

EFFECTS OF BRICK MAKING ON THE ENVIRONMENT:

ACASE STUDY OF KAJJASI TOWN,
WAKISO DISTRICT, CENTRAL UGANDA

BY
NAKAMYA MILLY
BEM/8129/51/DU

ADISSERTATION SUBMITTED IN
PARTIAL FULFILMENT OF THE REQUIREMENT
FOR AWARD OF ABACHELOR OF SCIENCE DEGREE
IN ENVIRONMENTAL MANAGEMENT OF
KAMPALA INTERNATIONAL UNIVERSITY

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DECLARATION

I Nakamya Milly ,BEM/8129/51/DU, declare that all the information contained in this report is solely out of my own effort and has not been presented by any other student in any higher institution of learning for award of a Bachelors degree or its equivalent.

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DEDICATION

I dedicate this work to my parents Mr. and Mrs. Ssalongo Nsubuga who enabled me finish my degree and produce this kind of dissertation.

ABSTRACT.

Bricks have been used for the last 5000 years. In Uganda, the practice of brick making is a long standing activity. An investigation to assess the effects of brick making on the environment was conducted in Kajjansi town, Wakiso district, central Uganda. This was narrowed down to tackling the raw materials used, effects of the activity to the environment and the measures of reducing the effects. During the study a number of methods for obtaining raw data were used and included Observation, Questionnaire, Interviews and Literature search.

The study revealed the following; the raw materials used include, clay, water, wood husks, saw husks, oil, soil, glass, grass, money and labor. The products from the industry are blocks, max pans, ventilators, roofing tiles, pompy, and half bricks. Both gender take part in this activity. Although brick laying has induced economic development, however it has caused environmental deterioration, damage to human health, creation of basins that act as breeding ground for mosquitoes, shortage of raw materials, destruction of vegetation, impact on drainage, loss of biodiversity, loss of nutrients, pollution and scenery alteration. Measures to reduce the impacts were; no digging deep pits (basins), filling up pits, sensitization, recycling damaged products, tree planting and need to use other sources of energy.

Generally brick making has caused greater impact on the environment such as alteration of drainage systems, swamp destruction and deforestation. Therefore this calls for government agencies (Local officials), NGOs and relevant stakeholders to ensure mitigation measures such as research, massive sensitization to reduce the impact for sustainable development.

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I thank my lecturers especially the course coordinator Ms. Anne Tumushabe and my supervisor Dr. Twaha. A. B. for their guidance helped me produce this document.

Finally, am grateful to my friends and class mates whose outstanding efforts enabled me in one way or another in the generation of this piece of work.

ABBREVIATIONS

NEMA	National Environment Management Authority
MDC	Mpigi District Council

TABLE OF CONTENTS

Contents	pages
DECLARATION.....	I
DEDICATION.....	II
ABSTRACT.....	III
ACKNOWLEDGEMENTS.....	IV
ABBREVIATIONS.....	V
TABLE OF CONTENTS.....	VI
LIST OF TABLES.....	IX
CHAPTER ONE	
1.0. INTRODUCTION.....	1
1.1. Background.....	1
1.2. Statement of the problem.....	2
1.3. Objectives.....	2
1.3.1. General objective.....	2
1.3.2. Specific objectives.....	2
1.4. Research questions.....	3
1.5. Scope of the study.....	3
1.6. Significance of the study.....	3
CHAPTER TWO	
2.0. LITERATURE REVIEW.....	4
2.1. Socio economic importance of brick making.....	4
2.2. Effects of brick making on the environment.....	5
2.3. Measures to reduce the impact of brick making on the environment.....	8
CHAPTER THREE	
3.0. DESCRIPTION OF THE STUDY AREA AND METHODOLOGY.....	10
3.1. Description of the study area.....	10
3.1.1. Location.....	10

3.1.2. Climate.....	10
3.1.3. Soils and geology.....	10
3.1.4. Other natural resources	10
3.1.5. Socio economic activities.....	11
3.2. Methodology.....	11
3.2.1. Sample size.....	11
3.2.2. Sampling methods.....	11
3.2.3. Methods of data collection	12
3.2.3.1. Observation.....	12
3.2.3.2. Questionnaire.....	12
3.2.3.3. Interviews.....	12
3.2.3.4. Literature review.....	12

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION.....	13
4.1. The raw materials used in brick making.....	13
4.2. Instruments used in this activity.....	14
4.3. Common products from the industry	15
4.4. Marketing of the products.....	18
4.5. Significance of brick making.....	18
4.6. Challenges brick makers face.....	19
4.7. Effects of brick making to human and physical environment.....	20
4.8. Measures to reduce the impact of the activity on the environment.....	22

CHAPTER FIVE

5.0. CONCLUSION AND RECOMMENDATIONS.....	24
5.1. Conclusion.....	24
5.2. Recommendations.....	25
References	26
Appendices	
Appendix 1: Questionnaire.....	28

LIST OF TABLES

Table 1: Raw materials used in brick making.....	13
Table 2: Source of raw materials/place of their extraction.....	14
Table 3: Instruments used.....	14
Table 4: Products from the industry.....	15
Table 5: Gender issues in the industry.....	16
Table 6: Ages of people who take part in this industry.....	16
Table 7: Level of education among workers.....	17
Table 8: How work is done.....	17
Table 9: Significance of brick making.....	18
Table 10: Effects to human and physical environment.....	20
Table 11: Measures to reduce the impacts of brick making	22

CHAPTER ONE

1.0. INTRODUCTION

1.1. Background

Bricks have been used for the last 5000 years: the first brick was used in the Middle East between the Tigris and Euphrates rivers in what is now Iraq. However, their bricks lacked durability and couldn't be used out doors. The Babylonians were the first to fire bricks from which many of their tower temples were constructed. Later on, during the 1200's, the Dutch started making bricks and exported them to England and during the 16th century, American people began to use bricks (Willie and Handle, 1985).

In Uganda, Brick making is a long-standing socio-economic activity, which has undergone phenomenal growth (NEMA, 1996). It takes place mostly in valleys dominated by swamp, grassland and forest. Such areas include Mukono, Wakiso and Mpigi Districts. It's a low technology enterprise requiring manual labour. The raw materials for brick making include; clay , water, fuel wood , muddy soils and simple tools like hoes, pangas, grass and transport for marketing. It provides employment opportunities to both unskilled people and school dropouts. In addition, it's also an informal sector activity, which has significant effect on the environment (MMC, 1998).

In Kajjansi, where this study was conducted, most of the poor people, including the youths and school dropouts, have been engaged in brick making as a way of reducing poverty. However, this has resulted into over exploitation of the natural environment, such as clearing of the natural forests, destruction of wetlands, and pollution of water bodies such as Lake Victoria and has also caused health problems in the area. Despite the economic importance of brick making, there is need for environmental conservation (Visso, 2007).

1.2. Statement of the problem

Brick making has become a very common activity in many areas in Uganda today. The need for economic development has led to an increase in demand for bricks to carry out construction of industries, schools, hospitals, bakeries and homes. However, this has caused environmental damage.

In Kajjansi town, where poverty and increase in levels of school dropouts coincide, pressure has been on natural resources for many years. This has caused environment deterioration through clearing of forests and swamps. This has led to soil erosion, floods, water pollution and loss of biodiversity. Such effects are environmentally unfriendly (Visso, 2007). This calls for effective conservation of the environment. Therefore, the study seeks to reduce the effects and suggest appropriate mitigation measures.

1.3. Objectives

1.3.1. General objective

- To assess the effects of brick making on the environment.

1.3.2. Specific objectives

- To find out the raw materials used in brick making
- To find out why many people are involved in brick making in Kajjansi town
- To find out the possible environmental effects of brick making on the environment
- To find out the measures brick makers use to mitigate the negative impacts associated with brick making activities

1.4. Research questions

The study was based on the following research questions:

- What are the raw materials used in brick making?
- Why are many people involved in brick making activities in the area?

- What are the possible environmental effects associated with brick making in Kajjansi town?
- What measures can be used to reduce on the possible effects associated with brick making on the environment?

1.5. Scope of the study

The study focused on the effects of bricks making on the environment of Kajjansi town by looking at the raw materials used, why people are involved in that activity and what the possible environmental effects are?

The study involved brick makers who were carefully selected by the researcher and the time frame to complete the study was approximately four (4) months.

1.6. Significance of the study

According to NEMA (1996), brick making has provided socio-economic benefits such as provision of raw materials for construction, employment opportunities to many people and economic development. However, due to over exploitation of natural resources associated with it, has caused environmental degradation.

The increase in demand for bricks causes pressure on natural resources such as vegetation, land, water, soils and the atmosphere. The study aimed at providing information on the effects of brick making on the environment of Kajjansi town. The information obtained will be used to make recommendations and suggest mitigation measures by involving government agencies (local officials), NGO's and other relevant stakeholders.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Socio-economic importance of brick making

Bricks made without burning help in the conservation of natural forests. Such bricks include the cemented ones. These are made while mixing sand, cement and water, then they are moulded and this results in durable bricks. It's an environmentally sound building technology in the world today because it does not involve clearing of forests to burn the bricks and it also reduces pollution since the bricks are sun dried. This fits well in environmental programmes that aim at sustaining economic growth (Drausma, 2008)

Brick making has helped in diversifying the economic. This is done along side agriculture in many developing countries. Many farmers have been frustrated with price fluctuations, land shortages, soil infertility and climatic changes. According to Somini (2007), brick making has enabled the peasant farmers to make and sell bricks which has enabled them make the best earnings, build proper houses, improve their standards of living and reduce the levels poverty. This has sustained the economic development in many poor countries.

Brick making provides a source of income to land lords, firewood sellers, brick makers and transporters. It provides employment opportunities to unskilled people and school dropouts in rural areas. It also enables the construction of permanent and aesthetically pleasing buildings (NEMA, 1996)

The activities of brick making have helped and given a chance to orphans of HIV/ Aids to go to school. Through the use of profits got after selling bricks, these children are under a brick making project in Masaka district, Western Uganda. The project also helped to reduce poverty by employing the rural poor people through making bricks, also the earnings from bricks have helped to reduce child mortality through medical treatment nutrition and good care.(URF, 2006).

2.2. Effects of brick making on the environment

Brick making has caused health problem in many people in the world.

According to World Bank (1996), health problems are caused by brick kilns, which are the prime cause of pollution and this has significantly contributed to increase in global temperatures by about 0.5°C . Also the use of poor quality fuel, inefficient and outdated technologies such as Bills, trench kilns are causing significant environmental and health impacts and many people have suffered from illnesses related to pollution such as respiratory system problems.

Informal sector activities such as brick making have significant effects on the environment. Such activities cause environmental degradation and result in land degradation through soil erosion, flooding and pollution. This is because improved sector activities are not registered under the government and their impact on the environment can not easily be identified and mitigated by environmental officers (Simon 2001).

According to NCRP (1987), radiation is present in the food we eat, water we drink and in construction materials used to build our homes. Such materials include bricks and these have higher natural radiation levels than houses made of other building material such as wood. High radiation may biologically kill the living cells in our bodies and in turn because cancer associated with higher dose exposure including leukemia, breast, bladder, colon, liver and audovarian cancers, all of which lead to death.

Numerous malaria epidemics have occurred with increasing frequency over the past 20 years and many people are dying of malaria especially in Africa. This has been increased because of development activities such as brick making. The excavation of clay as a raw material used in brick making create pits which are filled with water when it rains. This water becomes stagnant and the pits become breeding places for mosquitoes, especially the Anopheles, which causes malaria to many people living around such areas (DOAJ, 2008).

Inefficient production techniques reduces productivity and create excessive wastes. Improper brick and low quality inputs result in a high number of bricks that crack or break during firing and must be discarded. This decreases output and increases waste disposal costs. Brick wastes require significant amount of space, leaving less land available for other, socio- economic uses (Aluoch Gibleto 1997).

The removal of vegetation is related to changes in the surface roughness. Decrease in surface roughness could lead to increase in wind strength and result into depletion of moisture from the land areas. Increase in wind could also lead to direct negative impacts to agriculture due to enhanced crop damage by the wind in addition to negative impacts on houses (UNEP, 1991).

Species may be destroyed, either directly by clearing vegetation, or indirectly as a result of stress resulting from loss of habitats and other consequences imbalances in the ecosystems. Loss of species abundance may occur as a direct result of clearing vegetation or indirectly because of a shift in equilibrium of the ecosystem, such as change in energy flow due to vegetation removal or loss of feeding for birds such as the harmer kop. Deep pits pose a danger to large terrestrial animals, such as sitatunga and domestic stock, which may fall in (UNEP, 1991).

After the firing process, not all the products will become out whole and fit for sale. There are breakages and rejects. These must be removed from the site and dumped else where. Fired pieces cannot disintegrate easily and mix up with the soil. Though earlier on it has been stated that they can sink into the soil and cause no pollution, this is possible in places where the ground is soft. On hard ground the pieces will accumulate and the whole area will be rendered unsuitable for any economic activity (LLBR, 1992)

Brick making in the district is largely based in seasonal wetlands, which originally covered about 645km² or 14% of the land area that is dry land + seasonal wetland. An estimated 17% of the original area of seasonal wetland has been converted to farmland, improved pasture, residential and business areas and brick making activities now affect 5.75km² or 11% of the remaining seasonal wetland (UNEP, 1991).

Some ceramics works especially those that produce fine ceramics for example table ware, porcelain e.t.c. require proper refining of clay. This involves sieving to separate land, stones, shells and roots. Where this residue is dumped. With time, it accumulates to a huge heap, which renders the place useless especially for agriculture or any other activity (David.P.M. 1995).

The removal of vegetation again has interfered with interception of rain water by the leaves in addition to eliminating water percolation into the soil. This could lead to loss of moisture in the soil. The presence of water pools could lead to evaporation from the open waters as compared to evapo transpiration from the vegetated surface. Changes in such surface parameters could lead to changes in moisture flux which could be related to local conditions which govern the rainfall distribution (Omagor N 1995)

The mining of clay is in itself a big problem. After mining the clay deep, large pits are left uncovered, rendering the area affected unsuitable for any activity. The digging of clay goes deep and on a large area. This is usually on a wetland .as a result the water table will fall thereby reducing the size of the wetland. The clay products, after drying, are subsequently hardened by the firing process. The most economical fuel to these clay workers is wood felling of trees will therefore go on and with time the whole area will become bare which decertifies environment (NWCMP, 1996).

Bricks made in kilns require a lot wood to burn them. It is estimated that 55% of forest and lands have been threatened with over exploitation to meet the demand for forestry products such as fuel wood fire bricks. This has led to high levels of deforestation, reduction in water catchment areas, induced soil erosion, shortages of fuel wood and disappearance of herbal medicines. The numbers of bricks made are directly related to the amount of fuel needed to bake them (NEMA, 1997).

Similarly, the stability of wetland resources is being threatened by increasing wetland degradation due to human activities like deforestation ,reclamation for fishing, hunting, grazing, sand extraction, brick making and burning. The several activities of consumptive utilization have resulted in serious degradation consequences among others are pits as a

result of sand /gravel extraction, creating breeding grounds of disease vectors and accidents to animals and humans. Burning has resulted in loss of biodiversity as some of the flora and fauna lose their habitats and may be fire tolerant (MDC, 2003).

In Mukono district however as stated in the District Environment Status, 1999, exploitation and encroachment on wetlands is on increase, putting rate of swamp destruction, according to recent observations, at about 0.85km² (85ha) per year. The main driving force is brick making having a lot of socio economic benefits, the long term environmental problems will be far reaching in the near future.

2.3. Measures to reduce the impact of brick making on the environment

New brick making sites should be environmentally assessed especially in relation to soil and water conditions in particular, new sites should be confined as possible to grass land areas which regenerate faster, avoiding the more complex and slow regeneration forest and ecotones. The ponds should be interconnected to drain freely by cutting the earth boundaries and bridging channels to ensure easy walking. This will enable the clay deposits to regenerate for later use and, in the interim, the pits to be used for fish farming (Initial Environmental Assessment of Brick Making in Mukono District, 1996).

Processing involves sieving, washing, and elimination of stones, sand, shells and roots. In fine ceramics industry where large quantities of clay is processed the residue becomes a huge bulk. When it is dumped at any place, there will be no activity to be carried out on that land. The best way is to separate the residue such that the sand and stones can be used in construction work, shells can go to the animal feeds industry and roots can be burnt (David et al, 1995).

The major problem with firing is in getting cheaper fuel. So the alternative fuels to wood are coffee husks, rice husks, saw dust and of course electricity. Among this group of fuels electricity is the best: for it can be used to fan air in the combustion of the other three. The broken fired pieces which have no market outside the industry can be ground up and

mixed with raw clay as grog. Grog is very useful in that it is used for adjusting the clay in case it is very plastic, it can be mixed to the correct consistency (Thomas et al, 1995).

For the open pit mining it is better to do it while sloping towards the valley. This is done so that any water can drain down the lower end into the valley. Also by so doing, the water table is likely not to be interfered with and therefore will not fall. The same applies to mining sand for glass-making. Water should be allowed to drain into the adjacent lake or sea freely. Quarrying too for cement should be done in such away that a certain depth is kept. Otherwise pronounced irregularities in mining will not only interfere with the landscape, it will also cause a drainage problem and a fall in the water table (David.P.M. et al, 1995).

CHAPTER THREE

3.0.DESCRPTION OF THE STUDY AREA METHODOLOGY

3.1. Description of the study area

3.1.1. Location

Kajjansi town is located 7 ½ kilometers from Kampala. It is located on a relatively sloping hill of Nakigalala and situated on the shores of Lake Victoria. In the north it's boarded by Bwebajja hill, in the south boarded by Lweza, the east Seguku.

3.1.2. Climate

The area receives convectional rainfall and Kajjansi being on gently sloping area has water runoff to the swamp and water has acted as the main source of raw material for brick making. The area receives 1250-1500mm of rainfall distributed in two seasons. march-may and September-November. The mean minimum temperature is 17.4⁰C and the maximum mean temperature is 26.7⁰C

3.1.3. Soil

The area is endowed with clay especially in the swamp and also top muddy soils. sand which is also raw materials for brick making. Then soils are generally sandy clay. the dominant soil types are red gravelly loams with occasional murrum,reddish brown sandy loam, red clay loam and yellowish sands with quartz gravel. The soils in the wetlands include grey sands whose parent material is alluvium and will wash ,grey coarse sand from lake deposits. black and grey clays from river alluvium.Wakiso soils are generally of high productivity (state of environment report,2004,Wakiso).

3.1.4. Other natural resources

These include Lake Victoria which produces sand and water and a natural made forest which produces fuel wood for burning bricks. All these raw material have boasted brick making factories in the area.

3.1.5. Socio-economic activities

Kajjansi town is an administrative and commercial centre. It has well developed infrastructures such as schools, hospitals, hydroelectric power and roads such as the high way of Entebbe road over 50% of the population is involved in brick making.

3.2. Methodology

3.2.1. Sample size

The study targeted brick makers of different age and sex structure, with different education and social-economic backgrounds. 50 Brick makers were selected, and questionnaires and interviews were administered on them.

3.2.2. Sampling methods

- Simple random sampling
Every brick maker had a chance of being selected.
- Purposive sampling
This was used to obtain specific forms of data required from those brick makers possessing vital information.

Source of data

- Primary data. This was mainly collected from brick makers through fields based methods such as transact walks, observation and questionnaires.
- Secondary data. This was obtained from literature search from available sources such as journal articles, internet, dissertations in libraries and institutions such as NEMA.

3.2.3. Methods of data collection

3.2.3.1. Observation

This involved making keen use of the eyes while in a transect walk through the study area and systematic watching and recording of soil types. The observed phenomena involved data which would otherwise not be obtained using other data collection techniques.

3.2.3.2. Questionnaire

This involved asking questions to the respondents who completed them in written form. These were both closed and open ended questions.

3.2.3.3. Interviews

Face to face interviews were conducted to the respondents in administering the questionnaire and also while finding out other details, a part from those included in the questionnaire.

3.2.3.4. Literature Review

This consisted of data collected from various studies done before. Data was be gathered from text books, institutions and the internet.

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION

4.1. The raw materials used in brick making

Table 1: Raw materials used in brick making

RAW MATERIAL	FREQUENCY	PERCENTAGE (%)
Clay and soil	12	24
Water and oil	10	20
Wood husks and saw husks	8	16
Glass	2	4
Grass	8	16
Money	5	10
Labor	5	10
Total	50	100

The highly used raw material in this industry is clay shown by its percentage (24) in table 1, although the use of clay goes hand in hand with the use of other raw materials either as ingredients or mixtures and some times as compliments. This shows that a lot of extraction of soil takes place leading to its depletion though the extent is a gradual process. These are always derived from the wetlands, wood industry, plots, from the site of work and by buying soil from an area far from or near the site of brick making.

Table 2. Source of raw materials/place of their extraction

PLACE OF EXTRACTION	FREQUENCY	PERCENTAGE (%)
Wetland	25	50
Wood industry	5	10
Plots	5	10
On site(work place)	10	20
Buying from far areas	5	10
Total	50	100

The major contributor of raw materials/place of raw material extraction is the wetland which is about 50%, the least contributors tantamount to about 10% that is from plots under construction especially under ground, wood industry and purchases from far away areas like sand, river sand, clay and others. There fore leading to a greater rate at which the wetland resources get destroyed and degraded hence loss of the various values that be would realized from the wetland ecosystem that is both ecological and economic values.

4.2. Instruments

Table 3: Instruments used in brick making industry

INSTRUMENT	FREQUENCY	PERCENTAGE (%)
Hoes	30	60
Pangas	6	12
Slashers	2	4
Spades	4	8
Saws and others	8	16
Total	50	100

Most people in this business use hoes in the different activities and stages in the formation of the different types of bricks in this area (Kajjansi) amounting to about 60% as indicated in table 3 which they associate to as a time consuming instrument because of the long time spent in order to realize enough materials for use each time they are used.

4.3. Common products from the industry

Table.4. Products from the industry

PRODUCTS	FREQUENCY	PERCENTAGE (%)
Blocks	15	30
Max pans	5	10
Ventilators	10	20
Roofing tiles	5	10
Pompy	5	10
Half bricks.	10	20
Total.	50	100

Blocks are the major product and least production as roofing tiles, pompy and max pans indicated clearly in table 4. The response from the participants was that blocks are highly demanded in most of the construction sites a reason why most of the companies engaged in brick making is to invest most in the manufacture of this product and little to others since most of them are just complements in the construction for instance the ventilators, tiles and facing bricks of which the quantities that constructor may require from them is meager just to fulfill the construction standard and tidiness among other reasons for using such complementary products in the sites of construction whether for residential or other forms of building.

Table 5: Gender issues in the industry

SEX	FREQUENCY	PERCENTAGE (%)
Female	5	10
Male	45	90
Total	50	100

Whereas one would think this business is solely for males, few women also take part in the venture. Some of them even carry out more vigorous work than that done by some men, however in most cases they do less heavy work like supervising the laborers and heading a department in the company among others, this renders them full participants though in small numbers. No matter the contribution women are highly productive, although their performance can not out number that for men therefore there is need for more women to get engaged in this industry as it boosts individuals incomes and other significances.

Table 6: Ages of people who take part in this industry

AGE RANGE	FREQUENCY	PERCENTAGE (%)
15-25	12	24
26-35	20	40
36-45	15	30
46+	3	6
Total	50	100

The most active and productive age group in this industry is the age group between 26-35 and 36-46 (table 6). The least productive are those aged 46 and above.

Table 7: The level of education among the workers

LEVEL OF EDUCATION	FREQUENCY	PERCENTAGE (%)
Primary	17	34
Secondary	12	24
Vocational	7	14
Tertiary	4	8
None	10	20
Total	50	100

The table 5 above indicates that most of the people who operate in this venture are those who have attained primary education and none (uneducated).

Table 8: How work is done

TYPE	FREQUENCY	PERCENTAGE (%)
Individually	10	20
Groups	35	70
Companies	5	10
Total	50	100

High percentage of the workers in this place carries out work in groups and very few do it as companies (Table 6).

Those who do it in groups have the following reasons to back up their decision;

- There is little/no dodging.
- Specialization.
- Depends on ones income (amalgamation).
- Ease work/labor.
- Reduces the health risks that would accrue from heavy work load.

4.4. Marketing of the products

During research, the responses that were given showed that most of marketing is done through:

- Waiting for buyers at the site especially with the help of brokers
- Advertising on different sites
- It depends on the season and number of people that make bricks and its related products

Therefore, the greatest buyer of the products whether on large or small scale is the residents for domestic house construction, for sale in the hard wares and those in the construction sites of commercial/company buildings for instance those in Kampala city (developers), Entebbe, Mukono and other up country developers.

4.5. How brick making has improved peoples lives/its significance

Table 9: significance of brick making

SIGNIFICANCE	FREQUENCY	PERCENTAGE (%)
Revenue	10	20
Incomes	20	40
Support families	16	32
Materials (raw materials)	4	8
Total	50	100

There are many benefits of this activity both to the worker, people and the government at large as noted below;

Government gets revenue from the workers in this industry, the taxes they get from for the space used and that on the products contributes to the government revenue which then can be used in the development of the different sectors in the district

The sale of the different products by the workers improves on their daily income levels and hence the standard of living. This is one of the objective and aim of most of those involved in this activity contributing about 40% (Table 9).

Supports families of workers like paying school fees, standard of living and other family expenses.

Materials for establishments or constructions industry, large number of constructors in Kampala, Mukono, Entebbe are the highest consumers of products from this industry therefore this industry becomes a source of raw materials for the construction industry in such districts and others from far away.

4.6. Challenges brick makers face

Several challenges were passed across as affecting brick makers in the study area:

- Lack of water for use in the industry especially during the dry season.
- It's expensive to purchase wood for baking and kilning of bricks.
- Heavy sunshine during the dry season which damages the bricks before they dry.
- A lot of tax levied on them, their products and raw materials extraction.
- Too much rain destroys the products especially if there is flooding.
- Shortage of market for products be it on small or large scale.
- Middle men often cheat the seller, producers and buyers.
- Little income to purchase the necessary raw materials or even pay brick makers/laborers.
- The declining availability of sites for clay excavation.
- Diseases directly from heavy work done each day or from disease carrying vectors that breed in the contaminated water that accumulates in the basins of clay excavation.

4.7. Effects to the human and physical environment

Table 10: Effects to human and physical environment

EFFECTS	FREQUENCY	PERCENTAGES (%)
Damage to human health	12	24
Accidents	6	12
Shortage of raw materials	3	6
Destruction of vegetation	3	6
Impact on drainage	4	8
Loss of biodiversity	8	16
Loss of nutrients	1	2
Pollution	3	6
Total	50	100

Some of such effects include;

Generally this venture has a greater damage to human health and the public in general (24%) indicated in table 10. Here, the greater effect is realized by the workers them selves inform of back pain, chest pain and malaria. Malaria resulting from the mosquitoes that breeds in the stagnant water in the ponds created on extraction of raw materials continuously in the same area. This therefore can reduce heavily on the life expectancy of an individual since a lot of energy is needed in doing this job.

Accidents are very common to both the livestock that grazes in these wetland ecosystems and the humans them selves in so many ways.

Because of the increase in the numbers of people taking part in brick making, large chambers of land have therefore been excavated living out large basins/ponds hence breeding grounds for disease carrying vectors for instance mosquitoes especially when water stagnates thus exposing a greater population to disease and associated effects.

Because a wetland is one of the sources of raw materials like clay, grass, fire wood then this causes severe impact to the wetland ecosystem sustainability.

Destruction /clearance of most vegetation for kilning or baking, drying of bricks may interfere with the air temperature, rainfall, wind and hence forth the microclimate of an area.

The excavations/large basins where extraction of clay and other raw materials also cause an increased impact on drainage, stagnation of water and even leachates from the wastes dumped in the pits as a form of filling the basins may result to adverse effects to the residents in the area.

More to that, this activity has led to destruction of a lot of biodiversity both fauna and flora since the major impact is the destruction of the habitat it self, nests, affecting the species abundance and species diversity.

The use of soil purchased from other places, extraction of clay from new areas both within awetland, on site or plots has always resulted into use of soils containing nutrients in brick making.

Dumping of wastes in these pits may interfere with the air of an area hence bad smell on rotting, leachates, effect to both surface and underground water on erosion or leaching.

The extraction of raw materials also has altered the scenery of this area particularly the site.

4.8. Measures to reduce the impact of the activity on the environment

Table 11: measures to reduce the impacts of brick making to human and physical environment

MEASURES	FREQUENCY	PERCENTAGES (%)
No digging deep basins	3	6
Heavy taxes	6	12
Filling up pits	10	20
Sensitization	12	24
Recycling of damaged products	8	16
Tree planting	6	12
Need for use of other resources	5	10
Total	50	100

Some of the measures put across as ways of trying to reduce this effects are:

No digging very deep basins (over extraction), this has been passed across in the different articles and books on wetland and land use management as the activity has been known to cause harm not only to the physical environment but to human health as well so by having such bye laws in place, so that brick makers can do it sustainably while enhancing the environment up on which there activities solely depends for either raw materials or even operation among others.

Levy high taxes to those who extract a lot of clay (bulk extraction) or even use a lot of forest products in their activity. Such a policy functions just like the Polluter Pays Principle. Hence forth, reduce cutting of trees and extracting clay from wetlands and associated lands.

Filling up the pits/basins/excavations using scrap or demolition materials so as to reduce accidents and breeding grounds of disease carrying vectors. this has been done by majorly the town council government in the district as most of the constructors in the area surrounding this site dump all the unnecessary solid materials though dangerous to the environment in the abandoned pits .also wastes are dumped in this place covering the dangerous ponds/basins.

Massive sensitization should be conducted especially on the causes and effects of environmental degradation coupled with the way forward and environmental sustainability.

The operators in this industry try to be sustainable by recycling the damaged products or even using them to cover the pits/basins.

Planting of trees like eucalyptus have been planted. In addition, there is need for other sources of energy to reduce on fuel wood use, devegation and deforestation. This can be by reducing on the use of fuel wood in all the stages in the production of bricks and the involve use of hydro electricity power which has little disadvantages to the global balance of ecosystems.

CHAPTER FIVE

5.0. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion

Taking into consideration the result obtained in chapter four, it can be concluded that the raw materials are extracted from wetlands and forests, and these include clay, water and saw husks, and tools used include hoes, pangas and slashers. The common products are blocks, ventilators, half bricks and these are marketed through waiting for buyers at the sites.

There is great impact that brick making as an economic activity has on the environment ranging from loss of vegetation, bio-diversity, diseases, accidents, shortage of raw materials, impact on drainage . loss of nutrients and disruption of scenery and damage to human health.

The brick makers and the government have done alot on trying to ensure that the impacts accruing from this activity are reduced to enhance the environmental sustainability through imposing heavy taxes, filling pits, sensitization, recycling of damaged products and tree planting.

APPENDIX I

QUESTIONNAIRE

1. Name of the respondent

.....

2. Age

a) 15-25

b) 26-35

c) 36-46

3. Gender

Female

Male

4. Marital status

a) Single

b) Married

c) Divorced

d) Co-lasting

5. What level of education have you attained?

Primary vocational none

Secondary Tertiary

6. What materials do you use in these industries?

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.....
.....

7. Where do you get these raw materials from?

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.....
.....

8. How do you extract these materials?

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.....

9. What are the common products from your industrial activity?

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.....
.....

10. How do you work as?

Individual

Groups

Companies

11. Why do you work in those divisions?

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.....

12. What is the common category of people engaged in these industries?

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13. What makes them get involved in the activities in this industry?

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14. How is your innovation funded?

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15. How do you market your products?

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