SOLID WASTE AS MATERIAL FOR SCULPTURE:
AN INNOVATION FOR ENVIRONMENTAL CONSERVATION

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DEDICATION

To my father Mr. Bernard Mwebe, my mother Mrs. Robinah Mwebe. I also dedicate my work to my husband Mr. Godard Busingye for the support he gave me, lastly to my son David Busingye for being patient with me and for all the encouragement and endurance they exhibited in the course of this study.
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ABSTRACT

This research examines the possibility of using waste solid material in the making of sculpture as a means of environmental conservation in Uganda. It is perceived that solid waste material has not been seriously considered as a source of raw material for making sculpture in Uganda. Waste solid material is an environmental hazard. It contributes to environmental degradation. Environmental degradation negatively affects human livelihood. For example, it may lead to decreased yields from the land, which in turn may lead to food insecurity and at the extreme levels to poverty escalation.

In addition to collecting solid waste from the environment which will increase food security as a result of increased productivity, using solid waste as material for sculpture will provide income to different individuals engaged in the practice consequently improving their livelihood. The study looked at different solid waste generated in Kampala, the capital city of Uganda which generates tones of solid waste per day. Among the different types of solid waste generated in Kampala, the study selected Kavera, (polythene papers) and other plastics and bottle tops. These were selected because they were found to be the most accumulated solid waste daily and more so these are the ones that do not easily decompose. The study however, made trials with other solid waste and later concentrated on the above.

In coming up with sculptures made out of bottle tops, different methods were used. Some of them were placed on armatures in their round form while
others were flattened to ensure easy placement of the armatures. Others were joined together using a nylon thread and then manipulated to come up with sculptures with an aesthetic and attractive impression.

In coming up with sculptures made out of Kavera, different approaches of using the selected materials for sculpture were tried out. Melting was found to work but generated a lot of fumes that required protective gears and needed scientific experimentation to determine the type of emitted gases. The study then came up with a non-reactive method of using the Kavera material in their found form. The selected materials were used to produce sculptures which carry educative, decorative as well as functional purposes.

The produced art works took a lot of material waste which indicated that if solid waste was taken up as material for art, much of it will be removed from the environment, generate income for both the community that will collect it and sell it to the artists at the same time artists will also make money. It will also be appreciated if artists will make decorative and functional pieces out of it. The study recommended that further research should be carried out on solid waste material in order to establish better methods of using it as material for sculpture in an effort to contribute to environmental conservation.
CHAPTER ONE

INTRODUCTION

1.1 Background
An increase in Uganda's population, which now stands at 30.9 million people, and an annual population increase of 3.3%, has negative implications on the environment and general land usage (Affairs, 2009). This population increment trend has an impact on infrastructural development in Uganda, leading to some practices such as poor solid waste disposal as a result of expanding industrial activity. For example open dumping of bio degradable and non-bio degradable wastes in some places; these are not collected for quite a long time. Open dumping of solid waste may result into an unmanageable situations in some cases. It has fundamentally changed the country's state of environment. 

The state of the environment in Uganda's pre-independence period was probably the most ideal in the whole of the African region. Once described as the 'Pearl of Africa' by Winston Churchill, Uganda lies between 4° 12' and 10 29' N latitude and between 29° 341 and 35° 00'E longitude with an altitude above sea level of between 620 to 5110 meters. The country then enjoyed an ideal weather pattern suitable for agricultural production. Agriculture essentially forms the country's economic backbone, without destabilizing the ecosystem (Kataata, 2007).
Currently, Uganda is increasingly facing a problem of environment degradation caused by various human activities. The main causes that contribute to environmental degradation include among others deforestation, improper use of wetlands such as uncontrolled resource excavation and unplanned solid waste management due to open dumping. Taking the case of open dumping, it has led to overwhelming accumulation of solid waste generated from households, industrial sites and business premises. Materials such as polythene bags (Kavera), broken household plastics, tins, glass cut offs, used car parts and other machine parts, metallic bottle tops make up most of the solid waste dumped within the physical environment in and around Kampala City.

For example Uganda covers a total surface area of 241,038 km² of which 43,941 km² is open land, water and swamps the rest is dry land (GoU, 2008).

Kampala city, Uganda's Capital and industrial centre cover a total surface area of 195 km² of which 15 per cent is wetlands. A lot of non-biodegradable solid waste is generated in the City according to the State of Environment Report for Uganda (1998), in Kampala for instance, the average solid waste generation rate is about 0.8 kg per capita per day, averaging about 800 tonnes of waste per day. Large quantities of this solid waste end up in the wetlands. Despite this trend, many people in Uganda are not aware of environmental problems caused by solid waste especially on the impact it has on wetlands.

Situations of solid waste generation and disposal may not be different or even worse in other urban centres. For example a town like Mbale, which was one of the cleanest towns in Uganda from the 1960s to early 80s is now littered with solid waste.
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and very untidy. As Salaam Musumba, the Forum for Democratic Change Vice President for Eastern Uganda put it, once the cleanest town in East Africa, Mbale has literally gone to the dogs with roads peeling, garbage choking (Wanyama, 2010).

In other urban areas smaller bins are provided by the Local Governments and urban authorities in an attempt to keep these areas clean (State of Environment Report, 1998). Solid waste in Kampala City Council (KCC) poses a big problem to the city environment, in particular to the Nakivubo Channel which ends up in Lake Victoria. Lake Victoria among other uses for example transport, water for home and industrial use, modifies climate through formation of convectional rainfall and is a habitat for rare species like the Crowned Crane (*Balearica pavonina*), the Shoebill (*Baleaniceps rex*) and fish (Kataata, 2007). These rare species are an important asset to the tourism industry in Uganda. By withdrawing large amounts of solid waste from the environment, this study demonstrated how the Lake Victoria water resource would be made safe for the various functions it performs, which include acting as a habitat for these rare bird species.

The case study for this research, which was Kampala City Council, is shown in the two maps below. Map I shows the position of Kampala in the Uganda while Map II shows the boundaries of Kampala City Council.
strategies. The National Environment Management Authority (NEMA), for example came into existence in 1995 with the mandate to ensure that Uganda's environment is protected from negative impacts resulting from human activities.

In conjunction with other leading central and local government bodies such as KCC, NEMA strives to protect the environment and threatened species of plants and animals. NEMA's role is still regarded as an ordeal by most industrialists, since they consider meeting its requirements expensive and unnecessary (Kataata, 2007).

NEMA is still struggling to change people's attitude towards the environment and its conservation. It has put in place many programmes such as solid waste management, wetlands management programme, hilly and mountainous areas conservation programme, and tree planting programmes, to sensitize the community to change their attitude. The education and public awareness component of these programmes has gone a long way in sensitizing the public of the need to conserve the country's environment. Some of the interventions have succeeded while others have been negatively received (GoU, 2008). This could be attributed to different misconceptions that include lack of information or cultural orientation of the population, which is not easy to change, at least in the short run.

In this regard, additional effort to find out how local communities and professionals in Uganda could compliment NEMA's role in a bid to change people's attitude towards the environment should be explored. For example, contemporary visual artists could be encouraged to make sculpture from recycled solid waste as
means of contributing towards environmental conservation. This innovation could be an aspect of cleaner production.

Cleaner production is a strategy to prevent emissions at the source and to initiate a continuous preventive improvement of environmental performance of organizations. In terms of cleaner production, the focus of management is on prevention rather than cure in order to avoid environmental problems. It aims at exploring ways of waste minimization through projects that create voluntary environmental management. The concept stresses the option of development of stimulation of models for reuse, which in the case of this study, was turning waste into material for sculpture production. Sculpture introduced on the basis of cleaner production projects demonstrates, that cleaner production creates innovations with systematic tools and techniques of working in order to decrease the environmental impact and at the same time save costs from inefficient use of materials and energy and motivates the sculptor by creating awareness to contemporary artists and the community that they live (Fresner, 1998).

Cleaner production is equally an approach that demonstrates how scientific and technological innovation can influence the cycle of production. It helps to reduce the quantity and toxicity of waste that pollute air, land and water, these could be used as raw materials for better quality products (Republic of Uganda, 2008).

In a similar way, visual artists should change with the times because cultures keep evolving which in turn affect the way people live. Coleman (1999) illustrates this point by looking at how the innovation of firearms, building styles and visual art has
9. continuously changed in the history of mankind. The designs of firearms for instance, have become more sophisticated in terms of shape and function unlike when they first were invented. These changes in different aspects of life have affected visual arts in terms of new media, techniques, innovations and creativity. It is in this regard, that new possibilities such as solid waste were ventured into to find ways in which solid waste could be used as material in the production of sculptures. In the 21st Century visual artists are venturing into new ideas about what form of material to use in sculpture. In so doing, they are venturing into possibilities of finding solutions to the problem of environmental degradation.

The contribution of visual artists in this regard would be to withdraw solid waste from where it has been dumped and through their innovative methods, turn it into useful items. This process could in the long run bring about culture change and improve on the ways solid waste is handled. When a culture changes, there could be a corresponding change in the visual art forms of the culture if the art forms are to become significant. For example because of the invention of firearms, suits of armour used during ancient times have ceased to be significant utilitarian art forms. In comparison, when the problem of solid waste arose, artists needed to explore ways of using solid waste as a new media instead of the traditionally used media in order to contribute towards efforts aimed at environmental conservation. A change in social culture often results in a change for the reason for creation of works of art even though the function of the art form may remain the same (Coleman, 1999).
Solid waste has been identified as a global problem because of its impact on the environment (Republic of Uganda, 1994, p. 1). Improper disposal of solid waste at waste disposal sites or any other places in Kampala City is a set back to the country's initiatives towards environmental conservation. The accumulation of polythene material such as bags and plastic bottles in the soil for instance reduces or obstructs infiltration process and hence distorts water distribution system in the soil (NEMA Newsletter, 1999). The Government of the Republic of Uganda in a bid to rid the environment from the dangers of polythene bags known locally as Kavera, put a ban on Kavera of 30 microns in 2007 ((NEMA), 2007). This ban has attracted different reactions from Ugandans, including government officials.

For example the Minister of Trade and Industry in Uganda, Maj. Gen. Kahinda Otafiire while speaking at the launch of the Uganda International Trade Fair in Kampala on 3 December, 2009 said that it is the users of polythene bags that are a problem and not the product as it has been portrayed. The Minister is further quoted to have stated that "if you are in danger you have to survive, so we shall use Kavera if necessary; the use of polythene bag is not an abomination if disposed of well" (Ladu & Omurungi, 2009). It is in this direction, that this research looked at Kavera as a viable material for sculpture instead of being looked as a waste it can be turned into a resource. There is notable lack of appreciation of disposing items and the environment in Uganda especially in the urban centres. In Kampala and other parts of the country it is not uncommon to see a person in a very expensive car throwing an empty plastic water bottle on the streets. It is against this background that, Maria Mutagamba, the
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Minister of Water and Environment in Uganda threatened to ban packed water unless its producers put in place mechanisms for proper disposal of waste plastic bottles. The Minister said that the littering of used water bottles is slowly turning into an issue of environmental concern. She said that the ban on the importation of polythene bags will be meaningless if the dumping of plastic bottles goes unchecked.

According to The Minister of Water and Environment, several water drainage channels in Kampala are blocked by plastic bottles leading to flooding in some areas and that loads of uncollected plastic bottles are finding their way to Lake Victoria through Nakivubo channel posing a great danger to the lake and aquatic life (The Independent Newspaper, 2009). The Researcher visited a few places in Kampala City to establish the magnitude of the problem of solid waste material particularly in the Nakivubo Channel and on the streets. Most spots in the Nakivubo Channel appear as shown in the picture in Plate1.1 below. The picture was taken from part of the channel at Nalukolongo, near Wankulukuku Stadium, Rubaga Division (see map ii showing position of Rubaga Division).
Other places visited such as Sinai Bin Street were found to be littered with glass cut offs; Nakasero Market was littered with solid waste of different types, biodegradable and non-biodegradable particularly during morning hours.

It is important to note that the behavior of disposing waste haphazardly is not only a trait of the 20th or 21st centuries. The timeline of garbage history suggests that there has been a problem of solid waste disposal from man’s earliest time. As a strategy four basic means of dealing with solid waste have been used over and over in history. These include dumping, burning, recycling and waste minimization (Barbalace, 2009). The study in this particular case aimed at recycling waste into material for sculpture. One of the concerns of this research was to devise means of turning solid waste into material for sculpture. It has been noted that since time immemorial artists have
always used material placed in their hands by the circumstances of the time (Reed, 1951). Solid waste can be creatively used as a material for sculpture, a field of visual art known as found art or found media. The use of this found media aimed at conserving the environment.

The term found art or found media more commonly known as found objects refers to French word which means already made. It describes art from the undisguised, but often modified use of an object for example that which is not normally considered art because it already has a non-art function (Wikipedia, 2002). Media art is contemporary art that is related or created in a technological medium. It can be thought of as an artistic exploration of human interaction with art as mediated by technology. Found or media art derives its identity from the designation placed upon it by artists. The context in which it is placed for example in art galleries and museums is usually also a relevant factor. The idea of dignifying commonplace objects such as solid waste was originally a shocking challenge to the acceptable distinction between what was considered art as opposed not to art.

Found or media art, however, must have the artist's input, at the very least an idea about it, that is the artist's designation of the object as art, which is nearly often reinforced with a title. There is almost some degree of modification of the object, although not to the extent that it cannot be recognised. The modification may lead to it being designated a "modified", "interpreted" or "adapted" found object. A sub-genre of found art is known as trash or junk art and in this particular study, solid waste art. These are works primarily comprised from components that have been discarded. This art comes literary from trash (Wikipedia, 2010).
Sculpture in this study is the assemblage of ordinary materials so that it expresses something that transcends its parts or constituents. Sculpture traditionally has been known to involve shaping or re-shaping materials, this was not necessarily the case in the present study. In this case, another realm of sculpture was used, which consisted of the use of a collection of objects, some of which were not altered but were only arranged in a meaningful way. Contemporary sculpture as can be observed from this study can employ a variety of materials which may be worked in a number of ways. These include, coating objects, stuffing of polythene forms, piling, pressing and gluing, selection and mounting of a selection of objects or material, and twisting and wrapping of wire.

Found or media art is indeed a departure from the traditional material such as clay, wood, cement and stone. According to Reed, at one time the artist scratched on the walls of his caves, at another he decorated a temple or cathedral and at another he painted on canvas. A true artist, therefore, was one who would be sensitive to any material and conditions as long they expressed the will to form. The researcher further noted that in the recent past, contemporary visual artists have not used solid waste as material for sculpture. Sculptors need to be innovative in their use of different materials in order to be felt in the community. Sculpture as an area of art should contribute towards national and community goals for instance those aimed at environmental conservation. It should also contribute towards artists' noble role of advancing techniques.
1.2 Statement of the Problem

The amount of solid waste generated daily in Kampala City constitutes a big problem to the environment. Uganda is increasingly facing a problem of environmental degradation due to increase in population, human activities such as industrialization and peoples' attitude towards conserving the environment. The environmental problems caused by poor management of solid waste generated in Kampala City include pollution, decline in human health and traditional agriculture production. In Kampala for example, about 900 tonnes of solid waste are generated every day. Kampala City Council has only a capacity to dispose off only between 40-50% of this waste (Republic of Uganda, 2008).

The challenge is that Kampala City Council has not established alternative recycling processes that could turn solid waste into products that are aesthetically functional as well as contributing to reducing damage to the environment. On the other hand, few Ugandan sculptors have attempted to use solid waste as a material for sculpture in spite of the value it has as a found media. The commonly used traditional sculpture materials like wood, cement, metal fabrication and stone are expensive and also of an environmental concern because they contribute to its degradation. Lack of such innovative and creative recycling processes of using solid waste will escalate the problem of environmental degradation.

As a way of reducing solid waste in the environment, the researcher decided to find out how solid waste could be used as a sculptural material. This was premised on the fact that art is a powerful tool that demonstrates the power of creative thinking to
address challenges of daily life such as environment degradation. In art, one's waste material becomes another's treasure. Materials that many people may consider little more than junk are fascinating when one gets down to them, making something from nothing by taking waste and turning it into an art (Rizzo, 2003).

1.3 Main Objective
The study aimed at establishing the state of environment degradation as a result of solid waste in Kampala City Council, the type of solid waste generated in Kampala and through experimentation, how this solid waste could be turned into sculptural material that could be used to execute sculptures, hence conserving the environment.

1.3.1 The Objectives of the study
i. To establish the type of solid waste dangerous to the environment in Kampala City.

ii. To devise means of turning the solid waste into material for sculpture as an environmental conservation innovation.

iii. To practically use selected solid waste material to execute sculpture as an effort to contribute to conserving the environment.

1.4 Research Questions
i. What type of solid waste dangerous on the environment is generated in Kampala?
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i. Could solid waste be an appropriate material for sculptures that conserve the environment?

ii. Do the sculptural works executed from selected solid waste contribute to environmental conservation?

1.5 Scope of the Study

1.5.1 Time scope

This research had a span of two years from August 2007 to December 2009. During that period, the design process for this study was done and is presented in the Guide Book. The study covered a period dating from 1991 to date. The year 1991 was important because it was then that the Government of Uganda developed a National Environment Action Plan (NEAP) in an effort to address environmental degradation in the country (Republic of Uganda, 1995). The NEAP process was the first Government initiative that paved way for other programmes of modern environmental conservation in Uganda. Media artists’ contribution to the conservation of the environment in Uganda is equally based on the principles set forth in the NEAP, such as the concept of cleaner production.

1.5.2 Geographical scope

The experiments on solid waste as material for sculpture were conducted at Kyambogo University. For the part of the study that required gathering information, the geographical focus was Kampala District. Kampala District Location was chosen because it faces the greatest problem of urban solid waste disposal in Uganda.
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1.5.3 Content Scope

The content scope of this research was solid waste material which could be used as material for sculpture in Kampala. Glass cut offs, metallic bottle tops, plastic material and polythene bags (Kavera) materials were explored and used to produce free standing sculptures with an emphasis on the amount of solid waste removed from the environment.

1.6 Significance of the Study

It is hoped that the research done would benefit various categories of the public including policy makers and legislators; researchers and teachers; visual artists, and the general public both at local and international levels. Each of these persons would at least borrow a leaf from the experiments carried out in this research and use it to step up the campaign for environmental conservation.

Policy makers and legislators would initiate policies and legislation, compelling media artists and other categories of persons to include a percentage of solid waste in the materials used in their production processes following the success story of this study.

Researchers and teachers of art would, basing on the ideas generated and the findings of this study would develop interest in experimenting or using solid waste in their researches and teachings. This would encourage them to venture more in this field of research.

The research experiments generated new ideas such as importance of colour in strengthening concepts in sculpture and bridging the gap between material and the
technical, cognitive and aesthetic bases of human interaction with art. It is hoped that future visual artists could appreciate this effort and improve on it in an effort to contribute to environment conservation.

In terms of professional development, the research will inspire more visual artists to become more creative by using solid waste as material for sculpture as an innovation for environmental conservation. This can be done by following the procedures provided by the researcher in the Guide Book.

In relation to solid waste management, the research findings will enable visual artists to change their attitude towards solid waste. It also will inspire them to use found media and this in turn will contribute towards their national and community obligations to create a clean and healthy environment.

The general public would change their attitude towards solid wastes. This would be brought about by the sculptures made out of solid waste as a result of this study. Their demand for such products would increase, which in turn would increase the amount of solid waste collected from the environment.

1.7 Conceptual perspective

The study aimed at establishing the state of environment degradation in Kampala City Council, the type of existing solid waste and through experimentation, how this solid waste could be turned into sculptural material which would eventually be used to execute sculpture in an effort to conserve the environment.

This study was based on the understating that solid waste could be recycled by using it to make sculpture as a way of conserving the natural environment. Solid waste
has not been preferred by many visual artists as a material for sculpture. Basing on that perspective, solid waste was taken to be a non-traditional material for sculpture. The first task was, therefore, to identify conceptual and technical issues that negate the visual artists' ideas from using solid waste as material for sculpture.

This study first identified solid waste types. It was observed that solid types were of two main categories, bio-degradable and non-biodegradable types. Each of these types was found in the environment, mainly dumping sites that could not attract visual artists to collect it and turn it into material for sculpture. The other factors that could negate visual artist's idea to use that material for sculpture included age of the artist; for example young artists tend to use material that is readily available and found in clean places such as cement and wood instead of using solid waste.

Industrialization has made the work of visual artists easy; they do not labour hard with exploring new materials. Training of visual artists fixes them to using traditional materials. It does not direct them to innovations such using found media. Traditional media has disabled visual artists from being innovative and exploratory.

This particular study dealt with the non-biodegradable type because of the impact it had on the environment. Of the non-biodegradable type, glass cut-offs, bottle tops and plastic material were selected for this particular study. These were then subjected to experimentation to explore different avenues of turning the selected solid waste into material for sculpture. Their physical appearance such as size and texture, chemical behaviour of the waste such as fumes, and aesthetic values such as colour and texture were considered at this stage. Overcoming the above negating factors was the other aspect of the concept that would be an innovation for environmental
conservation. Visual artists would then engage in studio experiments in order to create methodologies of solid waste extraction.

Solid as an art medium has aesthetic qualities that needed to be explored and in this particular study, by venturing into an aspect of a cleaner production techniques. New techniques would be ventured to ensure effective environment management. The concept of a cleaner production demonstrates how scientific and technological innovation can influence the cycle of production. In line with this, the present study used solid waste of three categories to demonstrate how each of them could be manipulated in a number of ways in order to remove large amounts of wastes from the environment. Use of solid wastes, would, however, not be readily taken up by many artists as material for their works due to a number moderating factors. The study identified a number of moderating factors, some of which prevented artists from using solid wastes as material for sculpture and also those that improved on their knowledge of and made them aware that solid waste would be a potential material for sculpture. Traditionally, sculptors would use cement, clay, plaster of Paris and wood in their work. It would not be easy to change their mindset. Government Policies and Laws can have an effect of redirecting thinking of visual artists over time to utilise solid waste in execution of sculpture as an innovation of environmental conservation. By using solid waste, visual artists would be complying with the laws aimed at creating a clean and healthy environment for all. Education (sensitizing the population about the need to conserve the environment) would inspire visual artists to be at the forefront of conserving the environment since they are possessed with knowledge to reclaim and convert solid waste into material for sculpture.
Professional skills acquired by artists and studio practices and experiments would encourage them to use found art and media because it is readily available and not competed for by many other users. These skills enable visual artists to articulate themselves in society as they gain confidence and identity in using found media. Trends in arts by contemporary artists for example use of new media, recycling, would be a mode of expressing their freedom and self-actualization. This, however, would not be achieved in a short period of time.

In the long run, artists would appreciate the use of found media to among other things as a means of contributing towards creation of a clean and healthy environment. First of all, their other goal could also have been to create beautiful scenery that is aesthetically attractive to the human eye. By use of solid waste, visual artists would withdraw a lot of soil degrading material such as Kavera from the environment. As a result, their initiative would in effect contribute towards the reduction of the problem of soil degradation by the material.

Much of the urban solid waste finds its way into water bodies. It makes the water unclean and unsafe for human use. Withdrawing large amounts of solid waste from the urban environment, particularly Kavera and other plastic material would be an innovation by the visual artists to contribute towards making the water safe for human use.

The methods used to destroy some solid waste such as plastic material in urban areas is open air burning. The burnt plastic material produces a lot of noxious fumes that pollute the environment. Further experiments carried out by visual artists using plastic material would enable them to devise other means of using the material, in
large quantities without burning it. This would be an innovation towards creating a clean air for all humanity.

Finally, visual artists would be able to use their works to change peoples' attitudes and perceptions towards solid waste management and environmental conservation.

1.8 Operational Terms

The term 'environment' as defined by the National Environment Act, ("The National Environment Act," Cap. 153), means the physical factors of the surroundings of human being, including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animal and plants and the social factor of aesthetic and includes both the natural and built environment.

The term environmental conservation means using the environment in a manner that is sustainable; that is using the environment by the present generations in a manner that does not deprive future generations of the benefit to find and use it as they, the present generations found it. For example the future generations should not wonder how wetlands or other resources such as tree looked like.

Environmental management on the other hand is the aspect of manipulating environmental degrading phenomena in a manner that they do not continue to so degrade the environment (Our Common Future).
"Media" means material used by artists such as cement, wood, plaster of Paris, metal fabrication, stone and paper Marche.

"Solid waste" refers to organic and inorganic waste materials produced by households, commercial, institutional and industrial activities that have lost value in the sight of the initial user (Republic of Uganda, 2006, p. 275). Polythene bags and plastic bottles, clinical waste, glass cut offs, old car parts and metallic bottle tops.

"Waste" is defined by the National Environment Act for Uganda, (The National Environment Act," Cap. 153) to mean and include any matter prescribed to be waste and any matter, whether liquid, solid or gaseous or radioactive, which is discharged, emitted or deposited in the environment in such volume, composition or manner as to cause an alteration to the environment.

"Sculpture" is a three dimensional art object which can represent animate (human, animal, botanical aquatic) or inanimate forms, communicate the sculptor's interpretation of abstract ideas, or express or evoke certain emotions. They can be created singly or in groups (Jennifer Yap, 2007). It contains the structural beauty of architecture, changing beauty of drawing, rhythm beauty of music, and conceptual beauty of portrait. It is recreated life with appearance, feeling, meaning, romantic charm and anima. It records history, reflects reality, enlightens our future and offers endless attraction. It beautifies the environment, moulds peoples' temperaments, educates people towards truths, the good and the beautiful and encourages people to make great effort and work hard as well as purify peoples' minds (Gangshun, 2003).
Coleman defines "sculpture" as an art form seen from all sides, including the top and that it usually supports itself and is not part of or attached to a wall or background (Coleman, 1999).

According to this research, "sculpture" is an art work with three dimensional forms. This means that it is physically measurable in a constant scale, on three axes, length, height and depth. This art form can support itself and is not part of or attached to a wall or background. In essence, it is the assemblage of ordinary materials so that it expresses something that transcends its parts or constituents.

1.9 Limitations of the study

The researcher encountered a problem in collecting of the solid waste for this research because much as it was available in the study area, it was not found in one place. She, therefore, had to move from one place to the other in search of the material to be used. The researcher employed research assistants to collect the solid waste material in order to reduce on the time she would spend in the field collecting the material personally.

Much of the material used in this research had been dumped in dirty places. This posed a health hazard to the researcher who had to access it, clean it and make it ready for use. This was overcome by the researcher putting containers/collection centre in places where the waste was generated in order to intercept it before it had been disposed of in garbage dumping sites.

It was not easy to get literature specific on the use of solid waste as material for sculpture as an innovation for environment conservation. While a lot of literature
exists on the general topic of sculpture, little has been written by visual artists on use of solid waste as material for making sculpture as an innovation for environment conservation. The researcher, therefore, relied mostly on general literature about environmental conservation written by lawyers, social and natural scientists and that on making sculpture in general terms. She was, however, able to overcome this problem by getting primary data from the field using the various techniques adopted to gather field information.

The study was expensive because some processes such as those involving experimenting with heating of plastic materials involved heating the material using gas, which costly to procure. I devised other methods of manipulating material other than heating; this mitigated the problem of costs.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides a critical review of the conceptual issues that have been explored and studied theoretically and practically. It also provides a review of the existing literature regarding the use of solid waste as material for sculpture. The main objective of this study that formed the basis of this review was to establish the state of environmental degradation caused by improper solid waste disposal in Kampala City Council, the type of existing solid waste and through experimentation, how this solid waste could be turned into sculptural material for sculptures that conserve the environment.

Existing literature on this topic, however, is of a general nature; much of it is generated from the developed World and may not specifically relate to the solving of environmental conservation issues in Uganda. It is also not specific on the use of solid waste as material for sculpture. Very few artists in Uganda have understood the value of solid waste material in the making of sculpture and as an innovation of contributing to environmental conservation. Much of the available literature on environmental conservation in Uganda has been written by other scholars such as environmental scientists and lawyers, not artists. This means that there is scanty specific literature on the use of solid waste in the making of sculpture as an innovation for environmental conservation written by artists in Uganda.

sculpture has some remarkable relationship with living conditions of human beings. Gangshun (2003) argues that people including primitive man made various
shapes with stones, pottery clay and other materials not only for visual enjoyment, but also for the purpose of utility, the exchange of views, and the needs for intellectual life as well. Gangshun further argues that sculpture has been a kind of culture, a spiritual culture, which not only has close connotations with the material production, but also oversteps the material culture such as food, clothing, housing and transport.

As a solid object, sculpture produces an effect on peoples’ souls, mainly by the interaction of both the visual and tactical senses even if it is subordinate to the architectural and surrounding environment. This position helps to understand the importance of sculpture and how the use of solid waste would further strengthen this position.

According to Gangshun (2003) Sculpture is part of art integration. When people enjoy sculpture, they appreciate the form and its style at first site, but this is only for a short duration. After that, people will ask many questions such as "what is the content and meaning of the work?"; "what does it convey to us?" what emotions does it show us? And "what is the relationship between it and us?"

Any excellent sculpture piece of ancient or modern art should not merely be an object of appreciation, but also a kind of culture which has close connotations with local issues like economy, religion and other ideologies as well as social customs of the
time (Gangshun, 2003). This would then include using sculpture as an avenue for combating waste problems by using solid waste as material for sculpture.

2.2 Solid Waste as a Material for Sculpture
Solid waste as material for sculpture is supposed to be available, capable of being manipulated into a three-dimensional form. The 21st century is the age of information, now we can say it is also an age of the merging of different cultures and ideas. This is a period of merging the largest in scale, broadest in area, and most significant in human history. It is a period when sculptors' traditional ideologies, philosophy and values are being challenged. It also follows the theme of human history closely and shows that contemporary sculpture art has progressed to higher levels. In relation to this, sculpture as a major art event provides unique opportunities to sculptors to exhibit their craftsmanship (Gangshun, 2003). For example this research explored through studies experiments how solid waste could be used as a material for sculpture. Gangshun (2003) argues that material is a key aspect in sculpture production. Sculpture is always shown in the quality of material and the processing aspect. Under no circumstances can artists look down on the material and the processing aspect. The quality of material and its processing reflects on the production level of a time and influences the art effect of works directly. The selection and processing of material reflects the ability of artists to appreciate works of art and influences the artists' appeal of works directly. For example Visual artists, therefore, should be in position to select
appropriate material that can be processed to give art forms a three-dimensional character.

sculpture has been described as one of the plastic arts because it can involve the use of materials that can be moulded or modulated and manipulated. Many sculptors seek new ways and materials to make art. Jim Gary used stained glass and automobile parts, tools, machine parts, and hardware. One of Pablo Picasso’s most famous sculptures included bicycle parts. Alexander Calder and other modernists made spectacular use of painted steel. Since the 1960s, acrylics and other plastics have been used as well. Andy Goldsworthy made his unusually ephemeral sculptures from almost entirely natural materials in natural settings. Some sculpture, such as ice sculpture, sand sculpture, and gas sculpture, are deliberately short-lived (Wikipedia, 2000). Basing on this information, the researcher realized the importance of selecting material for sculpture and was accordingly guided by that principle in choosing the material she used in executing her sculptural work.

The opportunity to use solid waste material in executing sculpture is particularly appealing to visual artists who care about environmental conservation. For many centuries, visual artists have taken the trouble to use waste and in particular paper to execute sculpture since it was first invented in China as early as the second century AD (Mac Cormix, 1994). Solid waste as material was, however, not generally appreciated nor did it take root until the most recent times.
31. Parr (2008), a contemporary sculptor made trash fish out of solid waste. This fish was made out of waste found in the river running through Gwynns Falls Park in Baltimore, MD. Apart from plastic bags and car parts, most of the objects found like bottles are actually recyclable. The sculpture exemplifies that raising awareness about river pollution can be done in a constructive and creative manner. This sculpture is shown in the figure below.

![Trash Fish Sculpture](http://www.environmentalgraffiti.com/featured/creative-sculptures-made-of-trash/5106, November, 2009)

**Plate 2.1 Trash Fish Sculpture**


Parr's work shows that sculptors can make innovations that contribute towards environmental conservation. Parr's idea could be used by sculptors in Uganda to save the environment. For example, in the case of Kampala district, Nakivubo Channel which is polluted with solid waste of all sorts can be cleaned up if sculptors collected solid waste as material for sculpture and used it as material for sculpture. They could collect this material from the source where it is generated or even reclaim it from the channel itself. The magnitude of the problem of Nakivubo Channel can be illustrated
Its impact becomes enormous. According to the State of Environment Report (GoU, 2001), much of this solid waste is not sorted before being dumped. The environmental danger posed by the unsorted solid waste in Kampala City can be illustrated by the caption pictures below taken from one of the garbage sites.

Plate 2.3 Dump Site on the street: Photograph taken by the Researcher in Kisenyi, Kampala, 2008.

In the 1880 and 1890s sculptural work was influenced by symbolism and it represented some of the finest art work in the world. From 1920s new sculptural ideas of expression were developed, these lasted for the remaining part of the century (Moffat, 2008). Later on, sculpture was strongly influenced by international trends such as politics, religion and styles (Koons, 1988). Native art was very popular; Africans adopted from the immigrants only as much as seemed to be in accordance with their way of life. For example, Visiting Artists from Norway extended the scope of their sculpture work by using disposables of modern society such as solid waste (Arts
Arts Directory, 1999). This was in addition to the traditional materials like stone, bronze and marble. In recent years, however, sculptors have extended their work to involve more than just sculpture and to use materials other than stone, bronze, or marble.

They in addition use the disposables of modern society such as solid waste as material for sculpture. Precision Air Magazine (2008) reported a group of disabled artists in a small corner of Dar es Salaam who are transforming solid waste into beads. They collect empty bottles from the residents of Dar es Salaam, smash and crash them into powdered form melts them down and hand shape them into beads. In addition, this group collects discarded scrap and reinvents it into innovative desirable merchandise such as sculptures of wild animals in Tanzania. The work being done by this group of youth in Tanzania might have a connection with the work done by sculptors in Uganda.

Braunhoitz (1953) considers that there has been a transformation in the original art of many tribes in Uganda. For instance the cross-section of ironwork, wooden hoes curved knives, stools, shape and technique of basketry, and the weaving leaves by women of the Acholi resembles that of the Madi-Lugbara technique.

The modern sculptural works in Uganda have also been modified and adapted too much of the sculptural works from the developed world. The sculptures made in the present study were a departure from the traditional ones made in a sense that these consisted both of manufactured solid waste material and some parts of the primary material that was collected from dumping site. The works made contributed to environmental conservation because the materials used removed enormous amount of solid waste from the environment.
2.3 Magnitude of Environmental Problem of Solid Waste

Worldwide, solid waste is a problem. At present the world produces more waste than can be absorbed in the environment (Republic of Uganda, 2006). According to the state of Environment Report for Uganda (2006), the average solid waste generated in Kampala is estimated to be about 0.6kg per capita per day averaging about 900 tonnes of waste per day. The volume of solid waste generated in urban centres in Uganda has gone up mainly as a result of increased urban population, concentration of Industries, consumptions of residents, inadequate finance and facilities to manage Waste collection and disposal. The annual rate of urban solid waste generated in Uganda has been estimated to be 0.2 metric tonnes per person. Based on the increasing population in urban areas, the waste generated is also increasing and is to be 780,000 metric tonnes. A lot of this waste ends up in landfills or even

Some countries such as South Africa have made national commitment for zero waste by 2022 (Telesure, 2007). As governments consider removing solid waste from the environment, individual artists can make their contribution by using some of it to make sculpture. This would serve to change the attitude of most people who still think that solid waste is a problem and an inexpensive source of art materials. The Contribution made by those artists would help to conserve the environment, as they make something from nothing (Brackney, 1996). This study used solid waste material In the making of sculpture in order to reduce on the magnitude of solid waste in the enviroment

33
h. Withdrawing waste from the environment

Art is a powerful tool that demonstrates the power of creative thinking to address challenges of daily life such as environmental degradation and generation of alternative income options (Ssembajwe, 2005). It is the researcher's contention; therefore, that such creative thinking can help in the reduction of solid waste from the environment and is even cheaper in terms of accessing raw materials for the sculptors.

Uganda is experiencing an increasing level in solid waste generation by industries, domestic residues, and market. This situation is made worse by increased urbanization, rising standards of living and rapid development associated with population growth and advancement in science and technology (Nayebare, 2003). This problem could be solved by sculptors in Uganda making use of the solid waste material generated by the increasing population and industries and urbanization. Ugandans are endowed with skills of craftsmanship that have been passed on to them down from generation to generation. These skills are many but they include making of crafts such as basketry, pottery, and wood-curving (Braunholtz, 1953). In most cultures, the making of metallic tools and other utilities by blacksmith was also a common practice. Blacksmiths made cutting tools, the majority of which were spears and arrows. Wood-curving is also another sector which has thrived traditionally and still thrives today in Uganda. The commonest domestic woodcraft products include stools, beds, mortars, bowls, ladles, trays, wooden canoes ([online], 1998). The traditional making of all these crafts, and sculpture in particular did not, however, utilize waste material. In order to make a contribution to the solving of problems of solid waste in Kampala City,
This study departed from the traditional practice and ventured into use of solid waste as material for sculpture. KCC is faced with a problem of withdrawing solid waste from the environment.

According to a Baseline Survey (KCC, 2008), there is inadequate space in KCC for collection of plastic waste, lack of equipment for collection of plastic waste, and the common practice of burning plastic waste especially polythene bags. The Survey also identified that there is "the I don't care attitude" of people in KCC, poor culture of haphazard dumping of waste, inactive local leaders at the Local council level, and lack of vehicles to carry away solid waste from the communities. There is also lack of sustainable sensitization and follow up after sensitization, excessive flooding as a result of plastics being disposed of in the drainage channels, and the need to do frequent collection of waste.

These problems are compounded by the fact that Kampala was initially planned for 200,000 people yet today; the population stands at about 2.5 million people, hence The deficient services (Karungi, 2004). In order to mitigate on the challenges it faces, KCC contracts out the job of waste collection to a number of private companies. These include Kampala City Traders Association (KACITA), BIN IT, Uganda Taxi Operators and Drivers Association and United Bus Drivers Association (Living Earth DED, 2008).

There are also private initiatives within communities in KCC to remove plastic waste and use it for a number of businesses. Polythene bags are used for weaving shopping bags, hand bags, and mats. Straws are used for making mats, bags, and belts. Some plastic bottles are re-used for packaging drinks like juice and porridge and...
at times herbal medicines. The Kisenyi Widows and Orphans Association championed the move to rid the City of plastic wastes and using them to make crafts much as their original intention was only to make money out of their projects. All these initiatives were identified in most parts of KCC, particularly Central Division, Rubaga and Makindye division.

Visual artists too supplement the initiatives of KCC in removing solid waste from the environment. Some of their activities identified by the researcher include use solid waste as material for items such as plastic folders, slippers, saucepans, casting decorations for gates and plastic cups. An example of an artisan who used solid waste to make saucepans and casting decorations for gates was Mr. Engemu of Kisenyi Jua Kali Association. Use of such material increases awareness on environmental art. It also helps the artists to contribute to environmental conservation because it withdraws large amounts of the same from it.

All these initiatives, however, are overshadowed by the ever mushrooming population of Kampala and the accompanying activities that increase side by side with the population. On the other hand, however, the population could easily serve as a market or receiver of the items made from solid waste as an aspect of a cleaner
2.5 Value of Solid Wastes

A CEO for a South African Project, Waste at Work, Telesure says that as good corporate citizens, artists face the urgent need to help reduce waste from landfill sites (Telesure, 2007). This contributes to the economic savings of individuals who collect and sell the waste to the Project; it also contributes towards waste minimization.

Barsby (2008) who examined a sample of six eco-friendly gift ideas and in an article entitled 'Out of the Box', points out how each of the six eco-friendly gift ideas was developed and from what material. One of the ideas is the Wired-out Land Rover which is made entirely from recycled wire. Barsby's other idea is the eco-pop styled in the shape of a traditional mask. This bottle opener is made from old car engines. The engine oil is used as a heat source during casting. Barsby's third idea is the eco-wheels, a Land Rover. This Land Rover is exact in every detail; it is hand made from misprinted metal sheets, the wheels are old shoe polish tins, and the suspension made out recycled bilos (Barsby, 2008).

According to Barsby (2008), these items are made by the Banana Box Company limited, a Kenyan Company which specializes in hand crafted presents designed in cooperation with a wide range of local artisans, community projects, and refugees. They utilize entirely natural sustainable or recycled material to execute their sculptures. This type of information gave the researcher an inspiration to use solid waste material in the making of her sculpture. By doing so, this will reduce on waste material in the environment and hence contribute to environmental conservation in Uganda. This
example gives another lesson to learn especially in the economic growth of women and
The researcher was of the view that in the case of Uganda where poverty levels
are high, especially among women and children, reclamation art would contribute to
their empowerment. This is because some of them would participate in the collection
Of solid waste and participate in the making of sculpture works from these wastes.
The State of Environment Report (GoU, 1998), Kampala City district generates about
800 tonnes of solid wastes per day. This amount of solid waste generated in Kampala
Would be enough for individuals who would be interested in turning it into crafts and
other sculpture. Poverty in Uganda is mainly a rural phenomenon as 48% of the rural
population is below the absolute poverty line (of one United States Dollar per day),
compared with 16% of the urban dwellers Poverty Eradication Action Plan (PEAP)
2007/8). It is possible that women [and children] have not benefited as much as men
in the poverty reduction strategies in this country, yet opportunities such as those
created by reclamation sculptors exist and are possible avenues to supplement
government initiatives in the drive to alleviate poverty among the citizenry
republic of Uganda, 2000). The process generally contributes to job creation for
those that could not find jobs elsewhere (Chuwa, 2008).

6 Aesthetic Value of Solid Wastes
According to Gangshun (2003), some members of the public does not
acknowledge some work of art at first because of the perceptions they have about its
Origins. It is not because these works are not good, but because the idea and aesthetic tastes shown in the works are ahead of the times. Works made out of wastes have not been readily appreciated by the public. In the present study, the researcher believes that with the passage of time, works made out of solid waste will captivate the public step by step and achieve recognition in the end.

It is important to note that artists, unlike other members of the public create their own world out of their artworks. This could be from waste or other material. In this particular study, the artist found fun and relaxation in working with solid waste. The general public's attitude towards waste material is, however, different. In general, none artists or even their relatives will think that artists are a bit crazy when they see them in dumping sites or bushes collecting such material and later in the back yard assembling it into useful sculpture (Brackney, 1996). This research used solid waste material so that it can, like Brackney (1996) writes; contribute towards the changing of people's opinion on the use of waste material in the making of sculpture.

Making sculpture from recycled material is part of the larger subject known as reclamation art. Reclamation art combines politics, economics and aesthetics it is rich with possibility and relies heavily on available materials. It answers to the political Sentiments by doing that which is advocated for in Government policies, for example the ban on Kavera by the government of Uganda. It economically empowers those that engage in all the stages that lead to the material being turned into sculpture and finally, by their nature, sculptures are aesthetically attractive. Reclamation art embodies the strict aesthetic principles of more traditional art and can communicate a
strong political and economic statement (Kira, 2001). In light of this research, reclamation art constituted the identification of solid waste in dumping sites, collecting it cleaning it and eventually using it to execute three-dimensional sculptures.

During this study, the researcher established that some artisans in Uganda have now realized that solid waste is of value. They are reclaiming solid waste from the environment; in so doing, their actions contribute to environmental conservation. An interview with Mr. Engemu of Kisenyi Zone in Kampala, an artisan dealing in the making of saucepans from aluminum waste material portrayed that some of the waste reclaimed from the environment made things that were fabulous, although their main objective remains to make a living out of their work. The researcher observed that under this branch of art, one's trash becomes other artists' treasure. Materials that many people might consider little more than junk are fascinating when you get right down to them-making something from nothing by taking a trash and turning it into art (Rizzo, 2003).

In conclusion, some of the reviewed literature showed that solid waste can be used as material for sculpture. It also showed that there is enough waste being generated that can be used in making sculpture. It equally portrayed the aesthetic value of solid waste and can be used as a powerful tool of creative thinking to address the challenges of environment conservation.
CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction
This section discusses the methodology and techniques that were used to establish the state of environment degradation in Kampala City Council, the type of existing solid waste and through experimentation, how this solid waste could be turned into material which would be used to execute sculpture in an effort to conserve the environment. It also describes the nature of data collected from the reviewed literature and the procedures that were followed in the collection of that data. Lastly it shows how the information collected was analyzed.

3.2 Research Design
The study employed the qualitative, exploratory practical-based sculptural method. It was designed to generate information on material and forms developed from selected solid waste materials. The researcher also used qualitative methodology because it brings out the motivations connecting attitudes and behaviour and particular choices are made (Hakim, 2000; Katebire, 2007). The method also enabled the researcher to obtain people's perceptions and general attitude towards the use of solid waste as material for sculpture as a means of conserving the environment.

3.3 Population Sample and Study Area
The unit of analysis for the study was solid waste in Kampala City Council which was sampled. Solid waste in the City included the bio and non-biodegradable wastes.
Non-biodegradable solid wastes were selected for this study because of the danger they posed to the environment. Out of the various types of the non-biodegradable wastes only plastic material, glass cut-offs and bottle tops were selected for this study. The key informants for the study consisted of a sample of adult persons who could express themselves independently about solid waste as material for sculpture. The list of key informants included Kampala City Council officials, NEMA Officials, environmental activists, selected members of the general public, and Artisans. It also include Lecturers and students that made remarks on selected solid waste materials and the produced sculptural pieces.

The population sample involved a cross-section of persons that were identified to have relevant knowledge about the tasks of this study. The KCC officials, NEMA officials and Environmentalists (activists) respondents were in position to give useful data of the solid waste generated and its dangers to the environment. The study targeted Lecturers from Kyambogo University and students from Kyambogo University, Makerere University and Uganda Christian-Mukono. The students were all third year Art and Design students who had chosen sculpture as an elective subject. They were assumed to have acquired the necessary information and techniques for sculpture making and, therefore, they were assumed to be able to give a viable judgment of the material. The study also targeted selected members of the general public in the study knew the magnitude of the problem of solid waste on the environment. The
The researcher also targeted and interviewed artisans drawn from Katwe in Kampala who use solid waste material for various products.

The study sample also included artisans who were well equipped with information about techniques and materials used for making of sculpture with a particular choice of solid waste. The material used in this study was solid waste that could be accessed, experimented on and capable of creating 3-Dimensional work.

**Table 1: Summary of Key informants**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturers of Sculpture</td>
<td>2</td>
</tr>
<tr>
<td>Students of Sculpture:</td>
<td></td>
</tr>
<tr>
<td>(i) Kyambogo</td>
<td>2 from each University</td>
</tr>
<tr>
<td>(ii) Makerere</td>
<td></td>
</tr>
<tr>
<td>(iii) UCU</td>
<td></td>
</tr>
<tr>
<td>NEMA Officials</td>
<td>2</td>
</tr>
<tr>
<td>KCC Officials</td>
<td>2</td>
</tr>
<tr>
<td>General Public</td>
<td>2</td>
</tr>
<tr>
<td>Artisans</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
</tr>
</tbody>
</table>

**3.4 Justification for Population Sample**

The choice of the study sample was influenced by several factors such as knowledge of sculpture as an area of art, participation in the making of sculpture and the level of involvement in environmental policy formulation and implementation. It was also based on the nature of information possessed by each of the categories of persons selected relating to the creation of sculptural designs and forms and also their contribution towards environmental conservation through making of sculpture.
The research was divided into two main parts; a pre-research field study in which one person was selected from each category of persons identified and the actual field study in which a total of 10 respondents were selected.

### 3.5 Sampling Methods

Respondents of the study were identified using the dung and beetle or random sampling technique (Katebire, 2007). This technique involved the first person interviewed in the research giving him or her opportunity to nominate another knowledgeable person in the subject under consideration. Its main advantage was that it enabled the researcher to access knowledgeable individuals in the area under consideration.

### 6 Data Collection Methods

The methods used in this study for collecting information were interviews, document consultations, observations, exhibitions and studio experimentations.

#### a. Interviews

The interview method was used to obtain information about the magnitude of problem posed by solid wastes in Kampala City Council, the types of solid wastes and whether there were any solutions to the problem of solid wastes in the city. It was also used to obtain information about the perceptions of various categories of information about solid waste as material for sculpture and sculptures made out of solid wastes.
Interviews were conducted for KCC officials, NEMA officials, Lecturers, students, enviromentalists,(activists), atisans and selected members prepared interview guides for the study. The interview guide was designed in such a way that respondents were free to respond only to those questions they felt they should answer (see appendix I). She also ensured that during the interviews, the respondents were in a position to freely contribute to the development of ideas for the study.

b. Document Review

This method was used to obtain information about existing knowledge on the dangers of solid wastes on the environment, whether or not solid wastes had been used to make sculptures, if so, how sculptures made out of solid wastes were perceived by the artists and the general public.

The researcher made adequate use of libraries including the Kyambogo University Main Library, the Africana Section of Makerere University Main Library, the school of Art and Industrial Design of Makerere University, the Uganda Christian University library, the Uganda Museum, the National Environment Management Authority (NEMA) Library, and other Departmental Libraries located within Kampala. Given the scope of the study, the researcher also got information from the internet.

Information obtained from the Internet supplemented that obtained from the library
c. Observation

The method was used to obtain information on observable dangers of solid wastes on the environment. This was mainly in respect to designated dumping sites and the open environment such as streets of Kampala where solid wastes were haphazardly dumped. It also enabled the researcher to obtain information about observable behaviours of the members of the public while dumping solid waste.

The researcher developed an observation checklist aided by photography to enable her capture particular aspects of solid waste observed during the field studies. The observation checklist was particularly useful during the gathering of information from interviewees who make sculpture and who justified to the researcher why they make the particular types of sculptures at their work places. The information gathered using the observation technique could not have been obtained from the interviewees directly. That information helped the researcher to make valid conclusions and recommendations basing on what she had observed, read about and obtained from interviews.

In order to obtain information about what materials some of the existing sculptures were made of, the researcher visited art galleries in Kampala, Artisans in their workshop in the districts of Kampala and Wakiso and art departments of higher institutions of learning like Kyambogo University, Makerere University, Christian University-Mukono, and Michelangelo College of Creative Arts, Kisubi. The researcher particularly observed that little was being done in the use of solid waste material in the making of sculpture.
d. *Studio Experiments and Exhibitions*

The researcher carried out various experiments on selected solid waste material namely glass, plastics and metallic bottle tops. Two mini exhibitions in the Department of Art and Industrial Design of Kyambogo University during the second and third phases of her work were carried out. The exhibitions were organized to solicit for ideas from persons who attended the exhibitions. The ideas got from these exhibitions were used to improve on the scope and quality of her work. The exhibitions also inspired the researcher in terms of self-evaluation, skills and general knowledge in the making and assessment of sculptural works.
CHAPTER FOUR

STUDIO EXPERIMENTS ON SOLID WASTE

4.1 Introduction

The findings, analyses, and discussion of data collected from experiments observation, library, surveys and practical studio experiments are based on the main objective of this research. The study aimed at establishing the state of environment degradation as a result of solid waste in Kampala City Council, the type of solid waste generated in Kampala and through experimentation, how this solid waste could be turned into sculptural material that could be used to execute sculptures, hence conserving the environment.

The Chapter explores the type of existing solid waste and through experimentation, how this solid waste could be turned into sculptural material which would eventually be used to execute sculpture in an effort to conserve the environment. Practical studio experiments were carried out using selected solid waste material.

4.2 Solid Waste Impacting on the Environment in Kampala City Council

According to the State of Environment Report for Uganda (2006), population increases and poor industrial practices, inefficient use and pollution of rivers, lakes and wetlands pose a threat to water systems and the general environment. There is a general increase in the problem of waste disposal in Uganda because of increased urbanisation and industrial action (Lwanga, 2004).
f.
Management of the Municipal Solid waste is a major urban environmental issue as the country moves towards significant urbanisation. The country has over 75 urban centres as per the 2002 Population and Housing Census (Republic of Uganda, 2005).

Kampala is the largest city and is administered by a City Council; it had a population of 1.189 million as per the 2002 census. The practice of waste disposal is land filling and dumping at sites (Republic of Uganda, 2006).

Kampala City was the geographical area that was the focus of this study. The reason why Kampala was chosen is because it is the capital and the biggest urban centre in Uganda and as such experiences the biggest solid waste disposal problem.

Solid waste is dumped in open places such as street sides and un gazetted dumping sites. This solid waste is dumped without first being sorted. According to the State of Environment Report (NEMA, 1998, pp. 196-199) daily solid waste generation in KCC is 1500 tonnes and it follows the general pattern in the country whose composition is as follows:

Table 2: Waste generation in Uganda

<table>
<thead>
<tr>
<th>Material</th>
<th>0/0 Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic waste/Vegetable</td>
<td>73.8</td>
</tr>
<tr>
<td>Paper</td>
<td>5.3</td>
</tr>
<tr>
<td>Saw-dust</td>
<td>1.7</td>
</tr>
<tr>
<td>Plastic</td>
<td>1.6</td>
</tr>
<tr>
<td>Metals</td>
<td>3.1</td>
</tr>
<tr>
<td>Glass</td>
<td>0.9</td>
</tr>
<tr>
<td>Tree cuttings</td>
<td>8.0</td>
</tr>
<tr>
<td>Street Debris</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Environmental Alert, (2008, p. 3)
In Kampala Solid waste generation rates vary from one area to another due to factors such as economic status of the population, population density, geographical location, industrial growth, social habits, education levels, seasons of the year as well as the extent of recycling operation (Republic of Uganda, 2008).

It is important to note that much of the solid waste recorded by KCC consists of the non-biodegradable material, namely plastic and glass material. One of the reasons identified by the researcher for this composition was that the type of most of household items used in urban centres are bought packed either in metallic or plastic containers. The non-biodegradable materials may cause long term damage to the environment and also long term impact on human health. According to the State of Environment Report for Uganda (1998), the average solid waste generated in Kampala district is estimated to be about 0.8 kg/per capita per day, averaging about 800 tonnes of wastes per day. Out of the total tonnage of waste disposed in Kampala daily, 1.6 per cent is accounted for by plastics. Plastic material does not readily break down in the environment because of its chemical composition. They instead linger and are broken down by the sun and become smaller compounds which are then easily carried forth in water (Elena.5nowflake, 2010). The use of plastics in Uganda has increased tremendously with local production growing, catering for approximately 10-20 % of the domestic consumption and the remaining 80-90% of the plastics used in the country being imported. The mode of disposal of plastic waste in Kampala city undermines potential for recycling. There is no link between waste generation and potential use for economic activities (Republic of Uganda, 2001, pp. 76-80).
h. It has been previously identified that there are policy gaps, an overall lack of awareness, and limited community participation in the management of solid waste in Kampala district. That has contributed to poor waste collection and management in Kampala district (Republic of Uganda, 2001, pp. 76-79). The findings of this study, too, established that solid waste disposal in Kampala district was not properly managed. It also established that poor solid waste management was mainly due to lack of community awareness of the dangers of improper solid waste disposal habits. The findings of this study, in this respect confirmed what previous researches had already come up with as to what were the possible causes of poor solid waste management in Kampala district.

Poor waste management in Kampala City was identified even at designated solid waste management points as illustrated in the Plate 4.1. In this case, bio-degradable material is dumped together with the non-biodegradable material.

Plate: 4.1 Non-biodegradable and degradable materials dumped together in a container. Source: CDM: Makerere Lab Report part 4 (undated)
The researcher established that the way solid waste is disposed off affects the environment by emitting noxious fumes (Fig. 4.2). That was the case although the State of Environment Report (GoU, 2001, p. 79) says that sometimes solid waste is buried or burnt, officials from NEMA interviewed preferred burning to burying the waste. To them, burying of solid waste interferes with the aeration cycle of the soil. They seemed not to care about the noxious fumes that could be dangerous to human beings. On further inquiry, the research established that there is limited capacity in Kampala City Council for appropriate landfill citing, design and construction, operation and post operation management (Republic of Uganda, 2001, p. 79).

Kampala City Council has limited capacity to incinerate all hazardous wastes such as clinical wastes. The researcher experienced similar circumstances as in the case shown below while experimenting with plastic material for use in sculptural pieces for this research. It was, therefore, concluded that burning Kavera was not a solution instead it created even more a serious danger to the environment, environmental pollution.

*Plate 4.2: Burning of solid waste in open environment produces thick fumes which might be toxic in nature: Source: CDM: Makerere Lab Report part 4 (undated)*

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Picture 4.2 shows fumes generated by the burning solid waste; plastic materials emit noxious pollutants into the environment. The researcher established that many people in Uganda are not aware of the environmental problems caused by solid waste to the environment (Isagara, 2004). The researcher on interviewing some people in Nakasero Market in Kampala City Council noted that a big number of them were not aware of the dangers of the waste dumped in their midst. Their view was that the biodegradable waste could be used as manure in gardens. The demand for the manure in KCC area was, however, limited because very few people in the city are involved in agriculture. KCC did not provide a solution for the non-biodegradable solid waste. People in Nakasero Market who were interviewed were also not aware that solid waste could be reclaimed and used in a more appropriate manner for example in the making of sculpture. That understanding formed basis of the researcher's inspiration to explore which solid waste could be used to make sculpture in an effort to conserve the environment.

4.3 Turning solid waste in to material for sculpture

While the study advocates for use of solid waste as material for sculpture, the research underwent a process of selecting the type of solid waste suitable to be experimented upon. The researcher established that there are various categories of solid waste in the study area which could be used in various experiments. The categories of urban wastes identified by the researcher include domestic waste, commercial refuse, institutions refuse, and solid waste collected from streets and public places. The list also included building construction wastes which are mainly inert
wastes arising from demolition, excavation, and construction activities (Republic of Uganda, 2001, p. 76).

In this particular study, the researcher chose to explore on the non-biodegradable wastes because of their impact on the environment. The researcher discovered that the non-biodegradable wastes included old machine parts, cut-offs of metals, old machines, tins, bottle tops, broken plastic ware, polythene (kavera), glass cut-offs, bottles, old house ware and broken bottles. For the purpose of this research, three types of solid waste, namely metallic bottle tops, plastic material, and glass cut-offs were selected.

Well aware that the contemporary post-modern art employs both assemblage and installation, the researcher adopted the three selected solid waste because they could fit in the post-modern art perspective. These wastes were readily available and could be arranged to create pleasant aesthetic impressions. The researcher aimed at establishing opportunities for new experiences and concepts that were a departure from the traditional materials like clay, cement, wood carving plaster of Paris and stone curving.

The selected material for the study for example metallic bottle tops were found in several places in Kampala, Bamuda Triangle in Wandegeya, Kabalagala, Makindye and many other places. Above all, it could be located in large quantities. Bottle tops have long had a place in the folk art tradition as a decorative element. Usually they are deployed more as a texture, after sorting for color.
This is because of their shapes and colour. The appearance truly glows. This inspired the researcher to use them. See Plate 4.3 below which illustrates the colour concept and how these tops can be used to give a pleasant aesthetic impression.

Plate 4.3: An illustration of how bottle tops can give an impressive look:
Source: http://www.johntunger.com/bottle_cap_mosaic

Colour plays the role of increasing strength and beauty of the sculpture content in terms of subject matter, contrast and emotional association thus more appreciated by the public (Kizito, 1996).

Plastic/polythene material was selected because at the time of carrying out this study, there was a general outcry in Kampala City about the problem of polythene
(Kavera) and mineral water bottles which were being washed into Nakivubo Channel thus affecting the environment in particular Lake Victoria. The users and the habitat of Lake Victoria including the rare bird (Shoe Bill) and fish species which are assets to tourism industry in Uganda were at stake. Some of the bird species are migratory and only come to Uganda at specific periods of the year. Their attraction, therefore, contributed a lot towards the country's economy during the periods they are in the country. That knowledge inspired the researcher to execute sculpture from solid waste and this would reduce on the threats posed to the rare bird species such as the Shoe Bill, in so doing she contributed to making their stay in Uganda conducive.

The researcher was inspired by the fact that Kavera was a material that could easily be manipulated. She also recalled some of the childhood ideas and memories such as making of balls using Kavera which brought out defined shapes. The amount of Kavera used in making those balls was enormous. She hoped that the amount of this waste material that would be used in the making of her sculpture would contribute to save the environment from its dangers.

Glass was yet another waste material that the researcher ventured into. The glass cut offs found on Sinai Bin Street in Kampala portrayed unique, attractive and aesthetic reflection. The researcher imagined how these irregular shapes would appear after they were given a more defined arrangement. She was inspired to venture into mosaic sculpture in the round using this waste.
4.4 Studio Experiments for Metallic bottle tops waste material

The researcher experimented how bottle tops could be used as material for sculpture. The study in this particular case focuses on metallic bottle tops from beverages and soft drinks gathered from various places in Kampala City Council. The estimated number of bottled drinks that are consumed per day in Kampala is in tens of thousands. The impact of the minute bottle tops on the environment may not be realized until they are collected together in one place.

The surface appearance and shape of these minute bottle tops when collected in one place gave an aesthetic beauty that inspired the researcher to find out how that type of solid waste could be utilized in the making of sculpture.

Experiments 4.4.1 Bottle tops pasted with glue on framed metallic mesh

The bottle tops were collected from dustbins and other dumping places of bars, hotels, restaurants and kiosks. They were dirty and had to be sorted out and cleaned as shown in Plate 4.4

Plate 4.4 Bottle tops were sorted and cleaned:
Photograph taken by researcher Namwebe, 2008
The sorting was done according to colour shade. At this level the rusted tops were
separated from the rest.

Plate 4.5: Drying process of bottle tops after washing:
Photograph taken by researcher Namwebe, 2008

In order to avoid water holding in the tops giving room for rusting the washed bottle
tops were dried on a wire mesh that allowed water drop down, thus leaving them dry.

Plate 4.6: Bottle tops pasted with glue on framed metallic mesh:
Photograph taken by researcher Namwebe, 2008.
Bottle tops were fixed on a framed metallic mesh coated with a layer of paper using wood glue. The layering of paper on the mesh was used with the aim of creating a surface where tops would eventually hold firmly on the mesh. This experiment created an impressive glow. The layering left spaces between the bottle tops. Spaces did not give a good finish; that prompted the researcher to undertake further research into how spaces between the bottle tops could be covered.

**Experiment 4.4.2: Bottle tops covered with bandeaux**

The researcher used bandeaux to cover spaces in the patterns. The bandeaux, however, marred the aesthetic beauty of the tops and killed the vibrant and lively display. This prompted her to carry out further research in order to establish how best the created spaces could be filled.

*Plate 4.7: Spaces between bottle tops covered with bandeaux: Photograph taken by researcher Namwebe, 2008*
Experiment 4.4.3: Bottle Tops glue and filler

The artist then experimented by covering up the spaces between bottle tops with wall filler. This material is used to fill cracks created on walls after plastering. Filler cracked and did not give a uniform flat surface. She then used filler mixed with wood glue. This created an impressive glow as shown in Plate 4.8 above.

Plate 4.8: Spaces between bottle tops covered with glue and filler: Photograph taken by researcher Namwebe, 2008

The combination of the background colour with the logo on the bottle tops created colour tones that were vibrant and lively. After drying it formed a hard wall. The metallic tops could not be separated from the filler. After being exposed to moisture, it was evident that it would be used for in door and semi indoor sculpture. In the process of working it was inevitable to wash off the mixture glue and filler form the tops in order to save their appearance.
It was also observed that bottle tops could be arranged in a more harmonious way, which would give a patterned visual concept. The armature needed to be perfect when working with this material portraying the voids, masses and shapes since the method is an embracement.

**Experiment 4.4.4: Bottle tops, filler and colour in relation to colour patterns**

This experiment was aimed at answering the queries of previous experiments, which included issues of arrangement of the bottle tops in relation to colour. The tops created a more harmonious and aesthetic impression. The bottle tops in Plate 4.10 portrayed an amazing and new experience. The most amazing aspect about this experiment was the overlapping patterns which created a visual art representing the bird's feathers.

![Plate 4.9: Bottle tops, filler and colour in relation to colour patterns: Photograph taken by researcher Namwebe, 2008](image_url)
Plate 4.10: Bottle tops, filler and colour in relation to colour patterns: 
Photograph taken by researcher Namwebe, 2008

The golden colour of one of the caps, does not give an impressive look but when several of them are grouped together and let to capture the sunlight, they truly glow into a good sequence. The selected patterns in colour schemes created a movement with the material and eventually on the sculptures made. The combination of the background colour with a tops’ logo created tones that are vibrant and lively and wholly unexpected.

Experiment 4.4.5: Bottle tops, glue and cloth

The nature of this material limited the artists working with particular forms. In this experiment bottle tops and cloth were used with the aim of finding out how bottle tops could be used to make sculpture in the round with ease. Using wood glue, bottle
m. tops were fixed on a piece of cloth and left to dry. The result on cloth gave the material a flexible nature as illustrated in plates 4.11 and 4.12 below;

Plate 4.11: Bottle tops, glue and cloth:
Photograph taken by researcher Namwebe, 2008

Plate 4.12: Bottle tops, glue and cloth:
Photograph taken by researcher Namwebe, 2008

Experiment 4.4.5 was an improvement on experiment 4.4.1. In experiment 4.4.1 layering left spaces between the bottles tops. In Experiment 4.4.5, bottle tops were arranged diagonally unlike in the previous experiment where they were arranged in a straight line. This reduced the spaces between the bottle tops greatly. A thick
Plate 4.13: Bottle tops tied with a thin wire on an armature to create a sculpture
forms Photograph taken by researcher Namwebe, 2008

Experiment 4.7: Flattened bottle tops
This experiment was meant to find out other means of using bottle tops in the
making of sculpture without using a binder such as glue. The bottle tops wen
flattened punched and with the help of a thin transparent nylon string, tied over lapping
each other to reinforce a sequence on sheets of wire mesh. These were later laid 01
well-built amateurs. The metallic mesh was used to create a mat-like structure.
Plate 4.14 Flattened bottle tops fixed on a mesh using nylon thread

Plate 4.15: Flattened bottle tops overlapping in interesting pattern: Photograph taken by researcher Namwebe, 2008

This experiment was meant to find out other means of using bottle tops in the making of sculpture without using a binder such as glue. The bottle tops were flattened punched and with the help of a thin transparent nylon string, tied overlapping each other to reinforce a sequence on sheets of wire mesh. These were later laid on Well-built amateurs. The metallic mesh was used to create a mat-like structure.

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The overlapping of the tops emulated a decorative texture, which when exposed to sunlight, really glows. After the above experiments with bottle tops, sculptural ideas were explored as illustrated below;

4.5 Sketches of the selected themes for sculptures out of Bottle Top Waste Material.

4.5.1 Theme: Beggar
*Material: Bottle tops with glue and filler*

The human figure of the beggar was the source of the inspiration. The beggar in a sitting position was studied to come up with sculptural ideals of how the aspect of begging can be used to encourage our community on keeping the environment clean by giving to the beggar.

Plate 4.16 (a) Illustration of a beggar:
*Photograph taken by researcher Namwebe, 2008*
The way the beggars hold their plates drives an emotional feeling to those that see them forcing them to give. The sitting position and hands greats protection to what they have received.

Illustrations in plate 4.17(a, b,c) below show Studies of a human figure in a siting position that were studied with the aim of understanding the human forms in relation to sculptural forms and ideals.

Plate 4.17 (a, o, c) above. Appreciation of the sitting position of a human figure turned into three dimensional sculpture forms.
4.5.2 Theme: The Bird

Material: Bottle tops, filler and colour in relation to colour patterns

The selected patterns in colour schemes created during experiments with bottle tops in relationship to colour inspired the researcher into appreciating the patterns of the peacock to execute sculpture.

Plate 4.21(above) Illustration showing feathers of a peacock that were studied in relationship to their patterns and applied on a sculptural form
Plate 4.29: A Marquette out of clay, illustrating the sculptural form portraying the concept of protection
Photograph taken by researcher Namwebe, 2008

Experiment 4.6 Glass cuts off as waste Material for sculpture

This experiment was based on an exploration of how glass could be used as material for making sculpture. This material was to be used to explore glass mosaics in three-dimensional works.

Plate 4.30 A heap of collected glass cut offs
Photograph taken by researcher Namwebe, 2008

The glass cut offs had irregular shapes and different colours. It should be noted this waste needed a lot of protective device.
Glass cut offs were later cut and shaped into smaller parts as shown in Plate 4.31 below. The shapes of the glass were attractive

Plate 4.31 Glass cut off after being cut into regular sizes: Photograph taken by researcher Namwebe, 2008

**Experiment 4.6.1 Glass cut offs on uncolored background**

The cut glass pieces were sorted according to colour shades, shapes and sizes and fixed on a wooden experimental tray frame mounted with wire mesh covered with a sheet of white paper.

Plate 4.32 Glass mosaic on white surface: Photograph taken by researcher Namwebe, 2008
The paper on the tray in Plate 4.32 was left plain. The mosaic effect was elegant but lacked depth. The background colour of the paper (white) gave plain reflection. The glue did not affect the appearance of the glass since it created a transparent effect on drying.

**Experiment 4.6.2 Colour and Glass interaction.**

This experiment tray was covered with a layer of white paper which was later painted before placing on it the glass cut. The different shades of cut glass created depth and movement. The experiment portrayed an elegant and decorative element of a mosaic effect.

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*Plate 4.33: Glass and Colour interaction
Photograph taken by researcher Namwebe, 2008*
Experiment 4.6.3 Glass cut offs with no armature

In this experiment, the researcher aimed at assembling together broken glass pieces to create a three dimensional sculpture form in the round without an amateur. The broken glass pieces were assembled and joined together with wood glue. The glue created a coating that did not allow light to go through the glass, yet light is a fundamental element as far as glass images are concerned. The result was a three dimensional form but the appreciation of the material was not realized. The research carried out indicated that the only other means of manipulation of glass would be to heat the material which technology was not available to the researcher. The sculptor left this experiment at that stage, but recommends that future sculptors could pursue it further probably by other means of manipulating the material such as heating.

Plate 4.34 Glass Cut off and glue with no armature:
Photograph taken by researcher Namwebe, 2008
Plate 4.37: An illustration 'of a Marquette portraying the intended sculpture from 'troubled
Photograph taken by researcher Namwebe, 2008

Experiments 4.8 Plastic waste as Material for Sculpture
In the third experiment the researcher investigated how plastic waste could be
turned into material for sculpture. Plates 4.38 and Plate 4.39 below show a heap of
plastic mineral water bottles and other plastic material that were collected and later
used in the making of sculpture.

Plate 4.38 Plastic solid waste
Photograph taken by researcher Namwebe, 2008
The plastic materials collected were sorted according to physical categories; mineral water bottles, which are relatively light, were separated from other heavy plastic material.

**Experiment 4.8.1 Heating light plastics and mesh**

The researcher then carried out an experiment of heating the material in order to make it fluid. The purpose of this heating was to turn the plastic material into a medium that could easily be manipulated.

Aluminium saucepans were used in the heating of the plastic material. One was used to cover the material so as to reduce on the evaporation and emission of noxious fumes produced by the heated material. Using an aluminium ladle, molten plastic was experimented on a framed mesh. When heated, the mineral water bottles generated a liquid that passed through the mesh and formed pan cake structures at the base and needle-like structures hanging on the frame as illustrated in Plate 4.23.
Experiment 4.8.2 heating heavy plastic material

The artist then carried out experiment 4.8.2 using heavy plastic material; these stuck in the mesh as shown in Plate 4.41 below. A table knife was used to spread the melted plastic material on the frame.
The result gave a beautiful hard and brittle texture blended in blackish and greyish colour tones.

The above studio discoveries after executing this experiment revealed that a lot of plastic material was required to come up with this type of sculpture. For example a Twenty-litre jerry can when heated could produce about a quarter litre of the fluid. This experiment fulfilled what had been anticipated under objective number three; that is, to practically use solid waste material to execute sculpture as an innovation for environment conservation.

The researcher also discovered that the heating process produced thick toxic fumes that irritated the researcher's eyes and caused an itching on the throat. While this experiment could solve one aspect of physical removal of the plastic material from the environment, it caused yet another problem of air pollution. This experiment was in line with the findings of NEMA in 2001 (Republic of Uganda, 2001, p. 79), where it
was established that Uganda does not have adequate facilities to incinerate toxic wastes such as clinical wastes that include heavy plastic materials such as syringes.

**Experiment 4.8.3 Layering Kavera flat on the mesh using glue**

This experiment was aimed at using *Kavera* without a heating process. Using wood glue, *Kavera* was laid flat on the mesh as illustrated below;

![Kavera laid flat on the mesh](image)

*Plate 4.42 Kavera laid flat on the mesh: Photograph taken by researcher Namwebe, 2008*

In Plate 4.42 above, the findings revealed that the material did not hold firmly to give a hardened surface. It remained soft, and did not give a characteristic of long lasting nature. The artist then experimented with *Kavera* in a layering/tying on amateur manner.
Experiment 4.8.4 Layering/trying on amateur

This experiment aimed at using *Kavera* without glue. An armature was made and Kavera tied physically on the frames as illustrate in Plate 4.43.

*Plate 4.43 Layering/trying on amateur:*
*Photograph taken by researcher Namwebe, 2008*
This layering/tying on experiment gave a solid effect and the artist an opportunity to create definite shapes. The artist had the freedom of working with the material more freely than in the previous experiment. This experiment also demonstrated how large volumes of Kavera could be withdrawn from the environment and used in the making of sculpture. To create the different forms, several layers of Kavera were used.

It was observed that there was need to give the image a finish in terms of colour and texture. Coating of bandeaux with a knife was made to cater for that need. The method required large amount of Kavera waste. This enabled the researcher to achieve the set objectives of conserving the environment.

Plates 4.44 Application of coating to give harden surface
Photograph taken by researcher Namwebe, 2008
Experiment 4.8.5 Kavera balls and Glue

In this experiment, a lot of Kavera was made into balls and later joined together with wood glue to make a sculpture form as shown in Plate 4.45 and Plate 4.46 below. The method used in making the balls was exactly like the one used by some children to make balls from Kavera. The more Kavera used, the harder the balls became.

Plate 4.45 Kavera balls

Plate 4.46 Kavera balls joined with glue:
Photographs taken by researcher Namwebe, 2008
The balls were later joined together using glue to make a 3 dimensional form as illustrated in Plate 4.46

Plate 4.47 Mesh frame removed on drying of kavera balls:
Photograph taken by researcher Namwebe, 2008

In order to make sculpture forms in the round out of kavera ball, a frame was made out of wire mesh and using glue were joined together on drying the mesh frame was removed leaving a sculpture form of a leg see Plate 4.48

Plate 4.48 A Three dimensional form out of kavera balls
Photograph taken by researcher Namwebe, 2008
t.
In this experiment, the researcher aimed at assembling together balls of *Kavera* to create a three-dimensional sculptural form in the round without an armature. A sculpture was formed but the glue used created a coating that was not consistent throughout the sculpture.

It is recommended that future researchers should use other means of binding the balls so as not to lose the aesthetic value that would be created by these balls. The *Kavera* ball experiment inspired the artist to venture into another opportunity using the same material but in a different manner.

**Experiment 4.8.6 Rolled Kavera on a flat wire mesh**

In this experiment mineral water bottles were cut in sections which were used to wrap. In this experiment, *Kavera* was woven around plastic cuts of mineral water bottles. The intention was to fill the shape with wrappings of *Kavera* and the middle part was fitted with a ball made out of *Kavera*. Colour was used primarily to bring an impression. The task, however, was how to fix the segment made onto a flat wire mesh. Wood glue was applied; see Plate 4.49

![Plate 4.49 Rolled Kavera on a flat wire mesh](image)

*Plate 4.49 Rolled Kavera on a flat wire mesh*

*Photograph taken by researcher Namwebe, 2008*
The result was that a sculpture made with this material would not last for long.
it needed little interference. It is recommended that sculpture that area aimed to last a long period should be worked on using a stronger adhesive or another technique of fixing the material on the amateur.

**Experiment 4.8.7 Kavera stuffed in a mesh**

In this experiment Kavera was stuffed in a wire mesh as support. The intention was to fill the gaps with as much waste Kavera as possible. This worked with soft type of Kavera. An even finish depended on the workmanship of who was using this particular method. That style of working would require a lot of waste and for ordering the sculpture, Kavera could be sorted according to colour themes.

*Plate 4.50 Kavera stuffed in a mesh*  
*Photograph taken by researcher Namwebe 2008*
Experiment 4.8.8 Using Kavera rolling method (cigar type sticks)

Plate 4.51 Kavera Sorting Process:
Photograph taken by researcher Namwebe, 2008

Kavera was selected, cleaned and sorted according to thickness. It was then trimmed to regular shapes that could easily and neatly be folded.

Plate 4.52 Kavera Rolled Pipes
Photograph taken by researcher Namwebe, 2008

Kavera was then rolled in pipe like structures. This was done in a compressed manner giving the pipes a hardened result. The hardened rolls of kavera were put on top of other layers to enable it become strong.
The coloured kavera was put in the middle of the pipe while rolling and this gave an impressive appearance by the movements in the different layers of the material.
The pipes were then cut into cigar type of sticks. This experiment was done in order to devise means of how best kavera rolls could be fixed as a material to build a wall in sculpture.

Plate 4.55 Cigar type of sticks fixed on a mesh: Photograph taken by researcher Namwebe, 2008

The rolled cigar-like sticks were aided with holes on a mesh and supported by glue to hold firm.

Plates 4.56 Piling Kavera rolls Photograph taken by researcher Namwebe, 2008
Roundness to appreciate the body structure of a woman even when it is in abstract state. The forms are of an abstract nature because of the nature of the material that would not allow detailed studies. Formation of three dimensional forms through sketches to represent sculptural forms directly facing each other was an intended aspect to portray love and care.

Plate 4.59 A Marquette out of clay illustrating sculptural form mother
Photograph taken by researcher Namwebe, 2008

4.9.2 Theme: Uganda's Pride
Material: Kavera rolled (ciger type sticks) on mesh

Our environment is in great danger the flamingo bird was chosen as a source of inspiration. If our water bodies are not protected the bird life for example is doomed. The bird as a source of inspiration was used to portray Uganda bride that needs to be protected.
Plate 4.62 An illustration showing the arrangement of feathers this inspired the researchers to rolled kavera ciger like forms

4.9.3 Theme: Katooke

Material kavera Layering/trying on amateur

Plate 4.63 An illustration of banana fruit.
Photograph taken by researcher Namwebe, 2008

Uganda is a country that has had very good yields of Matooke which is loved by majority of its people. Among the Baganda food can only be Matooke. However, of recent this loved delicacy has been hit by poor weather conditions hence poor yield. Matooke was used as source of inspiration because it would be easy to get to the feelings of many Ugandans.
stock. The spacing of the fingers was intended to represent appreciate not a very healthy fruit hence the few fingers.

Plate 4.66 illustration of Marquette showing banana fingers made using layering and trying on amateur.
Photograph taken by researcher Namwebe, 2008

4.10 Conclusions
A number of experiments were carried out using three types of solid waste material to explore how these wastes could be turned into material for sculpture. The materials used in these experiments were bottle tops, glass cut-offs and plastic/kavera. sculptural ideals were explored through sketching and and semi abstract sculptural forms were arrived at.

It was established that bottle tops can be used as a surface embracement because of the aesthetic value in their shapes and colour. An armature was a primary aspect while working with bottle tops. While working with bottle tops, it is necessary to use binding material to fasten them together. Large volumes of bottle tops are required to come up with large piece of sculpture because they are minute in size.
It was also observed that glass cut-offs could be used in the making of sculpture as an embracement like bottle tops to create mosaics.

It was also established that kavera can be used as material for sculpture. Experiments carried out indicated that kavera could easily be used to make sculpture after heating and melting it or by manipulating the material. Either way, the material produced three-D dimensional works that removed large volumes of waste from the environment and would be of a long lasting nature because of their chemical composition.
CHAPTER FIVE

ANALYSIS, CONCLUSIONS AND RECOMMENDATION

5.1 Introduction
This chapter answers the question whether sculptural works executed from selected solid waste contribute to environmental conservation. The sculptures executed in this research explored how solid waste could be turned into material for sculpture with emphasis on volume of the waste used, the type and effect each of the selected waste has on the environment. It presents the final execution of sculptures that would contribute to efforts in conserving the environment and makes the relevant conclusions and recommendations based on findings that were made about the type of solid waste in Kampala City and experiments made on the selected solid waste as a material for sculpture.

5.2 Sculptures towards Environmental Conservation
As discussed in the previous chapters, waste management issues leading to environmental degradation has become a menace in Kampala City Council. It is the duty of every Ugandan including Uganda artists to make an effort towards solving this problem. As visual artists our works should cease to be just works of aesthetic value but should be works which give back to the communities' goals, needs and Expectations. This research, therefore, aimed at making sculptures that would contribute to the concerns of environment degradation. The researcher after various studio experiments proceeded to use the outcomes from experimenting on solid waste
material to execute sculptures that would contribute towards environmental conservation.

5.2.1 Making Sculpture from Bottle Tops Wastes

The sculpture in Plate 5.1 demonstrates how bottle tops waste material can be used to make sculpture. The sculpture in this Plate is a concept of a family portrayed in the different sizes of garden chairs. The sculpture executed is an inspiration of an egg form.

Plate 5.67: Garden chairs Topic: Garden Chairs
Material: Bottle tops Method: Embracement Size:1.4m x 80m x 1.5m

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The sculpture in Plate 5.1 above illustrates how bottle tops can be an inspiration, using already known and admired concepts to reduce solid waste from the environment. The sculptor executed sculptural forms that were functional, such as garden chairs, to achieve this objective. Uganda as country receives revenue from the breweries and soft drink manufacturing industries such as Coca Cola, Nile Breweries and Pepsi Cola. Despite the amount of revenue collected, the metallic bottle covers discarded from remains after taking the beverages are a great danger to the environment.

The sculpture in Plate 5.1 above portrays a solution, a set of chairs to get rid of the waste generated out of these leisure activities. The sculpture portrays togetherness that exists in a family. It is meant to demonstrate that it is the duty of Ugandans as a family to conserve the environment; sculptors belong to the same family just like how bird life depends on eggs for continuity. The roundness of each bottle top cap represents an aspect of unity.

Bottle tops were found interesting in this particular sculpture because they enhanced the sculpture through the value of colour. Colour by nature is believed to enhance sculpture as Kizito (1996) argues. It develops an emotional association and thus more appreciated by the public. This sculpture was made out of bottle tops that are bright because of their colour and are of definite shapes. This increased the strengths and beauty of the sculpture in terms of the subject matter Kizito (1996). It has also developed an emotional association and thus more appreciated by the public.
Plate 5.68: *The Beggar* Topic: The Beggar  
*Material: Bottle tops Method: Embracement*  
*Size: 1.4m x 1.2m x 1.5m*  

The studio discoveries after executing the Beggar revealed that the colour of the bottle tops could be arranged in a more harmonious way, which would give a consistent visual concept. The armature needed to be perfect when working with this material. In that regard, it would portray the voids of the sculpture which would be made possible by use of embracement as a method of executing the art works. The sculptor was aware that not all waste can be collected easily from the environment. There is always an aspect of sorting it according to the collectors’ ability.
long been considered out of the mainstream, modifying techniques, changing scales
and relationships so as to be viewed as new ways. Ssenyonga considers that this
move is guided by the artist's impulse to fulfill a particular ambition.

In line with Ssenyonga's idea, the present study experimented on different
material, namely metallic bottle tops, polythene/plastic material and glass cut off which
were already accumulated in a number of places in Kampala district. For example
broken glass material was readily available in the city centre on Sinai Bin Street,
Nakasero Market Area every morning. Until around 9.00 a.m every morning when the
Streets would be cleaned, these broken glass material posed a danger to the
pedestrians on the streets, they also made the places untidy.

Bottle tops were found disposed off haphazardly in several places in Kampala
including 'Bamuda Triangle' in Wandegeya, Kabalagala, Makindye and many other
recreation areas in the city. Polythene/plastic material was found littered in many
places in the city centre and its peripheries. Much as solid waste in these areas does
not appear to pose a big environmental problem, however, when aggregated together,
just as birds pick only what they can swallow and digest. This innovation is an aspect of cleaner production mechanism. Cleaner production mechanisms when applied to making sculpture can influence the cycle of collecting waste and turning it into useful items. Using the imagery of a bird, the sculptor made a sculpture piece out of bottle tops to come out with an aspect that is appealing to the human mind aesthetically as illustrated in Plate 5.3 below.
Plate 5.69: The Bird Topic: Untitled
Material: Bottle tops Method: Manipulation
Size: 1.5m x 1.5m x 2.5m
The sculpture in Plate 5.3 brings out a beautiful bird without a slight reflection on the material from which it was made. This is a situation of using art to create an inclusive healing environment. This sculpture has been designed taking space as a primary means of expression. The size also satisfies the objective of the study as an innovation to reduce the volume of solid waste from the environment. The amount of bottle tops used in executing this sculpture was approximately 800 pieces per square meter. The researcher noted that even a smaller piece of sculpture would require hundreds of bottle tops to complete.

The simplicity of the forms was designed in line with the nature of the material. Contrary to the traditional materials used in making sculpture, and perception of sculpture as masses curved out of block or built up to form a block, in this particular case, despite the size, the sculpture is a light one. It can easily be moved from place to place.

The environment is being crushed by our actions. The sculpture in Plate 5.4 below is a representation of a trap. Our actions have put the environment in a trap. The sculpture is a representation done using simple forms. Colour shades have been used to enhance the concept. The bottle tops were arranged to create an overlapping nature. This created a scale like effect.

The size of the trap is a direct response to the set objective of getting rid of waste from the environment. The round egg shaped image presents the wonderful gold bright environment being swallowed by solid waste from all corners that it cannot even escape. The glory of golden environment if not protected then we are in a trap.
Plate 5.70: Protection
Topic: untitled Material: Flattened Bottle Top
Method: Manipulation Size: 2.5m x2m x1.5m

The sculpture in Plate 5.4 did not scramble the artist's priorities or her creative vision.

5.2.2 Making Sculptures from glass waste

The struggle for new meaning and aesthetic function for light and colour is one of the fascinating phenomena of modern art. There was a need to explore light and this was paramount concern with glass solid waste. The sculptor was inspired to execute a multi- coloured sculpture using glass cut offs in an effort to conserve the environment as illustrated in Plate 5.5 .below.
The sculpture demonstrates that what is trash can be turned into something of value, in this case a sculpture depicting trouble. Under the theme "Troubled", the Researcher tried to show how the environment is "troubled" by human activity. The sculpture piece portrays an aesthetic function of light and colour, which gives way to a multi-coloured form. The amazement of the colour and the simplicity of the forms give an innate quality that makes it interesting to the viewers. A few artists who saw this
sculpture expressed that it is aesthetically satisfying and has no connotation with the material it is made of.

5.2.3 Making Sculpture from Polythene Waste

Industrialization has brought with it many benefits in terms of improved economic growth. Many developing countries are eager to accelerate their processes of industrialization even though this historically has resulted into environment degradation (Migoro, 1995; Republic of Uganda, 2001). One of the outcomes of industrialisation is production of polythene material which is used in various forms, largely as a packing material. It is produced in large quantities. Out of the total percentage of solid waste generated daily in Uganda, polythene material accounts for 1.6 percent (see Table 4.1 at page ... ). Communities in Uganda consider polythene material as part and parcel of their lifestyles in terms of wrapping and packing goods from shops. Polythene material is readily available and cheap. It has now become an environmental problem because of the poor disposal methods adopted by very many people in Kampala City Council.

Human life depends on the harmony between human beings and their surroundings just like a mother takes care of her children. The artist was inspired by the mother and child love relationship to contribute towards effort by Kampala City Council to reduce the amount of polythene material in the environment.
The sculptural piece came out clearly as an aesthetic piece of a mother and child. This sculptural work like other materials portrays considerable evidence of three dimensional works to suggest sculptural forms. This sculptural piece gives a result of a blended blackish and greyish colour that is attained by a mixture of different colors of plastic melt. This work is an inspiration for recycling and managing solid waste in Uganda. The final piece in Plate 5.8 below weighs about 100 kilogram's. Forty bags that carry 100 kgs say of maize grain were filled with mineral water bottles that were
11. used in this experiment; an additional fifteen, twenty-litre waste jerrycans were heated to complete the experiment.

Plate 5.74: Mother and child
Topic: Mother and child
Material: Plastic
Method: Manipulation
Size: 0.96m x 1.2m x 1.5m
Plate 5.75: Uganda's Pride
Topic: Uganda's Pride
Material: Kavera rolled cigars
Method: Manipulation
Size: 0.96m x lm x 1.5m

Plate 5.9 above "Uganda's Pride" portrays a sculpture made out of rolled kavera pieces and constructed using the assemblage method. The following is a process by which individual pieces of kavera are brought together to form a sculpture. The artist derived an idea using a bird form. Since Uganda is endowed with a rich family of birds, some of them being rare and endangered species of the world, the researcher
decided to execute the sculpture "Uganda's Pride" aimed at communicating the need to conserve the environment for the bird species. The use of kavera waste would go a long way in making people aware that waste is a useful material which can be used to communicate important messages. Among these is the message conveyed by Uganda's pride. This sculpture portrays that the waste which would affect the environment can be withdrawn and used in making useful art works in order to save the tourism industry in Uganda.

The manipulating process to make each feather-like shape affected the artist's emotional state and reaction as she went through the process of rolling individual kavera. These coupled with the time spent on the job while rolling the kavera, was rewarded by the pleasant, attractive and the general aesthetic arrangement of the Feather-like shapes on the 'bird'. The amount of kavera waste used to create the thousands of feathers is a direct realization of how much solid waste can be removed from the environment if sculptures used solid waste as material for sculpture.

Another made using kavera tying/layering method was made to portray that agriculture is the back born of Uganda's economy (GoU, 2009). This makes it necessary to conserve the environment because all agricultural activities depend on how the environment is conserved. For instance, when interviewing officials from NEMA it was discovered that banana yields have been reduced greatly as a result of damage caused to the soils by kavera. This is due to poor waste management habits. This observation inspired the researcher to execute a sculpture out of kavera as an innovation towards reclaiming it from the environment. In the postmodern era, artists
are moving from one technique of working a material to another guided by their impulse to fulfill particular ambition for instance conserving the environment. The sculpture 'Akattoke' below demonstrates the trend of direction visual artists are taking; using a known phenomenon such as matooke with a handful of fingers to execute sculpture. The sculptural concept illustrates how visual artists can contribute towards environmental conservation by removing large volumes of *Kavera*.

*Plate 5.10: Akatooke*

*Topic: Akatooke Material: Kavera.*

*Method: Manipulation Size: 0.84m x 0.5m x 1.3m*
13. **5.3 Conclusions**

The main objective of this study was to establish the state of environment degradation in Kampala City as a result of solid wastes. Samples of solid wastes, biodegradable and non-biodegradable that were found littered in the city were collected and experimented upon as sculpture material. The non-biodegradable materials were found to be the most dangerous to the environment; they were also easily to manipulate into material for sculpture. Selected solid waste materials were collected in large quantities and used in experiments to material to make sculpture.

Basing on the findings of this study, the following conclusions were made:

There is a general increase in the problem of waste disposal in Uganda because of increased urbanization and industrial action; the methods used to dispose of solid waste in KCC pose a danger to efforts aimed at environmental conservation; some of the solid waste material identified in KCC such as plastic material is non-biodegradable. This may cause long term damage to the environment and also have an impact on human health.

There are identifiable policy gaps and an overall lack of awareness, and limited community participation in the management of solid waste in KCC.

When solid waste is burnt in the open it causes direct environmental pollution by emitting noxious fumes; the fumes emitted during the experiment that involved heating and melting of plastic material were thick and noxious to the eyes.

Many artists in KCC are not aware that solid waste can be reclaimed and used in the making of sculpture; the sculptures made required large volumes of solid waste material.
14.
When solid waste material is used in the making of sculpture, it gives a consistent visual concept, which is aesthetically satisfying and has no connotation with the material it is made of.

The armatures needed to be perfect when working with bottle tops and glass cut offs in order to portray the voids, masses and shapes since the method was an embrace; the researcher was inspired by the fact that solid waste material could be manipulated.

The studio discoveries after executing the sculptures revealed that a lot of solid waste material was required to come up with any of the sculptures made; the sculptures made portrayed the importance of colour in sculpture as it increased the strength and beauty of sculpture in terms of the subject matter; they created an emotional association that could be appreciated by the public.

The material was relatively cheaper than the traditional material used in the making of sculpture because it was looked at as junk; and the experiments carried out in this study fulfilled what had been anticipated under the set objectives namely; establishing the type of existing solid waste impacting on the environment in KCC, devising means of turning solid waste into material for sculpture and to practically use solid waste material to execute sculpture as an innovation for environment conservation.
5.4 Recommendations

The study came up with a number of ways in which solid waste could be used to make sculpture. The amounts of solid wastes collected for this study were enormous. The experiments carried out demonstrated the importance of using knowledge acquired by professionals in this case artists to save the environment from further degradation by human activity. The study further demonstrated that solid waste as material for sculpture is cheap, and that therefore artists can resort to it as material for sculpture in order to make a contribution towards environmental conservation.

It is, therefore, recommended that various categories of the public including policy makers and legislators; researchers and teachers; visual artists and the general public adopt the methods used in this study or at least borrow a leaf from it to carry out activities that can save the environment in their local areas from further degradation.

The study generated new ideas such as the importance of colour in strengthening concepts in sculpture and bridged the gap between material and the technical, cognitive and aesthetic bases of human interaction with art. It is recommended that visual artists should appreciate this effort and improve on it as an innovation to contribute to environmental conservation.

The study demonstrated the strength of being creative behaviour and attitudinal change to solve an existing environmental problem such as its degradation by human behaviours which can be changed. It is recommended that visual artists become more creative and develop a positive attitude towards solid waste material, which is not
always preferred by many of them in the making of their art work as a contribution towards solving an environmental problem at hand.

On its part, the Government of the Republic of Uganda should bridge the identifiable gaps and increase on the overall public awareness of the dangers of solid waste on the environment and how such wastes could be handled in a manner that would not further the problem of environmental degradation.

It is also recommended that further research should be carried out on solid waste as material in order to establish better methods of using solid waste as material for sculpture in an effort to contribute to environmental conservation. For example, they should devise better methods of heating and melting plastic material, instead of burning it in open air, which generates fumes that are dangerous to human beings and the environment in general.

Art education programmes in Uganda should support innovations of using solid waste as material for sculpture to enhance creative thinking among artists.
15. **References**


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Appendix 1

KYAMBOGO UNIVERSITY

FACULTY OF VOCATIONAL STUDIES

INTERVIEW GUIDE

A. General questions to informants

1. Name

2. Organization/institution

3. Status at the organization/institution

4. Duration at the organization/institution

5. Do you understand what is meant by environmental conservation?

6. What do you know about environmental conservation?

B. Questions for NEMA Staff and KCC Officials

21. What are the main causes of environmental degradation in KCC?

22. Is solid waste one of them?

23. How do you rank solid waste in respect to the problem it poses to the environment?

24. How can the problem of solid waste be reduced in KCC?

25. What type of solid waste impacting on the environment is generated in Kampala?

26. How is waste managed in Kampala City Council?

27. What measures does your organization have in order to use solid waste in a productive manner?
28. C Questions for University Fine Art Lecturers

14. What is the area of your specialization in the field of Fine Art?

15. How can you define sculpture?

16. What are the common types of materials used for executing sculpture?

17. Is solid waste one of them?

18. If solid waste is one of the sculpture materials, what is your attitude towards it?

19. What are the benefits of using solid waste in executing sculpture in terms of environmental conservation?

20. What is your opinion on found media as material for sculpture?

21. What is your opinion on the problem of solid waste?

22. In what ways do you think visual artist can contribute to environment conservation?

D. Questions for University Fine Art students

23. In which of study are you?

24. What is your area of specialization?

25. What do you understand by the term solid waste?

26. What do you understand by the term sculpture?

27. What do you understand by the term environment?

28. What do you understand by the term environmental conservation?

29. How can the execution of sculpture form solid waste contribute towards environmental conservation?
29. **E. Questions for selected members of the general public**

30. What do you understand by the term environment?

31. What do you understand by the term solid waste?

32. What type of solid waste exits in your community?

33. What dangers, if any, does solid waste pose to your community?

34. What perception do the people in your community have towards solid waste?

35. What role has sculpture played in environment conservation process?

36. Do you think solid waste can be used to execute sculpture in an effort to conserve the environment?

**F. Questions for Artisans**

37. What is your opinion on solid waste?

38. What has been your experience with working with solid waste?

**G. General Concluding questions**

39. What are the views of your clients on your products?

40. What conclusions can you draw basing on this discussion?

41. What recommendations can you make basing on this discussion?

42. What other additional information do you wish to be considered for this study in relation to the topic of research?

I am grateful for your time and accepting to participate in this study.

**Rita Namwebe**