ResearchGate

See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/331111813

PADDY RICE GROWING AS AN INCOME GENERATING STRATEGY OF THE LOCALCOMMUNITIES IN KACHONGA SUB-COUNTY A RESEARCH FUNDED BY THE NETWORK OF UGANDAN RESEARCHERS AN….

Article · January 2004

CITATIONS
0

READS
231

3 authors, including:



Joseph Oonyu
Makerere University
46 PUBLICATIONS **132** CITATIONS

SEE PROFILE



Hedwig Acham
Makerere University
20 PUBLICATIONS **179** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Project Health Education View project

Project PHD Study View project

All content following this page was uploaded by Joseph Oonyu on 15 February 2019.

The user has requested enhancement of the downloaded file.

PADDY RICE GROWING AS AN INCOME GENERATING STRATEGY OF THE LOCALCOMMUNITIES IN KACHONGA SUB-COUNTY

A RESEARCH FUNDED

BY

THE NETWORK OF UGANDAN RESEARCHERS AND RESEARCH USERS (NURRU)

JOSEPH OONYU AND HEDWIG ACHAM

DEPARTMENT OF SCIENCE, TECHNICAL AND VOCATIONAL EDUCATION, MAKERERE UNIVERSITY

P.O. Box 7062, Kampala
Tel : +256 414540033/ +256 772 480669/+256 701480669
E-mail: dstve@gmail.com

Submission Date: January 2004

ACKNOWLEDGMENT

During the course of this study, we received considerable assistance and encouragement from our supervisor, colleagues, friends and students. First and foremost, we wish to acknowledge the profound support extended to us during data collection and report write up by Dr. Silas Oluka and staff of the Department of Science and Technical Education, Makerere University. Our sincere thanks are also extended to our Research assistants Muyagu Benedict, Ms Nabuhalya Catherine, Mr. Muniafu Koliabu and Mutende Francis for being very patient and accurate during data collection. Various colleagues in the different institutions within the university are also thanked for their unwavering support at the various stages of data analysis and report write-up.

This study was made possible by the financial support from the Network of Ugandan Researchers and Research Users (NURRU). Our gratitude goes to the programme administrators for facilitating the release of the research funds. We would also like to thank the local leaders of Kachonga Sub-county for facilitating our movement within the two parishes. Lastly, we would like to thank our fellow researchers for the mutual support and exchange of views in the true spirit of networking.

Contents

ACKNOWLEDGMENT ii

CHAPTER ONE: I N T R O D U C T I O N 1

1.1 Origin, Distribution and Importance of Rice 1

1.2 Paddy Rice Growing in Bunyole County of Tororo District 3

1.3 Research problem 4

1.4 Aim and objectives 5

1.5 Hypotheses 5

1.6 Justification 6

1.7 Scope 6

1.8 Report structure 7

CHAPTER TWO: AN OVERVIEW OF PADDY RICE PRODUCTION AND ITS IMPLICATIONS ON RURAL HOUSEHOLD INCOMES AND WETLAND CONSERVATION IN UGANDA 8

2.1 Factors Influencing Paddy Rice Production in Uganda 8

2.2 Implications of Rice Production on Household Incomes and Wetland Conservation in Uganda 11

2.3 Poverty and Strategies for its Reduction in Uganda 12

CHAPTER THREE: THE STUDY AREA AND METHODOLOGY 17

3.1 STUDY AREA 17

3.1.1 Geographical location 17

3.1.2 Climate 17

3.1.3 Soils 19

3.1.4 Vegetation 19

3.1.5 Human Population and Land-Use 19

3. 2 RESEARCH METHODS 20

3.2.1 Research design 20

3. 2.2 Sampling 20

3.2.3 Collection of Data on the Contribution of Rice Incomes to Family Welfare 21

3.2.4 Collection of Data on Trends and Factors Affecting Rice Production 25

3.2.5 Collection of Data on Effect of Rice Production on Food Security 26

3. 3 Validity and Reliability of the Data 27

CHAPTER FOUR: DATA PRESENTATION AND INTERPRETATION 29

4.1 Introduction 29

4.2 Farming Practices of Paddy Rice Farmers in Kachonga Sub-county 29

Farmers Category....32
Farmers Category....32
4.4 Contribution of Rice Production to the Family Welfare of Rural Farmers in Kachonga Sub-county....35
4.5: Rice Production Trends from 1970-2000 in the Doho and Nambaale Wetlands..36
4.6 The Major Factors Constraining Rice Production in Kachonga Sub-County....39
Major factor....39
4.6.1 Causes of the Constraints and Suggested solutions....40
4.8 Alternative Income-Generating Strategies and Action Plans of Farmers....50
4.8.1 Alternative Income-Generating Strategies....50
4.8.2 Action Plans of Rice Farmers within Doho Rice Scheme and in Outlying Wetlands....52
4.9 Summary....57
CHAPTER FIVE: GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS....58
5.1 Introduction....58
5.2 General Discussion....58
5.3 Conclusions....70
5.4 Recommendations....72
REFERENCES....77
APPENDIX 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS....82
APPENDIX II: RICE GROWING AS AN INCOME-GENERATING STRATEGY OF THE LOCAL COMMUNITIES IN KACHONGA SUB-COUNTY....83
Questionnaire Number ----------....83
APPENDIX III: FOCUS GROUPS....90
APPENDIX IV: RICE PRODUCTION FORMS....92
Shillings....92
APPENDIX V: INTERVIEW GUIDE AND FOCUS GROUP DISCUSSIONS....93

LIST OF TABLES

Table 1: Farming Practices of Paddy Rice Farmers in Kachonga Sub-county……..30
Table 2: Mean Rice Yields and Production Costs for Different Categories of Farmers in Kachonga Sub-county for the Years 2002…….....……...32
Table 3: Mean Production Costs Per Acre of Rice for Different Categories of farmers…..34
Table 4: Contribution of Income from Paddy Rice to Family Welfare of Farmers in Kachonga Sub-county……35
Table 5: Major Factors Constraining Paddy Rice Production by the Different Categories of Farmers in Kachonga Sub-county……..…….39
Table 6: Farmers Perceptions of the major Constraints Affecting Rice Production in Kachonga Sub-county……...…….41
Table 7: Marketing Related Practices of Paddy Rice Farmers Kachonga Sub-county…...46
Table 8: Impact of Rice Growing on Production of Other Food Crops…….…….47
Table 9: Farmers Ranking of Alternative Income Generating Activities……..…..49
Table 10: Action Strategies of Rice Farmers in Doho area……..52
Table 11: Action Strategies of Rice Farmers in Nambaale area……..….54

.....

LIST OF FIGURES

Figure 1: Relationship between poverty levels, intervention and quality of life……..15
Figure 2: The study area……...18
Figure 3: Rice production trends in the Doho and Nambale wetlands……37

ABSTRACT

A study to assess rice growing as an income-generating strategy of the local communities in Kachonga Sub-county of Tororo district was conducted between August 2002 and March 2003. The purpose was to determine the implications of using paddy rice growing as a strategy to alleviate poverty among communities living adjacent to wetlands. In particular, the study assessed the production trends and effects of rice growing on household incomes of the local communities living adjacent to the wetlands in Kachonga Sub-county. An in-depth study involved 60 small-scale farmers, 30 from Nampologoma parish and another 30 from Nambaale parish. However, a questionnaire was administered to 240 farmers in order to obtain an overview of the situation regarding rice growing in the area.

The study was carried out using Participatory Rural Appraisal (PRA), interviews, focus group discussions, document analysis, field observations and the use of questionnaires. The PRA tools that were used included problem identification and ranking, resource mapping, transect walks and trends analysis. The specific objectives were to:

(i) Compare the incomes from rice growing of farmers from the Scheme, out-growers and those in outlying wetlands.
(ii) Assess the contribution of rice growing to family welfare
(iii) Assess rice production trends in Doho and the outlying wetlands.
(iv) Identify the major factors that constrain rice production in the area.
(v) Assess the influence of rice growing on the production of other food crops.
(vi) Determine what the local communities consider to be other viable options for income generation.

The study established that rice is the main source of income for the majority of farmers living adjacent to the Kachonga wetlands. However, net incomes for small-scale farmers are low due to high costs of production, use of same planting seeds season after season, and inability to regulate water in the seasonal wetlands. It was also found out that there is a significant difference between the incomes of rice growers from the scheme and for out-growers and farmers outside the Doho wetland.

Furthermore, from the 1970s to 1990, paddy rice growing significantly improved the household incomes of local communities in the area. However in the subsequent decades, the contribution of rice growing to household incomes has steadily declined. A more urgent need is to ensure that out growers upstream do not deprive the Doho Rice Scheme farmers of adequate water. In addition, the study revealed that only a few people in the study area harvested papyrus and other wetland resources. Moreover, most of these people were rice growers as well. The contribution of wetland resources to household incomes was therefore not significant. According to the respondents, the most viable options to rice growing in the fight against poverty include introducing an alternative perennial cash crop for the area, fish farming, improved farming techniques, formation of an effective association for rice farmers in the area, and strategies that could lessen pressure on existing land by the rapidly expanding human population.

It was concluded that rice growing could contribute significantly to household incomes if farmers used high yielding varieties, adopted better farming techniques, proper control of water and if farmers organized themselves into an effective association. However in the long-term, alternative income generating strategies that bring in higher incomes should be adopted so as to reduce pressure on the wetlands and to ensure their sustainable utilization. There is also an urgent need to rehabilitate Doho Rice Scheme with the help of government and development partners

CHAPTER ONE: I N T R O D U C T I O N

1.1 Origin, Distribution and Importance of Rice

The exact origin of rice (*Oryaza sativa* L.) is not known for certain, but it is thought to share a common ancestor with *Oryaza glaberrina* of West Africa. However, it is suggested that domestication occurred over 5,000 years ago in India or Indo China from where it spread to other parts of South East Asia and beyond (Purseglove, 1988). Currently, rice is widely grown in Asia, Eastern Europe, Africa and Australia (Grist, 1975). During the first Millenium A.D, it was introduced to Madagascar, by the Malays from where it later spread to other parts of East Africa. Rice is now widely cultivated throughout East and Southern Africa. Madagascar and Tanzania are the leading producers in Eastern Africa (Luzi-Kihupi, 1997).

In Uganda, the earliest reference to rice growing was in Mubende in 1904 (Tothill, 1940), where small quantities were produced for food. Rice production only gained prominence in the 1970s following Governments establishment of commercial farms in Kibimba (Bugiri district), Doho (Tororo district) and Olweny (Lira district). It has since then greatly expanded because of the increased demand in urban areas and, the decline in the production of traditional food crops, particularly bananas, cassava and finger millet (Ochollah *et al*., 1997). Rice growing in Uganda has continued to be dominated by rural small-scale farmers living in areas adjacent to wetlands (ADC, 2001; Anon, 2002). The crop is mainly grown for consumption and for sale in local markets. Rice also has the potential for use in industry, and husks may be used for making charcoal briquettes.

Given its value and potential, it is likely that rice growing in Uganda will greatly expand in the near future. Of the average 600,000 metric tons produced in East Africa in the period 1995-2000, about 90,000 were from Uganda (ADC, 2001). This was higher than the 30,000 tons produced in 1990 (Ochollah *et al*., 1997). This upward trend in rice production has continued and it is estimated that in 2001, the country grew 76,000 hectares, which gave an output of 114,000 tons, placing it amongst the most widely grown non-traditional food crops. In some parts of the country, rice acreage is increasingly competing with those of the traditional staple food crops such as bananas, cassava, maize and finger millet. The major rice producing areas are the districts of Pallisa, Tororo, Iganga, Lira, Bundibugyo and Gulu.

In spite of its importance in Uganda, rice production has continued to lag behind demand (ADC, 2001). For instance, only 50% of the country's demand is being met, and the short fall has to be imported. A more recent but significant development has been the cultivation of rice for income generation among rural farmers. It is therefore, potentially an important strategy for reducing poverty in rural areas. Growing rice for income is, being promoted by the readily available market in urban areas.

The increasing realization by rural farmers of the value and potential of rice has encouraged them to expand acreage. One such area is Kachonga Sub-county, where rice production has greatly increased in recent years due to the presence of extensive wetlands.

1.2 Paddy Rice Growing in Bunyole County of Tororo District

Doho and associated wetlands in Bunyole County are some of the most productive rice growing areas in the country. The Doho Rice Scheme alone with an area of 2,500 acres produces about 2.5-5 million kg of rice annually. This amount excludes rice produced by the out-growers and those in outlying wetlands.

Rice growing in the Doho wetland started as far back as 1942 when the farmers of the area were requested by the Colonial government to grow rice for soldiers in the Second World War. Soon after the war, rice production declined. This was mainly caused by the reduced demand for rice, low yielding varieties, the rising incidence of pests and diseases, and problems caused by the farmers' inability to control the excess floods from River Manafwa.

It was not until 1972 that rice production again picked up under the Double Production Strategy of the government of Idi Amin. In 1974, the farmers appealed to government to solve the problem of floods so that they could boost rice production. Chinese experts were invited in 1975. The government also posted local agricultural personnel to the area. These actions led to the establishment of the Doho Rice Scheme.

The Chinese constructed the necessary infrastructure for controlling the water from R. Manafwa as well as farm roads in an area of 2,500 acres. The land was divided into 6 blocks, which were further sub-divided into small plots of a quarter an acre each. The Chinese established experimental and demonstration plots to show the local farmers the best farming techniques. High yielding varieties were later introduced including K23, 85,

K98. The land was leased to the local farmers, but the Chinese continued to manage it until 1987when they left. Now the Scheme is under the management of local farmers.

Local communities in the surrounding areas have since taken to rice growing as a way of raising household incomes. There are reports of declining yields due to such factors as the rising incidence of diseases and pests and declining soil fertility. However, no major study has been undertaken to assess the trends in rice production and the current rice yields in the Scheme and outlying wetlands. This is because rice yields and costs of production vary with farmer characteristics and practices.

Therefore, the major question is what the impact of paddy rice growing has been on household incomes of the various farmers in Kachonga Sub-county. Indirectly therefore, it begs the question of how effective the strategy of rice growing has been in poverty alleviation. For instance, it is not clear whether or not the benefits of rice growing have been significantly greater than would accrue from alternative income-generating activities.

1.3 Research problem

The local communities living adjacent to the wetlands in Kachonga Sub-county are increasingly draining wetlands to grow rice in order to raise household incomes, and reduce poverty. However, there is little or no information on the extent to which the strategy of paddy rice growing has affected their household incomes. Furthermore, it is not known how income from rice growing vary with farmers from the Doho Rice Scheme, among the out-growers and those in outlying wetlands. It is also not known how rice growing has influenced the production of other food crops.

1.4 Aim and objectives

The overall aim of the study was to assess how rice growing has influenced the household incomes of rural communities living adjacent to the wetlands in Kachonga Sub-county.

The specific objectives were:

(i) To compare the incomes from rice growing of farmers from the Scheme, out-growers and those in outlying wetlands.

(ii) To assess the contribution of rice income to family welfare.

(iii) To assess rice production trends in Doho and the outlying wetlands.

(iv) To identify the major factors that constrain rice production in the area.

(v) To assess the influence of rice growing on the production of other food crops.

(vi) To determine what the local communities consider as viable options to rice growing for income generation.

1.5 Hypotheses

Basing on the objectives above, the following Hypotheses were formulated:

(i) There is no significant difference in the incomes of rice growers from the Doho scheme, out-growers and those outside this wetland.

(ii) Income from rice growing does not significantly contribute to family welfare.

(iii) Rice production trend for the period 1980-2000 has remained the same.

(iv) The factors that influence rice production amongst the different categories of farmers are similar.

(v) Rice growing does not significantly influence the production of other food crops.

1.6 Justification

An assessment of the impact of rice growing on household incomes is critical to the formulation of effective interventions that would ensure a balance between development and wetland conservation in Kachonga Sub-county as well as other areas of Uganda. It will thus inform the policy makers, the local communities and the agencies involved in poverty alleviation on the situation on the ground. In this way, they are facilitated to make informed decisions based on concrete evidence.

Furthermore, the study could assist local leaders become aware of what the impact of paddy rice growing has been on the production of other food crops by the local communities living in areas adjacent to these wetlands. It has been claimed that the local people sell all the rice they grow, and even experience serious food shortages at the end of the season with adverse effects on their nutrition status and health.

One way of strengthening the management and conservation of wetlands is to gather accurate information on the impact of agriculture and other activities on their status. Such information assists in the design of intervention strategies that take into consideration the developmental needs of local communities. Lastly, the study could also open up new areas for research on poverty, agriculture and wetland conservation.

1.7 Scope

The study focused on the effectiveness of rice growing as an income generating strategy of local communities living adjacent to wetlands in Kachonga Sub-county. It was confined

to 250 respondents. For an in depth study, Focus group discussions and Interviews were held with 60 farmers and 10 local leaders.

1.8 Report structure

This report is divided into five chapters. The present chapter provides a general background to the study. In Chapter 2, literature is reviewed on rice growing and its impact on household incomes and wetland conservation, while in Chapter 3 the study area and methods of data collection are outlined. In Chapter 4, data on rice growing and household incomes of local communities is presented and interpreted. Chapter 5 consists of the general discussion, conclusions and recommendations.

CHAPTER TWO: AN OVERVIEW OF PADDY RICE PRODUCTION AND ITS IMPLICATIONS ON RURAL HOUSEHOLD INCOMES AND WETLAND CONSERVATION IN UGANDA

2.1 Factors Influencing Paddy Rice Production in Uganda

Given its value and potential, it is likely that the growing of rice in Uganda will greatly expand in the near future. However, expansion in acreage does not necessarily lead to greater yields. This is because, yields from farmer's fields have remained low, rarely exceeding 800 kg/acre as compared to yields in excess of 2000 kg/acre obtained in experimental trials (Anon, 1976). Many factors such as low soil fertility and drought, pests and diseases, losses due to weeds and hydrological conditions do influence rice yields (Audebert *et al*., 1999; Singh & Battacharjee, 1989; Wandulu *et al*., 1997). It is therefore necessary to develop appropriate conditions for the efficient production of the crop in Uganda.

Pests and diseases are major factors influencing rice production worldwide. The major pests of rice are stem-borers, plant bugs, armyworms and grasshoppers, while diseases include blast, leaf spot and foot rot (Purseglove, 1988; Wandulu, 1999). Apart from the incidence of pests and diseases, crucial factors responsible for low rice yields are seasonal fluctuations in the levels of soil moisture, soil infertility, use of low yielding cultivars and poor agronomic practices. High soil moisture is particularly critical during the phase of sowing and plant emergence, and from the time of panicle initiation to anthesis (ADC, 2001). Although some moisture is required during the other phases of plant growth, too much of it increases disease incidence, and dry weather is essential during harvest.

One of the major factors reported to limit rice production in Africa is the inability of farmers to control water from rivers or streams (Wandulu, 1999). Among farmers who cultivate in seasonal wetlands, soil moisture is often too low to adequately foster growth. In the large commercial farms scattered in the different parts of the country, there has been neglect of the infrastructure since government relinquished control. As a consequence, there have been reports of silting of irrigation channels, neglect of farm roads, and farmers' inability to follow a synchronized calendar (MAAIF, 2002).

Other factors influencing rice production include low soil fertility as a result of leaching by the heavy rains. The initial comparatively more fertile soils in many rice-growing areas have become depleted through continuous cultivation. Use of fertilizers must be done cautiously as this could affect the wetland eco-system. As reported by Purseglove (1988), the response of the crop to fertilizers depends on the type of cultivar and soil. Fallowing and crop rotation along with other measures such as the use of high yielding cultivars, could greatly improve rice production. It is not uncommon to find rural farmers using the same planting material season after season (MAAIF, 2002). The practice could be due to lack of awareness, inaccessibility and farmers' inability to afford new planning material every season.

There are also problems with the quality of extension services that are critical to the provision of vital technical advice to rice farmers. As reported by MAAIF/MFPED (2002), agricultural extension has served few farmers, and the approaches have largely been exogenous, non-participatory and ineffective. Rice cultivation is also labour intensive,

particularly during tilling, weeding, bird scaring and harvesting (Johnson *et al.*, 1999). This tends to affect farmers total acreage, since most farmers in Uganda rely on family labour.

Amidst all these problems, farmers have a number of management options available to enable them to increase rice yields (Terry *et al*., 1994). These include (1) Varietal choice, (2) type of crop establishment i.e. land preparation and method, and density of seedling planting, (3) fertilizer use, (4) crop protection. Optimum combinations of these options are likely to vary with farmers' resource base, access to supplies, extension and ecosystem (Fagade & De Datta, 1971; Shukla & Shrivastava, 1995; Gosh & Sharma, 1997). Audebert *et al*. (1999) found that performance of different rice species, ecotypes or cultivars and, their response to management interventions varied with hydrology. Furthermore, when crop management is relatively poor, any superiority of the cultivars in terms of yield will not be expressed. In Uganda, few studies have been conducted on optimum combinations of management options for increasing rice yields of farmers in different ecosystems.

With good husbandry practices, sufficient water provision, use of high yielding cultivars and moderately fertile soils, rice yield in excess of 1000 kg/ha can be attained (De Datta, 1981; ADC, 2001). It is therefore critically important for the institution of proper conditions, particularly good agronomic practices and provision of sufficient water from the time of planting until close to harvest, if production is to be improved. The potential exists for greater production of rice in East Africa, and indeed the rest of the continent. For

example, it was reported that of the 203 million hectares of land suitable for rice farming in Africa, only 12.2 million ha are used (IITA, 1990).

2.2 Implications of Rice Production on Household Incomes and Wetland Conservation in Uganda

Over the past 30 years, wetlands in Uganda have increasingly become important as areas for agriculture, particularly rice cultivation. There has been a prevalent view that agricultural utilization of wetlands is putting to good use what is otherwise a wasteland. From colonial time until recently, wetland reclamation was considered a prudent solution to people's ever increasing demand for farmland (NWP, 1999).

The impact of paddy rice cultivation on wetlands depends on wetland type, the intensity of drainage, agronomic practices including the use of fertilizers. Excessive use of fertilizers will affect the ability of the wetland to perform its various functions, such as maintaining and improving water quality. Wetland drainage for agriculture is particularly harmful to seasonal swamps. For example, it has been reported that 60% of the seasonal wetlands in Pallisa and Iganga districts have been lost as a result of this practice (MoNR, 1996).

Although guidelines have been developed for agricultural use of wetlands (WID, 2001), these have not been widely implemented. This implies that as demand for farmland steadily increases over the years in Uganda, many rice farmers will be forced to extend their agricultural activities to wetlands. Under the circumstances, it becomes increasingly difficult to ensure sustainable wetland utilization. This in turn could adversely affect the

present efforts to conserve and manage wetlands in Uganda. A study is critically needed to assess the impacts of rice growing on the ecological functions of wetlands.

Levels of wetland degradation have been worsened by the desire to produce rice for income. Despite this endeavour, production continues to lag behind demand. Declining yields have been reported in many areas of the country (Wandulu, 1999; Ego, 2001). Declining yields imply that in future, rice cultivation will bring in less and less incomes to households in Uganda. As a result, it could become a less important strategy for reducing poverty in rural households in Uganda. However, no major study has been conducted to assess the contribution of rice growing to poverty reduction, thus the need for this study. This is particularly significant in view of the current efforts by government to modernize agriculture. The mission of the Plan for the Modernization of Agriculture (PMA), is to eradicate poverty by transforming subsistence farming to commercial agriculture (MAAIF/MFPED, 2002).

2.3 Poverty and Strategies for its Reduction in Uganda

Over the last 10 years, Uganda's economic growth has been impressive, with an annual growth rate of between 5 and 10% (UNDP, 1997; Government of Uganda, 2000). This remarkable growth has partly depended on the country's natural resources, particularly its agricultural exports, fisheries and wildlife resources (MoNR, 1998).

The rapid growth in the economy is slowly translating itself into an improvement in the quality of life of many Ugandans. For instance, the infant mortality rate (IMR) has declined from 124 per a thousand live births in 1980 to the current figure of 88 (MFPED, 2000).

Access to safe drinking water has increased from 11% of the population in 1980 to the current 50%. It is also reported that poverty in the rural areas has declined from 87.1% in 1993/4 to 49.7% by 1995/6.

These figures on poverty hide regional disparities. For instance whereas the poverty levels of the population in central and the western regions of the country declined, the northern region in fact registered an increase in people living in abject poverty (MFPED, 1999). In eastern Uganda, although the poverty levels are dropping, these are occurring only very slowly. The headcount of poverty by district also shows disparities with districts such as Tororo showing higher poverty levels (UNDP, 2000). The widespread poverty in Tororo district may be attributed to a number of factors such as the absence of perennial crops like coffee, a decline in cotton production and loss of livestock to cattle rustlers and rebels during the period 1986 – 1992. Tororo district has registered a rise in poverty among its rural population, despite the phenomenal growth of the national economy. Indeed concern has been expressed about the fact that the benefits of economic growth are not reaching all parts of the country equally. While the country is emerging from poverty, there are many people in the district that have not been adequately captured by various poverty alleviation initiatives.

Initiatives aimed at addressing the question of poverty have come from both government and non - governmental organizations (NGOs). For instance, the Poverty Eradication Action Plan (PEAP) has been initiated by government with the objective of eradicating poverty from the households of all Ugandans through a multi-sectoral approach. Other

programs include alleviation of poverty and the social costs of adjustments (PAPSCA) and the Poverty Alleviation Project (PAP). Most recently, government initiated the "Entandikwa Scheme" with mixed outcomes. NGOs such as World Vision and Plan International have been active in Tororo and other districts.

Surveys conducted by various agencies e.g. ACFODE in the different parts of the country reveal that in many cases, "Entandikwa Scheme" has only benefited a small proportion of the population because of such factors as the poor administration of the fund and lack of clear guidelines on how to access it. No detailed study has been conducted in Kachonga Sub-county of Tororo district to assess the extent to which these initiatives by government and NGOs have benefited the rural communities.

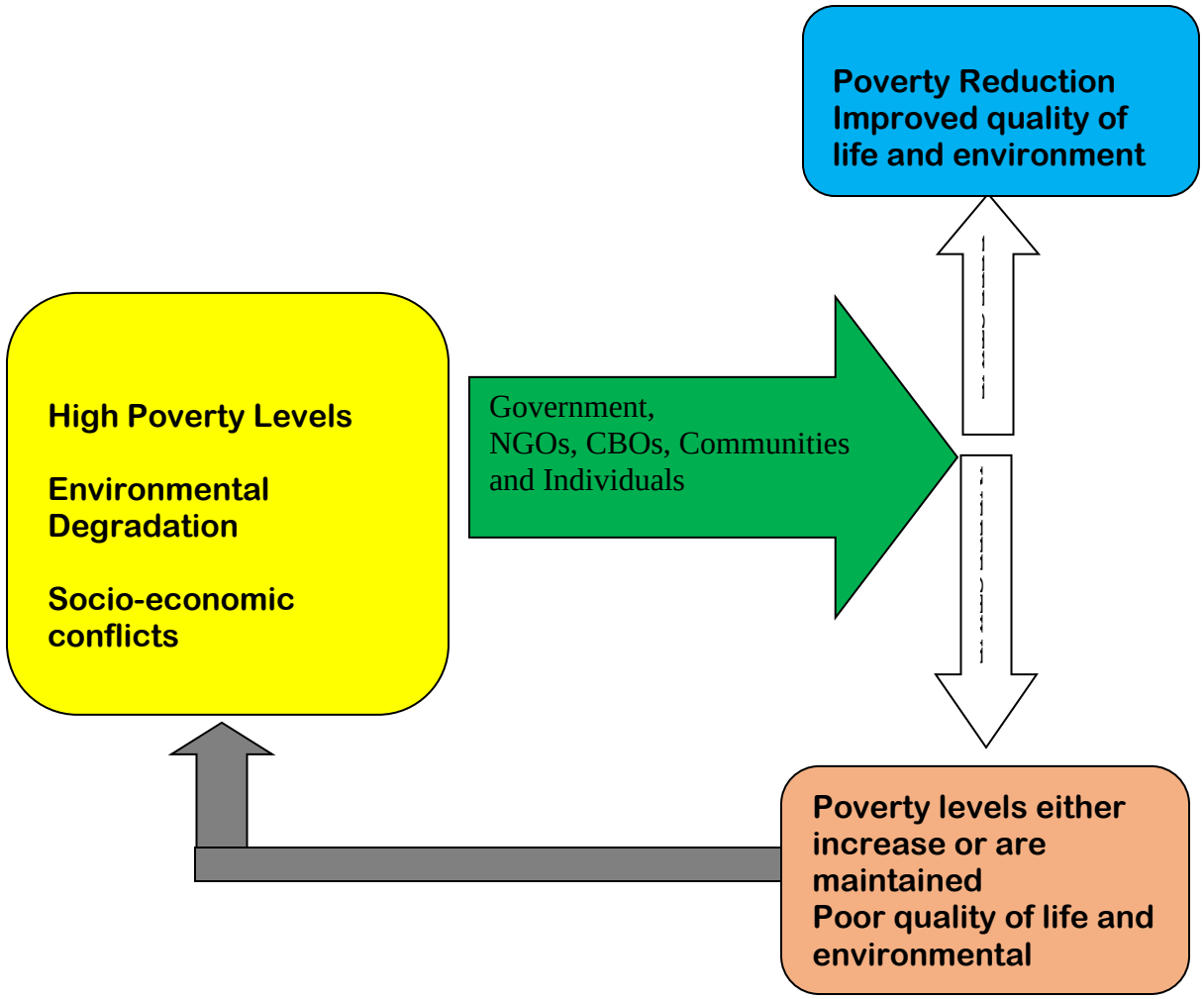


Figure 1: Relationship between Poverty, Intervention effectiveness and the quality of life

As illustrated in Figure 1, initiatives to reduce poverty rates could come from government, Non-governmental Organizations, Community Based Organizations and the community members themselves. If these initiatives are effective and the environment conducive to development, they could result in reduced levels of poverty. On the other hand, if they are ineffective the poverty levels will remain the same or even increase.

Poverty levels have a direct relationship with the quality of life of any given society or community. Low levels of poverty are associated with improved quality of life, while high quality of life could itself cause a reduction in poverty levels. On the other hand, high levels of poverty cause poor living conditions. The poorer societies also create conditions that can accelerate poverty. For instance, poor communities usually destroy their environment because of the high dependency on it for their livelihoods.

The local people in Kachonga Sub-county have reacted in various ways to poverty in their households. One of the major strategies that they have employed in order to reduce poverty is to increase the production of agricultural crops, particularly paddy rice cultivation for those communities living adjacent to wetlands. Wetlands are important for biodiversity conservation as well as other functions including flood control, storm protection, and the provision of wetland resources such as sand, papyrus reeds and fish. Their degradation and loss would have negative consequences to the communities living immediately in adjacent areas, aswell as the whole country. However, the critical issue is how to ensure the sustainable utilization of wetlands, rather than to stop people from using them for agriculture.

CHAPTER THREE: THE STUDY AREA AND METHODOLOGY

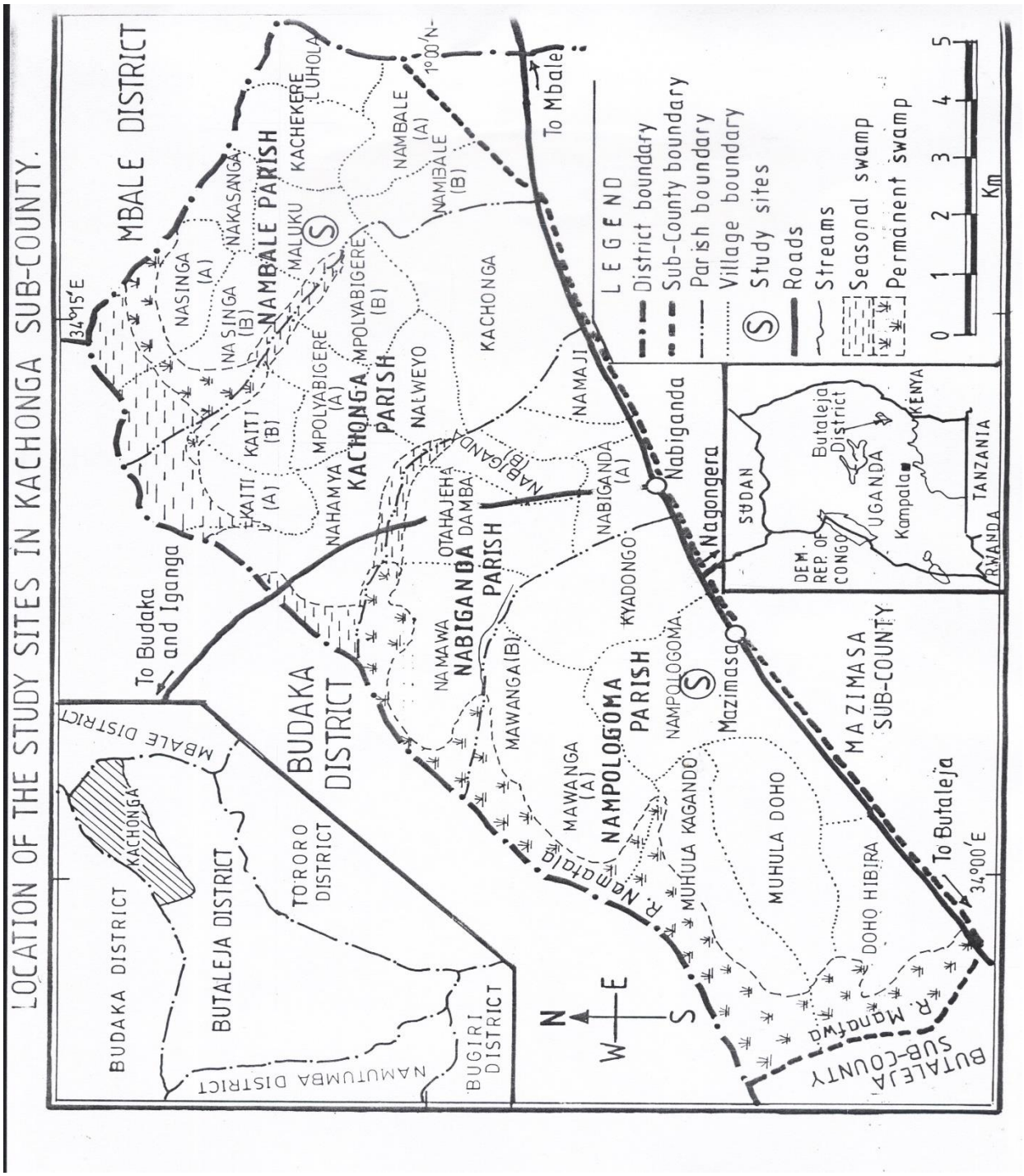
3.1 STUDY AREA

3.1.1 Geographical location

The wetlands in Kachonga are part of an extensive network of wetlands in Bunyole County of Tororo district. These wetlands include Doho, which forms the flood plains of River Manafwa, and the adjacent wetlands of Nakwiga, Nankwasi, Nahigande, Namatala and Nambale (Figure 2.1). Kachonga Sub-county is 10 km from the major centre of Mbale Town, between 33º 55′ - 34 º 05′ E and 0º 50′ - 1º 00′ N and on an altitude of 1050-1100 metres above mean sea level. The study sites were Nampologoma and Nambaale parishes, where most of the rice growing occurs within Kachonga Sub-county.

3.1.2 Climate

The area experiences a tropical climate with average temperatures of between 18-32º C (Langdale-Brown, 1960; Langdale-Brown, Osmaston & Wilson, 1964). The rainfall amount varies between 1500 – 1750 mm per annum and is received in 120 days (Government of Uganda, 1967). However, higher rainfall amounts have been recorded in some years such as 1975 (Government of Uganda, 1967; Unpublished reports of Chinese experts, 1976). The rainfall pattern is bimodal with peaks in March-May and August October.



Map of the Study Area

3.1.3 Soils

The soils in the area have largely been described as sandy and are characterised by low organic content (Government of Uganda, 1967). However, areas along rivers have fertile clay soils largely derived from the volcanic soils of Mbale district.

3.1.4 Vegetation

According to Langdale-Brown *et al*. (1964), the predominant vegetation in the area is grassland, wooded grassland and various types of swamps. Species as *Acacia polycantha, Echinochloa pyramidalis, Sorghastrum rigidifolium, Pennisetum purperium*, *Hyparrhenia rufa and Borassus aethiopicus* are common. Broadly, there are two types of wetlands. In the deeper waters, wetlands are dominated by papyrus (*Cyperus payrus* L.), which form extensive single species stands. In areas with less water, there are seasonal grass wetlands. The rice farmers have reclaimed the seasonal wetlands, while the Doho Scheme controls the flow of water from R. Manafwa for use by the farmers.

3.1.5 Human Population and Land-Use

Kachonga Sub-county has a population of 29,682 giving a population density of 346 persons/km^2 (Government of Uganda, 2002). The communities consist of small-scale farmers with an average farm size of less than two hectares per family. Household incomes are low (less than US $300/year per family), and are mainly derived from the sale of rice. Cotton was previously an important source of income, but this has given way to rice (Gimono & Burton, 1994; Government of Uganda, 1991). A few livestock, particularly cattle and goats are kept (MAAIF, 1995). The high population densities in the surrounding areas have, exerted immense pressure on the existing land resources.

Literacy rates are estimated at 60%, but this figure is lower for women (Government of Uganda, 1999). People mainly rely on extension workers for information on agriculture and land management.

3. 2 RESEARCH METHODS

3.2.1 Research design

The study employed a cross sectional survey design in order to gather information from several people on use of rice growing as strategy to generating household incomes of local communities in Kachonga Sub-county. Both qualitative and quantitative methods were used. Participatory Learning and Action (PLA) research approaches were employed for their cost effectiveness and capacity to obtain in-depth data.

3. 2.2 Sampling

The study involved 2 parishes, Nampologoma and Nambaale, adjacent to the wetlands. These parishes were purposively selected by the local communities themselves during a preliminary visit made to the area in July, 2002 because of the presence of extensive wetlands in them and, the intensive rice cultivation that is going on. A pilot survey of the area was made during this period.

During the sampling for purposes of questionnaire administration, 15 farmers were randomly selected from each of the 8 villages in Nampologoma and Nambaale parishes. This provided a sample of 240 respondents. However, for a more intensive study, 30 farmers were selected from each parish based on their extensive experience of rice

growing. The 30 farmers consisted of 3-4 from each village. In addition, the study involved 4 LC I officials per parish, 2 LC II Chairmen, the LC III Chairman, County Chief and 2 officials from Doho Rice Scheme.

3.2.3 Collection of Data on the Contribution of Rice Incomes to Family Welfare

Data on the major agronomic practices of paddy rice farmers, incomes from rice growing for farmers in the Scheme, out-growers and those in outlying wetlands, the contribution of rice income to family welfare and the overall household incomes were collected using:

(i) Questionnaires.

(ii) Focus Group Discussions (FGDs).

3.2.3.1 Use of Questionnaires

After defining the study objectives, a questionnaire was designed by carefully constructing questions that would obtain the desired responses. Question construction was done using guidelines recommended by Gall, Borg and Gall (1996). For example, the questions were kept as short as possible. In addition they were made simple and each item only required a response to a single idea.

One of the basic requirements of the questionnaire design was the computation of the Content Validity Index (CVI). CVI gave the proportion of items that the experts considered relevant to the research objectives. The CVI for the questionnaire was found to be 81. Constant adjustments were made until the questionnaire was considered sufficiently valid.

A total of 30 questions were constructed (Appendix I). The questionnaire was divided into six sections. Section A sought responses on the background of the respondent. Section B

had items on incomes of various categories of rice farmers, while section C had items on income from other wetland resources. Section D had items on the impact of rice growing on the production of other food crops. The last section focused on what the local people consider to be other viable options for poverty alleviation.

Sample size

The number of respondents involved in the study was 238 as described above. The targeted sample for the questionnaires was 240. This was considered adequate and representative of the study population because it was randomly sampled from all the villages.

Pretest

A pretest of the questionnaire was carried out among 10 members of the local community in Maluku village at the beginning of October 2002. These respondents did not participate in the main study. Subsequently, Cronbach's Alpha Co-efficient of reliability of the questionnaire was computed, and found to be 0.69. The value showed that the instrument was sufficiently reliable. The pre-test enabled the necessary adjustments to be made on the content of the items. In addition, it created a rapport with the community leadership in the study parishes.

Questionnaire Administration

After the pretest, the study commenced on the 5th September 2002. The two parishes for study were purposively selected on the basis of the extent of rice growing.

With the assistance of Local Council officials (L.C. I), the 8 villages in each of the two parishes were visited and the number of households determined. Household heads in each village were then assigned numbers. Using a table of random numbers, a sample of 15

household heads in each village was drawn from the list. This provided 120 respondents in each parish.

Questionnaires were given to the respondents, at an agreed venue by the research assistants. This was done after an explanation of the purpose of the study i.e. a contribution of rice growing to household incomes. Those respondents who could not read and write had the questionnaire carefully translated into the local language and responses recorded by the research assistants who were fluent in Lugisu, Lugwere and Lunyole, the main language spoken by people of this area. During most times of questionnaire administration, the researchers were present. Care was taken to ensure that only willing participants were given the questionnaires and no one was coerced or deceived as recommended by Burgess (1989).

Analysis of Questionnaire Data

Questions were assigned variable labels and codes to the responses. These were entered and saved in an Excel file. The data was analysed using the Statistical Package for Social Sciences (SPSS) version 10.1. Descriptive and inferential statistics were derived.

3.2.3.2 Focus Group Discussions (FGDs)

The interview guide was constructed in English (Appendix II). However, items were translated into the local languages during the interviews. The interview focused on the views of the local people regarding the importance of rice growing as a source of income, the problems they encounter, their ways of overcoming them, the role of local leaders and alternatives to rice growing. In addition, the impact of rice growing to the production of other food crops was also explored with them.

Local communities were organized into four focus groups, two in each of the parishes. Names of participants in the focus group discussions were selected from lists obtained from Local Council (L.C.I) Chairman. Each focus group had 10 people including housewife, an L.C I official, L.C II official, elder, farmer, youth and teacher. The group had a minimum of 4 women. FGDs were conducted either in the Sub-county Headquarters or Kachekere Primary School. All discussions were conducted over the weekends between 1200 -1600 hours when the participants were free from farm activities. The first interview in each focus group began with an explanation of the purpose of the study. In addition, the participants were then told to speak honestly and freely. Questions were then asked and the responses were also audio-recorded.

At the end of the discussions, the responses were recorded on a Standard Interview Record Form (SIRF) and then coded under themes or analytical categories for further analysis. These categories included the costs of rice production, acreage, yields, incomes, marketing, problems, alternative sources of income, how much rice is sold and how much is retained for family consumption, and the general impact of rice growing on the production of other food crops. The findings were then compared so as to relate the variations with the range of responses or observations made. Verification and clarification of information was sought whenever necessary. On the whole, discussions were held at least three times with each focus group.

3.2.4 Collection of Data on Trends and Factors Affecting Rice Production

3.2.4.1 Use of Participatory Rural Appraisal (PRA)

The conduct of PRA

Participatory Rural Appraisal was conducted during the months of August and September 2002. Essentially, the objective was to obtain information quickly yet accurately on rice production trends and problems, which affect rice production in the area. An explanation of the purpose of the study was made prior to any meeting with a farmer. Two 2-day field visits were made to farmers in each parish along transects formed by the major village tracks. Any relevant information that was observed along these transects was recorded down.

In addition, the local leaders and Research Assistants in each parish organized 2 workshops of 30 participants, during which information on rice growing as an income-generating strategy was sought. The choice of the participants was based on gender and years of experience in rice growing. The workshops for Nampologoma farmers took place at Kachonga Gombolola Headquarters, while those for farmers in Namabale parish took place in Kachekere Primary School. Apart from transect walks, other PRA tools used included problem-identification and ranking, resource mapping and, trends analysis.

Data Capture and Analysis

In order to ensure the capture of all relevant information by the different PRA tools being used, both the researchers and their assistants recorded it. In some instances, the farmers themselves were able to provide written information such as maps. All discussions were

also audio-recorded to ensure immediate capture of information. Analysis first took place in the field with the respondents who validated the information. This is because respondents are naturally well placed to do their own analysis and many of the conclusions presented in the data will be from the respondents. In this way, the local people were made part of the research problem and its solutions.

3.2.4.2 Document Analysis

Six documents from the District Agricultural Office, Tororo and the Doho Rice Scheme headquarters were reviewed for information on production levels for different years. Documents selected from the many that were available included Annual Reports, Evaluation Reports and Project Progress Reports. Information coded included the kinds of documents consulted, who produced them and for what purpose, when and under what circumstances, and whether the evidence available from the field was consistent with the contents of the documents.

3.2.5 Collection of Data on Effect of Rice Production on Food Security

3.2.5.1 Use of questionnaires

Information on effects of rice production on food security and household incomes in Kachonga Sub-county was obtained from the questionnaire described in Section 3.2.3.1. Based on the results of the preliminary survey, further adjustments were made to make the findings more reliable.

A total of 238 respondents were randomly selected from the local communities in the two parishes of Nampologoma and Nambaale. These were considered adequate and representative of the general study population. Data from the questionnaire were saved in a Sylk File in Excel software and subsequently analyzed using SPSS programme.

Descriptive and inferential statistics such as the Chi-square test (χ^2) were used in the more elaborate analysis

3.2.5.2 Interviews with Local Officials

Brief interviews were conducted with 12 members of the local leadership including 4 LC I officials per parish, 2 LC II Chairmen, the LC III Chairman, the County Chief and 2 officials from Doho Rice Scheme. This is considered necessary in order to gain a picture of how these officials perceive the impact of rice growing on the production of food and household poverty. It was also meant to obtain a comprehensive understanding of how the officials planned to resolve the various problems that farmers face in order to reduce levels of poverty in the area. Interviews with these officials were usually held on appointment and for 2 - 3 hours. As with FGDs, all information from interviews were audio-recorded, subsequently listened to and transferred to a Standard Information Record Form. Details of date, place and duration of the interview was also noted.

3. 3 Validity and Reliability of the Data

First, the majority of the local people did not speak nor read English. However, the researcher is fluent in Lugwere, one of the main languages spoken in the area. In addition the two Research Assistants involved in the study hailed from the area and spoke both English and the local languages and, had a good background of rice growing in the area. Furthermore, all the information was audio recorded and crosschecked by other people fluent in the local languages.

Secondly, some people in the area had been misinformed that there was a 'ban' on wetland utilization, and this could influence the way they frame their responses to the questionnaire.

However, this constraint was overcome by building trust with the local people and their leadership, as well as by carefully framed questions.

Lastly, to ensure valid and credible results, data from FGDs was crosschecked against the responses from the questionnaire and, with data obtained from other methods. This permitted the triangulation of information from all the different sources. Triangulation prevented the acceptance too readily of the validity of the data obtained using any one of the methods. Through the use of participatory approaches, feedback and periodic reviews were received from the local people, and the project was modified from time to time as was necessary. The research team also shared their impressions with collaborating researchers and other local resource persons as fieldwork progressed.

CHAPTER FOUR: DATA PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the results of a study conducted among rural farmers living in the areas bordering Doho and the Namabale Wetlands in Kachonga Sub-county to assess the contribution of paddy rice growing to household incomes. The study also assessed rice production levels and the implications of the observed trends on food security, household poverty and sustainable wetland utilization.

The chapter comprises eight sections. In Section 4.2, information on the farming practices of rice farmers is provided, while the rice yields and costs of production are presented in Section 4.3. The results on the contribution of rice incomes to family welfare and the production trends are presented in Sections 4.4 and 4.5. Section 4.6 presents findings on factors constraining rice production, while alternative income generating strategies and action plans of farmers are presented in Section 4.7. A summary of the findings is presented in Section 4.8.

4.2 Farming Practices of Paddy Rice Farmers in Kachonga Sub-county

Results of the agronomic practices of paddy rice farmers in the study area revealed that the majority of farmers (56.5%) had been growing rice for between 4 and 9 years (Table1). About a fifth have been growing rice for more than 9 years. The most popular varieties grown were K98 (61.9%) and K23 (18.1%), because of their comparatively higher yields and the ability to resist pests and diseases.

Table 1: Farming Practices of Paddy Rice Farmers in Kachonga Sub-county (N=238)

Practice	Category	Frequency	Percentage
Experience in rice growing	1-3 Years	52	23.9
	4-6 Years	71	32.6
	7-9 Years	52	23.9
	>9 Years	43	19.7
Variety grown	K98	130	61.9
	K23	38	18.1
	K85	11	5.2
	Others	31	14.8
Reason for Variety grown	High Yielding	102	49.5
	Fast Growing	29	14.1
	Disease Resistant	68	33.0
	Other	7	3.4
Times Per Year	Once	130	58.8
	Twice	91	41.2

Nearly 60% of the farmers reported that they grow rice once a year. Most of the farmers who grow rice once a year were those who cultivate on the seasonal Nambaale wetland. This is most probably due to the unreliability of water supply, particularly needed by rice plants during their pre-anthesis stage of development. The Nambaale farmers depend on rainfed agriculture. Farmers within the Doho Rice Scheme are able to have two crops per year because they have a constant supply of water that can be regulated.

4.3 Rice Yields and Costs of Production in Kachonga Sub-county

Results of a study of rice yields and costs of production during the years 2001-2002 for different categories of farmers in Kachonga Sub-county are summarized in tables 2-3. Generally, the results showed marked variations in rice yields from season to season and among the different categories of farmers. Table 2 revealed that rice production during the second season (August-February) did not significantly vary from that of the first season (April-August). However, the farmers reported that usually, rice yields are lower during the short rainy season compared to the first. The study also revealed that most of the farmers who participate in rice growing during the second season are either out growers or from Doho Rice Scheme.

Overall, yields vary between 11 bags (660 kg) and 15 bags (900 kg). Only a small proportion of this is retained for use in the households. Yields of out-growers were consistently higher than for the farmers within the Scheme and those in the outlying Nambaale wetlands. This probably implies that there are fewer factors constraining rice production among out growers compared to farmers in either Doho Rice Scheme or the Naaambale wetlands. Interviews with out growers revealed that they were better organized, had ready access to extension workers, a better synchronized planting regime and the soils were relatively more fertile. For example, out growers often paid the extension staff upon completion of tasks given.

Table 2: Mean Rice Yields and Production Costs for Small-Scale Farmers in Kachonga Sub-county for the Year 2002

(a) The Year 2002 – Season I

Farmers Category

	Within the Doho Scheme	Out-growers	Outside the Doho wetland	Entire population
Yield/Acre (Bags)	13.7	15.3	11.1	13.4
Bags sold (60 kg)	13.0	14.4	10.6	13.0
Yield/Acre (Kg)	780	864	636	780
Gross Income (Shs)	468,000	518,400	381,600	456,000
Production costs (Shs)	231,800	283,800	285,700	267,100
Net Income (Shs)	236,200	234,600	95,900	208,900

(b) The Year 2002 – Season II

Farmers Category

	Within the Doho Scheme	Out-growers	Outside the Doho wetland	Entire population
Yield/Acre (Bags)	14.5	13.8	12.0	13.4
Bags sold (60 kg)	13.9	13.0	11.6	12.8
Yield/Acre (Kg)	768	737.5	696	733.8
Gross Income (Shs)	460,000	442,500	417,600	440,280
Production costs (Shs)	231,800	283,800	285,700	267,100
Net Income (Shs)	228,200	158,700	131,900	173,180

In order to assess the income from paddy rice, the production costs were computed. The breakdown of the mean costs of production for various farmer categories, are summarized in Table 3 below. Generally, the costs of production are high. The major contributors of costs of production are labour and the hire of land. However, even the costs of land hire vary from place to place and range from 80,000 to 120,000/= per acre. The Nambaale farmers pay slightly less than out-growers, perhaps due to the lower productivity of the land. The net incomes of rice farmers during the first and second cropping seasons ranged from 96,000/= to 237,000/= and, 132,000/= to 229,000/= per acre respectively. The mean net income per acre for the entire population of farmers during the first cropping season was 209,000/=, and 174,000/= during the second season.

Usually, medium (3-5 acres) and large-scale (more than 5 acres) rice farmers have reduced costs of production because they own the land and practice better farming techniques. Their incomes are therefore on average higher than for small-scale farmers.

The costs of production are generally higher for out-growers and farmers outside the Doho wetland because they include the cost of land hire. Other major contributors to the high costs of production include tillage, planting, weeding, bird scaring and harvesting costs. However, the net income of farmers was computed by excluding the costs of fertilizers and seeds since most of the farmers (95%) did not spend any money on these two items. When the data was subjected to Analysis of Variance (ANOVA), it was established that there was no significant difference (P=0.05) in the yields and incomes of out-growers and farmers in the Nambaale wetland, but a significant difference exists these farmers and those within the Doho Rice Scheme.

Table 3: Mean Rice Production Costs Per Acre (shillings*) for Small-Scale Farmers (Less than 2 Acres) in Kachonga Sub-County

	Within the Doho Scheme		Out-growers		Outside the Doho wetland	
	Hours	Cost (Shillings)	Hours	Cost (Shillings)	Hours	Cost (Shillings)
A. Inputs						
Seeds (10kg)	-	10,000	-	10,000	-	10,000
Fertilizers (50kg)	-	50,000	-	50,000	-	50,000
Renting land	-	-	-	100,000	-	100,000
Drying/Transporting	33.7	17,113	25.9	15,600	29	17,585
Sub-Total	33.7	77,113	25.9	75,600	29	77,585
B. Labor						
Primary tillage	32.5	33,910	18	34,562	14.9	34,065
Secondary tillage	31.5	25,031	12.1	25,083	12.4	24,299
Planting	33	28,270	25	24,293	20	21,928
Weeding	34.4	28,462	21.1	22,571	29.8	19,170
Bird scaring	371	25,737	336	19,111	346.2	26,209
Harvesting	21.9	37,204	8.7	14,687	12.5	14,954
Threshing	6.1	19,005	5.3	15,392	5.4	12,585
Others	8	8,061	9	7,666	9	9,788
Sub-Total	538.4	214,639	435.2	268,187	450.2	268,129
Total (A + B)		**291,752**		**343,787**		**345,714**

***** 1 US Dollar=1900 Uganda Shillings

4.4 Contribution of Rice Production to the Family Welfare of Rural Farmers in Kachonga Sub-county

Results of the study to assess the contribution of paddy rice to family welfare are presented in Table 4. The majority of the farmers (45%) reported that income from rice is used for the welfare of their families, especially for buying food and clothing. Nearly 30% of the farmers reported that they use the income for paying school fees for their children in secondary schools. Only 14% of the farmers stated that income from rice is used to pay for labour in rice fields in the subsequent season. This implies that most of the labour required during rice growing is probably provided by the family members.

Table 4: Contribution of Incomes from Paddy Rice to the Family Welfare of Farmers in Kachonga Sub-county (N=218)

Use of Income	**Frequency**	**Percentage**
Family welfare	98	45.0
School fees	60	27.5
Labour costs	30	13.8
House construction; land; cattle etc	20	9.2
Others	10	4.5
Total	**218**	**100.0**

4.5: Rice Production Trends from 1970-2000 in the Doho and Nambaale Wetlands

Data on rice production trends are presented in Figure 3. Generally, rice yields have continued to decline for all categories of farmers. However, this decline is sharpest among farmers in Nambaale parish.

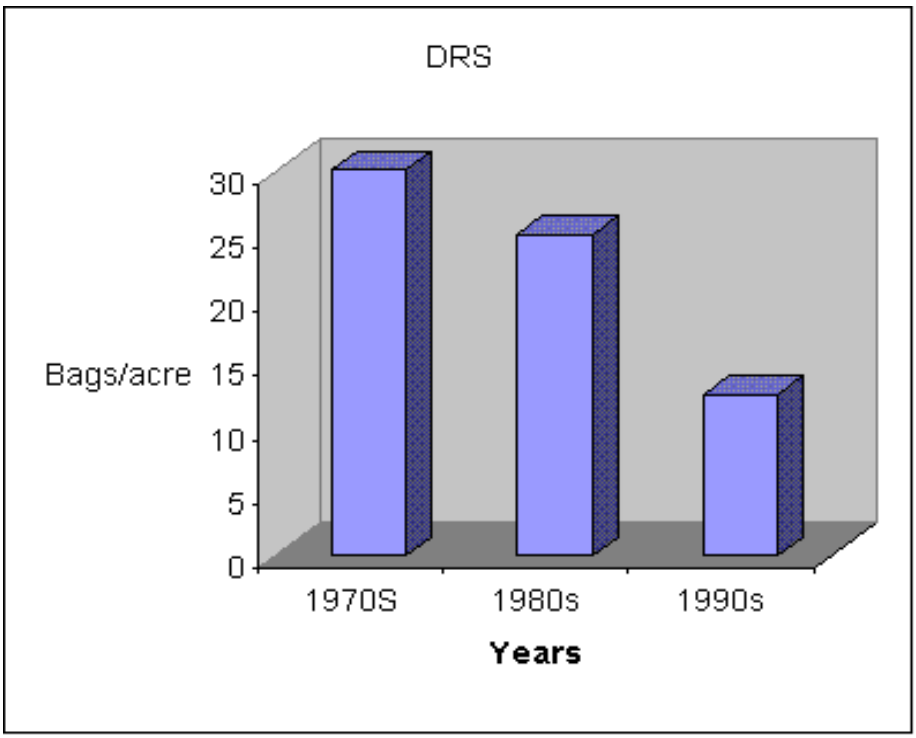
Farmers in the Doho wetland and those in Nambaale reported that before 1980, rice production levels were high with yields of between 30-35 bags per acre or 1,800-2,100 kg/acre. Since then, there has been a steady decline in rice production levels and incomes. Rice growing in Nambaale parish only began in the late 1970s and early 1980s.

Despite the downward trend in rice production, the majority of the rice farmers (82%) reported that rice growing had contributed towards reducing poverty levels in their households. The rice-growers perceive households where rice is not grown to be poorer. The major uses to which income from rice was put included, clothing the family, buying food, paying school fees, constructing decent houses and paying Graduated tax.

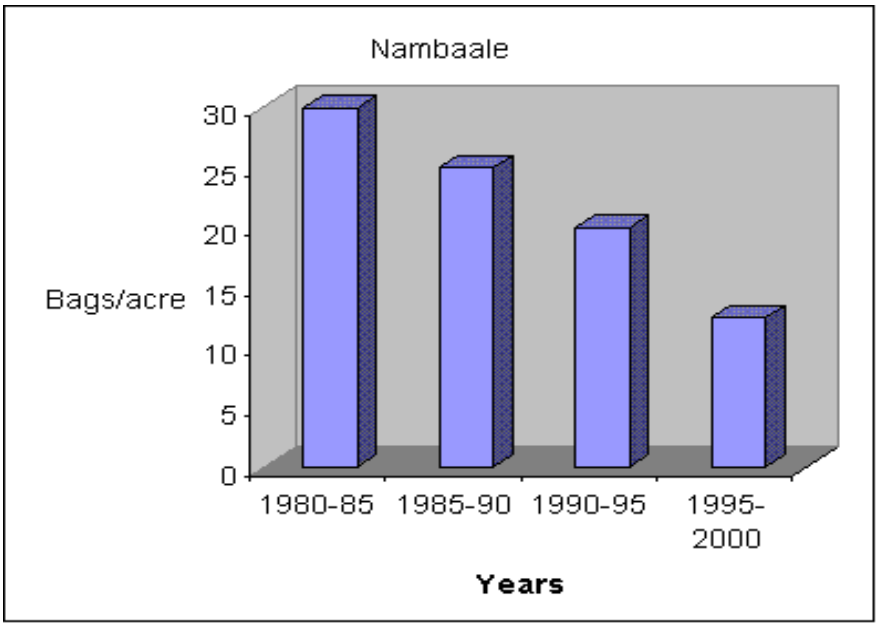
However, they acknowledged that income from rice is declining. From the Focus Group Discussions, it was evident that the majority of women have no access and control over the means of producing rice. Although women greatly contribute towards rice production, men are responsible for its sale. Women only get to know about the income from their husbands. A few men expressed the fear that giving women access and control over rice production could cause them to 'lose control over their wives' who might even invest in their parents homes.

Figure 3: Rice Production Trends Within Doho and Nambaale Wetlands for the Period 1970-2000 (n=60).

a) Within Doho Rice Scheme (DRS)



b) Within the Nambaale Wetland



Women revealed that prior to 1990 when the production levels were high, and men earned a lot of money from rice, there was a rise in polygamy in the area. This claim by some women was not, disputed by the men in the Focus Groups who reported that it was largely due to 'ignorance' that prevailed at the time.

However, in some families, women are given limited access to land from which they can earn money for their personal use. A few women also own plots of land within the Doho Rice Scheme, and can therefore be said to have both access and control over rice production. A more detailed study of gender relations in rice production is, being undertaken by a Masters student in the Department of Women and Gender Studies, Makerere University.

Interview sessions further revealed that the apparent popularity of rice growing in the sub-county was due to the following reasons:

(i) Rice is the only major crop that can at least bring income to households.

(ii) It brings in more income than cotton.

(iii) Rice is both a food and cash crop.

(iv) The area has no perennial cash crops.

(v) There is no total loss of the crop, for you harvest at least something.

(vi) There is no way of predicting yield, and so the farmers continue to hope that the next season's crop will be better.

4.6 The Major Factors Constraining Rice Production in Kachonga Sub-County

A study of the factors limiting rice production revealed variations according to the category of farmer. In other words, the ranking of these factors by farmers within the Doho Rice Scheme was different from the ranking given by those in the outlying wetlands of Nambaale. Even within the Doho wetland, the ranking by out-growers was different from that given by farmers within Doho Rice Scheme (Table 5).

Table 5: The major factors influencing paddy rice production by the different categories of farmers in Kachonga Sub-county.

	Major factor		
Rank	Within the Doho Scheme	Out-growers	Outside the Doho wetland
1	Weak management	High costs of production	Unreliable water supply
2	Decreasing water levels in the scheme	Lack of an effective association	High costs of production
3	Lack of an effective association	Marketing related constraints	Lack of an effective association
4	Health problems	Pests and diseases	Poor yielding varieties
5	High costs of production	Health problems	Pests and diseases
6	Lack of technical advice	Lack of technical advice	Decreasing soil fertility

However although not ranked amongst the first five, loss of soil fertility and the marketing practices were reported by farmers as factors that influence rice production in the area

4.6.1 Causes of the Constraints and Suggested solutions

Results of perceptions of rice farmers in Doho and outlying wetlands are summarized below in Table 6. Generally, there were variations in what the different categories of farmers reported to be the causes of these problems and the possible solutions. Within the Scheme, the major cause of low rice productivity was attributed to the mismanagement of the Scheme. The authorities within the Scheme were reported to exhibit apathy towards farmers' problems.

(a). Poor management of Doho Rice Scheme

Is caused by lack of managerial skills, irregular meetings and misuse of power and authority. It was suggested that training and sensitization of the management committee on their roles and responsibilities is necessary, and that the committee members should be paid salary. Educational standards also need to be raised when recruiting members of the management committee. Lastly, regular meetings need to be held to solve the emerging issues as they arise.

(b). Decreasing water level within the Doho Rice Scheme

It was reported by farmers within the Rice Scheme that the water levels are decreasing because out growers upstream have diverted water to their farms. For example, Hajji Naleba has over 100 acres and is tapping the water from River Manafwa before it reaches the scheme. The cause was identified as lack of an effective association through which to regulate water use for the good of all farmers.

Table 6: Farmers perceptions of the major constraints to increased rice production in Kachonga Sub-county and the possible solutions

Problem	Causes	Possible Solution
Weak management of the Doho scheme	- Lack of managerial skills - Unclear roles - Motivational factors - Low educational standards of managers - Political interference	- Sensitisation & re-training - Clarify roles & expected outputs - Motivate members - Demand high educational qualifications - Regular meetings
Declining water levels within the Doho Rice Scheme	- Out growers such as Lwola & Haji Naleba farms are diverting water upstream. - Lack of information on water needs of rice farmers along R. Manafwa - Little exposure of rice growers to water conservation techniques.	- A study of water requirements for rice farmers is needed - Government to support more research - Encourage farm tours and exposure to water conservation techniques
Lack of an effective association for rice farmers	- Mistrust among farmers - Weak local leadership - Ignorance of its importance - Prevalent poverty thus no funds	- Improve leadership in the area - Make appropriate bye-laws - Sensitize farmers and local leaders
Unreliable water supply in seasonal wetlands	- Low rainfall amount & poor distribution	- Adopt local irrigation technologies - Government intervention & developing partners
High costs of inputs and overall production	- High costs of inputs which are imported - Lack of local agents - Poor farming methods - Insufficient research on aspects of rice growing e.g. soils, varieties. - People cannot afford new seeds every season	- Have local stockists/agents - Technical advice on rice growing - Subsidies on inputs - Government to support research - Improved production for more money in households.
Lack of technical advice	- Few and poorly trained extension workers - Weak monitoring of technical staff - Poor attitudes/superiority complex	-Increase & retrain Technical staff -Motivate Technical staff

	- Poor facilitation/motivation of technical staff.	
Pests and Diseases	- Weak management of the scheme + Technical advice. - Poor agronomic practices e.g. no fallowing, use of some varieties season after season. - Varieties not disease & pest resistant. - Not following a uniform planting calendar.	- Research into resistant varieties. - Ensuring uniform calendar is followed.
Health problems that farmers face	- Overworking in the gardens - Lack of protective ware - Poor feeding - Lack of drugs in Health Centres and their unaffordability. - Poor sanitation facilities	- Purchase protective ware from stockists - Sensitisation - Government to avail drugs in Health Centres - Provide boreholes + facilities for disposal of wastes.
Poor yielding varieties	- Little research & dissemination of information to farmers - Use of same seeds every season Little exposure to other rice growers.	- Government to support more research - Make new seeds affordable - Encourage farm tours
Declining soil fertility	- No fallowing periods. - Farmers do not use fertilizers because they cannot afford them. - Poor farming techniques.	- Apply WID Guidelines on cultivation in seasonal wetlands - Judicious use of fertilizers - Encourage farmers to adopt the use of modern techniques

(c). Lack of technical advice

Is caused by inadequate technical staff, incompetent trained personnel, weak monitoring by government, poor transport facilitation for the extension workers and also a feeling of superiority over the farmers by the technical staff. To address these causes, it was suggested that enough extension workers need to be availed to the sub-county, frequent monitoring of the scheme activities is also necessary and, provision of transport facilities.

(d). Health problems

Which are caused by drinking dirty water while working in the fields, overworking, lack of protective wear and measures to prevent diseases, poor feeding and not enough health centres. Solutions suggested included the sensitization of the communities on health care, drilling of boreholes within the vicinity of the swamps, avail protective wear to the farmers and setting up enough health centres.

(e). High Costs of production

Are caused by rampant poverty in the households, low yields or production levels, high prices of inputs e.g. fertilizers and, lack of skilled extension staff to advice on how to do things. The production costs of many farmers, especially the out-growers or those in Nambaale are also pushed up because they have to rent the land. Solutions suggested included sensitization of farmers on poverty alleviation, lobbying for support from donors, soft loans, use of modern farming methods, research to study the soils in the area and government should be responsible for the sale of these inputs so that farmers receive them at a subsidized price.

(f). Lack of Organized Associations

It became evident from the discussions of the farmers that if a strong association existed, the problems of marketing, looking for donors, training, technical know-how and others would be solved. The lack of an association is caused by ignorance or lack of awareness among rice farmers, lack of funds and poor leadership in the area. In addition, it was also suggested that a major hindrance was mistrust among the people of the area. It was suggested that these problems could be solved by, sensitizing farmers and local leaders on the role of these associations. It was pointed out that local leaders should focus on development and not just politics. Government assistance is also required on this aspect. It was also suggested that local leaders should make byelaws and also sensitize people on the importance of farmers' associations.

(g). Pests and Diseases

Farmers noted an increase in the incidence of rice pests and diseases, which may be due to the development of resistance to the current pesticides, the continuous use of the same piece of land year in year out and the lack of technical advice. Other reasons suggested included such factors as poor soils, prolonged droughts and mono-cropping, which require solutions like use of fertilizers, pesticides and the need to learn crop rotation by the farmers.

(h). Health problems

As reported by the farmers within the Scheme, the health problems are associated with overworking, lack of protective wear and measures to prevent diseases, poor feeding and not enough health centres. Solutions suggested were to sensitize the communities on health

care, drilling of boreholes within the vicinity of the swamps, avail protective wear to the farmers and setting up enough health centres.

(i). Unreliable water supply

Is caused by decline in rainfall amounts, probably associated with forestation, change of weather and natural disasters. A possible solution to this problem is to ensure ways of conserving and controlling water flow, and to plant more trees (afforestation).

(j). Poor yielding varieties of rice

Is caused by lack of tours by farmers, lack of support from experts and lack of cheap high quality seed varieties. It was suggested that farmers should be exposed to other rice growing areas through tours and then sensitize them. Good quality seeds should be provided each year by the research institutes with the help of government subsidy.

(k) Marketing Practices of Rice Farmers

The marketing practices of rice farmers were also investigated (Table 7). It was found that market was not a major problem for farmers and about 60% of them sold processed rice. Their major complaint was the unreliability of electricity for rice hulling.

Nearly a third of the farmers sold their rice at the local markets such as Nabiganda Trading Centre within the Sub-county, while 52.9% sold it outside the Sub-county. Most of the farmers who sold their rice outside the Sub-county were from Nambaale parish. They sell their rice to buyers in Maluku, Mbale town because of its proximity and better markets. The study also revealed that most of the income from rice is used for family welfare.

Table 7: Marketing-Related Practices of Paddy Rice Farmers in Kachonga Sub-county

Practice	Category	Frequency	Percentage
Whether rice is sold raw	Yes	88	41.3
	No	125	58.7
Where sold	Farm level	38	17.9
	Local market	62	29.2
	Outside the Sub-county	112	52.9
How much is retained?	<0.25 of total harvest	168	92.3
	0.25-0.5	9	4.9
	>0.5	5	2.8
How much income is put back to rice growing?	Farm labour etc.	21	10.2
	Family welfare; land; bicycle etc	128	62.4
	School fees	45	22.0
	Others	11	5.4

4.7 Influence of Rice Growing on the Production of Other Food Crops

In order to assess influence of rice growing on food production, the indicators considered were land utilization patterns and food production acreage (Tables 8). One hundred and thirty of the respondents (59%) reported that rice growing had little or no impact on the production of other food crops by small-scale farmers (2 acres or less). However, for medium (3-5 acres) or large-scale farmers (>5acres), rice production appears to negatively impact on the acreage of other food crops. The major reason could be the increased labour demands that cannot easily be met by the family. Consequently, a lot of attention is diverted from the growing of other food crops to rice.

Table 8: Influence of Rice Growing on the Production of Other Food Crops in Kachonga Sub-County

Food crop	Non-Rice Growers (% Of farmers with various crop acreages)			Rice Growers (% Of farmers with various crop acreages)		
	<0.5 acres	0.5-1.0 acres	>1 acres	<0.5 acres	0.5-1.0 acres	>1 acres
Cassava	33.3	60	6.6	23.8	65.6	10.7
Maize	36.7	53.3	10	25.4	57.4	17.2
Potatoes	63.3	26.7	10	73.8	18.0	8.2
Millet	30.0	53.3	16.7	24.6	60.7	14.8
Beans	53.3	33.3	13.3	70.5	18.0	11.5
	N =30 farmers			N =122 farmers		

Another reason that can be advanced to explain the observation that rice growing for small-scale farmers has little impact on the production of other food crops could be the fact that paddy rice growing is confined to the wetlands, while other crops continue to be cultivated in upland areas.

The table shows that maize, millet and cassava had a larger acreage compared to other food crops among both rice growers and non-rice cultivators. Between 50 - 60% of both rice and non-rice farmers grew these crops on 0.5 - 1 acre of land. More farmers (60-66%) grew cassava than any other crop. The proportion of rice farmers who planted 0.5 – 1.0 acres of cassava, maize and millet was 65.5%, 57.4% and 60.7% respectively. The corresponding figures for non-rice growers were 60%, 53.3% and 53.3%.

The majority of farmers grew potatoes and beans on less than 0.5 acres. The proportion of rice farmers who planted less than 0.5 acres of potatoes and beans was 73.8% and 70.5%. The corresponding figures for non-rice growers were 63.3% and 53.3%.

From the findings, rice growing for small-scale farmers did not have any significant impact ($p>0.05$) on the acreage of other food crops. However, this is not true for medium and large-scale farmers because of the increased labour demands. It was also acknowledged by the farmers that in the 1980s when rice growing had just become popular in the area, people neglected the growing of other food crops leading to severe shortages.

4.8 Alternative Income-Generating Strategies and Action Plans of Farmers

4.8.1 Alternative Income-Generating Strategies

An investigation into what the local communities consider to be viable income-generating options to paddy rice growing in their order of importance, revealed the following: Alternative wetland use, Upland rice growing, fish farming, introduction of perennial crops such as coffee and soft loans or 'Entandikwa' for household projects.

Table 9: Farmers' Ranking of Alternative Income-Generating Activities

Rank	Income-generating option
1	Introduction of perennial crops such as coffee
2	Soft loans or 'Entandikwa' for household projects
3	Fish Farming
4	Upland rice growing
5	Alternative wetland use

(i) Introduction of perennial crops such as coffee

It was reported that cotton was less profitable compared to rice. However, a perennial cash crop such as coffee should be introduced to the area. Coffee is more profitable. However, the varieties to be introduced should be adapted to the local area conditions.

(ii) Loans or 'Entandikwa'

The local people interviewed were of the view that they should be given loans by government, with low interest rates to start income-generating activities. However, the 'Entandikwa' scheme was reported to have benefited only a few people. The

respondents complained about the high interest rates charged by the various micro-finance institutions.

(iii) Fish farming

The people also identified fish farming as a potential source of household incomes. They were of the view that it could also benefit the families because fish would provide a source of protein, particularly for the children.

(iv). Upland rice

The Focus Group Discussions revealed that trials for upland rice growing were done in the 1980s. However, the yields were low and the whole project abandoned. Some of the reasons given by the local people for the abandonment included the poor yielding varieties used, the low soil moisture levels in the area and the poor reception of the idea by the local communities. It was reported that even Upland rice requires a lot of water, particularly during the growth stage. Trials in Gulu, Bundibugyo and other areas of the country have revealed that Upland rice can yield as much as paddy rice (ADC, 2001; Ochollah *et al*., 1997).

(v) Wetland resources

It was established that some people were of the view that fish farming has a big potential in Kachonga. The only other major wetland resource that can potentially generate income was the harvest of papyrus reeds for making mats. However, only a handful of people harvest these reeds. Moreover, the harvest of reeds was associated with problems such as Bilharzia, eye infections, snake bites and, skin diseases. It was established that one could harvest reeds enough to produce 50 - 75 mats per season,

yielding 75,000 – 112,500= at a cost of 1,500=/mat. The mats are generally sold to the farmers in Mbale who need them for drying coffee. However, the income that would accrue from the sale of mats made out of palm trees in the wetlands would be greater than from papyrus reeds. The cost of these mats is 3,500 - 5,000 /=. The leaves can also be utilized for making baby cots and baskets, which cost between 5,000 and 7,500/=. In the near future however, it appears that wetland resources such as papyrus cannot replace rice growing as an income generator in Kachonga.

4.8.2 Action Plans of Rice Farmers within Doho Rice Scheme and in Outlying Wetlands

The study was action-based, and as such the local communities were encouraged to design interventions for the problems identified. The plans are summarized in Tables 10 and 11. Some of the suggestions are already being implemented such as the formation of associations. For instance, Nambaale Farmers Association was recently (January 2003) formed with Mr Koliabu Muniafu as its first Chairperson. Similarly farmers within the Doho Rice Scheme have re-invigorated their association. The old association executive committee has been disbanded. The new Chairman of the association is Dr.Mudusu. Through the association, farm tours and short courses have been organized for some rice farmers. Kilimanjaro Training Centre plans to train 90 rice farmers form the scheme.

In the design of these plans, farmers identified possible solutions, implementation strategies, the key actors, strengths and opportunities, and weaknesses and constraints. Time lines were set against each major activity, although some activities would be on-going (Table 10 and 11).

Table 10: Action Plan for Rice Farmers within the Doho Rice Scheme (2003-04)

Problem	Possible solution	Strategy	Time Line	Key Actors	Strengths/Opportunities	Weaknesses/Constraints
Weak Management	Strengthen management + form an Association	Call a general meeting Forward problems Demand elections Form a strong Association	30th April 2003	Association Local leaders MAAIF	Constitution providing for removal of committee Farmers want a change Association has been formed. Local structures	Difficult to remove O/C Sensitisation needed Political support needed
Water control/regulation	Desilting + Repair of irrigation channels	Project proposal from the Association. Repair excavator Initiate repairs on infrastructure	Work plan to be adopted in June 2003	Government/Local leadership Association	Farmers contribute irrigation fee Channels + farm roads exist Excavators exist	Expensive Not all parts are leveled Incompetent & few extension workers Diversion of funds Politicians not supportive
	Equitable sharing of water along R.Manafwa	A study should be instituted Involve local administration in resolving the problem	Work plan to be adopted in June 2004	Government/Local leadership Association NEMA	Willingness by out growers and farmers in DRS to find a common solution	Requires a lot of money & expertise in research

Poor farming methods	Make technical advice effective	Training Sensitisation Use of improved varieties Exchange visits	July 2003 (implementation begins)	Technical staff Association Local leaders	Farmers willing to learn Extension workers exist	Little modern farming skills/ knowledge Negative attitude of extension workers
Inputs	Effective & increased use of fertilisers and pesticides	Government subsidy Stockists Tax rice importers		MAAIF/Governm ent/ Association Management Committee	Farmers are willing Extension workers exist	No stockists Farmers are poor Not skilled in use of inputs Government policy of privatization
Health	Drugs to be stocked in Health Centres + Protective ware (increased use)	Health Education Stock drugs Stock protective ware		-Government -Local leadership -Private practitioners	There are many people who need medical attention	Farmers are poor People not educated on proper use of drugs -Private health providers very expensive

Table 11: Action Plan for Out-growers and Rice Farmers in the Nambaale Wetlands (2003-04)

Problem	Possible solution	Strategy	Time line	Key Actors	Strengths/Opportunities	Weaknesses/Constraints
Lack of a common voice	Formation of an Association	- Formulate bye laws - Meetings - Register the Association - Association to draw a work plan	June 2003	- Chairperson of Association - LCs/Chiefs - Parish mobilisers - Information secretary	- People are willing - Many people depend on rice - Association already formed	- Widespread poverty - Some people will discourage others from joining the Association
Dependence on rain	Irrigation system synchronize planting season	- Use R. Namatala - Design project proposal - Sensitise people on planting etc.	Workplan + Proposal from the Association	- Government - Donors - NGOs - Association - District leaders	- R. Namatala is permanent - Association already exists - Many farmers exist	- Ignorance + widespread poverty - Project is expensive
Poor farming methods/varieties	- Improve farming methods - Use of better varieties	- Technical advice Sensitization Demonstration Government subsidy - Co-ordinate with resident institutions	Association work plan	- Association - District officials - Government (MAAIF) - Local stockists	- Many extension workers - Willing farmers - Association exists - Resistance Institutions exist	- Widespread poverty - Negative attitude of workers
Rice Pests/Diseases	- Improve farming methods - Use of pesticides	- Technical advice Sensitization Demonstration	Association work plan	- Association - District officials - Government (MAAIF) - Local stockists	- Many extension workers - Willing farmers	- Widespread poverty - Negative attitude of workers

		- Government subsidy - Co-ordinate with resident institutions			- Association exists - Resistance Institutions exist	
Health problems	Improved medical services + protective ware	- Stock medical centres - Sensitise people subsidise the ware	Start in May 2003	Government local leaders Association	- Health Centre at Nakasanga exists - Protective ware easily accessible in Nabiganda TC.	- Widespread poverty - Government privatisation policy
High costs of inputs	Increased use of fertilizers + pesticides	- Avail technical advice - Sensitisation seminars - Demonstration - Stockists should be increased - Government subsidy		- Association - MAAIF - District leaders - Stockists	- Existence of many rice farmers - Ministry has extension staff	- Widespread poverty - Government privation policy
Few benefits to women	Women should also be allowed to control means of rice production	- Allocate some land to women - Sensitisation	April 2003	All rice growers NGOs LCs/Chiefs Association	-Emancipation policies of government -Structures to support women in place -Land Bill is being debated	Cultural norms and practices make this very difficult

4.9 Summary

This study has presented results, which indicate that rice is the major source of income for rural farmers living adjacent to wetlands in Kachonga sub-county. However, incomes from rice production are persistently low and their contribution to the welfare of families is increasingly becoming minimal. This trend is bound to continue unless strategies to increase yields and minimize costs of production are sought. This implies that rice production is likely to play a less important role in reducing household poverty in the area, unless production improves.

A study of production trends over the past few decades also indicates a steady decline of rice yields in the area. There is therefore need to improve the current production levels if rice is going to contribute towards poverty alleviation in the area. Farmers have to be assisted through provision of technical advice, high yielding varieties and water control technologies. However, increased rice production must be done in such a way as not to harm the fragile wetland ecosystem and in order to ensure sustainable wetland utilization. In addition, it may be necessary to introduce alternative high income generating perennial cash crops such as coffee and vanilla into the area. This would reduce the pressure on wetlands while allowing the local farmers to increase household incomes. However, a more urgent and serious problem has arisen as a result of water sharing between the rice growers within the Doho Rice Scheme and out growers upstream. The farmers within the scheme are likely to get less and less water with time, thereby further decreasing rice output. If the problem of water sharing is not solved soon, it is also likely to lead to conflicts between these farmers.

CHAPTER FIVE: GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this chapter is to bring together information from the major parts of the study, namely: rice yields and costs of production (Section 4.3), contribution of rice to household income (Section 4.4), rice production trends (Section 4.5), major factors constraining rice production (Section 4.6), impact of rice growing on the production of other food crops (Section 4.7) and alternative income generating strategies (Section 4.8). The chapter is divided into four sections: Introduction, General Discussion, Conclusions, and Recommendations.

5.2 General Discussion

Rice (Oryaza Sativa L.) is the world's most important food crop in terms of acreage and the number of people who depend on it (Ochollah *et al*. 1997; FAO, 1997). It is a staple food for 50% of the world's population and accounts for 20% of the world's calorie consumption (FAO, 1995). Rice is increasingly becoming important in the Eastern and Southern African region, of which Madagascar is the leading producer (ADC Report 2001; Alam *et al.* 1985; Asuzi-Kihupi, 1998). It is estimated that East African countries produce 503,137 metric tons annually, which is below the demand put at 625,795 metric tons. Tanzania, which produces 481,333 metric tons annually, is the leading producer in East Africa.

In Uganda, rice production has witnessed a steady rise since the 1970s (MAAIF, 2000; Ochollah *et al.*, 1997; MoFPED, 2000). It is estimated that rice acreage was 20,000 ha in

1980, 39,000 ha in 1990 and 72,000 ha in the year 2000. The proportional rice yield from this acreage was 27,000, 54,000 and 106,000 tons respectively (Bureau of Statistics Report, 2001). This upward trend in production has continued and it is currently estimated at 120,000 tons from 80,000 ha, placing it amongst the most widely grown food crops in the country (Anon 2003).

Several factors have been responsible for promoting rice production in Uganda. Firstly, in the 1970s, the Government encouraged paddy rice production through the establishment of commercial farms at Kibimba (Bugiri district), Olweny (Lira district) and Doho (Tororo district) under its "Double Production Strategy". These farms served as important demonstration gardens, which was not only responsible for providing technical advice, but also generated interest among farmers in the surrounding areas. Coombs and Ahmed (1975) have stressed that demonstration farms provoke interest by providing essential and new information. In addition, they promote the adoption of skills required by the local farmers. The Government of China provided the technical and financial support for the initial development of these farms.

Secondly, shortage of land in the densely populated districts of Eastern Uganda has forced people to cultivate swamp edges. These areas are suitable for paddy rice, cocoyams and other crops that have a high demand for water particularly during the vegetative stage of development. Thirdly, the rise is importance of rice growing has been attributed to rapid urbanization and the current decline in the production of food crops such as millet, cassava

and bananas. Consequently, the rising demand for food particularly in urban areas has caused rice production to surpass that of other traditional food crops (Anon 2002).

Lastly, rice as a crop is now an important source of income for rural households. In the districts of Bugiri, Pallisa and Tororo, it has long replaced cotton as the leading cash earner (MAAIF, 2000). The importance of rice as a source of income was highlighted by the responses of the people regarding reasons for its continued popularity in Kachonga Sub-county (Section 4.5). It was reported that rice still provides more earnings than any other crop in the area. The study has demonstrated that the farmers in Kachonga Sub-county consider rice growing as the most viable option for raising household incomes, and up to 80% of the households in the study area grew rice. Rice growing will therefore continue to be an important strategy for fighting household poverty in the area, until viable alternatives have been found.

The major contribution of income from rice was reported to be for the improvement of family welfare, which includes clothing, food and medication. A large proportion of rice farmers (29.4%) also claimed that the earnings from rice are used for paying their children's school fees. This finding demonstrates the importance of rice growing to general welfare of the people of Kachonga Sub-county. Although gender relations in rice production were not studied in detail, the study revealed that the majority of women had no access, control and ownership of land for rice production. A few of the women were allocated pieces of land by their husbands. Although women contribute towards rice production, the men were responsible for its marketing. Similar findings were reported in

studies conducted elsewhere in Uganda and other African countries e.g. Kakitahi (1993), Smith and Stevens (1987), Muriithi (1980). Kakitah (1993) found out that among the Bakiga of South Western Uganda, women do not traditionally own land and can only have access rights when married. Among the rice farmers of Kachonga, it was observed that a few women owned land, which they purchased by themselves. These were usually the working class women such as teachers. It is therefore essential to address the issue of women's access and control over land in order to improve production and family welfare.

Other issues to be addressed include child-labour, the rising incidence of *Schistosomiasis* and rice pests and diseases. Until the introduction of the Universal Primary Education (UPE), many children in rice growing areas did not attend school because they had to scare away bird pests. More recently, the Ministry of Gender, Labour and Social Development with the support of the International Labour Organization (ILO), embarked on a concerted effort to address the problem of child labour through sensitization seminars. These efforts have resulted in the decline of child labour in rice fields. The pressure needs to be maintained so that the local leaders are forced to enact appropriate byelaws to minimize the problem. However, it is important to carry out a comprehensive study of the impact of rice growing on enrollment and school dropout rates in Kachonga Sub-county.

A study on the rising incidence of *Schistosomiasis* is also needed. In particular, the relationship between disease incidence and the ecology of these wetlands needs to be understood. There are also reports of the rising infestation of such rice pests as leaf rollers, rice bugs, leafhoppers and caterpillars, and the incidence of Rice blast caused by the fungus

Pyricularia grisea (Cooke) are now common. Pests and diseases will reduce the rice yields of farmers. The incidence of these pests and diseases in upland rice has, been reported by Adipala *et al*. (1997), Wandulu *et al*. (1997) and Wandulu (1999). Unless patterns of infestation are understood, it will not be easy to design appropriate remedial action in order to ensure higher rice yields in Kachonga Sub-county.

The study has demonstrated that in spite of its growing importance as both a food and cash crop, rice production in Kachonga has continued to lag behind demand. Yields from farmers' fields have remained low, rarely exceeding 800 kg/acre as compared to yields in excess of 2000 kg/acre obtained in experimental trials and at the inception of the Doho Rice Scheme (Anon, 1975; MAAIF, 1980). Three major factors that influence rice yields in the area are the levels of soil fertility, use of the same rice cultivars season after season and the availability of water, particularly during the vegetative phase of plant growth. These findings are supported by studies conducted elsewhere in Africa and other parts of the world (e.g. Johnson *et al*., 1999; Audebert *et al*., 1999; Singh & Battacharjee, 1989; Wandulu *et al*., 1997).

Water availability was the main constraint facing rice farmers in the seasonal Nambaale wetlands, resulting in persistently lower yields (600 – 700 kg/acre) in comparison to those recorded in the Doho wetland and the outlying areas. The significance of water during the vegetative phase of rice growth has been demonstrated by reports of higher yields obtained during the first cropping season (April – August) as a result of the availability of more soil

moisture. Similar findings have been reported on yields of other crops planted during the long rains (first cropping season) (e.g. Oonyu, 1993; Ogenga-Latigo, 1990; Adipala, 1999).

The findings also revealed that the Doho wetlands have persistently been cultivated without any significant fallowing, probably resulting in the loss of much of the initial soil fertility that was responsible for the extremely high yields experienced in the area during the 1970s and 80s. The Ministry of Agriculture then reported yields higher than 1000 kg/acre (MAAIF, 1985). Consequently, lower yields are currently being registered by rice farmers within the Doho Rice Scheme compared to those in outlying areas. It will therefore be necessary for the rice farmers within the scheme to design sustainable soil improvement measures such as use of fertilizers in order to improve crop yields. Furthermore, the study also revealed that farmers in Kachonga use the same seed for planting season after season. It is widely known that yields of improved cultivars are dependent on use of fresh seeds at each new planting.

Rice production is a labour intensive activity and the costs of production in the area were found to be high thus reducing the net income to households. Inputs such as planting seeds, pesticides and fertilizers were found to be both expensive and unavailable to the majority of farmers. It was common to find farmers using the same planting seeds from the previous season. However, the major factors responsible for the high costs of production were labour and the cost of hiring land. Many farmers depend on hired land for rice growing.

The study established that while the gross incomes of rice farmers during the first cropping season ranged between 382,000 and 469,000/= per acre, the net incomes ranged between 96,000= and 237,000= per acre. The corresponding gross income during the second season ranged between 418,000/= and 460,000/=, while the net incomes ranged from 132,000/= to 229,000/=. Ochollah et al. (1997) found that when using a hand hoe, the gross margin in Ushs per acre of Upland rice in Gulu and Bundibugyo stood at 301,000 and 266,000 respectively. The net income was 175,600 and 147,100 Uganda Shillings respectively.
The figure obtained for Kachonga compares favourably with the findings in Gulu and Bundibugyo. It also compares well with the net income for rice growers in many parts of Uganda being about 180,000/= per acre (Agricultural Secretatriat, Bank of Uganda, 1993). The findings imply that rice production costs in Kachonga are high. Since most of farmer holdings were no more than 0.25 acres, it implies that available household incomes of farmers are extremely low. This would have been more evident to the rural farmers if they were costing their labour and using fertilizers.

Reduction of rice yield is also being experienced during milling. The study revealed that unreliable power supply results in poor milling yields. Further losses result from large quantities of broken grain. Besides rice flour, other by-products such as husks have tended to form huge piles around milling centers. Studies undertaken in various parts of the country (e.g. ADC 2001) have revealed similar findings about milling yields in Uganda. On average, these yields are only 55% of dry threshed rice, and the amount of broken rice can be as high as 50% of the total grain mill yield. Besides, the rice milling by-products such as bran, rice flour and husks were not utilized. Currently, huge piles of rice husks

are found in milling centers. These husks could be used to make charcoal briquettes, and for mulching or in the growing of mushrooms.

The study has demonstrated that paddy rice growing in Kachonga Sub-county has continued to decline from 20-30 bags/acre (1200-1800 kg/acre) in the 1980s (Anon. 1980) to the current 600-800 kg/acre. The sharpest decline was recorded amongst rice growers in outlying Nambaale swamps. This decline is largely because farmers from Nambaale depend on rainfed agriculture. Under rainfed conditions, rice yield is greatly influenced by the amount of available water particularly during the vegetative phase of rice growth. At this stage of crop development, the longer the field remains saturated, submerged or flooded, the greater the chances of obtaining higher paddy yields. If on the other hand, under poor or no water control, most fields remain dry for prolonged periods after planting, this will result in poor yields. Rice farmers in Nambaale need to be assisted with simple irrigation technologies so that they can access water from the nearby more permanent River Namatala. In Nigeria, simple technologies have proved effective in improving rice outputs of small-scale farmers (Fashola *et al*., 2001).

Declining yields amongst rice farmers within the Doho scheme or in outlying areas is largely due to weak management which has resulted in the neglect of the infrastructure such as maintenance and repair of water channels, de-silting, enforcement of timely planting and the provision of critical inputs. The study showed that as a result of the inability of management of Doho Rice Scheme to enforce a synchorised cropping calendar, it is not uncommon to find one farmer planting rice while the next farmer is weeding, in

spite of their differing water requirements. Other factors that have adversely affected rice yields include use of low yielding varieties or farmer's inability to purchase fresh seeds for planting during the new season, poor agronomic practices and lack of technical advice. It was noted that the four Agricultural Officers deployed at Doho Rice Scheme, were too few for the effective education and training of over 2000 farmers within the Scheme alone.

An interesting observation was that the rice yields of out-growers were higher than for farmers within the scheme. There are two possible explanations for this observation. First, the soils in the farms of out-growers are relatively more fertile than those within the Scheme, which have been continuously cultivated over the past three decades. Secondly, many out-growers have organized themselves more effectively into associations than the farmers within the scheme. Consequently, they can hire Technical Staff to provide advice and training when needed. Thirdly, farms of out growers get more water than those within the Doho Rice Scheme because they are further upstream. Out growers therefore divert much of the water that would otherwise reach the farmers within the scheme. This problem needs to be solved urgently so as to reduce the likelihood of conflicts and social upheaval occurring in the area. It is thus important to institute a study to comprehensively assess the water needs of various communities along River Manafwa.

The implication of declining rice yields is two fold. First, rice growing in Kachonga Sub-county, is becoming less profitable than in the past. In fact, the costs of production in many instances are equal to or more than the rice earnings. However, most farmers do not cost of family labour in rice production, resulting in the false impression that it is profitable.

As a strategy for generating income therefore, rice growing in the area will become less and less important unless rice yields increase in the near future. In fact, the major beneficiaries of rice growing are the middlemen and women who buy rice at 500 – 600/=/kg and sell it at 800/= in urban areas such as Kampala. Their gross earning per acre (13 bags or 800 kg) including transport costs is 160,000 – 240,000/=. If the rice farmers in the area were organized into a strong association, it would be possible for them to increase their profit margin by eliminating the middlemen and women.

Secondly, declining rice yields usually have the effect of encouraging farmers to continuously cultivate the crop leaving little room for the soil to recover lost nutrients. In addition, it encourages them to expand acreage because of the belief that bigger acreage means higher yields. Continuous cultivation and other poor agronomic practices have been reported as major factors that predispose wetlands to destruction and even loss (Oonyu, 2001). It is reported that in Iganga and Pallisa districts, 60% of the seasonal wetlands have been lost mainly due to rice growing (MoNR, 1996).

Although the Wetlands Inspection Division (WID) has produced guidelines for small-holder paddy rice cultivation in seasonal wetlands (WID, 2002), these are not being adhered to in Kachonga Sub-county. For instance, it is recommended that 2 – 5 years of rice production should be alternated with 2 – 3 years of fallow. A major impediment to fallowing is the growing pressure on land by the rapidly rising population. For instance, there are about 3000 farmers within the Doho Rice Scheme alone, and many more in outlying wetlands. Under the circumstances, it would be critical for rice farmers to be assisted with technical advice on how best to use fertilizers following guidelines laid down

by the WID and MAAIF. Whereas use of fertilizers could improve soil fertility, this must be done judiciously in wetlands because there is a real possibility of polluting water in springs and rivers.

In addition, guidelines for drainage and channel construction have been provided by WID in order to minimize loss of water supplies in springs and to avoid the occurrence of flash floods. Although the use of wetlands for agriculture should not be prohibited, it is critically important for the practice to be done in a sustainable manner as it could adversely affect other vital functions of wetlands. It is therefore, important that farmers are knowledgeable about the best practices for paddy rice cultivation, particularly in seasonal wetlands. This in turn depends on the capacity of Extension staff and local leaders to interpret these guidelines and to enact appropriate byelaws in accordance with the provisions of the Local Government Act (1997). Unless this is done, the sustainability of paddy rice cultivation in Kachonga Sub-county is doubtful (ADC Report 2001).

In spite of its importance as both a cash and food crop, there is growing concern that the crop being labour intensive could divert labour from the traditional food crops and hence, cause a negative impact on food production. This study, however, found out that paddy rice cultivation had no impact on the production of other food crops by small-scale farmers. This is because rice growing remains confined to wetlands, leaving upland areas for the cultivation of food crops such as cassava, millet, maize, sweet potatoes and beans. Secondly, the farmers usually own an average of 0.25 acres each. Thus the labour that is usually required for rice growing on such a small acreage can be, adequately provided by

the family. The occasional food shortages experienced in the area can be attributed to the occurrence of prolonged drought due to over dependence on rainfed agriculture.

The study also found that paddy rice growing remains a popular agricultural activity of the local communities in Kachonga Sub-county, and is the main source of household income for the majority of rural farmers living adjacent to the wetlands in Kachonga sub-county. This is perhaps due to the following factors. First, there are no alternative high income generating perennial cash crops such as Clonal coffee and Vanilla in the area. Secondly, cotton production remains unattractive due to the low prices it fetches and high labour intensity associated with its production. Thirdly, the increasing land shortage in the area has forced farmers to grow rice in the swamps while attempting to leave upland areas for the cultivation of other crops. Fourthly, rice has a ready market in urban areas and has a favourable attribute of combining cash-earning and being a food crop.

Fifthly, despite constant calls for upland rice growing, few studies have been conducted on its feasibility (Ochollah *et al.*, 1997; Adipala *et al.*, 1997; Wandulu *et al.*, 1997; ADC, 2001). Although trials have shown that upland rice growing can result in yields as high as 2000/ha, few farmers have picked on it. This is partly because contrary to the popular belief, upland rice yields are sensitive to water shortages as well, particularly during the vegetative phase of growth. Hence, it is necessary to synchronize planting dates with the periods of water availability. This has so far eluded many rice farmers and consequently results in poorer yields in comparison to paddy crops. Lastly, alternative wetland resources such as papyrus reeds fetch comparatively low returns. Moreover, the difficulty associated with its harvest, makes this activity restricted to a few people.

Given all these factors, therefore, paddy rice growing will continue to be popular in Kachonga Sub-county. The alternative income generating activities suggested by the farmers included crops like coffee, and interest free loans for supporting activities that would generate income. The strategy of alleviating poverty in the area remains improvement of rice yields and ensuring sustainable wetland utilization. The Scheme needs to be urgently rehabilitated by Government and/or development partners since local farmers do not have the large financial resources needed to do so. A water sharing mechanism must be worked out so that farmers upstream do not disadvantage those lower down the river.

The major contribution of this study has been in showing how paddy rice growing in Kachonga Sub-county continues to be important for income generation despite the declining yields and a possible adverse impact on the wetlands. Efforts must therefore be made by all stakeholders to improve crop yields and ensure the sustainable utilization of the wetlands.

5.3 Conclusions

1. The study has demonstrated that incomes from rice growing for the different categories of farmers are generally low and average net income for farmers within the Doho Rice Scheme was consistently higher than for either the out growers or the Nambaale farmers. This is largely due to the comparatively lower costs of production within the Scheme and the dependence of farmers within Nambaale on rain fed agriculture.

2. Most of the income from rice farming is used for the welfare of families, mainly for the purchase of drugs, other food items and clothing.

3. The study also showed that rice yields have steadily declined amongst all the various categories of farmers, but the sharpest decline has been recorded among farmers in the outlying wetland of Nambaale. Paddy rice growing continues to be an important income-generating strategy for farmers in Kachonga. But as a result of declining yields, there is a proportionate decline in the incomes of the various categories of rice farmers. It is therefore possible that rice growing, as a strategy for income generation amongst farmers will become less important unless profitability improves. There is therefore need to design ways of increasing rice production and minimizing the costs of production.

4. The major factors that appear to be responsible for the declining rice yields are the declining soil fertility, poor agronomic practices and the inability to effectively control water. The latter is due to the weak administration in the scheme or dependence on rain fed agriculture in wetlands outside the scheme. However, there is an urgent problem that has arisen over water sharing along River Manafwa. The out growers upstream are diverting much of the water that would otherwise reach the Doho Rice Scheme, and this is contributing to declining rice yields within the scheme.

5. Paddy rice growing by small-scale farmers (2 acres or less) in Kachonga sub-county does not adversely affect the production of other crops, which are cultivated in upland areas. However, the opposite is true for medium (3-5 acres) and large-scale farmers (> 5 acres) who rely on family labour. It was found that when rice growing had reached its peak in the 1980s and 90s, the area used to experience food shortages due to the diversion of family labour from the production of staple food crops to rice cultivation.

6. Other alternative income-generating strategies for paddy rice farmers are at the moment, not viable options to paddy rice growing. Moreover, the reasons for the continued popularity of paddy rice growing are many.

5.4 Recommendations

Based on conclusions of the study, the following recommendations were drawn in order to ensure that paddy rice growing continues to be an important income generating strategy for the people of Kachonga. These recommendations are presented in four clusters (i – iv) below for the convenience of readers.

(i) Rice growing as an income-generating strategy

(a) Due to the central role paddy rice growing plays in household incomes of the farmers in the area, they should be assisted to improve yields and minimize production costs by adopting recommendations in (ii) below.

(b) In addition, diversification of income sources such as through fish farming and the introduction of alternative crops such as coffee should be encouraged. This will

reduce dependence on paddy rice growing and thus lessen the pressure currently being exerted on wetlands in the area. In particular more attractive options to paddy rice growing should be sought.

(c) The farmers should be taught basic skills in the use of rice husks for mulching, mushroom growing and the making of charcoal briquettes so as to utilize the huge piles of rice husks around milling centers. These activities would also diversify income-generating sources.

(d) Research into upland rice growing should be intensified and the crop popularized in the area. The farmers also need to be sensitized and trained on the best agronomic practices for the growing of upland rice.

(ii) Rice Production

It is recommended that in order to improve rice yields,

(a) Government together with development partners needs to rehabilitate the Doho Rice Scheme, which fell into a state of disrepair in the 1980s and 90s. The local communities are unable to inject the large amount of capital needed for this venture. After the rehabilitation, the communities who heavily rely on it should institute measures to ensure proper maintenance.

(b) Rice farmers along R.Manafwa must be assisted to ensure equitable access to water resources. This will ensure increased rice production even in the lower plains.

(c) Soil fertility should be improved through careful and controlled use of fertilizers and, fallowing.

(d) Farmers should be assisted to purchase new seeds for planting each season through subsidies by the association or local government.

(e) Guidelines prepared by WID should be translated into the local language understood by the paddy rice farmers of the area. In addition, byelaws should be made by local leaders in order to ensure their enforcement.

(f) The Extension Staff should be increased and made more effective by formulating clear expected outputs to the rice farmers.

(g) The management of the Doho Rice Scheme should be strengthened in order to ensure that the existing infrastructure is repaired and maintained, and new ones constructed. In particular the management of water and to ensure that all farmers abide by a uniform calendar should be the immediate focus.

(h) The paddy rice growers of Nambaale who rely on a seasonal stream should be assisted to design a simple water control system to ensure water availability when needed. Private developers, NGOs or Government should be encouraged to undertake this venture on terms to be agreed upon with local communities.

(i) An association or associations of rice growers should be formed immediately so as to ensure that problems of rice production are collectively solved and to mobilise the necessary human and financial resources.

(iii) Impact on the Production of Other Food Crops

(a) In order to ensure that paddy rice growing has no significant impact on the production of other food crops, byelaws should be enacted and enforced to ensure minimum food security for all the people in the area.

(b) In addition, sensitization should be done to ensure greater appreciation of the need to continue growing the traditional food crops, especially those that are drought resistant.

(c) In order to reduce the pressure for land, the local people should be encouraged to practice intercropping and other techniques for increasing soil productivity.

(iv). Recommendations for Further Research

1. A major study to establish the water needs of rice growers along R. Manafwa needs to be urgently conducted. Currently, the farmers upstream are diverting much of the water to their farms, leaving those in the lower parts with less water. It is also necessary to understand the impact of various human activities in Mbale dictrict, where the river originates from on volume and other water properties.
2. A major study that addresses the sustainability of paddy rice growing in the area is also needed. The study should address the ecological impact of the current agricultural activities of farmers on the Kachonga Sub-county wetlands.
3. A study is also needed to establish the training needs of local leaders in the interpretation and enforcement of various provisions that govern wetland use within the Local Government Act of 1997.
4. It will be essential to undertake studies on factors that have hindered the implementation of various policies such as PMA and PEAP in rural settings such as Kachonga Sub-county.
5. A study is also needed on the impact of paddy rice cultivation on the health of farmers. In particular, the rising incidence of Schistosomiasis should be

investigated. Furthermore, it is necessary to assess the impact of rice growing on the attendance and attrition of primary school children in the area.

6. Lastly a study on the incidence of rice pests and diseases is needed as a casual survey indicates a rise. In particular, the relationship between incidence and the various agronomic practices of the farmers need a detailed study.

REFERENCES

ANONYMOUS. (1975). *Unpublished Rice Production Statistics, Doho Rice Scheme*. (Doho Rice Scheme, Tororo district, Uganda).

ANONYMOUS. (1976). *Pest Control in Rice: Pest Articles and News Summaries, Manual 3*. (Centre for Overseas Pest Research, London, UK).

ADIPALA, E; KAMWEZI, P & OGENGA-LATIGO, M.W. (1997). Influence of Time of Planting and Spacing on Development of Leaf Blast on Upland Rice. *African Journal of Plant Protection, (7): 95-101*.

AGRIBUSINESS DEVELOPMENT CENTRE (ADC). (2001). Upland Rice Production and Marketing Feasibility Study. (Agribusiness Development Centre Publications: Kampala, Uganda).

AUDEBERT, A; BECKER,M & JOHNSON, D (1999). Differential response of rice to hydrological conditions and agronomic management. *Proceedings of African Crop Science Conference, (4): 107-111*.

BURGESS, R. G. (Ed.). 1989. *The Ethics of Educational Research.* (Falmer Press, London).

COOMBS, P. H. and AHMED, M. (1975). *Attacking Rural Poverty: How Can Non-Formal Education Help?* (Baltimore: The Johns Hopkins University Press).

De DATTA, S. K. (1981). Principles and Practices of Rice Production. (Publications, Bombay, India).

ECAAT, J. (1991). *Sustainable Production of Fish, with Particular Reference to the Doho Swamps*. (Unpublished M. Sc. Thesis, Makerere University).

EGO, L. (2001). *Influence of Time of Planting and Planting Density on Growth and Yield of Upland Rice in Uganda*. (Unpublished M.Sc. Thesis, Makerere University).

FAGADE, S.O & De data, S.K (1991). Leaf area index, tillering capacity, and grain yield of Tropical rice as affected by plant density and nitrogen level. *Agronomy Journal* (3) 503-506.

FAO. (1995). *FAO Production Year Book, Volume 48*. (FAO Publications: Rome).

GIMONO, W and BARTON, T. (1994). *Equity and Vulnerability: A Situational Analysis of Women, Adolescents and Children in Uganda.* (Uganda National Council of Children, Kampala, Uganda).

GALL, M. D; BORG, W. R AND GALL, J. P. (1996). *Educational Research: An Introduction.* (Longmans. New York).

GLADWIN, C.H; STAUDT, K.A; & MACMILLAN, D.E. (1987). Providing Africa's Women Farmers Access. *Journal of Peasant Studies (19)1: 93-118*.

GOSH, A & SHARMA,A.R. (1997). Effect of seed rate, seed density and nitrogen fertilizer on performance of flood prone lowland rice. *IRRI Newsletter, (22) 37-38*.

GOVERNMENT OF UGANDA. (1967). *Atlas of Uganda*. (Government Printers, Entebbe, Uganda).

GOVERNMENT OF UGANDA. (1998). *Background to the Budget*. (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

GOVERNMENT OF UGANDA. (1991). *Population and Housing Census*. (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

GOVERNMENT OF UGANDA. (1999). *Vision 2025: A Strategic Framework for National Development, Volume I*. (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

GOVERNMENT OF UGANDA. (2000). *Vision 2025: A Strategic Framework for National Development, Volume II*. (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

GOVERNMENT OF UGANDA. (2000). *Background to the Budget.* (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

GOVERNMENT OF UGANDA. (2001). *Background to the Budget.* (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

GOVERNMENT OF UGANDA. (2002). *Uganda Population and Housing Census*. (Uganda Bureau of Statistics, Ministry of Finance, Planning and Economic Development: Kampala, Uganda).

GRIST, D. H. (1975). *Rice*. (LongmanS, London, The United Kingdom)

GUMONYE-MAFABI, P. (1989). *Ecology and Status of the Grey Crowned Crane (Balearica regulorum gibbericeps Reich) in Uganda*. Unpublished M. Sc. Thesis, Makerere University.

HYUHA, T. S. (1997). Impact of Vanilla Production on Food Security and Socio-economic Welfare of Gender Groups in Mukono District, Uganda. *Proceedings of African Crop Science Conference, (3): 1401-1406.*

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA). (1990). *Annual Report on Rice Research*. (IITA Publications, London).

JOHNSON, D.E;JONES,M.P; DALTON, T & DINGKUHN,M. (1999). Rice plant types for areas of low input management in West Africa. *Proceedings of the 19th Session of International Rice Commission, 7-9 Sep.1998, Cairo*. (FAO: Rome, Italy).

KAKITAHI, M. B. (1993). *Gebder Relations in Agricultural Production in Bubare Sub-county, Kibale District*. (Unpublished M. A. Thesis, Makerere University).

LANGDALE-BROWN, I. 1960. The Vegetation of Uganda (excluding Karamoja). *Memoirs of the Research Division, Series 2, No. 6.* (Department of Agriculture, Entebbe, Uganda).

LANGDALE-BROWN, I., OSMASTON, H. A. & WILSON, J. G. 1964. *The Vegetation of Uganda and Its Bearing on Land Use*. (Entebbe, Uganda: Government Printer).

LUZI-KIHUPI, A. (1998). Inter-relationship Between Yield and Some Selected Agronomic Characteristics in Rice. *African Crop Science Journal, (6) 3: 323-328.*

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES (MAAIF) and MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT, (MoFPED). (2002). Plan for Modernisation of Agriculture. (MAAIF/MFPED: Kampala, Uganda).

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES (MAAIF). (2001). *Agicultural Production Statistics.* (Ministry of Agriculture, Animal Industry and Fisheries: Kampala, Uganda).

MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT, MoFPED. (1995). *Uganda's Food Strategy and Action Plan.* (Export Policy Analysis Unit, Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT, MoFPED. (1996). *Uganda National Household Survey: 3rd Monitoring Survey, Volume I, Crop Survey Module.* (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT, MoFPED. (2000). *Uganda Poverty Profile: What do We Know About the Poor? Discussion Paper 3*. (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT, MoFPED. (2001). *Poverty Indicators in Uganda: Discussion Paper 4*. (Ministry of Finance, Planning and Economic Development, Kampala, Uganda).

MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT, MoFPED. (2001). *Poverty Eradication Action Plan (2001-2003), Volume I & II*. (Ministry of Natural Resources, Kampala, Uganda).

MINISTRY OF NATURAL RESOURCES, MoNR. (1996). *The National Wetlands Conservation and Management Program: Wetland Status Report for Pallisa*. (Ministry of Natural Resources, Kampala, Uganda).

MINISTRY OF NATURAL RESOURCES, MoNR. (1998). *State of Environment Report for Uganda.* (Ministry of Natural Resources, Kampala, Uganda).

MINISTRY OF WATER, LANDS AND ENVIRONMENT, MoWLE. (1992). *Environmental Impact Assessment of Olweny Swamp Rice Irrigation Project.* (Ministry of Water, Lands and Environment: Kampala, Uganda).

MURIITHI, C.N. (1980). The Role of Women in Small-scale Farm Production in Kenya. *Proceedings of a Seminar on Women in Agricultural Production in Eastern and Southern Africa.* (Report to the Ford Foundation, Nairobi, Kenya).

OCHOLLAH, A.R ; OGENGA-LATIGO, M.W & NSUGUGA, E.N.B. (1997). Impact of Upland Rice Cultivation on Crop Choice and Income of Farmers in Gulu and Bundibugyo Districts. *Proceedings of African Crop Science Conference, (3): 1407-1411*.

OGENGA-LATIGO, MW. And KHAEMBA,M.B. (1986). Influence of Soil Moisture and Fertility on Attack of Phaseolus vulgaris by Aphis fabae Scop. In Kenya. *Ken. J. of Sc. and Tech. 7(1): 39-44*

OONYU, J. C. (1993). *Influence of Time of Planting and Insecticide Soil Treatments on Common Bean (Phaseolus vulgaris) Infestation by the Bean Aphid (Aphis fabae) and Beanfly Maggot (Ophiomyia phaseoli.Tryon)* (Unpublished M.Sc. Thesis, Makerere University).

PURSEGLOVE, J. W. (1988). *Tropical Crops: Monocotyledons*. (Longman and English Langauge Book Society, London, UK)

SINGH, K.N. & BHATTACHARJEE, A.H.C. (1989). *Direct Seeded Rice Principles and Practices*. (Oxford & IBH Publishing Company: Janpath, New Dehli).

SMITH, C.D & STEVENS, P. (1987). Farming and Income Generation in the Female-headed Households: The Case of Haya Village in Tanzania. *Canadian Journal of African Studies (3)2: 552-566*.

SHUKLA, V.K & SHRIVASTAVA, S.K. (1995). Effects of planting geometry, weed management and nitrogen levels on morphological growth patterns of rice. *Oryaza. (32) 254-257*.

TERRY, A.T; MALTON, P.J & ADESINA,A.A. (1994). Enhancing Productivity in the Agricultural Sector: The Case of Rice in Sub-Saharan Africa. (WARDA, Bouake, Cote d' Ivoire)

TOTHILL, J. D. (1940). *Agriculture in Uganda*. (Oxford University Press, London, UK).

UNITED NATIONS DEVELOPMENT PROGRAM. UNDP (1997). *Uganda: Human Development Report.* (UNDP Publications, Kampala, Uganda).

UGANDA BUREAU OF STATISTICS. (2001). *Agicultural Production Statistics.* (Uganda Bureau of Statistics, Ministry of Planning and Economic Development: Kampala, Uganda).

WANDULU, J. A. (1999). *Pest Status and Relative Infestation of Some Upland Rice Cultivars by Major Pests in Uganda*. (Unpublished M.Sc. Thesis, Makerere University).

WANDULU, J.A; OGENGA-LATIGO, M.W & KYAMMANYWA, S. (1997). Effect of Plant Density and Planting Time on Pest Incidence and Damage of Upland Rice. *Proceedings of African Crop Science Conference, (3): 1183-1189*.

WETLANDS INSPECTION DIVISION (WID). (1999). *Report on the Status of Wetlands in Uganda*. (Ministry of Lands, Water and Environment, Kampala, Uganda).

WETLANDS INSPECTION DIVISION (WID). (2001). *Guidelines for Smallholder Paddy Rice Cultivation in Seasonal Wetlands*. (Ministry of Lands, Water and Environment, Kampala, Uganda).

APPENDIX 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

		Frequency	Percentage
Farmer category	Scheme	53	22.3
	Out-grower	23	9.7
	Outlying	162	68.1
Age	<20 years	5	2.1
	20-30 years	60	25.2
	30-40 years	90	37.8
	>40 years	83	34.9
Sex	Male	213	89.5
	Female	25	10.5
Occupation	None/Farmer	187	78.6
	Teacher	26	10.6
	Business	12	5.0
	Other	13	5.5
Education	None	43	18.1
	Primary	120	50.4
	Secondary	46	19.3
	Tertiary	29	12.2
Household size	1-3 people	40	16.8
	4-6 people	84	35.3
	7-9	63	26.5
	>9 people	51	21.4
Leadership	None	152	63.9
	LC/Chief	77	32.4
	Other	9	3.8

APPENDIX II: RICE GROWING AS AN INCOME-GENERATING STRATEGY OF THE LOCAL COMMUNITIES IN KACHONGA SUB-COUNTY

Questionnaire Number ----------

A: BACKGROUND INFORMATION

1. Parish ----------
2. Village ----------
3. Village Code ----------

4. Category of farmer i) Scheme ii) Out-grower iii) Outside scheme.

5. Occupation i) None ii) Teacher iii) Shop owner iv) Any other (Specify) ----------

6. Sex (i) Male ii) Female.

7. Age (yrs) i) <20 ii) 20-30 iii) 30-40 iv) >40.

8. Local leadership role i) None ii) LC iii) Chief Iv) Any other (Specify) ----------

9. Educational attainment i) None ii) Primary iii) Secondary iv) Tertiary.

10. Household Size i) 1-3 people ii) 4-6 people iii) 7-9 people iv) >9 people

B. INCOMES OF VARIOUS CATEGORIES OF RICE GROWERS

12. How long have you cultivated rice? i) 1-3 yrs
    ii) 4-6 yrs iii) 7-9 yrs iv) >9 yrs
13. How many times do you grow rice per year? i) Once/year
    ii) Twice/year (iii) Thrice/year (iv) Any Other (Specify)
14. What is the average yield per season? i) 1- 4 bags/ha
    ii) 5 - 8 bags/ha iii) 9 – 12 bags/ha iv) >12 bags/ha
15. Which variety do you usually plant? ----------
16. Why do you prefer that variety? i) High yielding ii) Fast growing
    iii) Disease resistant iv) Any Other (Specify) ----------
17. For the rice grown in the recent past, indicate amount produced, amount sold and the market price at the time.

Table 1. Table showing income from rice growing during the year 2001/2.

	2002			2001		
Season	Amount Produced	Amount sold (Bags)	Unit/Total value (Ush)	Amount Produced	Amount sold (Bags)	Unit/Total value (Ush)
One						
Two						

18. Is the rice sold raw or processed? i) Yes ii) No

19. Where is it sold? (i) At farm level to a trader ii) At the local market
    iii) In a market outside the sub-county iv) Any other (Specify) ------
    ----
20. How do the 2001/2 prices compare to those of earlier years? (i) They are lower ii) They are higher iii) They are about the same iv) I do not know.
21. Estimate the cost of labor you put in to produce the rice in the table below.

Table 2. Table showing activities and time spent (man-hours) to produce rice.

Activity		Time (man-hrs)	Cost (U Sh)	Any Comments
1. Seed bed				
2. Field preparation.	1st digging			
	2nd digging			
	3rd digging			
3. Planting				
4. Weeding	1st weeding			
	2nd weeding			
5.Bird scaring	1 Month			
6. Harvesting				
7. Drying				
8. Threshing				
9. Any other (specify)				

C: COMPARISON OF INCOME FROM RICE TO THAT FROM OTHER WETLAND RESOURCES

22. What other resources do you harvest from the wetland besides rice growing? (List them in the table below either by ticking those provided or writing your own in the space provided).

Table 3. Table showing other resources harvested from wetlands.

Resource	Tick	Amount/ month or season	For sale	Amount sold	Unit/Total cost (Ush)	Where sold
Fish						
Clay						
Papyrus						
Firewood						

Grass						
Sand						
Reeds						

23. How do these prices compare with those of the previous year? (i) They are lower ii) They are higher iii) They are about the same iv) I do not know.

24. Estimate the labor cost you put in harvesting and preparing these resources for sale in the table below.

Table 4. Table showing activity and time spent (man-hours) in processing the resources.

Resource	Activity	Time (man-hrs)	Cost (U sh)	Yield / Ha.	Price sold.

D: IMPACT OF RICE GROWING ON PRODUCTION OF FOOD CROPS

25. What do you do with the rice harvested?

i) Use/sell part of it for food ii) Sell all of it.

26. If you do not sell all, what proportion of the rice harvest do you retain for food?

i) Less than a quarter ii) About one quarter

iii) About half iv) About three quarters.

27. If you sell your rice, what do you do with the money?

i) Use it to prepare the gardens ii) For buying household items

iii) For buying other kinds of foods iv) Bank it.

28. Besides rice, which other food crops do you grow? List in the table provided below, and include the approximate acreage for them.

Table 5. Table showing production level for other food crops grown.

Food crop	Acreage	Yield/Ha	Amount sold	Unit/Total cost

29. How much of the harvest of the previous season did you store? Fill your answer in the table below.

Table 6. Table showing amount of food crop stored during the previous harvest

Food crop	Quantity stored	Mode of storage	Approx. loss	Major causes of losses

30. How much time and resources do you put into the growing of these food crops? Fill your answers in the table below.

Table 7. Table showing activities and the cost of production (Man-hours) of the various food crops.

Food crop	Activity	Time (man-hrs)	Inputs e.g fertilizers	Total Cost U. Sh

31. Have you experienced any food shortage in the past two years?

    i) Yes ii) No

32. If yes, when? Specify _____

33. How did you overcome the shortage?

    a. ----------
    b. ----------
    c. ----------
    d. ----------

34. What strategies do you intend to put in place to prevent any future occurrence of food shortage?

    a. ----------
    b. ----------
    c. ----------
    d. ----------

35. In your opinion, do you think rice growing has impacted on food availability/food security in this area?

    i) Yes ii) No

36. If yes, how?

E: VIABLE OPTIONS FOR POVERTY REDUCTION

37. What is your assessment of the level of poverty in households that grow rice in this area?

(i) Low (ii) Moderately high (iii) High

38. How does it compare with other households that do not grow rice?

(i) It is lower (ii) It is about the same (iii) It is higher

39. What are the major causes of this poverty? Rank your answer in order of importance, beginning with the most important.

(i) ----------

(ii) ----------

(iii) ----------

40. What suggestions can you make in order to reduce household poverty?

i) ----------

ii) ----------

iii) ----------

iv) ----------

ADDITIONAL COMMENTS

THANK YOU FOR YOUR CO-OPERATION

APPENDIX III: FOCUS GROUPS

A. NAMPOLOGOMA PARISH

Out-growers

1. Mrs Were Sarah: Namusita Village
2. Nasamba Muhamadi: Namunasa Village
3. Hadija Hanziri: Namunasa Village
4. Mugaba Yahaya: Kyadongo A Village
5. Hisejere David: Dohoro-Hibira Village
6. Mukadenghe Yakubu: Kyadongo B Village

Within the Scheme

1. Hiisa Isaac: Nampologoma Village
2. Magololo: Mawanga Village
3. Wasima David: Muhula-Kagondo Village
4. Mugido Ibahim: Namunasa Village
5. Sundya Sulaiman: Kyadongo A Village

Other Wetland Resource-Users

1. Tegu Yeku: Mawanga Village
2. Guloba Edirisa: Namusita Village
3. Sisye Moses: Mawanga Village
4. Tavuga John: Muhula-Kagondo Village
5. Mugwe Nathan: Muhula-Kagondo Village
6. Kanane LCI Chairman: Namisita Village

Landlords

1. Hifude Abdu Kadir
2. Sagula Robert
3. Koire Maliki

Research Assitants

1. Muyagu Benedict
2. Ms. Nabuhalya Catherine

NAMBAALE PARISH

1. Mrs Esther Wephukulu
2. Ronald Wakoko
3. Augustine Waki
4. Asadi Kirya
5. Luka Wegulo
6. Mudehere David

Research Assiatants

1. Muniafu Koliabu
2. Mutende Francis

APPENDIX IV: RICE PRODUCTION FORMS
Year 200….

Parish……. **Season……**

Name	**Acres**	**Bags**	**Kgs**	Shillings

APPENDIX V: INTERVIEW GUIDE AND FOCUS GROUP DISCUSSIONS

1. What is your responsibility within the community?
2. What are your views of the current trends in rice production within this area?
3. What is responsible for this observed trend? Explain your responses.
4. In which ways could problems that hinder rice production be overcome?
5. How does rice production influence household incomes?
6. In which way does this relate to the problem of poverty in this area?
7. How does rice production influence the production of other food crops?
8. How does rice cultivation affect wetland conservation efforts?
9. What viable alternatives are available to the local people for poverty reduction?
10. Suggest ways of improving rice yields/production in this area

View publication stats