed they had learnt little from their trip to Chibote because "in that place, they do not know how to look after their ponds". They were however, proud of their role as educators, claiming that Chibote farmers take their advice much more than they would of the "musungu" because he might be only cheating them. The informal nature of the exchanges did give the opportunity for plenty of discussion over *katubi*, (from which the women were not excluded). However, not much of the discussion was about the technical problems of fish farming.

Though the farmers participating in the exchanges no doubt benefitted from them (especially the ones from Chibote by their shopping trip in Mansa), there is little evidence to show that such fish farmer exchanges could be justified as an extension technique -at least not over such long distances.

8.7 INNOVATION AND ADAPTATION

One aim of the fish farmer exchanges is to encourage a discussion about fish farming techniques which is assumed to be missing in the villages. The activities with contact farmers, the use of trials to create a type of "demonstration effect" also very much depend for their long term effectiveness on the nature of knowledge transfer within the villages. Though it has been shown that many actions are inspired by the villagers' relationships to "external" interventions, transfers of knowledge and innovation also take place regardless of such interventions.

Several examples of innovation exist. A female fish farmer in Chibote dug a long and thin fish pond, a design which does not follow conventional recommendations. Her rationale was that she had neither household labour nor a net with which to harvest the pond. The long, thin pond was no wider than a big fishing basket, so she was able to move up and down the pond scooping out the fish, while those which escaped the basket jumped out onto a floating mat (see plate 3).

Other innovations are less useful: many farmers in Kawambwa area have left raised areas of earth on the bottom of fish ponds so that they are better able to see the fish. Others have planted trees in the middle of the ponds to provide shade for the fish. Both of these innovations have some value, but farmers discovered drawbacks: they made any attempt to harvest the ponds with seine nets much more difficult. The examples indicate that though farmers will often innovate and adapt the technology to their own needs, this may be more effective when accompanied by usable knowledge concerning pond construction and management.

Knowledge transfer within the villages takes a range of forms, more or less formal. Of those farmers in Chibote and Monga surveyed in 1991, 65% said they started fish farming after watching others and without formal advice. They saw the ponds, they watched the process of construction and they copied. This partially accounts for the poor construction of some of the ponds. As has been seen from the poor management practices, observation alone is insufficient.

Formal channels of communication within the villages are few and, with the exception of the church, relatively limited and exclusive in their membership. Local cooperatives, other aid and development organisations, "clubs" formed for specific productive purposes, political organisations, are all present within both Monga and Chibote. In both research sites, a limited number of people tend to have places on the executive of several such organisations. So far as the majority of the people are concerned however, the groups are irrelevant to their lives.

The tendency to direct extension towards male household members assumes a degree of information transfer within the household which should not necessarily be taken for granted. Direct questioning of men and women concerning the extent of discussion of farming activities, including fish farming, tends to yield answers indicating a high degree of information exchange. These answers, partially reflect the influence of the churches in promoting and idealising the monogamous nuclear family. People are naturally unwilling to give responses indicating disharmony. This is not to say that reports of information sharing are not true, but that observation leaves room for doubt (see chapter 2). Men and

women almost invariably eat separately and roughly half of married couples do not work together on their fields (though produce may be shared). Regarding fish farming, though no hard and fast rules can be made, marriage is certainly no guarantor that information will be passed on. In most cases, fish ponds, though seen as the property of the man, are viewed as a household asset⁸. When women are not allowed to make autonomous decisions regarding harvesting, they may not take an active interest in pond management.

Intergenerational transfers of information, mainly from fathers to sons, but also from sons to fathers and mothers to daughters, may be important. The men in a household will eat together, often farm together, socialise together. In the one case of a woman fish farmer with a husband who did not own a pond, her greatest assistance came from a daughter who was planning to dig her own pond. The son (who was one year older than the daughter) took no part in the activity.

Outside of the household, information about fish farming is transferred in a fairly ad hoc manner. In Chibote area, there appeared to be little discussion between farmers about the various technical aspects of fish farming. In a village only one kilometre from a group of farmers who had received extensive advice from ALCOM and DoF, a woman with 50 hens was not using their manure in her pond because she "didn't know she was meant to". The neighbouring farmers were all closely related to her and she was in regular contact with them. The failure to pass on information cannot be easily explained. It is possible that it is related to a general lack of confidence among farmers about their knowledge of aquaculture techniques, which has been largely created by the approach taken by the Mission and the resident fish scout. It seems less likely that it is the result of a conscious decision to exclude others from information for the sake of personal gain.

In this context, the gender of the people involved is again a potentially important consideration. The woman is the head of a household with no men present. Though there are not overt social restrictions on information transfer between men and women, there are also generally accepted parameters within which conversations between men and women fall. In particular, observed discussions showed a tendency for women to withdraw from conversations concerning "modern farming" - most usually the growing of maize with artificial fertilisers. Similarly, the woman in this case said she just did not discuss fish farming with the men because they were "big farmers" - so expected her experiences to be very different. Her contact with the households of these men was largely limited to the women, who scarcely participated in the fish farming activity.

8.8 DISCUSSION: EXTENSION IN PRACTICE

This chapter has outlined the functioning of extension in Luapula. A number of issues emerge. The effects of extension will always be influenced by the diverse reasons for which people adopt fish farming, including some which cannot be construed as a straightforward economic calculation of the costs and benefits. They depend partially on both the frequency and the nature of the interaction between the extension workers and farmers. In addition, the historical legacy of contact with fisheries and agriculture extension influence the way that people view a new extension worker. Good extension therefore does not always imply good fish farming.

Furthermore, posting an extension worker to an area is not enough to guarantee that extension work takes place. If there is no flow of information between the centre and outposted workers, and no functioning mechanisms for monitoring activities, the way that extension works in practice becomes entirely dependent on the personality of the fish scout. The provision of facilities such as transport is important, but only following from this first point. If the boundaries of what is possible and expected (given whatever limitations) are clear and acceptable, then achievements can be measured in relation to these. Obviously, partial provision - a motorbike without fuel, a bicycle without inner tubes - is particularly unsatisfactory.

In neither of the areas where extension was active, was explicit consideration given to women as potential fish farmers or as the wives of fish farmers. The lack of explicit consideration leads to the default position that "all fish farmers are men". The prevailing view is that women are weak, powerless and unable to participate in decision making.

Hence:

"Traditionally women are known to be weak to men. This therefore puts them off most of the activities, for instance fish farming. In short, inferiority complex is a hindrance for women".

and:

"Women are not involved in decision making, if the pond is owned by the husband".⁹

These views are not wholly accurate; they reflect one view which does not tie in with observations from the villages. Certainly, women suffer particular and identifiable constraints. They also can be active in household decision making, including that relating to fish ponds. Furthermore, the knowledge of female fish farmers tends to be even more partial and inaccurate than that of male fish farmers. Sensitisation of extension workers to the needs of such women could be potentially important for improvement of management practices at the margin. However, from the evidence above, it seems that training of all extension workers is more important than the specific employment of female extensionists. The second quotation above came from the one female fish scout in Luapula.

On-farm trials, farmer logbooks, and farmer-farmer extension are all research/extension activities which respond to the fact that in Luapula, as in many other places, facilities to conduct more comprehensive extension are very limited. Where there

are neither the staff nor the transport to cover large numbers of farmers, such techniques might be of value, both to those in immediate contact and to the wider community. The value of the selection of a limited number of "contact" farmers is, however, a subject of some debate.

If the contact farmers are expected to be responsible for a demonstration effect, copied by other fish farmers, it is understandable that they should be people who seem progressive and keen to learn; they are more likely to illustrate pond management practices with results which others are likely to copy. They are also simply easier to work with, often because they speak English and are willing to participate. These "essential" characteristics mean that in practice, the contact farmers are more likely to be men, with a better resource base than other fish farmers. These are classic biases, much criticised in development literature¹⁰. They result in a consolidation of difference between those in rural communities who have adopted "development culture" and those who have not. Does it matter?

Contact farmers in the sense in which they are used by ALCOM, do not have an explicit responsibility of transferring knowledge to other fish farmers. Nevertheless, a few choose to take on this role. Despite the numerous complaints about the farmer in Monga who was the principal contact farmer (see chapter four), when these are weighed up against reports of people starting fish farming following his advice, it is clear that for many people he has had a positive effect. Nevertheless, this is within an extremely curtailed sphere: inevitably his "enemies" in the neighbouring village did not benefit from his advice. Nor did any women.

The majority however, do not take on such a responsibility. Those farmers who have modified their fish farming in a way that is clearly visible to others (by, for example, the addition of a vegetable garden) may be copied. But for most of the rest of the community, they are seen to be somehow different or special because of their contact with the project. This is also partially the result of the fact that a core of farmers not only took part in trials, but also received logbooks and took part in farmer-farmer extension. Because of the very small number of contact farmers with whom ALCOM was working, it seems that the immediate impact at the village level is low rather than negative. The biases in selection of contact farmers do not harm other members of the community; they just do not help them.

Notes

1. This is a common problem. It has been noted for example in the case of aquaculture development in Rwanda; where fisheries staff were involved in both capture fisheries and aquaculture, the role of enforcer of fishing regulations dominated that of change agent (Moehl and Molnar 1991)
2. "Visitors" included the two ALCOM aquaculturists and socio-economist and their backstoppers from Harare; ALCOM researchers looking at nutrition, gender issues in aquaculture development and agroecosystems mapping; support to the nutrition work from Rome; the Stirling-Sussex researchers; a team working on ALCOM publicity materials.
3. Comment made by fish scout, Dec 1991. See chapter seven.
4. This is the word most frequently used by the fish scout to describe women's constraints in fish farming.
5. Farmers partially assessed the value of all training courses according to, not only course content, but what else was offered. It is accepted among many aid agencies that food and drink should be provided where farmers are expected to give up two days to attend a course. Agricultural extension agents report "competition" between agencies in providing extra attractions in their courses. Farmers themselves are keen analysts of the quantity and quality of such catering; hence the negative comments about the lack of Coca Cola on the ALCOM/DoF courses.
6. Comment made during discussion of the logbooks at the fish scouts seminar, Mansa, March 1992.
7. This is of course partially the result of ALCOM's decision to work in two places so remote from each other. The trend continues in 1992-3, with rice and fish trials at a distance of 160km from Mansa - a fact which makes close monitoring difficult (not to mention the fact that the ALCOM staff involved are located in Harare!)
8. Only one case was found of a woman who owned a fish pond with a husband who did not. The pond had been constructed before they were married.
9. These quotations are from papers presented to the Mansa fish scout seminar organised by ALCOM in March 1992. The second is from a female fish scout.
10. Robert Chambers (1983) refers to biases which beset many rural development projects. Among these is one which ALCOM could not be accused of: tarmac bias - (see endnote 7 above).

SECTION FOUR

CONCLUSIONS

CHAPTER NINE

CONCLUSIONS

9.1 OVERVIEW

Fish farming in Luapula appears to have similarities to that reported elsewhere in sub-Saharan Africa. A familiar pattern emerges: adoption following promotion by outsiders, low productivity, reduced interest, and eventual abandonment. The recent drive towards fish farming in Luapula is still on the upswing, but the prospects for long term viability are fragile. The difficulty is less one of persuading people to dig ponds than that they do so with limited knowledge of the technology and often following an assessment of risks based on the use of resources with few alternative uses. Elsewhere, in less stagnant economies, or in areas with greater resource competition, especially land, this is less likely to be the case.

A range of technical and natural obstacles apparently mitigate against fish farming in Luapula. There are many weaknesses in pond construction and management. Natural constraints such as water shortages and animal predation are also serious. Some of these problems could be overcome with improved extension. For example, advice about pond location should take into account the likely effects of predation. If the only available pond site is fifteen minutes walk from the home of the prospective fish farmer, it is unlikely that fish farming will be appropriate. Similarly, problems in water supply are often the result of poor pond location (as are those of flooding). It is noteworthy that the most productive ponds in Monga and Chibote are those located a stone's throw from the owner's house. Obviously, pond location also affects the regularity of feeding and fertilising. Poor knowledge about stocking, harvesting, and pond maintenance could also be overcome with better extension. Currently, rates of application of feed and manure reflect knowledge and an assessment of the importance of the pond within the farming system, much more than they do availability of inputs. Nonetheless, because in Luapula constructing a pond is not of itself seen as a significant cost, this has frequently taken place without an assessment of the availability of pond inputs. Improved knowledge and incentives to use inputs will result in more conspicuous problems of input availability

A critical characteristic distinguishing more from less productive fish farmers is the regularity of their contact with extension. In Luapula, extension has attempted to provide a combination of training and fingerlings to fish farmers. On balance, it has failed to do this. Government fingerling supply is of questionable benefit: the costs associated with it include not only the direct costs to the fisheries department, but the creation of farmer dependency. Because extension in terms of advice has been limited by the resources and capacity of the fisheries department, it has failed to reach many farmers. Weaknesses exist in training of personnel, in their numbers, and in the incentives with which they work. Although an obvious solution to this lies in the incorporation of fish farming within the training of agricultural extensionists, this process is only in its infancy.

Instead, and as with other technologies, there has been a tendency for donors to finance structures which the host government is not able (or unwilling) to maintain on the withdrawal of donor assistance. Support for government fish culture stations may be only loosely connected with sustainable fish farming. Nonetheless, they have been a major

recipient of donor assistance. ALCOM attempted to break this mould, but in a way which made very little difference to the farmers of Luapula and was frustrating to the department of fisheries.

9.2 RETHINKING SUCCESS AND FAILURE

This report began by questioning the assumption that African aquaculture projects have failed. It suggested that there is frequently a lack of fit between overall objectives and the criteria used to measure their achievement or non achievement, especially if those objectives have a poverty focus. This is by no means limited to aquaculture development. In the case of aquaculture it means that measuring the number of ponds, number of fish farmers, and even production of fish, does not give an accurate picture of household food security or income effects. Nor does it incorporate a picture of the role of fish ponds in relation to other aspects of rural livelihoods.

The reason for this is that stakeholders (farmers, donor governments, project personnel, host governments, provincial bureaucrats and extensionists), all have divergent expectations of what a project should achieve and how. They have different priorities depending on their position in relation to one another, and to their strategic interpretation of what is going on. There is considerable overlap, especially in adoption of a common language. However, this should not obscure significant differences which influence how projects work, and differences in perceptions of what constitutes project reality.

Promoters of fish culture: success and failure

For donors, there is an accountability requirement which demands that funds should be disbursed on time, according to fixed procedures, and that quantifiable indicators should be established. Because of the relatively short duration of most projects, it is not easy to measure the extent to which any new technology has become established within a community. Therefore, aside from the financial accountability criterion (funds disbursed correctly), the most obvious thing to measure is ponds dug, and, as much as is possible, production of fish. Socio-economic considerations relating to distribution, and to control of the product, are becoming increasingly important. They are, however, marginal so long as there is no product to distribute. Each individual project may therefore meet its immediate objectives (people dig ponds) while contributing nothing to its overall development objectives. It is only afterwards, and on aggregate, when donors look at the overall amounts of money spent on support to aquaculture compared to the tendency for fish ponds to produce fish, that doubts begin to arise.

Project personnel respond to the agendas of both donors and host governments. They also aim to be influential in reformulating those agendas. In ALCOM's case this worked at two levels: Harare and the various pilot projects. For people in Harare, evaluation was partly in terms of activities; successfully completed workplans, published and distributed studies. Furthermore, the nature of some of these activities was dictated by influential lobbies within donor countries - the gender agenda within ALCOM being a case in point. In the Luapula pilot project, the situation was somewhat different. Being closer to the "target communities", more tangible measures of success were theoretically possible. The most tangible measure was that of getting the technology to be seen to be working. This then became a primary objective, hence the desire to work principally with

farmers who were more productive. At the same time there were a wide range of immediate and practical concerns to deal with, relating to the day to day running of the project. These were inevitably time consuming, and began to constitute much of project reality. Furthermore, expatriate personnel had to negotiate their position in relation to government employees who have very different expectations of, and hopes for, aquaculture development.

Government planners have apparently similar objectives to those of the donors: to promote a technology that holds the promise of improving rural food security, increasing incomes and so on. However, when the low production of fish from aquaculture is placed in the context of economic crisis in all sectors, government support to aquaculture cannot be expected to be more than rhetorical. Fish culture has historically been supported from outside by the provision of funds for the construction of facilities such as fish culture stations. The justifications from the point of view of both donors and the government were of research into the technology in order to ensure local appropriacy, and fingerling supply to farmers. From the point of view of the donors, such structures represent capacity building. They are also fairly straightforward, if costly, to build and are visible, measurable achievements. In the 1980s and 1990s, the fish culture stations built in the 1950s (Fiyongoli, Misamfu in Northern Province, Chilanga, Mwekera) have been rehabilitated with the support of donor money. There was however, little or no consideration of the reasons that they fell into disrepair. The government still sees support for the fish culture stations as an important destination of donor money. Meanwhile, donors are moving towards greater concern with extension.

For **departmental personnel** at the provincial level, the time and effort spent on fish culture need to be justified, especially if they compete with natural fisheries. Although aquaculture has a separate budget, the attention this then demands in terms of time and allocation of personnel is not necessarily warranted when considered in relation to the gains from aquaculture. In Luapula, this is especially important because of the huge provincial importance of the lake and river fisheries. On the other hand, aquaculture provides access to donor funds. This is vitally important to a government department lacking the capacity to run its own vehicles. The project then potentially becomes a source of benefits such as vehicles and allowances, often accompanied with necessary concessions to the assumptions and methods of the donors. In the case of ALCOM in Luapula, departmental personnel felt there were more concessions than benefits.

Extensionists have still another perception of aquaculture development. Personal commitment to effective extension, as with commitment to any other job, inevitably varies according to personality. All scouts were equally hampered however, by a lack of capacity to do their job, the poor specification of what that job should involve, the lack of prospects for promotion, and the apathy engendered by all of these. While there is a pressure to show success in terms of activity (numbers of farmers contacted, numbers instructed, fingerlings distributed), there are few incentives to meet such success criteria. ALCOM disturbed the existing state of affairs and for some scouts provided welcome opportunities for contact with farmers. With the departure of the pilot project, however, little of substance in the extensionists perceptions of their problems was altered.

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View from the village: success and failure

For the promoters of fish culture, success is largely about farmers doing what is needed for the technology to work. From this it is assumed that the broader objectives of aquaculture development will follow. The research reconsidered this from two perspectives: looking at the reasons that people dig fish ponds, in order to improve understanding of their management practices, and examining the household and intra-household impacts of aquaculture adoption. What difference does fish farming make?

Farmers' responses to the introduction of a new technology include not only an assessment of the technical merits, but also the memory of earlier development interventions. In the case of Luapula, where competition for the resources required for fish farming is generally perceived to be low, such considerations become even more important. Many people do not need to know that they will get fish from their pond before they choose to dig the hole in the ground. There is little perceived risk. Some people therefore dig fish ponds in expectation of development assistance and as an indication of their own participation in a locally recognised culture of development. These people represent a fairly small group within the villages, who are the first to adopt new ideas and technologies. They tend to be men, and to be more socially and politically active. Among them are those who are adept at using the language of development. Non adopters of fish farming are generally people for whom other development interventions are equally irrelevant - until they begin to impinge on their lives.

The importance of other reasons for digging fish ponds varies with the perspective and needs of the farmer. The fact that ponds are likely to provide a source of favoured relish for contingencies and special occasions is important. The possibility of selling fish and fingerlings is also an attraction. Less obvious motivations centre on the function of fish ponds as a means to claim land. Many farmers have a long-term outlook towards their fish ponds. The fact of current lack of inputs or ability to manage the ponds, combined with the factors mentioned above, means that some farmers are prepared to construct ponds with expectations of benefit many years in the future.

As with many other interventions, the development objectives for aquaculture relate to improved household food security, to increased rural incomes, and to the diversification and strengthening of livelihoods. At the same time, these objectives are assumed (hoped?) to take place with minimal negative effects with regard to, for example, the gender division of labour and control of resources, and non adopters' control of resources including land.

The research found that adopters of fish farming are often people who are in a position to take advantage of alternative sources of fish. For them, the food security impact is therefore insignificant. Furthermore, the income gained from fish farming is currently also a small proportion of overall farming income. Nonetheless, as an addition to the farming system requiring resources with low perceived cost, fish farming may be valuable. In addition to the value of the fish from the pond, there are benefits in terms of improved water management and irrigation for vegetables. Fish ponds also represent a source of security and a permanent asset. The greatest food security and/or income effects of aquaculture adoption may coincide with lower levels of production of fish. This is because the most productive fish farmers are not necessarily the most needy. In particular,

for the few women heading households alone who have entered fish farming, the fish they produce are more important because of a lack of purchasing power on the market and poor access to fishing technology. These people are less likely to receive advice from extensionists.

At current levels of production, all members of fish farming households benefit from aquaculture. This reduces with increased commercial orientation. Labour contributions to fish farming are dependent on perceived benefit. Hence, the unpaid labour of the wives and children of male fish farmers cannot be taken for granted with increasing cash orientation. In Luapula, the withdrawal of male labour from other activities, such as land preparation, has not been a serious negative side effect of fish farming. This is not necessarily the case where a man has chosen to construct many ponds.

Under conditions of increasing resource competition, the spread of fish farming can have deleterious effects on non adopters, many of whom are less vocal members of the community. In Luapula, signs of this were visible in Monga area, in which there is mounting pressure on land and water resources close to human habitation. Because fish ponds can be used to claim land and to trap water resources, they have become a subject of political contention. Although one aspect of this contention is the extent to which women have been deprived of places to soak cassava, women themselves do not attend the meetings at which the disputes are contested

Projects

The research indicates the need for a more subtle analysis of project success and failure. Divergent stakeholder perceptions mean that before accepting that a project (in this case fish farming) is not working, it is important to ask **-in whose terms is it not working?** The various stakeholders in the process are each deriving different benefits, and possibly unequally sharing costs.

A first step is to move beyond seeing development projects as neat, bounded entities with straight lines from policy to outcomes. Long and Van der Ploeg (1989) point out the problems involved in viewing intervention in terms of discrete projects in time and space, which are ideologically neutral and have a fixed beginning and end. They argue that they should rather be recognised for what they are:

..an ongoing, socially constructed and negotiated process, not simply the execution of an already specified plan of action with expected outcomes. (Long and Van der Ploeg 1989, p.228).

Development projects are arenas of negotiation for groups and individuals. There exists a complex web of meanings from which different individuals weave their competing strategies (Crehan and von Oppong 1988). The ALCOM aquaculturist in Mansa, the Provincial Fisheries Development Officer, the farmers in Monga and Chibote, the extensionists, negotiate with one another and adopt each others' language. They are nevertheless constrained by their own structural positions.

They play a game which consists mainly of negotiating about establishing generally accepted rules but where, on the other hand, good tactics and strategy count as well. (Bierschenk 1988;p.146.)

What these interpretations of the development process have in common is the fact that they stress the importance of understanding the "interface" - the discontinuities in values and understanding at the point at which the different stakeholders in the development process meet (see also Long (ed) 1989). Not only is there a need to uncover the heterogeneity of the various individuals and groups specified as the "target population"¹, but these people should also not be assumed to be inert recipients of "assistance", "extension" or whatever. Equally, the "target population" are not the only ones whose priorities need to be assessed: what they do or do not do is only one part of the development process. The negotiations and priorities of the other stakeholders are as, if not more, influential in shaping the direction that projects take.

9.3 THE IMPLICATIONS

In practice, rethinking project success and failure may imply a range of things. Recent discussions have advocated the abandonment of projects entirely, and their replacement with a flexible process approach. In the case of aquaculture, it is likely that donor assistance will continue to take the form of projects for some time to come. However, there are both conceptual and practical possibilities for changing the ways these work in the future. What lessons emerge from the Luapula study?

The institutional context

External promoters of aquaculture need to give greater consideration to the motivations and interests of their institutional partners. Their cooperation may be taken for granted, but the incentives and disincentives for that cooperation are seldom made explicit. These issues are of course not limited to fish farming. They are equally applicable to attempts to promote livestock husbandry, improved varieties of rice, tractors, and many other new technologies.

A realistic assessment should therefore be made of the capacity and motivation of institutional partners to carry out their part in any project agreement. Weaknesses in government department participation are often cited as problems in fish farming projects. In many cases they might have been predicted.

This further implies that attempts to create a large and properly functioning extension service specifically for aquaculture are impractical - unless donors are prepared to commit themselves to projects lasting decades rather than years. Similarly, the rehabilitation of fish culture stations with neither an extension service functioning, nor government capacity for maintenance on the departure of donor support is pointless.

On the other hand, there is considerable scope, in Zambia at least, to improve the training and possibly the incentives of those extensionists that do exist - this means agricultural as well as fisheries extensionists. In addition, it may include training and support to indigenous non governmental organisations.

Extension

At a general level, training in fish culture should involve both technical aspects and training in principles and techniques of extension. It makes more sense for it to be part of an overall agricultural training than one for fisheries. Such training need not be carried out at a national centre. Indeed, local training of extensionists is more likely to ensure that the same language problems which emerged in Luapula are not so prevalent.

Agricultural extension also has weaknesses. Both capacity to operate and effectiveness of approaches are far from perfect. Extension services are also heavily dependent on donor support in order to be able to function. In facilitating the institutional change, donors should also address this institutional dependency. One key area to address is the incentives and working conditions of extensionists.

Existing aquaculturalists can take over much of the responsibility for the training of agriculturalists and people from NGOs. They in turn need to be trained in more than the purely technical aspects of fish culture. In particular, their training should cover a

range of socio-economic considerations (see below under "targets").

The selection of agricultural extensionists to be trained in fish culture should be made according to areas of existing fish farming activity. In Zambia, there is a need for more consolidation, and less promotion, of fish farming. Technical aspects of their training should focus on three main areas:

1. Pond location.
2. Fingerling supply. Equipping farmers with the knowledge of techniques of fingerling production and selection, in order to encourage the development of a private market for fingerlings.
3. Developing the application of the concept of a production cycle to fish farming. The greatest gap in farmer knowledge concerns breeding and growing times of fish, harvesting techniques, and methods of restocking.

Targets

Regarding extension approaches, decisions need to be made concerning who within rural communities extensionists work with. In Zambia, it is against government policy to identify particular sub-sectors within rural communities to be recipients of assistance. Nonetheless, partly because of the influence of earlier interventions in peoples' adoption decisions, early adopters of new agricultural technologies tend to be men, better educated and relatively resource rich, unless measures are explicitly taken to avoid this. This is also the case with fish farming.

As with other technologies, the benefit to these farmers of adopting the technology is not as great as that to poorer people. The justifications for allowing the de facto support to a limited group are mainly two fold: it is only through their adoption that the viability of the technology can be shown to those less willing to come forward. Hence there is more chance that in the long run the technology will become embedded in local knowledge. Second, the benefits from their improved productivity will trickle across to poorer members of society. In Luapula there is limited evidence for the latter contention. The first is more plausible, but the direction of causation between being a "better" fish farmer and benefiting from extension support is not obvious.

A decision to avoid the tendency towards support for mainly better off farmers implies significant intervention in existing political and social arrangements. For example, among the constraints of women mitigating against their adoption of fish farming are shortages of labour and insecure land tenure. There are only limited ways in which extensionists can or should be trained in intervention in such arrangements. On the other hand, the acceptance that women have difficulties in adopting fish farming has a self-fulfilling effect.

More important is gender training which allows for greater sensitivity to options which are differently available to men and women, and to the ways that they may be differently affected by the development of fish farming.

Monitoring and evaluation

If the extension service for fish farming is functioning, it is likely that a gradual improvement in pond management will take place. There is thus little point in spending time trying to measure pond productivity. Furthermore, a glance at fish ponds gives a fairly good impression of how they are managed. In the case of fish farming, it needs to be understood that sub-optimal management does not mean that benefits are not being reaped.

Monitoring should therefore take the form of careful attention to the training and working conditions of extensionists. In addition, an account of who is undertaking fish farming should be kept if it is felt necessary that the tendency for it to be an elite occupation is to be overturned.

Consideration should be given not only to who adopts the technology, but to the effects on non adopters, both within and outside of adopter's households. To do this, baseline information needs to be collected on land tenure arrangements and competition for land. This should be monitored with the development of fish farming. If fish farming is undertaken in areas of greater resource competition, it may be that its development among a relatively small group of farmers has negative consequences for non adopters

Furthermore, attention should be paid to the gender division of labour within fish farming households, and the way this is effected by the development of fish farming, especially with greater commercial orientation.

POSTSCRIPT

This report was written immediately following field work. Since then, these general conclusions were examined in the light of aquaculture development activities elsewhere - in Kenya and in Malawi. These comparisons and the conclusions arising from them are outlined in a discussion document (Harrison 1994b)

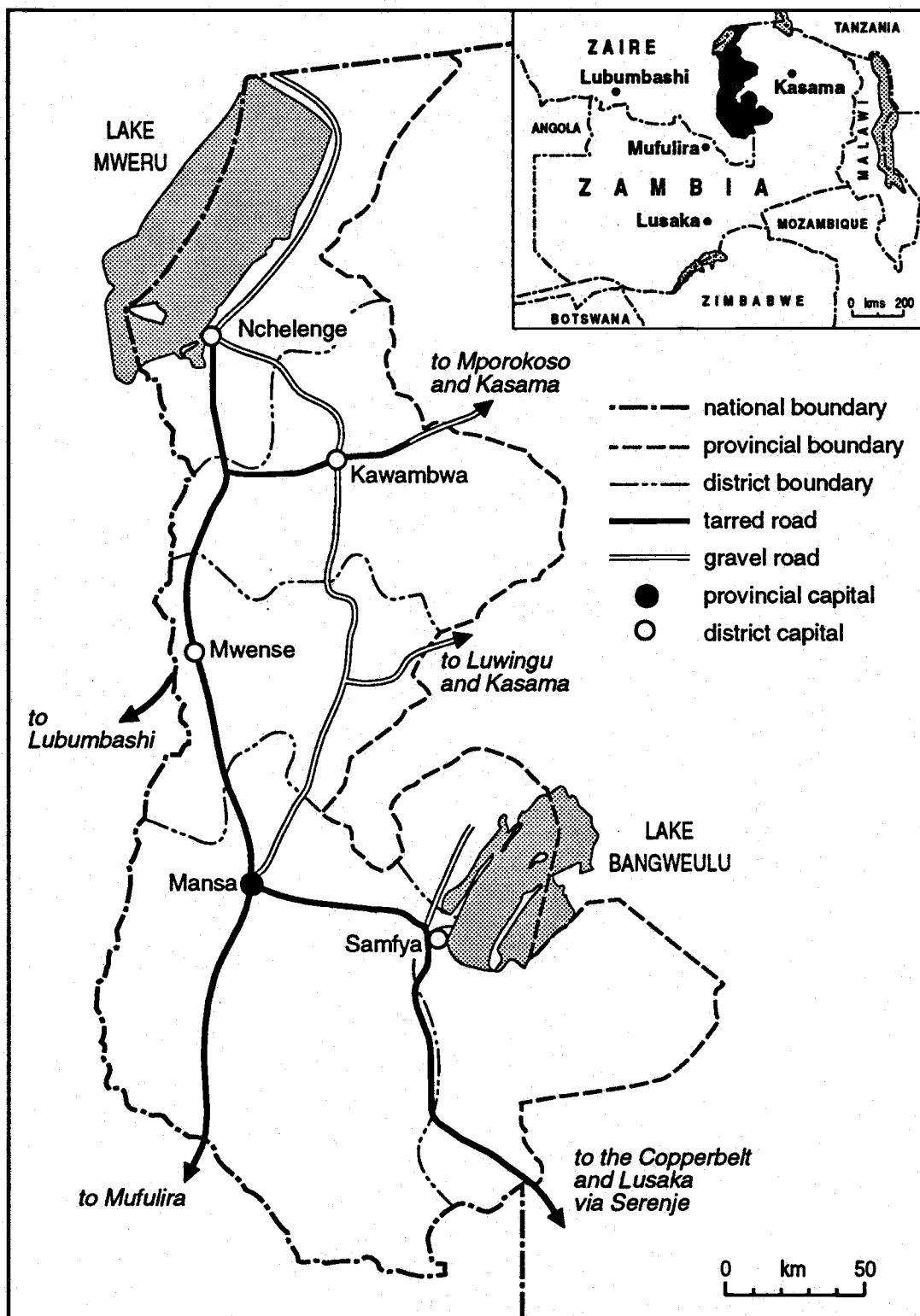
Since the time of writing, FAO, through ALCOM, has embarked on a project to strengthen extension services in Mozambique and Zambia. The focus of this will be the delivery of aquaculture information through the existing agriculture extension system. The Zambian project is based in Chilanga near Lusaka and will initially concentrate on the training of agricultural extensionists in Eastern, Central, and Luapula Provinces.

APPENDICES

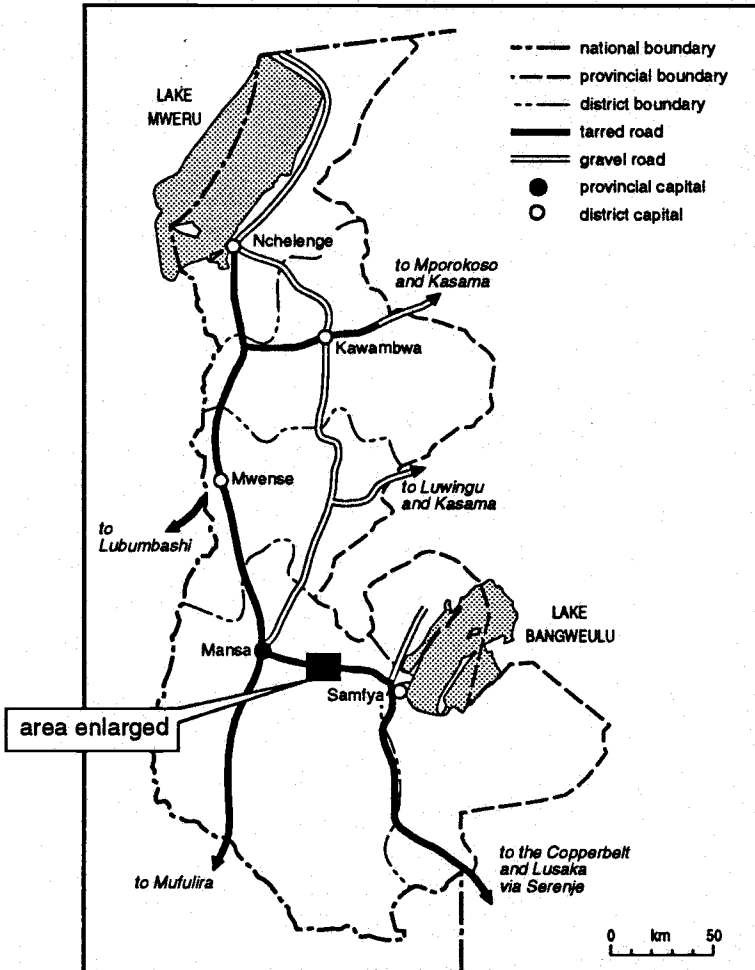
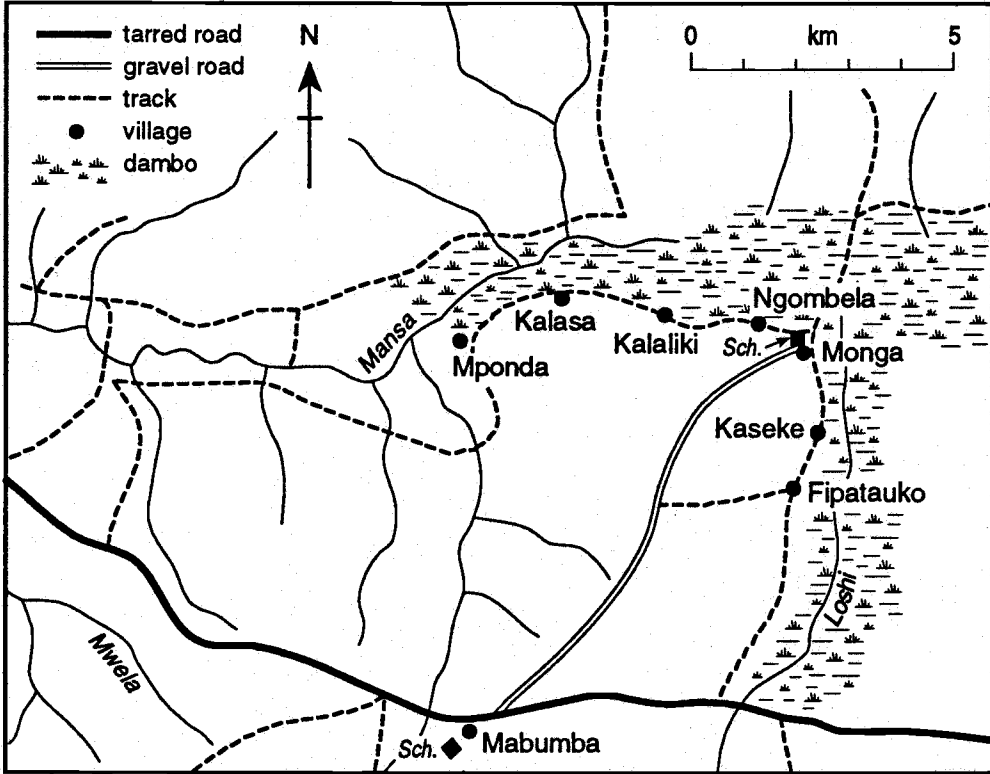
APPENDIX 1

MAPS

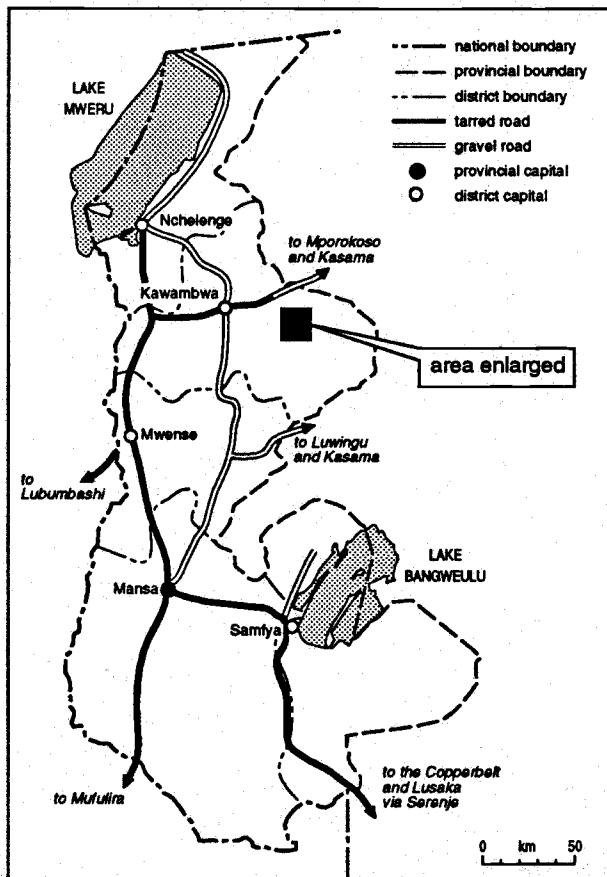
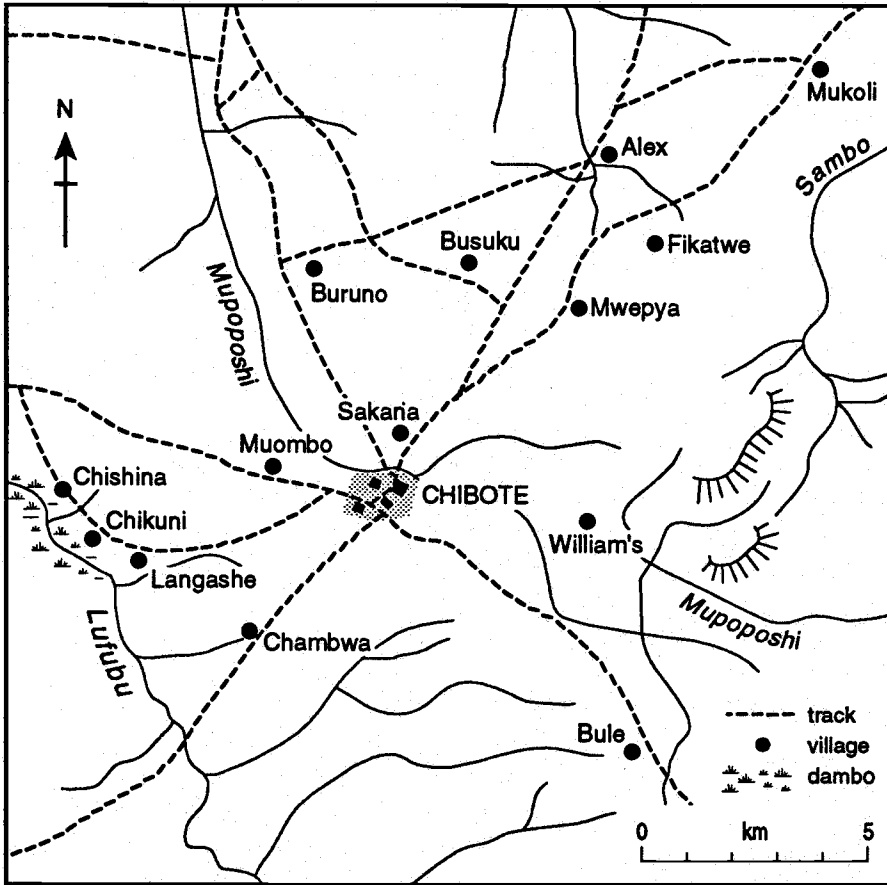
Map 1. Luapula Province.



Map 2. Monga area.



Map 3. Chibote area.



APPENDIX 2

RESEARCH METHODS

Research focused on two areas of ALCOM and DoF activity in Luapula: Monga area in Mansa district and Chibote area in Kawambwa district. Following a secondary data review and preliminary appraisal, the research methods used were: household profiles in two village research sites, case study based data collection and participant observation, farmer's diaries, and participation in extension activities.

SECONDARY DATA COLLECTION

The secondary data collection aimed to ensure that earlier work was not replicated and that findings concerning both aquaculture development and broader socio-economic concerns within the province were incorporated. In addition, and with the preliminary appraisal, it served to give broad research questions greater relevance to the specific research site. Secondary data covered included project documentation and research reports; anthropological and sociological research carried out in the area; governmental sources (fisheries department annual reports, policy documents); physical data (land, climatic); economic data on marketing, provincial development; other donor-assisted projects; nutritional status within the province.

PRELIMINARY APPRAISAL

The preliminary appraisal aimed to refine research questions and potential research sites for the later detailed phase of research. Over a period of three weeks, a range of techniques were used. These involved ranking exercises with groups and individuals, open group discussion, informal individual interviews, farm and village mapping, and observation. The techniques and approaches used are broadly allied to those of rapid and participatory appraisal.

The information gathered covered existing fish farming practices, perceived constraints, farmer views of ALCOM and fisheries department activities, motivations for fish farming, level of activity, and resource availability. Information was also collected on marketing and income generating opportunities, farming systems, institutional, political, and social structures.

Wealth ranking exercises used the perceptions of informants to rank households within a village according to overall wealth. This procedure provided information not only on the nature of social stratification within villages, but also revealed people's own definitions of poverty, richness and social status. Thus, it became apparent that for many men, the kind or size of house people lived in was not necessarily an indicator of wealth, but that being a "farmer" (growing plenty of maize, see chapter three) was. On the other hand, rankings with older women showed that a male head of household's ability and proclivity to distribute money and/or food was intimately tied up with concepts of his wealth. In all of the exercises, an attempt was made to illicit information on who the fish farmers were, and how they fitted into local definitions of wealth.

The aim of the preliminary appraisal was limited: to identify detailed research questions and give a broad picture of the fit of fish farming into rural communities. Given this, assessment of its value is principally based on the pertinence of those questions to the subsequent detailed research. Broadly, early impressions tended to correlate with later findings. Certain issues which during the preliminary appraisal, had appeared insignificant, later emerged as more important. These issues were specifically related to conflict - over land, and over the control of the project and government resources devoted to fish farming.

Such omissions are unsurprising. However participatory an external appraisal is, villagers' assessments of the kind of information they will choose to give are partially based on their perception of the role and priorities of the outsider or outsiders. In addition, local values regarding the expression or discussion of conflict are influential. In this particular case, a long history of development interventions stressing "community cooperation" combined with strong values of conflict avoidance to present a partial picture.

HOUSEHOLD PROFILES IN TWO VILLAGE SITES.

"Households"

The "household" as an empirical and analytical category is much contested in development literature. While development policy is frequently formulated on the basis of this unit being the means towards the achievement of objectives, objections are raised concerning both structure and processes within households. From one angle, conceptualisations of households as bounded and immediately recognisable units are criticised (Harris 1981). In the context of sub-Saharan Africa, generalised models of households as discrete units of production, residence, reproduction and consumption may be particularly inappropriate (Whitehead 1984). It is thus important in any particular analysis to specify the forms that household organisation takes or the basis on which a particular entity is judged to be a household.

From a second angle, the tendency to treat the household as a black box of joint utility is a common practice in much development planning. The neoclassical "New Household Economics" underlying this treatment has also been criticised for its failure to incorporate analysis of individual interests and strategies (Evans 1989, Kabeer 1991). Farming systems research, for example, tends to construct the farming system around a household in which labour supply and control issues, allocation of resources, and decision making are not subject to scrutiny.

Of course the household operates as an organising concept because residence, production and reproduction can be identified with particular units and because, within such units, a certain amount of altruism with regard to the other members is recognised. Obviously some form of cooperation will be a feature of household relations for so long as individuals remain part of the same unit (Kabeer 1991). The Luapula research aimed to specify the nature of that cooperation through detailed study of cases.

For the household profiles, identification and specification of what it means to be a

household are therefore important. In Luapula, descent and inheritance have primarily been determined by principles of matriliney. According to Poewe (1981), there is a structural contradiction in matriliney between the demands and priorities of the matriclan (*cikota*) and those of the conjugal household. Uxorilocal and unstable marriage mean that the household is an elusive entity. Within Poewe's description of Luapula, she allows that the matrilineal ideology is dominant but not held consistently in common by all members of society. That dominance is extremely doubtful in the 1990s (see chapter two). Though marriages remain unstable, and therefore households membership fluctuates, the self-provisioning nuclear household is now a clearly identifiable unit.

For this reason, households are defined in the first place by co-residence, with account taken of temporarily absent members. This is because, in the case of Luapula, units of residence are in most cases synonymous with units of production. Furthermore, such households have a recognisable identity as political units, identified through the name of the household head (Gatter 1990). The ciBemba word *inganda* refers both to the house and the people who live in it. Such households will then be the locus for wider distribution through kin networks.

The most common household structure resembles closely the nuclear family of a married couple and their dependent children. It may include others, such as divorced siblings of either men or women and, very occasionally, older relations such as parents. More often, such older relations would form their own household, possibly supporting grandchildren. Within the province, some 35.8 % of households have been identified as being female headed (Gould 1989). This follows the common classification whereby if an adult man is present, he will be designated household head. Female headed households are those in which the elder woman in the household is single, divorced or widowed (*de jure*) or the wife of a polygamist or absent migrant (*de facto*). The figure is based on 1980 census results. Preliminary results of the 1990 census (GRZ 1990) indicate this figure will be considerably reduced by increased return male migration from the Copper Belt.

Household profile

The household profile aimed to give a broad overview of farming systems, socio-economic background of households and fish farming practices in the two research sites. This wide and quantifiable overview was judged necessary in order to locate the case-study based information within a broader context.

A semi-structured questionnaire was developed using information from the preliminary appraisal. This was pre-tested in Monga area and modified. The questionnaire fell into two parts. In the first, general part, both spouses (if a conjugal household) were interviewed together, wherever possible. The second section referred only to fish farming activities and was separately addressed to all individual pond owners within a household. The survey was initially carried out during the rainy season in November.

Sample selection in the two research sites, Monga and Chibote, was not identical. In Chibote, a total of 15 villages were selected to represent varying degrees of fish farming "success" identified by the local fish scout. Each household in these villages was enumerated and identified according to the sex of household head and the existence of fish farming activity, producing a universe of 384 households. Of these, a random sample of

25% was taken in each village. The total sample interviewed was 96 households, of which just over half (52) included a fish farmer. In Monga, a natural universe was formed by the area enclosed by two dambos and the Mansa river. All households within the 9 villages in the area were enumerated, producing 225 households. A 40% random sample was taken in each village. The total sample interviewed was 96 households, of which 35 included a fish farmer. In total over the two research sites, 192 households were interviewed. 110 individual fish farmers in 87 households were interviewed.

Information in the general section fell into the following categories: household structure and demographic details; migration history, matrilocality; farming (crops grown, harvest, income and expenditure on farming); extra-household labour usage (not intra-household); main non-farming income-generating activities; major (contingency) expenses; asset ownership, including livestock; land access; social activity (membership and position in organisations and religion); and theft. Information was differentiated by gender wherever relevant (for example, with crops grown and income generating activities)

Information in the fish farming section covered: the number, stocking and construction history of ponds; current management practices; incidence and content of contact with extension; and harvesting (incidence, method, and destination, but not specific amounts).

In August 1992 a repeat survey was carried out in which all of the original sample of fish farming households were re-interviewed. The re-survey aimed to consolidate and provide a seasonal perspective to the November household profiles. Data collected concerned changes in household composition; farming activities; livestock sales; income sources; asset purchase/contingencies; theft; relish availability/fish consumption; and fish farming (harvest, training, experience of extension).

Data for both the first and second survey was coded and analysed using SPSS/PC.

Evaluation of household profile methodology

A number of factors affected the value and usefulness of the November survey results. Many of these are common to surveys in general and their effects were only identified subsequently during the case-study work - in other words they did not effect the internal consistency of the survey. If the case study work had not been undertaken, the November survey could have been justifiably judged valid. It is commonly acknowledged¹ that questionnaire surveys are not ideal for obtaining information which may be construed as contentious or sensitive. In different social and cultural contexts what is contentious or sensitive will vary but generally, information relating to intra-household control of resources and money is better obtained through other means. Furthermore, asking respondents to quantify things which they are not in the habit of quantifying (such as day to day expenditures, or quantity of inputs to fish ponds) may lead to unreliable data. As an aspect of this, asking people to recall events (which are for them) a long time in the past may yield very different responses from different people.

The reasons for such unreliability are also variable. In some cases the question may not be understood (this can be avoided by careful pilot testing and prior discussion

with enumerators and/or interpreters). More difficult to avoid (and spot) is conscious misinformation. This may occur because the respondent says what he/she thinks the interviewer wants to hear, either out of politeness or in anticipation of assistance. In many areas in which surveys are carried out, they are by no means the first in the area. This may result in antagonism towards the researchers, but equally likely, research may be associated with "projects" and it is then important to say things which allow oneself to be "selected". A corollary of this prior experience of research is that misinformation may be the result of "mischievousness", especially when people are beginning to doubt the value of all the other surveys.

The household profile therefore avoided obviously contentious subjects on the basis that these could be better pursued through observation and case study work. For example, no attempt was made to gather information on intra-household labour issues. Nevertheless, because of the association of the research with fisheries/aquaculture, there was possibly an incentive for people to distort information relating to ponds. The direction of the distortions depend on whether people want to express discontent with the extension service ("I've never been visited - ever") or show that they are a "good" fish farmer (exaggeration of yields or even number of ponds). Obviously such information can only be verified through observation which is not always within the scope of a sample survey.

Other problems involve the choice of informants. An extensive literature documents the tendency of sample surveys to misrecord or simply miss women's activities through both survey design and choice of informants². Pilot-testing of the survey with both men and women revealed that husbands and wives often have limited knowledge of farming and other activities which are undertaken separately. Thus, if a woman brews beer, her husband may have a limited view of the time, inputs or money involved. If a man farms maize separately from his wife, she will not always know what the harvest was. It was found that interviewing both spouses together wherever possible yielded the most complete information. The nature of gender relations in Zambia usually meant that the man would be the principal informant, but there were sufficient contributions from wives and other women at least improve the validity of the data³.

Such problems do not completely undermine the validity of the November sample survey, but they circumscribe the way that the data is read. Data should be taken as indicative and suggestive rather than conclusive.

In the context of the present research, the household survey was also a means to an end; approximately 80% of the questionnaires were administered by the researcher rather than by using enumerators. The remainder were administered by a technical specialist from the Institute of Aquaculture, Stirling, who was conducting complementary research. As a result, the household profile was immediately useful for selection of case study households and refinement of research methods to be used with these households. Even before statistical data analysis, broad trends could be identified which could help assure that the case study selection was as representative as possible.

In the second survey in August, a number of the biases experienced in the first round were reduced. The purpose and nature of the research was much better understood by farmers. There was therefore much less incentive to give false information (and much

less chance that it would not be recognised as such). Because basic household data questions had already been covered, there were fewer questions which the farmers had regarded as simply tedious and boring. Critically, there were no open ended questions referring to the past; the furthest back anybody was asked to recall was to the previous November.

CASE STUDY BASED INFORMATION COLLECTION AND PARTICIPANT OBSERVATION.

In each of Monga and Chibote, 12 case study households were selected, representing a broad range of socio-economic backgrounds and experiences of aquaculture development. In each household, one individual was the focus of the study, though relations with other members of the household were an integral part of this.

No attempt was made to reflect exact proportions of particular characteristics as revealed by the survey. Rather the case studies were chosen on the basis of their likelihood of illuminating specific research questions. For example, fish farmers and non-fish farmers were not selected to directly reflect their occurrence in the community; in each place ten of the households studied included at least one fish farmer. Information on the rest of the community was gained in large part from observation and group discussion.

The criteria for selection were not exactly the same in both places as key variables and tendencies differed. However, in both Monga and Chibote, case studies were selected on the basis of apparent socio-economic status and felt success or failure of fish farming activity. The former was weighted according to asset ownership and farming income and expenditure, as these recurred as the most important locally defined indicators. The latter classification was made according to both survey data and observation of ponds wherever possible. The classification was based on initial impressions and was modified in the course of the case study work. In Chibote, the number of women pond owners enabled this to be a factor in selection. In Monga however, only one female pond owner was identified.

In Monga on the other hand, closeness of association to the fish farming club emerged as a key factor in people's own perceptions of their success and failure. A balance between "insiders" and "outsiders" was therefore sought. By consciously choosing case study households who were both insiders and outsiders to the fish farming club, an attempt was made to avoid association with one or other faction. Everyone in the villages knew who were the households regularly visited and initially a fair amount of misunderstanding surrounded this: "why have you chosen them for your club?" Achieving this initial balance was therefore important.

Naturally in addition to these criteria, selection was also based partially on assessment of likely willingness to participate and accuracy of data given. In the course of the research two case study households (one each in Monga and Chibote) moved away, two adopted fish farming (in Monga), and one was abandoned because of unwillingness to participate.

Alternate months were spent in each research site. In this time, case study households were visited at least once a week (though some much more). During these visits data was collected through informal interviews, mapping exercises, pond visits and participant observation.

Information was gathered on a wide range of subjects. These include aquaculture practices; on-farm resource availability and use; economic and social aspects of alternatives and complements to aquaculture (eg vegetable growing); attitudes and perceptions of farmers regarding fish farming; women as fish farmers and affected by fish farming; intra-household gender relations - the sexual division of labour and household budgeting; land use and conflict; attitudes to livestock husbandry; the consumption and purchase of fish.

Evaluation of case study/participant observation methodology

Participant observation and time allocation techniques cannot be comprehensive in their coverage. By choosing to work in two sites 300km distant from each other, inevitably more information was lost than would have happened with residence in only one site. The value of the comparison to a large extent offsets this difficulty.

Residence in the villages and thus the opportunity to check and cross-check information over a period of nine months makes it likely that observations have a greater degree of reliability than those found in the survey. The detailed information from the case study households is also broadened by observation of others, by discussions with headmen, women's groups, by participation in village events such as funerals and weddings.

However, a complex debate surrounds the balance between the problems of reliability in surveys as against those of verifiability of more qualitative data. It should be noted that the qualitative/quantitative distinction refers to the data, not the way it was collected. Thus informal methods may collect information which can be counted. A number of critics question the objectivity achieved by a single researcher who is subject to all kinds of influence which cannot be controlled for and are not necessarily visible in the research report. Naturally enough, the kind of information collected becomes increasingly affected by those with whom friendship develops. It is not possible to remain a neutral outsider - nor to be equally friends with everyone in the village. Identification as the friend of particular people influences both whom is willing to talk and the information which becomes "data"

All of these criticisms have an element of truth in them. Their weakness is in the assumption that some kind of detached objectivity is achievable, even in a well organised sample survey. In fact, there is greater chance of making the presence of the researcher, and the various biases at work, visible in more qualitative presentations than in survey methodology.

PARTICIPATION IN EXTENSION ACTIVITIES

This aspect of the work was carried out both within the main research sites and more widely in the province. The village-based research methods aimed to answer questions relating to adoption, practices and impact of fish farming, as well as to village perceptions of extension. However, the picture would have been incomplete without examination of how the process of technology transfer is viewed from "outside".

Semi-structured interviews with extension workers and centrally based staff were undertaken. These covered information on the backgrounds, constraints, and perceptions of their roles - in relation to farmers, to ALCOM and to DoF. In addition, extensionists were accompanied on their work in two areas, Kawambwa and Lukola. During these visits, informal interviews took place with both the extensionists and farmers.

ALCOM activities in the villages and in Mansa were observed and participated in. These included a training seminar for extensionists in March 1992 and a number of fish farmer courses. In the dry season of 1992, 12 fish farmer mobile courses were organised by ALCOM/DoF. Five of these were attended by the researcher, during which socio-economic data on course participants was collected, and informal interviews with both participants and trainers took place.

Though the nature of the information collected is different from that gained through participant observation in the villages, the problems and advantages of the technique are not so. Issues around subjectivity and the influence of personal relationships also apply. In any case much of the information required related to perceptions, and understandings of roles. Questions of the reliability of the data become rather meaningless in this context. That information referring to "facts" such as occupational history of fish scouts, can obviously be cross-checked from other sources.

In the training courses, participation as a "fly on the wall", to not only the daily activities but the evening informal evaluations gave insights into both the relationships between the project and the extension workers and into extension workers views of the participants.

RESEARCH METHODS: CONCLUDING COMMENTS

Because the data requirements of the research were so wide ranging, a variety of methods was necessary for meeting them. Qualitatively gathered information and arguments derived from it are frequently accused of "subjectivity". However, the boundaries frequently drawn between qualitative and quantitative data are less distinct than they may appear; all quantitative data has a qualitative aspect (Lockwood 1992). It is a mistake to think that such subjectivity is the weak relation of some pure objectivity, especially that to be obtained through surveys. The November survey revealed that apparently "hard data" is equally the product of social and cultural conditions, of the personality and priorities of the respondent and of the researcher. Even when measures are taken to minimise these biases, they are to some degree unavoidable. The more observed an item of information is, the more confirmed by diverse sources, the better justification there is for taking it as fact. Thus, by approaching the research from as many different angles as is possible, there is at least the chance that as many of the various influences are taken into account as possible.

Appropriacy of research technique depends on the questions asked, and the information required. Nevertheless, the most appropriate technique is not always the most feasible. It was within the scope of this research to adopt a combination of techniques which included long term residence within rural communities. This is often not possible. Accordingly, the relative merits of other techniques need to be evaluated.

It is clear from the above that the time and effort required by detailed household survey (on the part of respondents as much as researchers) are often not justified by the poor validity of the data. Rapid and participatory appraisal on the other hand appear to give broadly accurate pictures and moreover enable the farmers to define their own priorities rather than just meet the agendas of researchers (ideally). Of course some research, such as a population census, has no interest in defining the priorities of farmers and a household survey may be the most appropriate tool. In the case of the Luapula field work the rapid appraisal gave some indications which did not correspond with later evidence and apparently missed other considerations.

Notes

1. See for example Burgess (1984), Ellen (1984), Casley and Lury (1987)

2. See for example, Dixon Mueller (1982); United Nations/INSTRAW (1984).

3. The issue of women tending to stay silent when their husbands are speaking was considered. Evidence from West Africa notes that only by interviewing women alone is it possible for them to feel able to give an opinion. The method adopted here may thus not be useful in another context. However, in Zambia, it was judged to be the best compromise.

APPENDIX 3

ABRAHAM KASONGO'S DIARY

Below is an extract from the diary written by one case study fish farmer during June-September 1992. The diary was written in English and copied before returning the book to the farmer. Between March and June, the diary was written in ciBemba and subsequently translated.

15th June 1992

I wash my body eat Nshima and sweech on to Mabumba I found cleaner cleaning the rooms I help her we clean atill we finish. Our friends find the clinic clean then the Asistant Clinic Officer came and teach us about the program for second week 15/06/92 Morning and Afternoon screening and dispensing drugs at the clinic. We work all day atill 16hrs thats when we nock off.

I said by to my friends and start come back home I pass in my field and collect sweet potatoes'liaves and take them straight to the fishpond, throughing them in ponds and drow water back home eat Nshima and keepon testing for few minutes we go to slip.

16th June 1992

Wash my body and each Nshima my father gave me K100 for helping me in food I start going atill I reach Mabumba I was late about 20 Minutes later then the Clinic Asistant officer came and start teaching about Theoretic teaching on the children clinic card and practicles in weighing and plotting weight we work all day atill 16 hrs I nock off and start coming back I pass in the field collecting food for fish I collect sweet potatoes's liaves and start came I went straight to the fishpond, came back with water and eat nshima, resting and My friend came to collect me to go and each Nshima we go and eat I came back and go to slep.

17 June 1992

Wash my body and eat Nshima then I start off I reach Mabumba and start cleaning. The Asistant Clinic Officer came and start off Village Inspection and Reporting (morning time) Afternoon screening and dispensing drugs. Around 16 hrs I start going back home. I pass in my field and collect sweet potatoes leaves and straight to the fish pond there after I came and drow water and came back. eat Nchima and rest for same hrs and slip.

20th June 1992

I went to the field to dig cassava ther we dig one 50Kg cassava and one basket mutonga. We came back and went to the river. With water cans we put cassava in the pond and drow water and came back My wife cooks Nshima and eat we keepon resting Afternoon I went to collect food for fish I collect sweet potatoes's leaves and came back straight to the pond I put the leaves into the water and came back we start resting antill we eat last Nshima we just rest for few hrs and go to slip.

21st June 1992

I was my body and go to church the we play and came back I found Nshima already and I was with my friends Moses Paul we eat Nshima and we go to drink Katubi to Mr

Chilundika my friend bought Katubi about K250.00 and start drinking antill at night we came back and each Nshima from house and Moses's house we eat too mills at the same time I came back and found my wife slipping and me I slip.

3rd July 1992

I went to the field to collect casava and my wife came she collect fire wood and come back I just go strait to the river put cassava in the water and drow water came back My wife is preparing Nshima we eat and take the book, went to the church for preparation Sunday Mass. then from there I went to dig sweet potatoes I came back and found water to wash my body I wash and eat Nshima with the same lelies dry bean liefs mixite with ground nuts she clean the sweet potatoes and put them on the fire my friend Moses came and my wife take out the potatoes out from fire she even put same on the plate and gives us we start eating antill finish my friend didn't stay he went back and we went to slip.

4th July 1992

I carry beans to the Garden I finish the bed and start planting beans I finish and put anather bed I went to the main station and open the out let I go back and start waiting the water to rich the place. water rich the Garden I started watering I finish and go to close the out let and came back to rest I found my wife pripared Nshima I eat and Keepon resting she pripare water to wash the bodys we wash and keep on resting atill 18hrs when I go to father's house I found them eating Nshima with fish my Mother gave me 4 fish to come and eat in my house I came back and found My wife pripared Nshima we eat, rest for few minutes and go to slip.

5th July 1992

Wash hand and face I went to see my father I found them I greet them My mother gave me an axe to cate fair wood I cate them and go back to my house I found water to wash my body pripared already I was my body and ware clean clothes go to Church we play the Lord and came back I just carry the plate to the Garden watered vergetables came back and eat Nshima see where my friend is I found them drinking Katubi Join them atill its at night I came back and I found my wife inside the house I knock she open and pripared Nshima I eat and go to slip.

6th July 1992

We go to the field to collect Cassava came back when I rich the village I found ELIZA around Mr Kaseke I said hellow she wafes me I go to the river put cassava in water and drow water came back and go to great her we shake hands she take snaps and give me. Henry came and great her we tolk and love together Henry goes then Eliza tould me she want to see the ponds we go there we even rich the Garden I show her the plan we came back she tould me that she brought me a wind braker nice one I thank her and she promise to bring on Wednesday we came she go. I eat Nshima and go too slip.

7th July 1992

We go to collect cassava we came back straet to the river we carry where to bring water for drinking and washing, back from the river each Nshima and wash our body I carry the left food to the fishpond I come back and found Nshima ahead pripared I eat and start resting after rest we go to slip.

8th July 1992

We go and collect cassava we came back and each nshima I dig sweet potatoes and get same ground nuts. Then Eliza came back from Mponda she told me that she want to collect the books from the Guys she give mea clothe I thank her and she collect books and talk together the she go I said buy. I went to choir I found my friends around sing song I just join them, We finish. we go to our houses Ifound my wife pripared Nshima we eat I wash with my friends and start resting after rest we go slip.

9th July 1992

We go to collect cassava we came back I go to the Garden water vergetable and came back eat Nshima and wash my body and start cating air with my friend Moses then Eliza came she brought me a fail. She gave me I thanks she go tell me about the Eggs which she was given by mr Kaseke she go and I go and finish my friend catting air he go and I start writting my notes evening we eat Nshima with Vergetables and starting waiting for the night to slip, we just wait for about 3 hrs, we go to slip.

14th July 1992

Morning I work up and clean my teeth. Kapansa said later go we go to the Grainding mill there we change our clothes and start working atill 17 hrs they brought us shima with chicken and vergetables we eat and change the clothes. We go to the station and get a refued (lift) we rich Mabumba and start coming after old Samfya road the car came and pik us to Mables father's house there we start coming we was having Katubi 5 lites we rich home and resting we eat shima and put water on katubi and start drinking father, Mapansa, me Moses and Henry, Henry promise me onion and told me to collect tomorrow. ther we go to slip.

15th July 1992

I to Henry's house ifound him to the Garden I go there I greet him he replied then he said you have came to collect seeds I said yea he gave me same vergetable and seeds. I start of I found Mr kapansa is ready to go he said lam going now and me I start journey to the Garden I carry seed and make a bead I plant seeds and came back wash my body and went to ENOCK Kunda to collect the hoe I found him around after same hrs I ask him about the hoe he said come on 17th July I will finishit. I come and each Nshima there after some hrs we go to slip.

16th July 1992

I went to the Garden and water the vergetable I came back. goto dig cassava came back carry the bucket we put cassava in the pond and drow water came back and rest she pripared Nshima we eat and washour body I went to see my friends jacob Chilufya Joefree Nkandu and Poul Mumba they were drinking Katubi I join them we drink I did spend mach of the time there I came back and went to the fishponds I feed the fish and came back I found my wife pripared Nshima. I eat with my friend Poul Mumba and the young man Kanta Chanshi we started resting atill slipping.

17th July 1992

I went to see my brother in low about seeds I want across the river and Ifound them eating Nshima I greet them they reply welcome and give me a sit we talk about seeds and he said lets go to Chibangu Peter collect the seed is the one kepty seeds went to Peter

Chibangu i was not there but the wife was there she gave as seeds and come back to his home found my sister pounding millet I start cutting fire hood we eat Nshima and came back with them straight to the church from there we go to drink Katubi came and eat Nshima with my friends rest about 2 or 3 hrs we go to sleep.

18th July 1992

I go to collect fire hood came back and take seeds I went to the Garden and start digging make a bed and plant seed watering them came back and eat Nshima I go back to draw water came back and wash my body went to see ENOCK KUNDA I found him cleaning my hoe I wait until he finish I came back carrying my hoe I found my wife in side the house she prepared Nshima I eat and keep on rest my friend Moses came talk and love he go we go to sleep.

19th July 1992

Morning I walk up and go to the Garden watering seeds and wash my body there come back and dress the new clothes eat Nshima and go to church after church I went a cross the river to see my brother in law he is sick I found him sleeping outside the house I ask him the cause, he said chest pains I give him an advice to go to the RHC he said he will go after 2 days I ask my sister to give me an axe she gave me I went to cut fire wood I cut a big piece and come back I start cutting I finish and start coming back home and found my wife prepared Nshima I eat and start resting we talk with my friend Moses until he go to sleep we get inside and sleep.

20th July 1992

I go to the Garden I start digging around 12 hrs I sow my daughter Kalaba came to collect keys I gave her she came back I dig all day after digging I start watering seeds and cook water to wash the body after washing I came back and eat Nshima with my grandson we finish and go to see my father and Mother I found them eating Nshima she give me the left Nshima I eat and came back I found Mr Kaseke around the house and said here are the keys look after the passes I open the door and look all around the house I came and locked the house we start resting my friend Moses came to visit us talk until 22 hrs then we go to sleep.

21st July 1992

Morning I go to the Garden and start digging I finish I came back and open the water and start watering the plants came back and start the journey across the river I found my brother in law slipping I ask him he said still I am suffering about I am planning to go to the clinic I spend 4 hrs my sister cook Nshima I eat and take the fertilizer and came back I pass to my father's house and came I found Eliza arrived in this place I greet her and go to the house I found Nshima already prepared I just wait for few hrs and start eating I finish and wash my body and go to see Eliza we talk and love until I came back to sleep I found my wife slipping and me I just go straight to sleep.

22nd July 1992

Morning I go watering the seeds after watering I came back and wash my body and go to my father's house to get the biscuit and start the journey to Kalaba to get the millet. I found the one who has been given the money is not around I start waiting for him around 14 hrs he came and give me millet I go where the people in the village where drinking the

coll me and I join them around 15 hrs I start coming back I found my wife is not around I go to my father's house and put millet then I show my father the fish for sale and the price is K200.00 he take the fish and I start coming back straight to the house. I found my wife preparing fire and start cooking Nshima with dry vegetables we eat and I go to see Eliza we talked until I came back to sleep because I was tired I just go straight to sleep.

24th July 1992

I went to the Garden and water the plants I came back and wash my body eat Nshima with vegetables with my friend Moses. I went to see my uncle and came back to see Eliza I told her that now I am going to Mabumba I went to see Mr Kapompole I found him and we start the journey to Mabumba, there we found the Chief was not there we start coming until we reach Kaseke I went to the fish pond with the sweet potatoes leaves and start throwing them into the fish ponds I draw water and came back I just start resting until I go and see Eliza she told me that she is from Chiteta we talk until I came to sleep I found my wife eating Nshima with vegetables I join them until we finish we just rest for few minutes and go to sleep.

25th July 1992

I went to the Garden and start digging I dig until I came to open the water and go back to the garden start watering the vegetables I finish and came back I draw water and start coming I found my wife around and she is cooking the green vegetable I just wait and ask her what she was doing she said she was pounding cassava for sale and she went to collect fire wood then she start cooking she prepare Nshima we eat and rest for about 3hrs we go to sleep.

26th July 1992

I went to the Garden and water the plants came and washing my body dress and went to church from there I went to see my friends the where playing card I spend 2 hrs and came to the house I found my wife cooking sweetpotatoes, I start writing the letter to my friend I stop I went to see Eliza she ask me to ask her she will go any look for Malasha for about K50.00 we just wait for about an hr the friends come they stop and I got in side the cor Eliza started coming we even start we rich Kaseke and come out then after some hrs I brought Nshima to them Eliza gave me soup I came back to sleep.

27th July 1992

I went to see my Uncle I found him very sick I pass there and went to the Garden water the plants came back my wife is preparing for a journey to Mansa she will be taken by Rainy, I found she have prepared Nshima I call my friend Moses to come and eat Nshima we eat with African plone and g.vegetables I went to see my friend from mansa I found them outside then my Uncle call me and ask me to talk to the people from mansa who is Eliza's friends to carry the sick person to the Hospital. I come back and ask them they said yes they will carry him they carry him to the Hospital this day we did walk any job in the evening my wife cook Nshima with beans we eat and rest for about on hr and went to sleep.

29th July 1992

I went to the Garden water the plant come back help my friend doing serve all morning

come back and found my wife prepared Nshima eat and went to the Garden to water plant came back went back for serving come back and rest went to Eliza's house and talk spend maybe 2 hrs come back and eat nshima and went to slip

2nd August 1992

I went to the Garden and water the vegetable I finish and came back wash my body, dress and go to church came back eat Nshima and went to Jacob Chilufya's house there I found my friends drinking beer I join them and drink all day around 23 hrs my friend Moses say now we can go we start coming back and rich the houses we went to my friend's house and found his wife sleeping he knocked the door his wife open the door we enter she prepare Nshima with Chisense mixed with vegetables we start eating atill we finish I told my friend to go to my house if theres any Nshima there he said no just go he its okey I came to my house I knock on the door 6 times my wife said just go back where you came from I said why? she said you spend the money without buying Chitenge for the young girl Chipampe I said open please she said no antill I go back to my friend Moses again and ask him for help he came to my house and told my wife to open the door then she open my friend go back I enter the house she start saying you have field to send me back to my mother so you pride me which mean I pride her I said okey tomorrow I will send you back and she talk may words but myself I just take off my clothes and go to slip I left her talking.

3rd August 1992

Morning she start talking I just started collecting plates, pots everything and say you can go she carry plates and came back with her Mother her brother to help her carrying things they go back I went to collect cassava leaves come back and went to the fish pond there I just fo strait across the river, I found people making the box for the dead boy from Zaire. I spend about 5 hrs there and came back water the garden and came back I went to my mother's house they give me Nshima with vegetables I eat and come back to slip.

4th August 1992

I went to the program for church choir to my big sister across the river we found my brother in low clearing where to dig the soil we start diging and make bricks we make 878 bricks we eat Nshima with Chisense and vergetables then my sister bring money for the bricks this is K1400.00 for 2000 bricks. We put the day when we shall go back to finish the chairman sayed on 11th August we came back I just go strait to the garden to water plants I came and went to my mother's house there I found Nshima with fish from the liver I eat and came back to slip.

5th August 1992

I went to the Garden to water the plants I came back and drow water, make fire I went to seem my ancle I found that the same no change I came back and wash my body ware clean clothes and start the journey to Mabumba I found my friends I greet them we wait for the Chief, and around 1030hrs he came and we start the meeting, Opened by the chairman AGENDA Last meeting's, minutes and this as follow hundred Kwacha for every village for making patient's house clean to give Chief mabumba certificates there they give us certificate and we went to the clinic the Chief and the Chairman went to the Assistant Clinic Officer's house then Banda said next week he will bring our kates. I start coming back I just work about 2 Kms from Mabumba the vinctle came from mansa they

carry and rich mye house I go out and say thanks I just go strait to my Ancles'house I found the same I went see my Mother if there's any food? I found sweet potatoes she giveme 4, I came to my house and eat all I went to seem my ancle there we spend all night without going to sliep he his very sick.

6th August 1992

I wash my hands and face and take the hoe went to the Garden I put the hoe and start mesuring the plat to give for piece worlk I finish and water the plants I was with Enock Chisala we came back and went to my mother's house I found Nshima with Chisense and start eating, finish and came to the sick person stay the about 4 hrs then we went to collect fire hood to Mr. Kapansa's land they we found firehood and collect them we was 4 first Mr. Stephen Kapompole second Bashichanshi thirdy Vincent Chisala and fourth myself we came back and start cating them into piecese then my friend Moses call me to eat Nshima I went there and found Nshima ready my friend wash his hand and give water to me I wash we start eating we eat Nshima with fish from the river We finish and go back to the petient we just stay they about 2 hrs and came to slip.

7th August 1992

I went to the Garden I carry verltilizer I rich the Garden and start digging I finish or stop and start putting verltilizer on the vegetables I finish and open the water water the plants I came back and wash my body my Mother came and say day are you sick? I say No, I was digging I just came very soon then she said goo and get food I went there and found Nshima with Chisense I eat and came back to house I sleep for about 2 hrs and we up went to church choir from there my friend Moses call me to drink Katubi and eat nshima with fish from the river I just eat Nshima and went to see the petient I just spend an hr and came back to slip.

8th August 1992

I went to see my Ancle Loster Mulela I found Mr Kaseke outside and the young brother Andrew Mulela I just go straight inside I found my Ancle still the same I try to ask him he said he is not filling well i came out and take a net went to the big river which is Mansa river I got five big fish and come to the fish pond there I got 18 fish I give Chilambe Justine 4 and take the lest to my Mother I found Nshima pripared my sister bring water I was and start eating I finish and went to see my Ancle I spend 3 hrs and went to the Garden water plants came back found Nshima eat and went to see Ancle came back and cook maize for him give it to the child and went to slip.

9th August 1992

I went to the Garden and water the plants I came back Mr Kapansa ask me where he can beer ther Mable's father said beer is at Chapa Village Mr Kapansa borrow a bicley from Mable's father and gave me K500.00 for beer I collect the plastics and start going, they I found the owner outside she greet me I reply and ask if the beer is finished she said no I got inside and she start saving me antill I came I found my mather making Nshima I took the beer inside and start priparing water to wash before eating we wait for few minutes mother bring Nshima with Chisense mixite with groundnuts we eat (4) four I went to my house and stay for 5 hrs came to mother's house eat Nshima with fish from the river we finish and my headche spaining I even eat Maize and go to slip.

10th August 1992

I went to see my Ankle I ask him how is he filling he said the same leg and abdomen is very paining, I came to my Mother's house I found her cooking Nshima she even prepare the lelies she call me to go and collect Nshima I brought Nshima with fish to my father and we eat, I went to the Garden water the plants and come back to look after the sick person around 12 hrs Mr Kapansa give me K200.00 for beer I bought Katubi from Costertino Mupeta's sister, I did take part I went to see my Ankle I found him slipping I came back and carry bathing soap and went to the river to wash my body. Come back eat Nshima with vegetables and fish from the river again I went to see my Ankle there I found Mr Kapansa asking Ankle about going same where can be a private Doctors I stay there for about 3 hrs and come to slip when I got inside ENESTE brought the money K375.00.

11th August 1992

I went to water plants carry an hoe went to the program to my sister making brakes there I found Poul Mumba and Julius Mwelwa waiting for a group to arrive we eat Nshima with fish and green vegetable after eating we start digging the soil we finish our friends didn't come so we think off four work we change the job and went to the next program to Mercy Chama she is a Member there we start taking off shalfes from Maize and we finish taking off we start carry the Maize home we finish and sit near the house and she prepare groundnuts with lotting cassava we eat and came back collect the book and went to the practice song to the church, from there I came back and I found aman from Samfya selling dry fish I bought fish for about K200.00 I found Kalaba Given is here I gave her fish for about K100.00 and My Mother carry the left ones, and the Money is from ENESTE MWABA he borrow Money from me last year and give me on 10th August 1992 and the Money he borrow was K370.00 I went to eat Nshima from there I came back and went to see my Ankle from there came to slip.

12th August 1992

I went to see my Ankle Loster Mulela I found people around my village there and I found him still complaining about the leg, Abodmin pain and not going out using the toilet. I came out and went to the Garden to see the vegetables I and my big sister, Moses we rich the Garden my sister started taking bean leaf and I, water plants. We came back and found Mother prepared sweet potatoes we eat and come back to the sick person spend almost 3 hrs and went back to mother's house eat Nshima with fish and bean leaf came back and went to see the sick man, from the I came back to my house to slip.

13th August 1992

I went to see my sister and I found her at my Mother's house she greet me and say that please Abraham can you go to Mansa to sell Maize for me I said yes she give me the National Card she said I will wait for the vinctle from Mansa so I came back to my house and start writting yesterday's work I finish and went to the Garden to water plants came back start waiting for the viancle antill evening I eat Nshima and went to the house to slip.

14th August 1992

I went to see my Ankle there I found Mr Kaseke and said to me that I must go and see banda if he can help us to come and give medecine to the sick person I went to Mabumba

and fund Banda there I told him about the case he said there they don't have any help which they can help me. I started coming and rich home I had to splain to my Ancle about the Doctor I went to my house take of the shoes and went ot my father's house I found Nshima with fish. I eat and come back there to the sick person and stay there for about 3 hrs came back and slip.

15th August 1992

I went to see my Ancle I ask him how is filling he said the same no change then Mr Kasese said Mr. Chilambe said before I came that I must carry a coat to go and exchange very far from Monga abut 22Km away and get the Medecine to Mr. Tuli I take a coat and the biscley and went to Kalaba on the way to Chief Kalaba I meet a Man and said to me if I am selling a coat I said no just for exchanging he said I have the Male one is that a fimale I said yes and drop down take it out from the biscley I started going antil I rich Kalaba and around 12 hrs I found my brother the Headman Mr Tuli is not there his doghter said I must go and look for him she go and look for her father she came back with him he greet me and sayid why I have been there I told him about medecine he said you can go back I will brought Medecine tomorrow I came back and rich home I had to explain to my Ancle went to my Mother's house and said Nshima with green vegetables is inside the house I eat, came back to slip.

16th August 1992

I went back to Kalaba to collect Medicine I found the Doctor preparing medecine and start explaining to me how to use the medecine I came back to my brother's village he bought 2 cups of Ombwa beer I drink and start coming back, I found my Ancle very very sick, I start meking medicine, finish and gave the ill man he eat and wait for about an hr the stools start coming out, my mother call me to and eat Nshima she show me the place I went to the house and take Nshima outside, start eating finish and come to see my Ancle there the said a child is very sick we went to she her we found her very sick, I told them to take her to the clinic they said no we did not go to slip we was waiting for my Ancle because he is very sick today around 24 hrs the child got dead. I went to tell Mr. Kasese Mr. Kapompole, father and my sister, I come back and made fire I spend all night there.

17th August 1992

Morning I come to the house and slip for about 2 hrs go back for church choirs the child's name is and she is my sister's daughter we sing all morning and in the afternoon we take the body to the claveyard we burry came back and went to collect fire wood came back and went to the big house I found mother cooking Nshima with meat I eat and come to the final from there I went to she my Ancle he told me about legs and hand and said that is the only thing which puts him on bed and to penful about the abodoman he said is okey because now is going outside. I went back to the final we did slip just talking and woman cleing antill morning.

18th August 1992

I wash my face, around 11hrs my call me she said I can go and call my brother in low to go and eat Nshima we went to the big house found Nshima with green vegetable and Eggs we eat and come back around 14 hrs another final to Chilonga's village we went there we found people Making a box we just wait for about 4 hrs we come back to our final stay, my ancle Loster Mulela call me to take him outside I put him on my back strait to the

back of the house we put him down and leaf him there. Came and stay to the final place from there he call me to brought him inside there I take him inside the house and stay there fore about 3 hrs. From there I went to the big house I found Mother and father eating Nshima with Meat I join them we finish eating I came to my house and wash my body went to see Mr. Loster, I found him still the same I come back to slip.

19th August 1992

I went to see mr Loster from the I went to the Garden and my brother come and ask me about the way of gating lelish I said we can go and mantern the bank in the river we went to built the bank and we carry what we call in Bemba Umono we carry 2 we built and put same Myono there came back drow water make fire and cook water wash the body and went to Mother's house I found sweet potatoes and Nshima with fish from the river I eat Nshima and carry sweet potatoes to the house and put them in side the house found the massage from Moses Mrss. Vincent told me that I am wanted to go and eat Nshima I said no I am over I went to see Mr Loster I ask him how is filling this evening time he said the same. I came back and went to slip.

20th August 1992

I went to see Mr. Loster I found the house is full of people I told them to leave the sky person alone some come out I ask him how is he filling he said leg and coughing is very very painful I come back and carry conterner to the Garden and start digging my brother come, and said to me lets carry thrones to privant the Myono. We cate the thrones and take them to Mansa river put them into the Myono come back, I went to the MMD Meeting and found many woman talking that the money which was given from M.P.s Chisha for building a club is for those who vote for MMD or MMD members only I said to them your not going to build if you want to follow that they said no and said again that they sweat for companing or surporting M.M.D. I came back and leave them there strait to the house I found the child waiting for me and told me that to Morrow will be the Meeting Mr Banda will bring a KIT I thank the chap for the information, from the house I went to my Mother's house she gave me Nshima with dry bean leaves I eat and came back to slip.

21st August 1992

I went to see mr Loster Mulela I ask him as I do every day he said still the same no change I came back and went to the Garden water plants and wash the body drow water for Mother. I found Mr Banda arivead already I just dress the clearn clothers and take the book went to the school we wait for people only headman Ngombela the lest nathing we wait for about 2 hrs no body came Banda said he his going back he will come back when they will be ready to atend the meeting we came to my house My father said I can dig sweet potatoes for my friend I dig and show him the way to use back to mabumba I gave him sweet potatoes and come back. Mr. Kaseke said I can go and pick Mr. Lost inside the house I went there we pick him in site the house came and found Nshima with beans eat and come to slip.

22nd August 1992

I went to the Garden water plants my brother came he said we can go look for the Mweno today I went there we found nathing we came back I start diging at the Garden, I came back and drow water I found my Mother cooking sweet potatoes she put some on a plate

and gave me I eat from the I went to sweep the house and went to see Loster Mulela and I found no change he told me that even Andrew is very sick, I went to Andrew's house I found him in bed ask him why he said I started filling malaria yesterday and Headche pain, legs and hands I told him that all those are malaria and he said Mr. Kapompole gave him same Asprines and chroloquines I just told him that he will be okey I came back and found Nshima with flesh bean leaves I eat and came back to slip.

23rd August 1992

I went to see Mr Andrew Mulela and Loster Mulela both I found the same every one is complaining about the same problems legs and body pains came back and wash my body dress and went to the church from the church I came back I eat Nshima with Chisense came to the house found women with their babies waiting for me I ask them why the said they brought their children their savaling with diarrhoea body hotness the name are bana Nkimya ba Mumba Katika and ban Chanda I gave them madeicine and went to see Mother she told me that nothing to eat I came back to slip.

24th August 1992

Iwent to see Mr Loster and his brother Andrew Mulela I found that Loster is still complaining about the same thing Andrew said he want to go to the clinic I went to the Garden and water plants came back look for food I found Nshima with meet from the man stay across the Mansa river he isexchanging with Maize I eat and went to see Loster Mulela again I found that he has changed from what he looks, My Mother told me that I can go to the big house and eat Nshima with same lelies I went there and found the food I eat and come back to the house and go to slip.

25th August 1992

I went to see Loster Mulela I found many people there I got inside and ask him, he said still the same theres no change I come out and went to Moses's Mother she blew the beer Katubi for Henry's work he dig a plot to the new wife's mother Moses gave me 2 cups I drink and went to the Garden I found Bwalya Tandeo and John Kapinga digging Bwalya is working a piece work for a drausers and John is money from my brother in low I start making a bed for Chainese I finish we nock off I come back and found Nshima with chicken from my sister in low Bana Sankalo I eat and went to the house Henry's brother came and said I am wanted to Henry's house I went there and found Nshima with chicken and beer Katubi I just eat Nshima and drink very little came and went to slip.

26th August 1992

I went to see mr Loster Mulela I found him sleeping on the bed I ask him he said today is over he said he don't know if he will be alive and said he want to talk to Timothy Mambwe before he past way, from there I went to the Garden started cleaning the bed after that I start transplanting Chainese I finish and came back, went to the Church and start placatising same song their we talk about our visitors from Kalaba Chathoric Church the group sent me to look for Chisense in mansa on 27th August they gave me K800.00 from the choir came straight to Mother's house I found Nshima with fish wish my father bought from jacob Chilufya from his pond, came back and went to see mr Loster came back and slip.

27th August 1992

I went to the Garden and water the plants I wash my body came and see Loster Mulela, from there I came to my house and dress the learn cloth went to mother's house there I found Nshima with fish I eat and start going to Mabumba I reach Mabumba around 10 hrs and got a left around 14 hrs In Mansa I bought Chisense K640.00 which is 4 balls I came to see Mr Kapansa and I found him he gave me K200.00 for transport money came back around 21 hrs and found Nshima with dry bean leaf mexit with groundnuts I eat and come to the house to slip.

28th August 1992

I went to water the plants came back I found the final Headman Mponda is past away I start dressing myself Jensen came we talk to him about the program of water problem after talking to Jensen the people from Yourth and Sports came there three one call me, and ask me where Henry stay he ask me I am a member of fish farmer I said yes, he told me his Simfukwe and ask me my name wewent to Henry's house we found him and discause about loans for fishfarmer not in a community but individual and said if any, they can came on friday nexit week, from there went to Mponda to atend the final come back went to church come back eat Nshima with chicken came back and went to slip.

29th August 1992

Collecting of fire hood came back went to see the Myono in Mansa river I found one of them eaten by animals two of them with fish came back eat Nshima and went to Church for pripareshion I found girls cooking vegertables and chisense. Come back and went to the river looking for lilies carry the next I cought 30 fish from the fish pond. I found Nshima with fresh bean lief I put 3 fish on the fire after loeining them I start eating Nshima finish and went to the Church I found the letter from Kalaba Church Choir that there not coming I came to the house and went to eat Nshima I found Mother pripared Nshima from the pond I eat and come back to slip.

30th August 1992

I went to wash my face to my father's house, there I found Mr. Kapompole he call me and told me that my doughter is sick, I went to she her I found that its true I came back and ask him about transport he gave me a buscle and took her to the clinic there they gave her injection I meet Bana Pemba and she gave me K400.00 for buying her fish, I came back I found Mr David Lengwe I ask him about lilies he said I can gave him money and I gave him the money and said I can go and she him tomorrow I came to the house and found people where waiting for me there after medecine I start giving them and went to mother's house, eat Nshima with Chisense and come back to slip.

31st August 1992

I went to the Garden I start watering plants and put same medecine to the vegetables came back and went to see David Lengwe I found his not there I came back and wash my body eat Nshima with fish from the river, went back found him there I ask him about the fish he said I can wait antil Nshima got ready the wife pripare Nshima with fish and vegetable we eat, he gave me fish for about K400-00 which is 33 fish I came back and found people inside their houses I just put fish on top of (Ichiteba) thats where we put groundsnuts and go inside the house and went to slip.

1st September 1992

I went to see my daughter Chipampe I found her the same came back and went to the Garden and water the plants from there I start digging the fallow came and wash my body and start washing cloths come and eat Nshima with Chisense and went to the house from the house I went to see Chipampe again I found Bana Kalaba washing Mwange I got Chipampe and sat on the stull she pripare Nshima with cassava leaves I come back and found Nshima with Chisense mixed with groundnuts I said I eat another so I am okey, I just went to the house and went to slip.

2nd September 1992

I went to see Chipampe I found her not so bad I come back and went to the Garden start finishing the fallow I finish and water the plants come back drow water and went to the big house eat Nshima with bean leaves and went to Church for priparation for our friends who will came on 5th September come back and found mother cooling sweet patatoes we eat and went to wash the body after washing I went to Mother's house I eat nshima with fish from the river and come to slip.

3rd September 1992

I went to see Chipampe I found her only coughing My wife pripare rotting cassava with groundnuts we eat with children came back and went across the Losi river to got the Medecine from my brother in low Mr Patrick Chama, I found them havesting Maize I help them taking the maize from the farm from there we came back my sister cook Nshima with eggs and chisense mexit with groundnuts we eat and come back my sister ask about the cassava wich we are selling I said the problem we are selling some is garden I want to make beds there now I don't have money she said she will buy she gave me K1000.00 and we went on the bush to show her came back found Nshima with dry fish from Maize eat and went to slip.

4th September 1992

I want to the Garden make fire and put water on the fire, start watering the plants I finish and wash my body came and found Nshima with fish I eat and come to my house dress the best closther and swich on to Mansa with John Chabala we rich Mansa around 10hrs we went to the office of the YOUTH AND SPORTS we found Shimfukwe and ask him about what he promise as to go and see him and make same arangements about the forms, he said Henry was there on 3rd September 1992 so he is the one who will tell you what to do just go and site down all members and choose 8 from the group then those 8 will came and fill the forms we come back to Mr Kapansa's house eat Nshima with fish and come back rich Mabumba we bout Chibuku about K50.00 after drinking we start off rich the house around 22 hrs in Mansa I bought Chisense about K00.00 and barthing soap K50-00 I gave all those thing to my wife and came to slip.

5th September 1992

I went to the Garden and start watering the plants came back and start resting from there I went to see Chipampe I found her okey I come back and stay around, my friend come we just stay about 2 hrs Eliza came to Mr. Kaseke's house I went to see her I greet her and she gave me a note book we come to my house I even tell her about my house problems she goes around 18 hrs our friends from Kalaba arived that is a Group of Choir. My girls pripare Nshima with Chisense and Rape they eat and then the representative of the Church

Council open the comp fire with the player and I explain the program from there went to pripare houses and come to slip.

6th September 1992

I went to the Garden to water the plants and wash the body come back went to Church from the Church I sow Jacob Chilufya he call me and said to me we are waiting for you there lets go we went inside the class room there I found arots of people- and they have written down the AGENDA first ward is about Leader ship and the second is filling the forms this meeting was opened by the Secretary Mr. John Masuwa and he read the last minutes and the Chairman said he was not there so that meeting was just for members only. After the minutes we start pay some shares and after paying we start making the new committee members and the election is this. The Chairman is Henry Musenga V.Chairman Abraham Kasongo Secretary J.Masuwa V.Secretary Peter Chilundika Treasure D. Musama V.Treasure William Chisenga. And they even choose the Members who will go and fill the forms they choose 8 members there names are J Musenga, A. Kasongo, J. Masuwa, S. Chundika, F. Katunasa, S. Kafyende, B. Chungu, J. Chilufya from there we came to our houses and I went to the big house found Nshima with meet from Timothy Chabatama where my father boght the meet for K600.00. I come back and slip.

7th September 1992

I went to the Gaden water the plants made fire and cool water wash the body and come back dress the clean cloths and went to Church start priparing food for our friends after eating we start ascouting them come back and went to the Gaden start digging come and eat Nshima with fresh bean leaves and meet I come to my house and lest for about 3 hrs, went to the P.T.A. EXECUTIVE from there I come and eat Nshima with meet and went to slip.

8th September 1992

I start digging the sweet potatoes and went to collect the Money from my sister across the river Losi there she gave me K1000.00 she bought cassava I come back and found the group of choir waiting for me I gave them K500.00 for piece work K150.00 for fish for my children then K200 for transport money when going to Mansa. I start cooking sweet potatoes for a group they work for me antill 14 hrs we came back found Nshima with bean leave fresh one, eat and went ot Headman Monga to get the change I found him not there I came and went to slip around 02:00 hrs Henry came to collect the medecine for her doughter Namayo I gave him Asprine and G.V. Paint and came back to slip.

9the September 1992

I went to cut the glass from there came and start digging the Gaden from there I came back and eat Nshima with meet and cassava leaves, I went back to the Gaden and start digging I went to open the water and drow water for washing the body start putting water in beds and wash the body come back found my sister in low cooking Nshima with fish from the river eat and come to the house start reading the books after reading went to slip.

10th September 1992

I went to the Garden and start digging around 13 hrs I came back to see if there is any thing to eat I found mother cooking Nshima with fish from Samfya I bought from cassava I eat with my friend Moses after nshima I so Eliza coming from Monga she stop and I went there she greets me and I greet her we just talk about 15 or 10 minutes she go. We went to the Garden with my friend Moses we carry the big pot there I made fire and we put the pot on the fire we start making beds we made 2 and start washing our body come back and eat Nshima with dry fish I went to my friend's house I found my friend not around I stay there for about an hr and come back to slip.

11th September 1992

I went to the garden start making beds I made 8 beds and go back to menten the fallow after the fallow I start transplanting the cabbage and feed 4 beds and water them. I wash my body and came back home eat nshima with fish from the river and I went to see my friends I found them drinking Katubi to Mr Katuka's house I start taking part anyway I didn't take much of the time I came back with my friend Moses and went to his house we found Nshima with cassava leaves and Rape we eat thats when I came back to my house to slip.

12th September 1992

I went to the Garden water the plants and came back my friend Poul came and took me to Henry's house where we found Katubi he bought about K120.00 and start drinking after same hrs the UNSEF came cement and Iron they said we can go and help them to take those things out we went to the school and take them out came back and went to the Garden water the plants and wash the body come and found Nshima with lottening fish I eat and went to slip.

13th September 1992

Morning to the Gaden water the plants and cool water, wash the body and come back dress, went to the Church there I found friends placticing songs I greet them then after that we enter the Church and start the Mass after Mass come back and eat Nshima with fish from the river my dad brought from the thing wish we built across the river and put same myono wish used to catch fish and from there I went to see my brother in low Mr Patrick Chama I found Katubi there I stay just for about 2 hrs and came back found Nshima with the same lelies wich is fish, eat and come to the house to slip.

14th September 1992

I went to the Garden and started making beds from there water the plants and come backwent to the P.T.A. Meeting on the meeting I sow Chilambe from the Daptment of fisheries he said he left things outside I open the house and started geting them inside the house and went to Mother's house found Nshima with fish from the mansa river finish I sow Eliza arrivead from mansa I went there we started greeting each ather and after some minutes went to the Garden and come back inther evening time I went to her house there I spend an hr come back to slip.

15th September 1992

To the Garden doing some work from there I come and I found Nshima with bean leaves mexit with groundnuts I eat and went back again to the Garden doing same work taking out the trees I made fire and cook water, wash the body come back found Nshima with fish from Samfya father bought, finish and went to Eliza's house I found her outside there I lest for about 1 hr and went to my friend's house (Moses) come back and went to slip.

17th September 1992

To the garden doing some work finish wash the body and came back start priparing chairs around the Headman's house. Then Jensen came with other officials from different Departments we said we want to change the place because of the wind there we change and went to Jacob Chilufya's house. Jensen opens the meeting and gave out the AGENDA or read the AGENDA from there we start discation well we are discassing Mr Kaseke came and ask about the Ponds around the area? For Saching Cassava we go round the dambo and look for water problem from the meeting I went back to the Garden from the Garden come and found Nshima with Chisense we eat and come to slip.

APPENDIX 4

CASE STUDY PROFILES

The following describes the case study households in Monga and Chibote areas.

Following a broad summary of fish farming in all households with ponds, ten selected households, illustrating widely varying histories of aquaculture development, are described in greater detail. The more detailed description show not only fish farming but the fit of fish farming into other aspects of the lives of the households, both social and economic.

For those farmers who kept diaries, an attempt is made to describe flows of resources over a period of time. The resource flow diagrams illustrate financial and food income to the household from farming and other activities, but not expenditure on items other than farming (such as food or clothes). The details of intra-household and extra-household labour use are also not specified. Resource-flow diagrams are therefore supplemented by additional "behind the scenes" information on subjects such as labour use, details of fish pond management, and main expenditures over the period between December 1991 and September 1992. Because fertiliser and seed for maize farming are generally bought in November and early December, these inputs are not recorded in the resource diagrams. Only three of the case study farmers described below (Sylvester Chipasha, Henry Musenga and Jacob Chilufya) grew maize with purchased inputs.

Codes in household summary

Italics = ALCOM logbook or trials farmers.

Pond management.

Feeding daily = ***

Feeding at least once a week = **

Feeding less than weekly = *

No feeding = 0

Manuring weekly = ***

Manuring weekly-monthly = **

Manuring less than monthly = *

No manuring = 0

More than ten harvests = ***

Five-ten harvests = **

Less than five harvests = *

No harvests = 0

Chibote case study households

	Owner(s) and no.of ponds, October 1991	Income from fish farming 1991-2 (k)	Management, 1991-2 (see note)
E.Bwalia	Wife (1)	nil	Harvesting: * Manuring: 0 Feeding: *
<i>S. Chipasha</i>	Husband with brothers (15)	1500	Harvesting *** Manuring *** Feeding ***
S.Chama	Husband (1) and wife (1)	nil	Harvesting: 0 Manuring: * Feeding: *
M.Jeresan	Husband (1) and wife (1)	nil	Harvesting: * Manuring: 0 Feeding: *
B.Kabo	Husband (3)	nil	Harvesting: * Manuring: * Feeding: **
<i>P. Kaoma</i>	Husband and wife (5)	nil	Harvesting: *** Manuring: ** Feeding: ***
M.Kapambwe	Husband (2)	nil	Harvesting: * Manuring: ** Feeding: **
<i>A. Mwenya</i>	Woman alone (1)	nil	Harvesting:0 Manuring: * Feeding *
P.Mupundu	Husband (1)	nil	Harvesting: * Manuring: 0 Feeding: *
E.Mwila	Woman alone (3)	nil	Harvesting: ** Manuring: * Feeding: **

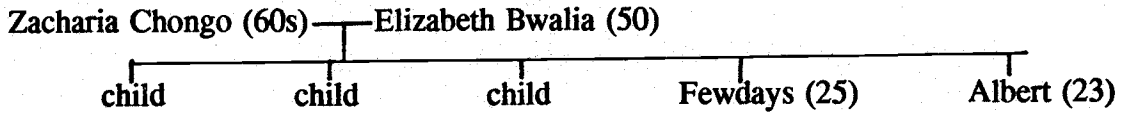
Monga case study households

	Owner(s) and no. of ponds, October 1991	Income from fish farming 1991-2 (k)	Pond management, 1991-2
J. Chama	Man alone (2)	775	Harvesting: ** Manuring: * Feeding: **
<i>J. Chilufya</i>	Husband (14) and wife (1)	8200	Harvesting: *** Manuring: ** Feeding: ***
P. Chola	Husband (1)	320	Harvesting: * Manuring: * Feeding: *
A. Kasongo	Husband (3)	100	Harvesting: ** Manuring: * Feeding: *
E. Kunda	Husband (1)	nil	Harvesting: n/i Manuring: n/i Feeding: n/i
<i>J. Masuwa</i>	Husband (3)	450	Harvesting: *** Manuring: ** Feeding: **
<i>H. Musenga</i>	Husband (4)	5350	Harvesting: ** Manuring: ** Feeding: *
<i>O. Ngandwe</i>	Husband (1)	790	Harvesting: * Manuring: * Feeding: **
<i>G. Nkandu</i>	Husband (8)	400	Harvesting: *** Manuring: * Feeding: **
S. Sumbu	Man alone (1)	nil	Harvesting: * Manuring: 0 Feeding:

CASE STUDY HOUSEHOLDS

ELIZABETH BWALIA, BRUNO'S VILLAGE, CHIBOTE AREA

HOUSEHOLD DESCRIPTION AND BACKGROUND



Fewdays and Albert are sons from her first marriage, which ended in divorce, following the death of three children during infancy. Two daughters, Juliet (12) and Chrisant (10) are from her second marriage, which also ended in divorce. The second husband was a polygamist and she quarrelled with his first wife. Elizabeth Bwalia and Zacharia Chongo were married five years ago and have one four year old child.

Neither Elizabeth nor her husband have ever been to school, but the older sons are educated to grade 7.

He is the headman of Bruno village.

RESOURCE STOCKS.

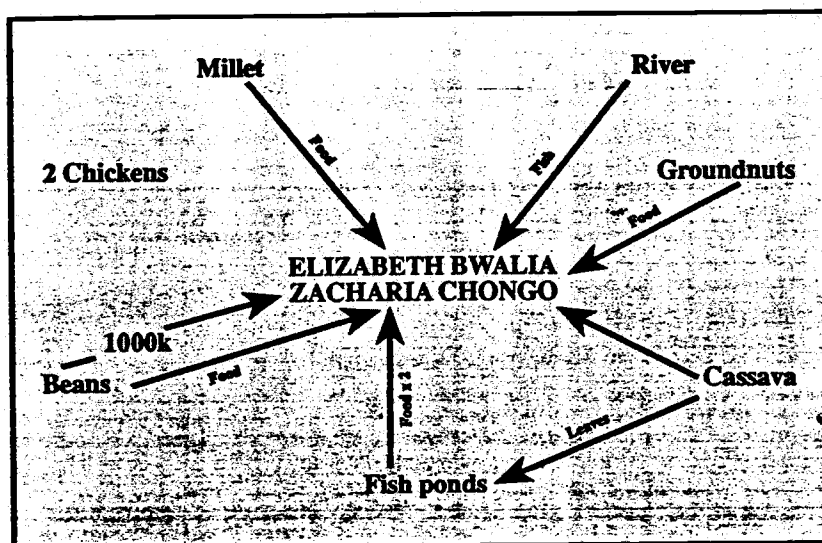
Their only animals are two chickens. They also possess fishing baskets. They cultivate groundnuts, cassava, beans and millet.

FISH FARMING HISTORY.

She has one two ponds, but only one is completed and stocked. This was dug using hired labourers who were paid 200k and one chicken for the 72m² pond. The money was raised through brewing. The pond was stocked in 1990 with 17 fingerlings bought for 50k from a neighbour. It is located about ten minutes walk from the house, on the dambo adjacent to the village. The land was acquired through her husband, who takes no part in the fish farming activity.

She was visited once, in 1991, by the DoF extensionist, but says no advice was given.

RESOURCE FLOWS, Jan-Sept 1992.



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour use

During the period under review, no extra household labour was hired. They have joint fields and work together for much of the year. During the rains, they were involved in a reciprocal labour arrangement for millet planting from her sister (and husband) and his two sisters with their husbands. This was the only occasion of labour reciprocation.

Pond feeding and use of manure

The pond was fed irregularly throughout the period under review. Though fairly close to the house, it is located a long way from the main cassava fields. On the other hand, there was no problem in taking leaves from the fields of neighbours. Most pond feeding was undertaken by the daughter, Juliet, who claimed to want a pond of her own in the near future. Manure was never applied to the pond.

Pond harvests

The pond was harvested twice between November 1991 and September 1992. On the first occasion, in December, Juliet took out a few fish with a basket on instruction from her mother. She complained that the fish were hard to catch. The fish were eaten by Juliet and the youngest child: "he was tired of always eating mushrooms".

On the second occasion, in January, the pond was partially drained following a visit from the DoF extensionist. He said he would be bringing a new breed of fingerling, so the pond had to be prepared. However, Elizabeth said she did not trust him to bring them, so was not prepared to lose all her fish in case he never came back. The harvested amounted to one 20cm plateful, which was shared among the immediate family.

Other

They claim that fish were stolen from the pond. By August 1992, the pond was scarcely maintained as a result of this. There is no direct evidence of theft.

Though she trades bananas, it is impossible to identify cash profit: on two occasions, the bananas went rotten before they had been sold.

On several occasions, the younger son went fishing in the river, bringing back between 10 and 20 fish at a time.

In the rainy season, Elizabeth collects caterpillars. These are both eaten and exchanged for bean seed during February. A frequent complaint concerning food availability relates to the lack of cash with which to buy salt. Throughout the period under review, the household subsisted entirely on their own cultivated and gathered food, principally mushrooms and caterpillars.

Income was derived from the sale of one tin of beans (about 5 litres) and the sale of two mats, made by Zacharia Chongo.

JAMES CHAMA, NGOMBELA'S VILLAGE MONGA AREA

HOUSEHOLD DESCRIPTION AND BACKGROUND (Sept 1991)

James Chama (45)

In September 1991, James Chama was living alone, having recently "sacked" his wife (she had gone to live with a new husband). By December, he had remarried to Peggy, who brought with her two children from a previous marriage. For James, this was his fourth marriage. He was born in Samfya. His mother (who is a widow), is from Ngombela, and his father now lives with a fifth wife in Mabumba.

James is educated to grade seven level, and his wife to grade eight. He speaks fluent English. She speaks very little English..

James was a member of the CMML church before remarrying. He then switched to Seventh Day Adventists, which is the church of Peggy's parents. Once a week, they walk 15km to go to church.

RESOURCE STOCKS

Household assets include one broken bicycle and a radio

Livestock owned are 2 cattle, 12 chickens and 2 guinea pigs.

In September 1991, cassava and pumpkins were the only crops planted, and owned by James, though groundnuts which were the possession of his ex-wife were also present. During 1992, European vegetables were planted.

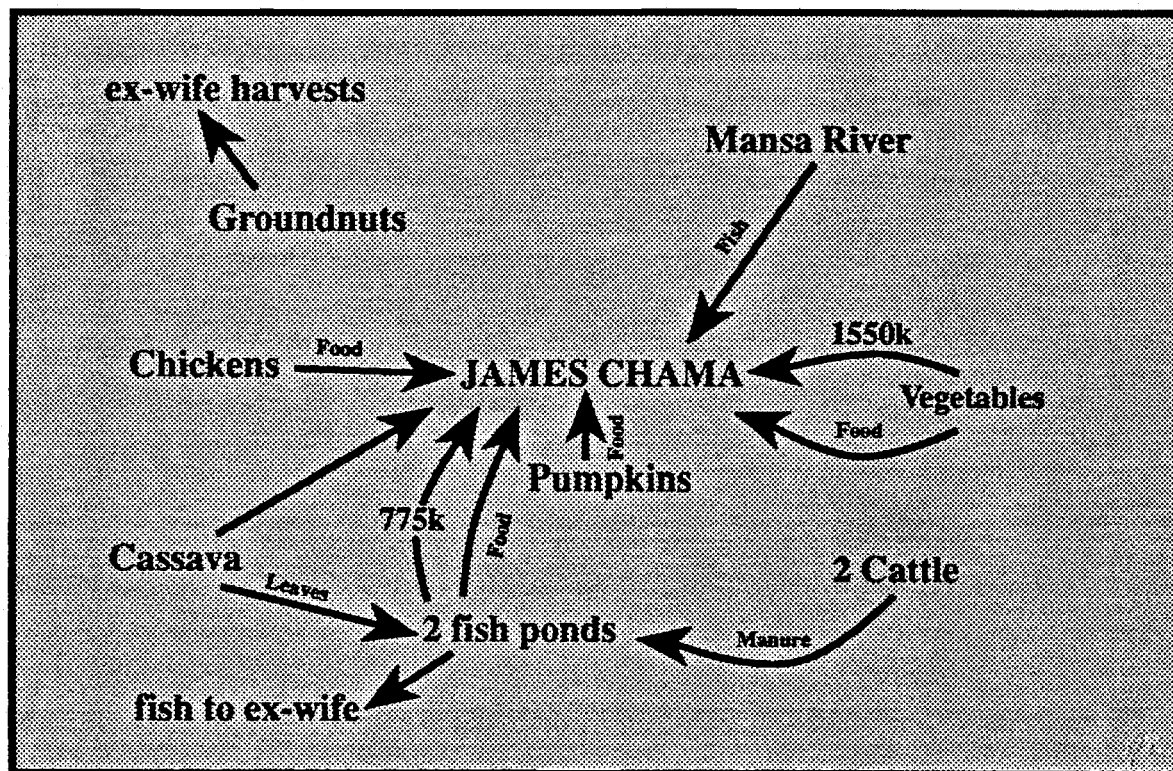
FISH FARMING HISTORY

James has two ponds, each approximately 500m². They are located on the edge of the dambo, at a distance of about five minutes walk from the house. The ponds are fed by groundwater and are drainable. One of them has a compost crib located in the corner of the pond. The ponds are constructed on land which James requested from the headman.

The ponds were both constructed using his own labour during 1989, following James' return to Ngombela. For fourteen years he had been a soldier, travelling throughout Zambia. It was during this time, that he had seen fish farming elsewhere in the country. He was a founder member of the fish farming club, though is no longer closely involved, and attended the course run by DoF in 1989. His ponds were stocked with fingerlings from DoF at Fiyongoli at a rate of 2kg per pond.

In 1992, he was in the process of constructing a new pond. The new pond was to be nearer the house, so as to minimise the danger of theft. James was also intending to put ducks on the new pond and to construct a new house next to it. By September 1992, the pond was not finished. He explained that he had been too busy preparing new cassava fields with his new wife.

RESOURCE FLOWS (Jan-Sept 1992)



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour use

In the period under review, no outside labour was hired. The intention is that the cassava currently being grown will be used to hire labour in the future. James and his new wife worked side by side in the preparation of new cassava fields. They are the only couple among the case studies who showed little division of labour in agricultural tasks. He took full responsibility for growing vegetables, which she took for sale in Mansa market. In August and September, James was ill and did virtually no farm work.

Pond feeding and use of manure

The ponds were mainly fed by Peggy: she throws in green leaves (predominantly cassava leaves) and household waste whenever she goes to collect water. The vegetable patch was wrecked in June, when cattle belonging to James' mother's brother strayed onto it. He was given 650k compensation.

In the period under review, the ponds were only fertilised once, in January, with cattle manure. In March, the cattle were moved to the far end of the village to be cared for by a brother, following a dispute with a neighbour (again over the animals spoiling crops).

Chicken manure is not collected, and is not used on vegetables in the belief that it

brings weeds. It was also not applied to the ponds in the period under review.

Pond harvests

Pond no.2 was drained once, in July, and all fish (about 20kg) were taken by his previous wife. He explained that this was part of the separation agreement and that the pond would in future be fully his. At the pondside, the former wife would not leave the draining to continue in her absence for fear that he would take some of the fish.

Pond no.1 has never been drained.

Of the harvests for sale, about half (380k) represented sales of fingerlings, at 5k each in January. There were seven harvests for relish, as opposed to 29 occasions of fishing from the Mansa river.

Other

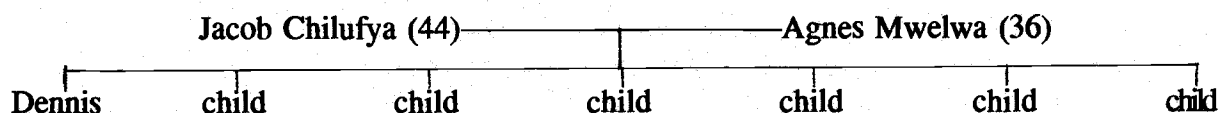
The groundnuts are harvested by James' previous wife. This involves a major dispute with his current wife over whether any of the groundnuts had been "stolen".

Two guinea pigs were kept for breeding and sale. They are the source of a traditional cure for anaemia. Both were killed by a dog in February.

There were no other sources of income in the period under review. Small expenditures were made on soap, salt, and other household goods.

JACOB CHILUFYA AND AGNES MWELWA, FIPATAUKO VILLAGE

HOUSEHOLD DESCRIPTION AND BACKGROUND, (Sept 1991)



Jacob Chilufya was born in Kalasa's village (about 7km away) and came to Fipatauko to marry. Agnes Mwelwa is from Fipatauko. They live near to her father, brothers and sisters. Her mother is divorced and has moved away from the area. Jacob is educated to grade four and Agnes to grade seven. Neither of them speak English.

The whole family lived in Kitwe for three years, returning in 1986.

Jacob and his wife belong to different churches: him to the New Apostolic church and her to Jehovah's Witnesses.

RESOURCE STOCKS

Nobody in the household possesses "status" assets such as a bicycle or a radio. The only livestock owned are nine chickens.

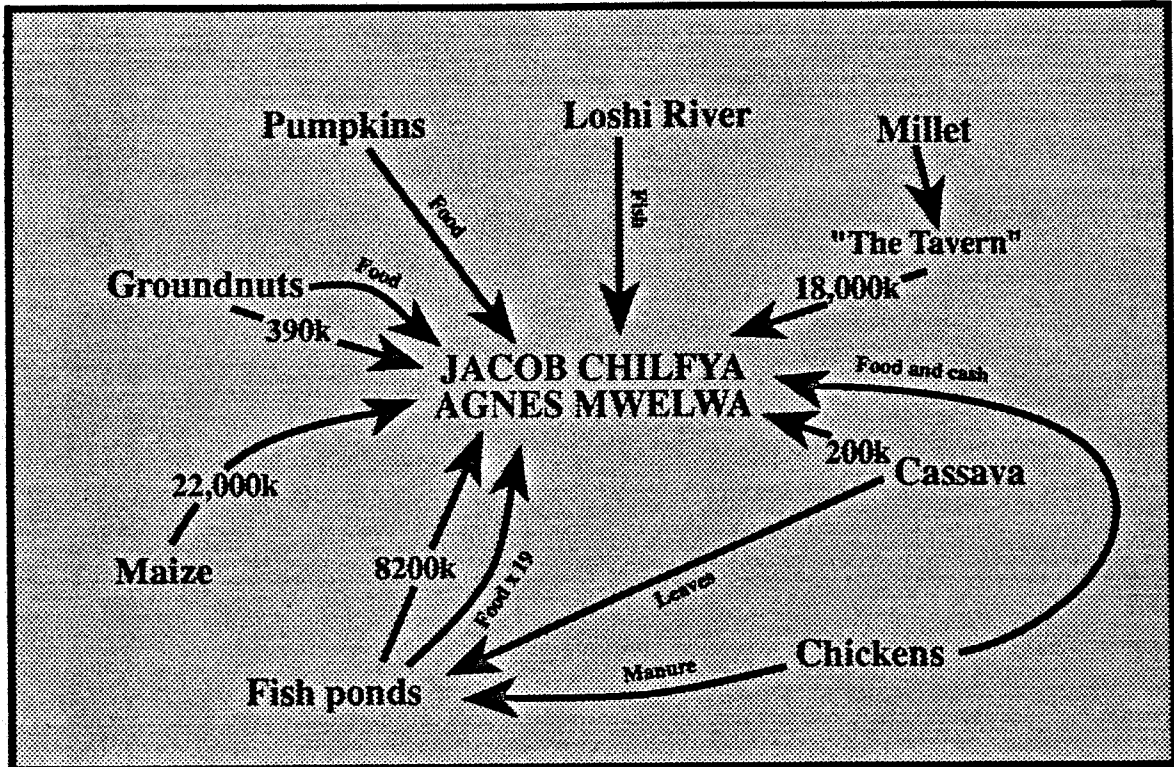
Fields are planted with maize (seperately for husband and wife), cassava, groundnuts, millet, pumpkins and sweet potatoes.

FISH FARMING HISTORY

Both Jacob and Agnes own fish ponds. He has fourteen ponds, while she has one which Jacob constructed for the cost of three chickens. She wanted a separate pond in order to control what was coming out of it. He was a founder member of the Monga fish farming club and, until August 1992, vice chairman. The first pond was constructed in 1989 in a reciprocal labour arrangement with the other three founder members. All subsequent ponds were dug by Jacob over the period August 1989 to August 1991. Initial ponds were stocked with fingerlings from DoF, though the last six were stocked from the earlier ones. Agnes' pond was stocked in 1990 with fingerlings which were free from her husband. Jacob attended the training course given by DoF, but Agnes did not. Jacob has been a contact farmer for ALCOM (he even appears on the cover of ALCOM news). He thus kept a logbook and took part in one trial.

The total surface area of the fourteen ponds is about 4000m². They were built on land which Jacob had previously been cultivating with vegetables. He explained that fish ponds are better than vegetables because "the fish pond can last longer than a garden; when the vegetables are finished you must buy more seed and fertiliser and pesticide, but a fish pond just goes on for ever". The ponds are located about fifty metres from the house. Jacob Chilufya and two other fish farmers built new houses during 1991 in order to be closer to their fish ponds. In the dry seasons of both 1991 and 1992, the majority of the ponds dried up. At one point, only one had water in it.

RESOURCE FLOWS (Jan-Sept 1992)



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour hire and use

In the period January-September 1992, extra-household labour was hired nine times, for weeding maize and for land preparation. On one of these occasions, a group of 50 school children were hired. The remainder of hired labourers were adults, five of whom were paid in cash and three of whom were given fingerlings for their work.

Unlike James Chama and his wife, Jacob Chilufya and Agnes Mwelwa work separately in most aspects of farming, with each having autonomous control over particular fields. For example, the disposition of the product of the groundnuts field is entirely at her discretion. They each grow maize separately from each other, with loans from different organisations. The degree of separation should not be overstated; they worked together on millet planting and Jacob prepared the ground for her maize farm. On the other hand, Agnes takes responsibility for cassava, the main food crop. She complained that during the time he was building the ponds, he failed to cultivate sufficient cassava and that they will be buying with brewing money towards the end of 1992.

Jacob never goes fishing, but she went to the river once with a hook and line and caught enough fish for two meals.

Both Jacob and Agnes did piecework for others during the period under review.

He went out on 24 occasions while she went out twice. On both occasions she did piecework in return for household goods (salt and soap). His pieceworking was generally for cigarettes and beer, though he also earned 3500k for digging a fish pond and 300k for digging a furrow

Pond feeding and use of manure

Jacob feeds the fish ponds every day, often twice a day. Agnes only ever feeds the ponds if he is away. He feeds her pond at the same time as his. This pond could not be said to be managed separately from the others, except regarding harvesting decisions. The ponds are predominantly fed with cassava leaves and soft grasses, of which the shortage in the dry season is compensated for by the lack of water in the ponds. Beer wastes are also regularly thrown in the ponds.

The nine chickens are not penned at night. They are the property of Agnes and bred for occasional sale. Their manure is sometimes used in the fish ponds - a basketful is put in about once a month. Though no cattle are owned, cattle manure "borrowed" from a neighbour, John Masuwa, was applied to the pond at least five times in the nine month period.

Pond harvests

The ponds were harvested regularly throughout the period under review. Jacob Chilufya earned the largest amount from his fish ponds of any case study farmers - obviously partially the result of the number of ponds he owns. Fish farming is the household's third biggest income generator after brewing and maize farming. All fish were sold at the pondside to neighbours. Of the 8200k made from fish farming during the year, 800k was from sale of fingerlings.

The ponds were harvested nineteen times for relish, predominantly by Jacob, and occasionally by Agnes and the eldest daughter.

Several of the ponds were drained during July and August because reduced water depth was leading to predation from birds. They were left dry, and fingerlings were stored in the last remaining pond.

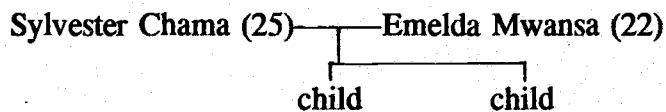
Other

For most of the period under review, Agnes was responsible for much basic household expenditure, paid for with money raised from brewing beer. This included not only small food items such as salt and soap, but also clothes and school books for the children. In August and September, Jacob turned the house into a "tavern", selling coffee and tea-flavoured wine, which he made himself. This enterprise was started with the profits from his sale of maize (22,500) which was used to buy sugar and yeast. After expenses, including hiring someone to sell the beer, he was making a profit of as much as 2000k a week. Some of this was spent on household goods, such as furniture (a bed) and clothes. Some was "lost" in Mansa, and with the remainder, Jacob opened a bank account. He stressed that the money was for him alone. During this time, all but one of the fish ponds were dry and neglected. He claimed that he was planning to stock fewer ponds with the onset of the rains.

Before the research period, during Jacob's initial pond expansion, a number of women complained that he had incorporated their cassava soaking places in his pond area. He refused to let them soak cassava because he was afraid it would kill the fish. The conflict was resolved when he and a neighbouring fish farmer, excavated some more cassava holes on the dambo.

SYLVESTER CHAMA AND EMELDA MWANSA, BULE 2 VILLAGE, CHIBOTE AREA

HOUSEHOLD DESCRIPTION AND BACKGROUND.



They live in Bule 2 village, in a house next to that of her parents. They moved here in July 1991, from neighbouring Muombo, where his parents live, following disputes with neighbours. The neighbours were his mother's mother's sons and the dispute centred on witchcraft accusations. The land farmed while they were in Muombo is still under cultivation, resulting in a 3km walk to the fields. They intend, in the future, to shift back to Muombo, building a house next to the fish ponds

He is educated to form 2 level, and she to grade 7. Both speak a little English.

In addition to farming, they obtain money from trading, from brewing and from him working as a temporary labourer for the DoF extensionist. When he left school, he stayed with his mother's brother in the Copperbelt where he "learnt about trading". He has travelled as far as Nakonde (Tanzania) for trading.

RESOURCE STOCKS

Sylvester owns a bicycle and an enormous (non functioning) gramophone.

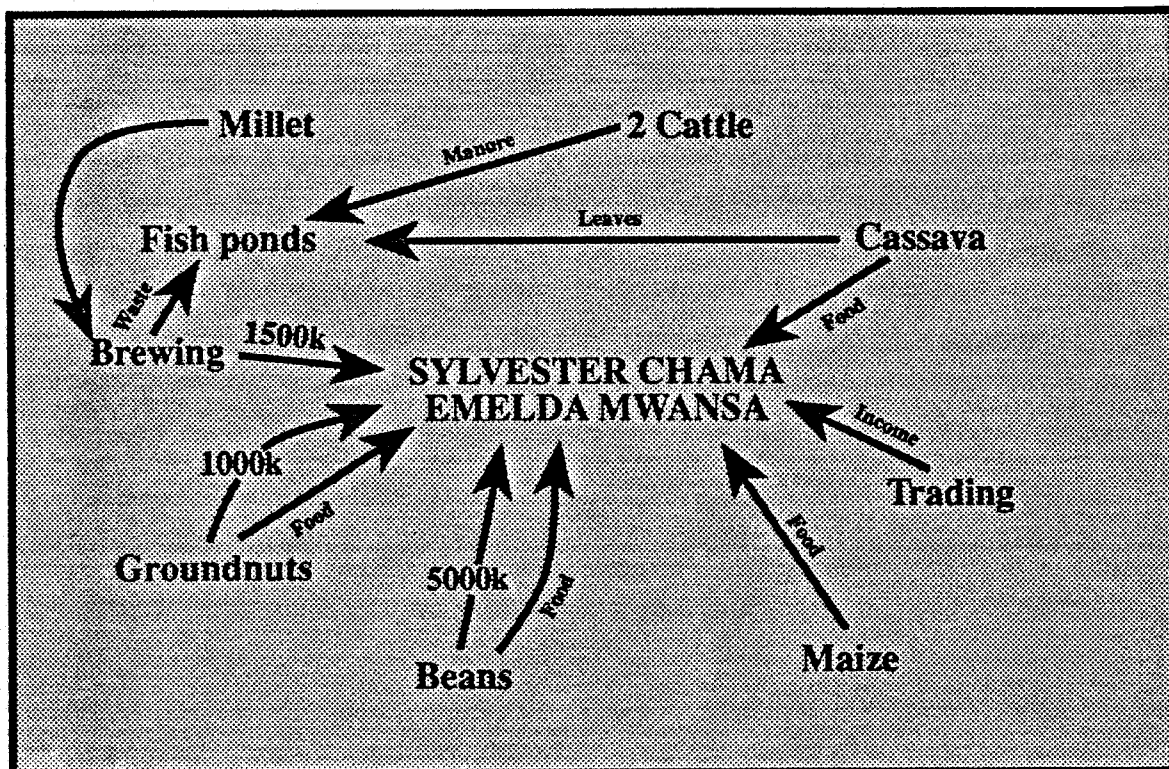
In September 1991 he had two cattle which were housed with his uncle in Muombo

In Muombo, fields of cassava, millet, maize, beans, and groundnuts are cultivated. Next to the house in Bule 2, there are a few tomato plants.

FISH FARMING HISTORY.

They own one pond each, both of which were dug in 1988 and are about 120m². He dug his pond alone with a shovel borrowed from the Fathers. She paid for two labourers with money from brewing, and Sylvester assisted with the digging. The two ponds are adjacent to each other, located next to the river on one side and the main farmland on the other. They are fed by both groundwater and a furrow from the river. The ponds were stocked with fingerlings from the Fathers - 37 in his pond and 40 in hers. Both ponds were harvested in 1989 and in May 1991. Sylvester is a friend of the DoF extensionist and gets fish farming advice from him.

RESOURCE FLOWS



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour use

They did not hire outside labour during the year, but he assisted his father with millet planting, and she brewed in collaboration with her mother. He worked during February and March for the DoF extensionist, but eventually gave up because he was not being paid. He travelled to Mansa in March to try to collect the debt from DoF, but was unsuccessful. While he was involved in this work, she was responsible for the weeding of beans and groundnuts. His time spent on farming is further reduced by high levels of activity connected with the mission: he is in the church choir and attends at least two church meetings a week.

Pond feeding and manuring

Pond feeding and manuring are determined entirely by other agricultural activities: when either Sylvester or Emelda go to work in the fields, they feed the fish. This was on an almost daily basis during planting and weeding time, but was left for a week or more at a time during April and May. Cattle and manure is added to both ponds. In addition to his own cattle and goats, Sylvester would be able to use the manure from his uncle's four cattle, which are penned in the same place as his. Three occasions of adding manure were noted.

Pond harvesting

No harvests were observed or recorded in the year under review. Emelda and Sylvester both said that during June, the bigger fish were stolen.

Other

Sylvester and Emelda harvested the fields of beans and groundnuts separately, each one deciding on the destination of the product. While her one bag of groundnuts was consumed by the family, his was sold to the mission. The beans harvest was entirely under his control and these were also sold to the mission. Maize, millet and cassava were farmed together and not sold.

In March, he sold a cow for 12,000, having bought it for 7,000 five months previously. The money was entirely under his control. He planned to use it to travel to the Copperbelt for trading, though this had not taken place by September.

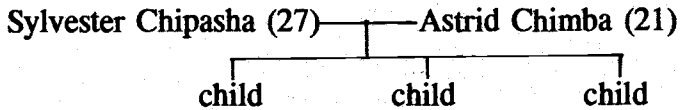
In February, he went hunting for a week with four friends, one of whom as a gun. They succeeded in catching an impala, the meat of which was divided between the four families.

She brewed *katata* three times in the period under review, each time making a profit of around 500k, all of which was immediately spent on household goods such as soap.

He travelled to Kawambwa, bringing back chisense and soap to sell in the village.

SYLVESTER CHIPASHA AND ASTRID CHIMBA, ALEX 2 VILLAGE, CHIBOTE AREA.

HOUSEHOLD DESCRIPTION AND BACKGROUND



Alex 2 village was formed in 1988 when Sylvester, his parents, and brothers, split away from Alex 1, which is a few hundred metres away. Astrid Chimba's mother's family are in Mambwe, some 20km away. Though each of the three elder brothers is married and maintains a separate house, the brothers and their father have a joint enterprise in maize, fish, and vegetable farming. Sylvester is the eldest brother. He has never worked away from the area and is educated to grade 7. Astrid is educated to grade 4. Neither of them speak English.

RESOURCE STOCKS

He owns a bicycle and a radio. There are also seven cattle and eight goats. All livestock are owned jointly with his father and brothers.

With his wife, Sylvester cultivates cassava, groundnuts, millet beans, and sweet potatoes. With his father and brothers he farms six hectares of maize, vegetables and pineapples. Despite symbols of affluence, Sylvester and Astrid live in a one room pole and dagga house, the smallest of all case study households

FISH FARMING HISTORY.

The brothers started fish farming with advice and assistance from the Fathers in 1987. At this time, they still lived in Alex 1. They moved to the present village site to be near their ponds. Their first four ponds were built individually, but after this, a further eleven ponds were built by all four working together. One of these was built in 1988, six in 1989, and two in 1990. The ponds are jointly managed and all products shared between the brothers. Their wives do not take any part in the enterprise

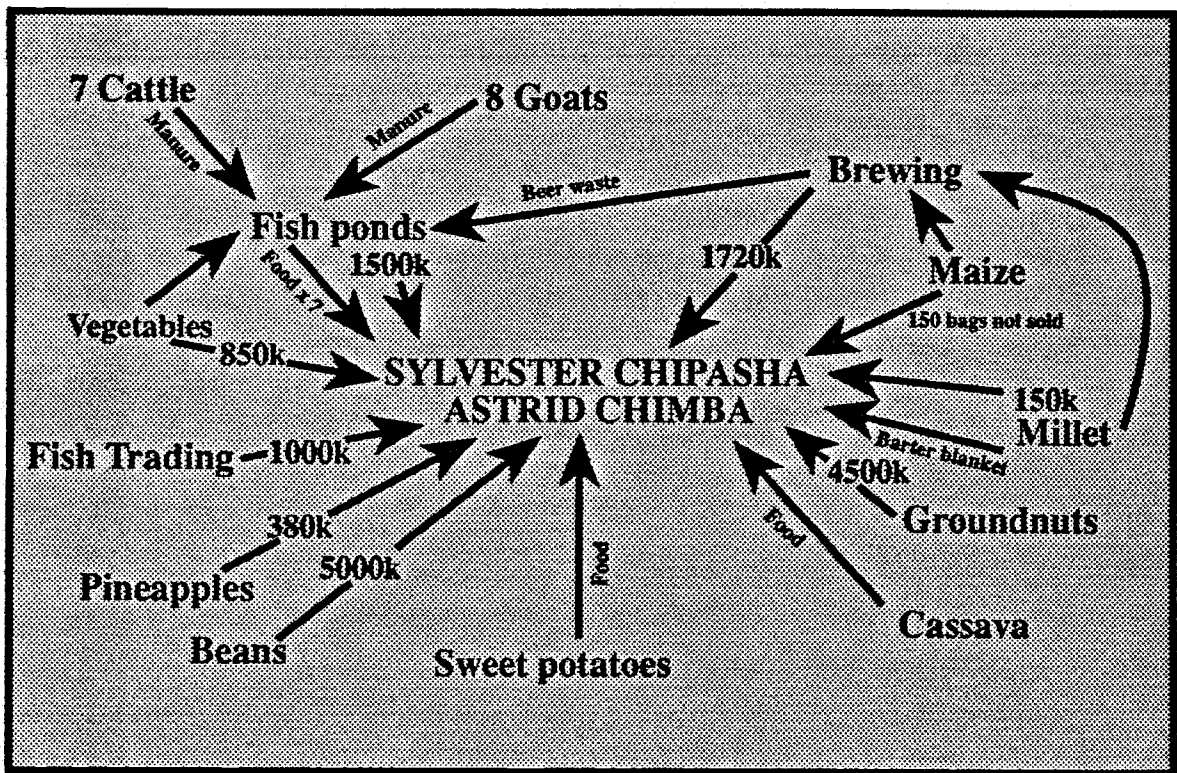
The ponds are located in a line immediately adjacent to the houses. They are fed by a river. Initially, the ponds had water flowing through but following a visit to farmers in Monga (see chapter 8), a furrow was dug to supply each pond individually.

The ponds are built on land on which the brothers had previously farmed rice. There is however, currently a dispute with the headman of Alex 1 (who is brother to Sylvester's father), concerning rights to the land.

The first four ponds were each stocked with about 50 fingerlings, purchased from the Fathers. All subsequent ponds were stocked from these first four.

The brothers in Alex 2 were contact farmers for the ALCOM aquaculturist. He assisted them in draining and restocking 11 of the ponds in January 1992, in order to complete his trials. The ponds have been used for trials of manuring and feeding. The idyllic setting of their ponds has resulted in numerous other ALCOM visitors coming to the village. Sylvester kept a log book. Himself and brother Mondesto went on an exchange to Monga.

RESOURCE FLOWS



ADDITIONAL INFORMATION ON RESOURCE FLOWS.

Labour use and household budgetting.

Two parallel but interacting economies are encompassed within the resource flows described above. On the one hand, Sylvester and his brothers have arrangements for both production and distribution, centred on their maize, vegetable and fish farming. On the other, Sylvester and his wife maintain a separate household economy for the cultivation of beans, cassava, groundnuts and millet, and for other enterprises, such as her brewing of beer. Within this, Agnes does assist him in maize farming (particularly weeding and harvesting), though not in fish farming. The three brothers all eat with their father. Their three wives all eat together, though not with their mother in law.

Labour was hired for maize farming, but not for any of the "family fields". Labourers were hired for 20 days to weed the maize. They were paid with fish (cost 1000k, labourers paid at the rate of one plate - worth 40k - for one line, which takes about one day to do). They were also paid with a goat. Later, eleven labourers were hired to complete the weeding, and were paid one plate of fish each, from the fish ponds. At harvest time, 50 labourers were paid in maize and with fish from the ponds. They were given five fish per day over two weeks. By August 1992, the maize was harvested (about 150 bags) but not sold. The Luapula Cooperative Union was in disarray and the brothers were concerned about their chances of repaying their loan.

Sylvester and Astrid work together on the citemene fields where millet, cassava and groundnuts are grown, but only during periods of peak labour requirement. For example, they worked together during February, making ridges and planting beans. At this time, the furrow which had been started to improve the water management of the fish ponds was temporarily abandoned. While she goes to the fields on a regular basis, he is much more likely to be involved with tasks connected with the "businesses", for example, travelling to Chibote in search of fertiliser.

In March, a bicycle was bought to assist with transporting crops. This bicycle was the joint property of the three brothers, not of Sylvester and his wife.

Of the crops that were sold during the year, the money raised from beans and groundnuts was used for household expenditure, while that from onions, and pineapples was kept in the brothers' mutual fund.

Fish trading involved Sylvester and his brother Mondesto travelling by bicycle to Northern Province, where they have a relative, buying 50kg of fish at 30k/kg, drying it there and returning to sell it at 50k/kg. The journey takes three days each way.

At least once a week, Sylvester goes to work for the Pioneer Club which is associated with the Catholic church

Pond feeding and manuring.

All ponds are fed on a daily basis. The brothers do not operate a strict rota - who feeds depends on who is around. The ponds are fed with cassava leaves, beer wastes, chinese cabbage, beans leaves, pumpkin leaves. The vegetable garden is adjacent to the ponds. Manure from sheep, goats, cattle and chickens is also applied to the ponds, about once a month per pond. On each occasion, the compost cribs are refilled. Three of the ponds are trials for ALCOM: two for feeding and manuring, and one for feeding without manuring. The animal manure is not used for any other aspect of farming: inorganic fertiliser is used for both vegetables and maize, while the other fields are thought to be too far away to transport manure to.

In April, two of the trial ponds flooded and had to be restocked. No quantitative trial results are available, partly because the brothers sporadically harvested the larger fish from their ponds. On the other hand, they were very impressed with the visible results (size of fish) of the intensively manured trial pond.

Pond harvesting.

In January and in April, ponds were harvested to restock other ponds for ALCOM trials. Two ponds were kept as breeding ponds. Of the ponds drained for restocking in January, excess fish were used for hiring labour (see above) and for household relish between four families.

In April, fish were sold for 1500k, two ponds were restocked with 680 fingerlings, and relish for three days for four families was taken. On only two occasions (in March and in May), were ponds harvested for relish alone. The women were never involved in these harvests

Other

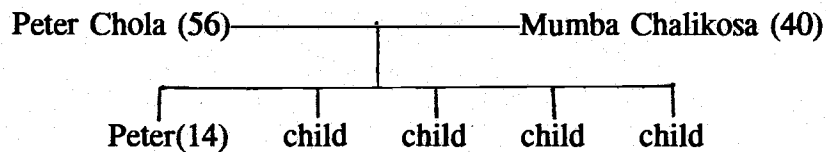
When discussing changes in workloads since the brothers began fish farming, Astrid mentioned that the biggest increase she has had to cope with is the result of all of

the "visitors" who now come to see them, for whom she must prepare food and show hospitality.

The brothers occasionally bulk-buy food items together, such as salt and cisense. A little may be sold, but most is used for household consumption.

PETER CHOLA AND MUMBA CHALIKOSA, MPONDA'S VILLAGE

HOUSEHOLD DESCRIPTION AND BACKGROUND (Sept 1991)



Peter Chola was born in Mponda's village, his wife in neighbouring Kalasa. A married son and married daughter also live within Mponda's village, both of whom occasionally help with fish pond maintenance.

Peter is educated to grade three level, while his wife has no schooling. Neither of them speak English. For twelve years, Peter worked in Chingola as a bricklayer, returning in 1964.

He is a contact farmer for ARPT, and has a demonstration plot on his land.

RESOURCE STOCKS

They own two goats and fifteen chickens. During 1992, they acquired a pig from the ARPT

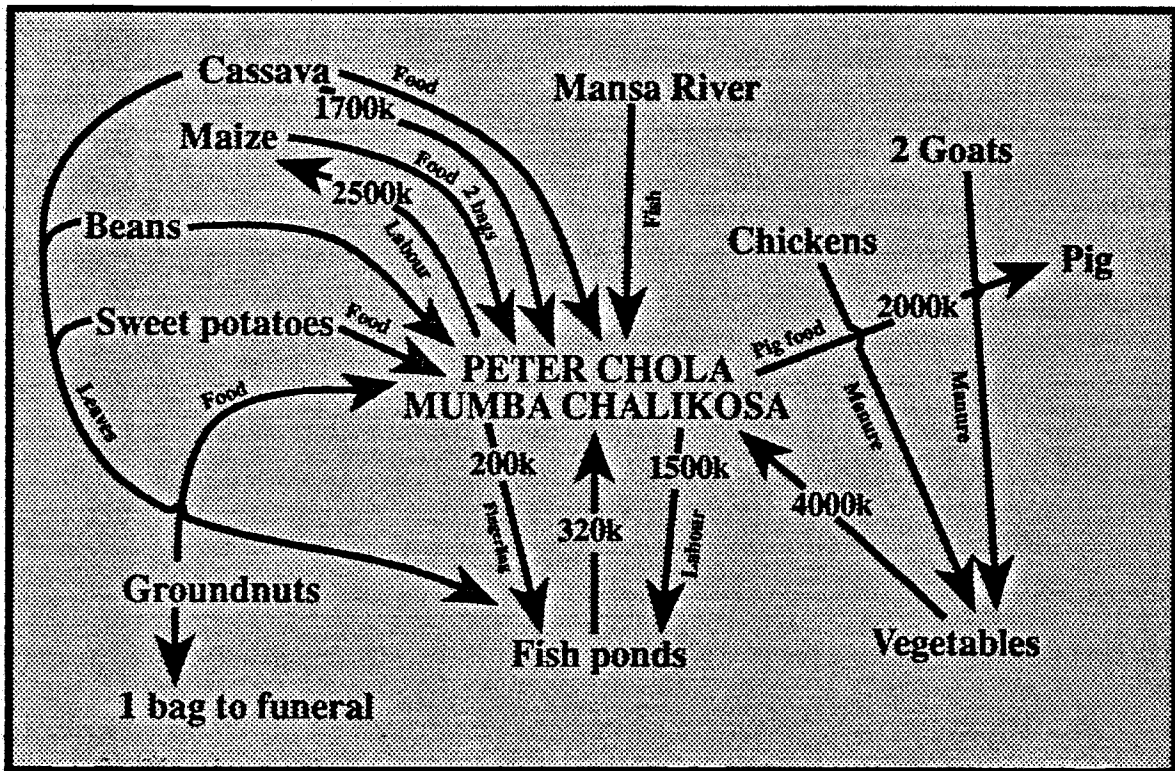
Fields are planted with maize, groundnuts, cassava, beans, sweet potatoes and vegetables.

FISH FARMING HISTORY

Peter Chola dug his first pond in 1965 after his return from the Copper Belt, where he had been a bricklayer. He had seen fish ponds there, but had no instruction. His pond was stocked with fish from the Mansa river. By 1991, he had given up on pond maintenance, because he was getting nothing from the pond. He was visited by Alcom and DoF during 1990. In 1992, he constructed another pond. He dug the pond with assistance from his son and a labourer during the course of two weeks in June. The first pond was drained and restocked in March 1992 with 104 fingerlings from a local farmer. The second was stocked with 50 fingerlings from the first in August.

The ponds are located about five minutes walk from the house, and close to his vegetable garden for feeding. They are separated from each other by a furrow which was also constructed in 1992. The ponds are on the edge of the dambo. One is fed with groundwater, the other with water from the first. Pond no.1 is about 150m² and pond no.2 is 200m²

RESOURCE FLOWS (Jan-Sept 1992)



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour use

Labour was hired on several occasions in April, May and June. Two labourers were paid 200 and 300k respectively for assistance with land preparation for cassava. One man was paid 2000k for preparing a field for rice, and in June, a labourer was paid 1500k for assistance with digging the fish pond. All of this money was paid out by Peter Chola.

Both husband and wife claim that the cassava is her crop and maize/vegetables are for him. They each have separate groundnuts fields. The meaning of this division is unclear. It does not represent separate control of the crop: due to late rains, they only harvested one bag of groundnuts between them, all of which was used to pay for the funeral costs of their daughter's child. Regarding maize, she was responsible for making ridges in December when he was ill, and undertook the harvesting in July when he was constructing a house for the new pig. The maize harvest in 1992 was 2 bags, all of which were consumed. He does all work in the vegetable garden. She takes the produce to Mansa to sell.

Mumba Chalikosa did piecework twice in the period January to September, for which she was given food items. She also assists her mother in law with millet planting, for no payment. The son, Peter, did piecework for 1200k - money which he gave to his father.

Pond feeding and use of manure

The ponds are mostly fed by Peter Chola. In January and February he was very ill, and as a result the pond was only fed irregularly by his son. After restocking the pond in March, feeding became more regular - seldom less than five times over a week. The fish

were fed leaves and household wastes. After June, vegetable leaves were also thrown in the pond.

In August 1992, Peter Chola received a sow from ARPT which, he claims, he will breed from and repay with piglets. The reason for having the pig is, he says, to breed for food, not cash. He was unaware that pig manure can be applied to the fish pond.

Poultry manure is used on the vegetable garden, but not applied neat. He makes a ridge, covers with grass, then poultry droppings, then soil. The ridge is watered for a month before the compost is dug in. The droppings are collected and stored and the compost is made prior to planting. He claims that from 15 chickens he cannot make enough compost for his 25m X 25m garden, but receives manure free from other people in the village.

He claims he developed the composting technique on his initiative. This is possible, but he is an ARPT contact farmer, so presumably has had exposure to knowledge about such methods.

The goat manure is not used in vegetable growing, nor is it applied to the fish ponds. In fact the only occasion recorded of the application of manure was once when a barrow-load of cattle manure was added to the first pond before restocking in March. The manure was a gift from a neighbour.

Pond harvests

When the first pond was drained, most of the harvest of one large basketful was given away to the extended family in the village. Peter explained that this was because they were not good fish (having originally come from Mansa river), and that after restocking, the harvest would not be just given away because the new fish would be for sale.

Two harvests for relish were made in the period under review: one in January, and one in August (when fingerlings were transferred to the new pond). At this time the pond was drained, and excess fish were sold for 320k.

Other

Almost 2000k was spent in August and September on food for the pig.

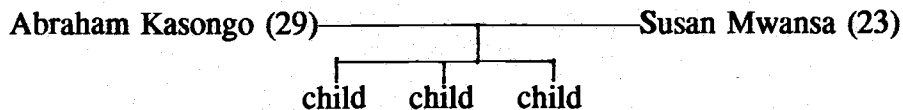
Sales of cassava are an important source of income in April and May. She sells the cassava and is responsible for most food expenditures at this time, including fish and meat.

There were no other sources of income in the period under review.

In addition to the nuclear family, Peter Chola and Mumba Chalikosa support her mother, who lives nearby and is too old and weak to farm. Food is sent to her every day.

ABRAHAM KASONGO AND SUSAN MWANSA, KASEKE'S VILLAGE, MONGA AREA

HOUSEHOLD DESCRIPTION AND BACKGROUND (September 1991)



Both Abraham Kasongo and Susan Mwansa were born in Kaseke's village and have all relatives living nearby. His mother's brother is Mr Kaseke, the headman. In August 1992, Abraham's wife left him taking the three daughters (see appendix 3). He continued to live alone, though visiting his wife and children on a daily basis. Abraham is educated to form 2 level and speaks good English. Susan has no schooling and speaks no English.

RESOURCE STOCKS (Sept 1991)

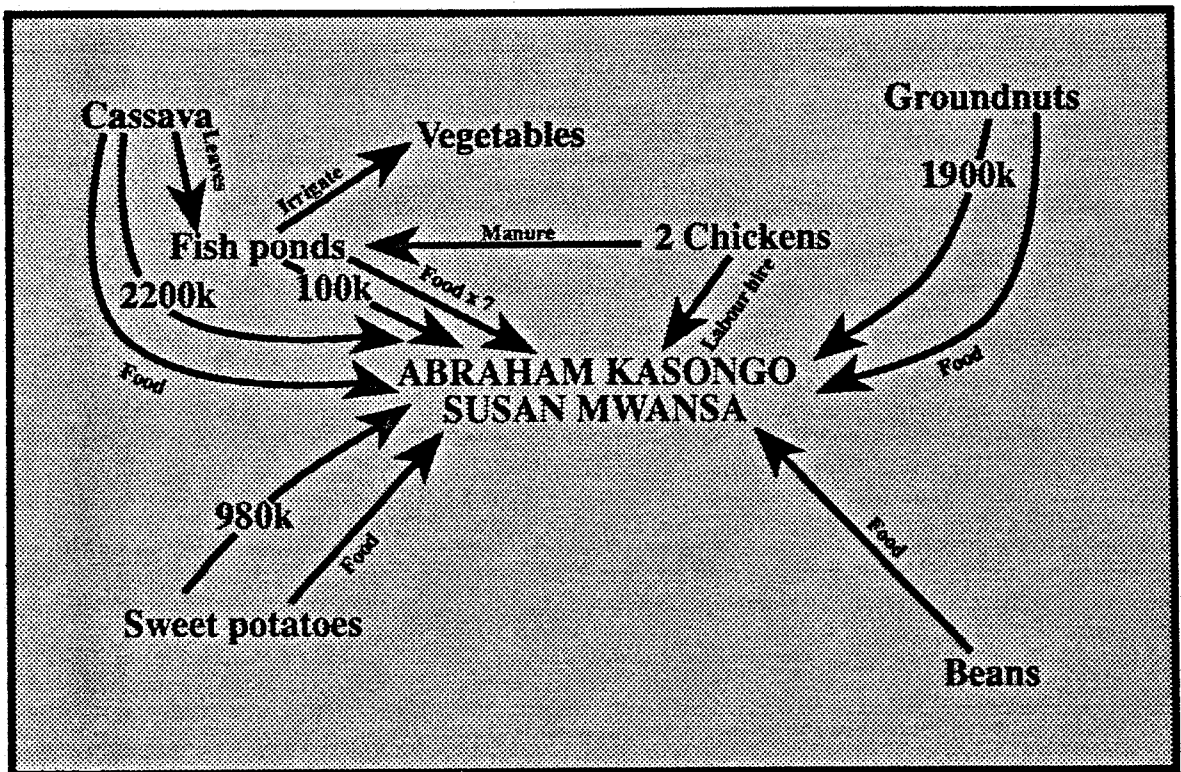
They own only two chickens and have no "status" assets. Fields are planted with cassava, beans and groundnuts. During 1992, Abraham constructed a vegetable garden.

FISH FARMING HISTORY (as at March 1992)

Abraham's ponds were built during 1990-1992. The first was dug in January 1990 with his wife's brother and stocked fingerlings from a neighbour. Due to a dispute, the pond was later drained, the fish shared for relish, and the pond sold to Abraham's brother for 600k. The second pond was started in February 1990 but only stocked in March 1991, stocked with fingerlings from the big pond, pond five. A third pond had been started in June 1991. Another brother of Abraham finished the pond off and claimed it to be his. Abraham conceded in order to avoid a quarrel. A fourth pond was dug in January 1992 with hired help, paid 200k. Abraham had been intending to sell it to his sister, but decided against this. The large pond, pond five, was first started in June 1990 and stocked with 250 fingerlings from pond one. During 1991 and 1992, he continued to dig this pond, while still full of water and fish, expanding it into a large, irregularly shaped reservoir. The ponds are constructed about five minutes walk from the house, on land next to the main drinking water and washing source for Kaseke village.

In September 1991, Abraham was not part of the fish farming club. Indeed, he believed that himself and others from Kaseke village were being excluded from the club by the original members, who were monopolising all resources (the extension service and grants). He had never been visited by ALCOM, nor had had advice from DoF extensionists. During the subsequent year, and accompanied by much acrimonious politicking between Kaseke and Fipatauko villages, he became vice-chairman of the fish farming club.

RESOURCE FLOWS



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour use

In the period under review, extra-household labour was used on four occasions.

In January 1992, Abraham had another group come to work for him. They were fed with 12 fish from the pond, though Abraham maintained that this did not constitute payment. In September 1992, a man was hired to assist in preparation of beds for a vegetable garden. He was paid a pair of trousers. Abraham is a member of a mutual cultivation group, with whom he was working every other day in March and April. On one occasion, the group came to work for Abraham and he provided five plates of beans with which to feed them. The group consists of seven men and one woman. They only help each other during this period of peak activity of clearing and mounding land at the end of the rains. On one occasion, during March, Susan hired a group of labourers from her church, to prepare land for the coming season. The group was given 150k, nshima and chicken. A dispute arose because she had not consulted him about slaughtering the last chicken. The 150k was raised by selling cassava meal, pounded by herself.

During March and April, Abraham went for piecework (for cash) on five occasions. On one occasion, both Susan and Abraham went to work for soap. Up to the separation in August 1992, Abraham and Susan maintained a high degree of labour segregation in agricultural activities. Since early 1991, they had been controlling separate

fields. The fish ponds and vegetable garden were entirely his responsibility and he did all work on them.

Pond feeding and use of manure

Abraham did all work on the fish ponds. During May 1992, he was away from the village to train as a voluntary village health worker. During this time, the ponds were not fed at all. Throughout the rest of the year, pond feeding was erratic and strongly influenced by Abraham's numerous social obligations. Feeding ranged from daily during a period in April, to hardly at all during August and September. Ponds were invariably fed with armfuls of leaves taken on the way back from the fields.

Manure was added to the ponds four times in the period under review, twice in March and twice in April. On each occasion a total of about one tin (10kg) of chicken manure was added. This manure was collected by Abraham from a number of neighbours, principally his uncle.

Pond harvests

The ponds were harvested both by draining (once), using a borrowed net, and with hook and line. On each occasion, Abraham decided on and carried out the harvesting. In the period under review, the ponds were harvested eight times, of which all but one were for relish and one included the sale of fish for 100k. In January, 12 fish were harvested with which to feed labourers. When pond one was drained in March, 12kg were harvested of which 3kg were fingerlings replaced into ponds two and four, and 1.5kg were eaten at home. The remainder were given away to both his and Susan's relatives. Harvests using a hook ranged from five fish to about 250 fish. After one of these harvests (12 fish), Susan cooked the fish, but they were eaten by Abraham and a group of friends only.

Other

During March 1992, Abraham expanded the area of his ponds. In the following months, he dug a 200m furrow to a patch of land which he was cultivating for vegetables on the dambo. The largest pond was to act as a reservoir for the irrigation of the vegetable garden, which he was setting up in partnership with his sister's husband, a local larger scale maize farmer. This pond expansion became the source of immense dispute within the village, especially as the dry season went on. On the one hand, fish farmers with ponds below Abraham's claimed that he had trapped all the water and was restricting the water supply both to their ponds and their vegetable gardens. Two of these fish farmers were the sons of the headman. For several weeks, Abraham was no longer welcomed at the headman's house. In addition, women in the village complained that the water level in the well had reduced as a result of Abraham's enormous reservoir. As everywhere else in the area dried up during August and September, Abraham's pond was virtually bursting its banks. On the other hand, Abraham did not see why his weeks of hard work should be taken over by others "who do not have the power". He also confessed that the reason for his expansion of irregularly shaped ponds had been so that he could have control of the water. At one point, the banks of the largest pond were broken to supply the garden of those below Abraham. In the end, Abraham capitulated and allowed furrows to be built from the reservoir. He decided that it would be better to have only one fish pond and concentrate on the vegetables.

The vegetable growing scheme involved a partnership with his brother in law, who paid a labourer to assist in land preparation and bought seeds. In September 1992, a bush fire passed through the vegetable garden and ruined the seedlings.

In 1989, Abraham had been growing maize. He had harvested 40 bags. In the following year, his wife was ill for almost eight months. Most of the cash raised from the maize was used in transport for her to Mansa, and food while she was in hospital. As a result, he had no money with which to buy fertiliser in 1991.

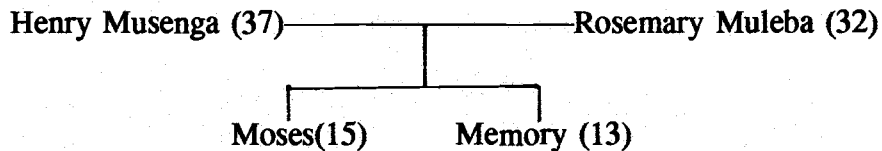
Susan controls the money raised from the sale of cassava meal. During August, she sold some, but refused to tell Abraham how much was raised. She kept the money after leaving him in early August.

When Susan returned to her parents, she took all cooking pots and mats. There was no furniture to take. Abraham immediately began to eat at his parents house, occasionally taking gifts of food, including fish from the pond. He continued to visit his wife and children regularly, especially when one daughter was sick.

In September 1992, Abraham applied for a loan of 108,000k from the Ministry of Youth and Sports, for expansion of his fish ponds. He was not successful.

HENRY MUSENGA AND ROSEMARY MULEBA, FIPATAUKO, MONGA AREA

HOUSEHOLD DESCRIPTION AND BACKGROUND (September 1991)



Henry was born in Kaseke village and Rosemary in Ngombela, both within 3km of their current home. Her parents are still in Ngombela, while his are just across the Loshi stream, in a settlement known as Musenga's village. They have no other children than those living with them. He worked in the Copper Belt for three years, returning in 1983.

During 1992, Henry married a second wife (see chapter five). His second wife came to live in a house next to the first with her three children and he travelled between the two.

Both Henry and Rosemary are very socially and politically active. She was secretary to the Unicef women's group and attended a course to be an adult literacy trainer. He was chairman of the fish farming club, contact farmer for ARPT, chief adviser to the women's group. He has contacts with the Ministry of Youth and Sport in Lusaka and in 1992, received an award for his contribution to Zambian small holder agriculture. He was educated to grade 4 and speaks fluent English. She was educated to grade 2 and speaks a little English.

RESOURCE STOCKS

They own no large livestock. They have 15 chickens and two rabbits.

During 1991-2, Henry bought himself a bicycle and a battery-operated record player with the proceeds from his farming.

His farming in November 1991 included both crops grown for home consumption and a vegetable garden and maize cultivated with financial assistance from a sponsor in Mansa.

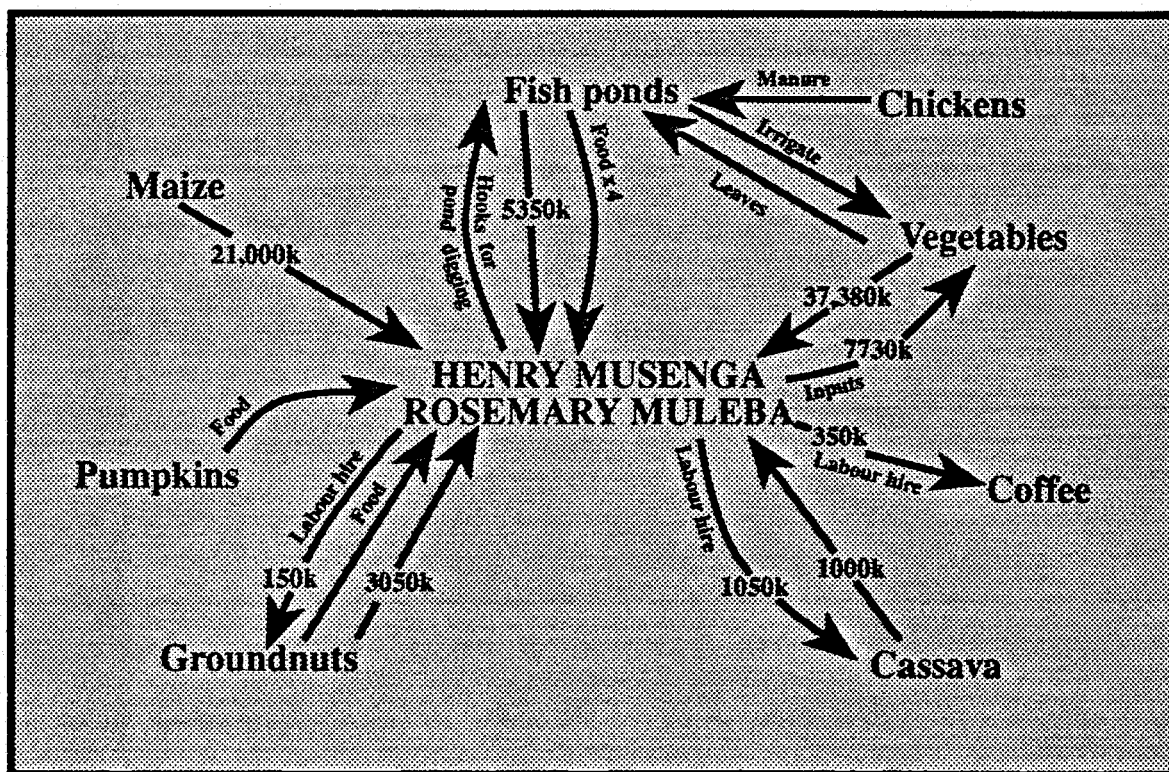
Henry's own fields were for cassava, groundnuts, and maize. His wife cultivated separately a 2 lima maize field (with a grant from Unicef), groundnuts, pumpkins and cassava.

The vegetable garden was of about one hectare, located below and irrigated by the fish ponds. On this were planted rape, irish potatoes, tomatoes, and cabbages. These were sold in Mansa, mainly to the teacher training college. Transport was provided by his sponsor. Farm equipment to support this venture included a chemical sprayer. A separate house was constructed for three labourers who were permanent employees on the vegetable garden.

FISH FARMING HISTORY

Henry was a founder member and is chairman of the Monga fish farming club. With three friends, he approached DoF in Mansa for advice about pond construction and fingerlings. He constructed his first two ponds in 1989 and a further two in 1990. These were stocked with DoF fingerlings supplied at 60k a kilo. A fifth pond was partially constructed in 1991, and this and a sixth were finished off by a hired labourer in early 1992. The ponds are located a few minutes walk from Henry's house, on the edge of the dambo. They are used to supply water to his vegetable garden. In September 1991, all but one of the ponds completely dried up.

RESOURCE FLOWS



ADDITIONAL INFORMATION ON RESOURCE FLOWS, (Jan - Sept 1992)

Labour use

Until March 1991, three permanent labourers were employed on the vegetable garden. They were paid by the sponsor in Mansa. After March 1991, the sponsor withdrew his support, following the adultery case and threats from a number of villagers (see chapter four). The labourers then left.

Henry hired labourers on five occasions in the period under review. In January he hired one man for three days planting coffee. He was paid 350k. Also in January, the same man deepened one of Henry's fish ponds in return for fishing hooks. In April, one labourer was given 120k for assisting with the building of a granary. In early June a group from the CMML church was paid 250k for harvesting 1/4 lima of groundnuts and at the end of the month, the same church group received 800k for preparing a new half lima cassava field.

Rosemary Muleba also hired labourers on several occasions. She hired *ulupwa* (relatives) for 100k to help her clear land for groundnuts in January. In March, she paid two women 100k each for helping her with weeding, and 100k to a woman for planting sweet potatoes. In late April a group of women were given cassava meal for weeding in the cassava field. In May, she spent 500k on the construction of a maize granary and 200k on cassava weeding.

Henry and Rosemary did not work together in the period under review. All fields are cultivated separately. Both of them were sporadically absent from the village, especially in the time surrounding the adultery case. For a while he was spending considerable time in Mansa with his second wife. Rosemary was also sick for prolonged periods, especially in March and April. In May, the second wife moved into the ex-labourers' house, next to that of Rosemary, the first wife. Henry also spent at least five days in every month in activities connected with his high profile in the community: attending meeting, visiting other farmers, and welcoming visitors from outside. Both of their children attend school, and assisted their parents when they were not at school.

Pond feeding and use of manure

Pond feeding was irregular, reflecting the numerous other concerns taking up Henry's life. During his absences in Mansa, the ponds were occasionally fed by his wife or son, but there was no established routine.

Henry added rabbit manure to the ponds four times in January and once in February. Chicken manure was added once in April, once in May and once in June.

Pond harvesting

The ponds were harvested five times in the period under review. In January, Rosemary Muleba took 25 fish for relish. In March, one pond was drained to raise money for the adultery fine (200,000k). Henry and Rosemary drained the pond together, she took a few fish for household relish and he sold the remaining 5kg. In April, 800 fingerlings were cropped from one pond and sold at 5k each. In early August, all ponds except one

holding pond were drained because the water level was so low. The fish harvested were sold for 850k, and some kept for household consumption.

Other Money

The household had much higher expenditure on luxury goods, only obtainable in Mansa, than any other case study household. This amounted to more than 2000k a month on average (for most case study households, the figure was nil). Although Henry and his first wife had complete separation of all farming activities, and maintained separate control of the income obtained, expenditure on luxury items usually benefitted both. Thus, on one shopping expedition, Henry bought clothes for all members of the family, sugar, bread, milk, biscuits, buns, and cooking oil.

When Henry moved in with his second wife, he paid rent on a house in Mansa, as well as buying sacks of kapenta, charcoal, and mealie meal.

On one occasion, Henry sold rape to his wife, Rosemary. She used this to trade and kept the profits for herself.

Of the income in the period under review, 53,130k is Henry's from the sale of crops, mainly vegetables, while 10,800k is hers, primarily from maize farming. She also swapped three 90kg bags of maize for cisense with which she was going to trade. It is not clear how much of Henry's income is passed on to his sponsor in Mansa, at least in the early months of 1992.

Separation of farming

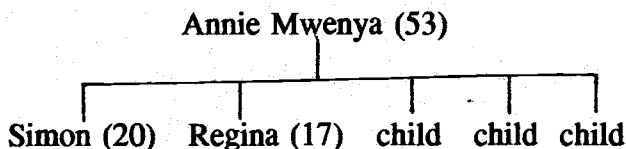
Henry and Rosemary both maintained that they farmed separately in order to ensure that she would not risk losing her land to his family if he died. On the other hand, she said that if she were to invest in a fish pond, it would have to be in her mother's village, Ngombela, for greater security.

Land

There is a discrepancy between Henry's claims concerning the source of his land, and those of others in the area. The five hectares he controls in Fipatauko is considered to be particularly fertile and well drained. The slight slope from the fish ponds to the vegetable garden is ideal for irrigation. While he maintains that he was able to just begin cultivating when he moved to Fipatauko in the mid 1980s, having obtained permission from the chief, a group in Kaseke village argue that he took over land which was already allocated to them. The fish ponds are at the centre of the dispute as the rush to dig ponds in the late 1980s was seen by some as a means of claiming land. It is possible that the jealousy and resentment arising from this dispute contributed to the acrimony of the adultery case in March and April.

ANNIE MWENYA, BULE 2, CHIBOTE AREA

HOUSEHOLD DESCRIPTION AND BACKGROUND (September 1991)



Annie Mwenya was born in Mufulira, where her father was a miner. Chibote is her father's home village. She returned to Chibote when ten years old. After marrying in 1963 she moved to Mushota to her husband's parents. They returned to Chibote area in 1985 following the death of her husband's father. Annie was widowed in 1990. Her husband was a carpenter for the OTC and was killed in an accident.

She has given birth to nine children, six of whom are alive. A son is married and lives in nearby Muombo. Simon, the next eldest son was married during 1991. She supports her children alone, but receives some labouring assistance from a brother and sister, who are both married and living nearby. A sister in Mufulira occasionally sends clothes.

She is an active member of the Church women's group.

She is educated to grade 2 and speaks a little English.

RESOURCE STOCKS.

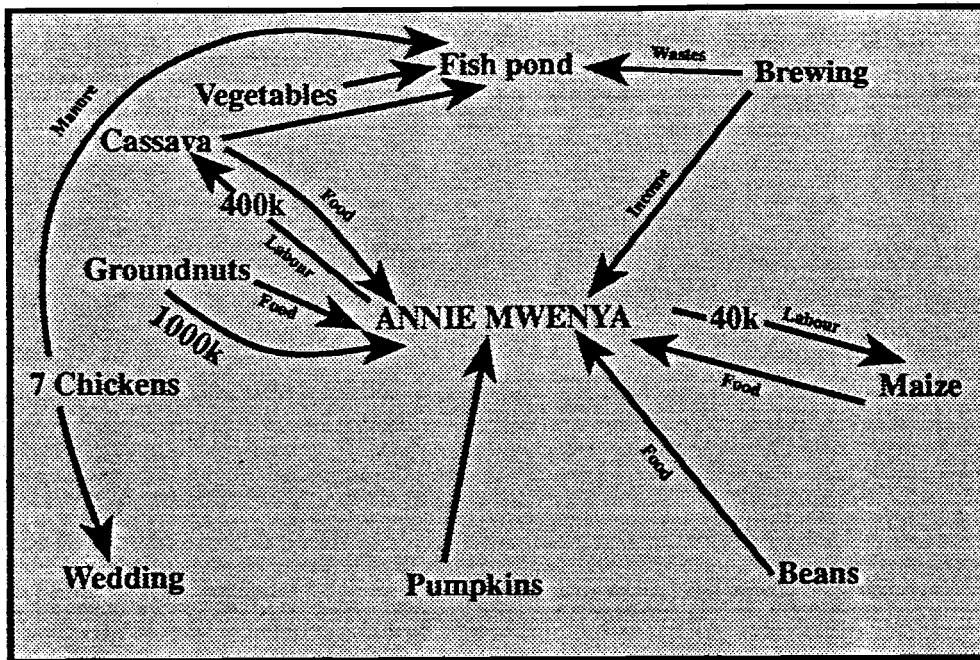
She had seven chickens but killed six for her son's wedding. She has no other livestock. She grows cassava, groundnuts and beans in fields half an hour's walk from the house. Near the house, she grows half a lima of maize, pumpkins, bananas, and vegetables. She owns a 120 litre drum for brewing.

FISH FARMING HISTORY

Annie's husband constructed a pond during 1989 with assistance from the Fathers. It was stocked with fingerlings which were a gift from her brother. Fish were taken once during 1990. After her husband died in 1990, Annie started another pond which she did not finish. During 1991 and 1992, she re-dug the old pond, doubling its size to 200m². She dug the pond with a hoe and with occasional assistance from her two elder sons. Most of the work took place during February 1992, interspersed with groundnuts weeding. This was subsequent to her participation in the fish farmer exchange to Monga. She was invited by the Chibote fish scout, following instruction from the ALCOM aquaculturist (on suggestion from me). Although she lives near Chibote centre, the fish scout claimed he did not know she was a pond owner.

Annie stocked her pond with 120 fingerlings in March 1992, but was immediately beset with technical problems. The pond is constructed over a spring so that there is a constant flow-through of water and all nutrients are washed out. During pond construction she was not visited by the fish scout or advised about this problem.

RESOURCE FLOWS



ADDITIONAL INFORMATION ON RESOURCE FLOWS (Nov 91-August 92)

Labour use

During 1991, Annie's citemene was cut by her brother Tresfo. She hired labour three times during the period under review. On one occasion she paid two young boys to weed her maize. She sold a bottle of home made "brandy" for 40k to pay them. She also hired her citente group once in December to weed groundnuts. She paid 100k for about 15-20 people for one day. Her eldest son Sebastian assisted her on three occasions. In July 1992 she paid 200k and spent 200k on food for labourers to cut her half lima of citemene. This was also paid for with brewing.

During the period under review she did no outside labouring, but assisted her sister with maize weeding twice and went to work with the women's league several times.

Pond maintenance.

After stocking the pond, Annie was throwing in cassava leaves and cassava peelings for a few weeks. She also applied cattle manure which she obtained (for free) from a neighbour. By August, with the fish failing to grow, she was seldom going to the pond.

Other

Brewing. Though Annie's main source of income is her brewing, this is an extremely precarious and risky business. Because she does not grow enough maize, she buys maize from the OTC. On one occasion she borrowed 500k to pay for this, but the brew "failed" (it tasted sour, and many other people had brewed that day so she was unable to sell it). She could have expected to sell the brew for about 750k, but on this occasion, lost the money. More frequently, she makes small quantities of "brandy" which are sold to meet immediate expenses. For example, she made brandy for 100k and used

75k for a bar of soap.

In 1992, her maize harvest failed. She blamed lack of fertiliser. She grew one bag of groundnuts, some of which were sold for 1,000k, and the rest kept for food. Throughout the period under review, she was highly active in the community, spending large proportions of every week visiting the sick, and attending meetings connected with the Church.

ELIZABETH MWILA, FIKATWE VILLAGE, CHIBOTE AREA.

HOUSEHOLD DESCRIPTION AND BACKGROUND

Elizabeth Mwila (50s)

|
child

Although Elizabeth Mwila lives with only one child, she has two married daughters and a married son living very close by. Two married daughters live on the Copperbelt, and one daughter is at school there. This daughter returned to live with her mother during 1992. Another daughter lives next to her mother. She is not married and has a small baby.

She was born in Northern Province, where her father was a messenger. She moved to Alex village with her husband because he had relatives there. The headman of Alex village is her husband's mother's sister's son. They shifted to Fikatwe (near Alex) in search of new land in 1972. After the death of her husband in 1990, she relies on the relatives in Alex for assistance.

RESOURCE STOCKS

She owns 40-50 chickens which live in the house. Only about ten of these are adult chickens

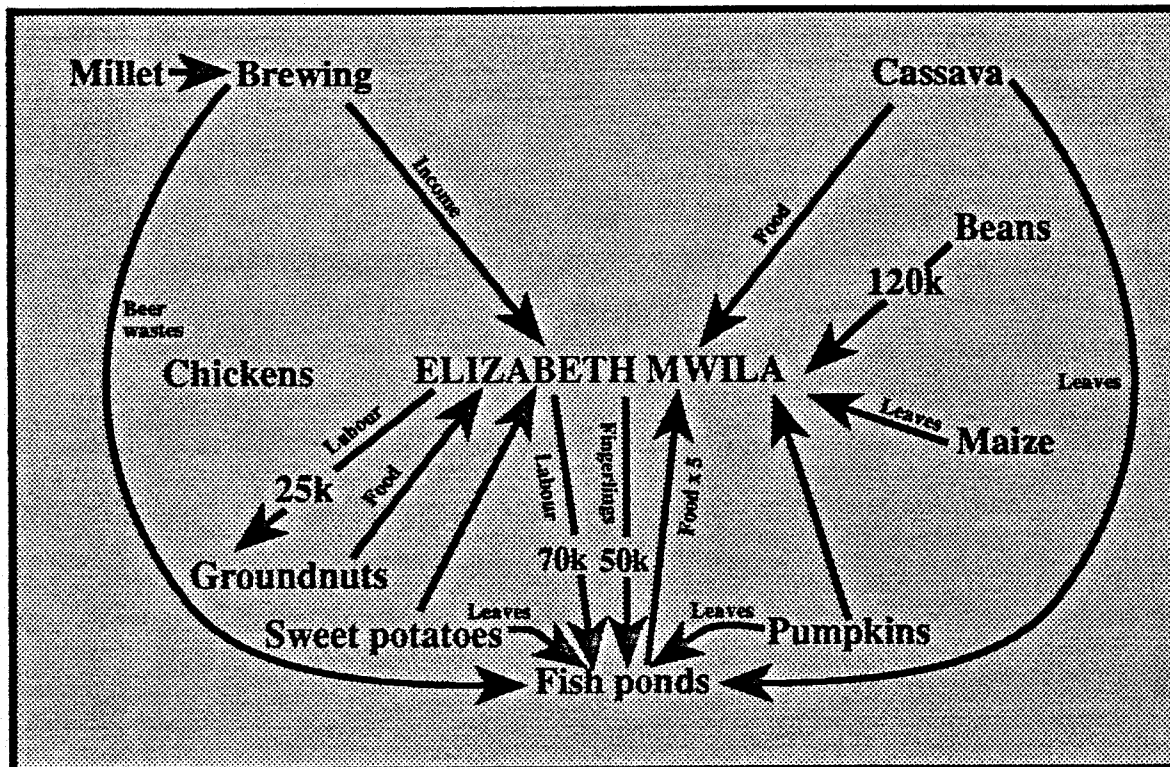
In August she received 2000k from the OTC group of which her husband had been a member. She used this to buy two sheep.

Her citemene is about one hour's walk from the house. On this she grows millet, cassava, groundnuts, maize and sweet potatoes. Near the house there are groundnuts, maize, pumpkins and bananas.

FISH FARMING HISTORY.

She has three fish ponds. They are all located at about five minutes walk from her house, and are fed by a stream. The first was dug by her husband and stocked with 30 fingerlings in 1989. It is 25 X 3m. The second and third were dug by Elizabeth in 1991 and stocked from the first. Both of them are very small (no more than 10m²), and stocked with 18 and 16 fingerlings respectively. None of the ponds have ever been drained. She has never received any visit from the extensionist.

RESOURCE FLOWS



ADDITIONAL INFORMATION ON RESOURCE FLOWS

Labour use

She hired piece workers four times in March and twice in April. In March she hired a boy to weed groundnuts and paid him 25k, someone to weed around the house on two occasions for 20k and 40k, and a labourer to clear around the fish ponds for 70k. In April two labourers were hired to harvest beans and were given 60k each.

On one occasion, some visitors from Mushota assisted her with her groundnuts harvest. Her sons cut her citemene for her, in return for beer. Apart from this, all work was undertaken by Elizabeth with her daughters. They invariably assisted with most aspects of farming and usually ate with Elizabeth. Her son mostly looked after the vegetable garden. Pond feeding was predominantly done by Elizabeth. All brewing was undertaken with her married daughters at Elizabeth's house.

Elizabeth did piece work three times in the period under review, once for salt and twice for rice.

Pond feeding and manuring

In the period under review, the ponds were fed every week, but often not more than once a week. They were fed by Elizabeth. She said she did not feed the fish frequently because cassava was soaking in the ponds and they could feed on this.

Despite owning only chickens, the ponds were regularly (at least monthly) manured using cattle and goat manure, obtained from neighbours. On the other hand, chicken manure was never used. The chickens were not cooped, so it was thought to be

too difficult to collect the manure.

Pond harvesting

The ponds were harvested on five occasions from December to the following August. All harvests were for household relish only.

In March, 50k was spent on fingerlings for the newly built pond.

Other

Precise information on income from brewing is not available, although this was Elizabeth's most regular source of money. She consistently maintained that there was no profit in brewing in Fikatwe because people would just come to taste without buying.

In June she exchanged some of her groundnuts harvest for fish. The rest were consumed.

APPENDIX 5 SEMI COMMERCIAL FISH FARMERS

In both Monga and Chibote areas there are fish pond owners who devote scarce resources to the activity, and for whom fish farming is not simply an addition to a mainly self-provisioning farming system. The difference between such farmers and those who have thus far been discussed, the "small scale" fish farmers, cannot be defined according to strict boundaries: some of these small scale fish farmers are prepared to devote some scarce resources. The categorisation is flexible but refers essentially to current scale of activity - but not to fish pond productivity.

Mr Musa Chama

Mr Chama is a policeman in Mansa. He owns a farm about 10km outside of Mansa, to which he intends to retire in the near future. Currently the farm is managed by his son and nephew.

In September 1990, he dug his first fish pond using labour hired with a slaughtered goat. He stocked it with fingerlings from nearby Fiyongoli fish farm. Immediately afterwards he went to the Lima bank to obtain a loan for 50,000. With this money he hired labour to construct five more ponds, each 900m², which were stocked in March 1991. The ponds were dug without construction advice from DoF. He bought 50kg of fingerlings from DoF at a cost of 50 kwacha/kg. Mr Chama was by far the biggest purchaser from Fiyongoli that year, given the limited stocks which were available.

During 1992, he bought 100kg of chicken manure from the Luapula Cooperative Union (LCU) at a cost of 2750 kwacha. He added this to the ponds at the rate of 10kg/pond/week. More recently, manure has not been available from LCU. As Mr Chama does not currently possess any animals, he has been unable to feed or fertilise his ponds. In 1992, three further ponds were dug, also using hired labour. Problems developed though, during the rainy season of 1992/3; the ponds are located in a particularly water-logged location. During the heaviest rains, the banks of five of the ponds burst, releasing the fish into the dambo.

The ponds were first cropped in February 1992, when 30kg were sold for 4500 kwacha to the government rest house. In March of that year, a further 38kg raised 5700 kwacha. In January 1993, 14kg of fish were sold for 5600 kwacha, also to the government rest house and a friend. The biggest potential profit however, lies in the sale of fingerlings. At a price of 15 kwacha each, he has so far brought in 32,000 kwacha from fingerling sales. It should be noted though that these fingerlings were purchased by the ALCOM aquaculturist (10,500 kwacha) for stocking trial ponds, and by the ALCOM driver, for his personal fish farming venture. The reason they were brought from Mr Chama was that there were insufficient fingerlings available at Fiyongoli. The prospect of there being other people around prepared to pay such prices is uncertain.

Mr Chama's venture has proved to bring in financial rewards in the short term. He

has still not paid off the initial loan, or the interest of 34,000 kwacha, but at current rates of inflation, this debt will become insignificant. The longer term profitability of the ponds is also hanging in the balance. The track to his farm is in such poor condition that he can only rely on one-off marketing opportunities. With many of the fish lost into the dambo, he will presumably have to rely on Fiyongoli supplies again, the availability of which appears to be rather disputed.

Mr Kafyende

Mr Kafyende lives in Mwale's village, across the Mansa river from Monga. He started fish farming in 1989 and has 19 ponds, of which, in December 1991, 10 were stocked. He has been a focus of attention for both ALCOM and DoF, partly because of the size and visibility of his operation. He has been visited by the Provincial Fisheries Director and Fish Culturist, and by several visitors from ALCOM. ALCOM have established trials with sunhemp and with duck-cum-fish culture on his farm.

For 25 years he was a "businessman" in Kitwe, followed by a spell in Mansa where he established a tailoring workshop with 13 industrial sewing machines. He moved to the village from Mansa in 1989. Born in Kazembe and ethnically a Lunda, his immediate family does not have kinship connections to the area. He acquired title deeds to his 45 hectares of land through application to the chief.

He explained his move to the village in the following way:

I wanted to go back to a simple life. Things in town are expensive and there are thieves. It is more peaceful on the farm

Nonetheless, he is investing considerable sums of money in a number of enterprises, including fish farming. He grows maize, coffee, vegetables, wheat, rice and popcorn. His ponds were dug using hired labour at a cost of 1600 -2000 kwacha per pond. Casual labour is also employed for the other farming operations.

After three years, his returns from the farm were insufficient to match the expenditures. With coffee, this is understandable (plants do not fully mature for seven years), but from other ventures he might have expected to see a profit. The fish farming had brought in about 4000 kwacha from the sale of fingerlings, but no ponds had been drained. Mr Kafyende's farming operation is currently subsidised by the profits from his factory in Mansa, which is still managed by a son.

Mr Chileya

Mr Chileya lives in Katota's village, about 7km from Chibote centre. He is recognised throughout Chibote area as the "big" fish farmer. He attended a two month fisheries department course at Mwekera in 1978. Previously (in 1972) he had seen fish farming in Mporokoso and constructed one pond. Following the course he constructed more ponds: four in 1978 and four more in 1982. He says that there was no profit from these ponds:

"I was concentrating on maize in those days and my brother should have been managing them, but he didn't know how to look after them".

Despite this, he was willing to expand: by 1992 he had 20 ponds, 11 of which had been constructed following his contact with ALCOM in 1989.

The ponds are built on land to which Mr Chileya has title deeds. The title deeds were however, gained subsequently to the pond digging, not before, and to some Mr Chileya believes were easier to get because of the existence of the ponds. He is the owner of a shop in Katota (managed by his son) and has a banana plantation, which he claims brings in up to 15,000 kwacha a month between March and August.

As with Mr Kafyende, visits from ALCOM and DoF have been frequent. Trials in duck-fish culture has been initiated at his farm. The fish scout in Chibote believes that an important part of his work is to concentrate on getting Mr Chileya's ponds "right" so that he can serve as a model farmer to others.

Mr Chileya hired pieceworkers to construct his ponds and has two full time paid workers for feeding the fish and slashing the grass. Economic returns cannot be specified though. Mr Chileya does not keep a record of harvests. A notice is posted on a tree on the day they will drain a pond and people come to the pondside. If there are any fish left, they are transported to "the harbour" in Mushota, where they may be sold, but must compete with river-caught fish. ALCOM have bought fingerlings from Mr Chileya to stock the village hatcheries in Chibote. He also sells to other fish farmers in the area. The ALCOM aquaculturist believes though that productivity is likely to be low: the ponds are located 3km away from his main maize farm, and there is a general lack of inputs to the pond in the area where they are located. Mr Chileya has only a few goats to provide manure for the 20 ponds.

Mr Chileya and Mr Kafyende have both been regularly visited by ALCOM and DoF, for whom they represent the "emergent" farmer. Both have been the recipients of inputs to assist with on-farm trials. This is partially because they have sufficient ponds in a suitable condition (as defined by ALCOM/DoF) to expect that the trials may work. In addition though, there is a suggestion, made increasingly frequently, that those who have already demonstrated commercial inclinations and ability should be the targets of extension advice. The logic is that such inclinations and ability can be translated into a fish farming operation with benefits in terms of both increased overall fish production and demonstration effects to the rest of the community. Mr Chama was not directly assisted by ALCOM. In fact he was pointedly reminded that it was not the job of the project or DoF to assist with harvesting by loaning him a seine net. Obviously though, his ability to get access to a large amount of cheap fingerlings was beneficial in starting up his fish farming operation.

The case studies illustrate that demonstrated commercial ability in one area of activity is no guarantee of ability in another, though of course they may be associated. It is not possible to make judgements about financial returns; information is of shaky reliability. From technical assessments however, the fish farms were considered to be unlikely to be profitable for their owners in financial terms. These limited returns can partially be blamed on inadequate knowledge - but only partially: these farmers have had considerably more extension attention than the majority of others. Possibly more important is the fact that the

reasons for these farmers' adoption of aquaculture are extremely complex. They encompass not only the desire to make money, but also considerations of social standing, conspicuous consumption, and response to development. These reasons also overlap with those of self-provisioning farmers.

APPENDIX 6

ACTIVITIES IN THE LUAPULA PILOT PROJECT (CHRONOLOGICAL ORDER)

Research and information collection

1. 1988. Survey of fish farmers, Luapula Province (Wijkstrom and Wahlstrom 1992).
2. 1988. Formulation of pilot activities on intermittent harvesting
3. 1988. Study on integration of fish farming into the farm household system (de Kartzow et al.1991)
4. 1989. Study on production costs of tilapia at Fiyongoli fish farm (Nystrom 1990, unpublished).
5. 1990. Fish farming census, Chibote area (unavailable).
6. 1990. Study on the integration of gender issues into fish farming in Chibote area (Mbozi 1991).
7. 1990. Rapid rural appraisal, Luapula Province (ALCOM 1991b, unpublished)
8. 1991. Household food security survey (Luhila 1992, unpublished)
9. 1991. Desk study on household food security and nutrition in Chibote (Luhila 1992, unpublished).
- 10.1991-3. Monitoring of fish production with logbooks.
- 11.1991-2. Agro-ecosystem mapping, Luapula Province.
- 12.1991-2. Sussex/Stirling study.

"Development" activities

- 13.1989. Seminar on integration of fish farming in farming systems.
- 14.1989-91. Repairs on Fiyongoli fish farm, Mansa
- 15.1989-91. Chibote aquaculture development (Finnida)
- 16.1989-91. Extension and training
- 17.1989-91. Fish farming trials
- 18.1991. Training of trainers course on household food security and nutrition, Chibote.
- 19.1991. Mutual feeding centre - trial
- 20.1991. Manual on integrating household food security and nutrition concerns in aquaculture.
- 21.1991-93. Extension and training
- 22.1991-93. Fish farming trials
- 23.1991-93. Testing of local fish farming gear.
- 24.1992-93. Fish and rice trials.

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