



IMPACT OF MUD BRICK MAKING ON THE PERI-URBAN ENVIRONMENTS OF MUKONO DISTRICT, UGANDA

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ABSTRACT

The study investigated the impact of mud-brick making on the wetland ecosystem in Mukono district. The major objectives of the study were to establish the impact of brick making on the peri-urban environment in Mukono District Uganda. The study properly evaluated the socio-economic factors that influence the reliance of the people in the peri-urban area on brick making and wood selling in wetland. The data was collected between August 2019 to February 2021 by administering a structured questionnaire to 50 respondents that comprised brick makers, brick buyers, Local Council Executive, tree farmers, fuel wood sellers and District Environmental Executives that were randomly selected. Several socio-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 mud-brick making process were analyzed. Result showed that brick-making process and impact to the peri-urban environment exposed significantly ($P < 0.00$) to high physical risk as compared to brick buyers in the same working parameters which affects the conservation and sustainable utilization of wetlands as well as natural environment.

Keywords: Environment, Brick-making, Conservation, Wetland, Peri-urban, Socio-economic

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. In many developing countries, there is a close relationship between poverty, the informal sector, and environmental degradation UNEP (2009). 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 establish the impact of mud-brick making on the peri-urban environment in Mukono district, that are in danger as a result of fast development initiatives notably informal brick making, 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 initiatives 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, 2015; 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, floodattenuation, nutrient retention, ground water recharge and climatic regulation (Barbier, 2003; Gayatri, 2000; Oglethorpe et. al., 2018). Because of their socioeconomic importance, wetlands have attracted significant portions of the human populations who survive by exploiting their resources, through different resource utilization activities, often driven by economic and financial motives (Kirsten, 2015). 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, 2015), 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., 2018). The Kampala-Mukono Corridor (KMC) presents an area where conservation benefits have been

hampered by the 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.

Statement of the research problem

The consequences of over-exploitation of environmental natural resources in Mukono district, Uganda 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 soil degradation and so on.

However, from another study, environmental problems 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, 2015).

A kiln of Mud bricks and firewood from the Forests



Mud Brick making close to the wetland

Figure 1



Figure 2

LITERATURE REVIEW

Impact of brick making on the socio-economic environment

Brick making if not controlled can have diverse effects on the environment. These impacts may range from loss of soil fertility, loss of natural habitats for some animals that thrive in swampy areas, reduced crop productivity since brick making impacts on soil fertility that comes in form of removing the soil cover. All these impacts need to be addressed through controlled brick making. Swamps are a reasonable resource and since time immemorial, man has used swamps for survival in form of obtaining food like fish, grass for thatching houses. However, with increased urbanization and modernization, the existence of these swamps is being threatened by increased demand for construction materials such as bricks. This has culminated in the constant destruction of swamps in search in places that can support brick making. Most people have preferred to have permanent buildings that call for bricks. It is however regrettable to note that the desire to have modern buildings has threatened the existence of wetlands such as swamps which greatly support brick making. Frasher (2007), also points out that the decline of the world's swamp and forest resources is because of activities like brick making, charcoal burning and agriculture. He explained how deforestation is a fundamental concern in the conservation of natural resources. According to FAO (1995), about 1.4 billion ton?? of biomass mainly fuel wood and charcoal worldwide were used to produce domestic energy in 1990 and this accounted for the wood harvested for all uses including timber, pulp and board. Rambaud (2005), also observed that if the current trend of swamp drainage and tree cutting is not checked and brick makers continue to cut and burn trees, then forests will eventually give way to grasslands, then semi-desert and finally deserts. The state of semi-desert report of Uganda (1998) indicates that the total energy consumption in Uganda is estimated at five million tones, with wood fuel and charcoal constituting about 96% of the total energy consumed in the country and all this fuel the environmental and charcoal are accounted for by the woody biomass. The continued drainage of swamps to pave way for brick making has made it even worse since the local folks are aware of the impacts of brick making on the natural environment. NEMA (1996) confirmed that about 46% of the constructions in Uganda are dependent on bricks.

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 halfway between an estate owned by the government and 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 the government swampy areas (Aryamanya, 2011).

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 Mukono Sub-county had been completely reclaimed ground for Irish potatoes growing, (Aryamanya, 2011).

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 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. Others have argued more specifically that only the dichotomous construct has outlived its usefulness, not the underlying distinction between degrees of ruralness and urbane (Rambaud 2005).



soil excavation mud by which is prone to flood in the environment

Figure 3



Figure 4

METHODOLOGY

Research type and Strategy

The methodology is described in three parts that are unit of analysis, data collection and the data analysis of the applied methods featuring the background of the methods. The kind of research was exploratory which attempted to assess the effectiveness of peri-urban conservation and the beneficial ecosystem in Kampala city environment and Mukono district as a case study.

RESULTS AND DISCUSSION

Socio-demographic of the respondent

This study presents the results of the fieldwork and the analysis in respect with the research topic. The majority of the respondents interviewed were of low formal education about 87% of them did not manage education beyond the 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 (2-5km) to the site and each of these had at one point in time converted a section of the forest for commercial gain. The common commercial activities that lead to conservation include brick, sand and clay mining as well as in sustainable methods of farming stone quarrying. 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 forest resources. A few respondents (5%) are primarily employed as brick makers it was reported that these mostly sell their wares to non-respondents, from Ntinda, Kampala, Mukono and the surrounding

The main peri-urban environmental problems

The analysis of environmental problems covered all the parts of Goma and Setta sub-Country urban areas of Mukono wetland are in the leading position for air pollution. The community in Juggo ward expressed the situation of lack of formal employment and access to education and health facilities. The central business was far from their ward and therefore they were forced to engage themselves in different kinds of activities that are detrimental to the environment. This was one of the problems that came out strongly from 10% of respondent in Juggo peri-urban ward area.

Descriptive Analysis

The Process to improve the industry to work best

The analysis revealed that (52.5%) of the respondents indicated that machine process would make the industry work best, while (27.5%) of the respondents revealed that the manual process would make the industry work best, and (20%) of the respondents indicated that availability of capital is the process that would make the industry work best, this information implies that machine process as indicated by majority of the respondents, is the process that would make the industry work best, as shown on the bar chart below.

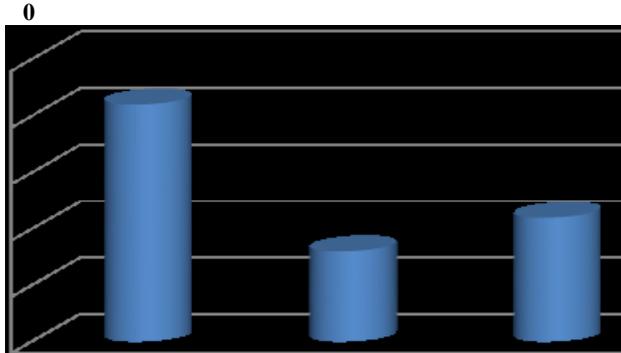


Figure 5 Machine Capital Manual

1. Process to improve the industry to work best

The above bar chart revealed that, the frequency 21 equivalent to (52.5%) of the respondents indicated that machine process would make the industry work best, while 11 equivalent to (27.5%) of the respondents revealed that the manual process would make the industry work best, and frequency 8 (20%) of the respondents indicated that availability of capital is a process that would make the industry work best, this information implies that machine process as indicated by majority of the respondents, is the process that would make the industry work best, as shown on the bar chart above.

2. Expected environmental problems in the business

From the analysis of the above question (72.5%) of the respondents indicated that they envisage land pollution in the business, while (20%) respondents revealed that environmental problem encountered by them have been loss of biodiversity (7.5%) respondents indicated that they envisage health problem in the course of the business as a transporter, a brick maker hence this finding implies that land pollution is the major environmental problem encounter by the respondents as shown on the graph below

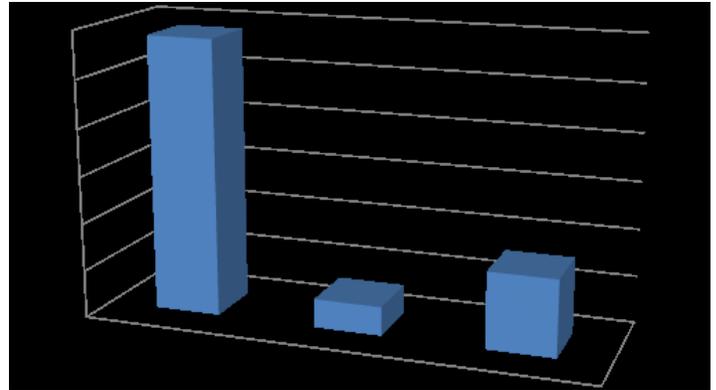


Figure 6 Land pollution Health problems Loss of Biodiversity

3. Mud Brick making related problems

The above question depicts the problem related to brick making, sand quarrying and stone excavation in the local area of the respondent, a total of (25%) of the respondents indicated atmospheric pollution to be the problem encounter by them, (29%) respondents revealed that encounter water pollution, lastly (46%) respondents indicated natural resource depletion, as the problem related to brick making, sand quarrying and stone excavation, these findings imply that most of the problem encounter by the respondents is atmospheric pollution, as shown on the pie chart is below.

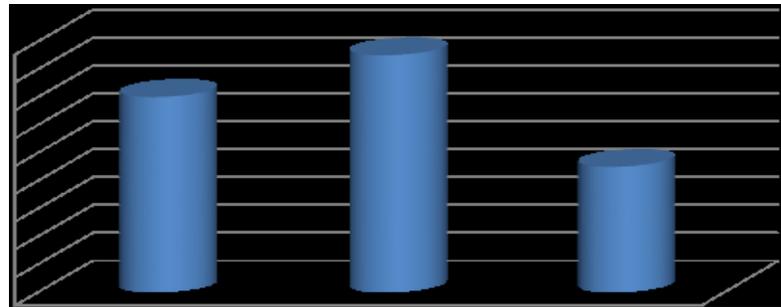
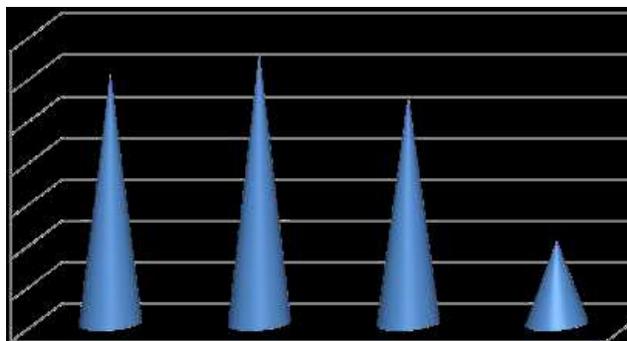


Figure 7 Atmospheric Pollution Natural resource Depletion Water Pollution

4. Mitigation measures are being taken at the district level to curb wetland degradation

In the bar chart below showed that total of (32.5%) of the respondents claims that educating people has been the mitigation is taken, in the district to curb the threat, while (30%) and (27.5%) indicated that environmental awareness and sustainable agriculture respectively are provided to decrease the major threat facing the districts and (10%) of the respondents are of the view that guiding policy was provided as to reduce the problem facing the district. Hence this is well represented on the bar chart below.

Improving the brick making industry



Environmental Guiding Campaign
Educate people Agriculture
Sustainable Policy

Figure 8

SUMMARY

Conservation and of brickmaking on the peri-urban ecosystem plays an important role in improving the livelihood of people living adjacent to the wetland resources in Goma sub-county, Mukono district. Activities like brick making, deforestation clay excavation and extraction and burning are particularly carried out in the wetland conservation areas. This has resulted in severe environmental degradation and many related problems.

Findings

- a) The brick makers and their socio-economic status although they have been in the business of brick making for quite some time in the peri-urban wetlands, they do not keep any records of how much they extract on sites. Therefore, determining the number of raw materials extracted at each stage proved difficult and therefore, the researcher used the questionnaire question that says that—How many bricks do you make per day? I. It was found that clay is the major material used to produce a brick, making up approximately 60% of the mixture. Sun is required for drying up the bricks while water required is at 35% of the total mixture. Water is obtained on site from the stream and ponds While clay is also extracted on site. Middle aged people were the majority aged between 20-40 years with on-site level of education below secondary school and as well lack of any gainful employment.
- b) Environmental impact of brick making on the peri-urban environment of Mukono district. Based on the impact assessment done, the study found out that the major physical environmental impact is land degradation due to extraction of the clay.
- c) Extent of impact by brick makers to address environmental degradation in the peri-urban environment. In response to the environmental impact some brick makers claimed to have adopted land rehabilitation and conservation although there was no evidence of this on the ground.
- d) It was found that factors forcing population to engage into destructive activities were based on the fact that, first lack of formal employment, high poverty level and the proximity to wetland by the peri-urban people in Mukono district.

CONCLUSION

The study concludes that natural environment should be considered as borrowed resource from our grandchildren or

future generations. we have a responsibility to conserve and sustainable utilization of these resource 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.

Conservation of wetland brick making in the peri-urban with emphasis on brick making and deforestation in the wetland ecosystem. Brick making in the peri-urban wetlands 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 set a sub-county as well as communities around the conservation wetland benefit from direct good 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 and welfare of them for their livelihood and the reduction of central Government and local administration expenditures and losses resulting from wetland destruction. Such losses should be incorporated into the decision-making process so that they appear as great potential to change people 's behavior about wetland utilization.

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. And unsustainable wetland utilization practices, ensuring independence of environmental institutions in making and the development of innovative funding mechanism for wetland conservation management.

RECOMMENDATION

In order to achieve wetland conservation as a result of brick making in peri-urban areas, 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 district, were of low level of education, therefore brick making is alleviating socio-economic in the areas of Mukono peri-urban, there are looming environmental problems especially degradation of swamp forest near the kiln constructed sites.

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 lops left pit sawing are very much used in brick burning.

This study recommended 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 maker and land lords form an association to present their industry and assist in the mitigation of adverse environmental impacts, Mukono District authorities should execute and integrated community project for the brick makers involving increasing environment awareness, wetland programme should make comprehensive, inventory to determine the size, distribution and ecological activities on Peri-urban wetland areas, and harmonizes brick- making activities with that National Environmental status, which forbids disturbances of a wetland likely to have adverse effects of animals and their habitat, also forest department should assess the Fuels wood requirements for brick makers and assist the development of plantation close to brick-making activities.

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