UPLAND RICE GROWING AND ITS ENVIRONMENTAL IMPACTS IN KAKIRI SUB COUNTY, WAKISO DISTRICT

NANKYA ROSE

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF BACHELOR OF SCIENCE IN ENVIRONMENTAL MANAGEMENT OF KAMPALA INTERNATIONAL UNIVERSITY

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DECLARATION

I Nankya Rose declare that this research report is my own presentation and has been produced by me with the help of my supervisor.

Signed.....

Date.....

NANKYA ROSE

APPROVAL

This report has been recommended for submission to the department of biological and environmental sciences for examination.

Signed……

Date…30th OCT 2012……

MADAM KATONGOLE HADIJAH

(Supervisor)

DEDICATION

This piece of work is dedicated to my parents, brothers, and sisters who have been there for me and helped me in the process of compiling this research report. All the knowledge I have obtained is because of their efforts to see me succeed, thanks a lot for everything. To mum dear, dad, aunt and her entire family, and for my friends, I am eternally grateful for everything. May the almighty God himself bless you abundantly.

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ABSTRACT

The study looked at the Factors affecting upland rice growing for improved livelihood among the people of Kakiri Sub County, Wakiso district. The study was guided by the following specific objectives; finding out the relationship between production of upland rice and the wellbeing of the natives, establish the extent to which the technology employed affects the amount of rice produced, establish the impact of rice growing on the environment and To identify the problem encountered in rice growing. The findings from the study are expected to help the rice producers in Kakiri Sub County and Uganda in general to adopt good farming methods and use appropriate techniques of production which are environmentally friendly. The study findings are expected to be helpful for the purpose of reference by other researchers. The study involved a total of 50 respondents. Simple random sampling and purposive non random sampling were used to select the respondents. Questionnaires, interview guide, participatory observation and group discussions were used to collect data during the study. The study observed that there was a close relationship between Upland Rice and Child Labor, Upland Rice and HIV/AIDS Concern , and Rice and Household Food Security. However, it was noted that in attempts to scare or reduce the impact of birds on farms, sometimes farmers use Carbon Furum, a chemical deadly to kill birds. Carbon Furum is presumed not good for the environment. The problems encountered in rice growing included but not limited to; Technology, Input supply, Volumes of production, Quality Controls, Rice Market Appraisal, Production constraints, Processing Constraints, Whole sale and constraintsand Consumption. Generally, All the rice farmers use rudimentary systems of production to produce the rice that is they use; Oxen, hand hoes, slashers, bush burning, sickles and pangas. This therefore affects the quantity of rice produced because none of the farmers used any modern equipment like tractors and this equally affected the output produced. The rice farmers also use mainly direct planting which consumes a lot of rice grains to plant instead of nursery beds that take less grain since the chances of the grain failing to germinate are minimized.

LIST OF ABBREVIATIONS

SPSS	Statistical Package for Social Scientists
NARO	National Agricultural Research Organization
MAAIF	Ministry of Agricultural Animal Industry and Fisheries
UBOS	Uganda Bureau Of Statistics
MFPED	Ministry of Finance, Planning and Economic Development
KADETFU	Kagera Development and Credit Revolving Fund
GDP	Gross Domestic Product
FAO	Food and Agricultural Organization
Nerica	New Rice For Africa
MVs	Modern Varieties
P.A	Per Annum
DAO	District Agriculture Officer
KDFA	Kakiri District Farmers Association

CHAPTER ONE
INTRODUCTION

1.0 Background of the study

Rice is the most important food crop in the world. Its sowing area reaches up to 154 million hectares accounting for 11% of the world's arable land. Rice is also a staple food for at least 50% of the world population. A large number of farmers are rice based farmers especially in Asia and Africa. It is estimated that the number of farmers in Asia is about 200 million and about 2 million families produce rice in Africa whose family income is mainly from rice production. Rice has been cultivated for a long time and it has been the number 1 staple food in china since 65% of the population eats it as a staple food (FAO, 2000). With the development of rice industry; farming practice, cropping system, rice types (varieties), and planting technologies have been changed significantly. The hybrid rice with a high yield has made a great contribution to food security. According to the Board of Science and Technology for International Development (1996), there are mainly two types of rice grown in Africa and these are African rice which is mainly red in color and white rice. Asian rice is so advanced, so productive and so well known. African rice is mainly reddish in color and can be used for more specialized uses like making baby porridge and other manufactured products.

Beinempaka (1983) argues that water is very important for good yield. Rice can be planted in water logged areas and standing water. Rice is sometimes grown in swamp fringes which are bundled to retain water. He further argues that though rice requires enough water for growth, heavy rain fall during flowering season discourages seed setting and is suspected to be one of the factors affecting output in rice production. Hari (1994) states that soil water availability is the main constant even in humid areas for upland rice. This is because drought seriously reduces the yields especially in reproductive stages. In general, clay soils have got a high water holding capacity than sandy soils making sandy soils mare drought prone except where rainfall is evenly distributed throughout the season. Organic matter also influences the water holding

capacity by stabilizing the soil aggregates, increasing the porosity and reducing bulk density thereby improving the rooting environment of upland rice.

Ackland (1971) in agreement with the rice water requirements states that the water requirements for paddy are very variable and are affected by several factors like the permeability of the soil, the length of the growing season, amount of rainfall in the growing season and the efficiency of water management. Gurder and Garry (1976) state that part of the growth in production was contributed by increases in the double cropped areas as irrigation investment increased. This is because growth rate in yields more than doubled after adaptation of irrigation and accounted for more than 90% of the growth in rice in 1980's compared to only 40% in the mid 1960's. MAAIF and UBOS state that agriculture is the mainstay of Uganda's economy with about 90% of the population earning a living from it. The sector accounts for 76% of GDP and 97% of export earnings. The sector provides with about 80% of the economy with employment and is the base of most of the manufacturing and service industry in the country. Production levels are however very low and the size of land that can be opened up for the cash crops and food crops production is limited since most people especially in the rural areas still use rudimentary implements such as hand hoes. Agricultural sector contributes about 43% to the total GDP and over 90% of the total exports. Food crop production contributes over 68% of the agricultural GDP compared to other sectors like livestock which contributes 17%, cash crop 7%, fisheries 5% and forestry 3%.

In Uganda, Upland rice farming, is being promoted and propagated by the Office of the former Vice President in which the former VP himself, H.E. Prof. Gilbert Bukenya has a farm in Kakiri Sub-county, Wakiso District.

1.1 Problem statement

Uganda is endowed with the capacity to produce 150,000 tons of rice per year that is required to fulfill the national demand (MAAIF,2000). However the agricultural secretariat (1998) states that with the increasing population especially the urban population which is the main rice consumers, Climatic changes, Poor technologies and

poor soil the estimated production of 90,000 tons in 1999 was far below the national demand. The researcher was therefore interested in analyzing the factors responsible for low yields in rice production and how they can be adjusted in order to improve on the rice yields to reduce on the poor wellbeing of citizen and the damages being caused on the environment. The low yields would aggravate the problem of low income among the farmers which could lead to over dependence on the environment to provide for the basic needs of the rice producers since the only venture they had was not yielding what is enough to provide for their daily livelihoods.

1.2 Purpose of the study

To establish the Factors affecting upland rice growing for improved livelihood among the people of Kakiri sub county, Wakiso district

1.3 Objectives of the study

The study was guided by the following specific objectives;

- To find out the relationship between production of upland rice and the wellbeing of the natives.
- To establish the impact of upland rice growing on the environment.
- To identify the possible remedies to reduce the impacts of upland rice growing on the environment.

1.4. Research questions

- What is the relationship between production of upland rice and the wellbeing of the natives?
- What are the impacts of upland rice growing on the environment?
- What can be done to reduce the impacts of upland rice growing on the environment?

1.5 Scope of the study

Geographical scope

Kakiri is located approximately 30 kilometres (19 miles), by road, northwest of Kampala,

Uganda's capital and largest city. The town is located on the highway between Kampala and Hoima. The coordinates of Kakiri are:00 25 12N, 32 23 24E (Latitude:0.4200; Longitude:32.3900). Kakiri is the location of the headquarters of the First Division of the Uganda People's Defence Force. It is the hometown of Professor Gilbert Bukenya Balibaseka, the former Vice President of the Republic of Uganda. He is also the Parliamentary Representative of the town.

Content scope

The study looked at the Factors affecting upland rice growing for improved livelihood among the people of Kakiri sub county, Wakiso district with focus on finding out the relationship between production of upland rice and the wellbeing of the natives, the extent to which the technology employed affects the amount of rice produced, the impact of rice growing on the environment and the problem encountered in rice growing

Time scope

The study covered a time scope of the period running from july 2012 to September 2012 that is three months.

1.6 Significance of the study

The findings from the study are expected to help the rice producers in Kakiri Sub County and Uganda in general to adopt good farming methods and use appropriate techniques of production which are environmently friendly since the research is exploring the factors affecting rice production and therefore this will lead to an increased rice production in general.

The study findings are expected to benefit the rice producers to understand the factors affecting rice production and how these factors actually affect the actual output in terms of the quality and quantity produced. This will make them devise better means to improve on the quantity and quality of rice produced in Uganda

The study findings are expected to be helpful for the purpose of reference by other researchers who may need to research in the same field that is some other researchers may need to use this research as a base to further their research into the rice field.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter summarizes the literature of the study. It covers different views on various authors who have written in the subject area and includes various arguments arrived at from different studies in line with the research problem.

2.1 The relationship between production of upland rice and the wellbeing of the natives.

Agricultural sector is pre-dominant source of livelihood for the biggest proportion of our population and will remain so until the industrial sector develops. The bulk of our agricultural production is by small scale farmers (about 2.5 million households) with an average farm area of 2.5 hectares each. Ten years ago, Uganda was hardly known among rice producing countries but recent successes in rice production have earned the country a respectable place among rice producers that it could quickly turn into the regional supplier of rice. The Consultative Group on International Agricultural Research cites Uganda as the best case of a country that has turned from heavily depending on rice imports to one that is almost producing more than it needs. Rice production has increased by more than 400 per cent in a decade due to improved agricultural practices; effectively positioning Uganda into a potential rice basket.Uganda mainly produces three varieties New Rice for Africa (Nerica) that is Nerica 1, 4 and 10. Nerica 4 locally known as upland rice is most type of rice produced by the Ugandan farmers. "Nerica varieties can be grown in places that were not possible before, Smallholder farmers cultivating pieces of land less than 5 acres are reaping from the rice windfall. The introduction and promotion of mechanized upland rice farming in the country can be taken as a step to lessen the problem of monoculture as well as an alternative to wetland conservation to paddy rice cultivation.

2.2 The environmental impacts of rice growing

Rice cultivation on wetland rice fields is thought to be responsible for 6–29% of the anthropogenic methane emissions annually. Rice requires slightly more water to produce than other grains. Long-term flooding of rice fields cuts the soil off from atmospheric oxygen and causes anaerobic fermentation of organic matter in the soil. Current contributions of methane from agriculture is ~15% of anthropogenic greenhouse gases, as estimated by the IPCC. Methane is twenty times more potent a greenhouse gas than carbon dioxide. A 2010 study found that, as a result of rising temperatures and decreasing solar radiation during the later years of the 20th century, the rice yield growth rate has decreased in many parts of Asia, compared to what would have been observed had the temperature and solar radiation trends not occurred. The yield growth rate had fallen 10–20% at some locations. The study was based on records from 227 farms in Thailand, Vietnam, Nepal, India, China, Bangladesh, and Pakistan. The mechanism of this falling yield was not clear, but might involve increased respiration during warm nights, which expends energy without being able to photosynthesize

Rice cultivation systems also have associated negative impacts. Indeed the potential for unsustainable slash and burn is high in upland areas (e.g. intensive short-fallow periods of <15 years). Such systems increase surface run-off and topsoil loss and erosion and decrease terrestrial root zone diversity. Sub-surface water storage is reduced, as is year-round water availability. Downstream flooding becomes more common and downstream water supplies become uneven, turbid and muddy. The short fallow also reduces terrestrial biodiversity and increases pest and disease build up (UNDP, 2010). In the lowland systems the introduction of the High Yielding Varieties (HYVs) and monocultures has also severely impacted upon the rice fields associated environmental services (ES); and previously positive externalities have, in cases, created negative ones. Higher crop yields from the HYVs relied upon increased fertiliser and pesticide load and irrigation (UNDP, 2010).

Methane is released from rice wetland. Methane released from rice paddies is now

believed to be one of the major contributors to global atmospheric methane, and the rise in methane in recent years is in part believed to be due to the increases in rice cultivation (Khalil, M.,et al 1998). Methane emissions will remain on the increase as irrigated systems continue to be developed. The excessive use of agrochemicals is widely recognised as a major source of air, water and soil pollution (IRRI., 2004). As little as 20-40 percent of nitrogen fertiliser may be captured by rice, this percentage is even lower with improper timing of applications (Islam, Z., 2007). Under such conditions the paddy field as a water purification system is severely compromised, and can cause the contamination of ground and surface waters. The indiscriminate use of pesticides has also led to health problems for farm workers and transmission of residues along the food chain. A study from the Philippines found that the health costs of farmers using pesticides were 40 percent higher than non-pesticide using farmers (Berg, H. 2002). Furthermore, it is reported that farmer□s direct health costs (medical costs andloss of earnings) tended to exceed the marginal returns to pesticide use (lower economic damages from pests) (Pingali, 1994). Fertiliser, pesticide and insecticide use is extremely high in many rice cultivations, particularly those engaged in intensive practices. Fertiliser use can be as high as four or five times the optimal amount. Insecticides are also used indiscriminately and spraying eleven times above the recommended amount is not uncommon. Lack of education regarding best practices and government policies do little to help. Governments, such as those of China and Vietnam, often advocate spraying and subsidise agrochemical inputs. In fact, insecticide sprays can be reduced by as much as 50 percent, with little to no effect on yields.

Furthermore, prolonged misuse of agrochemicals has affected the development of inland fisheries and reduced natural pest predators, both of which have further knock-on effects for food webs (Berg, H. 2002). Field experiments have shown insecticide sprays destroyed natural enemies, and detritivores (which are important in the breakdown of organic matter and fundamental to healthy, sustainable ecosystems). Indeed the loss of natural predators through indiscriminate spraying can result in major pest outbreaks; pests, which are released from predation and have evolved a resistance to specific pesticides, can wipe out entire crops. These secondary pests bring a new, intense,

vulnerability to rice ecosystems and cost the industry millions of dollars annually. These outbreaks are set to only intensify under new policies to increase agricultural output and increase cropping from two to three yields annually. The required irrigation of intensive rice crops creates demands on water supply. As water scarcity increases with climate change these demands may create increased conflicts amongst both agricultural and non-agricultural users.

Biodiversity is likely the most important rice-associated ecosystem service and the one at highest risk due to these intensification practices. Traditional rice systems have long been environmentally sustainable. This cultivation over several millennia has enabled a wide variety of land and aquatic organisms to become adapted to the rice-field aquatic system. The rice-field ecosystem is a mosaic of terrestrial and aquatic habitats, providing habitats for fish, amphibians, reptiles, crustaceans, molluscs and insects as well as various aquatic and freestanding plants. Local mammals and birds, migratory birds, as well as domesticated species such as ducks and cattle, also rely on rice vegetation for refuge and food (IRRI. 2004). Previous studies of rice-associated biodiversity concentrated on agronomic aspects - rice pests, their natural enemies and weeds. However, comprehensive studies on rice-associated ecology and biodiversity are scarce. Biodiversity suffers losses of an order of magnitude when converted from non-intensive to an intensive monoculture system. However, the long-term implications of this are unknown (UNDP, 2010).

Overall, conservation of biodiversity is important as diversity of species and maintained complexity of ecosystem functions play a major role to stabilise agricultural systems, and ward off total harvest collapse. This risk reduction factor is particularly important in dealing with a crop where the majority of beneficiaries are the „poorest of the poor and upon which countries economies rely. Furthermore, rice-associated biodiversity is an important source of nutrition and food security for many farmers as well as poorer landless workers. Recent studies have documented that during one season as many as 100 aquatic species collected from rice fields are utilised by rural people, in some rural communities this can account for as much as 70 percent of protein intake. A variety of

taxa is collected and has a number of uses. For the majority of rural households with little or no income, it is the local environment which must provide a diverse diet to sustain nutritional requirements. However, the availability of wild living resources from rice systems is declining; household consumption of rice-based capture has declined from half of total consumption to as little as one-fifth in as little as a decade (Halwort, M. 2006). Outside of local markets, the role of biodiversity to support local livelihoods is under-valued and even ignored in sectoral development strategies, which often concentrate only on yield increases.

The major rice producing areas in Uganda include the districts of Pallisa, Butaleja, Iganga, Lira, Bundibugyo and Gulu. The impact of rice cultivation on wetlands depends on wetland type, the intensity of drainage and agronomic practices including the use of fertilizers. Excessive use of fertilizers will cause eutrophication and adversely affect the ability of the wetland to maintain and improve water quality. Drainage for agriculture is particularly harmful to seasonal wetlands. 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). In Butaleja district, over 80% of the rice is cultivated in the Doho Wetland. The Doho Wetland is an important ecological flood plain for River Manafwa from the highlands of Bugisu, before it empties into Lake Kyoga, and eventually River Nile. It is also important for its biodiversity (Gumonye-Mafabi, 1989; Ecaat, 1991), and as a source of wetland products. These factors make Doho wetland a priority area for international conservation efforts. Although guidelines have been developed for agricultural use of wetlands (WID, 2001; WID, 2006), 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 cultivate in the wetlands. This in turn could adversely affect the present efforts to conserve and manage wetlands in the country. A study is critically needed to assess the impacts of rice growing on the ecological functions of wetlands. Despite the commercialization of rice production with the establishment of rice schemes, the output continues to lag behind demand. For example, the Kibimba Wetland produces 20,000 tons of rice each year, accounting for 20% of the total rice production in the country. Declining paddy yields have been reported in many areas of the country

(Wandulu, 1999; Ego, 2001), which implies that in future, it could become a less important strategy for reducing poverty in rural households in Uganda. However, no major study had been undertaken to assess the contribution of paddy growing to poverty reduction.

In addition, declining yields may either force farmers to continuously cultivate the crop, leaving little room for the soil to recover lost nutrients or to expand acreage in an attempt to increase yields. However continuous cultivation in wetlands has been reported as a major factor that predisposes wetlands to destruction and even loss (Oonyu, 2001). 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) (Ochollah et al., 1997; Adipala et al., 1997; Wandulu et al., 1997). Unless patterns of pest infestation in the area are understood, it will not be easy to design appropriate remedial action in order to ensure higher rice yields. Although the Wetlands Inspection Division (WID) has produced guidelines for small- holder paddy rice cultivation in seasonal wetlands (WID, 2002), these are unfamiliar to the majority of farmers in the area. For instance, it is recommended that 2 to 5 years of rice production should be alternated with 2 to 3 years of fallow. A major impediment to fallowing is the growing pressure on land by the rapidly rising population. It is important that farmers implement recommended agronomic practices for rice cultivation in wetlands. This in turn depends on the capacity of extension staff and local leaders to interpret and enforce these guidelines.

2.3 Sustainable rice production

Given the negative externalities associated with rice intensification and recent moves to further increase the annual rice crops from two to three, the obvious solution would be to revert back to more traditional, lower yielding farming regimes and to suggest diversification of livelihoods to overcome the poverty implications of yield loss. However, the soaring cereal prices and increasing demand would make this difficult. Two options exist which are worth further consideration. Additionally, there are site specific actions which can also improve biodiversity, for example in area with migratory birds the

timing of cropping can have important implications.

Integrated farming practices around rice

Integration of processes which build an infrastructure around rice cultivation may yield high livelihood and environmental benefits. As mentioned previously, rice cultivation offers a suitable environment for fish and other aquatic organisms, and rice-fish systems are not uncommon. Aquaculture of insectivorous and herbivorous fish, such as grass carp can aid rice protection and decomposition of rice by-products. Ducks can act as a pest control; water buffalo provides fertiliser and can be fed on urea treated rice straw, allowing a more environmentally sound disposal method than burning. The success of this system is dependent upon a reduced pesticide/fertiliser/fungicide load and works alongside integrated pest management (IPM) strategies. This system will also be more economically viable due to decreased input costs. Studies in the Mekong Delta show increased rice yields and incomes from integrated fish-rice systems compared with rice monocultures, furthermore IPM rice-fish farmers had the highest net income over non-IPM rice, IPM rice, and non-IPM rice-fish farmers, due to comparatively low costs and high yields in both rice and fish (Berg, H. 2002). However, introduction of such a scheme should take into account the right of the landless to these fish resources. Community based fishery management is recommended; during the flooded period waters can be treated as community property, hence access is available as is access to profit if sold, depending upon participation (Dey, M.M. & Prein, M. 2005). Rice-fish production is interesting because it lends itself to all types of rice systems: irrigated, rain-fed or deep water. The management of each will vary slightly, depending upon water availability; shallower systems will require addition of deep trenches and refuge ponds.

Rice intensification practices

The System of Rice Intensification (SRI) is also considered a possible alternative to high chemical use rice production. Numerous organisations are investigating the potential of this method, including the International Rice Research Institute (IRRI) and WWF. This system is based upon eight basic principles: preparing high quality land, developing nutrient-rich and un-flooded nurseries, using young seedlings for early transplantation,

transplanting seedlings singly, ensuring wider spacing between seedlings, preferring compost or farmyard manure to synthetic fertilisers and managing water carefully. SRI is labour intensive and has received mixed reviews, but is most likely to have greater impacts where soil quality is poor and water lacking (WWF, 2007). It will also significantly reduced pesticide load which will improve biodiversity. SRI will be best suited to improving marginal lands and in dealing with reduced availability of water. Indeed if SRI is employed in lowland wetland systems there is the potential to lose many of the environmental services associated with the paddy system.

Certification

Markets for organic, sustainable and „fair-trade products exist and global markets for organic products continue to increase (Seboonsarng, S., Leung, P. & Cai, J. 2006). However with approximately only 7 percent of rice traded internationally and the reliance on intensive systems for cheap rice it is unlikely that such a certification will impact on those systems which are perhaps the most environmentally damaging. Certification can however provide increased premiums and incentivise more sustainable practices. And as incomes continue to rise in these rice-producing countries the potential for certification improves. Thailands current rice strategy of exporting high-grade rice and the percentage of product exported makes it a good candidate for rice certification. Furthermore, its limited intensification means that conversion to more sustainable production methods can be made with lesser difficulty. Indeed, EU certification of organic rice exists in Buriran, North East Thailand. Contract farmers are employed to produce the high grade rice; yields are low but gain a good price. Contractors provide all inputs throughout all stages of production, as such implement traceable systems. In Vietnam however, where intensive regimes are more prominent, such a transition will be harder. It is perhaps in the upland areas where certification can have the greatest impact. Upland areas are those with poorer soil and which mostly missed out on the „green revolution. As such, these are the areas where export firms are more like to target; labour costs are lower and use of agrochemicals is minimal (Seboonsarng, S., Leung, P. & Cai, J. 2006). Implementation of sustainable practices now can decrease the negative impacts of intensification around the corner. However, these are niche markets which account for a minor segment of total rice

grown. And although may be able to alleviate environmental and poverty issues in specific areas, it does not answer the question of how to best deal with the inevitable increase in rice production in a manner that secures environmental and food security goals.

Valuation of environmental services for better policy frameworks

A number of rice-associated ecosystem services have been identified. However knowledge of the magnitude and relative importance of each ecosystem services is limited. Little work has focused on rice-field biodiversity and the implications of these species for the larger ecosystem (UNDP, 2010). The importance of these ecosystem services to continued rice sustainability is paramount but often ignored in policy decisions. Current policies favour subsidised agro-chemicals, and intensive use in anticipation of and to prevent further outbreaks. It is important to highlight the value of ecosystem services for food security, productivity, prevention of ecosystem breakdown and the potential net benefits of decreased pesticide use for overall government budgets (UNDP, 2010). The private sector may invest to support some of the environment services (such as flood control or water purity) if they can be mapped and monetised. However, without full knowledge of the value of rice-associated ecosystem services it is difficult to quantify the role of the private sector.

Land Use Planning

Increasing rice production is an inevitable policy for most Asian governments, with expansion being likely. Policies to increase productivity may require the procurement of new lands, and the risk of deforestation is high. Whilst lowland areas are now more suitable for conversions to rice production research into drought- resistant strains will allow expansion within the marginal lands, opening up new areas which were previously unsuitable for cultivation. Expansion policies should balance production targets with maintenance of ecosystem services. This will require an intensive evaluation of current lands, significant landscape planning and a holistic approach (UNDP, 2010).

Farmer field schools

Farmer Field Schools (FFS) have been working with rice communities for several years. FFS work with farmers to reduce pest load, and their work in Thailand showed decreased pesticide levels with no detectable change in rice gross margin (Praneetvatakul S. & Waibel, H. 2006). The FFS still need to be further developed to increase their scale of impact and find ways to become financially sustainable.

Basic farm business management

A number of simple actions exist to improve the livelihoods of rural rice farmers. Rice producers often have to sell their rice as soon as it is harvested due to a lack of storage facilities. The potential to store rice grain would give the farmer a position from which to barter from, and reduce the arbitrage exploited by middlemen. Access to information about market prices also improves a farmers bartering power. The formation of co-operatives can, therefore, further strengthen farmers power (UNDP, 2010).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter explains the methodology that was used in the study. Thus it presents the research design, area of study, population of study and sampling, data collection instruments, procedure and the method of data analysis.

3.1 Research design:

The research employed a descriptive study design. This is because it fits the nature of the research since the researcher was interested in the analysis of the factors affecting rice production in Kakiri sub-county

3.2 Population of the study and sampling:

The Uganda Bureau of Statistics (UBOS), estimated the population of Kakiri at 5,300 in 2008. In 2011, UBOS estimated the mid-year population of the town at 6,000. The research was carried out in Kakiri sub-county since it is one of the rice growing sub-counties Wakiso district. The researcher used simple random sampling for the rice farmers and purposive sampling for the community leaders and the agriculture officer. To select the respondents, the researcher selected three villages which included Kakiri trading centre, Kikandwa trading centre and Ssentema village out of seven villages in the sub county that grow rice from which 50 respondents that is rice farmers, community leaders and the agriculture officer were selected for the study. The researcher then interviewed the respondents to get their views on the different factors affecting rice production in kakiri and their effects on the environment.

3.3 Data collection methods.

3.3.1 Observation

This was done through going to the field and observer the various type of rice produced, methods used and the variety of grains that farmers use.

3.3.2 Questionnaires

The researcher used a structured questionnaire which was self administered by the researcher asking the respondents questions and filling in the answers. This was done for purposes of reducing respondent errors as a result of the respondents misunderstanding the questions and therefore filing in vague responses.

3.3.3 Oral interviews

An oral interview in form of discussions was arranged to different farmer groups. As some of them could not read or write and had no time to fill the questionnaires.

3.5 Data processing and analysis

This process involved scrutinizing the questionnaires to make sure that the information which was given by the respondents was right and there by any errors which would have been made would be eliminated. This ensured accuracy, uniformity and consistence of data collected. The researcher then coded the data for the open ended questions. This was done by determining a uniform range of values in order to ease data entry and analysis. After collecting the primary data, the researcher is expected to use Descriptive analysis which consists of construction of frequency distribution tables and percentages by use of SPSS.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter gives the inferential and descriptive statistics of the findings of the study. Thus it presents the data collected in tabular form and the analysis using hypothesis testing.

4.2 Back ground characteristics of the respondents

4.2.1 Gender of the respondent.

Table 2: Summary statistics showing the gender of respondents

	Frequency	**Percentage**
Male	36	72
Female	14	28
	50	**100**

According to table1, the males are more involved in rice production. 36 out of the 50 respondents that planted rice were male and this accounted for 72%. The rest were female. The gender of the respondent influences on the output produced by the respondent since the males are less involved in the process of housekeeping, they have more time to devote to the process of rice growing compared to the female who are first of all restricted by their house keeping responsibilities and the lack of productive assets.

4.2.2 Marital status of respondents

Table 3: Summary statistics showing the marital status of the respondents

Marital status	**Frequency**	**Percentage**
Married	34	68
Single	12	24
Widowed	4	8
Total	**50**	**100**

Basing on the marital status, the married are more involved in rice production that is 68% of the rice producers are married. This is followed by the singles who accounted for 24%. The lowest number of rice producers is however widowed which accounted for 8%. The marital status of the respondent affects the quantity of rice produced by the respondent. The respondents who are married have higher responsibility compared to those who are not married since the married respondents have to take care of their families in terms of feeding, school fees, treatment hence being involved in rice production enables them to get food to feed their families and income and this makes most of them to produce rice. They are also the ones with access to rice fields since very few singles have access to the rice fields since such land is highly valued by the villagers and can basically be got through inheritance.

4.2.3 Age of respondents

Table 4: Summary statistics showing the Age of the respondent.

Age of Respondent(years)	Frequency	Percentage
>18	7	14
19-28	11	22
29-38	22	44
39-48	7	14
49-60	3	6
Total	**50**	**100**

Basing on the age of the respondent, those who are aged between 29-38 years were more involved in rice production and this accounted for 44%. The least number of rice producers based on age were those aged between 49 and 60 years of age.

The age of the respondent determines his or her ability to produce the rice since younger and youthful respondents that is, in their 30's are more energetic and also more focused in the process of producing rice compared to the young ones who are either still in school, or the older ones who are less energetic.

4.2.5: the level of education.

Table 5: Summary statistics showing the highest level of education.

Level of education	Frequency	Percentage
Primary	30	60
Secondary	16	32
Tertiary	4	8
Total	**50**	**100**

Among the sampled rice producers, those who were highly involved in rice production had their highest level of education as primary. Those with tertiary education had the lowest number of participants in rice production that is only four out of the fifty participants had attained tertiary education. The higher the level of education of the respondent, the more the respondent is expected to know better rice production skills and the more suitable implements to produce the rice and therefore the higher the quantity of rice likely to be produced compared to the less educated ones who basically depend on back ward techniques to produce the rice.

4.3 The relationship between production of upland rice and the wellbeing of the natives.

Upland Rice and Child Labor

Closer to the time of harvesting, there are many birds that swarm the rice fields. In some cases even the scare crow does not prevent the birds eating the rice gardens. As a result, in some families children are used to scare the birds. In so doing the education of the children is put to a halt up to a time when rice is harvested from the fields. This practice is not only unacceptable as per the labor laws but is also destructive to the future of the children.

Upland Rice and HIV/AIDS Concern

It was noted that rice growing helps to generate income to support people living with HIV and AIDS. It was also noted rice as a food item in itself is a diet for those affected and infected with HIV/AIDS. To people that have been bereaved and have lost bread winners due to the disease, rice growing and trade has been a substantial source of

income and a way of survival. However, on a negative perspective, rice growing and the labor requirement is quite involving and tedious. It may not be a good practice for a person living with HIV/AIDS.

Rice and Household Food Security

Rice growing can be a threat to household food security if all land is used for rice growing. However, it was noted the farmers are aware of food insecurity. They are balancing production for home consumption and income generation. It was noted that most farmers are not only involved in rice growing as a lone means for income generation. In addition to rice growing some have other economic activities as well. One farmer of Kakiri trading center, also growing rice, is growing Pineapple on a large scale (2 acres), growing Banana (Matoke) and cassava for home consumption and at the same time is keeping bees and local poultry.

4.4 The impact of rice growing on the environment.

Table 6: the impacts of rice growing on the environment

Impacts	Frequency	Percentage
Flooding	11	22
Loss of biodiversity	20	40
Loss of wetland products	08	16
Pollution	11	22
Total	50	100

Source: from the field by researcher

From above table 6, It was noted that in attempts to scare or reduce the impact of birds on farms, sometimes farmers use Carbon Furum, a chemical deadly to kill birds. Carbon Furum is presumed not good for the environment. This has led to disappearance of most of the bird species and due to loss of vegetation during the slash and burn while clearing the fields for cultivation, other plant and animal species that initially survived in such areas as their niche have lost their habitat which has subsequently led to loss of biological

diversity.

Also, the opening of land prior to the season and during the planting time has exposed land to agents of erosion such has wind and water which has led to flooding of the low lying areas especially during the rainy season. This has increased prevalence of diseases from the vectors that breed in the flooded water and it becomes worse when flooded water is containing chemicals and pesticides that are used in the agronomy of rice. For farmers that grow upland rice in the swamps in Kakiri Sub County, the clearance of vegetation, slash and burn and use of fertilizers and pesticides has compromised the initial role of the wetland and vegetation leading to contamination of surface and ground water.

In areas where farmers have cultivated the upland rice on the low lands and wetlands, it was noted that it has led to disappearance of wetland products such as the fish and vegetation whose roles on maintaining the quality of the environment would be enormous had they not been tampered with and coupled with that is the influence that the wetland products would have on the income levels of the communities in the surrounding areas especially those who depend on it for art and crafts, and for fishing. But because they have been converted, all those functions and others have been lost which may spell doom for the future generation in Kakiri Sub County.

However, on a positive note, Upland rice is grown on higher plains and it requires a little less amounts of water compared to lowland rice. As such it is good for the conservation of the lowlands and the wetlands. This could probably explain why attentions are shifting to favour production of upland rice.

4.5 How to reduce the impact of upland rice growing on the environment

The government should strengthen existing laws and policies governing the growing of upland rice especially on the low lands in Kakiri and other areas of the country so as to ensure the conservation of wetlands and the functions that they play. It will also reduce on the impacts that accrue from their destruction especially the impact on the health and

income of the communities in the surrounding areas and simply the continued existence of the lowland and upland vegetation and other life forms.

There is need to initiate alternative sources of income for the upland rice growers so as to reduce the over dependence on the one venture whose effects are detrimental to the environment. This can be done by providing farmers with entrepreneurship skills, knowledge and incentives such as loans so that they can start up businesses that may in the short or long run reduce the over dependence on the land thereby cutting the impact of upland rice growing on the natural resources in the sub county.

Finally, since the number of upland rice growers is increasing at an alarming rate, more land will be required for cultivation and its effects on nature there for it should be important to note that the farmers should be educated on the best agronomic practices that increase the yields yet have less or no impact on the environment. Such practices could include but not limited to use of organic manures and agro forestry that are of much benefit to the natural ecosystems.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction.

This chapter looks at the conclusions made as per the factors affecting rice production and the recommendations put forward by the researcher.

5.2 Conclusions.

Generally, it was noted that the cultivation of upland rice was leading to increased biological diversity loss in the area. Therefore, the government should strengthen existing laws and policies governing the growing of upland rice especially on the low lands in Kakiri and other areas of the country so as to ensure the conservation of wetlands and the functions that they play. There is need to initiate alternative sources of income for the upland rice growers so as to reduce the over dependence on the one venture whose effects are detrimental to the environment, the farmers should be educated on the best agronomic practices that increase the yields yet have less or no impact on the environment.

5.2 Recommendations

There should be a policy in place to educate the farmers on the better techniques of production and since these techniques of production are expensive, there should be a policy to put in place means where the farmers can access better techniques of production like a tractor, fertilizer application.

The government should come up with the weather focus in a way that there should be up to date weather focus for the farmers so that they should know when to plant and when not to plant since the farmers depend on the un predictable weather to plant the rice such that sometimes there is sunshine in the middle of the season that leads to poor yields.

Farmers should be trained in the advantages of storing rice to improve on their profits from rice since most times the farmers tend to sell off their rice immediately yet when rice is sold off immediately, it fetches a low price which is usually 450 shillings for the price of un husked rice and yet the same rice can be sold off at a price of 1800 after it has been un husked and at a later date.

Farmers should be taught how to irrigate their land instead of depending on the rain only, there rice production should also be subsidized because most times farmers input in so much and yet what they earn from it is usually little.

The government should provide technical assistance to the farmers by way of providing skilled agricultural officers to advise the rice farmers in the incident of pests and diseases for example recently most people said that they were affected by Problem of grasshoppers that eat up the rice in its leafy stages hence affecting the rice yields.

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4. Level of education

Primary level	
Secondary level	
University	
Not attended school	

5. Number of people in the house hold

< 5 people	
6-10 people	
11> people	

SECTION B: The relationship between production of upland rice and the wellbeing of the natives.

6. A part from growing upland rice which other activity do you carry out

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.....
.....

7. How many kilograms of rice do you harvest every season

.....
.....
.....

8. What do you use the income you get from sale of upland rice

Appendix I:

Questionnaire

I am called Nankya rose, pursuing a bachelor of science in environmental management at Kampala International University. I am conducting a research on the factors affecting upland rice growing for improved livelihood among the people of kakiri sub county, wakiso district. This research will be purely for academic purposes. I will be grateful if the highest level of cooperation is exhibited by you my dear respondents and the information you provide will be confidential, so please take time to answer these questions.

Section A: Background information

(Please tick in the most appropriate box or write in the most appropriate space)

1. Sex

   Male _____

   Female _____

2. Age

Age Group	
18-25 ears	
26-30 years	
31-40 years	
41 and above	

3. Marital Status
   a) Single
   b) Married
   c) Divorced

.....

.....

.....

9. What are the benefits that your family gets from growing upland rice

.....

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.....

SECTION C: The impact of rice growing on the environment.

10. Where do you grow your upland rice

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11. What could be the likely impacts of growing upland rice on the environment

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.....

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12. What constraints do you normally encounter every time you grow rice?

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13. Generally, what is you view about the growing of upland rice and its impact on the environment?

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