

**IMPACT OF BRICK MAKING ON THE PERI-URBAN ENVIRONMENTS: A
CASE STUDY OF MUKONO DISTRICT**

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DECLARATION

I Suleiman Zubair Abdullah, hereby declare that to the best of my Knowledge, this is my original work and has never been submitted to any university or institution of higher learning for any academic award.

Signature 

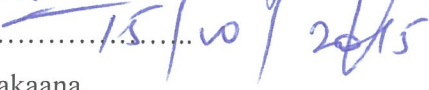
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APPROVAL

This thesis has been submitted for examination with the approval of the supervisor.

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Date.....

Prof. SilvesterNyakaana.

DEDICATION

I dedicate this dissertation to my beloved parents, the late Alhaji Zubair Adam Abdullah and Hajiya fatima (Larai) Zubair Abdullah.

TABLE OF CONTENTS

DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES	vii
LIST OF FIGURES AND PLATES	viii
ACKNOWLEDGEMENT	ix
ABSTRACT	x
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the study	1
1.2 Statement of the Problem.....	4
1.3 Overall objective	5
1.4 Specific Objectives	5
1.5 Research questions	5
1.4 Statement of the problem	6
1.6 Significance of the study.....	6
1.7 Justification of the study	6
2.0 CHAPTER TWO: LITERATURE REVIEW	8
2.1 Activities in and around Mukono detrimental to conservation.....	8
2.2 Damages and advance mechanisms to stop and rectify or restore the ecosystems. 9	
2.3 The classical structures forcing people to engage in destructive activities	11
2.4 Key ecosystems beneficial to biosphere maintenance	16
CHAPTER THREE: RESEARCH METHODS	24
3.0 Research type and strategy.....	24
3.1 Unit analysis.....	24
3.1.1 Qualitative data analysis	24
3.1.2 Quantitative data analysis	24
3.2 Data collection	25
3.2.1 Research techniques.....	25
3.2.2 Primary data collection methods.....	25
3.2.2.1 Questionnaires.....	25
CHAPTER FOUR: RESULTS AND DISCUSSION	26
4.1 Socio demography of the respondents	26

4.2 The main peri-urban environmental problems.....	36
4.3 Discussion	40
4.3.1 Beneficial ecosystem dependence in the Peri-urban community	40
4.3.2 Peri-urban as a concept	42
4.3.3 Typology of Peri-urban.....	45
4.3.3.1 VPU: Village Peri-urban or Peri-rural	45
4.3.3.2 IPU: In-place Peri-urban.....	46
4.3.3.3 CPU: Chain Peri-urban (In-migration from a single place).....	47
4.3.3.4 DPU: Diffuse Peri-urban.....	47
4.3.3.5 Absorbed Peri-urban	48
4.3.4 Links between Peri-urban types.....	49
5.0 CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS	50
5.1 Conclusions	50
5.2 Recommendations.....	53
5.3 Areas for further research	55
References.....	57
APPENDIX I: Questionnaire for Brick Makers	62
APPENDIX II: Questionnaire for Brick Buyers.....	63
APPENDIX III: Questionnaire for local council executive member.....	64
APPENDIX IV: Questionnaire for tree farmers	65
APPENDIX V: Questionnaire for district environment executive	66

LIST OF TABLES

Table 1	28
Table 2	29
Table 3.	30
Table 4.	31
Table 5	33
Table 6.	33
Table 7.	34
Table 8.	36
Table 9.	37
Table 10.	38
Table 11.	39

LIST OF PLATES AND FIGURES

Plate 1: Kiln of bricks and woods from the Forests.....	7
Plate 2: brick making close to wetland.....	7
Plate 3. People constructing a kiln of bricks without any regulation and policy.....	13
Plate 4. People engaged into destructive activities to ecosystem	16
Plate 5. People making bricks in Juggo Area of Mukono.....	23
Plate 6. Destructive soil excavation during brick making	33
Plate 7. A peri-urban Homestead in Goma Subcounty	42
Figure 1. Map showing the Geographical location of Goma subcounty	22
Figure 2. Responses on the problems caused by unregulated brick making	27
Figure 3. Responses on what processes would make brick making work best.....	29
Figure 4. Responses on what environmental problems are envisaged by brick transporters '	30
Figure 5. Responses on what interventions can be used to minimize the negative impactsof brick making.....	31
Figure 6. Map of Mukono showing levels of wetland degradation	32
Figure 7. Responses on the activities engaged in by the community to mitigate environmental degradation.....	34
Figure 8. Responses on environmental Problems and how they can be solved.....	35
Figure 9. Responses on the anthropogenic and environmental problems faced by the tree farmers	37
Figure 10. Responses on how to improve Biomass	38

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ABSTRACT

Rapidly changing conservation of peri-urban areas has great but unsustainable utilization of beneficial ecosystem by people that live in close proximity to the wetland ecosystem like the brick makers and fuel wood sellers. The study investigated the impact of brick making on the wetland ecosystem in Mukono district. The major objectives of the study were to generate information useful in promoting conservation of peri-urban ecosystems in Mukono District . The study also assessed the socio-economic factors that influence the dependency of the people in the peri-urban area on brick making and wood selling in wetland. The data was collected between August 2014 to February 2015 by administering a structured questionnaire to 50 respondents that included brick makers, brick buyers, Local Council Executive, tree farmers and District Environmental Executives that were randomly selected.e. Several social economic factors such as distance from the wetland, age, land owner's major income, level of education and the amount of fire wood used during the brick making process were analysed. The results indicate that the conservation and sustainable utilization of wetlands require involvement the local communities are actively involved.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Conservation and development are two important scenarios but do not respect each other because development swallow ecosystems through anthropogenic activities geared towards survival. Uganda is endowed with a good environment that is characterized by mountains, plains, swamps, hills, lakes, rivers, forest, grasslands and many other natural systems which have been altered by development. Uganda is a home of several swamps with unique species and above all the central location is the seat of the second largest fresh water body in the world Lake Victoria. Apparently Uganda as a country has no land use policy in place and any one time in any location of the country many land use practices are endangering the ecosystems that are fragile and in the end result into fast extinction of many animal and plant species irrespective of thorough EIA done. This study is set out to evaluate the key fragile ecosystems around Kampala Capital City Authority that are in danger as a result of fast development initiatives notably settlement, town agriculture, industrialization and recreation. The major problems affecting ecosystem management here in Mukono include sand quarrying, brick making in all the swamp and uphill environments and generally swamp reclamation in a bid to establish space for settlement and other activities.

The peri-urban environment is the transition zone or interaction zone where urban and rural activities are juxtaposed, and landscape features are subject to rapid modification, induced by anthropogenic activity (Ian, 2010).

Uganda is endowed with wetlands, covering approximately 13% of the land surface (NEMA, 2006; UNDP, 2009) representing one of the most vital ecological and economic resources (Amaniga *et. al.*, 2010; Bakama, 2010). They are associated with important functions that provide goods and services which have economic value and therefore satisfy human needs, directly or indirectly (Kirsten, 2005; Brander *et. al.*, 2006). Directly, wetlands are sources of water supply and other products such as fish and plant

resources, clay, papyrus, sand and they are also centres of recreation whilst indirectly, they perform environmental functions vital in the maintenance and protection of human systems through services like the preservation of water quality, flood attenuation, nutrient retention, ground water recharge and climatic regulation (Barbier, 1993; Gayatri, 2000; Oglethorpe *et. al.*, 2000). Because of their socio-economic importance, wetlands have attracted significant portions of human populations who survive by exploiting their resources, through different resource utilization activities, often driven by economic and financial motives (Kirsten, 2005). This has resulted in the degradation and modification of these valuable stocks of natural capital. This situation arises out of the fact that wetlands are perceived to have little or no economic value (Kirsten, 2005), coupled with the fact that no formal markets exist for their services to humanity (Jodi, 2005). Consequently, this makes wetland conservation not to be seen as a serious alternative compared to other uses that seem to yield more tangible and immediate economic benefits. As a result inadequate resources are fed into their management which breeds environmental degradation through inappropriate commercial exploitation of wetlands (Oglethorpe *et. al.*, 2000). The Kampala-Mukono Corridor (KMC) presents an area where conservation benefits have been hampered by human desire for economic gains. This challenge is, consequently, making decision makers, particularly at the local level, to opt for the conversion of wetland resources to other uses like agriculture, clay extraction and brick making. This trend is likely to result in grave and irreversible environmental consequences that potentially affect human welfare.

Some people love cities; others hate them. While Henry David Thoreau considered cities to be places where millions of people are feeling lonely together (Ponting, 1990), others have praised cities as centres of innovation and learning, transmitting accumulated knowledge on which future achievements can be built (Girardet, 1993). Whether one likes cities or not, the reality is that the majority of the world's population now lives in them and that further urbanization cannot be halted. By 2030, 60% of all people are expected to reside in cities and towns (Töpfer, 2001). Urban areas grow three times faster than their rural counterparts (Palijon, 2002; WRI, 2004). Urbanization is no longer an industrialized-world phenomenon. Urban areas in developing countries will account for nearly 90% of the projected world population increase between 1995 and 2030. Soon

more than half of the Asian and African populations will live in urban areas, while this share will be between 75% and 85% for Central and South America (FAO, 2002; WRI, 2004). Ongoing urbanization has brought about a wide range of challenges across the globe, and not only in terms of population growth. In the United States, for example, metropolitan areas tripled in size between 1950 and 1990 (Dwyer *et. al.*, 2000). More land is needed for urban areas to provide inputs and outputs of resources and energy, with a detrimental effect on forests and other green areas. During the early 1990s, more than a quarter of greenspaces in Asia were expected to be lost within two decades due to continued urbanization and suburbanization (Kuchelmeister and Braatz, 1993). Especially in the developing world, where most emerging mega-cities are located, managing and catering for urban populations will be one of the main challenges of our time. The influx of rural populations will not stop. Continuing urbanization in the developing world has led to major problems in terms of hunger, poverty, inadequate shelter, social segregation, unemployment, pollution of water, soil, and atmosphere and so forth. Those responsible for managing cities are under tremendous pressure to develop strategies for alleviating poverty and sustaining urban livelihoods. Cecil, *et. al.*, (2004).

Human wellbeing and sustainable development are vitally dependent upon improving the management of earth's ecosystems to ensure their conservation and sustainable use (Zedler and Suzanne, 2005). Whereas dire demands for ecosystem services such as food and clean water are growing, human actions are diminishing the capability of many ecosystems to meet these demands. Ecosystem services contribute to achievement of some of the Millennium Development Goals (MDGs) such as poverty alleviation, clean water and sanitation for all and environmental sustainability. Their vulnerability to shocks and stress leads to increasing future costs to water investors thus, leading to failure to meet MDGs (Boyinza and Nabalegwa. 2008). As population grow and people's expectation increase, the pressure on ecosystem and their resources services also increase. This put two major roles of ecosystem services of sustaining human livelihood and upholding the quality of environment under threat (Buyinza *et. al.*, 2008).

Wetland ecosystems account for about 6% of the global land area (Dugan, 1990). In Uganda Wetlands cover 13% of the country's total area (Buyinza *et. al.*, 2008). Uganda's

wetlands are geographically widespread across the country, rendering them easily accessible, exploited and degraded. Wetlands are among the earth's most productive ecosystems. They have been described as the kidneys of the landscape because of the functions they perform in hydrological and chemical cycles; they are also to as biological supermarkets, because of the extensive food webs and rich biodiversity they support (Babier and Thompson, 1998). Wetlands also provide numerous goods and services of local, regional, national and international importance, thus representing considerable ecological, social and economic values (Loomis *et. al.*, 2001).

Globally, wetlands have experienced severe losses, mainly through conversion to other uses (Owino and Ryan, 2006). In Uganda, wetlands has experienced serious conversion over the last 40 years (Buyinza *et. al.*, 2008), Converted wetland area has increased about 99% from 16 km² (0,05% in 1964-2,471 km² 18% in 1995. This represents an annual conversion rate of 3%. The problem wetlands conversion has reached unprecedented levels, for example in western Uganda alone about 1, 736 km² (20%) of wetlands have been converted to other uses compared to 8, 6 and 30% in the western, central and Northern regions of the country, respectively (Buyinza and Lusiba, 2006).

Wetlands conversion to agriculture contributes to the local and national economy. Karanja *et al* (2001) estimate the net economic value of Pallisa district wetlands at 1.221 billion Uganda shillings (789 million US \$) per year, of which crop cultivation accounts for 2.4% Emerton *et al* (1999) estimated the value of Nakivubo wetland at 2 billion Ugandan shillings a year, with crop cultivation contributing about two thirds of the value of resource utilization activities.

1.2 Statement of the problem.

The consequences of over exploitation of environmental natural resources are invariably deteriorating, destructive and economically costly. It is however very unfortunate the consumptive use of wetland, loss of biodiversity and soil fertility lead to the in advertent change of climate modification. Fundamentally, all such ecosystem stresses are likely to intensify as human numbers and demands increase in the peri- urban areas further. Brick making is greatly devastating to the environment as well as contributing to the unsustainable development. It is increasing at an alarming rate as population size

grows and peoples' demands rise. It results in loss of critical ecosystem services and imposes a high cost on society in terms of forgone income, subsistence, employment and increase public expenditure on infrastructure require to replicate conservation wetland functions or offset the effects of their loss(Schuyt,2005). Wetlands conservation in the face of brick making is an economic problem because important values are lost, some of them irreversibly. Decision to convert or conserve wetlands have serious economic implications and should be therefore guided by proper analysis of such gains and losses. Brick making in wetland causes loss of wetland values including losses in net production benefits and net environmental benefits.(Buyinza *et. al.*, (2009).

1.3 Overall objective

The main aim was to generate information useful in promoting conservation of peri-urban ecosystem in Mukono district.

1.4 Specific Objectives

1. To find the out beneficial effects of ecosystem conservation to the Peri -Urban community.
2. To evaluate and document all activities in and around Kampala city environment that is detrimental to conservation.
3. To investigate the factors responsible for persistent damage to the ecosystem in Peri-urban areas of Mukono district.
4. To examine the factors forcing population to engage in destructive activities

1.5 Research questions

1. What is the effect of brick making to the environmental conservation of peri-urban ecosystem in Mukono District?
 2. Do brick buyers contribute significantly to the environmental conservation of per-urban beneficial ecosystem in Kampala city environment?
 3. Are the local council executive members contributing to environmental conservation?
 4. Can tree Farmers have significant effects on environmental conservation of peri-Urban beneficial ecosystem in Kampala city environment?
- RQ.5. what are the contribution of the District environment executive on conservation of peri-urban beneficial ecosystem in Kampala city environment.

1.6 Significance of the study

The expected results will be discussed with relevant bodies to forge a way forward in order to restore and preserve key ecosystems like the lost Bat valley in Mukono, many swampy areas and the siltation problems that have made Lake Victoria become critically in danger.. Finally a model to advise Mukono district administration on planning structures, policy formulation and mind shift in order to save a good environment by looking at non consumptive uses of the biological resources in and around Lake Victoria will be targeted. Lake Victoria gets its waters from the highland hinterland of western Uganda, Rwanda and Eastern Uganda but feeds the whole of Africa through river Nile that stretches from Kampala to Cairo. Therefore It is important that this critical resource is conserved by any means so as to save the masses. Brick making in Mukono and building through the vast real estate system all around the lake region is a danger to many ecosystems.

1.7 Justification of the study

When carried out successfully the study findings will benefit the researchers, local government and district government and avail necessary information and knowledge on how to deal with urban environmental problem more so to the urban authorities that are growing at faster rate. The study will benefit other local government too in part of Uganda.



Plate 1: A kiln of bricks and firewood from the Forests



Plate 2. Brick making close to the wetland

2.0 CHAPTER TWO: LITERATURE REVIEW

2.1 Activities in and around Mukono detrimental to conservation

In the Mukono district, wetlands have often been regarded as the land most easily available for the development of industrial estates hence their reclamation for industrial developments. This is because of the uncertain character of the ownership of such areas, hanging half way between an estate owned by government and a *terra nullius* (belonging to nobody). Often, it must be remembered, an ineffective government is as good in managing resources as a total absence of ownership. This development is beginning to come to fruition. Bad fruits such as flooding due to impeded drainage are beginning to manifest in a number of swampy areas (Aryamanya, 2011).

The unclear regime of tenure in the wetlands has also attracted the emergence of unplanned settlements (slums) around these wetlands. While the current district Development Plan requires that wetlands be left as green areas, ineffective law enforcement has led to the growth of slum settlements instead. These settlements have become a home of environmental diseases such as cholera, dysentery and typhoid. This ugly development has been mainly because of impeded drainage of these areas and the resulting flooding (Aryamanya, 2011). There is a variety of threats to wetlands arising from human activities. These include drainage for urban and industrial development, agriculture and livestock ranching; excessive harvesting of vegetation such as papyrus and palms (*Phoenix reclinata*); clay mining for brick and tile-making; repeated burning by hunters to flush wildlife such as sitatunga and overuse for effluent treatment in a number of instances.

Decline in the availability of water resources mainly due to a rise in demand for the same has left farmers in peri-urban areas with no option but to use untreated wastewater for their irrigation and aqua farming. While some wastewater re-use has been in accordance with the usual requirements, the majority which is in most cases not treated is re-used without formality. Therefore, this effect poses a serious health risk for communities working under such agricultural settings and even those feeding on the products obtained under similar conditions (Mukwaya, 2013).

Twesigye *et. al.*, (2011) asserted that Nakivubo wetland has been subjected to a gradual process of conversion and reclamation and currently faces some of the most extreme

threats and pressures. The areas around Nakivubo, including the wetland itself are regarded as prime sites for urban development due to their proximity to the city centre and industrial district. Nakivubo wetland is under several anthropogenic uses such as increased agricultural development, urbanization and industrialization has increased the rate of loss of vegetation cover. Nakivubo wetland's characteristics and location means that it provides a unique and important set of services to Kampala's dwellers. It functions as a buffer through which much of the city's industrial and domestic wastewaters pass before being discharged into Lake Victoria at the Murchison Bay. Partially treated sewage from the Kampala Sewerage works is mixed with the untreated effluents already in the Nakivubo Channel before entering the wetland.

In addition, Twesigye et. al., (2011) explained that the recent rise in settlements around Nakivubo wetland is attributed to high demand for cheap accommodation by people who work as guards with the security companies located within the industrial area. A number of low income earners such as plant nursery girls and boys, workers with building companies and urban markets find cheap temporary houses built in the wetland affordable.

2.2 Damages and advance mechanisms to stop and rectify or restore the ecosystems

Wetlands have been historically considered "wastelands" and, therefore, subjected to degradation through dredging, flooding, filling and excavation for various agricultural and industrial uses. In recent times, however, the attraction and value of wetlands as important wildlife habitats, among other uses for instance; provision of fin and shell fish, salt, thatch, wood, and others) have been increasingly recognized. Coastal wetlands are especially important as nutrient-rich habitats for fish spawning and nursery. The degradation of the wetland could be largely attributable to neglect and unsustainable human activities such as bushfire setting, hunting, farming, fuelwood harvesting, estate development, and others, over the years (Wuver & Attuquayefio, 2006).

Gombya and Mukunya (2004) stated that waste Reduction seems the easiest and most effective way to manage solid waste is to reduce the amount of waste to be disposed. This is a strategy that seems simple in concept but has shown promise. An integrated approach to waste management will have to take into account community and regional-specific issues and needs and formulate an integrated and appropriate set of solutions unique to

each context. As noted, one of the approaches to waste management is by separating or sorting waste generated and eventually using it for other form of production implying recycling. Separating waste materials at the household level occurs to some extent almost universally, and prevents the most valuable and reusable materials from being discarded. Composting which is a somewhat more low-technology approach to waste management. The waste of many developing nations would theoretically be ideal for reduction through composting, having a much higher composition of organic material than industrialized countries. For example, generally, in developing countries, the average city's municipal waste stream is over 50% organic material.

The dumping of solid waste in landfills is the probably the oldest and definitely the most prevalent form of ultimate garbage disposal. Many "landfills" are nothing more than open, sometimes controlled, dumps. The difference between landfills and dumps is the level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leachate management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, control of the number of "tipping fronts" or compaction of waste. Another option for waste management is incineration. Incineration should not be considered a 'disposal' option, since following incineration there is still some quantity of ash to be disposed of (probably in a landfill), as well as the dispersal of some ash and constituent chemicals into the atmosphere (Gombya and Mukunya, 2004).

According to the World Bank (1996), water quality in Lake Victoria has declined greatly in the past few decades, owing chiefly to eutrophication arising from increased inflow of nutrients into the lake. Nutrient inputs have increased two to three-fold since the turn of the century, mostly since 1950. Concentrations of phosphorus have risen markedly in the deeper lake waters, and nitrogen around the edges. Stimulated by these and other nutrients, the five-fold increase in algal growth since 1960, and the shift in its composition towards domination by blue-green algae, is causing deoxygenating of the water, increased sickness for humans and animals drawing water from the lake, clogging of water intake filters, and increased chemical treatment costs for urban centers. Aside from the near-total loss of the deepwater species, the deoxygenating of the lake's bottom waters now poses a constant threat, even to fish in shallower portions of the lake, as

periodic upwelling of hypoxic water causes massive fish kills. The increased nutrient loads have also spurred the water hyacinth infestations.

Wastewater management is one of the many basic strategies for keeping the environment clean and safe for human habitation. Wastewater generated from industries, institutions, commercial establishments, and dwellings should be properly collected, transported, and treated (where necessary) before it is released back into the natural environment (Mukwaya, 2013).

Most of the peri-urban areas around the world have an increase in population, water consumption, and a rapid increase in waterborne diseases which stresses on the need of wastewater disposal. The released wastewater generally ends up in open and vacant lands resulting in the creation of smelling stagnant water ponds which in many cases affect those in contact with them such as children among others. Health risks are increased by the fact that households and surface water drainage systems are always combined, resulting in the contamination of floodwater with excreta. Diseases like malaria are transmitted by mosquitoes that breed in block drains and ponds. This issue is particularly persistent, in locations where piped water is brought before digging drainage channels (Mukwaya, 2013).

2.3 The classical structures forcing people to engage in destructive activities

The population of Uganda has increased from 4.8 million in 1948 to 30 million in 2008 and is likely to reach 130 million by 2050. At 3.2%, Uganda's population growth rate is one of the highest in the world. This poses an enormous challenge on the management of natural resources such as wetlands. The increased population is significantly marked with insatiable desire of both the rich and the poor to derive their livelihoods from the wetlands including desire for industrial expansion. In the 1980s, pressure on wetlands mounted in both rural and urban areas. The communities that access these wetlands use them for agriculture, extraction of various raw materials and fishing. Consequently, a significant amount of encroachment on wetlands has occurred. By 2000, 64 percent of the total seasonal wetlands in Iganga and 68 percent in Pallisa had been converted for rice cultivation. In Kabale district, the originally permanent wetlands such as Nyamuliro located in Muko Sub-county had been completely reclaimed for Irish potatoes growing (Aryamanya, 2011).

According to Zoltan (2010), historically, all societies may have a constant supply of entrepreneurial activity, but that activity is distributed unevenly between productive, unproductive, and destructive entrepreneurship because of the incentive structure. To change the incentive structure you need to strengthen institutions, and to strengthen institutions you need to fix government. The role incentives play in economic development has become increasingly clear to economists and policymakers alike. People need incentives to invest and prosper. They need to know that if they work hard, they can make money and actually keep that money. As incentive structures change, more and more entrepreneurial activity is shifted toward productive entrepreneurship that strengthens economic development. This entrepreneurial activity tends to explode during the innovation-driven stage that culminates in a high level of innovation, with entrepreneurship leveling out as institutions are fully developed.

The peri-urban areas tend to be occupied by low-income families and are typified by illegal settlements and slums. In addition, peri-urban areas are poorly served by urban infrastructure and experience worse sanitation conditions than their urban counterparts. The impact on the poor in developing countries is fundamentally different than the impact on the poor in the United States as the poor in developing countries are likely to depend on ecosystems for both basic services and their livelihoods, while often also facing more dire poverty. The peri-urban poor in developing countries often rely on ecosystems to provide basic services including water, waste disposal, regulation of climate and air quality, food production, and materials (such as, timber, fuel, medicines) that they cannot access elsewhere. This is partially because public provision of such services is significantly inferior in peri-urban zones than in urban centers (DID, 2013).

Environmental decline also impacts upon social structures. Social groups are affected differently: some may benefit from changes in price structures or in social relations that result from scarcities caused by environmental stress. More commonly, however, environmental decline adversely affects the health, well-being and livelihood opportunities of the individuals affected by pollution or natural resource depletion. Soil erosion, deforestation, the loss or depletion of animal and plant species limit the productive opportunities of vast numbers of people. Individuals respond to environmental degradation in a variety of ways: they may adapt their customary production and

consumption patterns to the new circumstances, search for alternative sources of income, migrate, or organize to undertake collective action to protect their livelihoods. Such individual responses, in the medium to long term, change social structures. When natural resource-dependent people intensify production, restrict or change consumption patterns, engage in new activities or migrate, they are changing their traditional societies, and participating in broader social transformations that will influence institutional change (UNRISD, 1994).

In developing countries, the peri-urban poor depend heavily on natural resources for income, as their livelihoods are in many cases based upon agriculture, horticulture, animal husbandry, forestry, or fishing. The economic impacts of land use change are disproportionately absorbed by the poor because of their high vulnerability to service or habitat loss, and the economic cost of lost land is high due to a lack of resources, influence, or alternatives for income, housing, or basic services. The lack of resources: especially when basic services provided by ecosystems are lost, the only alternative for the peri-urban poor is often to pay for services previously secured for free, and often at exorbitant prices (DID, 2013).



Plate 3. People constructing a kiln of bricks without any regulation and policy

The enforcement hierarchy of policies and regulation regarding wetlands management are still far from ideal implementation in that whereas it is now largely accepted that wetlands are an important resource worth protecting, and whereas enforcement of environment regulations, including those on management of wetlands is expected to be done through a hierarchy of enforcement levels from national (NEMA and Wetlands Management Department), District down to community levels, the enforcement capacity available (in terms of number of personnel, financial resources, and others) at all these levels appears not to be able to match the widespread nature of the problem of wetland abuse. In addition, while the responsibility for wetlands management has been vested under the local authorities, cases of local authority intervention on wetlands management are still few, implying that even where local authority intervention would have been enough to stop wetland abuse, such cases still continue to be referred to NEMA and Ministry (Aryamanya, 2011).

All countries in the global economy in the mid-1900s faced a period of transition from a more or less planned economy to a market economy. In other words, all countries needed to worry about the level of their technology and the quality of their institutions. Again it is worthwhile to go back in time to get a better handle on this (Zoltan, 2010). In his classic text, Rostow (1960) suggested that countries go through five stages of economic growth: (1) the traditional society; (2) the preconditions for take-off; (3) the take-off; (4) the drive to maturity; and (5) the age of high mass-consumption. While these stages are a simplified way of looking at the development of modern economies, they identify critical events. Zoltan (2010) asserted When the Soviet Union did not develop into a mass consumption society (in part due to a lack of total factor productivity), the stages approach to economic growth went out of fashion.

However, growth is not an end in itself as Rostow thought. The beginning and the end of growth is opportunity. A generation's worth of work on the determinants of growth has put the cart before the horse, focusing on the factors that result in growth rather than on the dynamics of the societies within which growth occurs. As a consequence, for a generation, political leaders and policy-makers alike have systematically neglected the vital role of entrepreneurship in capitalist development. As Schumpeter described over a century ago, entrepreneurs are vital to economic development not because they take risks

(as we have seen recently in financial markets, risk-taking does in itself not correlate with the creation of social value), but rather because they create 'new combinations' of economic activity which puts more pressure on the environment as a factor of production especially acting as a source of raw materials leading to overharvesting or exploitation henceforth degradation (Zoltan, 2010).

The environmentally displaced form a group that is in danger of being left without protection as their plight is tangled up with regular migration, voluntary environmental migration, and climate change migration. The distinctions that need to be drawn are the actual causal links between the environmental factors and migration and the extent to which the migration is forced. This is a particularly complex task because of the myriad factors that play a role in forced and indeed voluntary migration in the world today. The task is important, however, as a large proportion of environmentally internally displaced persons become urban IDPs (Internally Displaced Persons). The very existence of environmentally displaced persons is not universally acknowledged. environmental factors can cause political and ethnic conflicts, violence and war, resulting in forced displacement. What is clear, nonetheless, is an emerging consensus that environmental factors at the very least contribute to more direct causes of forced displacement, and thus are worthy of further research and clarification (Alexandra, 2008).

One of the most obvious limiting factors is poverty, and there is an observed correlation between environmental degradation and poverty in a wide variety of settings. This linkage has been exhaustively discussed, and the thinking on it has evolved similarly to that on local level resource management. After first blaming environmental degradation on the ignorance and wastefulness of the poor, conventional wisdom has turned to the explanation that the poor are forced to overexploit the environment by factors outside of their control. The simple version of this argument explains the linkage between poverty and environmental degradation in terms of two main processes. First, environmental degradation is said to cause poverty because, by definition, degradation involves the erosion of the resource base upon which the poor often depend for their livelihood, while the adverse impacts of environmental decline on people's health further limits their productive potential. Second, poverty is said to cause environmental degradation because the poor are forced into marginal resource areas: they are driven out of the best

agricultural lands, for instance, and into fragile and unproductive ecosystems. In addition, the poor do not have sufficient security to invest in the maintenance activities necessary for long-term environmental health (UNRISD, 1994).

The allocation of land in wetlands by the District Land Boards and Uganda Land Commission had been on the rise in the past few years therefore NEMA continues to receive development proposal on wetland areas that have been demarcated as plots by Planning Authorities and land allocated by Uganda Lands Commission which acts are illegal. This apparently continues to send bad signals to other wetland users who seem to perceive a sense of no action being taken in especially urban areas where wetland encroachment continues. In Kampala District, most of the wetlands which served as flood relief areas were allocated for industrial and residential developments and this trend has not been halted completely yet. Worth mention is the difficulty of enforcing planning requirements in peri-urban flood prone (Aryamanaya, 2011).

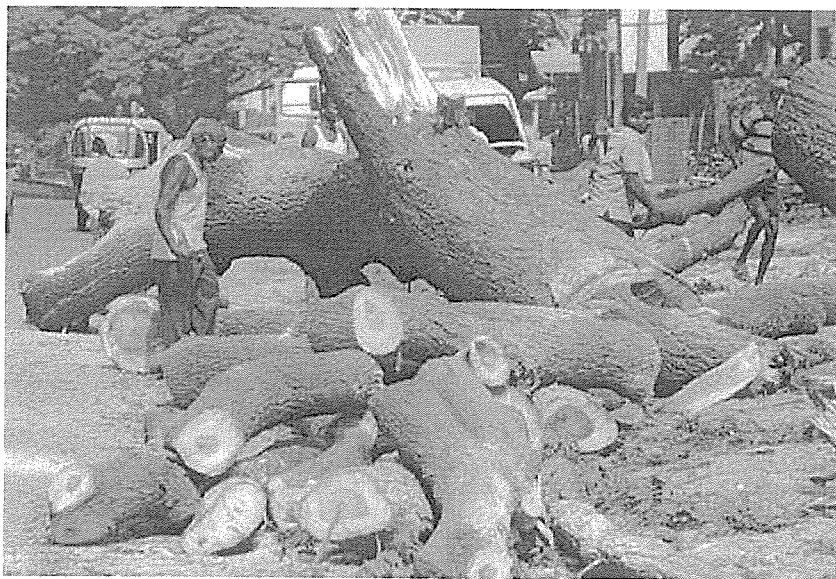


Plate 4. People engaged in destructive activities to ecosystem

2.4 Key ecosystems beneficial to biosphere maintenance

Wetlands provide a large array of ecosystem services defined as the benefits people derive from nature to Ugandans in urban and rural areas. They are used for farming, fishing, and livestock grazing. They supply families with basic needs such as water, construction material, and fuel. In addition to these local uses, the system of

interconnected wetlands plays a crucial role at a regional level by filtering pollutants and regulating water flows (influencing groundwater recharge, flood impacts, and water availability during the dry season). Of a total population of 28 million Ugandans by 2002 national census, it is estimated that wetlands provide about 320,000 workers with direct employment and provide subsistence employment for over 2.4 million (Aryamanya, 2011).

SCBD (2012) stated that the water purification through Nakivubo wetland was almost ignored when the local government had proposed draining the swamps to make way for agriculture, but when a study revealed that this ecosystem was providing a valuable service by filtering organic waste and other effluent derived from Kampala, the proposal was promptly dropped. The study indicated that a water-purification facility capable of performing the same service would cost several million US dollars to construct and US\$ 2 million a year to maintain. In this case, the value of converting land for agriculture would be offset by the cost of lost sewage-treatment capacity. Direct investment to maintain the wetland was a cost-effective measure to uphold the purification service.

Nakivubo swamp in Uganda for example has a fundamental function of regulating and buffering nutrient inputs and filtration of anthropogenic pollutants into Inner Murchison Bay. For over 35 years, the swamp has been the overall recipient of partially treated wastewater from the City of Kampala and storm water. The swamp's existence is further threatened by human encroachment through subsistence farming, settlements, burning, brick making and biomass harvesting for livestock (Aryamanya, 2011).

SCBD (2012) noted that urban biodiversity is the variety and richness of living organisms (including genetic variation) and habitat diversity found in and on the edge of human settlements. This biodiversity ranges from the rural fringe to the urban core. At the landscape and habitat level it includes: Remnants of natural landscapes such as leftovers of primeval forests; Traditional agricultural landscapes for instance meadows, areas of arable land; Urban-industrial landscapes for instance city centers, residential areas, industrial parks, railway areas, formal parks and gardens, brown fields. Therefore, the diversity of plants and animals in the urban landscape shows some interesting patterns: (i) The number of plant species in urban areas often correlates with human population size more so than it does with the size of the city area. (ii) The age of the city affects species

richness; large, older cities have more plant species than large, younger cities. (iii) Diversity may correlate with economic wealth. For example, in Phoenix, USA, plant and bird diversity in urban neighborhoods and parks shows a significant positive correlation with median family income. (iv) Twenty percent of the world's bird species and 5 percent of the vascular plant species occur in cities. (v) On average, 70 percent of the plant species and 94 percent of the bird species found in urban areas are native to the surrounding region.

Parks Victoria, a park management agency of the State Government of Victoria, Australia, launched the "Healthy Parks, Healthy People" (HPHP) approach in 2000. The goal was to emphasize the value of visiting parks and natural open spaces for the benefits they provide as healthy places for body, mind, and soul. Similar approaches have now developed around the world, including in Canada, the United Kingdom, and the United States of America. In addition, in many slums, the presence of trees and plants that heal is extremely crucial, as traditional medicine is typically the most economical, trusted, and readily available form of health care in such settlements. In Bangalore, one of India's fastest growing cities, an estimated 30–40 percent of the population lives in 550-plus slums. Surveyed slums in Bangalore have an average of 11 trees per hectare, versus 28 per hectare in other residential areas. The species that dominate are of high medicinal and nutritional value and are sources of primary health care. The trees also offer many socio-cultural services. Daily chores such as cooking and washing are carried out under tree cover. Trees act as pillars of support in such settlements symbolically and literally by bearing tents, clotheslines, wires, and so on. The variety of roles that plants play in slums is critical to people's health and well-being (SCBD, *ibid*).

The water cycle enables ecosystems to provision of goods such as food, fuel and timber; to regulate and support the environment and its biological diversity; and to provide for cultural services and fundamental ecological processes. Thus, ecosystem integrity and long-term health are at the very centre of sustainable food production, and efficient, equitable and sustainable management of water resources is crucial for both ecosystem health and food production. Built as it is upon the principles of economic efficiency, equity and environmental sustainability, Integrated Water Resources Management (IWRM) offers a comprehensive and adaptive management framework to support water

management for healthy ecosystems and food security. Associated economic and market-based, regulatory, awareness and capacity building instruments can be applied to manage demand and encourage greater water efficiency by planners and users (Gareth *et. al.*, 2013; Gordon *et. al.*, 2010).

SCBD (ibid) emphasized that the green spaces offer numerous ecosystem services hence these urban green spaces, ranging from parks and agriculture to residential lawns and roof gardens, contribute to climate-change mitigation in three principle ways: Green spaces can increase carbon storage and uptake. Although there is considerable variation in green space across cities, there is overwhelming consensus that urban green spaces offer numerous ecosystem services, among them shade provision, rainwater interception and infiltration, and pollution reduction. More green space generally means more vegetation that can act as a carbon sink for partially offsetting urban emissions. Trees can contribute indirectly to climate-change mitigation by providing more shade and cooling, thereby reducing overall energy consumption. Green spaces can significantly reduce the urban heat island (UHI) effect, where urban areas are warmer than surrounding regions. The UHI varies spatially, geographically, and temporally. Some of the key factors that determine its intensity include the relative amount of green vegetation versus buildings and paved surfaces, energy consumption within cities, and the types of materials used for building construction and their heat-absorption capacities.

Ian and John (2000) asserted that a Biosphere Reserve is an area of terrestrial and coastal/marine ecosystems which is internationally recognized within the framework of UNESCO's Programme on Man and the Biosphere Programme (MAB) as being of international importance in demonstrating three complementary functions: nature conservation; environmental education, research and monitoring; and sustainable development (UNESCO, 1996). Biosphere Reserves should help to strengthen the conservation of biological diversity, genetic resources and ecosystems. A Biosphere Reserve must contain at least one sample of an ecosystem that is typical of a biogeographic unit using criteria of diversity, naturalness and effectiveness as a conservation unit. The area concerned should be large enough to ensure the sustainability of viable populations of the component species of the ecosystem.

Each Biosphere Reserve includes one or more core areas which are strictly protected according to well defined conservation objectives and consist of typical samples of natural or minimally disturbed ecosystems. Collectively these core areas should be large enough to be effective as *in situ* conservation units and, whenever possible, have value as benchmarks for measurements of long-term changes in the ecosystems they represent. The size and the shape of the core area (s) depend on the type of landscape or aquatic environment in which they are located and on the conservation objectives they are intended to meet (Ian and John, *ibid*).

The core areas are normally surrounded by a buffer zone which must be strictly delineated. Both the core area and the buffer zone must have a clearly established legal or administrative status (such as a National Park) even when several administrative authorities are involved in its management. Only activities compatible with the protection of the core areas may take place. This includes research, environmental education and training, as well as tourism and recreation or other uses carried out in accordance with the management requirements. The core area (s) and the buffer zone are surrounded by a transition area which promotes several characteristic functions of the Biosphere Reserve, particularly its development function. It may include experimental research areas, traditional-use areas or rehabilitation areas. Usually, the transition area as a whole is not strictly delineated and corresponds more to biogeographic than to administrative limits (Ian and John, *ibid*).

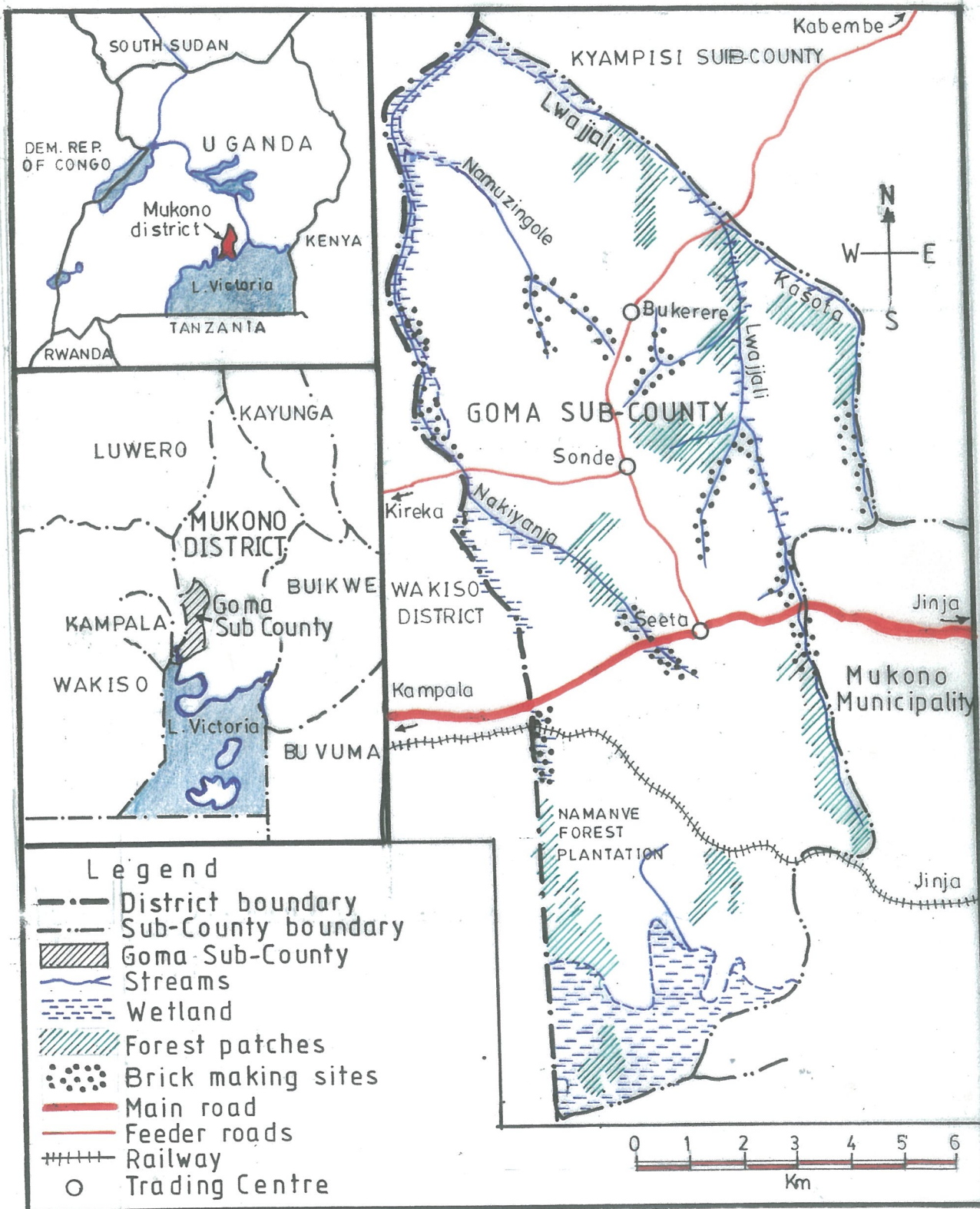
Natural vegetation, especially woodlands and forests, acts as a filter removing particulate matter arising from the combustion of fossil fuels from the air. Soils, and particularly forest soils, also serve as effective that remove organic materials and chemicals from water, contributing to its purification before it reaches streams and rivers. Wetlands too perform an essential function of water purification by removing nitrogen and phosphorous from agricultural runoff, preventing eutrophication of streams and rivers. Wetlands also remove or transform toxins that would otherwise contaminate habitats. In terms of cycling processes, vegetation plays an essential role in removing one of the main greenhouse gases, carbon dioxide, from the atmosphere. Carbon sequestration provides valuable economic services in terms of climate regulation. Nutrient cycling (through nitrogen fixation and the breakdown of soil organic content) and soil formation processes

(the breakdown and release of minerals from rock and the accumulation of animal and plant organic matter) are particularly important in maintaining soil productivity, which provides an important economic input to agriculture (Jodi *et. al.*, 2005).

According to SCBD (ibid) Uganda's largest city Kampala is well suited to agriculture because: it has a tropical climate, good soils, water, and abundant rainfall. Although the city is growing rapidly, agriculture remains highly visible, even in densely populated areas. In 2002, 49 percent of households were farming within city boundaries and the vast majority of them for food security or survival, not commercially. About half were raising livestock as well as crops. The recognition that urban agriculture was so widespread generated serious health concerns among Kampala's City Council. Many people were farming in hazardous or unsuitable places especially roadsides, wetlands, and contaminated sites. When an extended research project started on urban farming and public health, the city joined the effort. Between 2002 and 2005, the project researched the benefits and risks of urban agriculture in Kampala. As a result of this and other research, Kampala changed how it regulates urban food production. In December 2006 it passed five new ordinances defining how urban agriculture can be carried out in the city. The effort among the first serious legislative reforms to support urban agriculture was designed to encourage self-reliance among urban dwellers and safe and healthy food production while also ensuring public health.

Uganda's forest cover declined from about 5 million hectares in 1990 to 3.7 million hectares in 2005. This was a result of encroachment for agricultural production, deforestation to produce woodfuel, urbanization, industrial growth, migration and problems of internally displaced people. In Uganda forest governance is split at three levels: NFA (National Forestry Authority) for Central Forest Reserves, District forest services for community and the privately owned and managed forests. There has been increasing pressure to degazette Central Forest Reserves for industrial purposes from the Central Government. This has been the case for Namanve, Wabisi-Wajala (in Nakasongola district), Butamira forest reserve and more recently the intention to allocate part of Mabira central forest reserve to sugar cane growing (NEMA, 2006/7).

GOMA SUB-COUNTY IN MUKONO DISTRICT



Source : (UNFA) Forest Department, 1997.

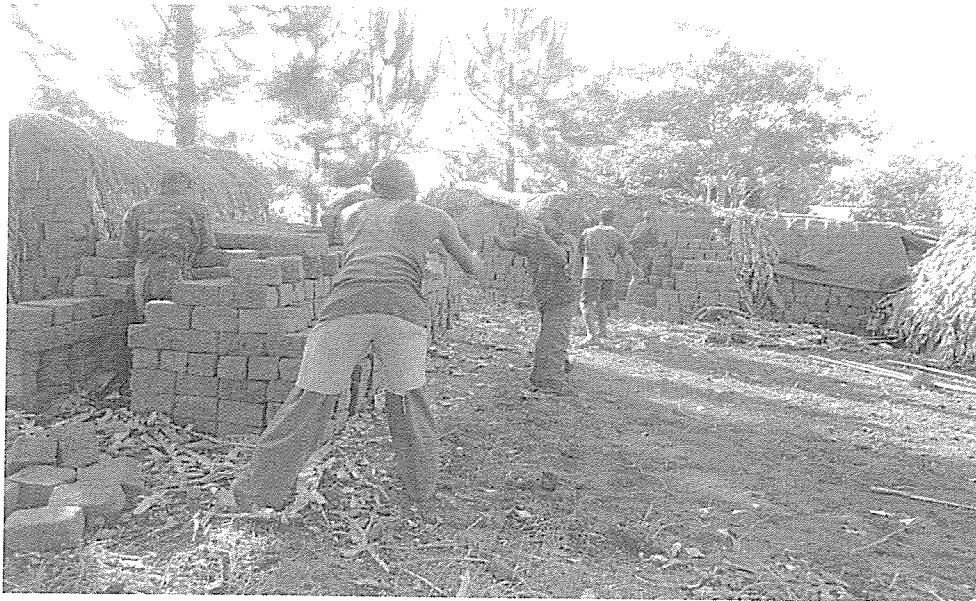


Plate 5. People making bricks in Juggo Area of Mukono



Plate 6. Destructive soil excavation during brick making

CHAPTER THREE: RESEARCH METHODS

3.0 Research type and strategy

This research was exploratory and attempted to assess the impact of brick making on the peri-urban environment using Mukono as a case study.

3.1 Unit analysis

The study covered the brick makers the brick buyers, local council executive members, tree farmers and district executive that are directly responsible for conservation of peri-urban ecosystem.. The study covered the Goma sub-county and some parishes like Juggo, Seeta, Kira etc with the aim of getting information from town residents. Therefore the unit of analysis questionnaire was for the above mentioned people.

In order to determine the potential role of conservation in peri-urban area towards the management of ecosystem environment, qualitative and quantitative methods were used. It involved designing of structured questionnaires to the community responsible and gathering opinions of different respondents through open ended interviews with both the environmental executive officers.

The use of the above instrument enabled me to collect enough information from the target population. While considering different stakeholders questionnaires were administered to 45 respondents of the brick makers community since they are the people on the fore front of affecting the ecosystem services.

Another 40 questionnaire were administered to brick buyers, 30 questionnaires to local council executives, 35 questionnaires to tree farmers and 10 questionnaires were administered to district environmental executives.

3.1.1 Qualitative Data Analysis

The procedure of analysis was applied, as I clarified on the view of the respondents on the existing phenomena the tools applied were observation, surveys, interview, questionnaire and documentation. The views of different respondents' were analyzed

Quantitative Data Analysis

For purpose of quantitative data analysis the collected data was analysed using descriptive statistics basing on the number of respondents from each one of the categories. Documentary research is the technique where news papers, journals article and books both published and unpublished and electronic documents were used. Thus, review of published documents, reports and policy papers relevant to the study were used from both private and public university libraries. This was useful for attaining qualitative information regarding the impact of deforestation on the environment.

3.2 Data collection

3.2.1 Research techniques

In the course of the research both primary and secondary data were collected. Collection of secondary data involved using already published materials to get more relevant information related to the topic from various sources such as libraries and online source.

Primary data was collected by principally going to the field for two month. And was able to get two experienced research assistants who administered the questionnaire and two other assistants for data entry in descriptive statistics and as well an interpreter who briefed the respondents in their own local language at the field.

3.2.2 Primary data collection methods

3.2.2.1 Questionnaires,

Written questions were used to gather information from respondents of the community such as the bricks makers, brick buyers, local council executive, free farmers and the district environmental executives. I was in the position to get information on challenges of peri-urban ecosystem in Mukono District.

3.2.2.2 Interview schedule

The interviews comprised of open ended questions were also administered to people involved in brick making and peri-urban conservation.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Socio demography of the respondents

The majority of the respondents interviewed were of low formal education about 87% of them did not manage education beyond secondary level. Most of the respondents (52.5%) were using manual means for brick making. (20%) of the respondents were agitating for capital to improve the brick making process with a level of ecosystem conservation 27.5% of the respondents were supporting using modern machines to improve the work and also 70% of the respondent stay in proximity (1km) to the site and each of these had at one point in time converted a section of the forest for commercial gain.

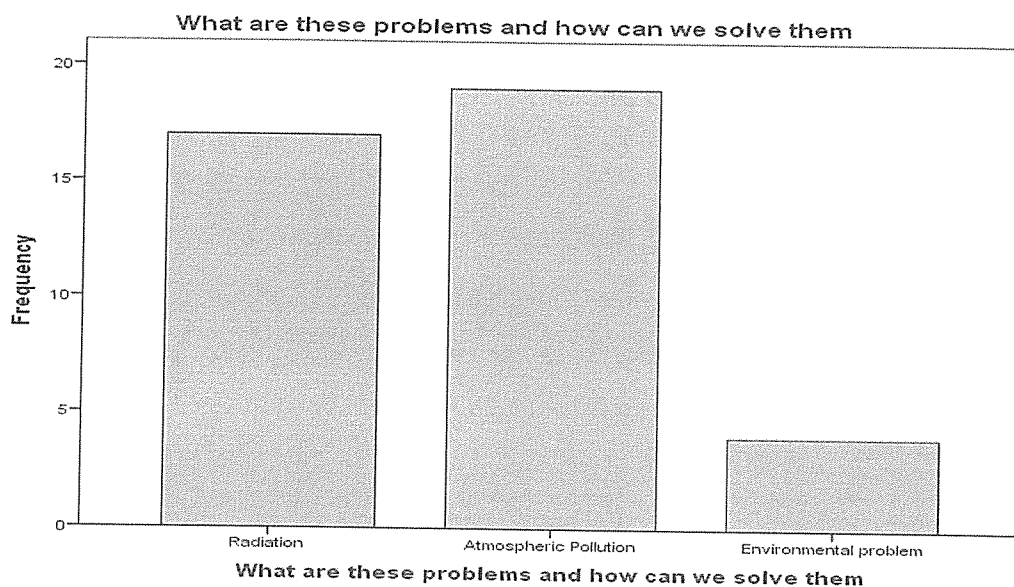
Most of the respondents (35%) reside in permanent or semi permanent houses. Many of the households in the peri-urban areas of the community made the bricks used for the construction of their homes from the swamp resources.

A few respondents (5%) were primarily employed as brick makers and it was reported that these mostly sold their wares to customers from Ntinda, Kampala, Mukono and the surroundings towns.

4.2 The main peri-urban environmental problems

The analysis of environmental problems covered all the part of Goma and Seeta sub county in Mukono area. Plate 8 represents the percentages of the 40 respondents in the area who expressed their opinions on environmental problems. The community in Juggo ward expressed the situation of lack of coordination. The central business is far from their ward and therefore they were forced to engage themselves into different kind of activities that are detrimental to the environment. This was one of the problems that came out strongly from 10% of the respondents in Juggo peri-urban ward area.

Figure 2. Responses on Problems caused by unregulated brick making



When considering the analysis of the environmental situation as seen in the figure above, the problem in the peri-urban areas of Mukono town the respondents expressed their views on environmental problem, 47% of the problems being air/atmospheric pollution, 17% beings the problem of radiation, and 4% being exceptional environmental problems such as wetland destruction, water pollution and they use this water for domestic use, few people knew about them and therefore they represent few percentages, some did not know what environmental problems were and trees felling took a percentage of 42%, being the destruction of forests.

Wetland destruction

The town officials also explained especially the local council executive members that there is evidence of encroachment onto wetland for brick making, clay extraction and crop production. This leads to loss of wetlands, loss of biodiversity and accumulation of stagnant water as a result of excavation for brick making that becomes habitat for disease carrying vectors such as mosquitoes.

Air pollution

47.5% of the community complained of increase dust level due to scattered brick making, quarrying and sand and clay sand excavation and burning that are near residential areas of the residential areas. The people of Juggo and Seeta mentioned that the town council has not taken up any scheme to help them out and due to the low income they may not afford to move elsewhere.

Deforestation

The district environmental executive stated that urbanization seemed to have contributed to deforestation through increased cutting of trees due to the demand for charcoal, firewood and timber for making bricks and construction. There was also evidence of encroachment on forest land for agricultural utilization for cultivation and grazing, leading to soil infertility, irregular weather patterns and occurrence of severe droughts. Some of the 47% respondents also identified this as an increasing problem and they sighted officials in the local as being part of the culprits and this depicts poor leadership on the side of the officers.

Summary Analysis:

Research question 1

Table 1

One-Sample Test

	Test Value = 0					
	T	df	P-value	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Effect of brick makers	15.165	39	0.000	.71250	.6175	.8075

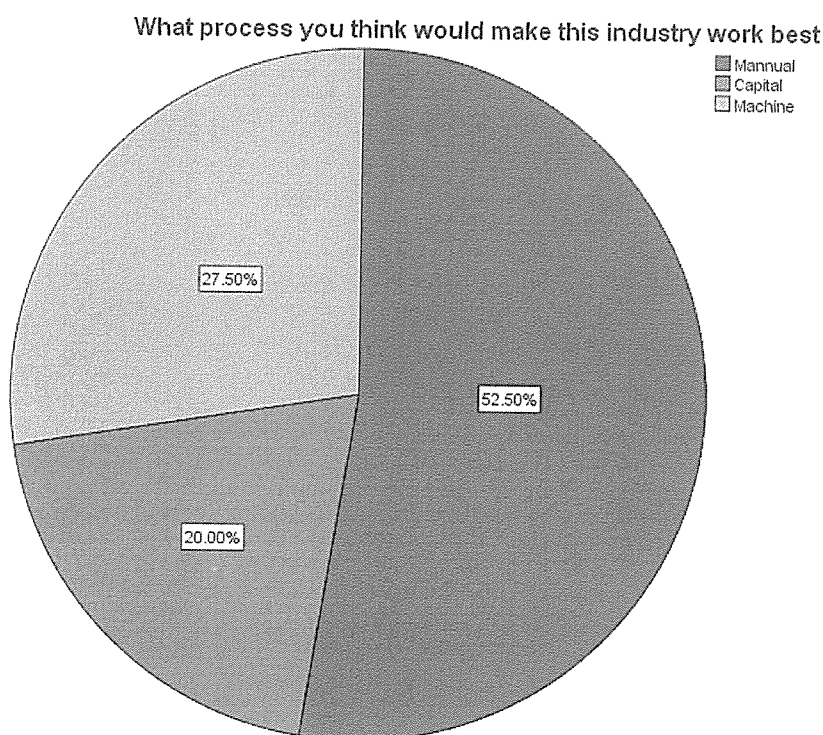
From the table above, it shows that the brick makers have significant effect on the environmental conservation of peri-urban ecosystem in Mukono since the P-value from the table is less than 0.05.

Descriptive Statistics

Table 2. Responses on what process would make brick making work best

	Frequency	Percent	Cumulative Percent
Manual	21	52.5	52.5
Capital	8	20.0	72.5
Machine	11	27.5	100.0
Total	40	100.0	

Figure 3. Responses on what process would make brick making work best



The table and pie chart depicts the frequency and percentage on what process respondents thought would make this industry work best and as regard to their response, 21 (52.5%) agreed with manual process, 11(27.5%) was recorded for machine and 8(20%) capital for the process that would make the industry work best.

Table 3. Responses on what environmental problems transporters envisage in the brick making industry

	Frequency	Percent	Cumulative Percent
Land Pollution	29	72.5	72.5
Health problem	3	7.5	80.0
Lack of resources	8	20.0	100.0
Total	40	100.0	

This table denotes the descriptive statistics of the environmental problems envisaged in business, from the table and the pie chart represents a total number of 29 (72.5%) of respondents are faced with land pollution as regards the business, while 3 (7.5%) was recorded for health problem and 8 (20%) for lack of resources. This is as well shown on the pie chart below.

What environmental problems do you envisage in this business as a transporter

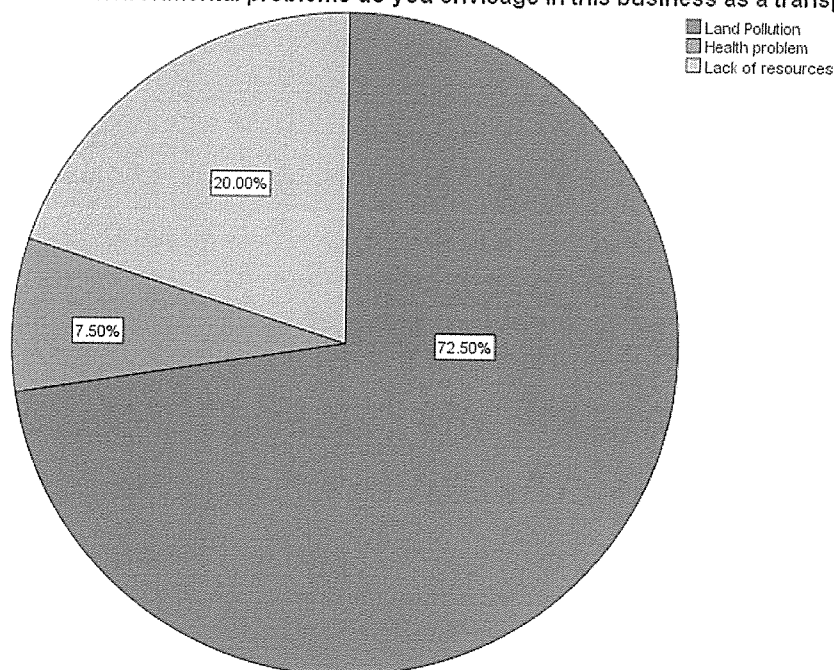


Figure 4. Responses on what environmental problems are envisaged by brick transporters

Table 4. Responses on which alternatives can be done to improve the brick making industry

	Frequency	Percent	Cumulative Percent
Capital	6	15.0	15.0
equipment	14	35.0	50.0
Law guiding the whole work	7	17.5	67.5
Education	4	10.0	77.5
Industrial ways	9	22.5	100.0
Total	40	100.0	

From the table 14(35%) agreed that the development of the industry can only be attained by the provision of equipment, 9(22.5%) was recorded for industrial ways, 7(17.5%) of the respondent regard the development of the industry to be dependent on enacting relevant laws to guide on the sustainable use of wetland resources, while 6(15%) believed the development of the industry could be achieved by injecting in more capital and lastly a total 4(10%) suggested educating the brick makers about the dangers of unregulated brick making. This is depicted on the pie chart below.

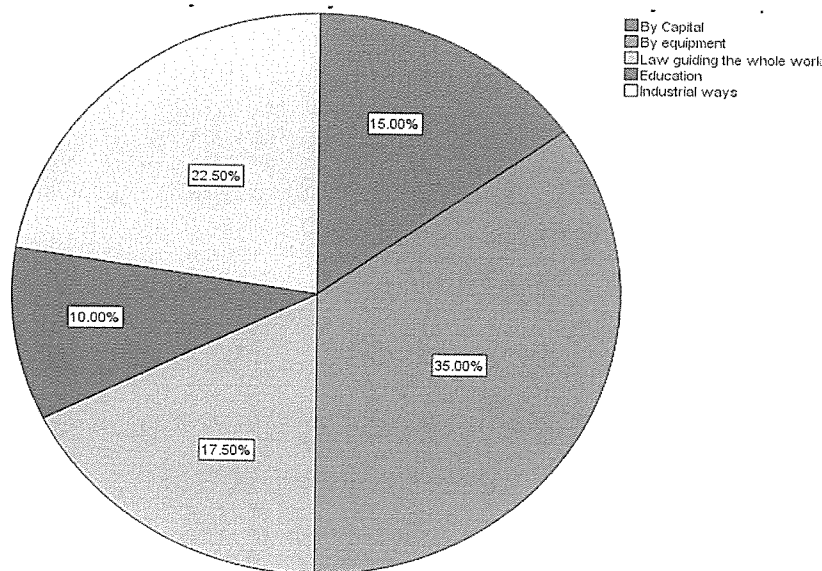
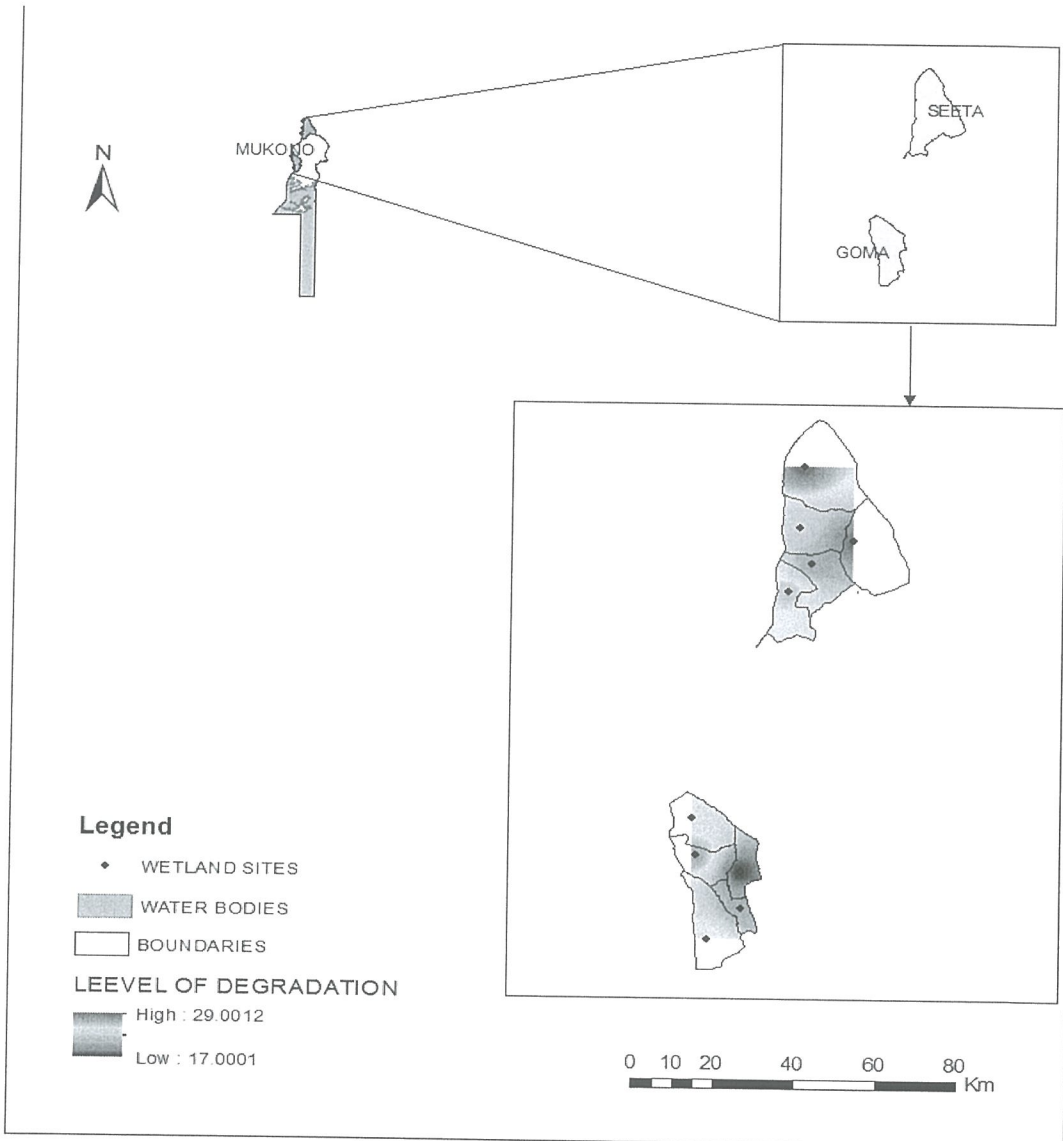


Figure 5. Responses on what interventions can be used to minimize the negative impacts of brick making

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Figure 6. Map of Mukono showing levels of wetland degradation



The above map indicates the level of degradation in Goma sub county and Seeta sub county based on the areas adjacent to the wetland.

In classifying the above information, interpolation kriging method was selected to determine the level wetland degradation basing on the several sample points that were selected from each site so as to provide an indicator of reliable estimates since the sample points randomly selected with a spatially correlated component known as a regionalized variable. It is assumed that the variance of the difference is a function of the distance between the points represented.

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The above information therefore indicates, bricklaying is tremendously increasing thus correlating with levels of tree cutting in wetland areas of Mukono.

Table 5.

Research Question 3

One-Sample Test

Test Value = 0					
T	df	P-value	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
51.740	39	.000	1.03333	.9929	1.0737

From the one sample test table above, it shows that the council members are significantly contributing to the environmental conservation as regard to their responses.

Table 6. Activities engaged in by the community to mitigate environmental degradation

	Frequency	Percent	Cumulative Percent
Tree planting	12	30.0	30.0
Agriculture	17	42.5	72.5
Afforestation	6	15.0	87.5
Sensitization	5	12.5	100.0
Total	40	100.0	

From the result of the descriptive statistics above, 17(42.5%)of the community engaged in agriculture,12(30%) for involve in tree planting, while 6(15%) and 5(12.5%) was recorded for A forestation and sensitization as to sustain, educate and maintain environment issues. As shown on the bar chart

Figure 7. Responses on the activities engaged in by the community to mitigate environmental degradation

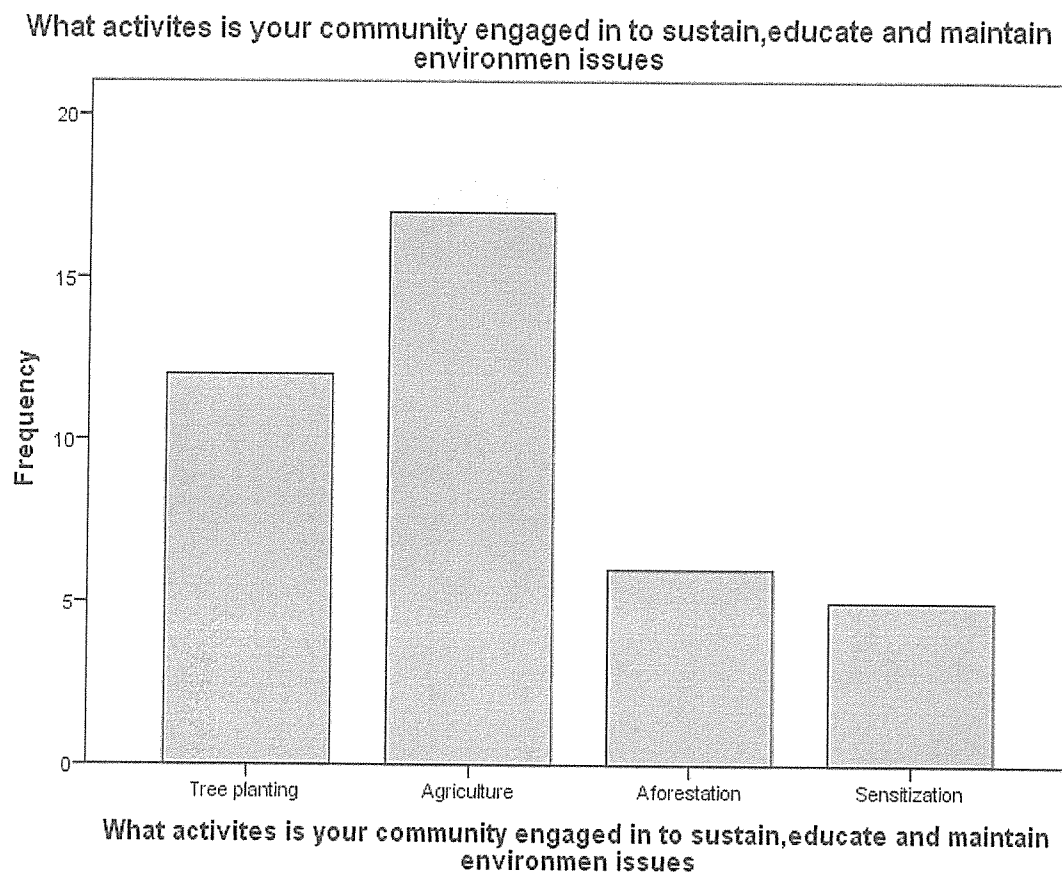


Table 7. Responses on the problems caused by brick making and how they can be solved.

	Frequency	Percent	Valid Percent	Cumulative Percent
Radiation	17	42.5	42.5	42.5
Atmospheric Pollution	19	47.5	47.5	90.0
Environmental degradation	4	10.0	10.0	100.0
Total	40	100.0	100.0	

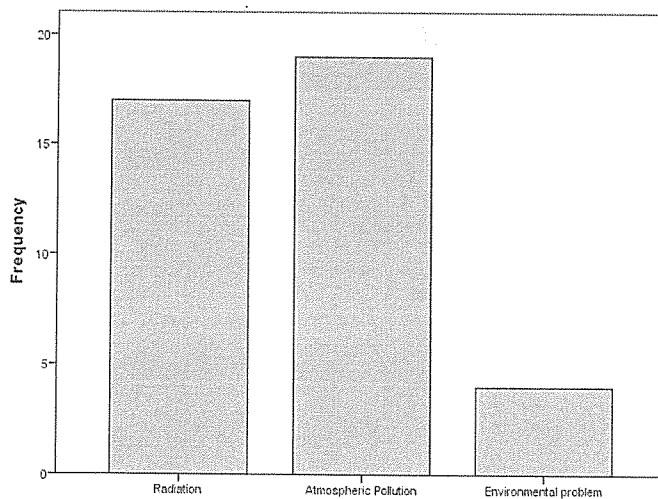
Solution

	Frequency	Percent	Valid Percent	Cumulative Percent
Sustainable development	14	35.0	35.0	35.0
Educate and Sensitize people	17	42.5	42.5	77.5
Avoid environmental Degradation	9	22.5	22.5	100.0
Total	40	100.0	100.0	

The descriptive statistics display the highest cited problem was atmospheric pollution (47.5%) followed by radiation (42.5%) and lastly by (10%) was recorded for environmental degradation.

Furthermore 42.5% of the respondents suggested that the solution to the problem could be solved by educating and sensitizing the people in the local area, a total number of 35% of the respondents believe a sustainable development could as well eliminate the problem while 22.5% agreed that avoiding of environment degradation will play a vital role in solving the problem cited above. This is as well represented on a bar chart.

Figure 8. Responses on environmental problems and how they can be solved



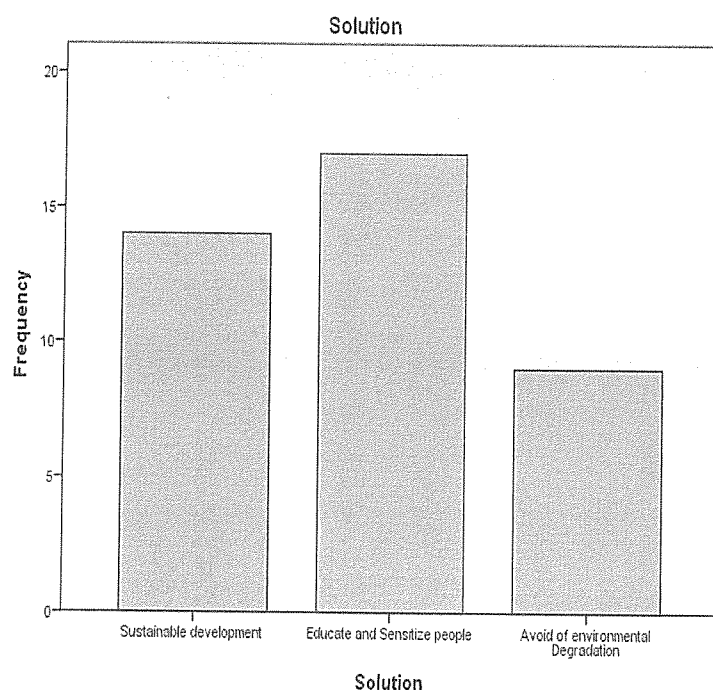


Table 8. Responses on what anthropogenic and environmental problems are faced by tree farmers

	Frequency	Percent	Cumulative Percent
Illegal cutting down of trees	19	47.5	47.5
Deforestation	12	30.0	77.5
Flood	9	22.5	100.0
Total	40	100.0	

From the table 47.5% tree farmers face illegal cutting down of trees while 30% encounter deforestation problem and 22.5% of the tree farmers encounter flood destruction. See chart below for pictorial representation

Figure 9. Responses on the anthropogenic and environmental problems faced by tree farmers

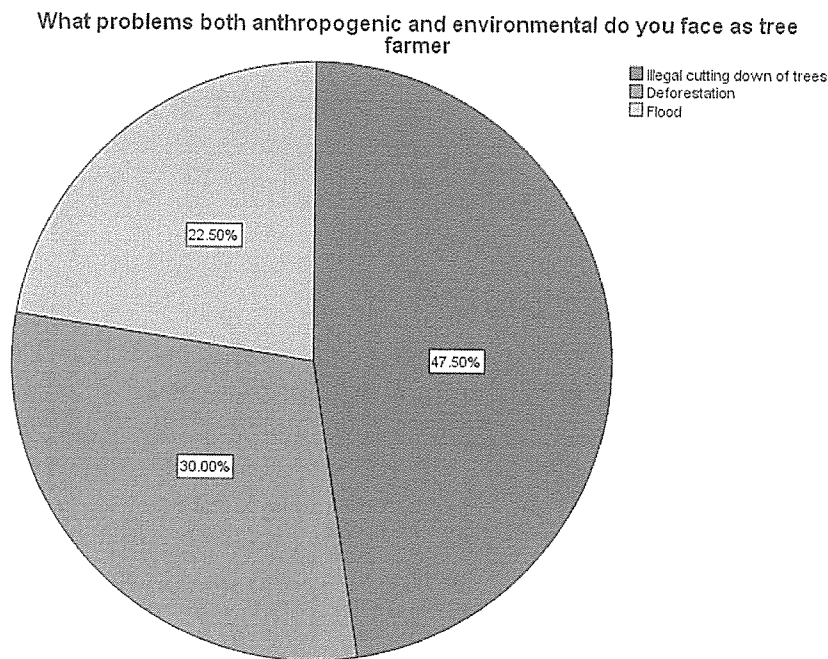


Table 9. Responses on what the communities do to improve the biomass levels.

	Frequency	Percent	Cumulative Percent
Aforestation	18	45.0	45.0
Sustainable Agriculture	16	40.0	85.0
Environmental awareness	6	15.0	100.0
Total	40	100.0	

From the findings of the descriptive statistics, 18(45%) agreed that for communities to improve the biomass levels and percentage of the area afforestation should be carried out while 16(40%) of the respondent presumed that sustainable agriculture can as well improve the biomass of the local area, lastly 6(15%) was recorded for environmental awareness. See chart below for percentage level.

Figure 10. Responses on how to improve biomass

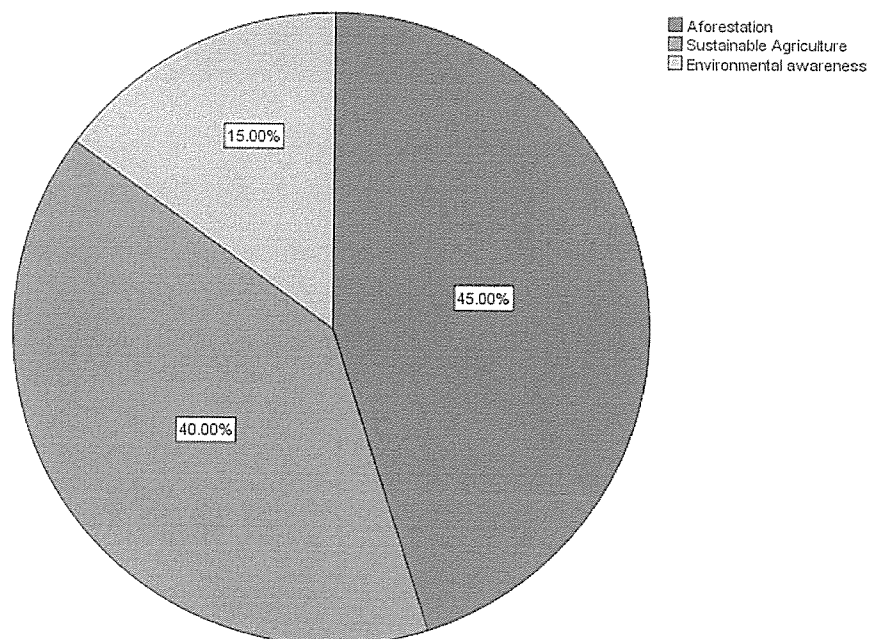


Table 10. Responses on the major threats of environmental degradation in Mukono district

	Frequency	Percent	Cumulative Percent
Environmental pollution	16	40.0	40.0
Deforestation	17	42.5	82.5
Environmental degradation	7	17.5	100.0
Total	40	100.0	

From the above table, 17(42.5%) of the district environment executive agreed that deforestation is the major threat prevalent in the district, followed by environmental pollution with 16(40%) of the respondents, and lastly environmental degradation with 7(17.5%) of the respondent view.

Table 11. Responses on what mitigation measures can be taken curb the threats of environmental degradation

	Frequency	Percent	Cumulative Percent
Environmental campaign	12	30.0	30.0
Educate people	13	32.5	62.5
Sustainable Agriculture	11	27.5	90.0
Guiding policy	4	10.0	100.0
Total	40	100.0	

A total of 13(32.5%) of the executive members claims that educating people, would eliminate the problem stated above, while 12(30%) and 11(27.5%) claimed that environmental awareness and sustainable agriculture respectively could as well decrease the major threat facing the districts and 4(10%) of the respondents are of the view that guiding policy should enforce so as to reduce the problem facing the district.

4.3 Discussion

4.3.1 Beneficial ecosystem dependence in the Peri-urban community

Peri-urban dependence on ecological life-support system is evident in subsistence economies, where communities depend directly on ecosystem for food and other product resources. Never the less in developed countries, most ecosystem services are not directly obtained or enjoyed from nature and socio-economic systems are becoming increasingly decoupled from natural ecosystem, alienating the consumer from the links between the source ecosystem and final goods and services (Gomez-Baggethan and de Grout, 2010). Thus, where social and ecological systems are tightly linked and there is heavy reliance on ecosystem goods in the peri-urban areas and one would expect awareness of ecosystem to be high; the contrary would be expected in the developed world. Ifteknar and Takama (2007). Recent studies indicate that the perception varies depending on the type of ecosystem analyzed. For example, in Kibale National park (Uganda) it was found that more people were likely to report that ecosystem services were provided by wetlands, rather than forests respectively (Harter 2010).

Most people in Mukono, are of low formal education , informally employed and maintain large families. The general lack of education leads to lack of formal employment with the rural setting and large families hint on peri-urban beneficial ecosystem.

This implies that the people in this area are very likely to be dependent on natural resources for most of their subsistence and commercial requirement, as they cannot afford the substances, which often cost money. Hundreds of millions of people in peri-urban and rural settings worldwide derive their subsistence needs and income from gathering and harnessing natural resources (Ticktin, 2004).

In Mukono peri-urban area, most people reside in semi permanent houses. It was reported that community members make the bricks used for house construction. The brick are fired using firewood collected from the swamp, forest, the soil and sand are excavated from the swamp after which the holes are left open. These holes collect rain water and these pools of stagnant water a breeding place for mosquitoes and other micro organisms. Most of the sand and bricks are sold to nearby fast developing urban areas of Mukono and Kampala.

Infrastructure development have been documented by NEMA (2001), as a major driving factor of biodiversity degradation in the peri-urban and the swamp forest of Uganda. In the long run poses a threat the climate as can contribute to climate change through global warming.

Many of the people consulted while conducting this research, live in close proximity to the swamp forest; they actually own sections of the swamp forest. This has enabled many of them to convert sections of the forest for commercial gain. Enabling laws are weak and sometimes contradictory and hence cannot effectively protect the many small forests located in remote areas (Infield, 2001; Kakuru, 2002; NEMA, 2001; Wahungu et. al., 2005).

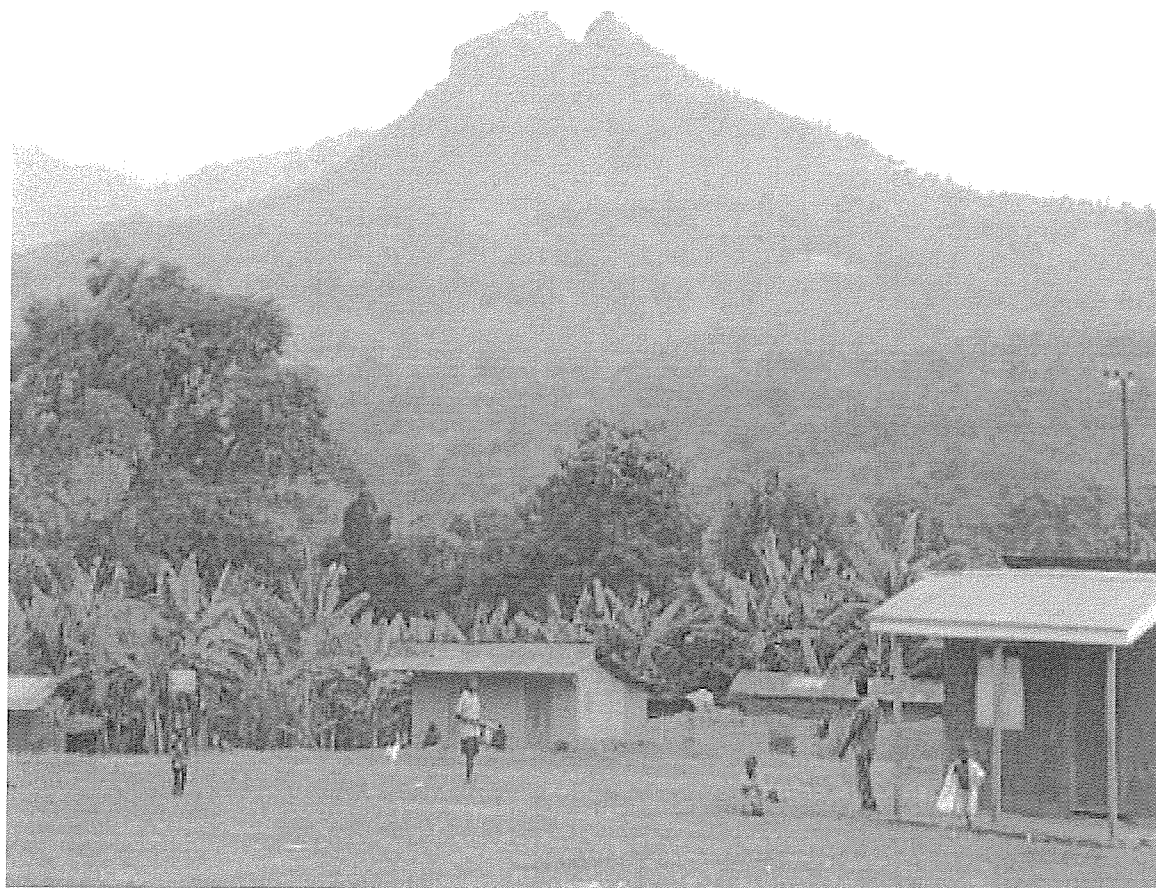
Many of the useful woody species that exist in Nakiyanja swamp forest have multiple uses, which make them susceptible to over exploitation. In eastern Uganda it was observed that species with multiple uses tend to be over exploited resulting in population declines (Tabuti, 2003). Some of the woody species from Nakiyanja that produce timber, wood fuel, food, crafts and medicine are sold locally. A marketable species is threatened with over-exploitation. The marketability of a species for timber depends on the quality, quantity of timber and fuel realized from a single stem. The good timber and fuel qualities include hard wood, a sizeable girth and straight trunks.

The hardness of the firewood or the charcoal is equated to the hardness of the woody species from which it is got. It should also be able to dry quickly. These qualities are attained by the large tree species that take very long to Mature such as *Neoboutonia Macrocalyx*, *Pycnanthus angolensis*, *Albizia zygia*, *Albizia coriaria*, *T. nobilis*, *E. abyssinica* and *M excelsia*. Population of large trees cannot withstand intensive harvest, as they are much slower at regenerating themselves (Ticktin, 2004). The marketability of large tree species for timber and fuel leading to over exploitation was noted in other parts of Uganda and Africa (Basemerwe 2003; Lykke, 1998; 20000; Obiri, 20002; Tabuti 2004).

Some species are not used for fuel due to cultural beliefs for example some are believed to cause death to members of a household that dare use it, others are said to bring bad

omen as well as being custodian trees for the spirits. Cultural beliefs such as these have played a big role in saving many species in many parts of the world (Cunningham, 1993; Kamatenesi, 1997; Infield 2001; Martins, 1995; Tabuti, 2004)

Plate 7. A Peri-urban homestead in Goma Sub county



4.3.2 Peri-urban as a Concept

Today researchers from many disciplinary and paradigmatic perspectives use the term peri-urban to describe contradictory processes and environments. Examination of the literature evidences a number of distinct patterns in the way researchers have addressed it. (See Jaquinta and Drescher, 1999). Unfortunately, a variable that is seen as definitional for some is seen as an outcome of peri-urban processes by others. Consequently, the concept of peri-urban has become trivialized and tautological, its analytical and practical utility severely compromised.

The concept of peri-urban emerged due to limitations in the dichotomy between rural and urban. Much research has identified the inadequacy of this simplistic dichotomy, some authors even suggesting its analytical relevance is long past.^{lv} Others have argued more specifically that only the dichotomous construct has outlived its usefulness not the underlying distinction between degrees of ruralness and urbaness (Rambaud 1973).

RUPRI (1998) specifically criticizes the dichotomous basis of “urban and “rural” definitions, arguing that many of the characteristics that define rural areas exist along a continuum within which individuals, households, communities and institutions distribute themselves. A key feature of peri-urban environments is their dynamic nature, wherein social forms and arrangements are created, modified and discarded. They are areas of social compression or intensification where the density of social forms, types and meanings increases, fomenting conflict and social evolution. Whether we decide to accept a continuum model or a model that employs a “typological set” is less important than the recognition that the spectrum of change from rural to urban is discontinuous, “lumpy”, and multidimensional, and that it arises from underlying social processes.

We begin the search for a comprehensive definition of peri-urban with the concept of urban.” Established theoretical definitions of urbanization urbanism identify the following components:

- Demographic component (i.e., increasing population size and density)
- Economic sectoral component (i.e., a primarily non-agricultural labor force)
- Social-psychological component (i.e., consciousness of what it means to be urban)

In sociology the first two components are usually taken as the basis for defining urbanization while the third is the core definition of urbanism--the social psychological reflection or response to urbanization (Fischer 1984). The social psychological component essentially refers to those values, attitudes, tastes and behaviors that are seen to be characteristic of urban as opposed to rural dwellers. Earlier notions of this component tended to be associated with “westernization”, reflecting the ethnocentric thinking of the time (Holleman 1964:3 24). More recent writers take a more neutral view of the process (Williams, *et.al.* 1983; 1990).

Given that the above three components form the basis of the definition of “urban” and given that peri-urban includes some level of urbaness, then it follows that some variation of these three components should underlie the definition of periurban. Holleman underscores this when he directly links pen-urban to the concept of a “change in mental orientation.”

Importantly, what seems to be not essential to the definition of peri-urban is “proximity to the city”. **The fact that much periurban “place” is proximate to the city is substantively important and instrumental to a comprehensive understanding of periurban, but it is incidental to an elemental understanding of peri-urban.** As we shall elaborate, “proximity to city” represents a further specification, which allows us to distinguish between “types” of peri-urban, not to define peri-urban in the first place. Additionally, concentration on geographic location as a basis for defining peri-urban also undermines a clear understanding of the rural- urban spectrum as dynamic, interactive and transformative.

The social-psychological component is the one most often omitted from peri-urban definitions. Yet as some scholars and policy analysts have argued, ignoring this component misses the reality of peri-urban, underestimates the prevalence of social change and misclassifies the experiences of numerous people and communities in the real world. VII Typically, those researchers arguing in support of including this component have also been the most critical of definitions that rely solely on proximity to the city (Groppo and Tosselli 1997).

A Peri-urban Typology and Related Institutional Contexts

Urbanization is a process of concentration and intensification of human life and activity. It is an uneven process that takes place in a physical environment. Urbanization is one possible outcome of the three fundamental population processes--fertility, mortality, and migration. These processes are in turn the result of individual decisions undertaken in a sociocultural, economic, political and environmental context. One consequence of urbanization is the uneven incorporation of a variety of institutional forms into the larger cultural environments, identified as urban, peri-urban and rural. In particular, we identify five classes of institutional arrangements that arise within the complex continuum from rural to urban and that fall within the range of phenomena that various scholars and

practitioners have identified as peri-urban. Each of these institutional classes is connected to a specific peri-urban type and hypothesised to arise from a specific demographic process (in parentheses) underlying urbanization.

- Village PU: Network Induced — (Sojourning/circulation/migration)
- Diffuse PU: Amalgamated — (Diffuse migration)
- Chain PU: Reconstituted — (Chain migration)
- In-Place PU: Traditional — (In situ urbanization)
- Absorbed PU: Residual — (Traditionalism with Succession/displacement)

4.3.3 Typology of Peri-urban

The importance of these classes of institutional arrangements is that they can help us identify useful meso-policy interventions. This is important in urban and peri-urban environments where there is an intensification of conflict and a necessity for negotiating and resolving competing claims (e.g., in residential versus agricultural land use debates, or between competing customary institutional forms and values) and for implementing development plans. Such conflicts occur at all levels, including family, neighborhood, organizational, community, regional, and national. The nature and complexity of this region of society, which combines elements of both “rural” and “urban,” is well established in the literature under terms like peri-urban, exurban, urban tract, urban, urban fringe, semi-urban, and even suburban.

4.3.3.1 VPU: Village Peri-urban or Peri-rural (“Rural” places with “urban” consciousness)

This category refers to areas that are geographically non-proximate to an urban area, yet are experiencing substantial urbanism (i.e., social psychological dimension of urbanization). While such influences can accrue solely through mass media and the diffusion of consumerist ideologies, they are more likely in developing countries to occur vis-à-vis such processes as:

- The inflow of out-migrant remittances,
- Out-migrant infusion of “urban” ideas and modes of behavior,
- Out-migrant infusion of non income resources, and/or
- Out-migrant participation--particularly strategic--in community decision-making.

This is the category of place that is most often omitted in the consideration of periurban environments. In essence its designation as peri-urban rests on its social psychological transformation rather than its geography or size. This transformation is itself posited to result from the demographic process of migration. However, rather than to focus on the geographic movement of the out-migrants, we emphasize the continuing linkages by which they effect the infusion of things urban into the village culture.’ Importantly, these are environments which are likely very stable yet capable of absorbing and accommodating ‘urban values’. The mechanism of accommodation rests on the stability of the community and the structured network of participation by out-migrants.

4.3.3.2 IPU: In-place Peri-urban

These areas are proximate to the urban area and result from in-place (in-situ) urbanization. That is, they are in the process of being absorbed whole, whether by annexation (actual expansion of the city fringe) or simple reclassification (reflecting de facto urban expansion). In some instances they become more urbanlike under their own power through natural increase and/or rural in-migration. More commonly, they are formed from peri-urban villages by a combination of those processes combined with in-migration from the nearby urban area.X Whichever is the case, because they are being absorbed ‘whole’, such places tend to perpetuate and reinforce the existing power structure and bases of inequality. To the degree that sufficiently large numbers of in-migrants arrive from the city, oldtimer-newcomer conflict is likely to emerge. Exclusive of any new urban in-migrants, the residents of these areas tend to reflect the extremes of the local power spectrum:

- Those least likely to be opportunistic since they chose not to migrate earlier (e.g., poor);
- Those most likely to benefit from customary or traditional arrangements and who had a vested interest in remaining (e.g., the rich and/or powerful);
- Those most embedded in and accepting of customary or traditional arrangements who had little real opportunity to migrate earlier (e.g., women).

Because of their lack of geographic displacement and the potential for increasing oldtimer-newcomer polarization, these environments should have the most intact and quite conservatively held customary and traditional institutions.

4.3.3.3 CPU: Chain Peri-urban (In-migration from a single place)

Some areas proximate to the city undergo settlement vis-à-vis a process of chain migration, i.e., the geographic translocation of a village population to a specific locale in the urban periphery. These migrants tend to be the most opportunistic (i.e., risk-taking oriented) members of their original village population, hence most open to change. These areas have a high degree of ethnic homogeneity and numbers sufficient for a critical mass. Consequently, traditional or customary beliefs and institutions tend to be carried to and reconstructed in the new environment, integrating elements of the new surrounding urban institutions.^{X11} This integration of urban institutions happens to a greater extent for chain peri-urban than for in-place peri-urban areas.

This type of “community” formation is similar to that described by Herbert Gans (1962) as leading to the creation of “urban villages”. Indeed, chain migration is the master trend underlying much international migration. Early migrants or “pioneers” serve as auspices of migration for later “settlers” from the homeland. By providing temporary housing and information on the ways of the new culture, the pioneers reinforce their status as *landsmann*. This process also reinforces both the tendency to form enclaves and to reproduce adapted “traditional” institutions—along the lines of kinship, *landsmanns* *chaften* or *coetlmicity*. This type of peri-urban community is highly stable. Areas identified as “squatter settlements” around the cities of developing countries are mostly this type or diffuse peri-urban.

4.3.3.4 DPU: Diffuse Peri-urban (In-migration from various places)

A separate category of peri-urban is comprised of areas proximate to the city, which are settled vis-à-vis in-migration. In this instance the in-migrants derive from a variety of geographic source points rather than a single one. In-migration to these environments often also includes migrants from urban areas. These areas are characterized by greater ethnic heterogeneity and a greater density of varied beliefs about customary institutions and arrangements than chain peri-urban environments. The institutional patterns here reflect much greater inclusion of “urban” forms than is the case for either chain or in-place peri-urban.

Diffuse peri-urban environments have a greater potential than chain peri-urban environments for both conflict and for negotiating new institutions that are more “urban”

oriented. Such areas of settlement may arise from a “staged” occupation, whereby unoccupied land is settled by the landless acting in a coordinated take-over at a time specific (e.g., de Soto 1989). These areas may also arise from spontaneous processes of migration over a period of time, whereby people from diverse origins—mostly the poor and landless—settle together.’ Importantly, the heterogeneity of cultures of origin requires that any collective organization must be negotiated across—rather than along—customary lines.’ Simple adherence to tradition is insufficient to settle conflicts, which derive directly from differences between traditions. Therefore, there must be increasing appeals to modern (i.e., urban) or transcultural modes and methods of dispute resolution and community building which transcend particular traditions. The likelihood of such cross cultural negotiation is increased by the in-migration of ‘urban’ residents whether they have been longtime urbanites or more recent in-migrants from rural areas temporarily making use of urban ghettos as auspices of migration.

4.3.3.5 Absorbed Peri-urban

The final category of peri-urban refers to areas proximate to or within the urban context that have been so for a considerable period of time. The defining characteristic of these locations is the maintenance of customary or traditional institutional arrangements which are derived from the culture of original settlers/residents who have long since ceased to be the numeric majority in the area. These areas derive from either in-place peri-urban areas or from chain peri-urban areas. Over time either of these peri-urban types can undergo the compositional processes of succession and displacement while on the macro level being evermore absorbed into the urban environment-- administratively, politically and social-psychologically.

In short, the original settler culture group is replaced through either residential succession or through diffusion due to differential migration along ethnic/cultural lines. Yet, some important customary arrangements (i.e., institutions) of the original group remain in place now supported by “newcomers”. These vestigial arrangements are supported through a combination of ritualism, power/dominance relations and reification by arrangements in the formal/modern sector. They have a strong conservative effect in the form of adherence to “tradition” for tradition’s sake rather than an adherence to traditional principles because they are functional for the community.”

4.3.4 Links between Peri-urban types

In our pursuit of a definition for peri-urban we also have had to explore the larger question of the relationship between rural and urban environments. One observation that is well established in the literature is that rural out-migrants generally do not go directly to large cities. Rather, a series of moves are involved, called step migration, wherein rural migrants move first to villages or small towns and successively to more urban environments. A second observation in the literature is that migration does not sever all—or even most—linkages between the migrant and her/his community of origin and family.’’¹

Taken together these two points underscore the importance of conceptualizing the peri-urban environment as a dynamic, transformative, and reciprocal arena linked at the macro level not only.

5.0 CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

Conservation of peri –urban beneficial ecosystem is a major challenge threatening the twins roles of conservation of wetland ecosystem sustenance of human livelihood in the peri-urban area and the preservation of quality environment. Activities like brick making , deforestation clay excavation and extraction and burning are particular carried out in the wet land conservation areas This has resulted to severe environmental degradation and many related problems .

The study aimed to find out the conservation of Peri urban ecosystem, in Mukono district. In the study I analyzed the activities of the brick maker the brick buyers tree farmers and the perception and contribution of the local council executive. The study was designed to achieve the following objectives.

With the following specific objectives

1. To find the beneficial effects of the ecosystem to the Peri-urban people.
2. To evaluate and document all activities in around Mukono district environment that is detrimental to conservation.
3. To investigate the factors responsible for persistent damage to the ecosystem in peri-urban areas of Mukono district
4. To examine the factors forcing population to engage in destructive activities

The study was carried out in two sub counties of Goma and Seeta . The methods that were employed were observation, questionnaire surveys, documents analysis and interviews. Data collected included name of the respondents'age, distance from the site of brick making , owners of the site how to improve the business of brick making.

Regarding the wet land conservation of Peri-urban ecosystem the total economic value of the people of Peri-urban depend solely on the ecosystem and any decision to conserve the wet land without providing another opportunity would be disastrous. Conservation and economic implication should therefore be thoroughly considered, especially in relation to wet land conversion into brick making sites or for use in unsustainable agriculture. There is need for government intervention and awareness creation in order to achieve balanced and sustainable development.

The location of Mukono near Kampala metropolitan city means that land in strategic

urban neighbouring rural locations is rapidly used up, making wetland resources vulnerable to encroachment, modification and conversions. A further observation during the study research was that the peri-urban wetland areas of Mukono are threatened by human induced activities. These activities are in form of extractive resource utilization activities like unsustainable agriculture, clay mining , sand quarrying , brick making and burning of fuel wood that result in massive deforestation in the area.

Owing to the fact that Peri-urban areas of Mukono wetland are threatened by human induced activities and government driven reclamation for industrial and infrastructural development, their sustainable management requires stepping up strategies that emphasize community involvement in the planning and implementation of appropriate approaches. It was also observed that at one of the sites, abandoned clay pits are being used as sanitary land fill by Juggo Village people. With growing population, this practice could spread to the rest of the abandoned site, which are very near the wetland, and abandoned pits had been turned to a breeding place for mosquitoes as a result of the stagnant water that is highly polluted.

The principal concern here is that chemical elements, compounds and micro-organisms that do not naturally occur in are introduced into these sites. To compound this argument and observation, the introduced pollutants may:-

- i. be difficult to detect
- ii. have a long term residency
- iii. be very difficult to remove from the system.

Therefore the likely negative impacts this could do to the nearby water system (both Wetland and ground water are:

- a. Leachate from the sanitary landfill disposal of solid waste may enter directly into the water system and cause contamination of the water table
- b. Generally impeded drainage and clay extraction physically changes the quality of water trapped in ponds; in essence this water, of poor physical properties, changes the quality of the receiving streams in event that they spill over into the wetlands.

Taking into consideration all the argument put forward in relation to the conservation of Peri- urban ecosystem further observation were made.

- Environmental impact Assessment should be conducted to guide any planned development activities in the peri-urban areas.
- Migration from the urban to the peri-urban due to the high cost of living has led to the breakdown of the environmental degradation of wetland conservation.

Basing on the above observations, this study concludes that the natural environment should be considered as a borrowed resource from our grand children or future generations. we have a responsibility to conserve and sustainably utilize these resources without compromising their value to the future generations. It should also be noted that each one of us has a responsibility of recognizing that, through complicity and silence we all contribute to environmental degradation and destroying the environment is compared as dangerous as weapons of mass destruction to the entire generation.

In reference to the findings of this study and the foregoing observation discussion and recommendations, the following conclusions can be made;

Conservation of peri-urban beneficial ecosystem with emphasis on brick –making and deforestation in the wetland ecosystem. Brick making in the peri-urban wetland area of Mukono plays an important role in improving the livelihood of people living in peri-urban areas of Mukono adjacent to the wetland resources in Goma sub-county and Seeta sub-county as well. Communities around the wetland benefit from direct goods and services through the utilization of wetland resources and through indirect values such as regulations and supporting services and the option values which are worth millions of dollars. This therefore implies that their protection and sustainable management is critical to the survival, welfare and livelihood of these peri-urban communities.

The study also showed that the brick making was an energy demanding activity. Due to this, brick making was dominated by males in their youthful age. The women who were involved in the activity were family head or widows. Age, proximity to wetland, sex and lack of alternative source of income were key determinants of wetland brick making. Other factors like the need to alleviate poverty, the need to meet social responsibilities, lack of employment opportunities and the fact that brick making required low capital influenced the people living near the wetland to carry out brick making.

Wetlands are key resources in the socio-economic fabric of the society and an important

factor in the development potential of Uganda. However despite the benefit that brick making contributes to the well being of the people, the wetland were increasingly being degraded by the activity. The high demand for fuel wood used in baking the brick had led to deforestation in the wetland. It was noted that encroachment upon the remaining forest is still taking place despite the claims by the district forest officials that it has been checked. The residents of the peri-urban areas still cultivate and graze the animal in the forest areas and it was found that the deforested areas of Mukono peri-urban corridor had experienced expansion in the range of habitat and this has resulted in the increase in the number of people degrading the environment and the animals which inhabit open ecosystem, therefore the growing demand on fuel –wood and other forest resources is a threat to the future existence of these forests.

The high dependence on brick making for employment, deforestation for wood business and the lack of alternative source of income has led to over exploitation of wetland resources in Goma and Seeta sub county areas of Mukono districts.

The concept of urban and peri-urban wetland conservation is particularly to secure multiple environmental and social benefits for urban and peri-urban dwellers and it focuses on what are perhaps the main elements of urban green structures.

5.2 Recommendations

In order to achieve conservation of peri-urban ecosystem, the impact of deforestation, land conservation, abandoned pits and other environmental degradation, it is recommended that alternatives sources of energy for brick making and firing should be explored. Whereas the majority of peri-Urban areas of Mukono were of low level of education, therefore brick making is alleviating socio-economic status of the communities in the areas of Mukono peri-urban environment. It is the recommendation of this study that brick makers should be involved in some integrated environmental management programmes. For example some environmental executive has ear-marked some heavily degraded forests near the brick making sites for degazettment and allocation to brick makers' groups for environmental project especially tree planting but it was established that tree tops and logs left by pit sawing are very much used in brick burning. This study recommends that the government creates incentives which would induce urban dwellers to adapt use of hydroelectric power for domestic needs.

Incentives could be in the form of tariff reductions in order to make hydroelectric power affordable and since the forest have suffered from degradation it is also good that laws should be strengthened to control the rate of trees harvesting on the private lands. Brick makers and land lords should form an association to represent their industry and assist in the mitigation of adverse environmental impacts. Mukono District authorities should execute an integrated community project for the brick makers involving increasing environment awareness. Wetland programmes should make comprehensive, inventory to determine the size, distribution and ecological activities on Peri-urban wetland areas, and harmonize brick-making activities with that of National Environmental status, which forbids disturbances of a wetland likely to have adverse effects of animals and their habitat. The forest department should also assess the Fuel wood requirements for brick makers and assist the development of plantation close to brick-making activities.

According to Buyinza, he recommended that sustainable utilization and conservation of wetland will be generally greatly enhanced if the local communities are actively involved in the sustainable management of the wetland resources since their livelihood directly depends on them. In order to attain sustainable utilization of the wetland, there is need to involve the local people in the management of the wetlands resources since their livelihoods are directly dependent on them. It is therefore, recommended that a more people oriented management approach be taken by empowering and involving the local communities in decision-making and allowing them more active participation in management, their stake in the conservation of the wetland resources could be enhanced.

There is need to increase awareness among policy makers about the benefit of wetlands to human well being so as to ensure the wetlands are better taken into account in economic welfare indicators like the Gross Domestic Product calculations. This will promote sustainable management of wetlands resources since their economic value will be known. As a means of restoring the areas degraded by brick making, there is need to encourage the local people to grow more trees in the areas. This will not only improve the wetland ecosystem, but will also provide additional benefits to the people in form of fuel wood and income.

The people neighboring the conservation resources area need to be trained in income

generating activities like bee keeping, tree nurseries. Such project will reduce their over dependence on the beneficial ecosystem resources hence, reduce over exploitation of the resources. Strict protection of these fragile ecosystems is rarely effective since it requires enforcement costs, bearing in mind that government are already facing public sector deficits, with many sectors with wetland conservation for the scarce resources.

Hence there is need to establish innovative funding mechanisms for wetland conservation and management. This may come from charges, fines, bonds and deposits levied against unsustainable wetland utilization. Any activities within the conservation areas be it brick making, tree planting and deforestation, clay extraction and quarrying sites should be environmentally assessed especially in relation to soil and water conditions. In particular, new sites should be confined as far as possible to grassland areas which regenerate faster, avoiding the more complete and slow regenerating forest ecosystem. Brick making operations should be monitored and regulated to stop mismanagement. And integrated with other less damaging land uses.

Campaign on environmental awareness should be commissioned and sensitization of the people to stop the increasing disappearance of the forest not only in Mukono district where this study was conducted but the entire country Uganda.

The residents of Goma and Seeta sub county should be taught to adopt sustainable practices when exploiting the environmental natural resources in the wetland conservation and environmental education should be taught.

5.3 Areas for further research

The study examined the conservation of peri-urban ecosystem in Mukono and revealed that there is a relationship between conservation and environmental degradation.

However the study could not tackle all the aspects pertaining urban, peri-urban wetland conservation and environmental degradation partly because it had a limit in its scope and mainly the reason being that of limitations of experience, during the study and because of such, it further recommended that further research should be done on:

- Classes of clay for brick making, Government designated site and environmental degradation.
- Conservation of the wetland areas for development and avoidance of extinction of plants species.

- The need to investigate on the effective management and formulation of strategies to conserve forest for sustainable development
- Research on the incentives of peri-urban people and impact of economic development on the environment is necessary.
- The role urban and peri-urban vegetation plays regarding water and the importance of trees reduction of storm water runoff.

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APPENDICES

APPENDIX I: Questionnaire For Brick Makers

1. What is your name?
2. How old are you? Where do you live- distance from the site of brick making to your residence?
3. Do you live in a rented house or your own?
4. When did you start this brick making job?
5. What is the process you think would make this industry work best?
6. How many bricks do you make per day? Which is the best month of the year do you sell most?
7. Who are your main clients, Kampala, Mukono, Jinja and why?
8. How many days do you take to dry the bricks?
9. How many days do you take to construct a kiln?
10. How much fire wood in terms of tones or Lorries fire 5000 bricks; 10,000 bricks and 20,000 bricks?
11. Which is the smallest kiln have you ever made and which is the biggest kiln have you ever made and why?
12. Do you rent this part where this brick business is being made?
13. Who is the owner of the land?
14. How much does he charge you?
15. Do you profit from this business?
16. What is your major other income?
17. Do you hope to continue in this business of brick making?
18. Do you think it is environmentally friendly and why?
19. Have you as an individual or as a group planted trees to sustain the fire wood needs?
20. Do you have any question for us?

APPENDIX II: Questionnaire For Brick Buyers

1. What is your name?
2. How old are you?
3. What is your level of education?
4. Where are you taking these bricks?
5. How long have been in the transport business of bricks, sand and other building materials?
6. Apart from sand and fuel wood what other building materials do you ferry for brick makers and construction industry?
7. What are the main sites where you collect sand, bricks, fuel wood, aggregates etc?
8. Do you realize these raw materials are dwindling in quantity?
9. Who are your main clients, towns town suburbs what?
10. What problems do you encounter in your transport business?
11. Do you know any concrete making centres competing with this local brick industry?
12. Do you think this business is sustainable?
13. What environmental problems do you envisage in this business as a transporter?
14. Are there any alternatives you can advance for this industry to develop?
15. Do you own this lorry or you are employed?
16. Do you any question for us?

APPENDIX III: QUESTIONNAIRE FOR LOCAL COUNCIL EXECUTIVE MEMBERS

1. Mr Chairman what is your name?
2. How long has the business of bring making been in your area?
3. What is your level of education?
4. Which year did you experience a fast demand of building materials?
5. Are your community planting trees to sustain the fuel wood needs for domestic and brick making industry?
6. Do you an environment secretary on your executive?
7. What activities is your community engaged in to sustain, educate and maintain environment issues?
8. Is there any problem with brick making, sand quarrying and stone excavation in the local area you lead?
9. What are these problems and how can we solve them?
10. Is the community benefiting from this business?
11. Do you have any question for us?

APPENDIX V: QUESTIONNAIRE FOR DISTRICT ENVIRONMENT EXECUTIVE

- 1) What is your name?
- 2) How old you?
- 3) What is your level of education?
- 4) How many years have been in your position?
- 5) Do you have brick making and stone quarrying and sand sand quarrying activities in your district?
- 6) What are some of the problems community members point out linked to these activities?
- 7) Are there any bylaws or guidelines to brick making, sand quarrying and stone excavation?
- 8) Who is the main client of these products from your area?
- 9) Do you envisage any environmental problems related to these activities?
- 10) Who are your partners in development to help solve the environmental problems?
- 11) As a district do you have gazetted forest and tree planting plans and where are these?
- 12) Are there any threats to biomass and environmental as a result of anthropological activities surrounding the ecosystem in your district?
- 13) What are the major threats of environment in your district?
- 14) Is there a water problem since most of the swamps were utilized to make bricks and mine sand?
- 15) What mitigation measures are taking as a district to cub all these?
- 16) Do you have any question for us?

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