Draft

IMPACT OF THE OXBOW LAKES PROJECT II ON PARTICIPANT HOUSEHOLDS

December 1996

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bangladesh rural
advancement
committee

BRAC

February 16, 1997

Dr. Hans A. J. Middendorp
Chief Technical Advisor
DTA/OLP-II
Jessore

Subject: Impact Study Report of the Oxbow Lake Project II

Dear Dr. Middendorp,

I am pleased to attach one copy of the draft report of the OLP-II Impact Study for your kind reference. We would appreciate your comments on the report which would be helpful in updating, if necessary.

Thank you for your cooperation.

With warm regards.

Yours sincerely,

M. G. Sattar
Manager, Research and Evaluation Division

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EXECUTIVE SUMMARY

The Oxbow Lake Project II is being implemented by BRAC since June 1991 in co-operation with the Directorate of Fisheries (DOF), the Project Implementation Unit (PIU) of the Government of Bangladesh, International Fund for Agricultural Development (IFAD) and Danish International Development Assistance (DANIDA). BRAC is entrusted with organizing the fishermen at the grassroots level, capacity development of the fishermen through management and skill training, credit support, and overall supervision of work to improve the condition of the rural poor fishermen in particular, and to eradicate rural poverty, in general. This study focuses on the impact of the Second Oxbow Lake Project (OLP II) on participant fishermen households. The objective of the study is to provide the analysis of the changes in the material well-being of the participant households and to discuss the changes in the lives of the non-participants of the oxbow lake catchment areas as a result of OLP II intervention.

The study gathered data through survey in 1993 and resurvey in 1995 from 1189 participant and non-participant households of 21 oxbow lake catchment areas. The households were randomly selected for conducting survey. Both participants and non-participants are the members of BRAC's Rural Development Programme (RDP). To find out the displaced fishermen household due to the OLP II intervention and to know their economic condition the study also included case study in 3 oxbow lake catchment areas.

Positive changes have taken place in the oxbow lake catchment areas as a result of the fishermen's participation in the OLP II. These changes have been categorized into two broad areas, i.e., material well-being of the participant households as well as the indirect impact of the OLP on the inhabitants of the oxbow lake catchment areas and displacement caused by the project. According to the findings the shelter environment in terms of electricity facility and sanitation of the participant households has improved compared to that of the non-participant households.

Household study reveals that the participant households have increased their property (household assets) retaining capacity and they no longer need to go for distress sale of their livestock for their subsistence. Fishermen households have also increased their fishing implements and tools which indicates their increasing necessity and dependency on fishing.

The participant households' main source of income is fishing and they have increased their income after the implementation of the OLP II. The overall mean monthly income of the participant households is higher compared to that of the non-participant households. The fishermen (LFTs -- lake fishing team) perceive that they have been able to decrease their deficit months (income and food shortage period) by 33 percent and increase surplus months (period where amount of income and food is greater than needed) by 81 percent with respect to income and food security in 1995. Likewise the non- participant households (FVO female village organisation) also could decrease their deficit months by 28 percent and increase surplus months by 82 percent, since the non-participant households are also the member of RDP, BRAC. Both participant and non-participant enjoy the input facilities including credit of RDP. Therefore, during the OLP II intervention period LFTs are not only able to increase surplus months and to decrease deficit months but also the FVOs. But the non-participants have no access to OLP II. Due to the participation in OLP II of the LFTs the surplus and deficit period of LFTs are 114 percent greater and 12 percent lower respectively than that of the FVOs during the project intervention.

One of the important indicators of material well-being is fish consumption. The OLP II cultivates different species of carps, i.e., *Ruhi, Katla, Mrigel*, Mirror carp, Grass carp and Silver carp in the oxbow lakes. The participant households' consumption of carp fish was greater by 360 percent after OLP II intervention (1995) compared to the initial stage of the project (1993). Again the consumption of carps of the participants is greater by 282 and 283 percent in 1993 and 1995 respectively compared to the non-participants.

The fishermen households who were engaged in fishing in the oxbow lakes before the project intervention but excluded from the peoject were identified as displaced. None of these households (16.5%) are reported to be involved in fishing at present. The reasons for displacement are land ownership (of >0.50 acre of land), high fishing change, no vacancy in the lake fishing team to be recruited as member of LFT, and self exclusion. All of the displaced households at present are engaged in non-fishing activities such as manual labour selling, agriculture and trade and transportation. Target displaced households are in relegated condition than the target (LFT) households in terms of some indicators, viz., carps consumption, floor space utilization, number of poultry birds and per capita expenditure.

The participants, non-participants and villagers of the study areas perceived that a change had occurred in increasing crop production, creation of new income earning opportunities, increament in trade, expanded labour mobility, hat/bazaar expansion, increasing social visits, mode of transportation, etc., in the project areas due to the project intervention. They reported that these changes have placed a conducive role in improving their livelihood living in the sampled oxbow lake catchment areas.

The study also attempted to explore the management capability of the fishermen through involving them in the oxbow lake related activities like de-weeding, restocking, maintenance of oxbow lakes, fish harvesting, marketing of fish, financial management, etc. In this respect, fishermen of one oxbow lake played a satisfactory role while management of two others showed comparatively poor performance. The findings revealed that long term involvement of the fishermen with cooperative activities was the main reason for satisfactory management role in that particular oxbow lake. However, there is scope for further improvement in the management practices of the LFT participants of the two other lakes.

ACKNOWLEDGEMENT

This report provides information of an impact of Oxbow Lake Project II on participant households. The Project is being implemented by BRAC since June 1991 in co-operation with the Directorate of Fisheries (DOF), the Project Implementation Unit (PIU) of the Government of Bangladesh, International Fund for Agricultural Development (IFAD) and Danish International Development Assistance (DANIDA). Many people deserve mention in connection with this study. We feel happy to acknowledge their support and contribution.

Our special thanks are to IFAD and DANIDA for financial support and to DOF and PIU of the Government of Bangladesh for technical and administrative support but for which the project could not have been materialized.

Our cordial thanks to Prof. A. M. Muazzam Husain, Ph.D, Research Specialist at RED, BRAC for his invaluable suggestions and guidance in developing and finalising this report. Dr. M. Anisuzzaman, formerly Dean of Chittagong University, went through the draft and offered many useful suggestions which have added to the quality of presentation. AMR Chowdhury, Ph.D, Director Research, BRAC provided constant guidance and inspiration to accomplish this work as best as possible.

The BRAC study team (please see next page for their names) had been involved in a painstaking work in analysing the data and preparing the report within a short time. My heartiest thanks to all members of the research team for their hard work.

A. H. Mallick, Azmal Kabir, Dilruba Banu, Nurul Amin, Md. Jakariya, Mamun-ur Roshid, Md. Abdur Razzaque and Gulshan Ara at RED, extended best of their support at various stages of implementation of this study project. Their role in supervision, data analysis, and report preparation has been very useful. The field interviewers and coders worked diligently in collecting and processing the data.

Last but not least, our cordial thanks are to the respondents of this study for their nice cooperation and sacrificing their times for our work.

BRAC, Dhaka
15 February 1997

M. Ghulam Sattar
Manager, Research and Evaluation

STUDY TEAM

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1. INTRODUCTION

Bangladesh is the delta for all the major river systems of the vast catchment area of the Himalayas and the Gangetic plain. The major river systems along with their tributaries and branches numbering 230 have extensive flood plains along both sides of their courses. The estimated total area of the flood plains within Bangladesh is 5.5 million hectares. Within the flood plains there also exist deep depressions locally known as beels and haors (Ali, 1994). The total area of 1.47 million hectares of inland fishing ground in Bangladesh is distributed as : rivers, streams and canals - 56.6 percent; natural depressions (haors, baors, beels, etc.) -20 percent; brackish water - 12.4 percent; ponds and tanks - 5.2 percent : and lakes - 6.1 percent (Chittagong University, 1977 cited by Rahman, 1986).

Fish production in Bangladesh comes from the open inland waters (i.e., the rivers, tributaries, canals, estuaries, monsoon inundated flood plains, beels and haors), closed inland waters (ponds, baors and brackish water ponds) and the Bay of Bengal. Of these, the inland water sub-sector has been traditionally the most significant and important (Ali, 1994).

Fisheries play a dominant role in nutrition, employment, foreign exchange earning and other areas of the country's economy. It contributes about 80 percent to the nation's animal protein (The Fourth Five Year Plan 1990-95, 1995; Bangladesh Economic Survey 1993-94, 1995). Fish has traditionally been a source of low-cost protein. High in protein, it is an excellent source of minerals such as calcium, phosphorus and iron, contains key vitamins and complements the high carbohydrate diets of many regions. Fish can be an important part of the diets of malnourished children " whose small stomachs prevent them from consuming the bulk they need to get enough nutrients and grow" (Panos Briefing, 1995; FAO, 1991).

In Bangladesh the fisheries sector is estimated to provide full-time employment to about 2 million people. This is equivalent to 7 percent of the total employment (World Bank Fisheries Credit Appraisal Report 1989 cited by Ali, 1994). The fisheries sector was estimated to have contributed 3.5 percent of the country's total GDP and about 9 percent of the export earnings (Bangladesh Economic Survey 1993-94,1995).

'To expand employment opportunities for rural youth, women, landless people and fishermen through productive activities and to improve the socioeconomic conditions of rural people in general and of fishermen and fish farmers in particular were two of the six objectives as set out in the Second Five Year Plan of Bangladesh for fisheries development. These social objects were quite important because without the development of fishermen it was hardly possible to develop the fisheries sector (Rahman, 1986).

In view of the importance and long term potential of fisheries development the Fourth Five Year Plan (1990-95) also put emphasis on increase in fish production, improvement of the socio-economic conditions of the fishing community and creation of additional employment opportunities for poverty alleviation.

BRAC is the largest non-government development organization in Bangladesh in terms of programme coverage and staff and para-profession workers involving in operational works. The extensive experience of this organisation in development has shown that income and employment generating activities are the best ways to improve the fate of the rural poor people as well as to eradicate rural poverty. Fisheries programme is one of the most promising income and employment generating activities among the farm based activities (BRAC Fisheries Programme, nd). Hence, BRAC has undertaken the Oxbow lake (Baor) fisheries project. The Oxbow Lake Project is being implemented by BRAC since June 1991 in co-operation with the Directorate of Fisheries (DOF), the Project Implementation Unit of the Government of Bangladesh, the International Fund for Agricultural Development (IFAD) and Danish International Development Assistance (DANIDA). As per terms and conditions, BRAC is entrusted with organising the fishermen at the grassroots level, capacity development of the fishermen through management and skill training, credit support, and overall supervision of work. The work starts with the identification and organising the genuine poor fishermen at the oxbow lake level. After group formation, BRAC arranges training for the group members and extends credit support to the organised fishermen. The credit is used for paying lease fees as an access right to oxbow lakes, purchasing gears and boats, restocking, etc. BRAC also performs overall supervision of the project and maintains coordination with the related government agencies. This organisation also conducts survey and evaluation of the project. The oxbow lake development activities are carried out through the Rural Development Programme (RDP), a vital development initiative of BRAC, designated to allaviate poverty and

empower the poor. The major activities in RDP include organising the poor into village organisation (VO), capacity development of the members through various kinds of training, savings and credit, and employment and income generation of the VO members. RDP has now covered 1.7 milion rural poor as active members. Over 90 percent of the members are women. The group is charged with the responsibilities of lake maintenance, including weeding, repairing and maintaining embankments and other structures. The group is also responsible for lake restocking operations and have the right to dispose of the catch. Both the cost and benefits of lake management are shared equally by the licensed fishermen. Sharing of income has been defined on the basis of the number of days a fisherman participates in fishing. After deducting 50 percent of a day's gross income for cost the other 50 percent is equally distributed among those who participated in that day's fishing. The present study, however, focuses on the impact of the Second Ox-bow Lakes Project (OLPII) on participant households.

1.1 Objective of the study

In line with the posited scenario and concerns, this study selected ited objectives as the following:

- To provide the analysis of the changes in the material well-being of the participant households.
- To discuss the changes (if any) in the lives of the non-participants of Oxbow lake catchment areas as well as the cause of displacement as a result of OLP intervention.

1.2 Scope and significance of the study

Before 1950 the Oxbow lakes were the properties of the landlords. Following the abolition of the landlord system through the East Bangal State Acquisition and Tenancy Act of 1950 the ownership of all inland fisheries, with the exception of ponds and tanks, was transferred to the government. Both before and after this Act, the fishermen were ignored in general and were passed over for the highest bidders in auctions. The leaseholders employed the fishermen on a catch sharing basis to harvest the lakes. Moreover, the lease did not provide any incentive for the leaseholders to invest in the development of the lakes or the fish stock. At the same time, because of their vulnerable economic and social position, the fishermen were dominated and exploited by the rich leaseholders. In the 1970s, it became evident that fishery resources were being increasingly depleted; the revenue collection was also declining, and there was no improvement in production or equity issues. The government thus felt an immediate need for

introducing a more professional and technical guidance to the sector. To this end, in the late 1970s the administration of waterbodies was handed over to the Department of Fisheries.
The First Oxbow Lakes Project (OLP I) (1978-1986) with financial assistance from World Bank/IDA was in the form of a pilot project to demonstrate the possibilities of a major increase in production of table fish in six lakes (1059 ha) of Jessore district. OLP I was managed by the Department of Fisheries (IFAD, 1991; PIU, 1996). The experience of OLP I inspired the Government to undertake OLP II (1989-1997).

In 1985 a new fisheries management policy (NFMP) was introduced by the then government of Bangladesh. This was a big shift over leasing system to the licensing system. The Oxbow Lakes Small Scale Fishermen Project (OLP II) was initiated in 1989 under the new fisheries management policy to establish the rights of the poor fishermen on the oxbow lake fish culture management. The specific objectives of OLP II are following:

- An increase in the overall productivity of the chosen water bodies (i.e., the selected oxbow lakes any adjacent waters in which fish production can usefully be integrated to the general economy of the oxbow lake) in order to serve local and external domestic markets with various species of fish, enhance the general economy and provide nutritional benefits to the population at large.

- Assistance for the poorest users of the oxbow lakes to participate to the maximum extent in all the various tasks which underpin the development of aquaculture and fishing in general, and thereby to help them reach a higher level of income and of social status.

The new fisheries management policy (NFMP) of 1985 introduced a new system of user rights by replacing the leasing system with a licensing system. The objective of NFMP is to spread the benefits from the natural resources to the more disadvantaged segments of the population and to maintain and improve the productivity of fisheries on a sustainable basis. On the basis of the project's selection criteria DOF and BRAC jointly selected genuine, poor fishermen of 21 oxbow lakes and granted them license in exchange of a reasonable sum in license fees. Conditional upon adherence to the rules and regulations of the project licenses are automatically renewed every year.

According to the terms and conditions of the project, an impact assessment study was conducted by the Research and Evaluation Division (RED) of BRAC. Accordingly, two rounds of household survey were carried out in 1993 and 1995. Though BRAC has implemented OLP II in 1991 but the actual operation for fisheries started in 1993 and almost all of the targetted oxbow lakes have come under the umbrella of OLP II in 1993 (Table 1), therefore the year 1993 was considered as the base year and that year's survey provided the baseline. The information collected through the survey of the oxbow lakes in 1995 is compared with the baseline data to assess the changes in the socio-economic condition that have taken place in the lives of project participants. Further it describes the difference between the project participants and the non-participants. The participants were the licensed fishermen and the non-participant comparison group was the RDP members not participating in the OLP. In order to isolate the RDP inputs, a community level comparison was made with the census data collected from 9 villages of 3 oxbow lake catchment areas in 1995 (no baseline of community data was available). In order to have an in-depth insight on some selected qualitative issues, a few case studies were conducted in randomly selected oxbow lakes in 1995. The study, expects that the findings will help the policy makers and development agencies to plan for future development and research implementation in the oxbow lake fisheries.

Table 1: Cumulative Number of Oxbow Lakes, Area (ha), Number of Beneficiaries and Loan Disbursement by the Year of Oxbow Lakes Project Period

Year	1991	1992	1993	1994	1995
No. of oxbow lakes	7	14	22	23	23
Area (ha)	364	687	1193	1334	1334
Beneficiaries					
Lake fishing team	528	890	1602	2657	2625
Loan disbursement	-	-	5333000	9685000	18724000
Outstanding	-	-	4834516	9477127	16967702

2. METHODOLOGY

2.1 Definition of Key Terms

Ox-bow lake. An Oxbow lake is locally known as a Baor. It is formed when a river changes its course and isolates a body of water. Usually Baor looks like a horse shoe or an ox-bow and is an abandoned meander of an ancient river bed (UNDP,1991).

LFT. Lake fishing team (LFT) refers to the licensed fishermen around whom the ox-bow lake fisheries project (OLP) was built. LFT households enjoy input facilities of both OLP and BRAC's Rural Development Programme (RDP). In this study LFT households are known as participant households.

FVO. Village organisations (VOs) are mutual support institutions for their members, creating a degree of cohesion to counteract the isolation and vulnerability that is associated with poverty. BRAC establishes VOs for male and female separately (Mustafa et al., 1996). FVO is a female village organisation. FVO households enjoy RDP input facilities only. This study refers FVO households as non-participant as well as comparison households. The members of FVO households are not usually fishermen.

Genuine fishermen (the beneficiary). A genuine fishermen is a person who personally and physically catches fish for income generation and/or household food security. Such a person is generally poor, his poverty being defined as one who owns less than 0.50 acre of land and has an annual income of less than Tk. 10,000 (UNDP, 1991).

2.2 Study Area

A sample survey method was used for the study representing 23 oxbow lakes under the OLP II located in five districts of south-west of Bangladesh, viz., Jessore, Jhenaidah, Chuadanga, Faridpur and Kushtia districts where the oxbow lakes are concentrated (Figure 1 and Figure 2). The profile of studied oxbow lakes are presented in Table 2. A baseline surey was conducted on 21 oxbow lakes during 1993 while 10 oxbow lakes were included for the resurvey in 1995.

Table 2: Profile of Studied Oxbow Lakes

Name of oxbow lakes	Thana	District	Water body (Area in hectare)	Survey Year	Year of affiliation in the OLP II
Bahadurpur	Sarsa	Jessore	141	1993, 1995	1992-93
Bukbhara	Jessore Sadar	Jessore	5	1993, 1995	1992-93
Hamidpur	Jessore Sadar	Jessore	141	1993	1992-93
Hariharnagar	Monirampur	Jessore	65	1993	1991-92
Jhapa	Monirampur	Jessore	57	1993	1992-93
Konnadah	Sarsa	Jessore	18	1993	1992-93
Khatura	Monirampur	Jessore	28	1993, 1995	1991-92
Khedapara	Monirampur	Jessore	121	1993, 1995	1992-93
Ujjalpur	Jhikargachha	Jessore	36	1993, 1995	1991-92
Kayetpara	Harinakundu	Jhenaidah	115	1993, 1995	1992-93
Nasti	Mohespur	Jhenaidah	41	1993, 1995	1992-93
Porapara	Mohespur	Jhenaidah	31	1993	1991-92
Sarjad	Kaliganj	Jhenaidah	10	1993	1991-92
Sastar	Mohespur	Jhenaidah	38	1993	1991-92
Benipur	Jiban Nagar	Chuadanga	45	1993, 1995	1991-92
Bhandardah	Chuadanga Sadar	Chuadanga	48	1993, 1995	1991-92
Marufdia	Jiban Nagar	Chuadanga	25	1993, 1995	1992-93
Ujalpur	Chuadanga Sadar	Chuadanga	34	1993	1992-93
Chaitarkol	Sadarpur	Faridpur	121	1993	1991-92
Harihamagar	Boalmari	Faridpur	133	1993	1991-92
Kaliganga	Kumarkhali	Kushtia	26	1993	1992-93

2.3 Study Samples

For the baseline survey of 1993, 189 households of LFTs were randomly selected (which was part of a larger sample of 305 households from 21 oxbow lake catchment areas) from 10 oxbow lake catchment areas, and 269 households for the resurvey (1995) including those from the baseline. Ten lake areas were selected, for resurvey of 1995, five of which were from the list of lakes where biological studies of fish were being carried out by the OLP II. The remaining five were selected on the basis of lake size to represent large, medium and small

sizes, and the length of project involvement which was assessed according to the number of production cycles completed.

For comparison 387 FVO households were randomly selected for the baseline survey of 1993 (part of a sample of 860) and 345 households for resurvey (1995). Forty two out of 387 households were excluded from the resurvey because of the non-availability of the sampled FVO households.

For case study three oxbow lakes were selected, viz., khedapara, Bahadurpur and Bhanderdah to explore the cause of displacement and the area level impact of OLP II.

Village census was conducted in 11 villages of three oxbow lake area. The census covered a total of 1463 households. The questionnaire used for census was a short version focusing on two key variables such as fish consumption and household expenditure.

2.4 Technique of Data Gathering

The study gathered data through a survey in 1993 and resurvey in 1995 from sampled households only and through a census in 1995 of all households in the oxbow lake catchment areas. The structured questionnaires were used for gathering data. The survey questionnaire included questions regarding household's socio-economic characteristics, living condition and economic condition. BRAC's trained enumerators collected data. Researchers themselves collected data through Rapid Rural Appraisal (RRA) method for case study from three oxbow lake catchment areas, viz., Khedapara, Bahadurpur and Bhandardah. For this study three techniques e.g., physical mapping, wealth ranking and group discussion of RRA method are followed by the researchers. Both LFT members and inhabitants of oxbow lake catchment areas joined group discussion.

In order to locate a group of households which are socio-economically comparable to the fishermen at the initial stage of the project, the RDP member households of the oxbow lake catchment areas are considered to be a reasonable comparison group. As both the groups belong to RDP's village organisations it is assumed that they are comparable.

2.5 Analysis of Data

Data were analysed with the help of SPSSPC+ statistical package. Both descriptive and analytical statistics were used. Descriptive statistics, e.g., percentage, mean, cross-tabulation were used for analysing the data. The t-test finds out the differences between the means.

2.6 Limitations of the Study

This report assesses the impact of the Second Ox-bow Lake Project on participant households. Data were collected through two rounds of survey. The questionnaire of second round survey (resurvey, 1995) was modified on the basis of first round survey (1993) findings. From this point of view, resurvey collected more information using the modified questionnaire, some of which were irrelevant for comparison due to their lack of comparability with the first round survey data because of their absence in the first round survey information. For maintaining consistency the present study excludes those irrelevant information from its report.

Moreover, the original principal investigator who was associated with and responsible for the study designing, conducting surveys, etc. left BRAC already. In his absence the first author (newly appointed) of this report was assigned the responsibility to prepare the report. Due to time constraint and the technical difficulties related to computer the quality of the draft report could not be sufficiently enhanced.

Figure 1. Map of Bangladesh Showing the Study Areas (Districts)

Figure 2: Map of Thanas Showing the Oxbow Lake Locations

Scale 1 : 4,0000,000

Legend

District Boundary : ~·~·~

Thana Boundary : ~ ~ ~

3. SOCIO-ECONOMIC CHARACTERISTICS OF THE PARTICIPANT HOUSEHOLDS

This section describes some basic socio-economic characteristics of the LFT and FVO households which help to understand the existing status of the households. It includes the basic socio-economic characteristics like age, educational level, occupation and land holding.

3.1 Age

On the basis of the findings, this study classifies three different age groups, viz., young, middle aged and old. Young consists of up to 30 years old, middle aged 31-50 and old 51 and above years. Majority of the respondents of both LFT and FVO households belong to the middle aged group followed by young and old (Table 3). The average age of the respondents of LFT households is 40 and that of FVO households is 41.

Table 3. Respondents' Age Composition by Households and Survey Years

(Percent distribution)

Age group (Years)	Household Category	
	LFT	FVO
	1995 (n=267)	1995 (n=343)
Young (up to 30)	21.7	19.0
Middle aged (31-50)	62.2	61.8
Old (51 and above)	16.1	19.2
Total	100.0	100.0
Average age (Years)	40	41

Missing data : One and two of LFT and FVO in 1995, respectively.

3.2 Educational level

This sub-section describes the educational level of all the members (excluding <5 years old children) of the LFT and FVO households.

Table 4 shows that 66 and 58 percent members of LFT and FVO households are literate in 1995. The literacy rates are 35 and 12 percent higher than that of 1993, respectively. On the other hand, the literacy rate of LFTs is 14 percent higher than that of FVOs in 1995. Illiteracy rate, however, is decreasing, consequently the literacy rate is increasing. It indicates the increasing awareness of education and economic well-being among the members of households. Higher the level of education lower the percentage of literate members but this percentage is increasing almost in every level of education. Probably this is due to the cause of BRAC's community development activities (e.g. non-formal primary education and training) and the Government's emphasis on education.

Table 4. Educational Level of the Household by Household Category and Survey Years

(Percent distribution)

Level	Household category			
	LFT		FVO	
	1993	1995	1993	1995
Illiterate	51.5	34.5	48.5	42.3
Ability to read & write	20.9	31.6	28.7	28.3
Primary	21.7	25.7	17.9	22.8
Secondary	5.4	7.6	4.4	6.2
Higher secondary and above	0.5	0.6	0.5	0.4
Total	100.0	100.0	100.0	100.0

3.3 Occupation

It is understood from different studies that traditionally the Hindus are predominantly engaged in fishing profession. Later on for the subsistence pressure Muslims also started to earn their livelihood with this profession. In view of this point this study tries to find out the occupation and religion in the oxbow lake catchment areas. In this context, however, Table 5 states that fishing is the main occupation of both Muslim and Hindu LFT households. Fishing profession of LFT households has been increased to 94 percent in 1995 from 91.9 percent of 1993 among the Hindus while decreased to 77.3 percent in 1995 from 88.3 percent in 1993 among the Muslim fishermen. Muslim respondents engage themselves increasingly in all other

occupation like trade, transportation, wage labour and especially in agriculture. Anthropologically perceived, the low caste Hindus constitute the fishing communities in Bangladesh. Since in a feudal system the low caste Hindus are traditionally subordinate to the upper caste ones, their economic conditions are naturally bound to be depressed (Rahman, 1986). In the context of the present study an inference may be drawn here that the license and the fishing loan encouraged Hindu community and consequently it increased the percentage of fishermen. On the contrary, among the Muslims who have lately entered the occupation suffer from additional problems: (1) they are not skilled as Hindu fishermen; (2) they can not be fishermen in their totality as in the case of a typical 'jele' community; (3) they have incurred a psycho-cultural risk of being socially isolated from other members of the Muslim community and (4) they can not be assimilated overnight with the Hindu community of the same occupation (Rahman, 1986).

Table 5. Household Occupation by Religion, Household Category and Survey Years

(Percent distribution)

Occupation	Household category							
	LFT				FVO			
	1993		1995		1993		1995	
	Muslim (n=103)	Hindu (n=86)	Muslim (n=150)	Hindu (n=117)	Muslim (n=368)	Hindu (n=19)	Muslim (n=323)	Hindu (n=19)
Agriculture	2.9	1.2	9.3	0.0	17.7	0.0	15.8	0.0
Fishing	88.3	91.9	77.3	94.0	0.3	31.6	1.2	21.1
Trade	4.9	5.7	5.3	5.1	16.8	21.1	18.0	42.1
Transportation	0.0	1.2	0.7	0.0	3.8	0.0	5.6	0.0
Wage labour	3.9	0.0	5.3	0.9	47.3	5.3	51.4	15.8
Others	0.0	0.0	2.1	0.0	14.1	42.0	8.0	21.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Missing data: One and three of LFT and FVO households in 1995, respectively.

3.4 Land holding

It is evident from Table 6 that majority of the households are in target group who belong to the land holding group up to 0.50 acres. There was no change in the figure of absolute landlessness of LFTs from 1993 to 1995 but some of the target group who possess 0.50 acres of land among LFTs have increased their land holding. Table 6 further shows that the relatively richer LFT group (who possess 0.51 and above acres of land) have increased their land by 16 percent in 1995 compared to that of 1993. On an average LFTs have increased their landholding by 12 percent (11.9) during the period of intervestion of OLP. On the otherhand

Table 4 also shows that there was a decrease in average size of land per household among FVOs during the same period. In 1993 the average size of landholding per household among LFTs was smaller than that of FVOs (0.42 acre against 0.45 acre)it is evident from this picture that the LFT households are in better position in respect to land holding compared to the FVO households.

Table 6. Household Land Distribution in Acres by Household Category and Survey years

(Percent distribution)

Land holding (In acre)	Household category					
	LFT			FVO		
	1993 (n=189)	1995 (n=269)	Change* over	1993 (n=386)	1995 (n=345)	Change* over
0.0	39.2	39.0	-5.7	50.5	45.8	-0.1
≤0.50	34.9	30.9		24.1	28.7	
0.51-1.00	15.3	16.3	16.2	11.7	13.3	0.4
1.01 and above	10.6	13.8		13.7	12.2	
Total	100.0	100.0		100.0	100.0	
Average (acre)	0.42	0.47	11.9	0.45	0.40	-11.1

** Change over is calculated on the basis of two categorie i.e., target group (upto 0.50 acre) and non-target group (0.51 and above).*

4. MATERIAL WELL-BEING OF THE PARTICIPANT HOUSEHOLDS

According to the findings, some positive changes have taken place in the project catchment areas as a result of the fishermen's participation in the project. This change can be categorized into two broad areas, viz., material well-being of the participant households as well as the indirect impact of the OLP on the inhabitants of the oxbow lake catchment areas and displacement caused by the project.

This chapter highlights some selected indicators like shelter environment, household assets, income, credit, fish consumption and monthly expenditure to determine the material well-being of the participant households and the area level impact. Material well-being is to be considered by the improved condition of these indicators over time and by the difference between the participant and non-participant households. The next chapter describes the displacement of the fishermen from the OLP on the basis of case study. Shelter environment section consists of shelter structure, electricity facility, sanitation and source of water. Household assets include livestock (cattle and poultry) and fishing materials (boat and other tools).

4.1 Shelter Environment

4.1.1 Shelter structure. The houses of the study areas are made of earth, straw and chan, mainly. Most of the houses use earth for building wall and floor while for roof straw (either of rice or wheat) and chan (thatching grass) is followed by tile, tin, golpata (leaves of a small tree akin to the fanpalm which usually grows in saline area) etc. (Table 7). Change is very little for choosing the building materials for wall. But some of both LFT and FVO households have changed their roof by using tile and tin instead of straw and chan and golpata. Consequently the houses of straw and chan and golpata have decreased over time. This indicates an improvement in the quality of life of the households. Further this result is strengthened by the findings of per capita floor space of the respondent households Table 8 shows that per capita floor space has also increased over time in both the LFT and FVO households and intra-household increment of per capita floor space is statistically significant whereas the inter-household difference is insignificant. Statistically significant t-values of house value at both intra and inter-household level indicate the material well-being of the households also. An inference may be drawn here that since both groups are the clients of BRAC, and both

received financial assistance (credit) from BRAC related project, this credit assistance generated higher income which eanbled them to make better housing arrangement for themselves after meeting up their food needs. Hence, respondents increased their spending on improvement of dwelling houses (Hossain, 1995). It is, however, apparent that the performance of the LFT households in housing improvement was not so much different from that of FVO households.

Table 7. Distribution of Respondents by Building Materials for Wall, Roof and Floor by Household Category and Survey Years

(Percent distribution)

Materials	Household category			
	LFT		FVO	
	1993	1995	1993	1995
For wall				
Earth	86.1	84.4	89.1	89.9
Bamboo	8.4	7.9	3.4	2.1
Brick	2.6	3.9	2.1	3.6
Jute stick, straw, tin, concrete, etc.	2.9	3.8	5.4	4.4
For roof				
Straw and Chan	45.0	38.7	55.8	45.7
Tile	26.4	28.9	27.7	35.5
Tin	19.9	25.9	10.8	17.2
Golpata	6.7	4.3	3.9	0.4
Others	2.0	2.2	1.8	1.2
For floor				
Earth	98.7	98.0	99.0	98.8
Others	1.3	2.0	1.0	1.2

Table 8. Floor space and House Value by Household Category and Survey Years

(Percent distribution)

Item	Household Category							
	LFT		FVO		t-values			
	1993	1995	1993	1995	1vs2	3vs4	1vs3	2vs4
Floor space/person (Square feet)	41	67	46	61	-8.04**	-5.73**	-1.71^{ns}	1.83^{ns}
House value (Tk/household)	7951	11560	4184	8321	-3.22**	-8.00**	5.05**	4.08**

ns = Not significant

*** = Significant at p<0.001 level of significance*

4.1.2 Electricity facility. The vast majority of the members of both LFT and FVO have no electricity in their households yet. However, number of households having electricity is increasing. But rate of increase is not remarkable (statistically insignificant) among the FVOs while the intra-household electrification rate is significantly higher among the LFT households (Table 9) Further this change is significant in LFT households compared to FVOs. In this case LFT households are in better condition than the FVOs.

Table 9. Distribution of Households According to the Electricity Facility by Household Category and Survey Year

(Percent distribution)

Have electricity	Household category				t-values			
	LFT		FVO					
	1993 (n=189)	1995 (n=269)	1993 (n=386)	1995 (n=345)	1vs2	3vs4	1vs3	2vs4
Yes	2.1	13.0	2.8	4.3	4.18**	1.09^{ns}	0.52^{ns}	-3.94**
No	97.9	87.0	97.2	95.7				
Total	100.0	100.0	100.0	100.0				

ns = not significant
*** = Significant at p<0.001*

4.1.3 Sanitation. The tendency of ring slab or sanitary latrine use is increasing among the members of both LFT and FVO households. Even though still now most of the members of LFT and FVO households are used to defecate in the field, bushes, bamboo groves, *katcha* latrines etc. It is perceived that environmental pollution and ill health are the offshoots of this unhygienic sanitation. However, in the study area LFT households have significantly higher (p<0.1%) percentage (20%) of ring slab or sanitary latrine compared to than that of FVOs (12.8%) in 1995 but at the initial stage (1993) of OLP intervention the difference between LFTs and FVOs for ring slab or sanitary latrine using is not significatn (t-values 0.57). It is evident from Table 10 that LFTs are in better position compared to FVOs since the former have access to the OLP. Higher the access to the input facilities higher the opportunity of material well-being in the households.

Table 10. Type of Latrine by Households and Survey Years

(Percent distribution)

Type	Household category				t-values			
	LFT		FVO					
	1993 (n=189)	1995 (n=269)	1993 (n=386)	1995 (n=345)	Ivs 2	3vs4	Ivs 3	2vs4
	1	2	3	4				
Ring slab/Sanitary	3.2	20.1	4.1	12.8	5.43**	4.28**	0.57^{ns}	2.47*
Other	96.8	79.9	95.9	87.2				
Total	100.0	100.0	100.0	100.0				

ns = not significant
* = *Significant at p<0.01*
** = *Significant at p<0.001*

4.1.4 Source of water: This study gathered data on sources of water for drinking and washing utensils. Almost all of the households of LFTs and FVOs have been drinking drink tubewell water for a long time. The vast majority (89%) use tubewell water also for washing utensils. The remaining households use water of oxbow lake, river, well, etc. for washing utensils. But their percentage is decreasing over time (Table 11) . There is no difference between LFTs and FVOs against tubewell water using for drinking. But the performance of FVOs is better in respect to the tubewell water using for washing utensils and ownership of tubewell. It is evident from the findings that respondent households are aware of safe water. Most of the households have no ownership of tubewell (Table 12) but they fetch water either from their neighbours' tubewell or from the public (government) tubewell established in the locality. Secondly the percentage of tubewell owner is increasing. This not only indicates the households' safe water awareness but also to the enhancing economic capability to afford tubewell.

Table 11. Sources of Water According to the Purpose of Use and by Household and Survey Years

(Percent distribution)

Purpose and source	Household category			
	LFT		FVO	
	1993 (n=189)	1995 (n=269)	1993 (n=386)	1995 (n=345)
Drinking				
Tubewell	98.4	98.9	99.7	99.7
Ox-bow lake, river, well, etc.	1.6	1.1	0.3	0.3
Washing				
Tubewell	80.4	87.4	89.4	95.7
Ox-bow lake, River, well, etc.	19.6	12.6	10.6	4.3

Table 12: Distribution of Households by Ownership of Tubewell and Survey Years

(Percent distribution)

Ownership	Household category			
	LFT		FVO	
	1993 (n = 189)	1995 (n = 269)	1993 (n = 386)	1995 (n = 345)
Owned	19.6	22.3	22.5	26.7
Neighbour	43.4	35.7	53.9	55.4
Government	37.0	42.0	23.6	17.9
Total	100.0	100.0	100.0	100.0

4.2 Household Assets

This study focuses only on the selected productive assets, viz., livestock and fishing materials. The fishing materials section is discussed excluding FVO households because they are non-fishermen households usually.

4.2.1 Livestock. In this study livestock comprises of cattle and poultry. It is suffice to say that there is no increment in number of cattle and poultry in LFT households, while it decreased in FVO households. The reason behind the decline in number of cattle is the cattle selling because some of the FVO households have switched over from agriculture to other occupation (Table 5). They used their cattle as draught power. But it is evident from Table 13 that the present value of existing cattle and poultry has increased to some extent. LFT households claim for 20 and 14 percent greater values of cattle and poultry respectively in 1995 from 1993 at intra-household comparison and 7 and 3 percent at inter-household (LFTs vs FVOs) comparison. Statistically these changes are not significant (Table 13). However, in this point of view it is assumed that the increased values of livestock is the offshoot of upward trend of market price of commodity. But it may not be an exaggeration if the study reports that the member of LFT households have increased their property retaining capacity. At least they did not need to sell their livestock for their subsistence.

Table 13: Mean Number and Values of Livestock by Households and Survey Years

(Percent distribution)

Item	Household category				+ - values			
	LFT		FVO					
	1993 (n=189)	1995 (n = 269)	1994 (n = 386)	1995 (n = 345)	I vs 2	3 vs 4	I vs 3	2 vs 4
	1	2	3	4				
No. of cattle	2.05	2.06	2.32	1.88				
Value (In Taka)	2929	3534	3069	3288	1.34	-.64	-.36	-.62
No. of poultry	9.28	9.50	8.87	8.47				
Value (In Taka)	271	309	289	299	1.42	-.38	-.57	.38

t-values of 2.00 or more are significant at p = <0.05

4.2.2 Fishing materials. Boat is one of the important materials for fishing. There are different types of boats for fishing distinguished by its size (Table 14). *Donga*, a small sized boat is especially used by a single individual. *Donga* and other small sized boats i.e. less than 15 feet (ft.), 15 to 23 ft. and 24 to 30ft. for fishing are decreasing compared to the initial stage of the OLP II. Fishermen prefer to use larger sized boat since they fish teamwise in the oxbow lake. Therefore, the large size boats (above 30 ft) have increased in the fishermen households remarkably though majority of the fishermen households use 24 to 30 ft. sized boat. Due to these reasons the members of LFT households spend much more for the higher price of larger boat. On an average the price of boat is Taka 1509 which is higher than the average boat price of 1179 of 1993 (Table 14). Fishermen are capable to pay this higher price of boat for the access to the credit facility of OLP II and the increasing economic capability of the LFT households.

Other than boat fishermen also use different types of tools for fishing (Table 15). These tools are well known by their local name, viz., *Kochal jal (net), Tati, Pata, Khapla, Silka, Chela/Maya, Kai/Puti, Dhali/Current, Chabak/Teta, Chak, Ghuni and Barshi. Kochal jal* is the most important tool for fishing in the oxbow lake and that is why the LFTs have boight *kochal jal* as per their requirement at the initial stage of the OLP II intervention with the help of the OLP II provided credit. For this reason LFTs did not increase the number of *knchal* jal in 1995. Other tools than *kochal jal* are not so important for fishing and not so expensive like *kochal* jal. Table 13 shows

that LFTs have decreased the number of several fishing tools and at the same time have increased the number of several tools also as per their degree of necessity. The increasement of fishing tools indicates its necessity and the dependency on fishing of the households. LFTs have increased the value of fishing tools by 22 percent in 1995 (Table 15). This indicates. LFT households economic upliftment during the project period also.

Table 14 Type and Average Price of Boat by Household and Survey Years

Type and price	LFT household	
	1993	1995
Type		
Donga	8.7	0.7
Below 15 ft.	1.4	1.1
15-23 ft.	31.9	23.6
24-30 ft.	55.1	51.0
Above 30 ft	2.9	23.6
Total	100.0	100.0
Price (In Taka)	1179	1509
t-value	-1.67	

t-value <2.00 is insignificant at p=<0.05

Table 15. Distribution of Average Number of Fishing Tools by Their Name, Households and Survey Years

Name of tools	LFT household	
	1993	1995
Kochal jal	1.3	1.3
Tati/Kathi	2.4	2.3
Pata	8.1	9.4
Khapla	1.7	1.3
Sitka	1.4	1.1
Chela/Maya	3.3	15.6
Kai/pati	7.3	8.6
Dali/Current	6.1	6.1
Chabak/Teta	1.7	1.5.
Chak	2.7	1.4
Ghuni	20.8	26.3
Barshi/Barsha	211.7	176.4
Average value of tools/household (In taka)	2573	3150

4.3 Income

In the study area some households of both LFT and FVO have more than one source of income. For this reason Table 16 shows occupationwise, household income for the year preceeding the investigation year. It is evident from Table 16 that LFT households earned highest income from fishing and this income increased to some extent after the implementation of the OLP. The difference of their income (before-after) is not significant. But their fishing income (1993-1995)is significantly higher than that of the FVO household. On the other hand the FVO households earn highest income through wage labour. And there is very little change over time. Income from fishing is followed by the income of wage labour, fish trade, agriculture, trade and service in LFT households while income of wage labour is followed by that of trade, service, fishing, agriculture and fish trade in FVO households.

Fishing is the main source of income in the LFT households. However, the overall mean monthly income of the LFT households in 1993 and 1995 are 1288 and 1396 respectively whereas those of FVO households are 805 and 968, respectively. Inter-household income differs significantly in respect of survey years (Table 17). The reason of this significant difference is the higher income through fishing occupation. It is interesting to note here that the FVO households earn less than that of the LFT households but they have increased their (intra-household) income significantly ($p<.01$). This is due to their RDP membership and the indirect impact of the OLP. It is evident from the income of fishing, fish trade, service and others especially. It may be noted here that service refers to the service of teacher, clerk, night guard, Ox-bow lake guard, OLP cashier and peon, school attendant, etc. While 'others' refers to the BRAC organised activities, e.g., teaching in non-formal primary education (NFPE), mat making, weaving, tailoring, *kantha* sewing, etc. LFT households have increased their income mainly in fish trade, trade and others by 177, 146 and 328 percent, respectively. FVO households have increased their income by 163 percent in service, 124 percent in fishing, 98 percent in fish trade and 107 percent in others occupation in 1995 from 1993. These are evidences of positive impact of the project intervention upon the local economy though due to limited scope of fishing in the lake and some management problems the increase in per capita income was relatively small. For details in this respect chapter to on management may be seen.

4.3.1 Perceived economic condition. This study tries to find the perceived economic condition over last one year on the basis of income as well as food security. In this respect the household monthly economic condition is classified into three classes, i.e., surplus, equal (hand to mouth condition) and deficit. Surplus months refer to that period in a year when the amount is greater than needed in terms of income and food availability. Deficit months refer to that period in a year when the amount leaves much to be required in terms of income and food availability. Both LFT and FVO households improved their economic condition according to their own perception. LFT households pass their life through hand to mouth condition on an average for 6.18 months followed by surplus and deficit months (Table 18). In 1993 the surplus and deficit situation of LFT households are 116 percent greater and 5.0 percent lower respectively than that of the FVO households. Both LFTs and FVOs are the member of RDP. Both enjoy the input facilities including credit of RDP. Therefore, during the OLP intervention period LFTs are not only able to increase surplus months and to decrease deficit months but also the FVOs. For instance, LFTs have decreased their deficit months (2.69) by 33 percent and have increased surplus months by 81 percent (1.71 to 3.09) in 1995. The t-values (4.67*** and -5.04***) show this result as significant. On the other hand, the average deficit months (3.04) have decreased by 28 percent while surplus and equal condition months have increased by 82 and 7 percent respectively in FVO households. In the context of inter-household difference, the LFT households are in better position especially for the surplus (3.09 vs 1.44) and equal (6.18 vs 7.51) condition. The highly significant t-values of 7.09*** and - 4.88*** respectively strengthen this findings. This result indicates the upliftment of the LFT households' economic condition due to the intervention of the OLP.

Table 16. Mean Monthly Household Income by Occupation, Households and Survey Years

(Taka)

Occupation	Household category			
	LFT		FVO	
	1993	1995	1993	1995
Fishing	1014.17	1101.37	25.08	56.21
Fishtrade	24.83	68.71	5.90	11.70
Agriculture	0.00	32.00	31.79	15.54
Wage labour	73.47	102.89	483.51	488.95
Trade	12.32	30.33	180.47	212.32
Service	42.43	29.97	25.77	67.78
Others	6.17	26.41	55.68	115.24

t- values of the income from fishing:

LFT '93 vs LFT '95 :	- 0.99^{ns}
FVO '93 vs FVO '95 :	- 1.90^{ns}
LFT '93 vs FVO '93 :	26.35***
LFT '95 vs FVO '95 :	21.45***

ns =Not Significant
*** = Significant at p<.001 level of significance*

Table 17. Mean Monthly Household Income by Household Category and Survey Years

	Household category							
	LFT		FVO		t-values			
	1993 1	1995 2	1993 3	1995 4	1vs2	3vs4	1vs3	2vs4
Monthly In come (In Taka)	1288	1396			-1.12^{ns}			
	1288		805				6.91***	
			805	968		-3.25**		
		1396		968				6.12***

ns = Not significant
** = Significant at p<.01 level of significance*
*** = Significant at p<.001 level of significance*

Table 18. Household Economic Condition by Mean Month, Household Category and Survey Years

Condition	Household category				t-values			
	LFT		FVO					
	1993 (n=189)	1995 (n=268)	1993 (n=387)	1995 (n=345)	1vs2	3vs4	1vs3	2vs4
	1	2	3	4				
Surplus	1.71	3.08	0.79	1.44	-5.04***	-3.48***	4.16***	7.09***
Equal	6.29	6.11	7.00	7.51	0.52^{ns}	-1.71^{ns}	-1.82^{ns}	-4.88***
Deficit	4.00	2.69	4.21	3.04	4.67***	4.15***	-0.58^{ns}	-1.5^{ns}

ns = Not significant
*** = *Significant at p<.001 level of significances*

4.4 Credit

A fisherman in Bangladesh need credit not only for running his fishing operation but also to buy his daily consumable items. But among the institutional and the non-institutional sources of credit only the later is approachable by the poor fishermen. In a country like Bangladesh the institutional credit is normally available to those who have either economic assets or socio-political influence (Rahman, 1996).

The respondents of this study enjoy the credit facilities provided by the BRAC. Members of LFT obtain credit from OLP and RDP while FVOs from RDP only. This study tries to find respondents' accessibility to other than BRAC (OLP and RDP) provided credit. In this respect present study finds that 46.0 and 47.6 percent respondents of the LFTs, 44.4 and 45.8 percent respondents of the FVOs received loan from different other sources in 1993 and 1995, respectively (Table 19). In short, a little less than 50 percent of both LFT and FVO households borrow money from institutional and non-institutional sources (Table 20). Table 20 shows that the access to institutional credit of boths LFTs and FVOs has increased in 1995 compared to that of 1993. On the other hand, among the non-institutional credit sources majority of both LFT and FVO households borrow from their neighbours. Respondents prefer to borrow money without interest. For this reason they loan from their neighbours and relatives. Usually neighbours and relatives do not charge interest. Respondents borrow money from the private money lender at exhorbitant rate of interest only when they badly need

money and fail to manage from other sources. However, it is evident from the findings that the dependening on non-institutional sources of credit of both LFTs and FVOs has decreased in 1995 from 1993.

Respondents use their loan for different purposes, e.g., household consumption, production, business, land purchasing, etc. (Table 21). Majority of the respondents (65.5%, 46,1% and 51,2%, 55.7% of LFT and FVO households in 1993, 1995, respectively) enjoy loan for children's education, medical treatment, marriage and for other household consumption. The percentage of households using loan against consumption is decreasing and against production is increasing among the LFTs while reverse situation exists among the FVOs. LFT households are enthusiastic to invest capital for production and thus increase by 90 percent in 1995 over 1993 (41.4 over 21.8). This positive response of loan use helps them to increase production as well as income. Consequently the investment of loan for consumption is decreased and economic well-being is increased. It is evident from Table 21 that FVO households are economically in relegated condition compared to LFT households since the percentage of FVO households using loan for household consumption instead of the investment for production have increased.

Although, however, both the LFT and FVO households loan money, they have decreased their amount of loan during 1993-1995 (Table 22). This also indicates the economic well-being of the households.

Table 19. Distribution of Households According to the Access to Non-BRAC Loan by Household Category and Survey Years

(Percent distribution)

Have access	Household Category			
	LFT		FVO	
	1993 (n=189)	1995 (n=269)	1993 (n=387)	1995 (n=345)
Yes	46.0	47.6	44.4	45.8
No	54.0	52.4	55.6	54.2
Total	100.0	100.0	100.0	100.0

Table 20. Distribution of Households by Sources of Non-BRAC Loan, Household Category and Survey Years

(Percent distribution)

Sources	Household Category			
	LFT		FVO	
	1993 (n=87)	1995 (n=128)	1993 (n=172)	1995 (n=158)
Institutional				
Bank, cooperative, etc.	2.6	9.0	2.6	7.8
Non-institutional				
Neighbours/friends	16.9	15.6	20.7	19.1
Relatives	12.7	11.5	7.1	9.0
Private money lender (mahajon)	13.8	11.5	14.0	9.9
Sub-total	43.4	38.6	41.8	38.0
Total	46.0	47.6	44.4	45.8

** Others = land owner, doctor, etc.*

Table 21. Distribution of Households by Purpose of Use of Non-BRAC Loan, Household Category and Survey Years

Purpose of use	Household Category			
	LFT		FVO	
	1993 (n=87)	1995 (n=128)	1993 (n=172)	1995 (n=158)
Consumption	65.5	46.1	51.2	55.7
Production	21.8	41.4	27.3	25.9
Business	6.9	4.7	11.6	3.2
Land purchasing	3.4	7.0	6.4	10.1
Others *	2.4	0.8	3.5	5.1
Total	100.0	100.0	100.0	100.0

** Others = Loan repayment, conducting a case, purchasing gift for marriage, rent payment, etc.*

Table 22. Amount of Non-BRAC Loan by Household Category and Survey Years

	Household Category				t-values			
	LFT		FVO					
	1993	1995	1993	1995	1vs2	3vs4	1vs3	2vs4
	1	2	3	4				
Amount	5075	3843			0.93^{ns}			
of loan			3599	2362		2.02*		
(In Taka)	5075		3599				1.73^{ns}	
		3843		2362				1.72^{ns}

ns = Not significant

** = Significant at p<.05 level of significance*

4.5 Fish consumption

In the oxbow lakes are found both mixed fish and various carp species. The first oxbow lake project (terminated in 1986) showed that with an effective management, carps could be cultured to provide a manifold increase in production (IFAD, 1988). Hence, the OLP II cultivates different species of carps like *Ruhi, Katla, Mrigal*, Grass carp, Mirror carp and Silver carp in the oxbow lakes along with the miscellaneous indigenous captured small fish. These miscellaneous indigenous small fish are known as *Rani maceh* to the fishermen. It may be noted here that the fishermen catch small fish for their consumption and/or earning income for family maintenance when they do not harvest cultured immature carps.

The study gathered data on small fish consumption as well as big fish like carps. The data indicate major improvements for the fishermen (LFT) households both over time and in comparison with the FVO households (Table 23). The 'before' (1993) and 'after' (1995) differences of the LFT households indicate a consistent improvement with respect to the fish consumption :

- total fish consumption is greater by 38 percent;
- the consumption of carp fish is greater by 360 percent.

The 'with' and 'without' differences, that is the comparison between the LFT and FVO households, support the above finding. For the LFT households :

- total fish consumption is greater by 50 percent and 59 percent respectively in 1993 and 1995, than the figures for comparison households (FVO);
- the consumption of large fish is greater by 282 percent and 283 percent respectively in 1993 and 1995.

The differences with respect to consumption of all fish and of carps in particular, between the LFT and the FVO households indicate a better situation for the former. The differences shown in the table between the LFTs and the FVOs for the preproject (OLPII) indicate a better situation for the LFT households with regard to fish consumption. To show the impact of the project it is necessary to show that two pre-project difference is not only maintained in the after-project period but it is increased. The higher percentage of increment indicates higher production and availability of carps in the oxbow lakes and the locality, respectively. But the LFT has more access to fish compared to FVO households and it differs significantly. Even

though the OLP II appears to have made small but significant contribution to the wellbeing of non-participant households.

On the contrary, small fish consumption has increased in LFT households while decreased in FVO households and both results are insignificant. But it is evident from Table 23 that the members of both LFT and FVO households were used to have small fish (575 and 299 gm in 1993) rather than carps (65 and 17 gm in 1993), respectively. It might be the cause of : (1) reduced or stagnant production of small fish. The reason for this may be the reduced availability of small fish in the locality. Moreover, since the members of FVO households have no right to catch fish from the Ox-bow lake, they have to depend mostly on the market supply. So the fishermen (LFT) have greater access to small fish than non-fishermen (FVO). (2) The members of both LFT and FVO households change their choice of fish selection (or food habit) due to the higher production and availability of carps in the locality.

However, this image is also reflected through the community level data (Table A3). The overall fish consumption rate of LFT households is greater than others including the richer non-target households and the t-values prove the difference significant.

Further, this statement is buttressed by the average figure of national fish intake. The average fish intake is 690 gm/person/month (Ahmed and Hassan, 1986) while the fish intake (all fish) is 996 and 411 gm/person/month in the LFT and FVO households in 1995, respectively. Thus, the fish intake of the LFT households is 44 per cent higher and FVO households is 40 percent lower than the national fish intake rate.

Table 23. Fish Consumption Scenario by Household Category and Survey Years

Item	Household category				t-values			
	LFT		FVO					
	1993 (n=189)	1995 (n=268)	1993 (n=386)	1995 (n=345)	1vs2	3vs4	1vs3	2VS
	1	2	3	4				
Small fish (Gm/person/month)	575	610	299	283	-0.77^{ns}	0.64^{ns}	8.26***	9.91***
Carps (Gm/person/month)	65	299	17	78	-10.89***	-6.20***	5.09***	12.31***
All fish (Gm/person/month)	720	996	360	411	-4.36***	-1.67^{ns}	8.45***	12.65***

ns = Not significant
**** = Significant at p<.001 level of significance*

4.6 Expenditure

Household expenditure consists of the cost for cereal, non-cereal foods, clothing and footwear, education and health, other consumption and saving and investment. Table 24 shows the result for household expenditure. It is evident from this table that the LFT households have increased their expenditure (per-person per-month) for all the selected item, viz, cereals, non-cereals food, clothing and footwear, education and health and other consumption except saving and investment over time. The 'before' (1993) and 'after' (1995) differences for the LFT households indicate improvement with respect to the household expenditure. In this respect the intra-household (LFT) expenditure is greater by 26 percent in 1995 compared to 1993. The inter-household exponditure (pc/month) is greater by 14 and 36 percent respectively in 1993 and 1995.

As for household expenditure Table 24 shows that the post-project expenditure values for LFT households increased by a greater margin (26.2%) than that for the comparison group (5.5%). The difference in expenditure between the two groups of household was greater in the post-project period than it was in pre-project period. This result indicates their economic upliftment and better quality of life due to the project intervention.

At the community level the household expenditure of LFT households is greater than that of the FVOs and non-VO Tgs (Table 25). But their difference is not statistically significant. Further table 25 shows that household expenditure of the richer NTG group is higher than that of LFTs followed by non-VO Tgs and FVOs.

Table 24. Household Expenditure by Household Category and Survey Years

(Taka/person/month)

Item	Households category					
	LFT			FVO		
	1993	1995	Change over	1993	1995	Change over
Cereals	175	204	16.6***	162	167	3.1
Non-cereals food	109	140	28.4***	90	90	0.0
Clothing and footwear	25	28	12.0*	22	21	-4.5
Education and health	18	20	11.1	15	15	0.0
Other consumption(1)	53	97	83.0***	46	67	45.7***
Saving and investment	13	7	-46.2***	11	5	-54.5***
Total household expenditure	393	496	26.2***	346	365	5.5

t-values for total household expenditure
*LFT '93 vs '95: -6.67***, FVO'93 vs '95: -1.75, LFT '93 vs FVO '93: 3.98***,*
*LFT '93 vs FVO '95: 9.94****
(1) Include fuel, transport, hospitality, tobacco, toiletries, etc.
*Level of significance : * =p<0.05, **=p<0.01, ***=p<0.001*

Table 25: Household Expenditure at Community Level

	LFT (n=233)	FVO (n=437)	Non-VO TG (n=519)	NTG (n=518)	t-values
Expenditure (In Taka/person/ month)	501	468	-	-	1.87
	501	-	488	-	0.66
	501	-	-	655	-4.53
		468	488	-	-1.22
		468	-	655	-7.28
			488	655	-6.70

LFT= Participant, FVO=Non-participant, Non-VO TG=RDP target group, NTG=Non-target group
t-values 2.00 or more are significant at p<.05 level of significance.

5. DISPLACEMENT OF THE FISHERMEN CAUSED BY THE OXBOW LAKE PROJECT

5.1 Meaning of Displacement

Although there are several reasons for different types of displacement in the fishing community, the present study deals only with the displacement caused as a result of OLP- II.

The fieldwork for the present study did not follow the objective definition of the genuine poor fishermen as adopted in the project, in order to identify the displacement. The fisher households which were engaged in fishing in the oxbow lakes before the project but excluded from the lake fishing team (LFT), were identified as displaced by villagers in group discussion. Economically, these may be either well-off or worse-off.

5.2 Identifying the Displaced Households

In order to identify the displaced only those households were considered as fishermen household from which at least one member was engaged in oxbow lakes fishing for their living. Second assumption was that the LFT members were 'genuine fishermen' who fished in the oxbow lakes before project intervention and were considered as part of the preproject fishing community. Thirdly, the households that were involved in fishing activities before the project which are currently engaged in oxbow lakes fishing for their livelihood, were not considered as displaced households. These we term as the 'non-displaced non LFT households'.

In determining wealth class of the villagers we divided them into six different groups on the basis of their landholding and thereafter pile-sorted them into three groups: (a.) non-target households: with more than 1.0 acre of land; (b) semi-target households: with 0.5 to 1.00 acre of land; and (c) Target households: with less than 0.50 acre of land .

For the present purpose, the fishing community was classified into four categories according to a combination of the importance of fishing as a livelihood, the type of fish caught and the gear used. Those are as follows:

1. Full-time professional: The households identified as full-time fishermen's households which were engaged in oxbow lakes fishing round the year and usually caught large fish in the ox-bow Lakes with their large gear and boat.

2. Full-time subsistence: This study considers the households as full-time subsistence fishers' households which were involved in fishing round the year. They differ from the 'professionals' in that they catch small, miscellaneous fish with small, hand held single operator nets and traps, and they themselves retail their catch at local bazaars.

3. Part-time fishers: Part-time fishers' households are those households which were engaged in oxbow lakes fishing in parts of a year. Usually they depended on oxbow lakes fishing in the peak season and in the slack season or other time in the year they depended on some other activities to earn an income.

4. Occasional fishers: These households mainly depended on other professions but caught fish in the oxbow lakes during slack season to eke out their living.

5.3 Magnitude of Displacement

According to the above definition it was found that 491 households were involved in fishing before project out of a total 1879 households of 3 oxbow lakes catchment areas. Among them 81 households were displaced from oxbow lakes fishing due to the project intervention. So, it was found that 26 percent of the households who are not licensed fishermen, living in the oxbow lakes catchment areas were involved in fishing before project intervention. Of these 16.5 percent (annexed Table A6) was displaced from fishing due to the project. Among the displaced households 42 percent came from non-target Hhs and 58 percent from the target households.

When we consider displacement in the context of total fishermen households of the area, the rate of displacement among the non-target fisher households was considerably higher than it was for the target fishermen households. Data show 25.8 percent (Table A6) household were displaced from the non-target group, 23.8 percent from semi-target and 13.2 percent from target households. So in the community, rate of displacement amid target households was

lower compared to non-target HHs. If we want to have a clear picture of magnitude of displacement, we should look at the non-displaced fishermen of the fishing community. Table A6 shows that 75.4 percent of total households which were continuing oxbow lakes fishing were from the target households, 7.8 percent and 16.8 percent from semi target and non-target households respectively. The issue of displacement can be examined from another point of view. We noted earlier that we categorized the displaced households into four groups on the basis of the nature of their fishing activities before the project intervention. Among the 47 displaced target house holds, 53.2 percent (Table A7) is from the full time subsistence fisher households, 23.4 percent each from part-time and occasional fisher households. On the other hand most of the non-target and semi-target households (30 out of 34 households) involved in part-time and occasional fishing. This suggests that most of the target households involved in oxbow lakes fishing took it as a way of earning an income whereas the non-target households considered it as a means of non essential supplement for their consumption of fish and not as their livelihood.

5.4 Real Displacement

The term 'real displacement' more accurately indicates the displacement in the specific context of the project target definition .It is applicable to the full-time professional, full-time subsistence and part-time fisher households of the target group. The occasional fishermen were not fully dependent on the fishing rather they had their own professional identity, (like, rickshaw puller, etc.) and who only caught fish to supplement other earning sources occasionally. In view of the above criterion it was found that 36 households (out of total 81 displaced households) displaced from the project, according to the project's target group definition were the 'real displaced' households. It was 44.4 percent of the total displaced households and 7.3 percent of those who caught fish before the project.

Among the 'real displaced', 58.3 percent was receiving BRAC support as these households were RDP member households (table-A8). On the other hand, one out of the 15 non BRAC household was involved in earning income from rickshaw pulling which was made possible due to the road that was constructed as part of the project initiative. So this study shows 14 target fisher households have no access to RDP inputs or to the opportunities created by the project.

They constitute 17.3 percent of total displaced households and 2.6 percent of the fishing community as defined by the four categories of fisher households.

5.5 Reasons for Displacement

The group discussions in the villages revealed a number of specific reasons for displacement. We have grouped them under four categories of reasons, which are: land ownership above the target definition ceiling, high fishing charge, no vacancy, and self-exclusion.

5.5.1 Land ownership. It was found that 27 non-target households (33.3 percent of total displaced households) were displaced from the project due to their larger land holding (more than 50 dec.). Among these 27 households (81.5%) come from non-target households and 18.5 percent come from semi-target households (Table A9).

5.5.2 High fishing charge. On the other hand, three households(3.7% of the total displaced households) were displaced since they were unable to pay the required amount of money for license fee. All of the three households belong to the target group and two of them were involved in full time subsistence fishing group. These two real fishermen were too indigent to pay high fishing charge.

5.5.3 No vacancy. According to the villagers 19 households (23.5 percent of total displaced households) were displaced as the project already had recruited the required number of LFT members. The most interesting thing is that, all the displaced households in this reason category, belonged to the target households; and in terms of fishing activity they were the real fishermen. The informant group identified several factors to explain the exclusion of some who appear to meet the project targeting criteria.

5.5.3.1 Multiple membership. Informant group alleged that in some cases project excluded some households from the project who resided in the same homestead land(plot) but in different households by saying that the project is not intended to allow more than two households from a 'bari'. So prevention of multiple membership was one of the reasons for displacement.

5.5.3.2 Intra-community conflict. In one of the oxbow lakes areas some displacement occurred due to long term feuding between the people from two villages. The displaced who qualified as project target group, alleged that it was their rivals from the other village enjoying leadership of the licensed fishermen who excluded them from the oxbow lakes project.

5.5.3.3 Nepotism. Informants group of one oxbow lakes alleged that some of the influential fishermen who were given primary responsibility for selecting LFT members had included their own relatives in the project. During case study the study team also found four LFT members included in the oxbow lakes from a village far away from the oxbow lakes catchment area. These LFT members were related by marriage to the former president of the management committee. This type of nepotism included some false fishermen in the LFT group and resulted in the displacement of some real fishermen's households.

5.5.3.4 Inefficient targeting. Group discussions at each oxbow lake catchment areas identified inefficient targeting as a major cause of displacement. According to the villagers a lot of non-target households were included in the LFT which ultimately displaced some real poor fishermen from the project. Data from wealth ranking exercise also support the villagers allegation that the proportion of non-target in the LFT stands at 22.6 percent on average and the range is between 17 and 32 percent.

5.5.4 Self exclusion. The single most important reason for displacement that displaced 29 (35.8%) households is self exclusion. It was found that mainly the poor fishers keep themselves out, as nearly 80 percent households belong to the target group displaced by the reason. Present study identified some reasons behind the reason self exclusion which keep the poor fishermen out of the project. The reasons are:

1. External pressure: threats from previous leaseholders, cooperative leaders, etc;
2. Suspicions about the project: not believing that the previous lease holders would relinquish control and the fishermen would be able to control the lakes;
3. Reluctance to BRAC membership: fearing that they would be converted to Christianity, that their wives would be taken away, etc.
4. Avoidance of confrontation: a reported internal conflict among LFT members at one location discouraged a group from joining fearing physical violence.

5.6 Present Condition of the Displaced Households

The obvious question that arises out of the discussion thus far: how was the displaced coping with the changed situation? None of these households was reported to be involved in fishing. All of the displaced households professed manual labour selling, agriculture, or trade and transportation as their current occupation. With respect to the present occupation the data show that 35.8 percent of the total displaced was now involved in manual labour selling and 42.0 percent and 22.2 percent respectively involve in agriculture and trade and transportation (Table A10).

There is a systematic pattern of adopting new occupation by the displaced households. One half of the target households (55.3 percent) went into manual labour selling, and 29.8 percent and 14.9 percent households respectively adopted trade and transportation and crop cultivation (according to the informants most of the households involved in agriculture of this category are share croppers). On the other hand, most of the non-target (> 100 dec. of land) households (87.5 percent) professed agriculture as their current occupation and, similarly, 60 percent of the semi-target (50-100 dec. of land) displaced households also went into agriculture as the main occupation(Table A10).

A similarly systematic pattern emerges when the current occupation of the displaced households are compared with the pre-project extent of their fishing activities. Table A11 shows that for the current wage laborer fishing was a subsistence activity (55%) in contrast to the crop cultivators for whom fishing was an occasional activity(62%). For the current traders and transport operators among the displaced, the distribution is less dramatic but does show a similar concentration in the subsistence (44%) and occasional (33%) categories of pre-project fishing activity.

On the other hand, among the current wage labourer households, a large majority (15 out of 16 households) include target household who were previously involved in full-time subsistence fishing. On the contrary, the current crop cultivators, who were involved in occasional fishing before project, include a large majority (19 out of 21 households) of non-target households. Although, there is no such dramatic pattern of change in the case of present trade and transporation, here is a clear cut trend to be concentrated to target households, since, all (8

out of 8 households) full-time fishermen's households, were engaged in trade and transportation, belong to the target households category and 4 out of 6 occasional fishermen households went into trade and transportation, belong to the target households category (Table A12). The traders and transporters are likely to have experienced positive impact of the project's overall activities which created new opportunities in the localities.

5.7 Changes in Economic Condition of the Displaced Households

Now let us look at the economic change experienced by the displaced households during the intervening period. According to the informant groups, 38.3 percent of the target households material condition suffered decline as a result of their displacement from oxbow lakes fishing, whereas, only 4.17 and 10 percent of the non-target and semi-target households experienced material decline during the period(Table A13). Here the trade and transportation workers were faring better than the wage labourers and crop cultivators as, 56.25 percent of the households in the improved category were involved in trade and transportation while 25 percent and 18.75 percent were involved in agriculture and wage labour respectively (Table A 14).

So far, we were considering overall condition of the displaced households in the context of wider community and fishers community on the basis of their land holding and profession. Now we will compare LFT and displaced households on the basis of some material well-being indicators, viz. fish consumption, expenditure etc. of the respective households.

A comparison of overall economic condition of the displaced households with the LFT households with respect to material well-being indicators, secured from household survey, reveals an unclear and complex picture. Four out of 7 indicators showed the displaced households to be little better-off and with respect to three other indicators comparatively worse-off, than the LFT households (Table A15).

Only fish consumption indicates LFT households' significantly better-off position than the displaced households. So, it is difficult to conclude whether the displaced households are being economically improved or declined as a result of their displacement.

At the beginning stage, it was assumed that the displaced households might have suffered material decline as a result of their displacement from the project. But in reality, their condition was not found to be declined as much as was apprehended. The possible reason for this may be due to the inclusion of non-target households amid the displaced and secondly, they are earning more income from their current occupation. To look into the matter in detail, we divide both the LFT and displaced households into target and non-target household categories on the basis of their landholding. Table A16 shows that both the target and non-target displaced households consume significantly lower amount of fish compared with their respective counterparts of the LFT households. It means fishermen households consumed comparatively greater amount of fish than any other section of the community. Per capita floor space utilization indicator shows that target LFT households are using more space than the displaced target households. In comparison with the target displaced households, target LFT households possess significantly higher number of poultry birds. It was also expected that the number of duck would be increased due to various oxbow lakes development activities, especially for the deweeding. In the case of expenditure, non-target displaced households spent significantly greater amount of money per capita than the target displaced households and non-target LFT households. It means that among the displaced households there are some households who are from extremely well-off family and so their high score pulled the average per capita expenditure of the displaced households. So when we compare target LFT households with the target displaced households it shows target displaced household's little lower expenditure than the LFT households.

Per capita expenditure on all food consumption of the LFT households is lower than the displaced households. Here displaced target households were spending little higher amount (statistically insignificant) on food item than the LFT target households(Table A17). On the other hand, target LFT households are less secured (in the context of monthly food security and expenditure) than the target displaced households. Likewise, non-target displaced households are more secured households than the non-target LFT households although, in both the cases difference is insignificant. Overall, displaced households owned on average significantly greater number of cattle than the LFT households but the difference between target LFT and target displaced households is not significant. The difference explains displaced household's greater number of dependency on agriculture which need a considerable number of animals as a tools of cultivation, for the traditional farming system. On

the other hand, Table A18 shows that per capita protected living quarter, especially the protected roof utilization by the target LFT households was greater than the target displaced households.

So, above mentioned indicators do not show clearly whether the displaced households were improving or declining during the year that intervened after their displacement. But it was evident from the above analysis that target displaced households are running below the target LFT households in respect of some indicators.

5.8 Area Level Change as an Impact of OLP

Infrastructure development was an important part of the oxbow lakes development project and the construction of road was one of the major components of the physical development activities. Roads were constructed to facilitate the incoming supply of fingerlings safely and to supply the harvested fish quickly to the market place. Apart from direct benefit of road construction it was expected that some other benefits of the project intervention would accrue to the local communities. The Appraisal Report of IFAD expected that 'The financial status of the fishermen would improve through improved trade, new roads even if not intensive, will open up hitherto remote locations.'

This section has been furnished with the information that were collected through case studies, using some of the techniques of Rapid Rural Appraisal method. This was not our intention to put forward any numerical data to look into the statistical significance of changes taking place due to the project intervention. Rather, we tried to gain a clear idea about the villagers' perception of changes as an impact of project intervention, especially road construction. It is worth mentioning that, the changes that were identified as the result of project intervention may have been influenced by some other factors which are difficult to single out.

5.8.1 Magnitude of change. According to the informant groups, the changes taking place in the localities as a result of project intervention include: increase in crop production, creation of new income earning opportunities, increase in trade, expanded labor mobility, *haat* and *bazaar* expansion, increasing social visits, change in mode of transport and change in traffic volume.

The villagers reported that these changes have played a conducive role in improving their livelihood living in the sampled oxbow lake catchment areas.

5.8.2 Change in production. The villagers reported that the project intervention helped to enhance crop production in the project areas. According to them, new fertilizer and pesticide selling shops were established in the local bazaar after road construction. Those shops enabled them to purchase the inputs locally and thus saving time and transport costs which were incurred previously as they had to go to markets away from their respective villages. Here, improved communication decreased transport cost and increased scope of using marketing facility. The informant groups explained that the reason for increase in non-agri-production was mainly due to the marketing and transport facilities created by road construction.). Some of our informants said "before road construction we had to pay at least 25-30 tk as transportation cost to carry one sac-ful (80-90 Kg) of goods to the market place. The earthen road was so muddy and slippery we could not walk straight, we had to slide sideways in mud during the rainy season, and during (dry) winter season we had to push our way forward in knee deep dust. This set dire obstacles on traffic of both villagers and their goods".

5.8.3 Increase in vegetables cultivation. Informant groups of one studied oxbow lake informed that vegetable production increased tenfold after road construction. According to them except some poor farmers they produced vegetables only to meet their household consumption need. But after road construction a vegetable depot was created in the local bazaar. It was ensuring the producers in selling their vegetables and was giving assurance to the buyers making it available in the market. To meet the increasing demand some large farmers also started to cultivate vegetables commercially. The villagers opined that every day at least 3-4 trucks of vegetables were being exported to the different parts of the country. In this particular area, due to the increased vegetable production some 15-20 villagers were directly employed in buying, storing, loading, and watering the vegetable. Among the new employees 4-5 were female who used to shed water on the vegetable to keep it fresh. Another studied oxbow lake has experienced somewhat similar increase in vegetable production although, it was not such extensive as former one. The informant groups of this oxbow lakes termed it a vegetables fair (*Shobji Mela*).

5.8.4 Hat/Bazaar expansion. Near 2 out of 3 studied oxbow lakes, there was a little Bazaar before project intervention and, the remaining oxbow lakes had no bazaar yet. According to the informant groups, before project intervention there were only a few shops in the bazaar and the trading activities lasted only for a short time. But now, many new shops of different types have been established in the bazaar.

There was a big change induced in one of our studied oxbow lakes. According to the informant groups there were only a few shops in the bazaar to meet the very basic needs (such as rice pulse, kerosene, match, etc)of the villagers. To meet some other necessity they had to travel about 6-7 km. away from the village. But now there were at least 8-10 grocery shops, three tea stalls, 3 stationery shops, a vegetable depot, a fertilizer shop, two permanent restaurants, two medicine stores and a wholesale depot in the Bazaar to buy various crops during various crop season. The duration of the Bazaar was also extended to 9-10 p.m. from the early morning.

The villagers consider the bazaar not only as a business place but also use it as a place of socialization as most of the time when they have no work, they usually go to the bazaar for just meeting people and gossiping. The villagers valued the bazaar as a committee consisting of prominent persons of the area had been formed and every body had to take prior permission from the committee before erecting any new shops in the bazaar. Moreover, another independent bazaar was established in the vicinity of the oxbow lakes catchment area. According to the villagers there were 1-2 temporary shops at the place before road construction. But after project intervention when the road was constructed some entrepreneurs started to erect permanent shops and now an independent Bazaar was established at that place with 15-16 permanent shops of different types. The villagers opined that the project had created some new employment and income earning opportunities for the villagers. Not only male but also three destitute females had been employed as cook of the restaurant opened after project intervention.

In the case of another studied oxbow lake, which had a little bazaar from the start, it experienced similar expansion of shops in the bazaar after road construction. The informant groups said 3 grocery shops and 2 stationery shops had been created after project intervention. Moreover, 2 restaurants, 1 medicine store and several vegetable retailers started their business in the bazaar after project intervention. It is also worth mentioning here that in

the case of these two oxbow lakes there was not only creation of new shops in the bazaar but also the existing ones expanded their business. Another oxbow lakes that had no formal Bazaar yet experienced increase in growth of some shops along the roadside. Five different shops were established by the road side, among which three were grocery shops, one barbershop, one fabric and garment and a bi-cycle repairing shop.

5.8.5 Change in mode of transport. Due to the road construction, there has taken place some changes in the mode of transport which paved the way for economic improvement of the area. The road has been constructed by the project in all three oxbow lakes catchment area we studied. Informant groups of one of our studied oxbow lakes said "the only transport for going outside the village was ox-cart. In the rainy season the mud was so deep and pasty that usually we had to wade out in the mud". Each of the studied oxbow lake groups has stated the same opinion about the mode of transportation in the respective areas before road construction. They opined that only those who had dire necessity used to go outside the village by cart or on foot. Now, after road construction, the mode of transport has been changed tremendously and different types of transport like rickshaw van, by-cycle, scooter and baby taxi have been introduced. Now, due to the improvement of the transport system and increased volume of trade, pedestrian traffic has experienced a relative down turn. One of our studied oxbow lakes experienced highest level of such change. Villagers of this oxbow lake adjacent area opined that now at least 100-150 rikshaw van, 8-10 baby taxis, numerous bi-cycles and 8-10 trucks were engaged in transportation. The informants said even 7-8 LFT members were also involved in rickshaw van pulling on a part time basis who earned a considerable amount of money from the part time occupation. Now more favoured means of transportation are auto-rickshaw and rickshaw van. The change in mode of transport has also reduced time and cost of transportation. Other two oxbow lakes also experienced somewhat similar change in mode of transport.

5.8.6 Change in traffic volume. Informant groups of all studied oxbow lakes said that before road construction they rarely went outside the village without having any dire necessity. Moreover, most of the time they had to go outside on foot. Those who were small traders or sellers had to carry their goods physically. The situation changed after road construction. According to the villagers, traffic of people and goods have increased. Now people of all backgrounds are availing themselves of the opportunity as it only takes a minimum time and

money. Some respondents reported, 'before road construction we could not even get the opportunity of better treatment facility. Because the doctors could not come to our village due to the poor communication and on the other hand it was difficult for us to bring the patients safely. But now due to the introduction of more mechanized transportation, we have access to health facilities". This increased traffic volume has influenced three major aspects of socio-cultural development determinants. These are:

5.8.6.1 Labour mobility . The informant groups reported that people of the locality did not go outside looking for job to avoid incurring loss in time and money. So they were quite unaware of the outside world. They always searched for work within their native villages even when unemployment was high. Now people came to realize that it would not give them increasing scope of employment and income earning opportunity if they always stay in their periphery. So people of the area particularly who are on the bread line, used to go outside looking for job when they find them out of work. One of our studied oxbow lakes experienced higher level of such opportunity. The respondents informed that about 10-15 number of wage labourers daily went to the nearer by town 15 km away from their village for selling their labour in a biscuit factory and interestingly most of them were women. Another oxbow lakes also enjoyed better scope of such mobility of labour though all of them were not involved in the same work.

5.8.6.2 Increase in social visit. Due to the undeveloped roads and communication one area may remain in socio-economically and culturally backward position. Each of our three studied oxbow lakes had experienced such backwardness before project intervention. Some of our informants of a studied oxbow lake said that "before road construction this area was so backward and inaccessible that the people from other villages were unwilling to establish any matrimonial relationship in this area. After the road construction the previous attitude of the other people has changed". The informant groups of one oxbow lake area informed us cheerfully that 'due to the road construction presently various types of people were coming to the village for different needs. Having seen these educated people our children are also encouraged to go to school.'

5.8.6.3 Schooling. In the case of all three studied oxbow lakes the schooling situation has improved. The informant groups opined that before road construction pupils could not reach the schools because the road was very muddy in the rainy season and sometime it was

flooded. They said, 'we are now free from all this inconvenience and anxiety.' On the other hand, BRAC established some of its non-formal primary schools. These schools are providing scope of education to the poor children in the village who usually stay out of school. All these opportunities created a positive environment in the area. Particularly, BRAC schools are helping to enhance education. All the things pulled up the rate of education comparatively higher than the national average. Data from household survey also reveal the same trend of change as informed earlier. All these opportunities had been created by road construction.

Increase in volume of trader's transaction. Increase in volume of trader's transaction was one of the indirect impacts of road construction, according to the villagers of the study area. They opined that the things that were necessary for their daily life were available now in their local market and so they needed not to go outside to buy it. Due to the improved road communication the traders could provide host of goods within short time and the consumers were also satisfied with the supply as it means no extra time and money. Some respondents of one of our studied oxbow lakes said before road construction the traders carried their goods by ox-cart but now they fetched it some time by truck. Satisfying increasing needs of the people the traders also increased their variety of goods and the shops were growing.

6. OXBOW LAKE MANAGEMENT

One of the major objectives of the oxbow lake project is to develop management capability of the poor fishermen through involving them in the oxbow lake related different activities so that in time they can manage the project by themselves. To operate oxbow lake related all activities, each lake has a Lake Fishing Team (LFT) Committee. LFT committee members are selected from LFT leaders. Each LFT committee therefore is made up of the leaders of respective LFTs. The LFT committee then elects its president, secretary, cashier committee members. The present study tries to understand how far the management committees succeeded in acquiring management capability through practicing the below mentioned different activities:

6.1 De-weeding

Due to the infestation of aquatic weeds, productivity of the oxbow lakes was very low before the project intervention. The fishermen could not harvest their stocked fish properly due to immense water hyacinth. On the other hand submerged aquatic weed hindered both productivity and harvesting in the oxbow lake. We were informed by informant of one oxbow lake that water hyacinth was so huge and thick that one could even walk across the oxbow lake. They reported that the lakes were only a suitable habitation for indigenous fish and not carps. Considering all these, supervision mission of IFAD suggested a partial removal of water hyacinth. According to the report *'A partial removal could continue to provide habitat for miscellaneous fish which have adapted to this environment. This approach would also enable us to see that other equally less desirable plants do not colonize the vacant niche, thereby nullifying benefits to fish, except perhaps grass carps.'* So it was necessary to remove water hyacinth immediately for improving natural productivity of the oxbow lake and at the early stage the project initiated deweeding as a part of infrastructure development. Irrespective of oxbow lakes the informants stated that LFT members enthusiastically participated in the de-weeding activities.

It was a difficult job to remove all the living water hyacinth, so at first some medicine was sprayed throughout the oxbow lake on behalf of the project to destry the hyacinth. Thereafter the dead water hyacinth was removed by the LFT members who worked for two months. Each

day about 60-70 persons were involved in the operation and they would get taka 30 each. In addition the participants earned about taka 30-40 per day selling the fish they caught during de-weeding session. This particular oxbow lake did not experience such massive cleaning operation rather the members keep it clean by up-rooting the hyacinth during harvesting. Now this oxbow lake is not facing any problem regarding water hyacinth.

LFT members of another oxbow lake played an active role de-weeding activity. They informed that the labourers who were employed by the project were interested in catching fish instead of de-weeding. In most of the cases they dumped the water hyacinth very close to the lake water. As a result when it started raining all the deposited water hyacinths were washed away and dispersed in the lake water. Later on LFT members cleaned the oxbow lake by themselves. Now this lake is completely free from the water hyacinth.

In the case of another studied oxbow lake, water hyacinth had been cleared two times by the project's initiation in 1990 and 1992. According to the informant groups the whole water body was covered completely by water hyacinth and they could not even bathe in the oxbow lake water. About 50 percent of the total water body was cleaned by employing 130-140 person per day for two months in 1990 and the rest was removed in 1992.

Informant groups of this oxbow lake alleged complete removal of water hyacinth was a wrong decision. When there was hyacinth there was no 'champta'(lichen, one kind of filamentous algae). Actually, the fishermen of this oxbow lake was facing the problem of an increase in filamentous algae adversely affecting fish growth and mortality. Having noticed the degrading impact of water hyacinth on filamentous algae, the LFT members recently placed some water hyacinth in the oxbow lake re-weeded as a remedial measure at the cost of TK 10,000-12,000. The amount was collected from the fishing teams. Although at the early stage there was no formal management committee, yet the proposed LFT members (at time they did not get their license) collectively participated in the de-weeding activity which indicates their positive attitude towards participatory management.

6.2 Restocking

One of the most important duties of the LFT members is to manage stocking related different activities. The restocking is a vital activity where decisions are to be made by the management

committee. Restocking related activities in which LFT members are directly involved include: ensuring quality of fingerling, keeping accurate composition of different species, stocking density, collecting fingerling, responsibility distribution in collecting and releasing fingerlings, etc. In our present analysis we tried to look into the matter in detail to have a clear idea of how much participatory the decision making process was and how far the management committees could succeed in achieving the set goals.

6.2.1 Determination of quantity and quality of fingerlings: Informant groups of all studied oxbow lakes stated that the lake management committee,along with Technical Assistance from DANIDA, Fishery officer of GOB and BRAC office concurrently determined the amount of fingerlings to be released. Informant groups of one of our studied oxbow lake said *"usually we released fingerlings in between March 15 to mid April because at this time the sizes of the fingerlings remain ideal in about 5-7 inch."* Some times they had to release under-sized fingerlings in the month of July to October. It seems LFT members are quite aware of the size of the fingerlings although only last year, in this particular oxbow lake, 60,000 under sized fingerlings (collected from the government hatchery) of grass carp fish had been spoiled. Irrespective of oxbow lakes, the informant groups stated that the amount of fingerlings that had been released in the oxbow lake was quite adequate in the context of present water body.

An allegation regarding fingerlings stocking was raised by the informant groups of a certain oxbow lake. According to them *"the management committee always deceived us regarding quantity and price of the fingerlings. They used to show higher price of the fingerlings than the actual market price and release lower amount of seeds than they told us to have released"*.

6.2.2 Fingerlings collection process: According to the informant groups, in collecting fingerlings they depend mostly on the government hatchery because it is more reliable than the private sources. But some of the informants alleged that the fish-fry collected from government hatchery was always undersized. The informants from one oxbow lake said *'In the last Falgun(February-March)we lost TK. 30,000 due to the purchase of undersized fingerlings from government hatchery'*. If the government hatchery failed to supply adequate fingerlings-then they had to try to collect it from other sources. In the case of buying fingerlings from private hatcheries, informants of one of our studied oxbow lakes said they invited open tender bids. After receiving the bids LFT members along with TFO and BRAC staff scrutinized it and

placed order with the lowest bidder. In case they were to buy without inviting any tender, the lake management committee usually decided where from it would be purchased and how it would be transported, etc. So management committee of this particular oxbow lake played an important role in collecting fingerlings.

However, informants of another studied oxbow lake alleged that the management committee played a detrimental role in this regard as it always selected a particular interest group. They asserted that the management committee was arbitrary in making decision about buying fingerlings and in every case they bought undersized fingerlings which would not grow to minimum weight for harvesting in the coming year. If anyone contested he had been threatened to be ousted from the LFT group by the lake management committee.

6.2.3 Process of releasing fingerlings in the oxbow lake: The informant groups of one of our studied oxbow lakes showed quite sound knowledge of fingerlings restocking process in the oxbow lake. According to them *'when fingerlings have to be carried in from a distance they become weaker due to lack of oxygen in the container in which they are carried. If these weak fingerlings are stocked in the lake water directly they die instantly'*. Therefore, they used the hapa in the lake water as a resting place to adapt the fingerlings with the temperature and pressure of the oxbow lake water. They asserted that in this particular oxbow lake the fingerling releasing process strictly followed the rules set by the project.

Two other oxbow lakes did not maintain the process strictly as, alleged by the informant groups. The study team also had such experience during field investigation.The team found quite undersized fingerlings were being released without first placing them into the hapa. There was no BRAC staff, or TFO or representative from DANIDA. Most interesting thing is that no other LFT member was present there to help the van puller LFT member. In reply to our question the van puller LFT member said lake management committee along with some other members were waiting in the government hatchery where from the fingerlings were coming. Later on, the BRAC PO said they did not inform us about stocking and the day having been weekend the respective PA was not present there. So it was clear from the analysis that management committee and the general fishermen of the oxbow lake were not always cautious about the process.

6.3 Maintenance of oxbow lakes

Although aquaculture does not require any supplementary food but it needs adequate care to keep the water body's natural carrying capacity high in order to maintain the required supply of nutrients for the fish. Another important responsibility of the lake management committee is to protect the oxbow lake fish from poaching. The IFAD /AR (Annex 1, p.16) notes that *'for the oxbow lakes, poaching can lead to 17% loss."* The LFT groups of all oxbow lakes alleged the non-licensed fishers who were allowed to fish would catch the larger carps secretly. Some other villagers also try to poach in the oxbow lake. In protecting fish from poaching the LFT members of all oxbow lakes played an important role. They adapted several policy to overcome the problem.

6.3.1 Restricted miscellaneous fishing: During stocking period the LFT members imposed restriction on any sort of fishing activity by any one, even by the LFT members. Because, having being small in size the fingerlings usually stayed near the shore so any kind of net or trap would be harmful for the fingerlings. Considering the situation they prohibit fishing totally in the oxbow lake for one to two months. After two months the LFT members again permit catching the miscellaneous fish with some restriction on the size of the nets used. The LFT members determined the size of the net from time to time according to the growth of the fish and every one is to take prior permission from the lake management committee.

6.3.2 Surveillance team: An important measure adopted by the LFT members is to constitute vigilant teams who in turn guard the oxbow lake. In a particular oxbow lake there are 34 fishing teams who in rotation take the responsibility. The informant groups said when the water depth increase during the monsoon and the fish are about to mature for harvesting the LFT members often guard the lake throughout the night by themselves. In addition, there are three paid permanent guards (who are also LFT members) to prevent the poaching in the oxbow lake, who receive 1200 taka per month from the project account. Moreover, use of any monofilament net has been prohibited by the lake management committees of all oxbow lakes. But informants of another oxbow lake alleged that some of the LFT members did not care for the rules. Specially, the LFT members who were comparatively rich used to send a wage labourer as a guard instead of himself. They were not respectful to the rules and regulations

of the project. Respondent groups of another oxbow lake asserted the LFT members who were responsible for preventing poaching were involved in plundering fish by themselves.

6.4 Harvesting

Harvesting management is an important activity as this involves monetary transections. So precise harvesting management of a oxbow lake reflects the managerial capability of the management committees.

6.4.1 Determination of quantity and size of the fish to be harvested: Usually Agrahayan and Poush(mid November to mid January) is considered as the starting months for fish harvesting in the oxbow lake and it continue upto Bhaishakh(April-May). Before starting fish harvesting in the oxbow lake the management committee used to invite TFO, local representative of DANIDA and BRAC staff to consult whether the fish of the oxbow lake was mature enough to be harvested or what size of fish would be harvested or when and how fishing would be started. Management committees along with the representatives of different offices decided the size of the harvested fish. They also determined the amount of fish to be captured within a certain period of time. *'We do not catch fish less than 12 inches in length and less than 1 kg. in weight in the early months of harvesting.'* Informant groups reported that the size and the amount of fish to be harvested was determined by the management committee in concurrence with the concerned project officials. But in the month of chaitra-bhaishakh, when the time of restocking nears the lake management committee permits fishing irrespective of fish size.

In a certain oxbow lake the management committee along with the other members caught under size fish last year because they came to learn that some new LFT members would be introduced in the lake management committee. Having been furious the committee and other members captured under size fish for they did not want to allow any share of their released fish. They said that *'we released fish in the oxbow lake by our own, we spent a lot of money for this purpose, now why should we give chance to the other people who did not spend even a taka for this purpose?'*.

6.4.2 Team wise fishing: To enhance participatory management in the oxbow lakes the fishermen are divided into small groups and entrusted with specific responsibilities. To ensure participation of all small group members in the fishing process, team wise fishing was an important forum where the members enthusiastically participated. All of our studied oxbow lakes had their small groups of different size. According to the informants of one of our studied oxbow lakes there were 34 fishing teams containing 8-10 members each. Although, in this particular oxbow lake there were only 175 LFT members another 100 non-licensed fishermen were included in the fishing teams. These non-licensed fishers got 50% of their captured fish. So in this oxbow lake fishing team consists of both licensed and non-licensed fishermen. Each and every team has its own fishing gear and boat that had been acquired with the loan money provided by BRAC office.

There were 56 licensed fishermen in the case of one oxbow lake who fished in the oxbow lake collectively. At the beginning they were told by the project to form small fishing teams but due to lack of adequate gear and boat they did not maintain the group. Now they fish collectively in the oxbow lake.

Another studied oxbow lake which had six fishing teams arranged fishing according to a predetermined schedule. Members of this oxbow lake objected to the fishing as it was very unprofitable to them. According to the members, by catching fish in the oxbow lake we used to earn only 15-20 taka per-day, on the other hand, the well off members usually sent hired non-licensed fishermen instead. Moreover, the influential team(consisting of management committee members and rich persons) did not obey the rules.' At a stage of our discussion some LFT members said that they would withdraw their membership as they were losing day-by- day. They alleged the little amount that LFT members were supposed to receive would have to collect from the rich people to whom fish was sold on credit by the management committee. However, having been poor fishermen it was difficult for them to collect the money.

6.5 Marketing of the harvested fish

In most of the cases the respective management committee decided where the fish would be sold and who would be the proper person to handle the related activities. One oxbow lake had a systematic pattern of selling their fish depending on the amount harvested. When the

amount remain very little they would usually sell it in the local market 7-8 km. away from the oxbow lake. Otherwise they would bring it to the district town 30-40 km. away where there are some wholesale centres. Management committees always discharged the duty of selling the harvested fish. Price of the fish was determined by the management committee on the basis of their size. In addition, they would allow villagers to buy fish at the landing platform, at concessional rates for consumption purpose.

Informant groups of other studied oxbow lakes alleged that marketing of the harvested fish was under control of some influential members of the MCs including president, secretary, and cashier of the respective oxbow lake. No outsiders are allowed to purchase fish from the landing platform except some selected persons, generally termed as Mastans by the villagers, who were also the relatives of the lake management committee. They asserted the fish was not only sold at a low price but they were also given an excessive amount. The amount of fish they were given as 5 mounds contained actually 6 mounds at least. Price of this excessive amount would go to the pocket of lake management committee partly. The management committee of this particular oxbow lake allegedly paved the way for pilfering a considerable amount of money through this filthy way.

Informants of another oxbow lake accused that the lake management committee earned some money by illegal dealings with the wholeseller or Aratder because selling of the fish was under direct control of the management committee who usually sold it to the Aratder 15 km. away from the oxbow lake. On the other hand, most of the villagers' allegation was that the fishers did not sell fish to them at cession rate but the LFT members ruled out the allegation by saying that those who had objected to, intened to take the fish for business purpose.

6.6 Financial management

Generally, the lake management committee has to play an important role in financial matters including purchase of fingerlings and sale of harvested fish. They are to collect loan, purchase nets and boats, make loan repayment, distribute revenue share among the members and look after and repair of boats and nets, salary payment for the guards, transportation, renewal of license etc. Informant groups of one studied oxbow lake were quite satisfied with the financial management of the committee. But the situation was not the same for the other two oxbow

lakes. Informants of these two oxbow lakes alleged that the management committee misappropriate money in various ways. In some cases the MC did not even deposit the sales proceeds to the bank account and thereby prevented loan repayment. Some informants asserted that people from different walks of life provoked the LFT members not to pay installment as BRAC was exploiting them with high rate of interest. They said *' you are paying higher rate of interest than Krishi Bank. If you take loan from the BKB, then, you would have to refund it at the end of the year with only 9% interest.' Being agitated* they stopped repaying the loan installment for the time being.

6.7 Other management issues

Since the oxbow lakes project is a big project, so, it involves a lot of activities and the management committee was supposed to be in the driving seat.

6.7.1 New LFT member selection: The oxbow lake management committee has to perform some other oxbow lake related activities in addition to their ascribed duties. New LFT member selection is one of them. The project implementation policy now is to increase LFT members to one member per acre instead of one member per hector. The management committees prepared the list of the possible LFT members and sent those to the authority for approval. In selecting new LFT members management committees of different oxbow lakes reflect their management capability.

According to the informant groups of one of our studied oxbow lakes new LFT member selection process was very smooth in this particular oxbow lake. The team did not experience any kind of discontentment among the members with regard to new LFT member selection process. However, some members feared that the enlargement of fishermen group might reduce their share of oxbow lake income.

But there was a severe feeling of discontentment amongst the licensed and the non-licensed fishermen of two other studied oxbow lakes. The issue of new LFT member selection was so contentious in a particular oxbow lake that the LFT members were divided into two groups on the issue. They could not prepare a combine list of the new LFT members as a result. One group was preparing and the other group was disputing it. The list had not been finalized when

the research team was there in 1995. There was a little agitation among the general members of the third oxbow lake regarding new member selection, as, the management committee included some non-target non-fishermen households instead of target fishermen.

6.7.2 Conflict resolution: As a common property the oxbow lake had its various uses and users before project intervention. It is quite natural that after project intervention some kind of restriction had to be imposed on various uses and users of the oxbow lake catchment area. The immediately affected persons were the former leaseholders of the oxbow lake along with some fishermen who caught fish in the oxbow lake but were displaced because of the project's rules and regulations. At the early stage there happened some dangerous events by the delirious oxbow lake users that was faced boldly by the management committee. In the case of one of our studied oxbow lakes, there was a fishermen's cooperative before the project. In 1990 when the oxbow lake was brought under the project's control the leader of the former cooperative along with some other displaced members opposed it persistently. At one stage, with the help of some unscrupulous government officials, they registered some portion of the oxbow lake in their name, that was wrongly omitted in the original record. Having legal document they prepared for fishing in the oxbow lake while LFT members persistently contested it. The situation deteriorated and on 27th November 1994, while catching fish in the oxbow lake, the LFT members were attacked by the rival militants with fire arms and lethal indigenous weapons. One LFT member died on the spot. The management committee of the oxbow lake then lodged a case in this connection and took necessary legal action against the miscreants. Later, other LFT members decided to compensate the family by making an allowance of 1500 taka per month upto the project tenure. This particular oxbow lake management committee had a good reputation amongst the members because of their knowledge, skill and integrity.

It is clear from the above analysis that one of our studied oxbow lakes played a satisfactory management role. The remaining two oxbow lakes showed comparatively worse performance regarding management. In their case polemical leadership created a contentious situation and resulted in mismanagement of the oxbow lakes. Leadership of these two oxbow lakes had been captured by an influential interest group that was initiated by including some well off non-fishermen. One of the major causes for success might be due to their long term involvement with cooperative activities. Before the project this particular oxbow lake was

under management of a cooperative for some time. After project intervention most of the fishermen related to the cooperative were included in the project and having been included they got chance to use their previous knowledge and skill that proved to be conducive to the overall oxbow lake management. Moreover, most of the fishermen of this oxbow lake was from same socio-economic background.

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This study has documented the impact of Oxbow Lake Project II on participant households using several selected indicators. As per the requirement of the project the study tries to assess the impact of OLP II. Impact assessment usually measures the sustainable change in given indicators. Since the study period is only two years, the period is much too short (1993-1995), for conducting an ideal impact assessment study.

Within the short period under survey the project generated positive impact on the majority of the material well-being indicators for the participating households (LFT) both over time and compared with non-participant households (FVO) of similar socio-economic background.

The indicator 'shelter environment' consists of shelter structure, electricity facility, sanitation and source of water, among which the performance of LFTs and FVOs against shelter structure and source of water are more or less the same; rather to speak the truth in this case FVOs are in better position than the LFTs. More or less the same situation apparently exists between the LFTs and FVOs in terms of household assets (livestock) holding. These are due to the fact that, both LFTs and FVOs are the members of RDP of BRAC and enjoy the same input facilities.

Other indicators like income, credit, fish consumption and household expenditure indicate the positive impact of OLP II on the LFT households. The improvements measured for the LFT households over time are greater than that for the comparison households.

However, to insulate the impact of OLP II on LFT (participant) households and more reliability the study compared them at community level in terms of fish consumption and expenditure. In this regard, the findings shows positive impact of OLP II on LFTs because LFTs performance was better compared to other socio-economically comparable group i.e., FVOs and non-RDP target groups (Non-VO TG).

The project may have generated positive results for the locality as a whole by increasing the supply of carps which appears to have increased the consumption basket for the non-fishermen households.

It appears from the findings that fish intake (per capita per month) of the non-participant households is lower compared to the rate of national fish intake. Further this study also reveals the insignificant increment and decrement of small fish consumption among the participant and non-participant households, respectively.

A few of 'real fishers' households have been displaced from the OLP II and most of them are wage labourers at present and belong to the target group. A considerable number of affected households is addressed by different programmes of BRAC and some others are also receiving project's indirect benefits through trade and transportation. But unfortunately it is evident from the findings that target displaced households are running below the target LFT households in respect of some indicators.

The changes, according to the people of the oxbow lake catchment areas, expedite improving socio-economic condition of the people through increasing production, employing people in different activities and creating income earning opportunities thereby.

An oxbow lake out of three played satisfactory role in lake management. Polemical leadership created a contentions situation and resulted in mismanament in the remaining two oxbow lakes. After project intervention most of the fishermen related to the cooperative were included in the project and having been included they got chance to use their previous knowledge and skill that proved to be conducive to the overall oxbow lake management.

An improvement in management practices such as reducing release of undersized fingerlings, better maintenance of the lake and restocking and improved havesting practices could further enhance the success of the OLP-II and improve the income and well-being of the LFT fishermen.

Recommendations

Considering the findings and analysis the recommendations are the following: The OLP II should be contined and after certain period of time the impact of OLP II may be assessed for expected reasonable change.

The access of carp fish to the inhabitants of the oxbow lake catchment areas is increased due to consistently higher production of carp fish. Therefore, the OLP should be continued so that the increasing production and access to carp fish enhance the nutritional well-being as well as economic and material well-being of fishermen households, in particular and of rural people , in general.

The reason of insignificant increment and decrement of small fish consumption is unknown. Further research should be undertaken to know whether there is environmental imbalance or not so that large fish cultivation might not be the reason for the abolition of indigenous small fish.

There is scope for further improvement in the oxbow lake management especially in determining appropriate size and number of fingerlings, lake management, harvesting practices and marketing of fish which would contribute to enhance income of the LFT members.

The displaced fishermen households who belong to the target group deserve considerable attention either from the OLP or from BRAC's RDP so that they could generate their income as well as their material well-being

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ANNEXURES

ANNEXURE TABLES

Table A1. LFT Households by Monthwise Food Security in Terms of Surplus, Equal and Deficit and by Survey Years

Name of month	Surplus		Equal		Deficit	
	1993	1995	1993	1995	1993	1995
BAISHAKH	11.3	34.3	46.3	47.0	42.4	18.7
JAISHTHYA	6.2	33.2	55.4	50.7	38.4	16.0
ASHAR	5.1	25.0	47.5	41.8	47.5	33.2
SHRABON	4.5	12.3	42.4	51.5	53.1	36.2
BHADRA	3.4	13.4	44.6	55.6	52.0	31.0
ASHWIN	3.4	9.0	39.0	56.7	57.6	34.3
KARTIK	12.1	8.2	37.9	56.0	49.7	35.8
AGRAHAYAN	16.9	34.7	46.3	54.1	36.7	11.2
POUSH	16.9	41.0	47.5	53.4	35.6	5.6
MAGH	16.4	39.6	46.3	51.9	37.3	8.6
FALGOON	16.9	33.6	42.9	51.9	40.1	14.6
CHAITRA	15.3	26.9	41.2	48.5	43.5	24.6

Table A2. FVO Households by Monthwise Food Security in Terms of Surplus, Equal and Deficit and by Survey Years

Name of month	Surplus		Equal		Deficit	
	1993	1995	1993	1995	1993	1995
BAISHAKH	5.4	13.6	49.9	67.1	44.7	19.4
JAISHTHYA	5.4	11.8	54.8	72.8	39.8	15.3
ASHAR	4.4	11.6	43.4	59.8	52.2	28.6
SHRABON	4.1	9.8	42.6	58.7	53.2	31.5
BHADRA	4.1	11.3	48.1	64.7	47.8	24.0
ASHWIN	4.1	9.2	37.7	52.0	58.1	38. 7
KARTIK	4.4	7.2	37. 7	57.2	57.9	35.5
AGRAHAYAN	4.4	18.5	55.3	70.5	40.3	11.0
POUSH	4.4	19.1	56.6	69.7	39.0	11.3
MAGH	3.9	15.3	54.3	70.2	41. 9	14.5
FALGOON	3.9	9.5	46.8	62.7	49.4	47.7
CHAITRA	3.9	7.5	43.1	46.2	530	46.2

Table A3. Fish Consumption Scenario at Community Level

Item	LFT (n=233)	FVO (n=437)	Non-VO TG (n=519)	NTG (n=518)	t-values
Small fish (Gm/person/month)	639	432	-	-	1.44^{ns}
	639	-	335	-	5.46***
	639	-	-	409	4.16***
	-	432	335	-	1.06***
	-	432	-	409	0.25***
	-	-	335	409	-3.35***
Carps (gm/person/month)	224	85	-	-	10.93***
	224	-	60	-	14.85***
	224	-	-	138	5.98***
	-	85	60	-	3.08***
	-	85	-	138	-5.17***
	-	-	60	138	-8.52***
All fish (gm/person/month)	864	489	-	-	8.78***
	864	-	454	-	10.30***
	864	-	-	674	4.49***
	-	489	454	-	1.16^{ns}
	-	489	-	674	-5.77***
	-	-	454	674	-7.39***

ns = Not significant
Significant at p<0.001 level of significance

Table A4 : Consumption of Carps by Month and Community Categories

Name of month	LFT (n=423)	FVO (n=702)	Non-vo TG (n=519)	Non-TG (n=518)	t-values		
	1	2	3	4	1 vs 2	1 vs 4	1 vs 3
BAISHAKH	627	180	43	124	6.41	6.21	10.36
JAISHTHYA	183	59	46	98	6.76	4.27	1.06
ASHAR	101	51	45	108	3.87	-0.39	0.54
SHRABON	95	52	45	98	3.22	-0.22	0.68
BHADRA	14	16	41	113	-0.29	-5.88	-3.12
ASHWIN	101	55	36	103	3.28	-0.11	1.78
KARTIK	182	61	48	129	7.29	2.43	1.03
AGRAHAYAN	395	119	88	230	11.45	5.69	2.09
POUSH	439	125	129	267	12.68	5.87	0.29
MAGH	458	130	100	266	13.28	6.25	2.00
FALGOON	477	137	97	266	12.74	6.44	2.62
CHAITRA	364	112	79	208	11.52	6.01	2.20

** LFT = Licensed fishermen; FVO = Female Vilage Organization; VO=RDP members; TG = non-RDP target group; NTG = non-targets*
t-values 2.00 or more are significant at p<.05 level of significance

Table A5: Distribution of Fish Consumption Indicators by the Number of Production Cycles Completed

Indicators	Number of production cycles				t-values
	1 (N=99)	2 (N=132)	3 (N=85)	4 (N=141)	
All fish (gm/person/month	613	773	-	-	-2.07
	613	-	786	-	-2.20
	613	-	-	1230	-6.99
	-	773	786	-	-0.15
	-	773	-	1230	-5.39
	-	-	786	1230	-4.69
	07	155	-	-	-8.28
	07	-	206	-	-10.62
	07	-	-	382	-11.85
	-	155	206	-	-2.02
	-	155	-	382	-7.03
	-	-	206	382	-4.72

t-values of 2.00 or more are significant at p<.05 level of significance

Table A6: Distribution of Displaced and Continued Fishermen Households (HHS) by Land Category

Land Category	Continue	Displaced	Total
>1.00 acre	69 (74.19) (16.83)	24 (25.81) (29.63)	93 (100)
0.50-100 acre	32 (76.19) (7.80)	10 (23.81) (12.35)	42 (100)
≤0. 50 acre	309 (86.80) (75.37)	47 (13.20) (58.02)	356 (100)
Total	**410 (83.50) (100)**	**81 (16.50) (100)**	**491 (100)**

Figure in the parenthesis showing percentage

Table A7: Distribution of Displaced HHs by Pre-project Fishing Activities and Land Category

(No. of households)

Land Category	Fishing activities				Total
	Full-time professional	Full-time subsistence	Part time	Occasional	
>1.00 acre	1 (4.17)	-	5 (20.83)	18 (75.0)	24 (100)
0.50-100 acre	-	3 (30.0)	2 (20.0)	5 (50.0)	10 (100)
≤0. 50 acre	-	25 (53.20)	11(23.40)	11 (23.40)	47 (100)
Total	**1 (1.23)**	**28 (34.6)**	**18 (22.2)**	**34 (42.0)**	**81 (100)**

Figure in the parenthesis showing the percentage

Table A8: Distribution of Real Displaced HHs by BRAC Membership

Total real displaced HHs	BRAC member HHs	Non BRAC member HHs
36 (100)	21 (58.33)	15 (41.67)

Figure in the parenthesis showing the percentage

Table A9: Distribution of Displaced HH by Land Category and Reasons for Displacement

Land category	Reasons for drop out					Total
	Land > 50 dec.	High fishing charge	No-vacancy	Self exclusion	Other	
>1.00 acre	22 (81.48)	-	-	1 (3.45)	1 (33.3)	24 (29.63)
0.50-100 acre	5 (18.52)	-	-	5 (17.24)	-	10 (12.35)
≤0. 50 acre	-	3 (100)	19 (100.0)	23 (79.31)	2 (66.7)	47 (58.02)
Total	**27 (33.3) (100)**	**3 (3.7) (100)**	**19 (23.5) (100)**	**29 (35.8) (100)**	**3 (3.7) (100)**	**81(100)**

Figure in the parenthesis showing the percentage

Table A10: Distribution of Displaced HHs by Their Present Occupation

Land Category	Present Occupation of the displaced HHs					Total
	Migrated	Fishing elsewhere	Wage labour	Crop cultivation	T & T*	
>1.00 acre	-	-	1(4.17)	21 (87.5)	2 (8.33)	24 (100)
0.50-100 acre	-	-	2 (20.0)	6 (60.0)	2 (20.0)	10 (100)
≤0. 50 acre	-	-	26 (55.32	7(14.89)	14 (29.79)	47 (100)
Total	-	-	**29 (35.80)**	**34 (41.98)**	**18 (22.22)**	**81(100)**

** T&T - Trade and transportation*
Figure in the parenthesis showing percentage

Table A11: Distribution of Displaced Households by Present Occupation and Fishing Activities

Present occupation	Pre-project fishing activities				
	Full time professional	Full time subsistence	seasonal/ part-time	occasional	Total
Wage labour		16 (55.17)	6 (20.69)	7 (24.14)	29 (100)
Crop cultivation	1 (2.94)	4 (11.77)	8 (23.53)	21 (61.76)	34 (100)
Trade and transportation		8 (44.45)	4 (22.22)	6 (33.33)	18 (100)
Total	1 (1.23)	28 (34.57)	18 (22.22)	34 (41.58)	81 (100)

Figure in the parenthesis showing percentage

Table A 12 : Distribution of Displaced Households by Preproject Fishing Activities and Current Occupation

Present occupation	Pre-project fishing activities of the displaced households				
	Full time professional	Full time subsistence	Seasonal	Occasional	Total
Wage labour		16(55.17)	6(20.69)	7(24.14)	29(100)
<0.50 acre		15(57.69)	6(23.08)	5(19.23)	26(100) (32.10)
>0.50 acre		1(33.33)		2(66.67)	3(100) (3.70)
Crop cultivation	1(2.94)	4(11.76)	8(23.53)	21(61.76)	34(100)
<0.50 acre		2(28.57)	3(42.86)	2(28.57)	7(100) (8.64)
>0.50 acre	1(3.70)	2(7.41)	5(18.52)	19(70.37)	27(100) (33.33)
Trade & transportation		8(44.44)	4(22.22)	6(33.33)	18(100)
<0.50 acre		8(57.14)	2(14.29)	4(28.57)	14(100) (17.29)
>0.50 acre			2(50.0)	2(50.0)	4(100) (4.94)
Total	1(1.23)	28(34.57)	18(22.22)	34(41.98)	81(100) (100)

Figure in the parenthesis showing percentage

Table A13:Trend of Change of the Displaced Households by Land Category

Land category	Change			Total
	Improved	No change	declined	
>1.00 acre	3 (12.5) (18.75)	20 (83.33) (44.44)	1 (4.17) (5.0)	24 (100)
0.50-1.00 acre	4 (40.0) (25.0)	5 (50.0) (11.12)	1 (10.0) (5.0)	10 (100)
≤0.50 acre	9 (19.15) (56.25)	20 (42.55) (44.44)	18 (38.3) (90.0)	47 (100)
Total	16 (19.75) (100)	45 (55.55) (100)	20 (24.7) (100)	81 (100)

Figure in the parenthesis showing percentage

Table A14 : Present Occupation of the Displaced Households by Their Economic Change in the Intervening Period

Change category	Present occupation			
	Wage labour	Crop cultivation	T & T*	Total
Improved	3 (18.75)	4 (25.0)	9 (56.25)	16 (100)
No change	11 (24.44)	29 (64.45)	5 (11.11)	45 (100)
Declined	15 (75.0)	1 (5.0)	4 (20.0)	20 (100)
Total	29 (35.80)	34 (41.98)	18 (22.22)	81 (100)

* T & T = Trade and transport
Figure in the parenthesis showing percentage

Table A 15: Mean Difference One month fish consumption, Expenditure, All food Consumption, No. of Deficit Month, Cattle and Poultry by Household Category

Item	Type of households		
	LFT (n=233)	Displaced (n=69)	t-value
Carp fish	289	121	3.92
All food	345.61	391	-0.96
No. of secured month	8.67	9.55	-2.36
Floor space sq.ft/person	54.26	48.02	1.12
No. of cattle	2.36	3.38	-2.64
No.of poultry birds	9.17	8.54	0.46
Expenditure	5.18	552.22	-0.99

Table A16: Mean Difference of Indicators of Economic Well-being by Household Category

Item	Type of households				
	LFT(N=185) <0. 50 acre	LFT(n=48) >0.50 acre	Displaced (n=40) <0.50 acre	displaced (n=29) >0.50 acre	t-value
Bigfish (Carps)	304.92	226.08			1.42
	304.92	-	72.20	-	3.95
	304.92			188.22	1.67
	-	226.08	72.20	-	3.91
		226.08	-	188.22	0.77
			72.20	188.22	-3.18
Floor space (Per capita)	50.13	70.18	-	-	-2.91
	50.13	-	42.61	-	1.40
	50.13	-	-	55.48	-0.80
	-	70.18	42.61	-	2.28
	-	70.18	-	55.48	1.05
	-	-	42.61	55.48	-1.79
Poultry No.	8.63	11.25	-	-	-1.55
	8.63	-	5.08	-	1.99
	8.63	-	-	13.31	-2.22
	-	11.25	5.08	-	3.41
	-	11.25	-	13.31	-0.96
	-	-	5.08	13.31	-4.07
Expenditure (Per capita)	522.68	502.02	-	-	0.54
	522.68	-	491	-	0.73
	522.68	-	-	636.67	-2.31
	-	502.02	491	-	0.21
	-	502.02	-	636.67	-2.31
	-	-	491	636.67	-2.07

Table A17: Mean Difference of Indicators of Economic Well-being

Item	Type of household				
	LFT <0.50 acre (n=185)	LFT >0.50 acre (n=48)	Displaced <0.50 acre (n=40)	Displaced >0.50 acre (n=29)	t-value
All food	349.09	332.26	-	-	0.72
(Per capita)	349.09	-	360.83	-	-0.40
	349.09-	-	-	431.61	-2.65
	-	332.26	360.83	-	-0.69
	-	332.26	-	431.61	-2.54
	-	-	360.83	431.61	-1.26
Secured month	8.44	9.54		-	-2.55
	8.44	-	8.85	-	-0.85
	8.44	-	-	10.52	-3.81
		9.54	8.85	-	1.27
		9.54	-	10.52	-1.67
			8.85	10.52	-2.51
Cattle No,	2.06	3.52	-	-	-3.58
	2.06	-	2.18	-	-0.25
	2.06	-	-	5.03	-5.52
		3.52	2.18	-	2.40
		3.52	-	5.03	-2.03
			2.18	5.03	-3.71

Table A18: Proportion of the Living Quarters with Protected Roof

House holds category	% of living quarters with protected roof
LFT households <50 dec. (n=285)	61.1
LFT households >50 dec. (n=48)	79.2
Displaced households <50 dec (n=40)	57.9
Displaced households >50 dec (n=29)	82.8

**Protected roof include concrete, corrugated iron sheet and tiles.*

Figure A1 : Lorenz Curve for Fish Consumption
'Before-After' - LFT households

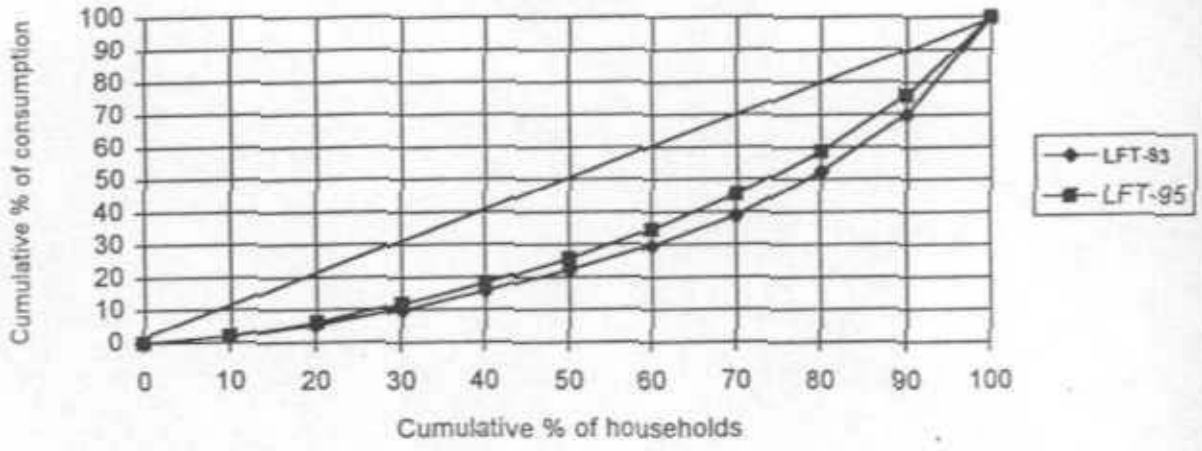


figure A2 : Lorenz Curve for Fish Consumption
'Before-After' -FVO Households

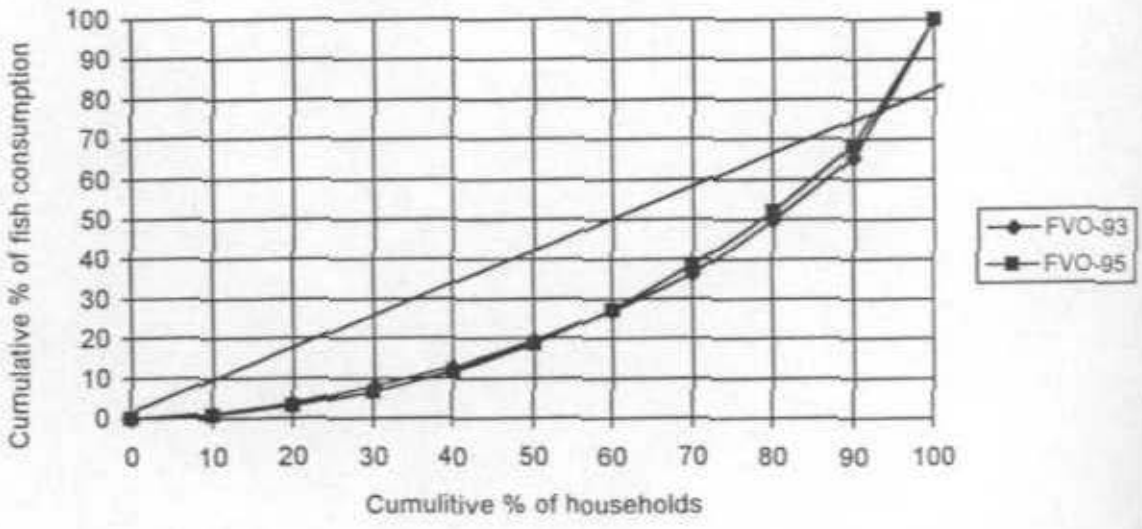
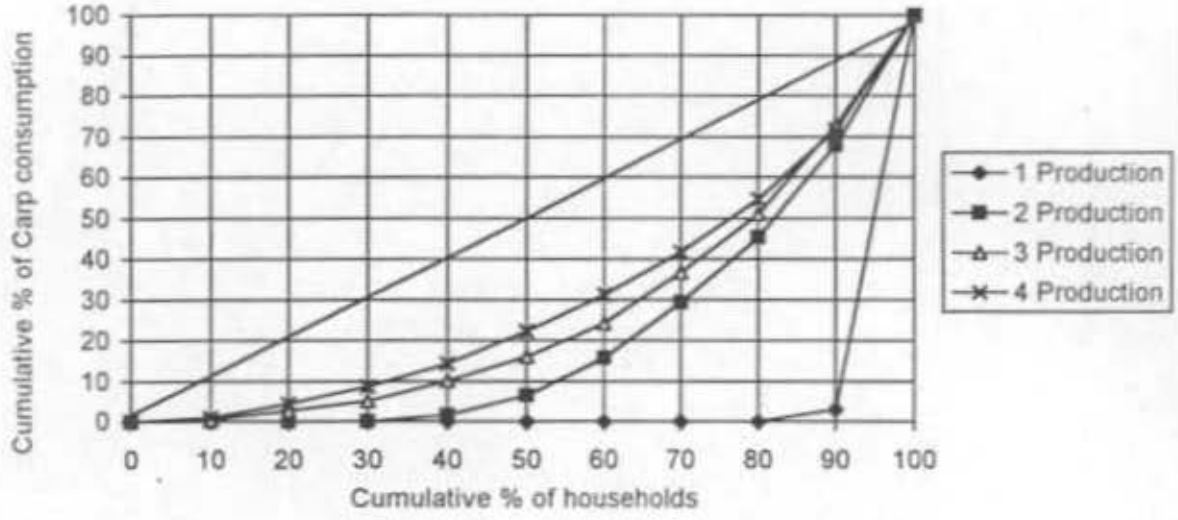


Figure A5 : Lorenz Curve for Carp Consumption
Number of Production Cycle



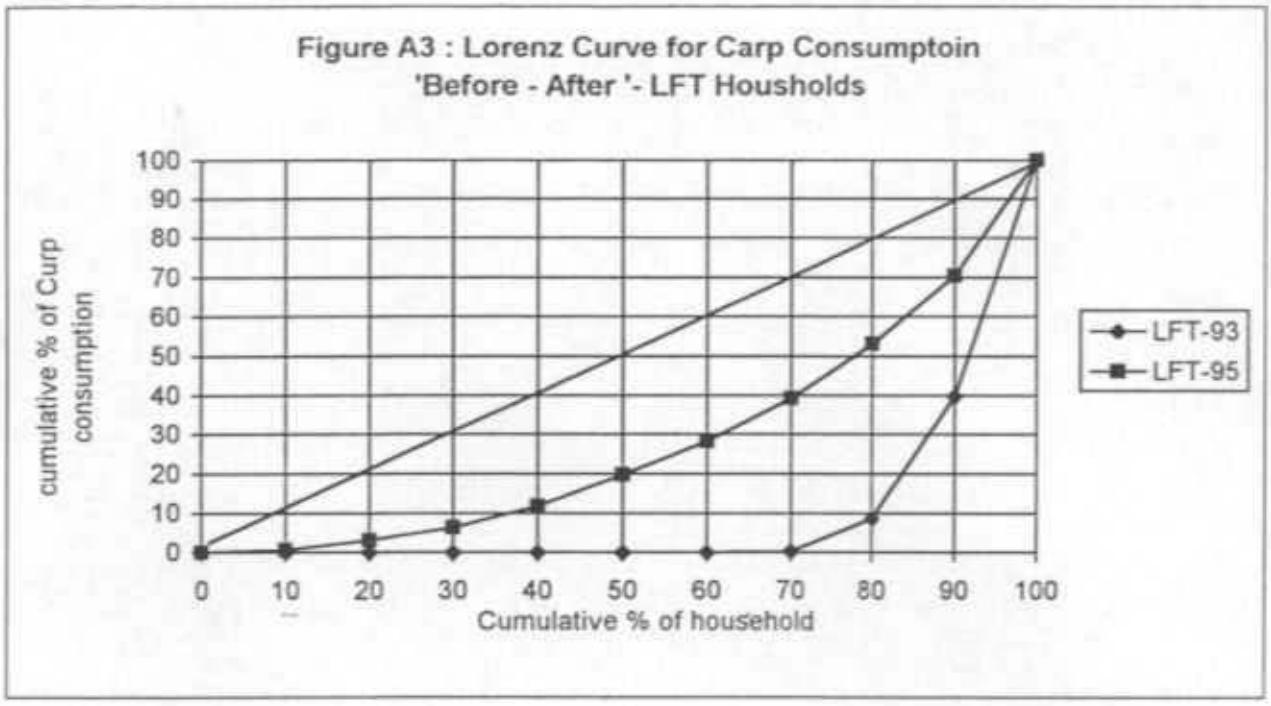


Figure A3 : Lorenz Curve for Carp Consumptoin
'Before - After '- LFT Housholds
cumulative % of Curp consumption
100
90
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90 100
Cumulative % of household
LFT-93
LFT-95

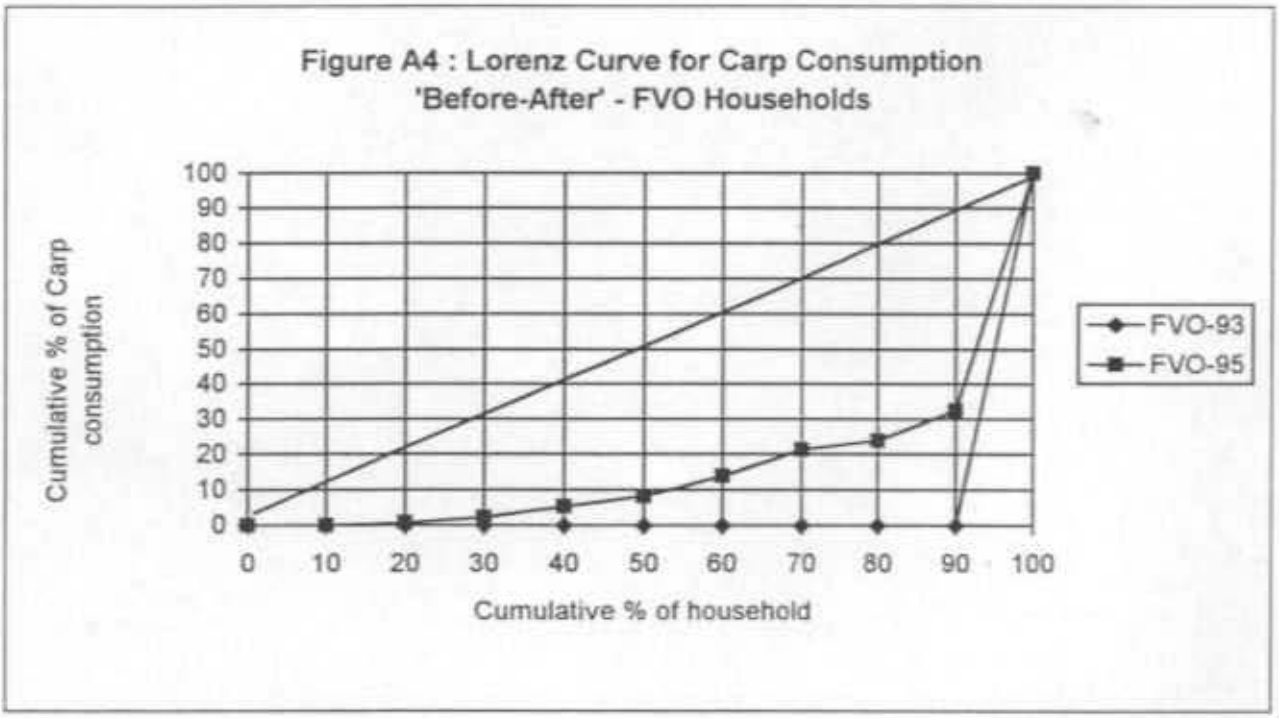


Figure A4 : Lorenz Curve for Carp Consumption
'Before-After' - FVO Households
Cumulative % of Carp consumption
100
90
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90 100
Cumulative % of household
FVO-93
FVO-95