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INSTITUTE FOR ENVIRONMENT AND SANITATION STUDIES

UNIVERSITY OF GHANA, LEGON



**CEMETERIES AS SUSTAINABLE GREEN SPACES IN THE
URBAN LANDSCAPE OF THE GREATER ACCRA
METROPOLITAN AREA (GAMA)**

BY

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OF DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL SCIENCE**

DECEMBER, 2021

DECLARATION

I hereby declare that this thesis is my own research. All references to other works have been duly referenced. This work has not been either partly or wholly presented for another degree elsewhere.


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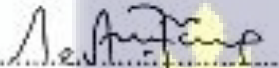
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ABSTRACT

Cemeteries are primarily constructed as the final place of rest for the dead. The presence of plant cover in cemeteries and their sacred nature make them unique components of the urban landscape that need some protection. With mounting pressures on the urban space due to population growth, most urban cemeteries find themselves at the centre of cities and as a result face various abuses, although, they provide shade, perform other ecological functions, enhance the natural aesthetic beauty and promote healthier city life.

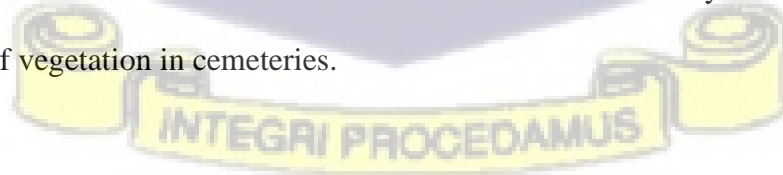
The objective of the study was therefore to explore the potential of cemeteries as functional green spaces within the urban landscape by examining their physical features, the ecological status and socio-cultural attributes in the Greater Accra Metropolitan Area of Ghana.

The study employed a mixed-methods approach involving on-the-spot observation, floral and social surveys, and key informant interviews. A total of 500 questionnaires were administered and 12 key informant interviews were conducted. Orthophotograph images of the cemeteries were analysed using Geographic Information Systems to obtain the land cover classification of the cemeteries. The quantitative data of the research was analysed with the aid of Statistical Package for Social Sciences (SPSS), software version 20 (IBM). Descriptive statistics were used to analyse the perception on multi-use of cemeteries, acceptable uses of cemeteries, actual uses of cemeteries and chi-square statistics was used to test the relationship between perception about multi-use of cemeteries and other uses apart from burial. The qualitative data was analysed under the broad themes of tree management, other uses of cemeteries, and policy challenges regarding cemetery operations and management.

Cemeteries were located in the majority of the Assemblies in GAMA. From the study, 48 cemeteries were identified in GAMA. Private families owned 69%, the public owned

17%, 4% were commercial and 10 % owned by religious organizations. Ownership type can be traced to strong cultural and traditional beliefs. More than 50% of the cemeteries were walled, with the rest not walled. Activities observed in the cemeteries included construction, farming, commercial, residential and relaxation. Evidence of open defecation and cemeteries as waste dump sites were also observed. The findings of the research showed that, a total of 176 species from 62 families were identified. Out of which 71% naturally growing species, and 29% were introduced species. The land cover analysis showed that the area covered by each land cover type varied across cemeteries, with the highest tree cover found in the private family cemeteries. The belief that the dead must be protected from harsh weather conditions mainly accounts for vegetation in cemeteries. A total of 92% of the respondents perceived cemeteries as monofunctional places (burial purposes only), although 42% reported having used the cemeteries in other ways aside from burial. The study also showed that 7.4% of the respondents use the cemetery as toilet and waste dump sites. The location and distribution of cemeteries in GAMA make them green areas. The floral composition and vegetation cover of cemeteries make them good green areas in cities.

For the cities to realise and benefit from the full potential of cemeteries as functional green spaces, traditional and cultural beliefs associated with cemeteries, particularly the ones linked to vegetation, should be blended with the formal management of cemeteries and city authorities must strive to direct multi-use of cemeteries in ways that complement the presence of vegetation in cemeteries.



DEDICATION

To my late Dad, Mr. Joseph Kwami and my father in-law, the late Mr. William Adufutse.



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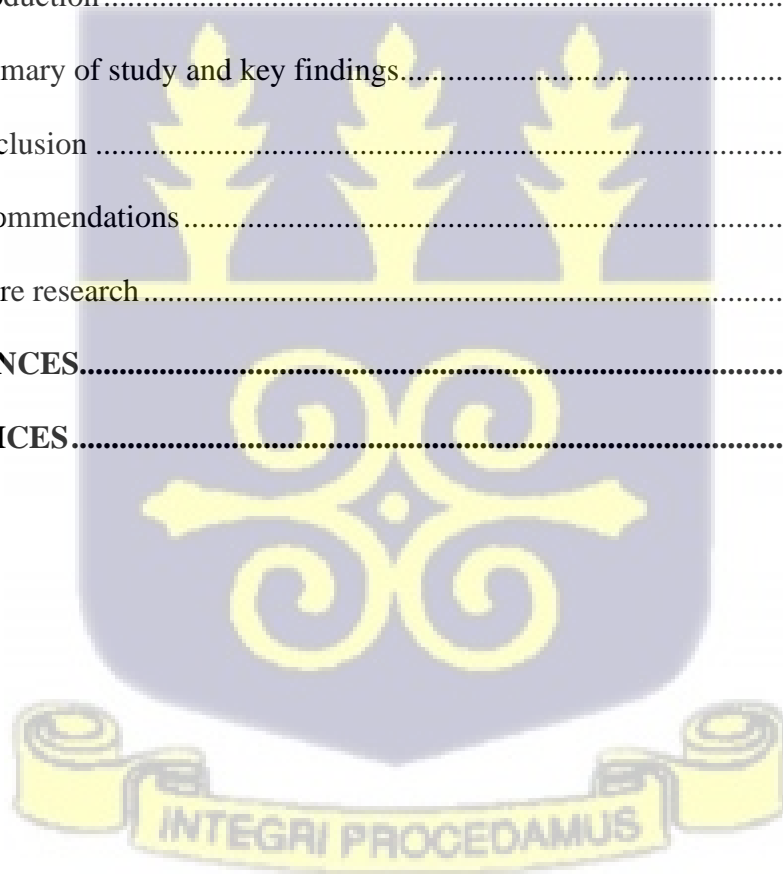
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LIST OF ABBREVIATIONS

AbWMA	Ablekuma West Municipal Assembly
CBAS	College of Basic and Applied Sciences
FAO	Food and Agricultural Organisation
FROGGIE	Forest Reserves of Ghana Geographic Information Exhibitor
GAMA	Greater Accra Metropolitan Area
GARCC	Greater Accra Regional Coordinating Council
GIS	Geographical Information Systems
GPS	Global Positioning System
IUCN	International Union for Conservation of Nature
LUSPA	Land Use and Spatial Planning Authority
MA	Municipal Assembly
MEA	Millennium Ecosystem Assessment
MLGRD	Ministry of Local Government and Rural Development
MMDA	Metropolitan, Municipal and District Assemblies
MOFFA	Mortuary and Funeral Facility Agency
MOH	Ministry of Health
PHC	Population and Housing Census
SDG	Sustainable Development Goal
UN	United Nations
UNESCO	United Nation Educational Scientific and Cultural Organisation
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background to Study

Humans are responsible for the destruction of biodiversity and for making ecosystems disappear (Roe, et al.,2019). Similarly, the Millennium Ecosystem Assessment (MEA) reports that more than 60% of the world's ecosystems are being destroyed or utilised in a manner that does not guarantee their future (Reid et al., 2005). In cities worldwide, the urban ecosystem is being disturbed through the impact of human activities of high emissions, poor waste management among others (United Nations, 2018). As more people migrate to cities and populations increase, the pressure on land and demand for natural resources increase (Holden & Otsuka, 2014; Addo-Fordwuor, 2014). Large spans of vegetation are lost in the process and city dwellers find themselves having little or no contact with nature. Indeed, most cities are experiencing reduced contact with nature. This is what Verschuuren et al., (2010) and Warber et al., (2015) describe as 'nature deficit disorder' which has detrimental effects on city life.

McDonald and Beatley, (2021) report that, the world's population is expected to rise to about 9.8 billion in 2050 which means a corresponding increase in demand for space for housing and other infrastructure in cities worldwide. These increases could result in huge pressure on land and its associated resources (Neema, et al., 2013; Swensen et al., 2016). It is therefore, paramount to pay attention to the interactions between city dwellers and their environment and amongst indigenous residents of cities and migrants. This is consistent with the focus of Sustainable Development Goal (SDG) 11; building safe, resilient, and sustainable cities by 2030. The associated indicator of SDG 11, indicators 11.4 and 11.7, are focused specifically on protecting cultural heritage and green spaces

for all, especially women, children, and the vulnerable in the world (United Nations, 2018). In the same vein, SDG 15 focuses on how terrestrial ecosystems are used sustainably, protected, restored and promoted. It also looks at how forests are managed sustainably. Furthermore, SDG 15 is concerned with how desertification, degradation and loss of biodiversity can be stopped (Tisdell, 2021). Green spaces in urban settings are relevant in sustaining terrestrial ecosystems and urban spaces (Wang et al., 2019).

Georgi & Dimitriou, (2010) assert that, many modern cities do not have enough green space even though green spaces present an excellent opportunity for connecting with nature within the urban space (de la Barrera et al., 2016). Research has established that urbanisation and rapid population growth are the main reasons for the destruction of vegetation, including green spaces (Liu et al., 2015; Mensah, 2014; Lai et al., 2020). Mensah, (2014) pointed out that lack or weak enforcement regimes, difficulty in identifying who owns and controls these spaces, lack of maintenance, weak collaboration among institutions associated with green spaces, and citizens' attitudes are some of the critical factors responsible for the devegetation of city landscapes. It is also reported that most governments' local authorities have little or no control over lands associated with tradition, culture, and religion (World Bank, 2016). This poses more problems in the protection and conservation of religious and cultural green spaces.

Globally, it is recognised that every city requires green spaces because they form part of the overall composition of vegetation in cities and enhance the quality of life in cities by contributing to the economic, social and environmental well-being (Russo & Cirella, 2018; Arvanitidis, 2007; Kothencz et al., 2017). They have great potential for solving most urban problems of intense heat, air pollution from industries and heavy traffic (Derkzen, 2017; Chaytor et al., 2014; Pervaiz et al., 2018). Cities with enough greenery provide dwellers with a better chance of a healthier and improved quality of life (Oduro-

Ofori et al., 2014; Mensah, 2014; Russo & Cirella, 2018). Examples of green spaces include tree lots, lawns, parks, backyard gardens, urban forests, sacred groves and cemeteries (Nero, 2017). Thus, green spaces basically cover all natural environments.

Many studies provide evidence to support the fact that nature is linked to the health and wellbeing of humans (Hartig, et al., 2014; Sandifer et al., 2015; Pretty, 2004). Nature has reportedly been cited for positively impacting human health and speeding up healing processes in some instances. Indirectly, nature promotes social cohesion and interactions among people (Jennings & Bamkole, 2019). According to Sandifer et al. (2015), reduced contact with nature negatively affects health, wellbeing and also does not encourage protective behaviour towards nature.

Cemeteries are part of the urban green space (Nordh & Evensen, 2018). In a UNESCO conference held in June 2010, Kiss and Bassa reported that cemeteries were part of ‘protected natural territories’, thus forming part of UNESCO's World Heritage Composition (Pecsek, 2015). Cemeteries (burial sites) and sacred groves form part of protected areas (Nganso, et al., 2012). There have been several studies on cemeteries worldwide, including those that identify cemeteries as green spaces with cultural properties or as cultural landscapes with recreational, economic and spiritual uses (Nordh & Evensen, 2018; Quinton & Duinker, 2019; Cheng, 2013).

Even though most cemeteries in urban areas are seen as green spaces, they are not accorded the same attributes as other green spaces (Nordh & Evensen, 2018). In fact, Nordh and Evensen, (2018) noted that urban cemeteries were seen only partially as green spaces by city planning and development authorities in Norway. Similarly, Anna and Ewa, (2020) state that, although cemeteries are communal, they are not regarded as such by cities authorities. The confusion in categorising cemeteries as green spaces adds to how

cemeteries are perceived and used, especially in city spaces. Nordh and Evensen, (2018) conclude that, huge populations and increasing green space needs of cities call for decisions from city authorities on how urban cemeteries can be placed to perform their multi-functional role successfully. It is well documented that some cemeteries serve as recreational or leisure centres (Nordh & Evensen, 2018) and people take time off to relax.

In the United States of America, the Lafayette aerial cemetery is a typical cemetery used for recreational purposes. The cemetery is visited by many tourists from all over the world. Huge amounts of money are generated annually through these tours (Tomašević, 2018). Similar cemeteries can be found in the United Kingdom (UK), like the Highgate Cemetery. This cemetery contains numerous war graves and the graves of significant people like the grave of Karl Max (Tomašević, 2018). Other cemeteries which serve as great recreational places include the Pere Lachaise cemetery in Paris, which has existed since the 1880s, the Mount Auburn Cemetery and the Assistens Cemetery located in Copenhagen (Al-Akl et al., 2018). For Al-Akl et al., (2018), these cemeteries and others of similar features have served and continue to serve as spaces for social interactions.

Some cemeteries are more open to recreational activities than others. A study by Grabalov, (2018) on three cemeteries in the city of Malmo, Sweden; the Gamla Kyrkogarden, S:t Pauli Kyrkogarden and Ostra Kyrkogarden showed jogging, walking, walking dogs, cycling and visiting graves as the typical activities that take place in all three cemeteries. Of the three, however, it was only S:t Pauli Kyrkogarden that allowed picnics. Many factors may be responsible for allowing or disallowing activities in cemeteries. Prominent among these factors is tradition and culture (Goh & Ching, 2020). According to Goh and Ching, (2020), the use of cemeteries for recreation has not been

fully adopted in Asia but it is worth noting that the younger Asian is more open to the notion of cemeteries as recreation places than the older generation.

Cemeteries hold historical and cultural value to many cities. Examples include the Greenwood Cemetery in Brooklyn, New York in the United States of America and the Ostra Kyrkogarden in Malmo, Sweden (Rae, 2021). The tourism value and potential for tourism development of cemeteries is well established and documented. Pecsek (2015) notes in her work on 'City Cemeteries as Cultural Attractions' that, people showed more interest in cemeteries' cultural and natural components than in dark tourism. This is important in the promotion of cemeteries as tourists' sites. Cemeteries are homes to many animal species. Indeed, the works of Tryjanowski et al., (2017) indicates that just like parks, cemeteries made suitable homes for some important bird species.

To the African, the acceptable and dignified way of interring the dead was through burial (Leuta, 2019), making cemeteries important parts of societies in Africa. Cemeteries, therefore, hold a more religious, cultural and traditional meaning in Africa. In South Africa, for example, burying the dead and the one year after burial celebration where the tomb is unveiled still hold strong culturally (Leuta & Greene, 2011). Their study also showed that South Africans were neither open to alternate body disposal methods nor multi-use of cemeteries. In Nigeria, studies on cemeteries try to address several issues ranging from the origin and types of cemeteries, burial and health concerns about cemeteries in River State and the neglect of cemeteries (Adeboye, 2016; Douglas, 2013; Onwuanyi et al., 2017).

Despite these positives and benefits derived from cemeteries as green spaces, cemeteries have also been linked to some negative social behaviours such as crime and abode of homeless people (Wolch, et al., 2014; Lapatha et al., 2019; Swensen, et.al. 2016). Grave

looting and indiscriminate waste disposal have also been reported in several news items. City dwellers experience green spaces differently (Chaytor et al., 2014). Thus, an examination of these different experiences is critical. How these spaces are regarded, used, perceived and managed are influenced by many factors, including the location of the landscape, accessibility, their appearance or physical characteristics, the meaning and the attachment people have for them (Chaytor et al., 2014). Russo and Cirella, (2018) for example, concludes that people are more likely to use green spaces they perceive as secured and beautiful. Spaces that are deemed dangerous, according to Russo & Cirella, (2018) are avoided at all cost.

A major concern is whether cemeteries should be put to multiple uses (Nordh & Swensen, 2018). Another concern is how people can protect these cemeteries and how cemeteries can be used sustainably. These concerns are even more legitimate in cities where the population is vast and there are competing needs for land and natural resources (Nordh & Swensen, 2018).

Very few studies have looked at cemetery locations, distribution, and contributions to cities' greenery in Ghana. Again, few studies have looked at the acceptable and unacceptable uses of these cemeteries. Therefore, this study seeks to examine the physical characteristics, ecological significance and socio-cultural attributes of urban cemeteries as a potential for greening urban spaces within the Greater Accra Metropolitan Area (GAMA).

1.2 Problem Statement

Many cities are faced with inadequate green spaces (Colding, et al., 2020). This green space inadequacy requires that cities find other ways to meet their green space needs. Urban cemeteries have the potential to meet this green space in cities because of their high biodiversity value (Yılmaz, et al., 2018). There have been some studies on cemeteries and

their role in conservation and biodiversity protection (Nowińska, et al.,2020; Löki, et al.,2019; Löki, et al.,2020; Kowarik et al., 2016). However, cemeteries are overlooked with regards to planning and management of green spaces (Długoński et al., 2022; Rae, 2021; Grabalov & Nordh, 2021). There is therefore, limited knowledge on the full potential of cemeteries as green spaces (Al- Akl et al., 2018). This makes it difficult to acknowledge the ecosystem service they provide and their contribution as green spaces.

Few studies like Quinton et al., (2019), Glover et al., (2010), and Jones, (2011) have conducted studies on cemeteries, their role as green spaces and the meaning and value people assign to them. Contemporary researchers in cemetery studies, such as Nordh & Evensen (2018), Quinton and Duinker, (2019) and Swensen et al. (2016) point out the need to study the use of cemeteries aside being a place for interring the dead. These researchers are also interested in the attitude of cities towards cemeteries as green spaces. They want to know how the values of these spaces have changed in cities and how these influences the uses they are put to currently (Masterson, et al., 2019). According to Al-Akl et al. (2018), it is essential to also find out how people feel and interact with urban cemeteries. All these have implications on the sustainability of green spaces and life in cities. It also has implications on meeting Sustainable Development Goal 11 (SDG 11), which makes the protection of cultural and natural heritage a priority in making cities safe, resilient and inclusive (United Nations, 2018). At the same time, the current uses of some cemeteries have raised concerns about sustainability, loss of cultural values and safety in the cemeteries (Quinton & Duinker, 2019; Skar et al., 2018; Swensen, et al., 2016).

In Ghana, studies on cemeteries have been limited mainly to burial rites and assessing old cemetery sites for other uses and the design of monuments for the dead (Ansah-Asiedu, 2016; Nero, et al., 2016). Amoako-Gyampah, (2022), Balakrishnan, (2022), and Kweipeh,

(2020) can be described as emerging studies with their focus varying from public health social politics, mortuary politics, use and management of cemeteries. Very little is known about cemeteries and their role as green spaces in Ghana. Additionally, there is limited knowledge about cemeteries in the Greater Accra Metropolitan Area of Ghana (GAMA), their locations, distribution, management and particularly their role as green spaces. The whole of Greater Accra Region continues to experience rapid expansion with the Accra Metropolis experiencing increases in the built-up environment from 55% to 84% and decreases in green spaces from 41% to 15% in almost three decades (Puplampu, & Bofo, 2021). The result is that, the natural environment particularly green spaces face the risk of extinction within the Greater Accra Metropolitan Area (Akubia, et al., 2020).

To add to this, there have been reported cases of encroachment of cemetery spaces, the desecration of graves, and other antisocial behaviours which can affect the sustainability of cemeteries in GAMA. The loss of cemetery lands not only results in the reduction of available burial and memorial places, it also means a loss of culture, heritage and history, biodiversity and ecosystem services provided by them (Niță et al., 2014).

Against this backdrop, this study aimed to explore the potential of using cemeteries in the greening of cities by examining physical characteristics, their ecological significance, and their socio-cultural features in GAMA.

1.3 Objectives of the study

The main objective of the study is to explore the potential of cemeteries as functional green spaces by examining the physical characteristics, ecological status, and socio-cultural attributes / properties of the cemeteries in the Greater Accra Metropolitan Area (GAMA) and explore their capacity as greening tools. The study will add to existing knowledge and inform policy on the potential of cemeteries as green areas in cities.

1.3.1 Specific Objectives

The specific objectives of this study were to:

- i. Map and characterise cemeteries in GAMA.
- ii. Determine the status and quality of vegetation in the cemeteries.
- iii. Examine the perceptions of city dwellers on the multi-use of cemeteries.
- iv. Establish the extent of use and threats to vegetation of cemeteries within GAMA.
- v. Examine the legal, regulatory and policy framework for operating cemeteries.

The objectives above were addressed using the following questions as indicated below;

To map and characterise the cemeteries in GAMA were determined using the questions below.

- Where are the cemeteries located?
- What are the sizes of the cemeteries?
- In which municipalities can they be found?
- Who owns these cemeteries?
- How are they managed?
- What are the patterns of distribution of the cemeteries?
- What are the factors that account for the distribution pattern of the cemeteries?

The second objective, which was to determine the status and quality of vegetation in the cemeteries, was addressed using these questions.

- What are the vegetation classes within the cemeteries?
- What area does each of the vegetation classes cover?
- What types of plant species are found in the cemeteries?
- What are the main plant life forms of the species found in the cemeteries?
- What are the families to which these plants belong?

- What is their nature in the habitat in which they are found?
- What is their International Union for Conservation of Nature (IUCN) rating?
- What are the star ratings of these plants (where available)?
- What are the uses of the plants found in the cemeteries?

The objective of examining the perception of city dwellers on the use of cemeteries was addressed with the following questions were asked.

- What is the perception about the other uses of cemeteries apart from burying the dead?
- What is the perception about the possible multi-use of cemeteries for greening cities?
- What uses are considered acceptable or allowable?
- What meanings and descriptions are assigned to cemeteries in GAMA?
- What is the association between perception about cemetery and the use of cemeteries in GAMA?

To establish the extent of use and threats to vegetation of cemeteries in GAMA, the underlisted questions were posed.

- What are the self-reported uses of cemeteries in GAMA?
- Do demographic characteristics influence use of cemeteries?
- Does type of cemetery influence multi-use of cemeteries?
- What are the factors that influence multi-use of cemeteries?

To examine the policy and regulation governing cemeteries use and management, the following questioned were asked.

- What are the legal and policy framework under which cemeteries operate in GAMA?

- Which institutions are responsible for ensuring cemeteries are operated and managed within the legal framework?
- What are the challenges of policy implementation with regards to cemetery governance?

1.4 Justification for the study

There have been emerging interests in studies on unusual green spaces and what they mean for cities and sustainability. Greening of cities is important in promoting sustainability and quality of life in cities worldwide (Cooke *et al.*, 2019). Sustainable Development Goals (SDG) 11 and 15 directly deal with sustainability of cities. The targets of these SDGs are to promote the safe, lasting and ultimately, sustainable environment for healthy living. Cemeteries as green spaces present unique opportunities for cities to achieve their required green space needs as well as preserve their culture and religion. Cemeteries as green spaces, also contribute to the economic, social, cultural and spiritual needs of many cities.

In GAMA, essential the whole of Ghana, studies on cemeteries hardly draw links between sense of place, green spaces, and city greening. This study thus, hope to bridge the knowledge gap between people and their interaction with such spaces and how these interactions are influenced or guided by the emotions and perceptions of people towards these places.

1.5 Scope of study

The study examined the potential of urban cemeteries in greening cities in GAMA. Cemeteries rather than other green spaces were chosen due to their specific role as a place for disposing off the dead in a sanitised and dignified manner. Cemeteries also have rich biodiversity that when used properly will be instrumental in providing the green space

environment that GAMA needs. Interactions between people and cemeteries are quite complex producing tensions and conflicts in certain instances. Urban cemeteries in GAMA for that matter, present an interesting case due to the fact that urban centers struggle with rapid population growth, scarcity of land and diminishing cultural and traditional influences in urban communities in Ghana.

1.6 Limitations of the Study

This study is focused on landscapes associated with culture, religion and taboos in the Greater Accra Metropolitan Area of Ghana. The first limitation of this study is that there was no generally agreed or official list of cemeteries present in GAMA. Thus, the total number of cemeteries could not be verified with any official data leading to possible biases as there could be either present or recently lost cemeteries that may not have been captured in the study.

Secondly, the strong traditional and cultural practices associated with cemeteries made access to some cemeteries difficult, thus preventing the discovery of certain issues. Another limitation of the study was the sensitive nature of cemeteries. Issues of death and burial made some respondents uncomfortable discussing their thoughts, experiences and beliefs about cemeteries. The grief and pain associated with losing a loved one also made it quite difficult for some respondents to share their experiences freely.



CHAPTER TWO

LITERATURE REVIEW, CONCEPTUAL FRAMEWORK AND STUDY PROPOSITIONS

2.0 Chapter Introduction

This chapter unpacks among others what cemeteries are, the ownership types, ecological benefits and their multi-functional role in city spaces. Furthermore, it contains a theoretical review which integrates the theory of sense of place and the social ecological theory to explain the interaction between people and cemeteries in cities and its influence on use.

2.1 Literature Review

2.1.1 *Cemeteries, what are they?*

Rugg, (2020) states that the word cemetery is the generally accepted term used in referring to places where the remains of humans are interred. Thus, cemeteries were created/established as a place where people who have died can be respectfully laid to rest. It is also described as place of record of the past (Cheng, 2013). Cemeteries shed light on the past and the people who existed before. There is usually some reverence and fear attached to cemeteries due to their primary role of being the home of the dead (Swensen et al., 2016). They are characterized as ‘memorial’, places of ‘pain’ or ‘sadness’, ‘spiritual’ and ‘hallowed’ places. (Al-Akl, et al.,2018; Uslu, 2010; Nordh & Swensen, 2018; Woodthorpe, 2011).

According to Rugg, (2000) however, not all places where burials occur are considered cemeteries. She argues that for a burial site to be considered a cemetery, who owns and operates the sites and the primary aim for setting aside the site or land are important questions to consider. In other words, qualifying a burial site as a cemetery is dependent

on who owns, who manages the site and whether the site has been earmarked to serve as a place for burying the dead. Consequently, a burial place can only be said to be a cemetery if it has specifically been set aside as a cemetery and used for that purpose.

2.1.2 Origin and History of Cemeteries

The word cemetery originates from a Greek term which means ‘to lay to rest’ according to Rugg, (2020) and is also known in Latin as ‘dormitoriitn’ meaning ‘place of sleep’ (Beyenka, 1951). Cemeteries therefore refer to places of rest for the dead. Cemeteries hold an important place in life and its historical accounts can be traced back to the late 1880s (Rugg, 2006). It was believed that cemeteries were established away from human settlements for public health reasons. Before this period, burials were mainly in churchyards and private yards or family backyards. Early accounts of the global history of cemeteries paint a picture of the evolution of burial grounds from the control or affiliation of the church (churchyards) to public burial grounds owned by the state or municipality, with the current ownership structure emerging from this narrative (Rugg, 2000; Greene, 2002).

Today, three main institutions namely, the church, the state, and private entities own, operate and manage cemeteries across the world. Johnson, (2008) asserts that, cemeteries were created to protect the living from diseases believed to be caused by dead bodies. At the time, the causes of diseases were still not known. Thus, cemeteries were established at the time as a response to public health concerns of decomposing bodies spreading diseases to the living.

Other accounts of how cemeteries were established state that the control and management of burial by the church was taken over by city authorities because of public health reasons and also because some people revolted against the authority of the church (Queiroz &

Rugg, 2003). For those who were not Christians, public burial sites (cemeteries) were necessary to meet their needs of burial places in the event of death as they did not want to be buried in Christian cemeteries. This historical account holds for most western countries and has slight similarities to Africa's experience.

2.1.3 Colonial influences and the origin of African cemeteries

In many African countries, cemeteries continue to hold important places in the socio-cultural lives of the people. Thus, the African will choose burial over any other method of body disposal. The practice of burial in cemeteries, according to Greene, (2002) was influenced by both religion and formal governance. It is noted that, prior to the 19th century, burial occurred mainly in the homes of the deceased (Balakrishnan, 2019; Greene, 2002). In addition, the African strongly believed in ancestral spirits, so the dead had to be buried in a respectable manner and close to the living. Africans also believed that the spirit of the ancestors could step in and assist the living through life and therefore, they must be close to the living (Greene, 2002). This accounts for the motivation people had in burying the dead particularly in close proximity to the living.

Historical accounts of cemeteries from Nigeria and Ghana, highlight the role of the colonial masters in the evolution of cemeteries. According to Onwuzuruigbo, (2014) and Balakrishnan, (2019) creating a common burial place for all people was through coercion, as acceptance was enforced through laws and fines. The colonial authorities were concerned about sanitation and health issues emanating from the handling of the dead at the time. They also wanted records about their people who died. The then Gold Coast therefore enacted the Cemeteries Ordinance Act of 1888. (Dake & Fuseini, 2018).

An account by Greene, (2002) on how public cemeteries originated in the Anlo area of Ghana, indicated similar experiences of burial at homes or in houses. The acceptable norm at the time was burial at home. The report also indicates that, burial at the outskirts of towns

occurred only in cases where the person was perceived to have died a bad death. These burial sites, usually described as scary/cursed or unholy places, were typically in forests with thick vegetation and people avoided these places which were usually left undisturbed. The link between burial at home and public health concerns was therefore established by the colonialist who then used compulsion and punitive measures including fines to get people to discontinue burying the dead at home.

Other historical accounts on the origin of cemeteries or public burial places in Africa were traced to the introduction of the Christian religion. Greene, (2002) indicates that newly converted Christians expressed their desire to be buried in public burial grounds with other Christians. The above narrations bring out two distinct accounts on the origin of cemeteries in Africa. What is clear from these accounts is that, for Africans, burial of the dead was the major practice even in the past and colonization brought with it public burial places.

2.1.4 Characteristics of cemeteries

The accounts on the origin of the public burial ground further brought about issues of cemetery ownership types in Africa. These are whether cemeteries are owned by religious institutions, the state, the assemblies or the families. As was found by Eriksson, (2010) in a study in Dar es Salaam, Tanzania, cemeteries are owned either by the municipality, family or religious institutions, that is, the Ismailis and the Hindus. The Ghana case appears to be similar to that of Tanzania. Cemetery ownership in Ghana and Tanzania are mainly the state, religious institutions, private individuals and families.

Rugg, (1998) asserts that, cemeteries are typically burial sites owned by municipal authorities, large in size and located at the periphery of towns and cities. Cemetery ownership can be put under public or private ownership (Rugg, 2000; Rae, 2021). What

connotes a private or public cemetery ownership differs from country to country (Rae, 2021). For example, in South Africa, cemeteries are owned and managed by the state (Leuta, 2019). In Ethiopia, Santime, (2019) notes that religious and municipal authorities own public cemeteries in urban communities, while clans own cemeteries in rural communities and private cemeteries are owned by families.

The type of cemetery ownership influences the management system employed in the cemetery, an assertion consistent with that of Rugg, (2020). Rugg states that, ‘cemetery systems’ are run by either the municipal authorities, religious leaders or private cemetery owners. Studies on cemetery management globally have found out that management varies from country to country. For instance, a comparison between the management of the cemeteries in the United States of America (USA) and Europe indicates that the US employs more private and commercial management, whilst countries Europe gravitate towards municipal management (Rae, 2021). In essence, cemetery management and operations are dependent on who owns a cemetery.

Cemeteries were mainly sited at the outskirts of towns and villages in the past. This feature of cemeteries has changed over time with population increases. There was a conscious effort in those days to protect people from the potentially harmful effects of contact with dead bodies (Greene, 2002). Since these cemeteries were on the outskirts of towns and cities, it was easy to allocate large acres of land for them (Rugg, 2000). However, the practice of allocating vast plots of land for cemeteries is no longer possible, especially in urban communities, due to the enormous demand for land and natural resources. Currently, cemeteries are located at the core of many cities and towns through urbanisation and development. This has resulted in blending human settlement and cemeteries (Anna & Ewa, 2020). What is observed now is an integration of cemeteries within predominantly urban communities.

2.1.5 Vegetation in cemeteries

Cemeteries until recently have been one of the most revered places in human society and this has always made them good biodiversity conservation sites (Löki et al., 2019). Plants form a massive component of cemeteries worldwide (Nowińska et al., 2020). The presence of vegetation in cemeteries makes them unique spaces. In a historical account of the development and evolution of cemeteries by Johnson, (2008), it was reported that trees were cultivated mainly at the borders or edges of cemeteries to conceal graves from the living. The trees hid the graves and made the loss of their loved ones easier to bear.

Vegetation in cemeteries can either result from nature or the cultivation of plants (Yılmaz et al., 2018). Whether through nature or by cultivation, cemeteries have proven to be places where vegetation has thrived. Even the smallest cemeteries are composed of rich vegetation (Quinton & Duinker, 2019; Kowarik, et al., 2016). In their study, Clayden et al. (2009) provide a typical example from England, the Woodland Burial Ground, where the practice since the 1990s is to plant trees on graves instead of erecting monuments. Basically, factors that promote greening in cemeteries include nature, human activities where people intentionally cultivate plants in cemeteries. Cemeteries are also greened for aesthetic reasons (Löki et al., 2019; Yılmaz et al., 2018).

Researchers have always been interested in the vegetation found in cemeteries because of their conservation and other values (Löki et al., 2019; Quinton & Duinker, 2019; Nowińska, et al., 2020). In their work, Löki et al. (2019) used orchids to measure the conservational worth of cemeteries in Turkey. They found out that there were more native trees in rural cemeteries than urban ones. Their results also show that the type of management used in urban cemeteries affected vegetation classes which could either be herbs, shrubs or trees in the cemetery.

Quinton and Duinker (2019), compared cemeteries and parks and noted that cemeteries and parks had as many things in common as differences. They both contain rich vegetation, concerns about the two were similar and rules governing their operation and use were also identical. They concluded that, the kind and degree of maintenance affected the type of vegetation found in cemeteries just as in the parks (Quinton & Duinker, 2019). In effect, cemeteries can take the place of parks especially in urban areas where green spaces are inadequate and sometimes unavailable.

The plants, especially trees, provide shade for visitors to the cemeteries, as well as other ecosystem services such as food, cooling, purification of air, habitat for other organisms (Al-Akl et al., 2018), and are in themselves a source of biodiversity and a conservation medium (Nordh & Swensen, 2018). They also have the potential to serve as a good refuge for plants that are facing extinction (Yilmaz et al., 2018). In the same breath, the presence of trees in cemeteries could cut off the noise and distraction from cities and provide a serene and peaceful atmosphere. This property of trees in cemeteries contributes to the cemetery's 'sense of place' (Quinton et al., 2019).

Apart from trees, the vegetation of cemeteries is also composed of shrubs and herbs. However, Forman, (2008), notes that city cemeteries do not have enough shrubs. This could be because of the primary role of cemeteries as burial grounds. Graves take part of the space in cemeteries. Sometimes the plants are in the way and become a source of concern for cemetery managers.

The presence of vegetation in cemeteries has both positive and negative impacts on cemeteries and society. As Quinton et al. (2019) found out, trees sometimes destroy monuments or gravestones and could be a good hiding place for miscreants who commit crimes under their cover (Paraschiv, 2013). Furthermore, some plants, usually non-native

species in cemeteries produce detrimental effects like allergic reactions in humans (Quinton & Duinker, 2019). The presence of vegetation in cemeteries requires proper management for the benefits to outweigh the adverse effects mentioned above.

2.1.6 Management of vegetation in cemeteries

Trees make up a critical part of the floral composition in cemeteries. According to Goh and Ching (2020), vegetation makes cemeteries places with rich flora, history, and culture. Their management is vital to their ecological property and the ecosystem services they provide. The management of vegetation in cemeteries appears to come second to protecting grave stones and epitaphs on graves. Quinton et al. (2019) found out that in the East Coast of Canada, cemetery managers were more focused on preserving history and, therefore, protecting monuments found in the cemetery than maintaining and planting trees. Sometimes, cemetery managers use chemicals to control vegetation (Löki et al., 2019). The chemicals are sprayed on the plants in the cemeteries leading to the plants wilting and dying. The use of chemicals destroys or kills other living organisms in the cemeteries particularly micro-organisms. Hence, vegetation in cemeteries must be managed sustainably to control unintended effects on other organisms. The balance between cemetery management and cemetery vegetation management is critical to protect the conservation property of cemeteries.

2.1.7 Urban green spaces

Urban green spaces encompass any vegetation or wetland found in urban area. Examples include parks, tree lots, wetlands and street trees. (Taylor & Hochuli, 2017).

Green spaces have become one of the main ways city dwellers keep in touch with nature (Russo & Cirella, 2018). An essential part of urban life is the presence of green spaces. The mental and physical well-being of humans is enhanced with green spaces (Cooke,

2020). They can reduce the impact of climate change (Lahoti, et al., 2020). They have the ability to reduce extreme heat, flooding and pollution within urban environments (Kabisch & Haase, 2014). They form part of a larger network known as green infrastructure. Urban green infrastructure is made up of a network of green spaces, water bodies and other natural landscapes within urban area (Pauleit et al., 2019). Urban green spaces provide environmental benefits to city dwellers through their ecosystem services.

They also provide social benefits such as a place of play and exercise, meditation, and even a place where cultural and religious or traditional practices are performed (Jennings, et al., 2016). Consequently, green spaces are essential in building sustainable cities (Russo & Cirella, 2018). Studies show that green spaces allow people to connect and relate. Therefore, green spaces are classified as tools that promote ‘social cohesion’ and ‘inclusion’ (Jennings et al., 2016). Kazmierczak and James, (2007) believe that green spaces allow individuals to connect and become involved in societies in four ways. Firstly, green spaces are public goods owned by all. Secondly, green spaces create a platform for people to engage. Thirdly, green spaces allow for relaxation and reduces strain on the brain. Finally, in urban communities, green spaces make voluntary engagement easy and possible.

Green spaces also provide a sense of belongingness (Hosseini, et al., 2021). To sum it all, Hosseini, et al. (2021) assert that a city's ability to be sustainable is hinged on the amount of green spaces available. Therefore, it is unsurprising that the current global focus of many cities is achieving sustainability using green spaces. Countries that have succeeded in this quest are the ones that took both the physical and social dimensions of green spaces into consideration (Jennings & Bamkole, 2019). There is evidence that green spaces are essential to urban life, and effort must be made to promote and protect them.

2.1.7.1 Sustainability of green spaces

Green spaces are important for life in cities. In many cities, including Ghana, studies continue to highlight the steady loss of green spaces to other land uses (Mensah, 2014; Pupilampu & Bofo, 2021). The presence of green spaces in urban areas is seen as an indicator of sustainability. The challenge of many cities however, is to ensure that green spaces continue to exist so that they can perform their role in ensuring that cities are sustainable and livable. For the purposes of this study, sustainable green spaces are green spaces that are present in the now and will continue to exist in the future. In the city space, it is critical to ensure that green spaces are sustainable. In other words, sustainable green spaces refer to green spaces that promote life in the present and will continue to promote life into the future. Thus, green space sustainability involves sustainable use of green spaces for present benefits as well as future benefits to humans or use that guarantees future use and benefits.

Sustainable green spaces should be available, accessible, distributed equitably, safe and secure. Size and adequate vegetation are also important components of sustainable green spaces (Taylor & Hochuli, 2017; Kothencz et al., 2017). According to Stessens et al., (2020), quietness, spaciousness, maintenance, facilities, safety are essential quality of green spaces. The qualities outlined promote the use of green spaces and must be preserved to ensure green spaces sustainability.

2.1.8 Cemeteries as green spaces

Many studies have established an association between cemeteries and green spaces (Nordh & Evensen, 2018; Swensen et al., 2016; Skar et al., 2018; Rae, 2021). Quinton and Duinker (2019) classify cemeteries as novel green spaces. The link between cemeteries and green spaces was established around the 19th century (Johnson, 2008). Cemeteries contain enormous vegetation and serve as habitat for numerous organisms hence, their

classification as green spaces (Rae, 2021; Nordh et al., 2017; Quinton & Duinker, 2019). As places for interning the dead, cemeteries also serve humans through cultural, spiritual and religious functions (Nordh & Swensen, 2018). The vegetation in cemeteries and the multi-use of cemeteries make them green spaces with their key role as burial places.

2.1.8.1 Factors that promote greening in cemeteries

Most cemeteries contain vegetation. There have numerous studies on the presence and the beneficial effects of vegetation in cemeteries (Quinton & Duinker, 2019; Löki et al., 2019; Anna & Ewa, 2020). Ownership type influences management style and the nature and quantity of vegetation in cemeteries (Rugg,2020). For example, Villaseñor & Escobar, (2019) note that park like cemeteries contain enormous vegetation because they are managed to mirror traditional parks. The location of the cemetery also promotes vegetation in cemeteries (Anna & Ewa, 2020). Other practices like cultivating plants in remembrance of the dead also contributes to vegetation in cemeteries (Quinton & Duinker, 2019).

2.1.9 Multi-use of cemeteries

Cemeteries as places of burial of the dead are also considered places of history, culture, memorial, business, politics and green space (Woodthorpe, 2011; Anna & Ewa, 2020). Woodthorpe, (2011) classifies cemeteries as ‘emotional’, ‘commercial’ and ‘community’ spaces. He further notes that, the commercial significance of cemeteries is closely associated with the evolution of the traditional cemetery to lawn and memorial parks from the late 1880s to the 1990s. Cemeteries are no longer places of fear and pain but rather a place for business and beauty.

Findings concerning the use of cemeteries indicated that cemeteries were being put to many uses. Examples include Highgate and Kensal Green Cemeteries located in London

in the United Kingdom. They are used for recreational activities like walking and jogging (Skår et al., 2018). Cheng, (2013) indicates that the use of cemeteries as parks started even as early as the 1880s. The practice was also common in the United States in cemeteries such as Mt. Auburn, close to Boston (Cheng, 2013).

In their writeup, Harnik and Merolli, (2010) talk about the changes in the way cemeteries are used. They give the example of Wyuka Cemetery in Nebraska used for theatrical performances. People visited this cemetery to watch Shakespearean plays. All these provide evidence that cemeteries have evolved from places for burial or memorial to places of tourist interests, relaxation, places of economic benefit, and places where food and medicinal plants can be found.

What is significant about the changes experienced with cemeteries is that the transformations experienced within cemeteries originated from cemetery managers and sextons of various cemeteries across the world (Harnik & Merolli, 2010). It is reported that, these managers and workers felt that the cemeteries had more to offer than just being a place for interring the dead (Cheng, 2013; Harnik & Merolli, 2010). This is an essential property of cemeteries, mainly in city spaces where land is scarce and expensive. The idea that the home of the dead can be used in multiple ways makes cemeteries unique. Indeed, contemporary researchers believe that cemeteries are as crucial to the living as the dead. They are classified as green spaces and considered an integral part of the green infrastructure of cities (Nordh & Evensen, 2018; Quinton & Duinker, 2019). The diversity in use of cemeteries sometimes results in disagreements or disputes (Woodthorpe, 2011). Woodthorpe, (2011) reinforces the view that some strains or complications come from the multi-functional use of cemeteries, although the multi-purpose potential of cemeteries can guarantee their sustainability.

Cemeteries are grouped under green spaces with multiple functions which are either social, ecological or economic (McClymont & Sinnett, 2021). Studies on cemeteries as green spaces have focused on their multi-functionality, with many researchers highlighting their recreational functions. The works of Rugg, (2000) and Deering, (2012) are of interest to this study. Their works explored cemeteries by looking at the functions and meanings assigned to them. Understanding the meaning and functions of cemeteries can be described as ‘placemaking’, which develops into a sense of place. Even though researchers have shown that cemeteries are important green spaces, they have rarely looked at cemeteries through the lenses of sense of place.

It is well established from literature that people ascribe different meanings to cemeteries (Nordh & Evensen, 2018; Yilmaz et al., 2018). People's different meanings and values on cemeteries make them complex spaces. This complexity is further compounded by the changes in their usage over time (Grabalov, 2018; Nordh & Swensen, 2018). How people feel about death has also contributed to the way cemeteries are used. (Evensen et al., 2017). Masterson et al. (2017) assert that knowledge about how people relate to cemeteries helps in understanding why cemeteries are used the way they are used. It also helps in identifying the factors to be considered if changes are to be made to the way cemeteries are used in order for them to become relevant agents in greening cities.

2..1.9.1 Factors that influence multi-use of cemeteries

There has been a number of studies into why people use cemeteries the way they do. One such study is by Swensen, (2018), who found out that the location and design of a cemetery directs the way it is used. Another factor which influences the multi-use of cemeteries is the type of cemetery and the kind of use being proposed (Quinton & Duinker, 2019). In most western countries multi-use of cemeteries for recreation, research and sun baths are common (Evensen et al., 2017; Nordh & Evensen, 2018; Quinton &

Duinker, 2019). Generally, studies on cemeteries in Africa are few. Studies on the multi-use of cemeteries in Africa are even fewer (Eriksson, 2010). That is not to say the multi-use of cemeteries does not occur in Africa. Literature on the multi-use of cemeteries is well documented in most western countries. However, cemetery studies in African countries have not focused much on how cemeteries are used aside from burial and its related practices.

2.1.9.2 Perception about cemeteries and their other uses

People's perceptions of cemeteries are diverse and subjective (Oliveira & Mell, 2019). This is because of the multiple roles of cemeteries in the life of humans. Studies on perceptions regarding cemeteries are mixed with some research focusing on respondents' perceptions of the restorative ability of cemeteries spaces (Lai, et al., 2020). Swensen et al. (2016) perceive cemeteries as special because they possess cultural, spiritual, historical, recreational properties and are considered sacred by many. Another group looked at how people perceive cemeteries and the qualities they prefer in cemeteries (Al-Akl et al., 2018). Others explored the perceived safety of cemeteries. It came to light in one study for example that, people perceive cemeteries as unsafe places with poor lighting, use of illicit drugs and unmaintained greenery (Quinton & Duinker, 2019).

Additional studies looked at the perception on the multi-use of cemeteries (Cheng, 2013; Swensen, 2018; Evensen, et al., 2017). While others like (Leuta, 2019) have looked at the perception of multi-use of cemeteries at the institutional level. The take-home from all these studies is that, perception about cemeteries varies from person to person. For instance, many people still perceive other uses of cemeteries aside from burial as inappropriate (Rae, 2021). Promoting other uses of cemeteries require information and rules on what is appropriate in cemeteries and what will be allowed or accepted as

complementary to their use as burial grounds. In addition, cultural context is crucial in how cemeteries are perceived.

2.1.9.3 Inappropriate use of cemeteries and abuse

A significant concern about the use of cemeteries aside burial, is the appropriateness of other uses. Inappropriate uses of cemeteries include use as hideouts for criminals and drug users (Skår et al., 2018; Rae, 2021). Likewise, Evensen, et al. (2017) found out that some cemeteries in Norway were places where people use alcohol and drugs, leaving in their wake dangerous waste materials that could cause harm to other users. Other inappropriate uses found by Rae, (2021) were sunbathing in the nude in the cemetery and the use of cemeteries by the homeless as a place of abode (Evensen, et al., 2017). One other worrying occurrence is the indiscriminate waste disposal in cemeteries, neglect of cemeteries resulting in bushy and unkept spaces (Tudor, et al., 2013). All the above, coupled with the lack of good lighting and proper maintenance, make cemeteries unsafe places in urban areas (Quinton & Duinker, 2019).

2.1.9.4 Acceptable uses of cemeteries

People have expectations on how cemeteries should be used. Some would argue that it is not appropriate for certain activities to be undertaken in the cemetery. A case in point is the open day organised in 2016 by the City of London Cemetery and Crematorium. Whilst it was reported that the open day was a success, some people were not happy with the cemetery manager. They felt that it was disrespectful to visit the cemetery for reasons other than to bury the dead (Woodthorpe, 2011).

The reality is that cemeteries are used in diverse ways aside from burial. Some uses are considered acceptable and other uses are not considered acceptable. Acceptable uses mean activities permitted or agreed upon by society or supervisory authority to be carried out in

cemeteries (Quinton & Duinker, 2019). In other words, they are activities that can take place in cemeteries without restrictions. On the other hand, unacceptable uses mean activities that are not permitted to be carried out in cemeteries. For example, in the Greenwood Cemetery located in New York City, USA, recreational activities such as jogging, dog walking and cycling are not permitted (Rae, 2021). Rugg, (2000) notes that the cemetery is not only for the dead but also for the living, thus requiring some restrictions on how it should be used.

In the study by Goh and Ching, (2020), respondents perceived cemeteries as places for learning about culture, heritage, history and designs in cemeteries. In the same study, they found out that respondents perceive the use of cemeteries for recreational or social purposes as not acceptable. In similar studies, Evensen et al., 2017 and Swensen et al., 2016 found out that some activities were seen to be acceptable in cemeteries whilst others were considered not acceptable. Cemeteries require proper regulations to benefit both the living and the dead. There are rules on the use and activities that are allowed in most cemeteries. These rules make the conversion of cemetery lands to other uses an almost impossible task.

2.1.10 Policy, legal framework, rules and regulation of cemeteries

Like any other space created by humans, cemeteries are governed by specific rules and regulations. Policies and regulations exist to govern cemetery management and operation in many places. Rugg, (2020) asserts that having rules and regulations are essential for the proper disposal of human remains and for effective management of cemeteries. Aside from the sanitised burial of the dead, cemeteries need the right legal and regulatory framework to operate due to their complex nature as social, environmental, religious, cultural and economic places. For instance, where cemeteries are placed or where a cemetery exists can become a source of conflict and disagreement (Bennett & Davies,

2015). The disagreements usually arise when leadership at the community and the regional levels do not agree on the place to site the said cemetery (Bennett & Davies, 2015). Other times, the use of cemetery aside burial has resulted in conflict situations, as Leuta (2019) notes.

Another angle to evaluate is land ownership. Cemetery lands must be appropriately acquired and the proper compensation paid to avoid conflicts (Bennett & Davies, 2015). People are also sometimes apprehensive and reluctant to acquire properties close to cemeteries. Bennett and Davies (2015) conclude that cemetery locations are influenced by the cost and availability of land, the spiritual or cultural properties of cemeteries, and consensus from the planning and development processes. It is evident from the above that, apart from planning, community involvement and compatibility of land use are vital in siting cemeteries. Thus, the planning, siting and operation of cemeteries can therefore not be seen as an ordinary task.

Until recently, the planning of most cemeteries has solely been for burial only rather than their contributions to green infrastructure as is seen in America, the United Kingdom and South Africa (Koonce, 2011; McClymont & Sinnett, 2021; Leuta, 2019). Now, with the incorporation of the green properties of cemeteries, policies on cemeteries must be all-encompassing with attention to cultural and religious contexts (Lai et al., 2020). The general practice globally is to have municipal, city authority or local governing bodies as institutions to implement policies and plans for cemeteries (Capels & Senville, 2006). However, city authorities play no role as the regulator in some cases. Religious bodies are in charge of regulating, operating, and managing cemeteries as noted by McClymont and Sinnett (2021) in some cemeteries in England.

In Ghana, various rules and regulations govern the siting, operation, and management of the cemeteries. The earliest policy associated with cemeteries was the Cemetery Ordinance Act of 1888 (Dake & Fuseini, 2018). According to Bonetti, (2019), the Cemetery Ordinance Act of 1888 also distinguished public cemeteries from private cemeteries. The Health and Institution Facilities Act (829), under which the Mortuary and Funeral Facility Agency (MOFFA) was established in 2011, provides standards for storing, disposal of dead bodies, and other funeral services (Government of Ghana, 2011). Under this Act, all facilities associated with the storage or disposal of dead bodies, including cemeteries, must obtain a special license before operating. The Act is operationalized by the Ministry of Health (MOH).

Before this Act, the Mortuary and Funeral Facility of 1998 (Act 563) was passed to provide guidelines for managing human remains through to their disposal under the supervision of the Ministry of Health (Government of Ghana, 1998). Another framework regulating the siting of cemeteries is the Zoning and Planning Guidelines of 2011. This is used to guide the siting of cemeteries and other related spaces for death and funeral services (Land Use and Spatial Planning Authority, 2011).

At the assembly level, bye-laws exist for the day-to-day operation and management of cemeteries. For instance, the Accra Metropolitan Assembly's bye-law of 2017, with backing from the Local Government Act (936), authorizes the Assembly as the implementing bodies to issue permits to operate private, religious, and family cemeteries. These permits are to be renewed annually. The Public Health Department of the Assembly is the supervisory body tasked to ensure burial is done safely and sanitised. The Assembly is also mandated to control the entire burial space, from the planning of cemeteries, allocation of graves, width and depth of graves, the dimensions for any gravestones or epitaphs and the general tidiness in cemeteries (Local Government Bulletin, 2019).

Similarly, the Ablekuma West Municipal Assembly (AbWMA), also established under the Local Government Act (936), section 181, controls the operation and management of cemeteries. The Assembly issues permit to private, religious and family cemetery managers. Akin to AMA, the Assembly is mandated to control all aspects of the burial space. The Environmental Health and Sanitation Department of the Assembly is required to do regular inspections in all cemeteries to ensure that no nuisance is committed and all the rules and regulations are observed. AbWMA sentences an offender,

“to a fine, not more than one hundred penalty units or a term of imprisonment of not less than thirty days and not more than six months or to both; and in case of a continuing offence, is liable to a fine of not more than one penalty unit for each day that the offence continues. Fifty percent (50%) of the fine paid should be allotted to Ablekuma West Municipal Assembly.”

In Ghana, each assembly has its bye-laws on cemeteries. From policy formulation to promulgation of bye-laws, cemeteries need to be appropriately regulated, particularly to promote public health and safety in Ghana. A well laid out policy and legal framework also ensure that the interaction between the living and cemeteries is controlled. This study explores these interactions using the theories of place making, sense of place and the Social-Ecological theory.

2.1.11 Remote sensing methods in vegetation analysis in cemeteries

Remote sensing allows larges surfaces of the earth’s surface to analyse, map and study ecosystem patterns and processes (Gould, 2000). Remote sensing methods have been used extensively in the study of graves and cemeteries (Zychowski, et al., 2012). Similarly, remote sensing can be used to study vegetation within cemeteries like tree crown, vegetation cover and change detection within a particular place (Graves et al., 2018). It is regarded as one of the non-invasive and non-destructive methods to analysis vegetation.

The use of aerial imagery for studying the earth's surface started around the 1920s. Applications of remote sensing include mapping, predictions and analysing vegetation (Pitt, 1997). Aerial photographs are among one of the best remote sensing images for such analysis because they have high resolution and are largely less expensive (Gould, 2000; Karlson & Ostwald, 2016; Pitt, 1997). Vegetation mapping is used to quantify vegetation cover using remote sensing and Geographic Information Systems (GIS). This gives an indication of the state of vegetation or vegetation inventory in the landscape under study. Although very useful remote sensing with regards to vegetation mapping is not sufficient for vegetation inventory. The short comings from remote sensing methods are controlled by ground truthing (Xie et al., 2008).

2.2 Concepts and theories on green space development

The main theories that informed this study are the theory of place making and sense of place supported by the social ecological theory.

2.2.1 Place and the theory of Sense of Place

Central to the sense of place theory is the concept of place. A space with human engagement is described as a place (Rogers & Bragg, 2012). Consequently, a place is a space with human interaction. Early works on people place relationship (sense of place) were recorded in the 1970s by Relph and Tuan. Tuan's initial work was on the what constituted space and place. Generally, place meanings and place attachments explain sense of place. Tuan, around the 1970s proposed that people have 'meaning' and 'attachment' to places. This, he described as sense of place (Grantham & Tuan, 1978; Beidler & Morrison). Sense of place, he argued, influences how people relate to places. Chapin and Knapp, (2015) give a more elaborate definition of sense of place as 'meanings, beliefs, symbols, values and feeling that people feel and exhibit towards place'.

People's meanings and bonds for places influence how people use and behave towards places (Najafi & Shariff, 2011; Verbrugge et al., 2019). This is highlighted by Stedman, (2003), where he found out that, people with stronger bonds to a place are more likely to take action in protecting those places. Place meanings are illustrative or depictive (Stedman, 2003). These meanings inform how people build attachments to places (Chapin & Knapp, 2015; Masterson et al., 2017; Rajala et al., 2020). Meaning can be formed individually or by society (Masterson et al., 2019). Place meanings are therefore created socially. Place attachment looks at what draws people to places and how that bond can be maintained will help promote sustainability (Stedman, 2003; Masterson et al., 2017; Masterson et al., 2019). Place attachment involves emotions and is created based on people's personal encounters with place. 'Site of loss or tragedy' can create attachment, in this case, attachment to a cemetery (Wolf et al., 2014).

Attachments to cemeteries are not easy to determine. According to Wolf et al., (2014), losing a loved one at a place invokes attachment. In this sense, cemetery attachment can be developed due to a loved one buried in that cemetery. Additionally, the benefits one gets from cemeteries through other uses can also produce some attachment to cemeteries (Grenni, et.al., 2020).

Sense of place theory recognises the vital role of participation and the engagement of people, their values, beliefs and generally what people care about in the study of places. Additionally, it allows different actors to participate in making decisions concerning a place and how it must be used (Agyeman & Devine-Wright, 2009). Many researchers acknowledge the fact that unified sense of place especially in cities allows for consensus-building and therefore, a unified decision on how to protect or utilise places (Chapin & Knapp, 2015; Masterson et al., 2019; Stedman, 2003; Najafi & Shariff, 2011; Rajala et al., 2020).

Sense of place has been used in diverse fields such as geography, theatre arts, theology, anthropology and has further expanded to architecture, urban planning, design, and environmental psychology. (Beidler & Morrison, 2016). The focal point in all the mentioned areas of the study is the relationship between people and place, which is of interest in this study. In essence, sense of place suggests that meaning and attachment influences pro-environmental behaviour towards places.

2.2.2 Place making theory

The origin of place making can be traced to the 1970s (Ghavampour & Vale, 2019; Wyckoff, 2014). Place making is described as a process with aim of creating quality places that people will desire to interact with (Wyckoff, 2014). The essential components of quality places, according to Wyckoff, (2014) are; mixed uses, must be public, must preserve heritage and culture, multiple transport options, recreational options and also green spaces. There are four types of place making; standard, strategic, creative and tactical place making. Place making is seen as a people centered approach to creating places for people (Boros & Mahmoud, 2021).

Place making is one of the ways in which green spaces can be created within urban landscape. An essential component of place making is creating quality places. Linked to the process of place making is the concept of sustainability (Boros & Mahmoud, 2021; Cilliers, 2015; Cilliers, 2021). Place making processes are aimed at changing meaning and value of places. The use of greenery is usually approach in place making (Cilliers, 2015). Green spaces making are critical to the sustainability of cities. Over the years a number of cities have put measures in place to create new green space within the city space whilst protecting existing urban green spaces. What place making does is to engage at the community level and consider the input of individuals on the creation of place (Keleg et. al., 2022). Place making goes hand in hand with sense of place. Place making

involves creating meaning of places and therefore what makes people attached to places (Wingren, 2013). Place making can be used to transform existing places like cemeteries into sustainable green spaces with multifunctional properties.

2.2.3 Social-ecological systems theory

People and place interactions have been of interest to researchers. This is because of the recognition that understanding people and the places that are important to them is critical in promoting sustainability. This is highlighted by Newman and Jennings, (2008) in their statement that, sustainability can only be achieved if the places which matter to people are taken into account. This can be put under the broad umbrella of social-ecological systems (SES) theory which examines interactions between the social and ecological facets of issues.

SES theory is reported to have been first used around 1988. However, the main research or works it is associated with were by Berkes and Folkes in the late 1990s (Colding & Barthel, 2019). The basic components of SES theory are the human, the environment, and their interaction. Colding and Barthel (2019) note that SES theory was first used to explore the resilience of institutions in managing natural resources. Since then, the theory has been used in economics, health, environmental science, and social science (Colding & Barthel, 2019). The analysis of SES by Ostrom, (2009) shows that SESs are complex and multi-layered. He notes that SESs framework is composed of ‘resource systems’, ‘resource units’, ‘governance system’ and ‘users.’ In this case, the ‘resource system’ is the cemetery, the ‘resources units’ are the graves, vegetation and other amenities in cemeteries, ‘governance systems’ include the owners, managers and rules and regulations of the cemetery, and the ‘users’ utilise the cemetery either for burial, recreation, among other uses. In the study of protected areas, Cumming and Allen, (2017) note that SES regarding protected areas consists of the three main themes; resilience and sustainability, scale/

spatial extent and the definition of the protected area and interactions between people and the area. The studies by Ostrom, (2009) and Cumming and Allen, (2017) align with this study because cemeteries can be categorised as both a resource and a protected area.

2.2.4. The relationship between sense of place, place making and green spaces

Studies on the relationship between sense of place, place making and green spaces have centred on the relationship people have with green spaces and how this relationship influences people's behaviour towards these green spaces (Žlender & Gemin, 2020; Cilliers, et al., 2015). The relation between place making, sense of place and green spaces is the value of place. There have been many researches about green spaces, place making and sense of place. Some of these researches have looked at place attachment (Hosseini et al., 2021). Other researchers like Žlender & Gemin, (2020) also assessed people's relationship with recreational green spaces using their sense of place. Others have explored the multi-use of cemeteries in relation to sense of place (Deering, 2012; Grabalov, 2018; Nordh & Evensen, 2018). Cemeteries have transformed over the years and there is room for further transformation of cemeteries to sustainable and functional green spaces particularly in cities.

The first change experienced by cemeteries is that cemeteries are now in the centre of cities and towns (Cheng, 2013). The implication is that the interaction between people and cemeteries has changed over the years. There are frequent interactions between people and cemeteries, making cemeteries lose their sacredness. People now treat cemeteries as ordinary lands. Secondly, cemeteries are experiencing changes in use. Cemeteries are now being used for other activities aside burial. Activities like jogging, picnicking and in some cases, undesirable activities like crime go on in cemeteries causing security concerns in cities (Skår et al., 2018; Evensen et al., 2017). Although not new, the multi-use of cemeteries continues to be promoted especially in urban communities; however, the

perception of people is important in determining whether cemeteries can perform multi-functions in cities. Sense of place theory and place making are therefore unique ways to study the social ecological changes that urban cemeteries are undergoing to position cemeteries as quality green spaces with the special function of being the resting place for the dead. The study is therefore focused on exploring the relationship between sense of place, place making and place related behaviour.

2.2.5 Integration of sense of place and social ecological model

Some researchers have criticized sense of place as being subjective, vague, and consequently cannot be quantified (Stedman, 2003; Masterson et al., 2019). Despite the above, contemporary researchers have taken an interest in integrating sense of place into social ecological research (Masterson et al., 2017; Masterson et al., 2019; Rajala et al., 2020). Integration of the sense of place theory in social-ecological studies has been extensively discussed by Masterson et al. (2017). They propose research agendas and steps in using sense of place to explain how individuals and society at large behave within ecological systems. Sense of place is generally influenced by; the physical properties of place, the place attachment and the place meaning (Ghoomi et al., 2015; Hashemnezhad et al., 2013). Ghoomi et al., (2015) and Hashemnezhad et al., (2013) argue that demographic features are also important in forming sense of place and therefore cannot be ignored in sense of place discussions.

Another study of interest is by Beidler and Morrison, (2016) where they developed four elements to measure sense of place in the field of planning and design. For a holistic development of place, they argued that, researchers have to look beyond the physical appearance of place. The four elements from their work indicate that a person's sense of place is influenced by the self which connotes the individual and their understanding of the place of interest, the environment, the social/cultural elements of the place and finally,

time, which looks at duration of one's engagement or contact with place. From the above, an individual's sense of place is influenced by demographic characteristics such as age, education, gender, physical features, social and cultural characteristics and time.

Masterson et al. (2019) note that, such social-ecological issues can be analysed using key concepts of stewardship, resilience and transformational change. Integration of the Ostrom, (2009)'s framework as referenced earlier, Cumming and Allen, (2017)'s theme of the cemetery as a place defined by its function and the interactions people have with it, and Masterson et al., (2017) model of sense of place which notes that sense of place is composed of the physical properties, the meaning and attachment of place.

2.2.6. Conceptual Framework

The need for green spaces with urban communities have been well established by research and everyday life. Green spaces are important for improving quality of life in cities. The presence of green spaces promotes good mental health, increases physical activity and the overall wellbeing of both urban areas and humans (Zhang et al., 2015; Mensah, 2014; Lee & Maheswaran, 2011). Within urban landscapes, sustainable green spaces can be created by private, public or non-profit organisations. In other words, they can be created by Municipal and Metropolitan authorities, property owners (Cilliers et al., 2015). However, a major component of placemaking is the involvement of people and what they value in a place. Thus, the perception and everyday experiences of people are critical to developing sense of place and creating quality places (Cilliers et al., 2021). The idea that people's sense of place can be incorporated into place making to create quality places in cities although not new, is critical in managing public spaces particularly cemeteries as sustainable green spaces.

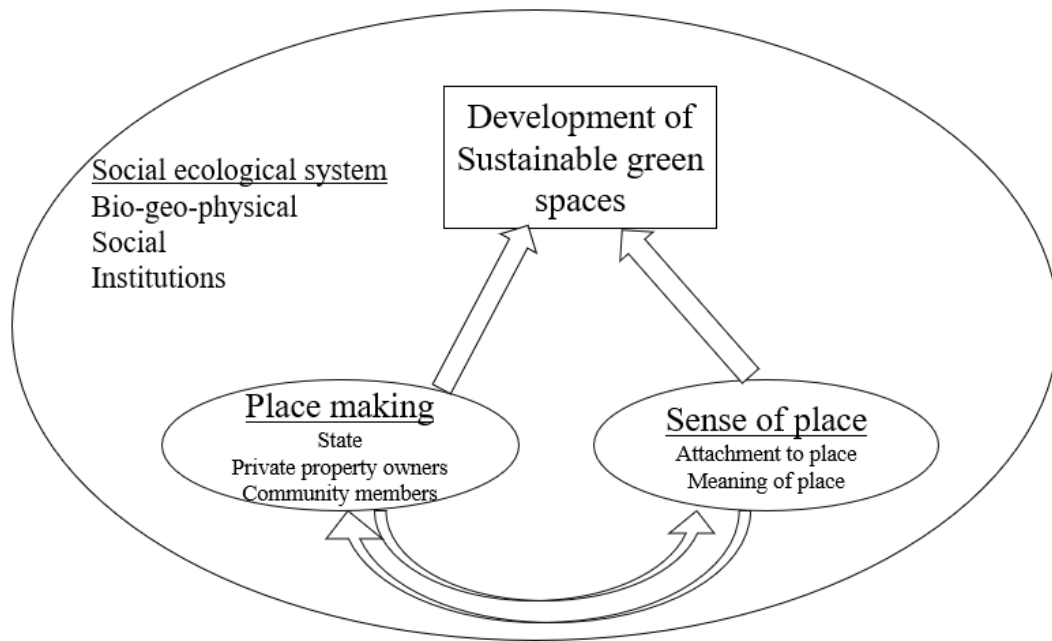


Figure 2.1: Sustainable green space development

2.3 Study Proposition

There have been numerous studies on interactions between people and the environment. For the purpose of this study, place making and sense of place are used to study the interaction between people and places with focus on how people perceive places and how it influences their creation, use and protection of places. Orr (2013), states that, 'sense of place' allows for 'managing natural resources efficiently and promotes pro-environmental behavior'. In cities, the reality is that people do not have the same beliefs and values for places. This influences their sense of place. The absence of a common belief or value system does not mean that people do not have sense of place towards places. Place making can influence sense of place and ultimate the creation and protection of quality places. In essence, cemeteries can be transformed into sustainable green spaces through place making and the building of strong sense of place within social ecological systems. The major proposition adopted for this study is that, people's perception(s) about cemeteries

influence the use of cemetery as a green space. The study also postulates that the cemetery itself influences use apart from burial.



CHAPTER THREE

METHODOLOGY

The materials and methods employed to collect data, assess the study area and the assemblies under which the study areas can be found are presented. The people's economic, cultural, and belief systems within the study area (GAMA) are included as well as procedures/processes used to collect data to address the objectives of the study.

3.1 Description of the study area

The study was undertaken in the Greater Accra Metropolitan Area (GAMA) of the Greater Accra Region of Ghana. Currently, GAMA is split administratively into 2 metropolitan and 23 Municipal Assemblies (MA or Districts) (Government of Ghana, 2019) as indicated in Appendix 4. The Accra Metropolitan Assembly and the Tema Metropolitan Assembly are the two metropolitan assemblies. These two metropolitan areas have the highest population size and economic activities. It is estimated that over 4 million people live in GAMA with a population growth rate of about 2.4%. GAMA is described as 53% urban. The rate of urbanization in GAMA is 3.6%, with a poverty rate of 10.6% (Alliance, 2018; World Bank, 2017; Koppelaar et al., 2018).

GAMA's growth and development has produced a core developed city space with intense economic activity surrounded by an underdeveloped and less privileged periphery (Alliance, 2018; World Bank, 2017; Koppelaar et al., 2018). It is estimated that 3 out of every 10 persons are unemployed in GAMA. It is also reported that a person between the ages of 14-25 is 6 times more likely to be unemployed in GAMA than in rural Ghana. It is also of interest that 80% of the people in GAMA are engaged in the economy's informal sector. GAMA continues to experience rapid urbanization due to increasing population resulting in pressure on the limited resources available. Housing, water supply, waste

management and other infrastructural needs remain critical for city authorities and the Government (World Bank, 2017; Alliance, 2018). The spread of human settlement has not been appropriately managed. Buildings can be found in waterways and other unapproved places.

3.1.1 Location and size

The Greater Accra Metropolitan Area (GAMA) is located between 5°5'27" to 5°28'2" North latitude and 0°4'58" East longitude to 0°37'2" West longitude along the coast of Ghana (Figure 3.1). It covers 3,245 square kilometres in size, with a shore line of 225 kilometres (World Bank, 2017).

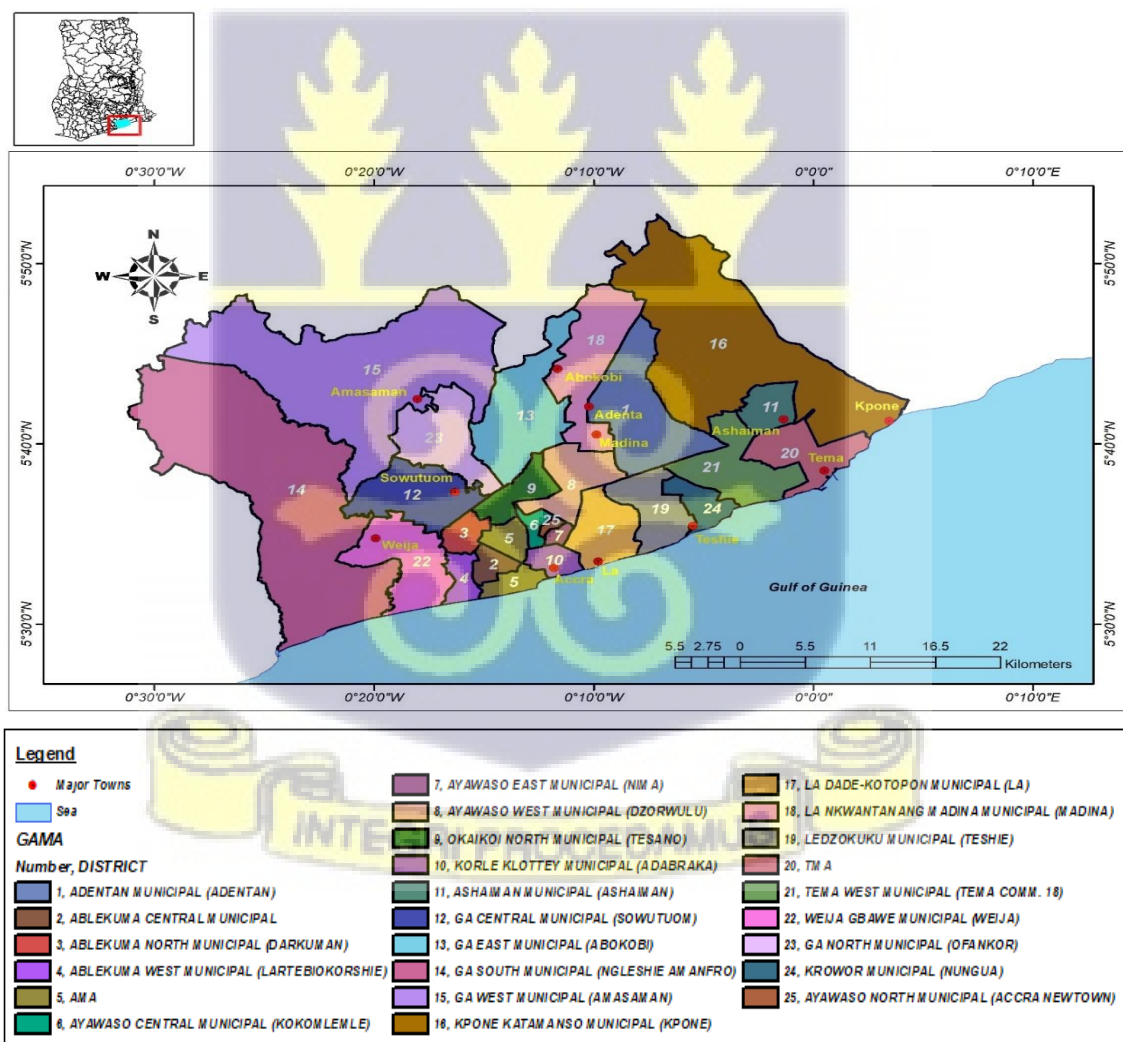


Figure 3.1: Map of the Greater Accra Metropolitan Area (GAMA)

3.2 Demography of GAMA

3.2.1 Population

The Greater Accra Metropolitan Area (GAMA) is predominantly urban in setting (World Bank, 2017) and made up of people from different ethnic backgrounds. About half of the inhabitants are migrants, mainly for economic purposes (Geier et al., 2015; World Bank, 2017). The result is a choked cosmopolitan area causing people to move to the peripheries of the metropolis (Geier et al., 2015). As of 2016, with an annual growth rate of 2.4%, the population of GAMA was estimated to be around 4.6 million from the 2010 national population and housing census (World Bank, 2017; Addae & Oppelt, 2019). In 2016, GAMA's population out of the total population of Ghana was 16.3%, according to the (World Bank, 2017). Poverty remains one of the significant problems in GAMA, with about 4 out of every 100 people living below the poverty line in the urban areas of GAMA (World Bank, 2017).

3.3 History, culture and belief system of the people

GAMA is a cosmopolitan area made up the Gas, who are natives of the land, and people of virtually all tribes of Ghana and even beyond Ghana as well. The indigenous people of GAMA, the Gas are believed to have migrated from Nigeria, where they are said to be part of the Kwa people of Africa. The Ga people belong to six traditional units; Ga-Mashie, Osu, La, Teshie, Nungua and Tema (Osabu-Kle, 2008). A person may belong to any of the traditional units mentioned above through paternal or maternal links. These units are typically indicated by name of clan. The indigenes are also guided in their daily lives by strong cultural and traditional beliefs although Christianity is the dominant religious practice in GAMA. Lands in GAMA are either state, clan or family owned. Private property owners and individuals acquire parcels of land through these families or clans. The traditional occupation of the Gas are farming, fishing and salt mining. This is

not surprising as their land is situated close to the sea. Many Gas have moved on to other economic activities, but others still make their living from fishing (Mitja, 2017).

In relation to death, funeral and cemetery, the Gas believe in burying their dead (Adjei, 1943). In addition, they believe in ancestral spirits. They also believe that the burial ceremonies are necessary to break the link between the dead and the living. Ancestors are perceived as good people who have died. The Gas believe that ancestors must be close to the living to bless, guide and protect the living. It is common for the Gas to bury their deceased loved ones in rooms of family houses and backyards (Manoukian, 1950).

3.4 Research design and methods

Explanatory mixed method research approach involving both quantitative and qualitative methods of data collection and analysis was employed in the study (Creswell, 2014). Mixed method research is viewed as both a methodology (quantitative and qualitative approaches) and a method (obtaining, managing and analysis of quantitative and qualitative data) (Creswell, 2017). Mixed method research approach was selected for the reason that studying cemeteries using facts alone could be result in telling half and not the full story. It is argued that, the weaknesses and the biases associated with either the quantitative or qualitative approaches are reduced by using mixed methods approaches. In addition, mixing the two approaches allows one to better understand the problem under study compared to the understanding obtained from using either approach (Creswell et al., 2011; Creswell, 2014).

3.4.1 Research Philosophy

This study is situated in the pragmatism world view. Pragmatists believe in using all available and relevant methods to solve problems (Creswell, 2014; Morgan, 2007). Pragmatism therefore allows the researcher to use the research methods that answers the research questions (Kaushik, & Walsh, 2019). For this study the use of mixed method is

appropriate given the use of pragmatic theoretical foundation or research philosophy. In fact, many researchers consider pragmatism to go hand in hand with mixed methods research (Johnson, et al.,2007; Kaushik, & Walsh, 2019; Maarouf, 2019). Cemeteries are complex spaces and any study about them requires open-mindedness and willingness to go with what works. Thus, for this study, qualitative and quantitative methods are employed from different sources to enhance a better understanding of the issues associated with cemeteries as green spaces (Creswell, 2014). The methods and materials employed for the study are presented in relation to the study objectives.

3.5 Materials and methods

3.6 Objective 1: Mapping and characterisation of cemeteries

Cemeteries were identified with the help of community members or locals. The name of cemetery was obtained from the community members. The locations of the cemetery were obtained by picking coordinates using Global Positioning System (GPS). Mobile data collector application was used to pick the coordinates of the cemeteries identified. The coordinates of each of the cemeteries identified was then used to create an excel table. The coordinates had to be processed in Geographical Information System (GIS) application to obtain the map. The coordinates were then exported into in the Arc Map and projected to create cemetery distribution map. The coordinates were edited to define the coordinates systems which in this case was, Geographical Coordinate System. The base map was then added. This was used to develop the map which indicated the location and the distribution of cemeteries in GAMA. A total forty-eight (48) cemeteries were identified in GAMA.

The research team mapped the cemeteries within the study area to obtain details of the location and distribution of the cemeteries using Geographical Information Systems (GIS). A cemetery distribution map of the cemeteries of GAMA was then created.

An observation guide to help assess the cemeteries in the study area was developed for this study. The observational guide was used to collect information on the type of cemetery and host community, the state of the cemeteries, including boundaries, and the type of activities within the cemetery. The owners of the cemetery, the presence of a wall and well-defined entrance and activities taking place in the cemeteries were also noted. The general state of the cemetery, road network around it, and adjoining land use were also documented. Details included in the check list for the observation guide are provided as follows:

- i. Location and distribution
- ii. Community located
- iii. District/municipality located
- iv. Presence of wall and well-defined entrance
- v. Ownership of cemetery
- vi. Observed activity

Some members of the host communities, particularly those found proximal to the cemetery were engaged in informal discussions on the activities that take place in the cemeteries and also their concerns about the location of the cemeteries. People from a linear distance of about 300m from the cemeteries were used for this informal discussion. The distance was informed by the WHO's 2017 brief for action on urban green space requirement. The brief states that urban dwellers should have access to green spaces of size between 0.5 to 1 hectare and it should be within 300m or 5 minutes from their residence (WHO, 2017). All kinds of activities observed within the cemetery and its environs were recorded as well.

3.7 Objective 2: Status and quality of vegetation in cemeteries

The status and quality of vegetation in cemeteries 25 cemeteries were selected for the research using a multi-stage sampling selection process. Multi-stage sampling is usually employed in cases where the population is spread over an area or where a sample frame does not exist. The multistage sampling was done using the 48 cemeteries located in GAMA and categorised using the criteria in 3.7.

3.7.1 Criteria for site selection

The criteria used to select the cemeteries were as follows: Municipal Assembly (MA), Accessibility, Ownership, and Area.

1. Municipal Assembly (MA): The MA in which the cemetery is located.
2. Accessibility: This shows cemeteries with convenient and easy access since some were not accessible.
3. Ownership: It indicates the institution or person who owns and manages the cemetery and not who is allowed to be buried there.
4. Area: This indicates the land area or size of the cemetery measured in meter square (m²).

The study cemeteries selected were those that met all four criteria. The first criterion for selection was the Municipal or Metropolitan Assembly in which the cemetery was located. A cemetery from each of the Assemblies has a chance of being selected. Accessibility was the next category to consider. The criteria indicated whether the researcher would be granted access to the cemetery for fieldwork. All cemeteries which were restricted or had no access were removed from the list for the study. The next criterion considered was ownership. The cemeteries were selected across the ownership types. Within the ownership types, some cemeteries were selected due to their location within indigenous communities of GAMA like Osu, Nungua, La, and Tema. These cemeteries were selected

to highlight the traditional and cultural factors of the Gas regarding siting of cemeteries, the presence of certain trees in the cemeteries, perception of cemetery use and management issues. Other cemeteries were selected because they were located in communities where most people found there are migrants. This was to bring to light the influence of other cultures and experiences. The sizes of the cemeteries were then considered. The smallest size and the largest size cemeteries were selected for range.

The list of selected cemeteries is shown in figure 3.2.

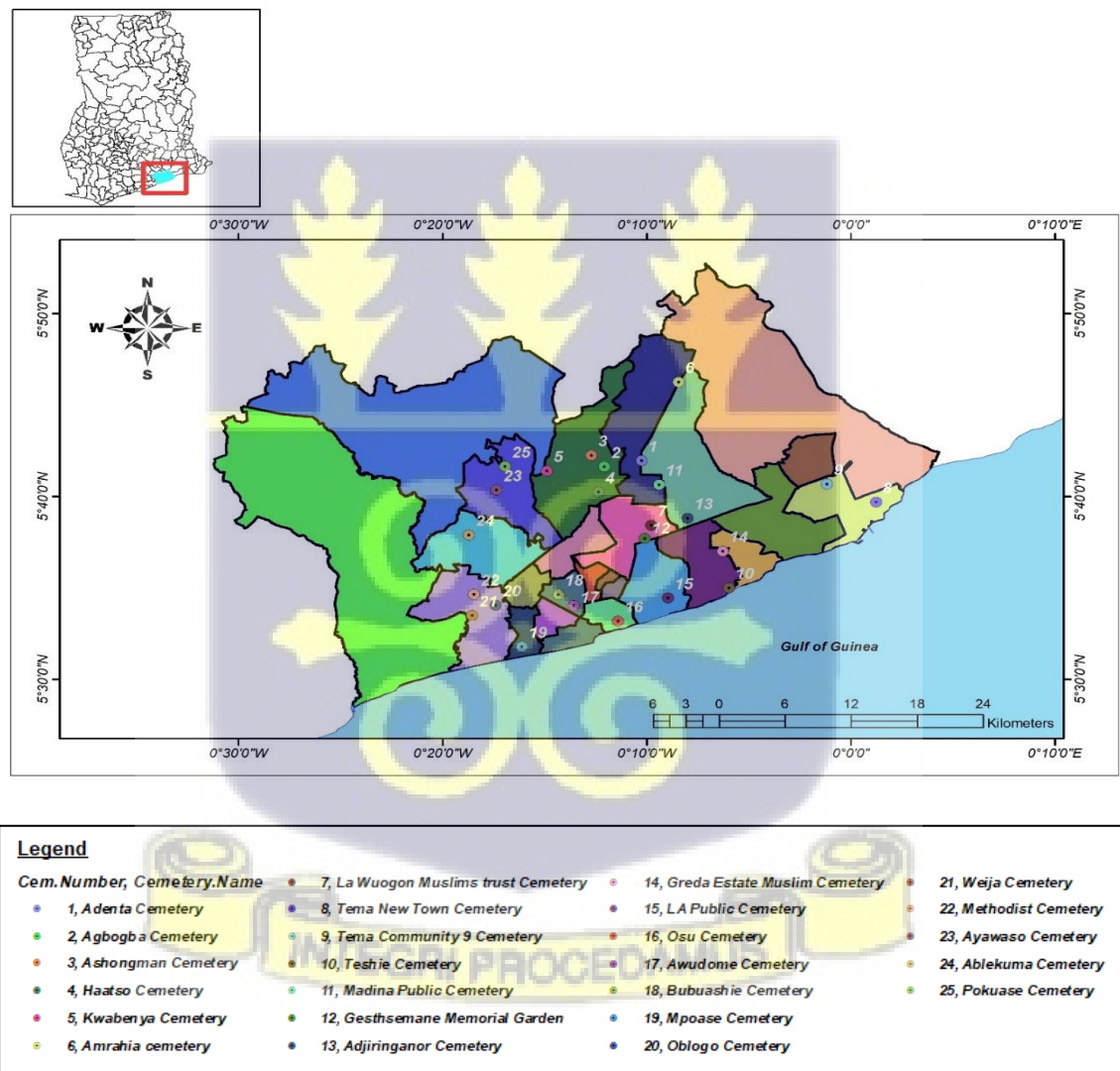


Figure 3.2: Map of the selected cemeteries for field work

3.7.2 Vegetation/land cover analysis

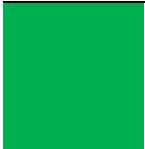
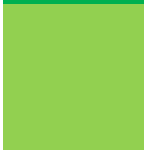


Land cover classification is one of the remote sensing tools to characterise and analyse land use and land cover studies in research (Aplin & Smith, 2008). According to Aplin and Smith, (2008), for micro-level land cover analysis, high-resolution images are required. Orthophotographs are also recommended for analysing cities and areas with varying properties (Li & Shao, 2014). Thus, this study employed aerial images of high resolution of 20cm (orthophotos) of the cemeteries in GAMA obtained from Ghana Survey Department. Orthophotograph images are considered one of the most accurate and cost-effective means of capturing images on the earth's surface. ArcGIS was used to analyse orthophoto images of the cemeteries found in the study area to examine the vegetation cover in the cemeteries. The 2014 orthophotograph image of GAMA was used for the land cover analysis as this is the most recent high-resolution image of GAMA available. The vegetation classification indicated the type and quality of vegetation found in the various cemeteries. The method employed is object-based classification which uses the objects instead of pixels for the classification. Object-based classification automatically relies less on the human, giving more precise results. It uses patterns and makes them more relatable to the landscape being analysed (Aplin & Smith, 2008).

3.7.3 Image processing, classification and area of land class type

The classification was a supervised object-based classification of land cover. The eCognition software was used for image segmentation, which refers to the process of separating images based on specific parameters (Salehi, et.al, 2012). After the segmentation, training of sample for each landcover class was defined and then used to create a signature file for the classification. The initial classification was into the area covered with vegetation and areas with no vegetation. The vegetated area was then

separated into grass cover, trees and shrub cover, graves and bareland. The four vegetation cover classes are described and presented in Table 3.1.

Table 3.1: Showing the land cover classes and their description

KEY	CLASS LEVEL	DESCRIPTION
	Trees and shrubs	Areas dominated by trees and tall shrubs cover at cemeteries.
	Grass cover	Areas dominated by grasses, herbs and small shrubs.
	Bare land	Patch of land or rock which are not covered by vegetation. Bare lands are common in cemeteries, they are either path ways through cemeteries or area cleared for the construction of new graves.
	Graves	Area where the dead have been interred. It is usually demarcated by grave stones, tombstones, monuments or epitaphs.

The area of each land cover class was calculated by multiplying the pixels covered by each land cover type and the area of a pixel. The orthophotographs were of resolution 20 cm, giving an area of 20cm × 20cm. Thus, the pixel area was multiplied by the total number of pixels of land class to give the land cover area in m².

Since the orthophoto image were taken at resolution of 20cm

Area of a pixel = 20cm × 20cm = 0.2m × 0.2m or 0.04 m²

Land cover area = Number of pixels × 0.04 m²

3.7.4 Accuracy assessment

The accuracy of the classification was confirmed using visual and statistical assessment (Jia, 2015). The orthophotographs were of high resolution (20cm) which was clear enough for the images to be easily identified. Making it easy to compare the classification results to the orthophoto images. Thus, the accuracy of the classification was validated this way

Another way in which the classification results were validated was through a comparison of the classification results and the orthophoto images (Cai, et al., 2018; Jia, 2015). In this case, ten random (10) points were selected for each class at the object level. The points of each land cover class were compared to the trees, graves, grassland, and bare land of the orthophoto images of the cemeteries. The accuracy assessment is calculated in percentages and is obtained by dividing the total number of correct classified pixel by the total number each category (which is 10 points in this case).

3.7.5 Floristic composition in cemeteries/Plant inventory

Our team created a composition of floral species or plant inventory list to examine the types of species, plant life forms, star rating and the International Union for Conservation of Nature (IUCN) rating of plant species found in the cemeteries. Finally, the research team administered questionnaires to respondents within the study communities and also conducted key informant interviews to obtain information on the management practices, challenges and policies in cemetery operations.

The 25 cemeteries selected from the multi-stage sampling were visited to assess their floristic composition within each of them. The plant species were identified to the level of families, ecological life forms and both IUCN (International Union for Conservation of Nature) and Star rating for each species was obtained.

A rapid assessment method was employed for the plant survey. The rapid assessment involved a walk through the cemetery to observe the vegetation in each cemetery. Floral species are identified using characteristics like shape and texture of plant organs like the leaf, flowers and fruits, if any (Patrick et al., 2014). Plant species were readily identified in the cemeteries during the visit. Those that were not readily identified were collected and treated appropriately as voucher specimens and sent to the Ghana Herbarium at the Department of Plant and Environmental Biology, (University of Ghana), for identification. At the Herbarium, the plant species were matched with already identified herbarium specimens and named following the standard convention used to identify species by Hutchinson and Dalziel (1954-1972).

Table form plant identification was followed by an extinction risk assessment using IUCN and Star ratings. The IUCN Red List is a universal assessment of species that are in danger of getting extinct in nature. There are nine (9) groupings according to this assessment by IUCN. The 9 groupings are; NE- Not Evaluated, DD- Data Deficient, LC- Least Concern, NT- Near Threatened, VU- Vulnerable, EN- Endangered, CR- Critically Endangered, EW- Extinct in the wild and EX- Extinct.

Not Evaluated (NE): This is when no evaluation has been performed on a plant species.

Data Deficient (DD): A species is assigned Data Deficient, DD when there is lack of data on the species and therefore cannot be ranked under any of the other groups. These kinds of species have little information on their abundance and distribution, making it difficult to assess their risk of extinction.

Least Concern (LC): These species have been assessed and found to not be in the critically endangered, endangered, vulnerable or near threatened group.

Near Threatened (NT): This applies to plant species evaluated against the set criteria that did not qualify for critically endangered, endangered or vulnerable status but are close to qualifying or are likely to qualify for a threatened category in the immediate future upon further evaluation.

Vulnerable (VU): These are plant species considered to have a high risk of facing extinction in the wild.

Endangered (EN): They are considered to have a very high risk of extinction in the wild.

Critically Endangered (CR): These are considered to be facing an extremely high risk of extinction in the wild.

Extinct in the Wild (EW): These are species known only to survive in cultivation, captivity or as a naturalized population well outside the past range.

Extinct (EX): Species are classified in this group when there is no reasonable doubt that the last individual has died.

In order to determine species of high conservation concern in Ghana, the Star rating for each species was determined. The Forest Reserves of Ghana Geographic Information Exhibitor (FROGGIE) database was used for this process (Hawthorne, 1995; Hawthorne and Abu-Juan, 1995). The underlisted definitions were used in the Star ratings.

- Black Star species: Species that are rare internationally and uncommon in Ghana. They require urgent conservation attention.
- Gold Star species: Species that are considered relatively rare internationally and locally.
- Blue Star species: Species that are widespread internationally but rare in Ghana or vice-versa.

- Scarlet Star species: Species that are common species but under intense pressure from heavy exploitation.
- Red Star species: Species are common but under pressure from exploitation.
- Pink Star species: These groups of species are common and moderately exploited. They are also non-abundant species of high potential value.
- Green Star species: These are of no particular conservation concern and are common in Ghana.
- Others: this last group of species are forest species. They also cover species that are excluded from analysis for various reasons.

3.8 Objective 3: Perception of city dwellers on multi-use of cemeteries

A survey was conducted using the 25 selected cemeteries as the study areas. Respondents from communities hosting these 25 cemeteries interacted with to elicit responses to a set of questions in a questionnaire. The same cemeteries which were, the 25 selected for vegetation analysis and the floristic composition was used for the survey to ensure consistency and manage cost (Acharya, et al., 2013). The survey was conducted in the communities in which cemeteries were located to obtain data on the sense of place and the uses of cemeteries. Surveys allow the researcher to make inferences and generalisations on the population.

3.8.1 Sampling procedure

Convenience sampling procedure was employed to select respondents for the survey. The respondents were selected from host communities of the 25 cemeteries, a quota of 20 participants were selected to allow for equal representation among the sampled cemeteries (Acharya et al., 2013). Convenience sampling is a non-probabilistic sampling procedure where members of the population are selected for practical reasons like accessibility and

availability at a given time (Etikan et al., 2016). Convenience sampling was used because it was practical and allowed for easy access to respondents. In total, 500 respondents took part in the survey.

Respondents provided information through close ended questions, on the proximity of the respondent to cemetery, the meaning they ascribe to cemetery and the use of the cemetery. In addition, they were asked through a five-point Likert scale, to rank perception on other uses of cemeteries and what the acceptable and allowable uses of cemeteries are. The five-point Likert scale, first developed by Rensis Likert to estimate a series of attitude related propositions (Chyung, et al., 2017) was used to assess the multi-use potential of cemeteries in GAMA.

Respondents also provided information on the economic, recreational and conservational uses of cemeteries as well as role in conserving nature (plants) through one of the options of strongly agree, agree, not sure, disagree and strongly disagree. Perception on what should be acceptable or allowable was also obtained by ranking some uses of the cemetery as most allowable/acceptable, somewhat allowable/acceptable, least allowable/acceptable. The questionnaire was mainly administered in the local language or dialect that is Twi, Ga and Ewe. Respondents who could speak English were addressed in English.

3.8.2 Inclusion and exclusion criteria for the study

Although mourners are an important group for the survey, only mourners who had already buried their dead and were willing to partake were included in the study. People living around, operating commercial businesses or visiting the cemetery were also included in the study. People actively mourning or burying their dead were not included in the study due to the emotional state they find themselves in. The impression was that, it could affect their sense of judgement and may affect their responses.

3.8.3 Ethical requirements

Best practice indicates that every research particularly, involving human subjects consider ethics and privacy of such subjects. Therefore, this study went through all processes required by the College of Basic and Applied Sciences (CBAS) of the University of Ghana for ethical clearance to undertake this research.

Secondly, verbal consent was obtained from all respondents of the study, as well as verbal permission before any photographs were taken in all the cemeteries. Consent was sought from the Greater Accra Regional Coordinating Council (GARCC) and from the traditional leaders in the communities in GAMA.

3.8.4 Community Entry

For any work to take place in the cemetery, permission was required from the relevant authority for access. In each community, a local guide was sought to link up with community leaders and the cemetery care takers or managers. In the case of the private family cemeteries, the permission had to be granted by the traditional leaders in the community who performed certain rites including the pouring of libation to seek permission from the ancestors before access to the cemetery is granted.

3.8.5 Pre-Test of questionnaire

The questionnaire for this study were pre-tested to find out if the data collection instruments will elicit the required responses to the research questions posed. According to (Daniel, 2012), for a pre-test, a sample size between 20-150 is acceptable and would give enough information about the appropriateness of the questionnaire. For the pre-test, a sample size of 30 was used to obtain an understanding of the people and their interactions with the cemeteries. Two cemeteries; Dome main and Achimota cemeteries in the Ga East Municipal Assembly and Okaikoi North Municipal Assembly respectively were selected for the pre-test. These cemeteries were excluded from the main survey. The

pre-testing process provided solutions to some challenges likely to be faced during the data collection process. It also helped the researcher to make changes to the questions in order to be clearer to the respondents to obtain the answers the study sought to find.

3.9 Objective 4: Extent of other use and abuse of cemeteries

The same sampling procedure used in selecting respondents selected for objective 3 was used to collect data on the extent of other uses of cemeteries and abuse of cemetery.

3.9.1 Observation

Data on the abuse of cemetery was also obtained through background observation. Observation is used to describe events and behaviours. This was done by taking photographs and writing of notes (Kawulich, 2012).

3.10 Objective 5: Legal, regulatory and policy framework for operating and managing cemeteries

Desktop review: Secondary data was obtained from academic journals, acts and bye-laws on cemetery operation and management was used to obtain an overview of the governance structure of cemeteries as burial sites as well as green spaces.

3.12 Key informant interviews

In-depth interviews of key informants were conducted to better understand the issues involved in cemetery operation, use and management (Eppich et al., 2019; Creswell & Creswell 2017; Creswell, 2014). Key informant interviews were conducted to solicit information from persons or supervisory bodies managing cemeteries and their operations. These included the traditional leaders and clan heads. Environmental Health Officers, Cemetery Managers or Sextons and Clan Heads or Traditional leaders were participants of the

Participants for the interviews were purposively selected from the supervisory bodies involved in cemetery management including, the.

An interview guide was then used to conduct key informant interviews to solicit views on issues concerning the siting of cemeteries, the presence and importance of vegetation in cemeteries, multi-use and perception about multi-use of cemeteries and the potential of using cemeteries for greening cities. Information was also sourced from supervisory institutions responsible for cemeteries to explain further any observations in the survey (Creswell, 2014). The role and challenges of policies governing cemeteries were also discussed. The researcher conducted a total of 12 key informant interviews.

3.13 Data management and analysis methods

Quantitative data obtained from the field were analysed using quantitative methods and qualitative data and desktop review were analysed using qualitative methods.

Information from all the sources above are then triangulated. Opposing data were then contested with facts (Creswell et al., 2011).

Qualitative data were mainly from observation and key informant interviews. Descriptive analysis was used to analyse data from observation. A table of the ownership, management, presence or absence of wall and activities observed in the cemeteries was created to give a general overview of the situation in the various cemeteries.

Data from key informant interviews were transcribed verbatim into Microsoft word documents and analysed using thematic analysis. Thematic analysis is a process that allows one to identify cross references between themes (Alhojailan, 2012; Javadi & Zarea, 2016). The themes were summarised and organised into broadly to fit the objectives and conceptual framework of the study. The themes included place making with sub-themes such cemetery management, vegetation preservation in cemetery, vegetation management

in cemetery and sense of place of cemeteries with cultural and traditional beliefs linked to cemeteries as some of the sub-themes.

Quantitative data was analysis: The Global Positioning System (GPS) was used to obtain coordinates of the location of the cemeteries. ArcGIS was used to construct a geo-referenced locational map of the cemeteries in GAMA.

Data collected from the survey was entered into the SPSS version 20 software for processing and analysis. The demographics of the respondents were also collected. The study used descriptive statistics to give an overview of the uses, what acceptable/allowable uses of cemeteries are and perception of the use of cemetery as a conservation hub. The perception of what cemeteries can be used for apart from burial and acceptable or allowable uses of cemeteries were also obtained from the quantitative data. *Chi-square* test was used to determine whether there was significant association between perception about multi-use of cemeteries and actual use of cemeteries at 95% confidence interval. In addition, the association between use of cemetery and type of cemetery was tested using *Chi-square*.

Review of policy documents on cemetery operation and management was analysed using thematic analysis. Policy, administrative, enforcement challenges and future of cemetery governance were the themes developed from the key informant interviews. These were discussed under cemetery governance and sustainability of cemeteries.

3.14 Challenges to data collection

Access to the cemeteries was limited. There were many restrictions on what could be done in the cemeteries. In the cemeteries where access was granted, the researcher could not carry certain activities and could not measure additional parameters.

CHAPTER FOUR

RESULTS

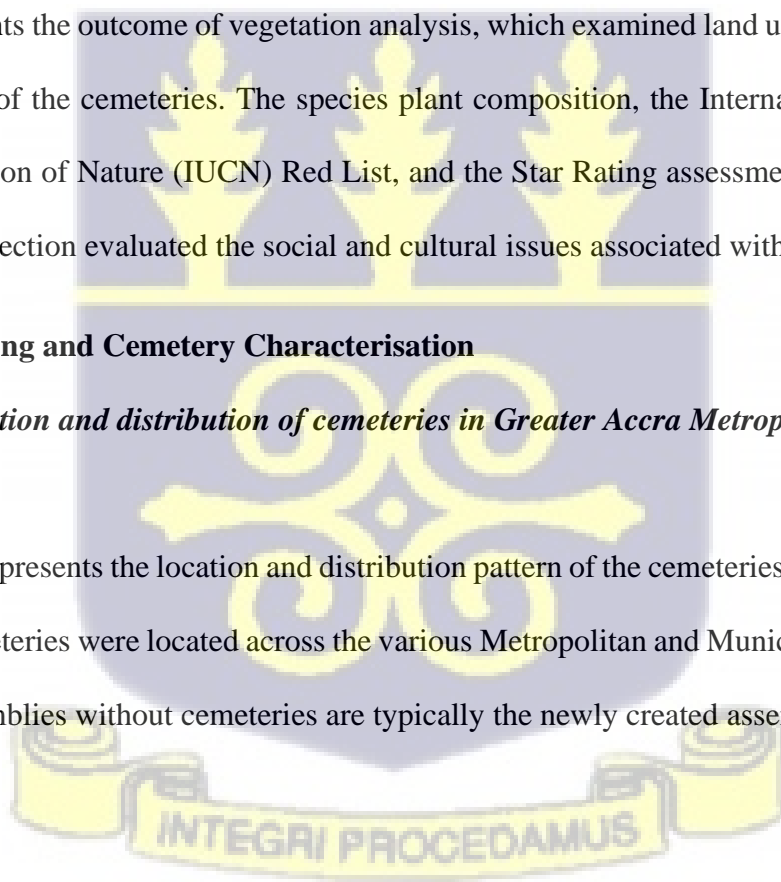
4.1 Introduction

Findings of the study aimed at examining the potential of cemeteries as greening tools are presented. The presentation of the findings is informed by the sense of place and social ecological functional model under the broad headings of the physical properties, functional properties and the people in the places studied. The first section therefore, involves the physical characterisation of cemeteries, including the names and locations of the cemeteries, distribution, and the number of cemeteries in each assembly. This chapter also presents the outcome of vegetation analysis, which examined land use and land cover dynamics of the cemeteries. The species plant composition, the International Union for Conservation of Nature (IUCN) Red List, and the Star Rating assessment of the species. The final section evaluated the social and cultural issues associated with cemeteries.

4.2 Mapping and Cemetery Characterisation

4.2.1 Location and distribution of cemeteries in Greater Accra Metropolitan Area (GAMA)

Figure 4.1 presents the location and distribution pattern of the cemeteries in a map. A total of 48 cemeteries were located across the various Metropolitan and Municipal Assemblies. The Assemblies without cemeteries are typically the newly created assemblies.



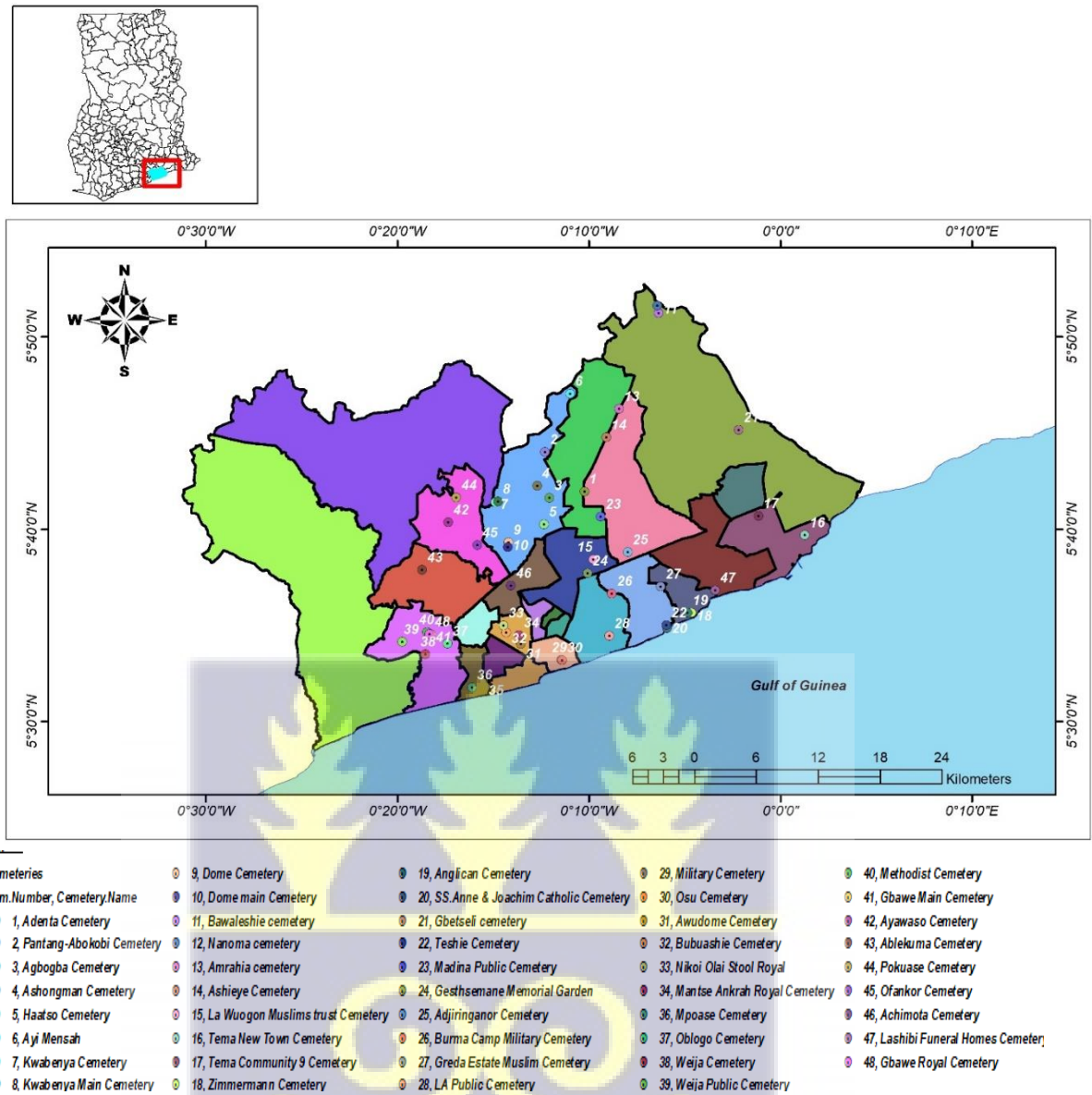


Figure 4.1: Map showing the location and distribution of 48 identified cemeteries in GAMA

The locations and distributions of the cemeteries identified are presented in figure 4.1.

4.2.2 Pattern of distribution of cemeteries in assemblies

Figure 4.2 indicates the number of cemeteries found in each assembly. The Ga East Municipal Assembly has the highest number of 9 cemeteries, followed by Ga South Assembly with 6. Ayawaso North Assembly, Ga Central Assembly and La Nkwantanang Madina have a cemetery each. The rest of the MA have between 2 to 3 cemeteries. No cemeteries identified during the course of the study in the assemblies not represented in figure 4.2.

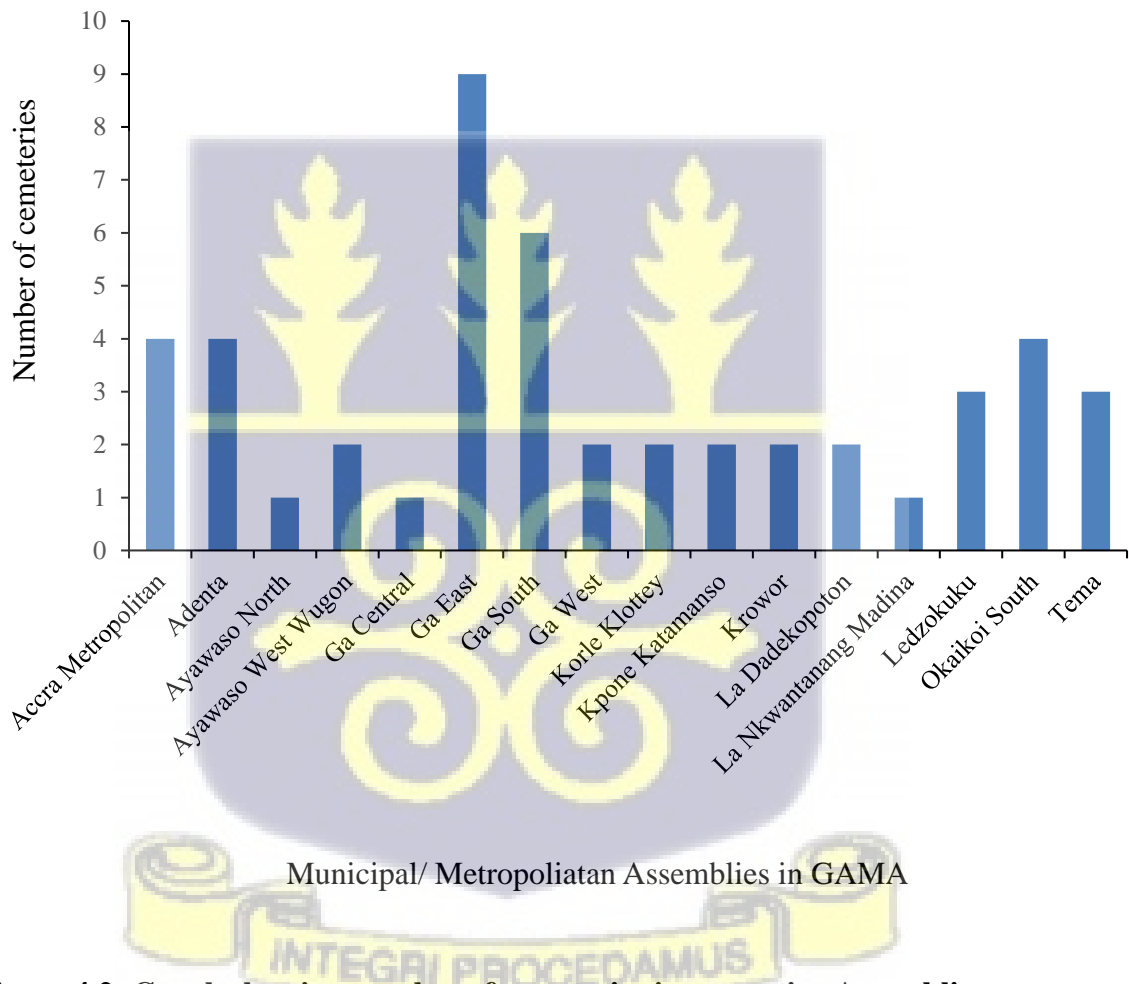


Figure 4.2: Graph showing number of cemeteries in respective Assemblies

4.2.3 Ownership of Cemetery

The two main ownership types identified from the study were private and public or state owned. Within the private are, commercial, religious and family-owned cemeteries.

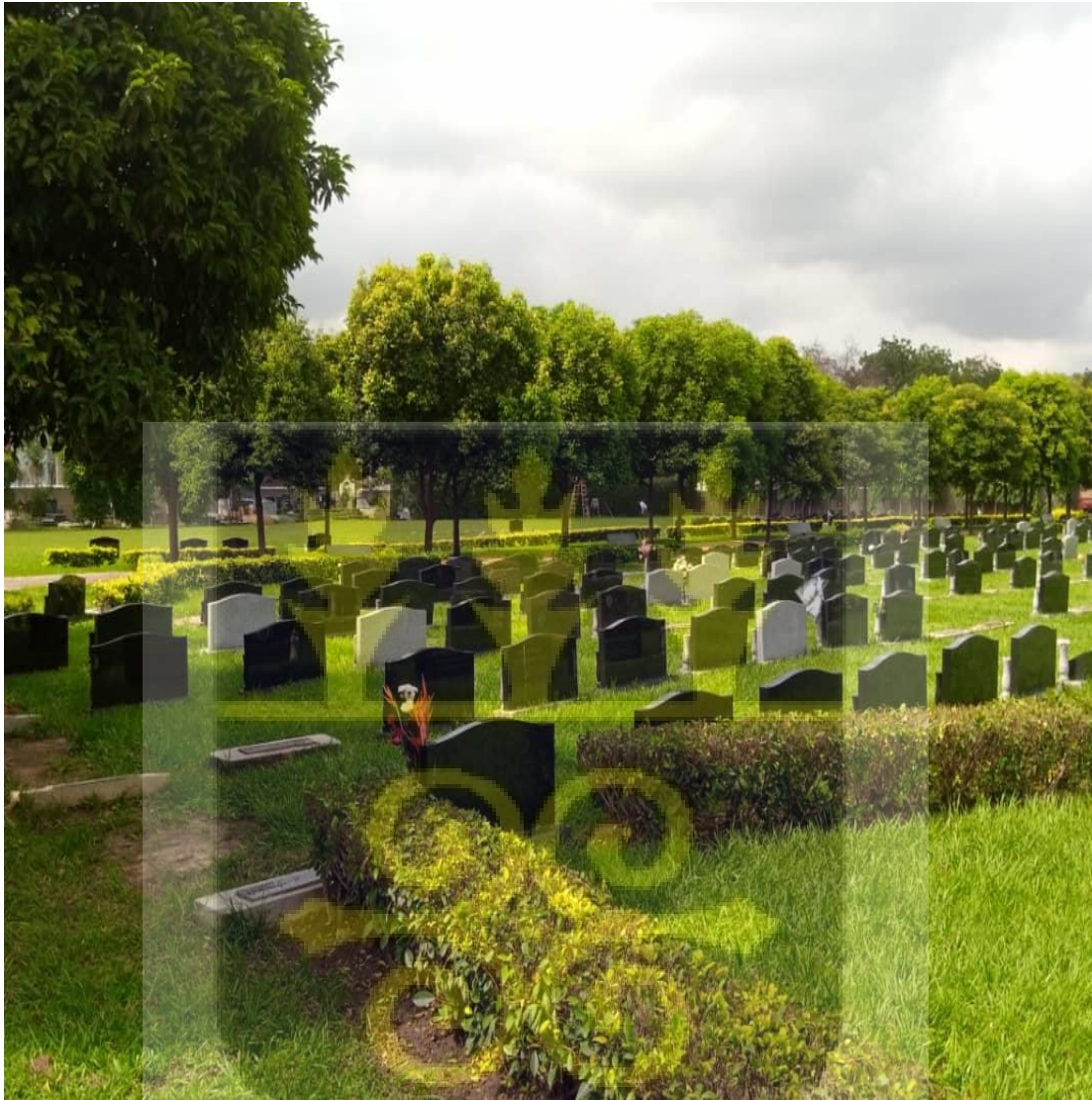


Plate 4.1: Gethsemane cemetery: A private commercial cemetery

Plates 4.1 of Gethsemane Cemetery, a private commercial cemetery located in the Ayawaso West Wuogon Municipality of GAMA. The municipal authorities play a supervisory role to ensure the sanitised burial of the dead.



Plate 4.2: Private Family cemetery/Stool cemetery

Plate 4.2 shows a royal cemetery owned by the Nikoi Olai family of Bubuashie in the Okaikoi South Municipal Assembly.

Clans, stools or families also own the second kind of private family cemeteries where only members are buried here. The Weija Cemetery is in this category. Plate 4.3 shows sections of the Weija Cemetery, a private family.





Plate 4.3: Weija Cemetery- A Private Family Cemetery

The third example of private family cemeteries are family/clan owned or managed, but available to the public. Members of the family or clan are buried in such cemeteries, yet people who are not family or clan members are buried in such cemeteries for a fee or because of extended family ties, links or affiliation with the family.





Plate 4.4: Family managed public cemetery in Ashongman located within the Ga East Municipality

Public cemeteries: Cemeteries in this category are owned and managed by the state through the Municipal Assemblies. Any member of the community with the appropriate authorization, and payment of required fee, where necessary, can bury their dead here. An example is the Madina Cemetery.



**Plate 4.5: Portion of Public cemetery Madina, in the La Nkwantanang Madina
Municipal Assembly of GAMA.**

Plate 4.5 is an example of a public cemetery which serves both the indigenes of Madina as well as non- indigenes. The day-to day management of the cemetery is by the Assembly

The study found Osu Cemetery as one of the oldest public cemeteries in GAMA. It is managed by the Accra Metropolitan Assembly (AMA) and any member of the community can be buried in this cemetery once the required fees are paid (Appendix10).



Plate 4.6: A Private Religious Cemetery - La Wuogon Muslim Cemetery

Private religious cemeteries: This group of cemeteries belong to identifiable religious groups, Christian or Muslim. They could even be owned by specific religious sects or denominations within the Christian or Muslim fraternity. Burial of a non-member is normally not allowed unless under special circumstances (Plate 4.6).





Plate 4.7: Military Cemetery located at La in La Dade Kotopon Municipality.

Military cemeteries: These cemeteries belong to the Ghana Armed Forces, where burial is limited to members of the military and high-ranking government officials such as the President and Vice President (Plate 4.7).



4.2.4 Types of Cemetery ownership

Figure 4.3 presents a pie- chart on the ownership of the cemeteries. About, 69% of the cemeteries are private family cemeteries. The assemblies usually have no control over burial in these cemeteries. There is typically a cemetery manager chosen by the family to man and keep the cemetery clean.

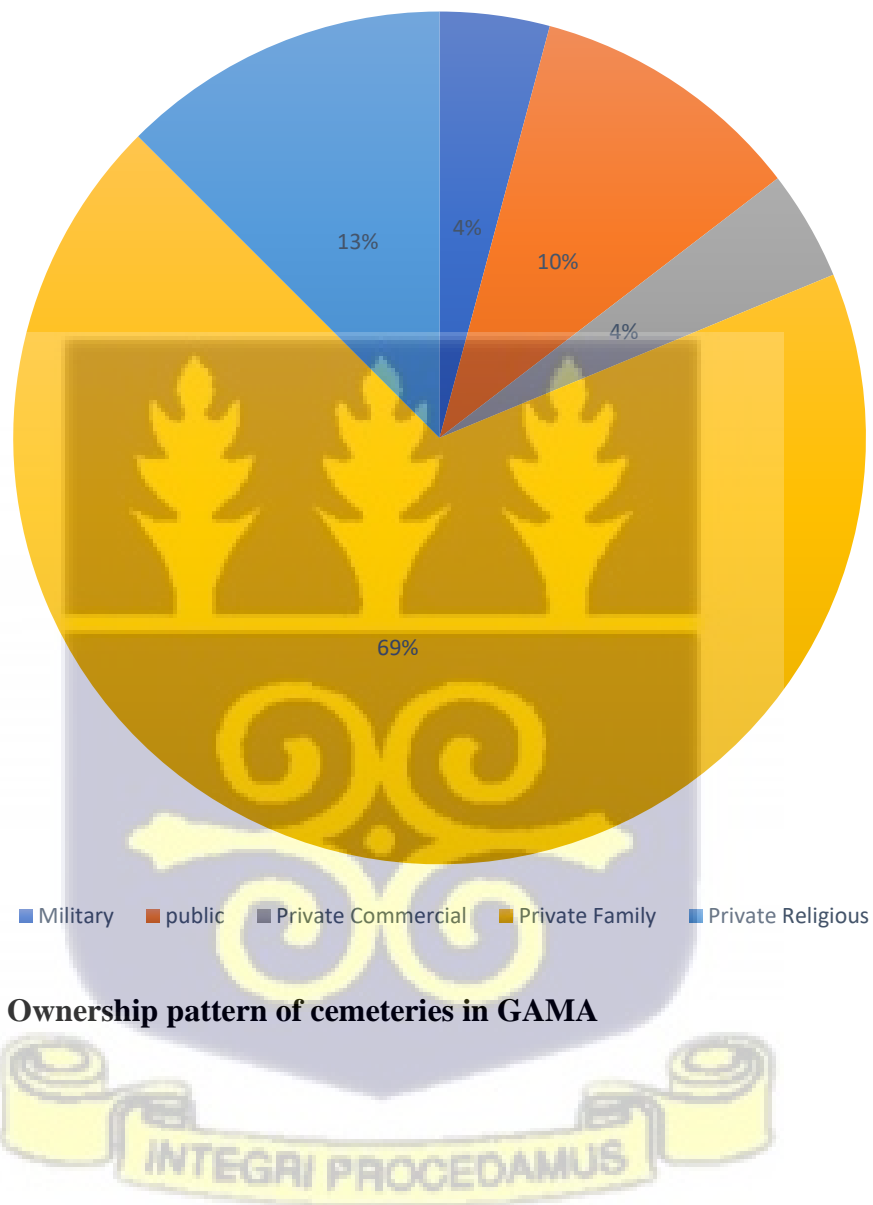


Figure 4.3: Ownership pattern of cemeteries in GAMA

4.2.5 Ownership Pattern of Cemetery

Cemetery ownership pattern within the Assemblies in GAMA shows that, the Adentan Municipal, the Ga East Municipal and the Ga South Municipal have the highest number of privately owned cemeteries in GAMA. (Figure 4.4).

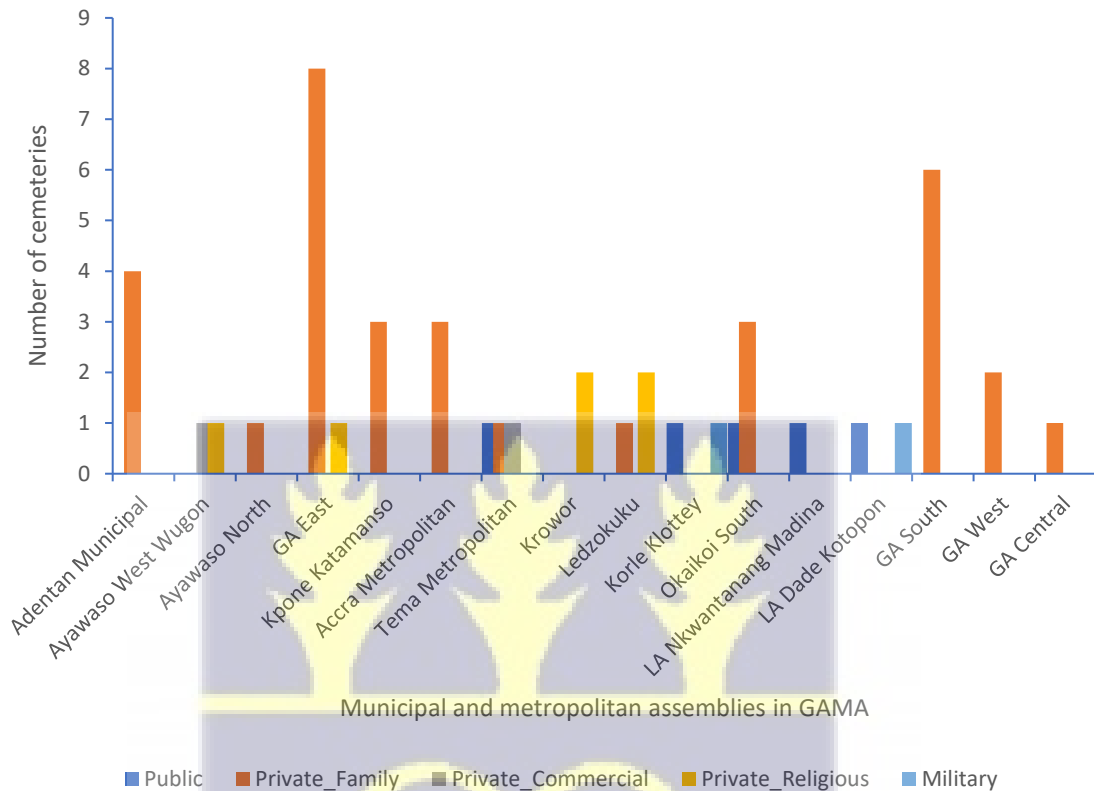


Figure 4.4: Ownership of cemetery among Municipal Assemblies

There are five (5) public cemeteries with each located within Tema Metropolitan, Korle Klottey, Okaikoi South, La Nkwantanang Madina, and La Dade Kotopon Municipal Assemblies.



4.2.6 Demarcation of cemeteries

The boundary here is the presence of wall and well-defined gate or entrance.

Cemeteries demarcated with walls and those without walls are shown in figure 4.5.

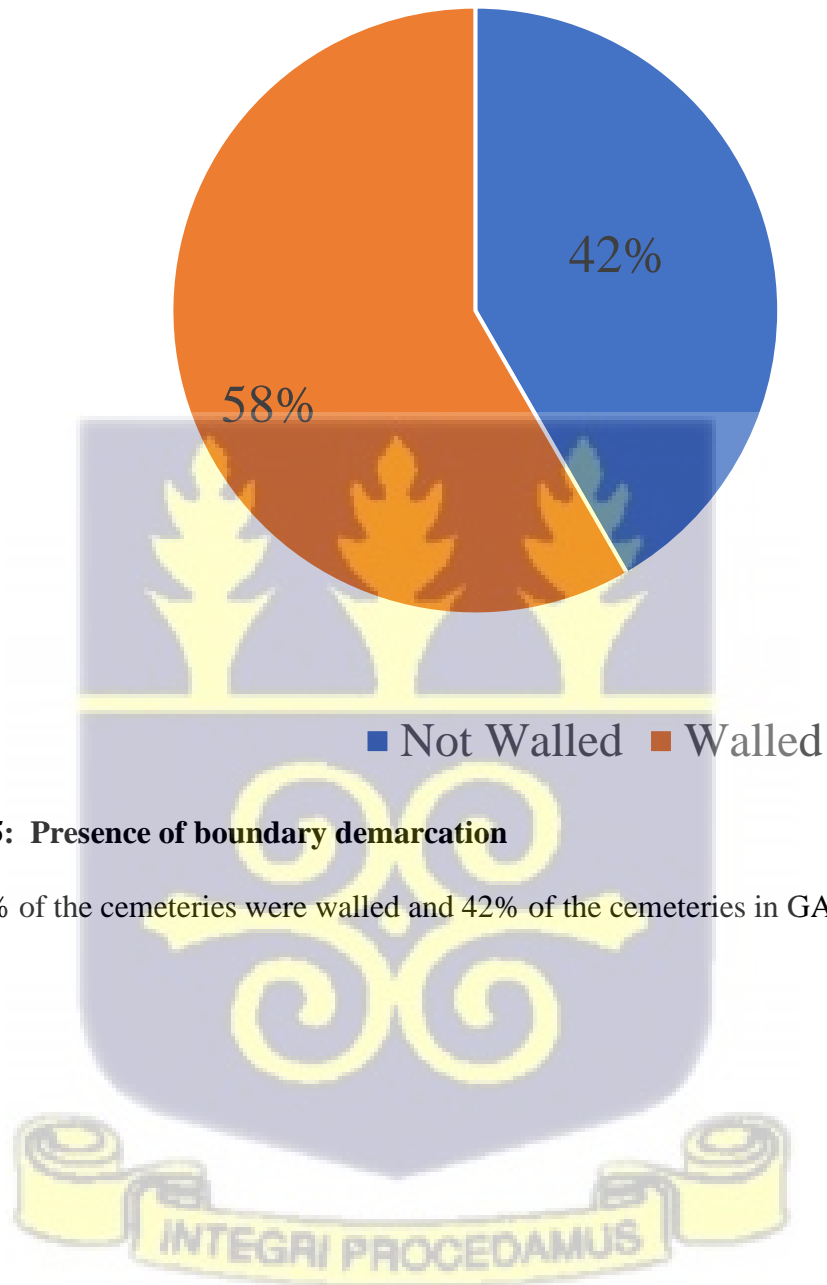


Figure 4.5: Presence of boundary demarcation

About 58% of the cemeteries were walled and 42% of the cemeteries in GAMA were not walled.



Plate 4.8: Walled cemetery at Haatso, with a well-defined entrance.

Walled cemetery: Some cemeteries are walled and have a clearly defined entrance. The walls protect the cemetery from encroachment and other unwanted activities. Plate 4.11 shows a walled cemetery in the Ga East Municipal Assembly.





Plate 4.9: Unwalled cemetery in the Kpone-Katamanso Municipal Assembly

Cemeteries without walls: These are cemeteries without a well demarcated boundary around them, hence some are demarcated with vegetation whilst others have no boundary at all, making access into the cemetery easy and also allow entry without authorisation.

4.2.7 Amenities observed in cemeteries

The cemeteries were observed to have few amenities. All the public cemeteries had an office to receive and attend to visitors. The private commercial cemeteries also had an office and a waiting area for their clients. There was no waiting area for the private family cemeteries. It was also observed that about 85% of the cemeteries had no waste bins provided for efficient waste disposal. Majority of the cemeteries had no toilet facilities or changing rooms for the workers in the cemeteries. Less than 20% of all the cemeteries had a properly functioning toilet.

The private commercial cemetery, Gethsemane and the La Public has seats for visitors to use as indicated in plates 4.10 and 4.11.

A dust bin in Agbogba cemetery is depicted in plate 4.12



Plate 4.10: Seat for visitors in Gethsemane Cemetery





Plate 4.11: Seat for visitors in La Public Cemetery



Plate 4.12: Waste disposal bin in the cemetery

4.2.8 Total cemetery coverage area

The total area covered by the 48 cemeteries in GAMA is 1,193.878 m² or 1.2 km². According to Addae and Oppelt, (2019), the estimated total area of GAMA is 1,585 km². Thus, cemeteries make up 0.08% of the total area GAMA.

Appendix 5 shows that, Awudome cemetery located in the Okaikoi South Sub Metro of the Accra Metropolitan Assembly is the largest cemetery with an estimated area of about 0.3 km², while Oblogo Cemetery has the smallest area of less than 0.01 km².

4.2.9 Activities observed in cemeteries

The study found other activities occurred in the various cemeteries. During the field visits, it became evident that some cemeteries allowed no other activity apart from burial whilst others had different activities taking place in them. The observed activities included relaxing in the cemetery, construction, and commercial.

4.2.9.1 No activity observed in cemeteries

These were cemeteries that do not allow other human activities aside burial and burial. These are typically the royal and military cemeteries where no other activities are allowed.

4.2.9.2 Commercial activities

Various forms of commercial activities were observed in some cemeteries. It was observed that 15 out of the 48 cemeteries had some form of commercial activity taking place in them. These included selling of food and other items, operation of a shop on cemetery lands, and operation of a washing bay on cemetery land. Examples like the Agbogba cemetery where an individual was keeping and selling poultry birds, Adenta where there were a number of metal shops, Amrahia where there was a fitting shop at the periphery of the cemetery.



Plate 4.13: Activities observed in cemetery

a: Food vendor sleeping at La Public Cemetery.

This vendor usually serves people who work in the cemetery like grave diggers cemetery managers and people who come to the cemeteries to relax.

b: Container shops placed in the Amrahia Cemetery

c: Portions of Agbogba Cemetery being used to raise and sell poultry.

d: Fire wood from the La Wuogon Muslim Cemetery.

4.2.9.3 Cemeteries as residential facilities

Some parts of some cemeteries have been converted to human settlements although those parts were still demarcated as cemetery lands. An example is the Ashongman Cemetery (Plate 4.14).



Plate 4.14: Part of Ashongman Cemetery

4.2.9.4 Cemeteries as waste dump site

Whilst it is undesirable to have waste dumped in the homes of the dead, it was observed that some cemeteries had become waste dump site (Plate 4.15).



Plate 4.15: Waste skip and waste in Ashongman Cemetery

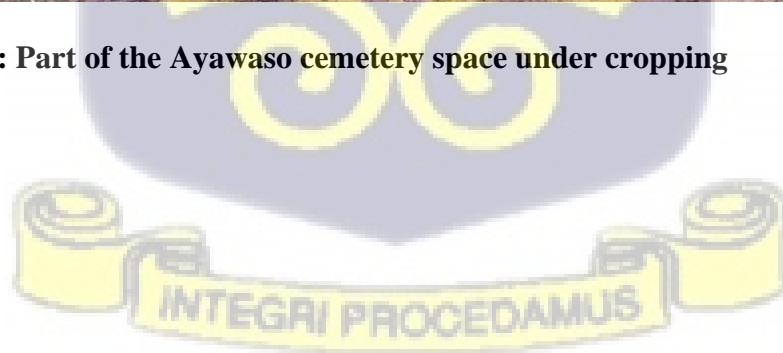


4.2.9.5 Farming activities

Another of type activity observed in some cemeteries was crop farming, where parts of cemeteries have been converted into a farm. The location and conditions in the cemeteries seem to provide favourable conditions for cropping by cemetery managers or caretakers (Plate 4.16).



Plate 4.16: Part of the Ayawaso cemetery space under cropping



4.2.9.6 Construction activities

There were construction activities taking place in parts of some cemetery. Construction activities observed include, moulding of blocks and other civil works. These actors take advantage of materials like free sand or water (Plate 4.17).



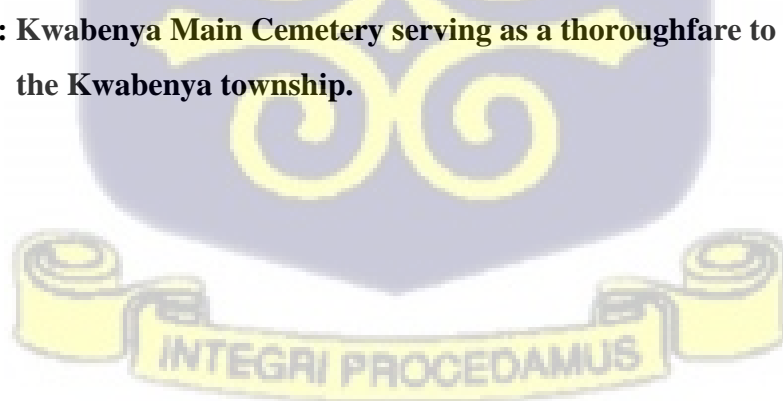
Plate 4.17: Agbogba Cemetery with heaps of sand probably for construction.

4.2.9.7 Cemetery as thoroughfare

Other activities noted during the field visits included some of cemeteries being used as thoroughfares. These typically create unsightly footpaths through the cemeteries (Plate 4.18).



Plate 4.18: Kwabenya Main Cemetery serving as a thoroughfare to others areas of the Kwabenya township.



4.2.9.8 Car park/car wash

Ecosystem services like shade in the cemetery provides a good condition for parking of cars. In cemeteries where there are water bodies, some drivers even wash their cars (Plate 4.19).



Plate 4.19: Haatso cemetery serving as a car park

4.2.9.9 Home for some people

Some cemeteries serve as home for some people, as depicted in the Ashongman Cemetery in plate 4.20.



Plate 4.20: Ashongman cemetery with a ‘home setting’

4.2.9.10 Recreational use of cemetery



Plate 4.21a: An aerial view of the Madina Public Cemetery showing a football park within the cemetery.



Plate 4.21b: Image of goal post indicating that part of the cemetery was being used as a football field.

Football field for recreation in Madina Cemetery as seen in plates in 4.24a a& 4.24b.

4.2.9.11 Summary of observed activities

A graphical representation of the observed activities in the cemeteries are shown in figure 4.6. The most dominant activity in the cemeteries in the study is commercial activity with 31% while school had the lowest tally of the observed activities with 2%.

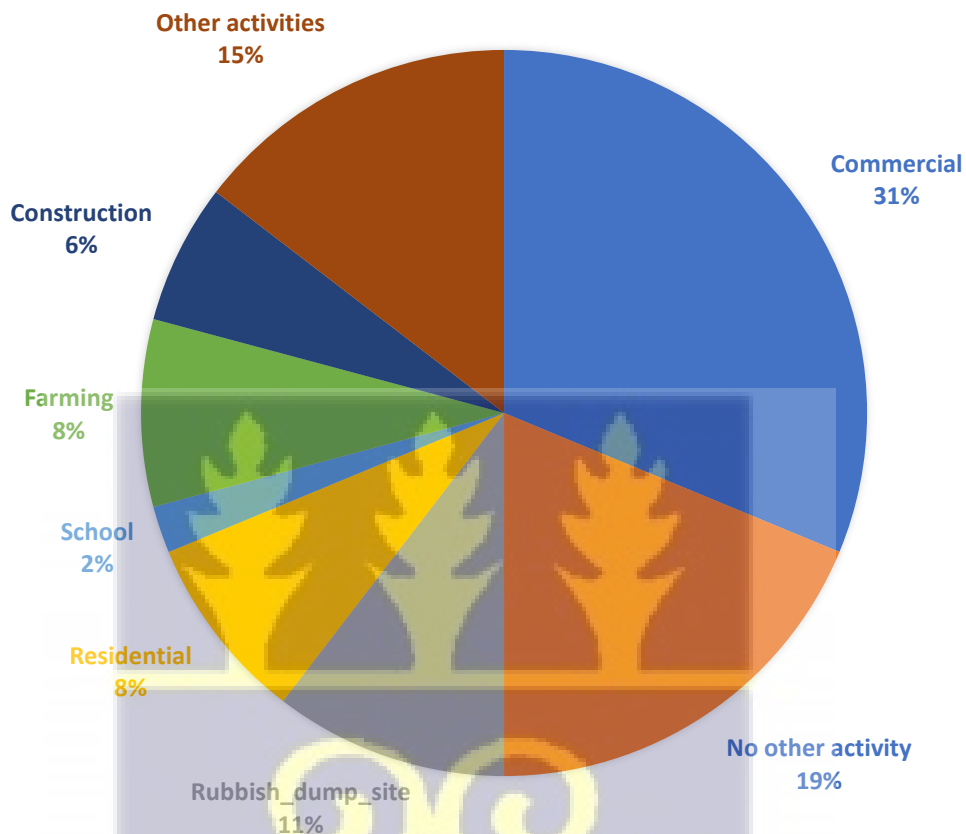


Figure 4.6: A summary of observed activities in the cemeteries

Stray animals like dogs, goats and chicken were also observed moving within the cemetery. In some cases, also, the care takers of the cemetery were the youth of the area whose jobs were to keep the cemetery clean and to stop people from entering the cemetery without authorisation. Their presence also prevented people from dumping waste or defecating in the cemetery.

About 15% of the activities observed in the cemetery was categorised under other activities. These are activities that were not common but occurred in less than two

cemeteries at the time of visit. These include collection of plant material, relaxation and cooking in the cemetery. Some of the plant, materials collected included neem leaves, ‘nyanya’ (*Mormordica* sp).

Table 4.1: A summary of cemeteries, location and observed activities

No.	Community	Cemetery Name	District	Observed Activity
1	Adenta	Adenta Cemetery*	Adentan	Farming
2	Abokobi	Pantang-Abokobi Cemetery*	Ga East	None
3	Agbogba	Agbogba Cemetery	Ga East	Rubbish dump site
4	Ashongman	Ashongman Cemetery	Ga East	Other (Relaxation/smoking)
5	Haatso	Haatso Cemetery*	Ga East	Commercial (Washing bay)
6	Ayi Mensah	Ayi Mensah	Ga East	Construction
7	Kwabanya	Kwabanya Cemetery	Ga East	Commercial (Trading)
8	Kwabanya	Kwabanya Main Cemetery*	Ga East	Other (Relaxation/smoking)
9	Dome	Dome Cemetery	Ga East	Commercial (Washing bay)
10	Dome	Dome main Cemetery	Ga East	Commercial (Charcoal Production)
11	Bawaleshie	Bawaleshie cemetery	Kpone Katamanso	Commercial (Welding)
12	Nanoma	Nanoma cemetery	Kpone Katamanso	Rubbish dump site
13	Amrahia	Amrahia cemetery	Adentan	Farming
14	Ashieye	Ashieye Cemetery	Adentan	Commercial (Block moulding)
15	East Legon	La Wuogon Muslims trust Cemetery*	Ayawaso West Wugon	Commercial (Fuelwood production)
16	Tema New Town	Tema New Town Cemetery	Tema East	Other (Relaxation/smoking)
17	Tema Comm. 9	Tema Comm. 9 Cemetery*	Tema	Commercial (Trading)
18	Nungua	Zimmermann Cemetery*	Krowor	Farming
19	Nungua	Anglican Cemetery*	Krowor	School

Where * are cemeteries that are walled

Table 4.1: A summary of cemeteries, location and observed activities (cont'd)

No.	Community	Cemetery Name	District	Observed Activity
20	Teshie	SS.Anne & Joachim Catholic Cemetery*	Ledzokuku	Rubbish Dump site
21	Gbetseli	Gbetseli cemetery	Kpone Katamanso	Other (Relaxation)
22	Teshie	Teshie Cemetery	Ledzokuku	Rubbish Dump site
23	La-Nkwantanang Madina	Madina Public Cemetery*	La Nkwantanang Madina	Commercial (Washing bay)
24	East Legon	Gesthsemame Memorial Garden*	Ayawaso West Wugon	None
25	Adjiringanor	Adjiringanor Cemetery*	Adenta	Rubbish Dump site
26	Burma Camp	Burma Camp Military Cemetery*	La Dade Kotopon	None
27	Greda Estate	Greda Estate Muslim Cemetery*	Ledzokuku	None
28	LA	LA Public Cemetery*	La Dade Kotopon	Other (Relaxation/smoking)
29	Osu	Military Cemetery*	Korle Klottey	None
30	Osu	Osu Cemetery*	Korle Klottey	Commercial (Trading)
31	Awudome	Awudome Cemetery*	Okaikoi South	Other (Relaxation)
32	Bubuashie	Royal Cemetery*	Okaikoi South	Commercial (Trading)
33	Bubuashie	Nikoi Olai Stool Royal*	Okaikoi South	None
34	Awudome	Mantse Ankras Royal Cemetery*	Okaikoi South	Commercial (Rubber production)
35	Dansoman	Mpoase , Agage Cemetery*	Accra	Commercial (Trading)
36	Dansoman	Mpoase Cemetery*	Accra	Other (Relaxation/smoking)
37	Oblogo	Oblogo Cemetery*	Ga South	Residential
38	Weija	Weija Cemetery*	Ga South	Construction
39	Weija	Weija Public Cemetery	Ga South	None
40	Gbawe	Methodist Cemetery	Ga South	Commercial (Trading)
41	Gbawe	Gbawe Royal Cemetery*	Ga South	None
42	Gbawe	Gbawe Main Cemetery	Ga South	Residential
43	Ayawaso	Ayawaso Cemetery	Ayawaso North	Farming
44	Ablekuma	Ablekuma Cemetery	Ga Central	Commercial (Trading)
45	Pokuase	Pokuase Cemetery	Ga West	Commercial (Trading)
46	Ofankor	Ofankor Cemetery *	Ga West	Residential
47	Achimota	Achimota Cemetery *	Accra	Residential
48	Lashibi	Lashibi cemetery*	Tema	None

Where * are cemeteries that are walled

4.2.10 Observed inappropriate uses of cemeteries

From this study, three main forms of abuse were identified. These are the use of cemetery as waste disposal sites, open defecation in cemeteries and the presence of miscreants who use the place as hideouts for improper behaviour like drug abuse and other criminal activities. Out of the 25 cemeteries sampled, 22, (88%) had waste dumped in them, 18, (72%) had evidence of open defecation occurring in them and 17, (68%) had miscreants hanging around in the cemeteries. This is presented in figure 4.7 and plates 4.22 and 4.23. Viewer discretion is advised for the images in the plates provided.

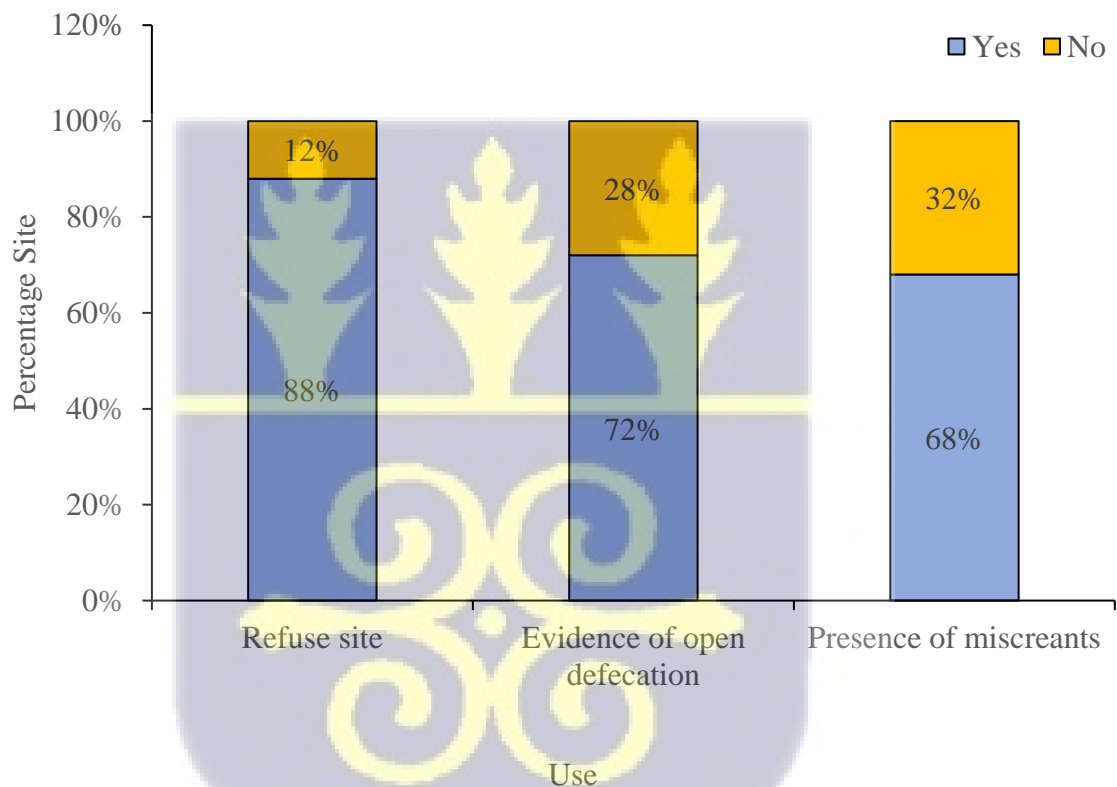
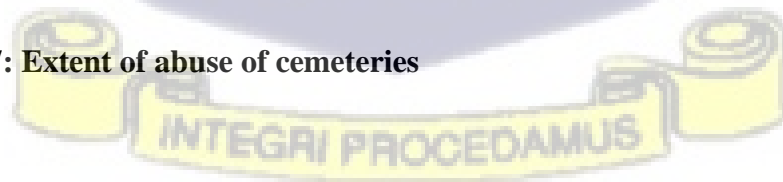


Figure 4.7: Extent of abuse of cemeteries



Viewer discretion is advised



Plate 4.22: Open defecation in cemetery

The plate 4.23 shows solid waste deposited in the Gbawe Cemetery. The image shows plastic rubber, bottles, old and damaged wreaths left in the cemetery.



Plate 4.23: Sections of Gbawe Cemetery as a waste dump site

4.3 Ecological significance of cemeteries

4.3.1 Vegetation analysis

Average accuracy assessment of the landcover classes show that; trees were 93%, grassland was 83%, graves were 70% and bareland was 80%. For accuracy assessment value to be accepted, it must be 80% and above (Turan & Günlü, 2010). The accuracy assessment of the trees, grassland and bareland are all 80% and above and therefore acceptable. Graves however had an average accuracy of 70%. This was because the vegetation cover made it difficult to locate the graves accurately.



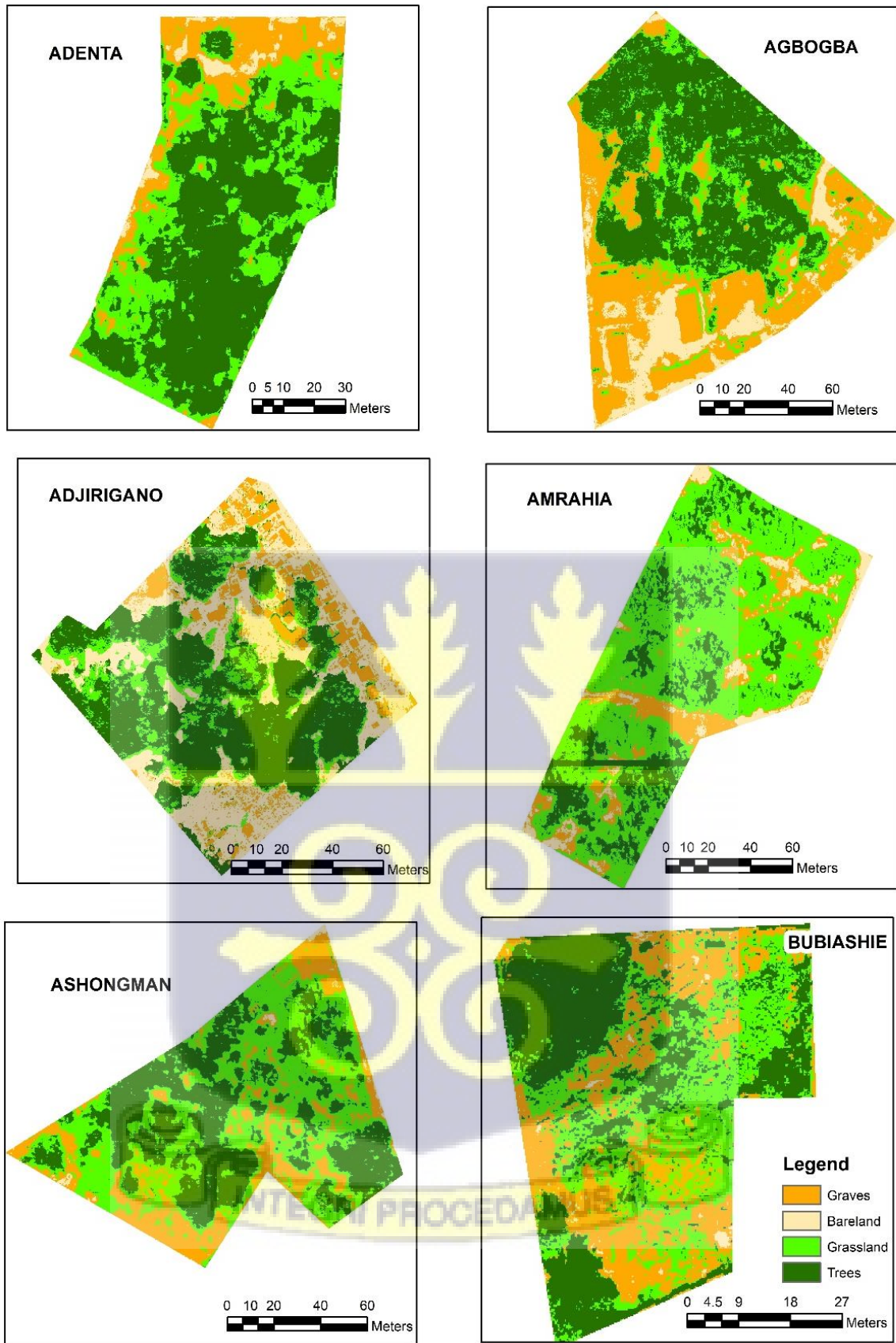


Figure 4.8: Images of the land cover classes in indicated cemeteries

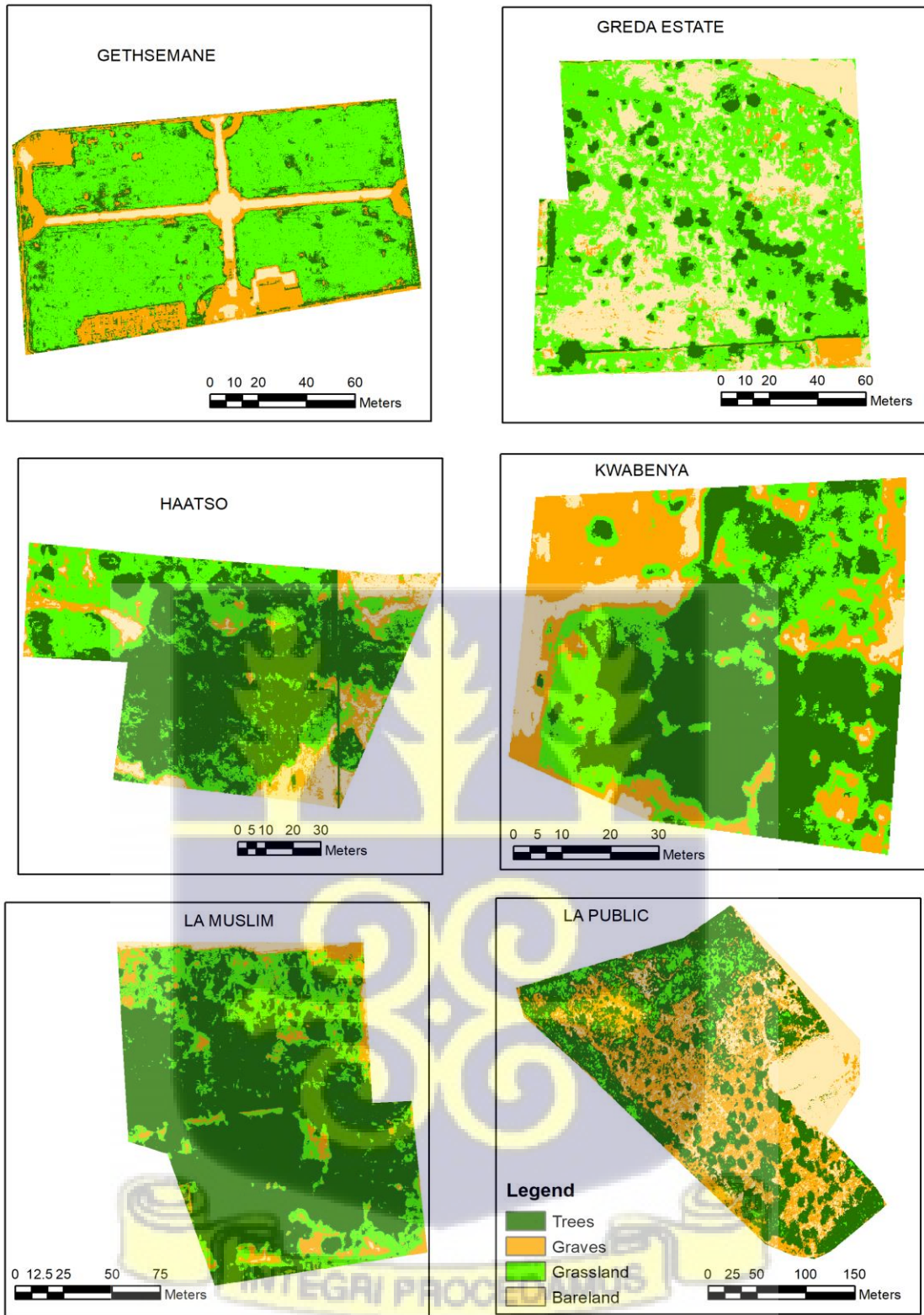


Figure 4.8: Images of the land cover classes in indicated cemeteries (cont'd)

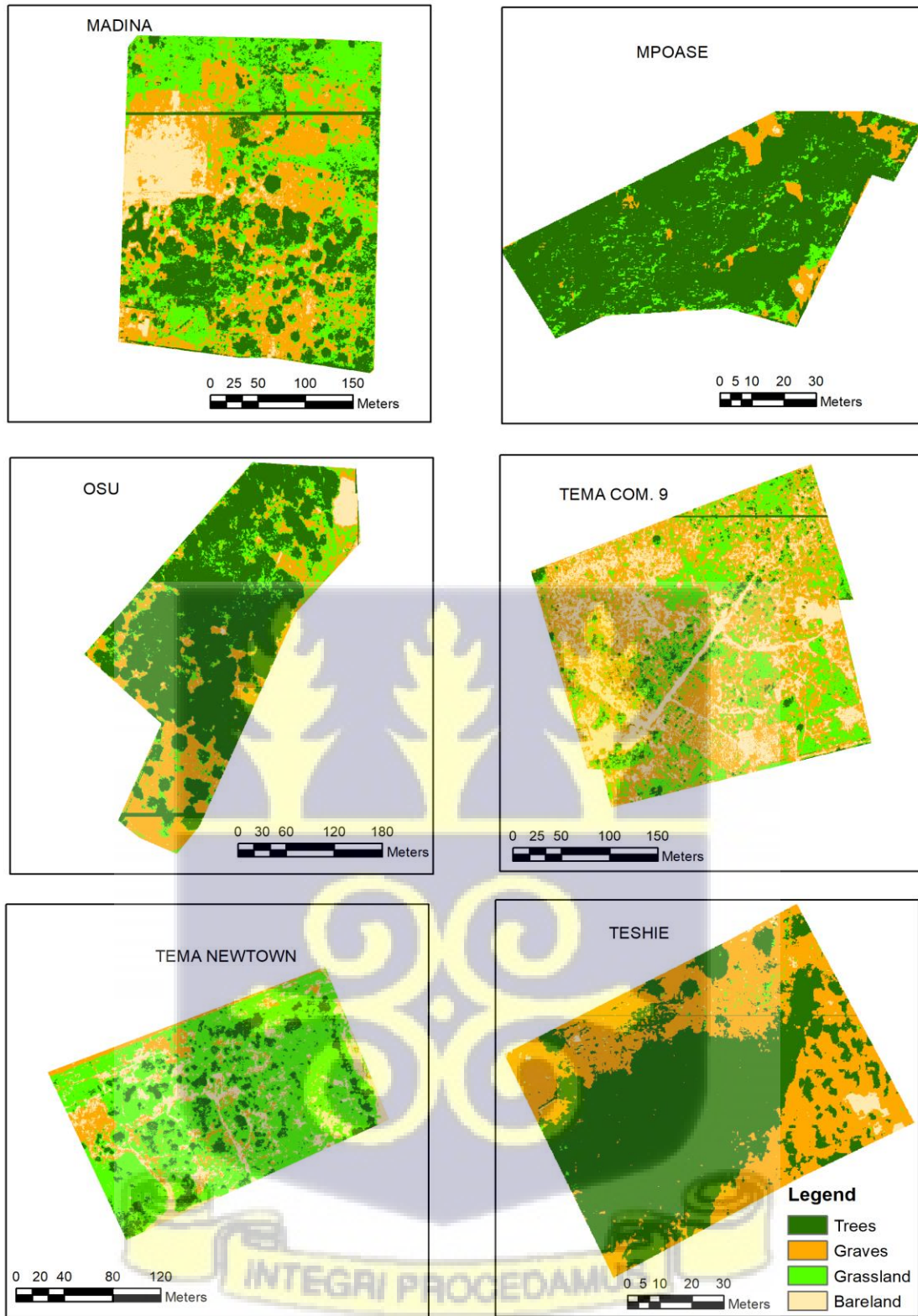


Figure 4.8: Images of the land cover classes in indicated cemeteries (cont'd)

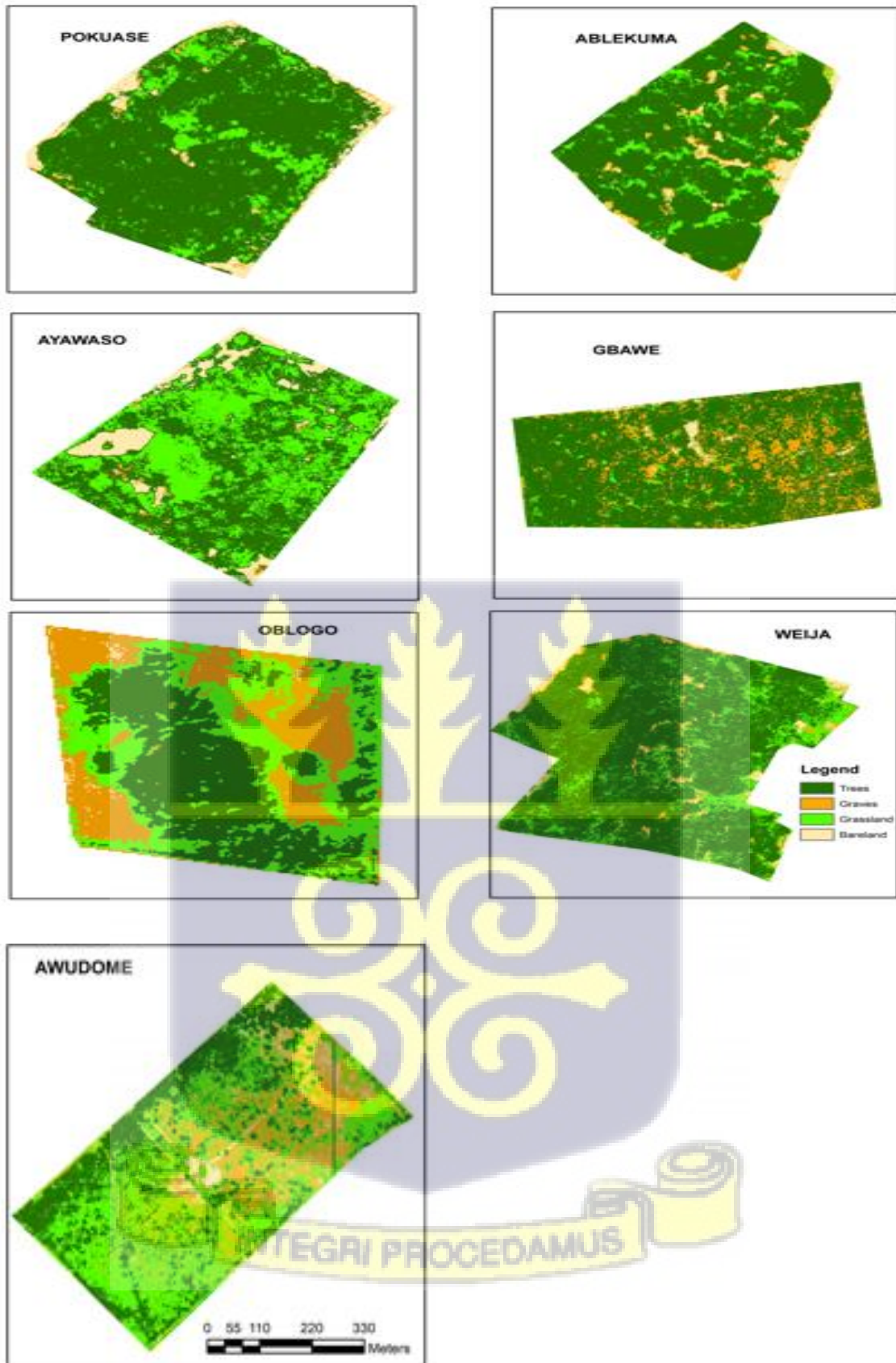


Figure 4.8: Images of the land cover classes in indicated cemeteries (cont'd)

Table 4.2: Area of land cover classes in the cemeteries

Cemetery	Grassland area (m ²)	Grave areas (m ²)	Bareland area (m ²)	Tree area (m ²)
Ablekuma	840.64	337.80	426.44	6,169.64
Adenta	2,215.36	1,102.32	202.12	3,590.80
Adjirigano	5,156.52	1,410.24	1,717.36	3,579.72
Agbogba	6,261.72	4,979.80	2,557.40	1,850.12
Amrahia	2,791.40	1,802.88	9,218.28	974.04
Ashongman	4,362.92	2,260.68	4,896.00	92.04
Awudome	87,752.16	60,085.68	134,138.04	18,303.08
Ayawaso	5,954.40	202.08	1,410.40	7,370.68
Bubuashie	793.04	26.96	969.12	1,074.64
Gbawe	1,038.84	4,751.80	494.56	21,731.36
Gethsemane	2,118.64	2,446.08	884.12	9,150.12
Greda_Estate	765.56	9,238.96	5,836.96	1,757.16
Haatso	5,316.12	858.44	2,955.52	886.48
Kwabenya	1,251.20	427.84	1,527.32	2,467.08
La_Muslim	15,637.60	1,640.80	4,955.08	457.84
La_Public	32,262.12	21,208.04	5,148.60	15,271.00
Madina	30,262.88	8,407.72	28,822.76	24,893.64
Mpoase	4,566.80	380.40	446.80	13.56
Oblogo	190.72	159.24	5.40	236.40
Osu	52,931.72	16,291.64	9,853.64	2,063.68
Pokuase	845.68	110.60	477.04	5,757.36
Tema_C9	4,179.16	38,860.48	21,022.52	22,512.32
Tema_Newtown	4,699.92	3,810.56	22,315.64	5,947.16
Teshie	4,788.40	3,320.48	53.80	106.88
Weija	4,853.72	915.68	598.40	20,359.92

Table 4.3 shows the area covered by each of the land cover classes in each cemetery.

From the land cover analysis of the 2014 orthophoto images; Madina Cemetery had tree cover area of 24,893.64 m² (0.0249 km²), Awudome had grassland cover of 87,752.16 m² (0.0878 km²), grave area of 60,085.68 m² (0.0609 km²), and bareland of 134,138.04 m² (0.134k m²). It must be noted that Awudome is the largest among the cemeteries sampled.

The results of the land cover classification are presented in figure 4.8. The four land-cover classes were trees, grassland, graves and bareland. The extent of area covered by each class is presented pictorially in figure 4.9.

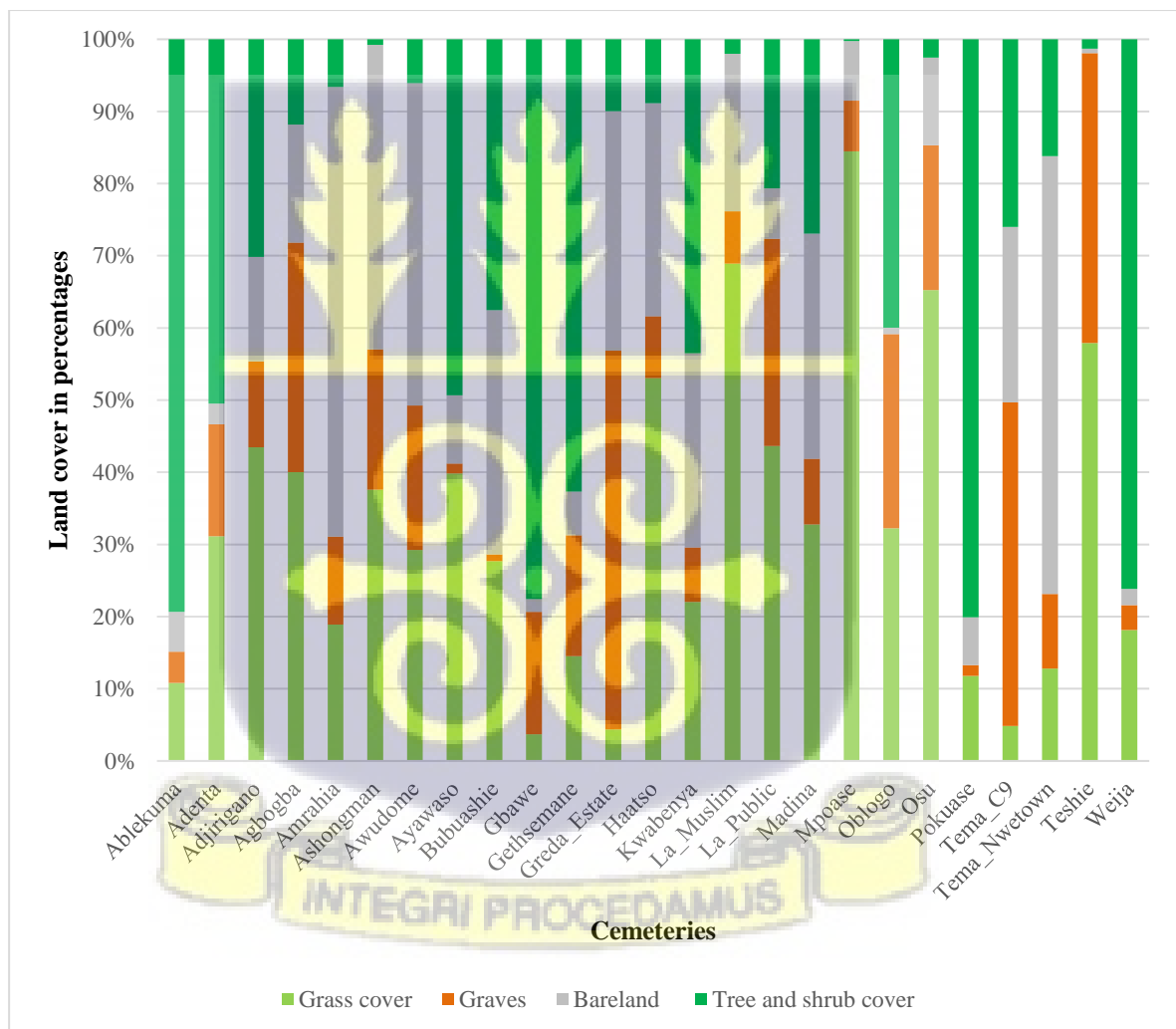


Figure 4.9: Proportion of each land cover class in cemeteries

4.3.2 Floral composition in cemeteries

All cemeteries had some form of vegetation. Out of the 25 cemeteries sampled, a total of 176 plant species from 62 families were identified (Appendix 6). Out of these, herbs make up 38.6% followed by shrubs (27.3%), followed by trees, (25.6%) with grasses and sedges at 7.4 and 1.1% respectively (Figure 4.10).

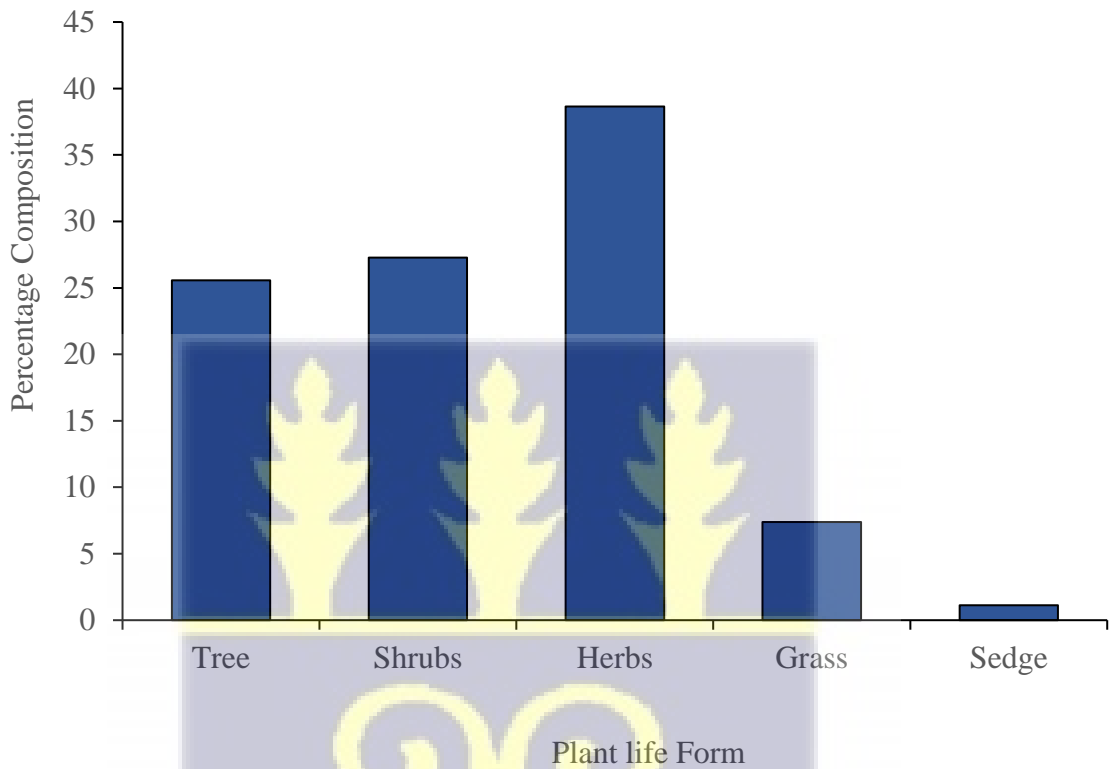


Figure 4.10: Bar chart on plant life forms in the sampled cemeteries

Two categories of nature / habit of plants species were evident from the plant inventory from the sampled cemeteries. These categories are naturally growing plants and the cultivated plants or introduced plants.

4.3.2.1 Natural plants

The natural plants are usually those not planted by anyone. They germinate with the help of natural seed dispersing agents like insects, wind or rain. Some of the plants found in this category are herbs, forbes, and grasses. From the data, 71% of the plants can be classified as naturally growing. Examples are shown in plates 4.24 and 4.25.

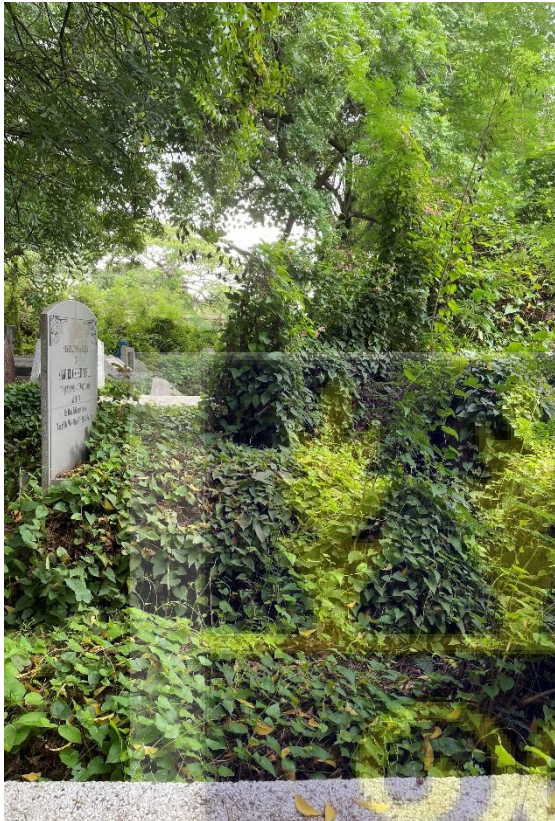


Plate 4.24: *Antigonon leptopus*, a climber which grew naturally in nature found in the Osu Cemetery.

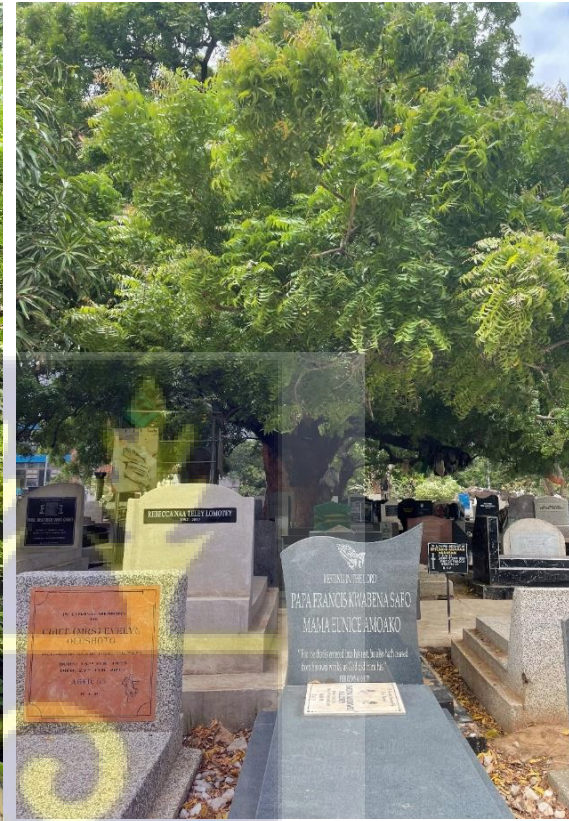


Plate 4.25: *Azadirachta indica* (neem), a naturally growing invasive plant in the Osu Cemetery.

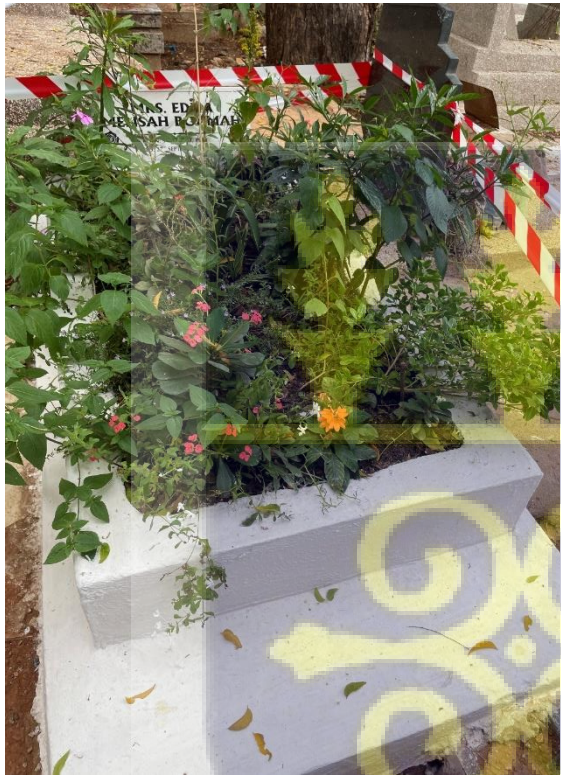
4.3.2.2 Introduced plants

The second category of plants are the introduced or exotic plant, which are intentionally planted by people in the cemeteries. The results show that 29% of the plants identified were introduced plants.

a. Decorative plants

Some of the introduced plant species are decorative. These usually have flowers and are used to decorate graves. Example are seen in some cemeteries like Osu cemetery. Species such as *Plumbago auriculata* Lam., with beautiful flowers are planted on some graves of some people who have died. It is believed that this plant is able to drive bad spirits away from their deceased family member who has died. It is also for aesthetic purposes. Plate 4.26 shows some decorative plates on graves.

(a)



(b)

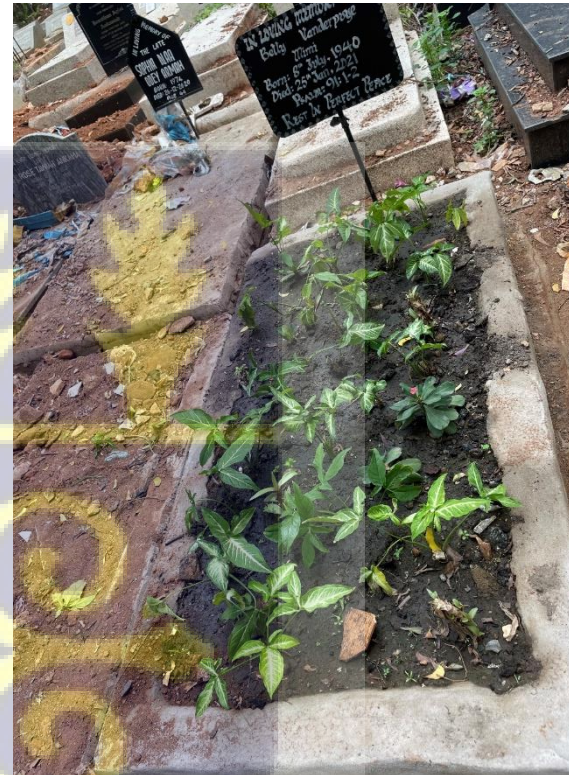
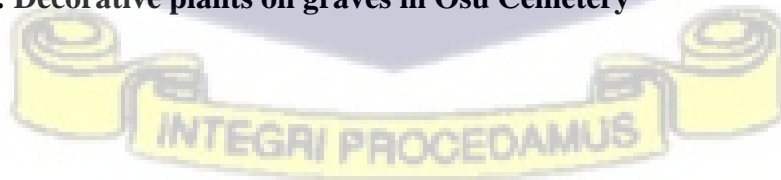


Plate 4.26: Decorative plants on graves in Osu Cemetery



Food crop

The second group of cultivated plants are the food crops grown in cemeteries. The practice is that some families plant food crops on the graves of deceased family members. These plants have symbolic meaning to the family. Some cemetery managers also plant food crops in cemeteries as shown in plate 4.26.



Plate 4.27: Food crops grown in the cemetery

(a) *Anacardium occidentale* (cashew), (b) *Carica papaya* (pawpaw), (c) *Musa x paradisiaca* & (d) *Manihot esculenta* (cassava)

Private cemeteries for example Gethsemane Cemetery intentionally plant trees to beautify cemetery. Cemetery managers are usually in charge of the beautification of the cemetery.

4.3.2.3 Plant species and their ratings

Appendix 6 provides a list of 176 plant species found in the 25 cemeteries sampled, categorised with their scientific (botanical) names, families, life forms, IUCN ratings, star ratings and the frequency of occurrence of the plants. The IUCN rating was obtained from the IUCN red list and the star rating of Ghana's forest species. Many of the plant species identified were not forest species and thus do not have star ratings.

About 55% of the plant species found in the cemeteries have not been evaluated and cannot be found in the IUCN red list. The next largest group of the plants (41%) were found in the IUCN red list least concern category. Only 1% of the plant species are in the near threatened group which were *Milicia excelsa* (Iroko) and *Gossypium arboreum* (Cotton) presented in appendix 6.

4.3.3 Cemetery vegetation management

A summary of the top ten tree species based on occurrence in cemeteries are presented in table 4.3. From the study it was found out that, just like all plant species, the trees in the cemeteries were either indigenous or exotic. The results further show that the first ten trees with the highest occurrence were mainly indigenous. However, exotic species like *Spondias mombin*, *Araucaria columnaris*, *Roystonea regia*, *Araucaria columnaris* and *Thuja occidentalis* are cultivated mainly in private commercial cemeteries for aesthetic purposes. The most common occurring tree is *Azadirachta indica* which is an introduced species that typically grows naturally in cemeteries. In cemeteries like Gethsemane Cemetery, the trees are usually cultivated and managed by the cemetery manager. The cemetery manager manages and maintains the overall vegetation in the cemetery.

Table 4.3: List of trees with highest occurrence in sampled cemeteries

Tree	Family	Frequency of occurrence in 25 cemeteries
1. <i>Azadirachta indica</i> A.	Meliaceae	24
2. <i>Elaeis guineensis</i> Jacq	Arecaceae	16
3. <i>Ficus</i> spp L.	Moraceae	12
4. <i>Carica papaya</i> L.	Caricaceae	9
5. <i>Mangifera indica</i> L.	Anacardiaceae	9
6. <i>Senna siamea</i> Lam.	Fabaceae	9
7. <i>Antiaris toxicaria</i> Lesch.	Moraceae	8
8. <i>Millettia thonningii</i> (Schumach. & Thonn.)	Leguminosae	6
9. <i>Terminalia catappa</i> L	Combretaceae	6
10. <i>Acacia auriculiformis</i> A.	Leguminosae	5

In the private commercial cemetery, tree planting was deliberate and part of general cemetery management as indicated by the interviewee's assertion on the existence of trees in the cemetery.

"...Our director asked that the trees be planted. The people you see over there are workers employed to ensure that the plants are watered and the trees are in good shape" – (Private Cemetery Manager).

The study unveils the fact that in public cemeteries, trees were usually not the focus of the cemetery managers rather, their focus is on epitaphs in the cemetery. However, the trees were usually left untouched because of traditional and cultural beliefs. This is highlighted by this interviewee's submission.

"...We don't plant the trees in the cemetery but we try not to cut them too. There are no spaces to plant trees. In fact, in some cases the trees destroy the grave stones and that is a worry to us." - (Public Cemetery Sexton).

The study revealed that, family cemeteries were sited in areas that have vegetation because of the belief that the dead live with the living and therefore should be protected from harsh weather conditions. This is highlighted by the interviewee's assertion about vegetation in cemeteries.

"... Once we see a cemetery land, we know. The land for cemetery calls out to us. These places are filled with thick vegetation. We don't plant the trees. Our ancestors must be protected from the sun. We look out for water too because the ancestors need to quench their thirst..." - (Traditional Leader, Adenta)

This statement suggests that there were some associations between plants and tradition and culture in cemeteries. However, plants or trees that were in the way of the graves were either weeded, sprayed with weedicide, or burnt, thus, making tree management in the cemeteries unsustainable. The trees were also not spared this treatment. The trees are either fell or burnt alive.

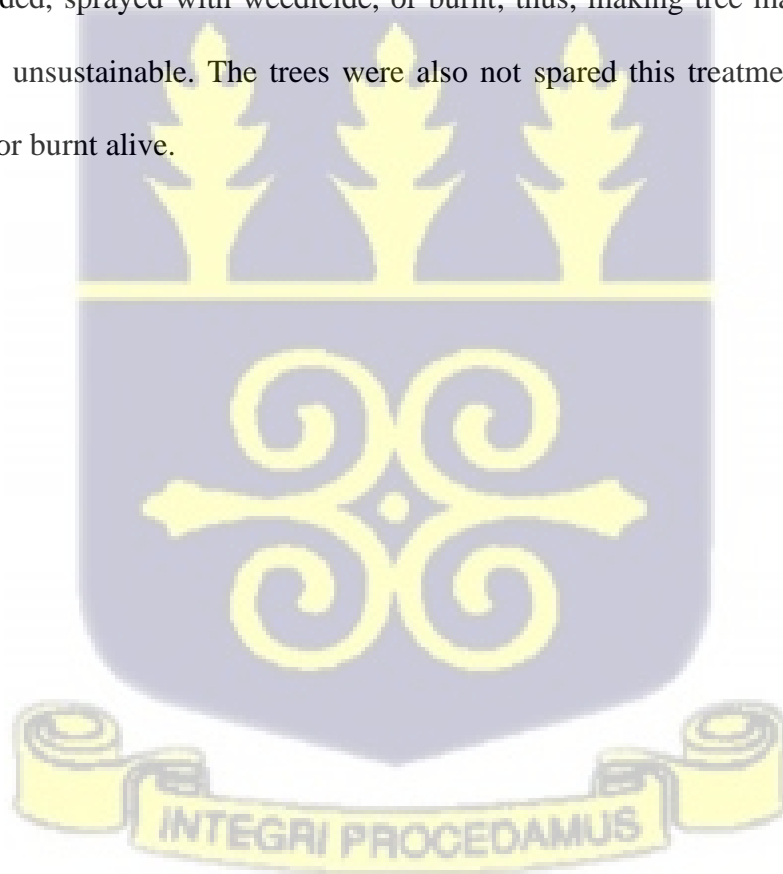
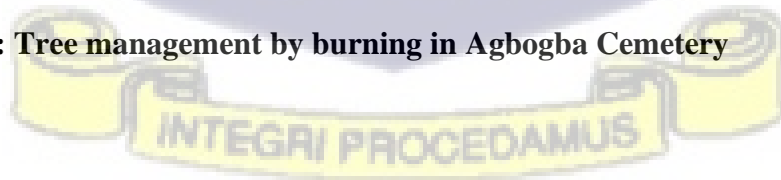




Plate 4.28: Tree management by burning in Agbogba Cemetery



4.4 Social and Cultural Perspectives

Results on the demographic characteristics of respondents, perception of respondents about cemeteries and their multi-use, the uses of cemeteries apart from burial and the role of sense of place in influencing this use are presented in this section.

4.4.1. Demographic characteristics

A total of 500 respondents selected in the communities in which the 25 sampled cemeteries were located took part in the survey. The total number of males were 247, (49.4%) and the females were 253, (50.6%). The 30-39 age group made up 38.6% of the total number of respondents. The results show that 43.6% of the respondents had Middle School Leaving Certificate. From the results, 88.6% indicate that they were Christians with Muslims being 7.6 %. The two highest ethnic groups were the Gas/Adangbes, (38.6%) and the Akans (38.4%), the Ewes accounted for 14.2% and the Mole Dagbani, 5.6% (Table 4.4a).

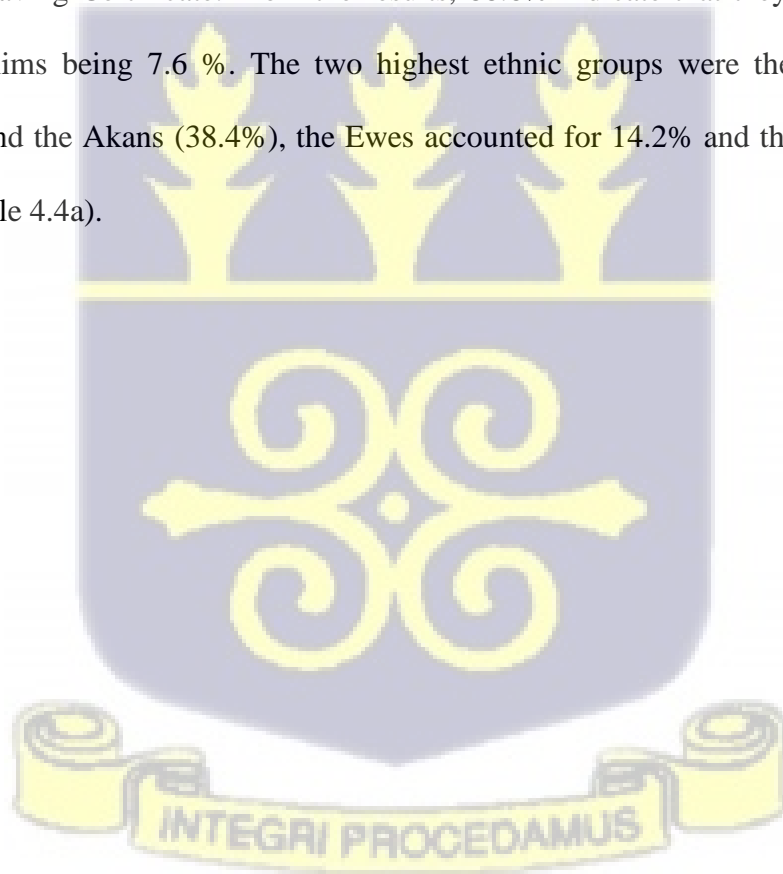


Table 4.4a: Demographic characteristics of the respondents

Variable	Category	Frequency	Percentage
Gender	Male	247	49.4
	Female	253	50.6
Total		500	100
Age Range	Less than 20 years old	18	3.6
	20-29 years old	95	19.0
	30-39 years old	193	38.6
	40-59 years old	122	24.4
	50-59 years old	57	11.4
	60+ years old	15	3.0
Total		500	100
Educational Level	No formal education	52	10.4
	Primary	163	32.6
	MSLC	218	43.6
	Secondary/Vocational/Technical	20	4.0
	Tertiary	47	9.4
Total		500	100
Religious Affiliation	Christian	443	88.6
	Muslim	38	7.6
	Traditional religion	3	.6
	No religion	16	3.2
Total		500	100
Ethnic Background	Ga/Adangbe	193	38.6
	Akan	192	38.4
	Ewe	71	14.2
	Mole Dagbani	28	5.6
	Nzema	2	.4
	Gur	2	.4
	Others	12	2.4
Total		500	100

The results further showed that 73% of respondents were workers in either full time employment or self-employed, 15.8% in part-time employment, 4% of them were students and 7.2% unemployed. Approximately 66% of respondents lived in the communities hosting cemeteries, whilst 34% did not live there. The duration of stay in the community for 5.4% of respondents is less than 2 years whilst 19% lived for between 6-10 years. The longest duration was more than 21 years by 10% of respondents. About 62% of

respondents work in the communities where cemeteries were located whilst 38% did not work in the communities (Table 4.4b).

Respondents who had relatives buried in cemetery accounted for 26% of the respondents, while 74% did not (Table 4.5).

Table 4.4b: Demographic characteristics of the respondents

Variable	Category	Frequency	Percentage
Employment Status	Full-time/ self-employed	365	73.0
	Part time	79	15.8
	Student	20	4.0
	Unemployed	36	7.2
Total		500	100
Residential status	Resident	328	65.6
	Non-Resident	172	34.4
Total		500	100
Length of stay in community	Less than 2 years	27	5.4
	2-5 years	71	14.2
	6-10 years	95	19.0
	11-15 years	47	9.4
	16-20 years	38	7.6
	21 years or more	50	10.0
	Not applicable	172	34.4
Total		500	100

Table 4.4c: Demographic characteristics of the respondents

Work location	Works in the community	309	61.8
	Do not work in the community	191	38.2
Total		500	100
Length of work	Less than 2 years	59	11.8
	2-5 years	94	18.8
	6-10 years	71	14.2
	11-15 years	44	8.8
	16-20 years	19	3.8
	21+ years	22	4.4
	Not applicable	191	38.2
Total		500	100

Table 4.5: Frequency of respondent who had relatives buried in cemetery

Relative buried in cemetery	Frequency	Percent
Yes	130	26.0
No	370	74.0
Total	500	100.0

4.4.2 Location of cemeteries within communities

In order to get a complete picture of how respondents felt about the current location of cemeteries in their communities, they were asked to indicate whether they had any concern about the cemetery location. From the data, 63% of respondents did not have any concern about the location of the cemeteries within their community. About 37% of the respondents, however, had some concerns about the location of the cemeteries (Figure 4.11).

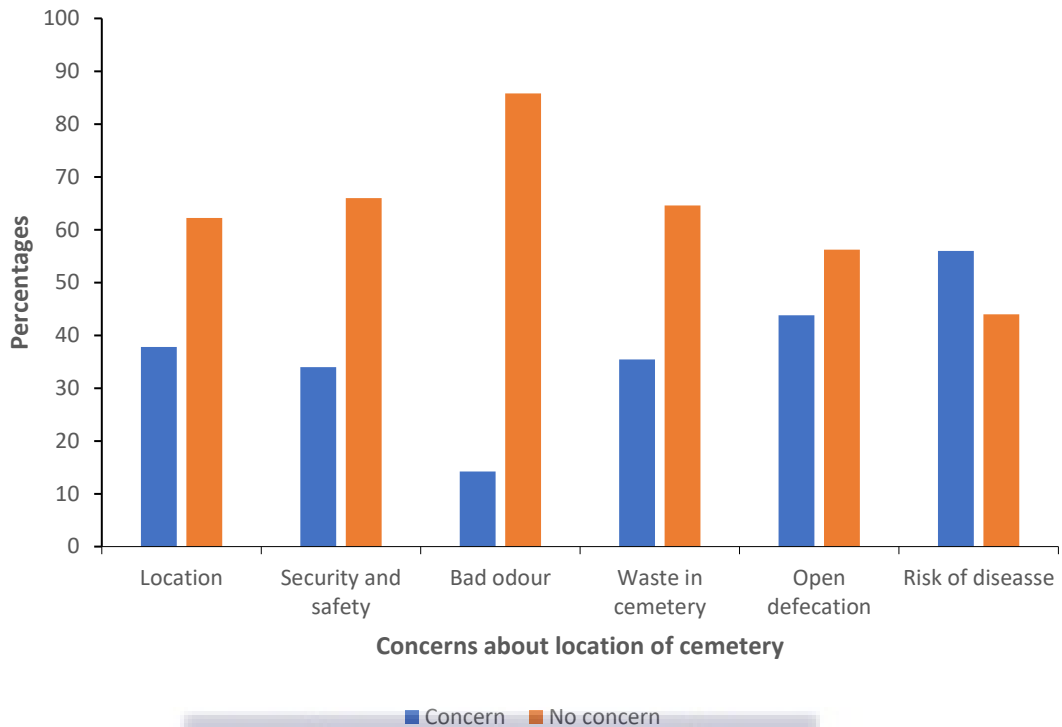


Figure 4.11: Concern about cemetery location

About 40% of respondents were concerned about cemetery location, about 34% felt the location of cemetery posed a threat to their security and safety, about 24% were concerned about bad odour from cemeteries, 35% were concerned about the amount of waste in the cemeteries, about 44% were concerned about open defecation in cemeteries and about 56% were concerned about the risk of disease due to the location of cemeteries within the communities.

4.4.3 Perception of respondents towards cemeteries

4.4.3.1 Sense of place of cemeteries

The meanings associated with cemeteries are depicted in figure 4.12 and the descriptions of cemetery are shown in figure 4.13. For the functional meaning of cemeteries, almost all respondents indicated that cemeteries meant a place for burial only, about 7% indicated that cemeteries meant a place of burial and recreation, about 4% indicated that cemeteries meant burial and spiritual place and less than 2% indicated that cemeteries meant burial

and green vegetation place. About 43% of respondents described cemeteries as peaceful place, 41% described cemeteries as ordinary places, 11% felt cemeteries were scary places, none of the respondents saw cemeteries as sacred places.

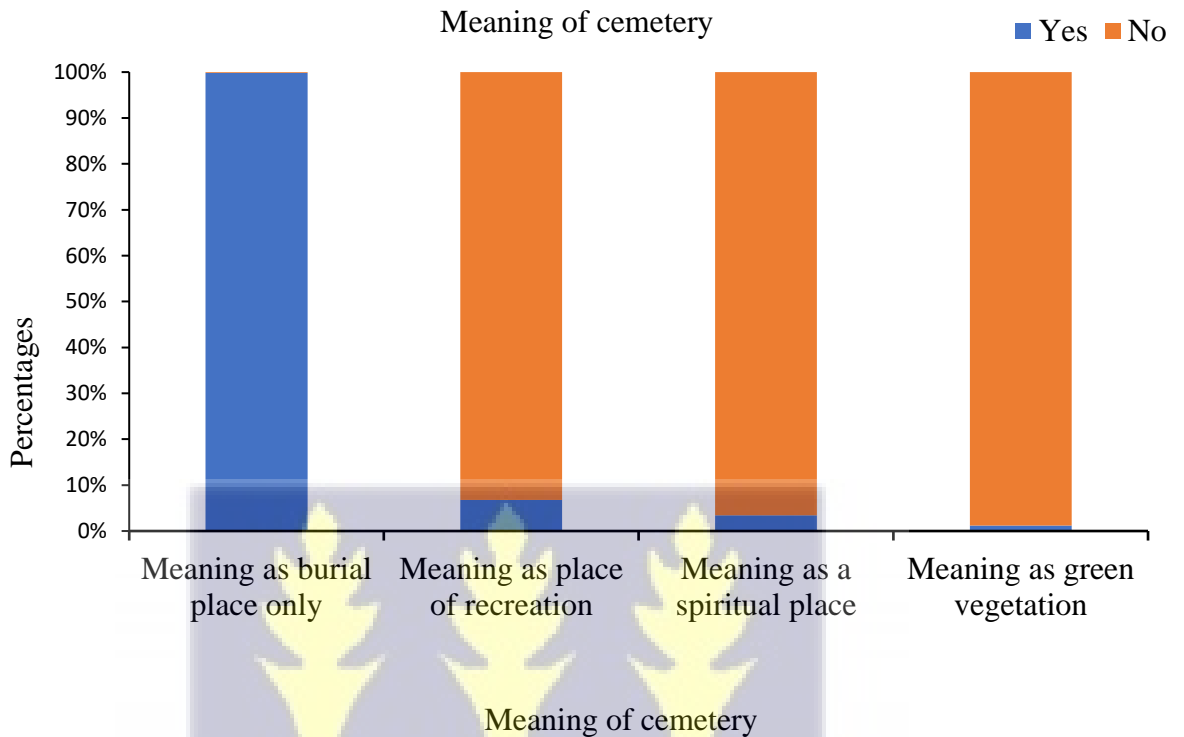
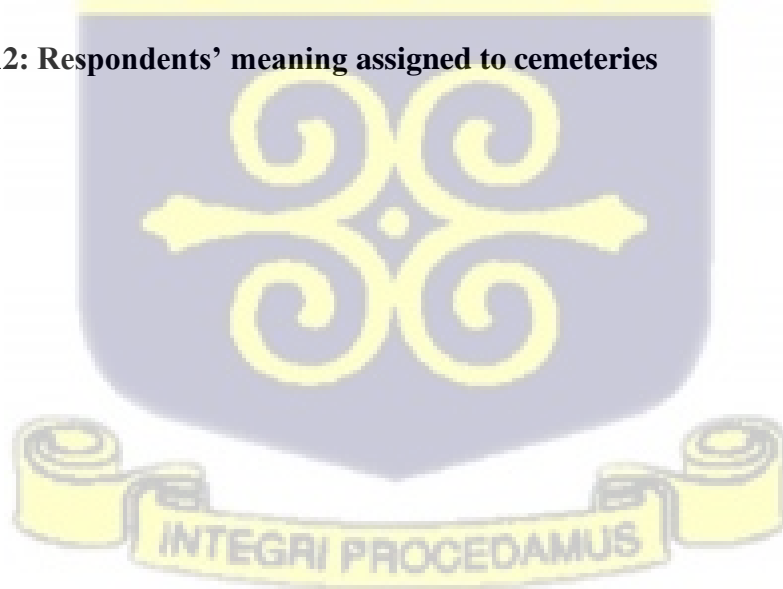


Figure 4.12: Respondents' meaning assigned to cemeteries



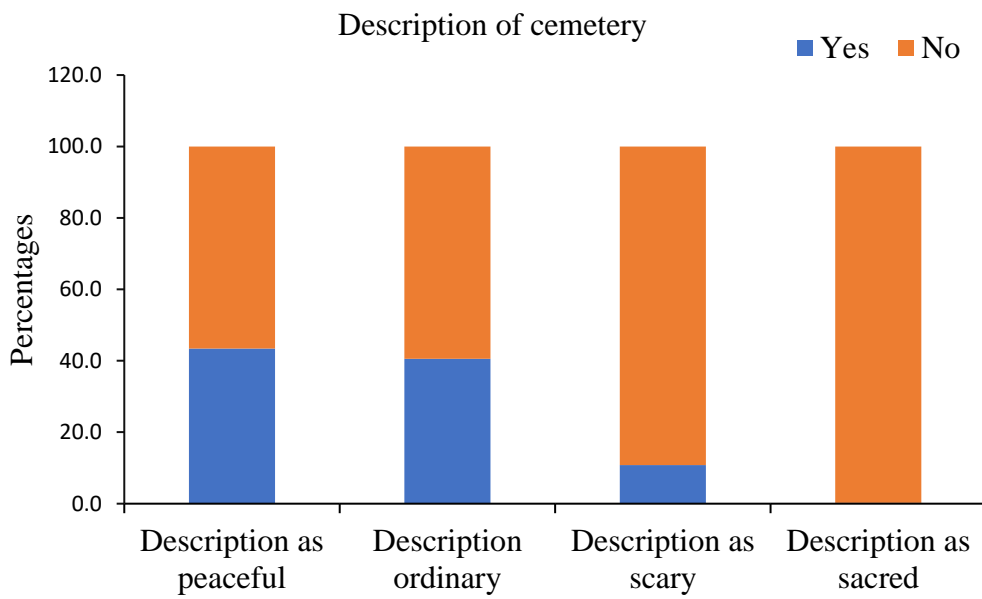


Figure 4.13: Respondent’s description of cemetery

4.4.4 Perception on the multifunctional use cemeteries

Majority of respondents, (92%) perceived the cemetery as a mono functional space, meaning that cemeteries should be used for burial purposes only. A marginal 8% of respondents perceive the cemetery as a multi-functional space as shown in table 4.8.

Table 4.6: Perception on other uses of cemetery

Perception on use of cemetery	Frequency	Percent
mono-functional (burial only)	459	91.8
multi-functional (other uses)	41	8.2
Total	500	100.0

Table 4.7: Perception on acceptable uses of cemetery

Frequency/ Percentage of Acceptable uses of cemetery			
Activity	1	2	3
Recreation	489 (97.8%)	7 (1.4%)	4 (0.8%)
Access route	48(9.6%)	21(4.2%)	431(86.2%)
Performing rituals	75(15%)	57(11.4%)	368(73.6%)
Grave site visits	489(97.8%)	7(1.4%)	4(0.8%)
Research	254(50.8%)	85(17%)	161(32.2%)
Farming	2(0.4%)	0(0%)	498(99.6%)
Dumping waste	1(0.2%)	1(0.2%)	498(99.6%)
Human settlement	1(0.2%)	0(0%)	499(99.8%)

Where 1=Most acceptable, 2= Somewhat acceptable, 3= Least acceptable

Table 4.7 presents the views of the respondents with regards to other activities observed in the cemeteries aside from burial. Their views were described as either most acceptable, somewhat acceptable and least acceptable. Acceptability in this study refers to undocumented rules or norms which are agreed upon by society. The table shows that, the respondents perceived using cemeteries as access route, performing rituals, farming, dumping of waste and human settlement in the cemetery as least acceptable. The respondents however perceived the use of cemetery for recreation, grave sites visits and research as most acceptable activities in cemeteries.

For a clearer picture on respondents' perception on multifunctional property of cemeteries, respondents had to indicate whether they agreed or disagreed to a number of statements. The results show that, 56.4% respondents disagreed whilst 23% strongly disagreed that cemetery could be used for profitable ventures when necessary and 47%

strongly disagreed that they could be used for social purposes. The data also showed that 8.6% agreed that cemetery could be considered conservation hub whilst 32% were undecided when it came to cemetery as conservation hubs however, 37.4% and 21.2% disagree and strongly disagree that cemeteries could be used as conservation hub as shown in figure 4.14.

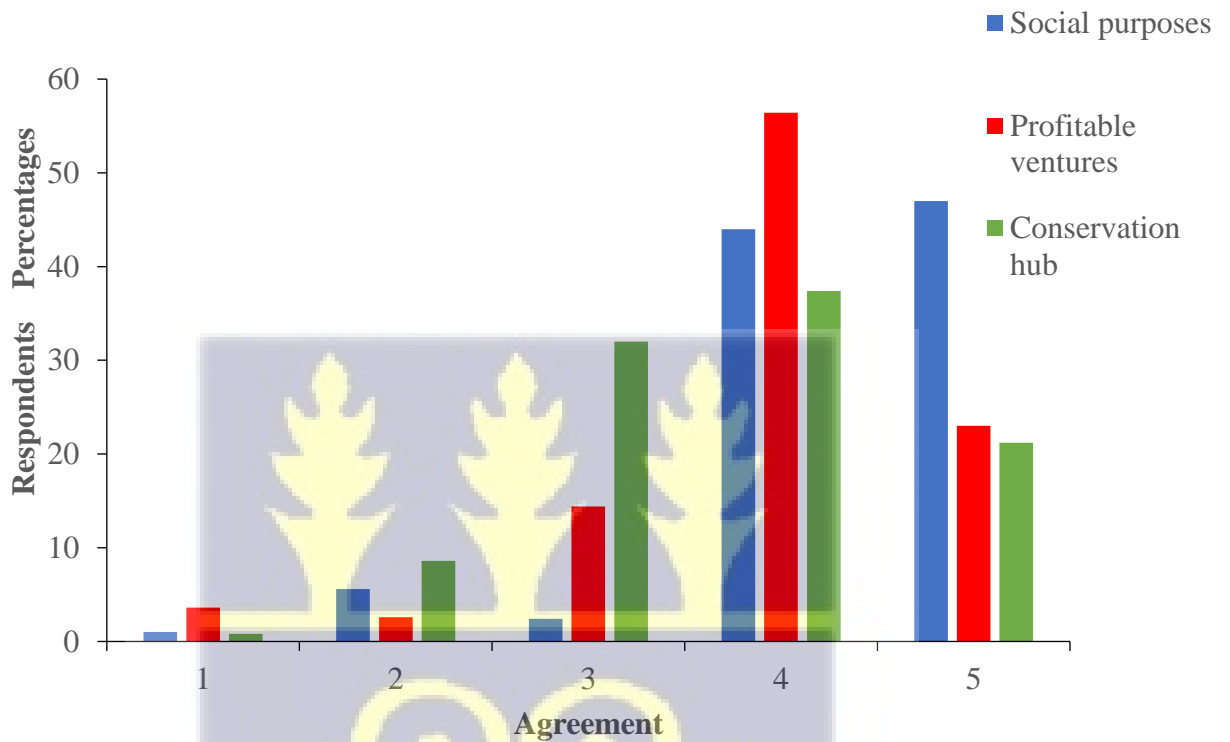


Figure 4.14: perception of respondent on use of cemeteries for different purposes

Where 1= Strongly agree, 2= Agree, 3= Undecided, 4= Disagree, 5= Strongly disagree

4.5 Actual use of cemetery

Results indicate that, 42% of respondents indicated that they had used the cemeteries in their community in other ways aside burial whilst 58% indicated they had not used the cemeteries in other ways as represented in table 4.8.

Table 4.8: Use of cemetery

Use of cemetery aside burial	Frequency	Percent
Have used cemetery in other ways	210	42.0
Have not used cemetery in other ways	290	58.0
Total	500	100.0

4.5.1 Reasons for not using cemetery in other ways aside burial

Respondents indicated the reason why they had not used the cemeteries in other ways aside burial (Figure 4.16). About 32% of respondents indicated that community restrictions were the reasons for not using cemeteries followed by respect for the dead at 27.9%. Faith was the least reason for not using cemeteries in other ways at 5.9%.

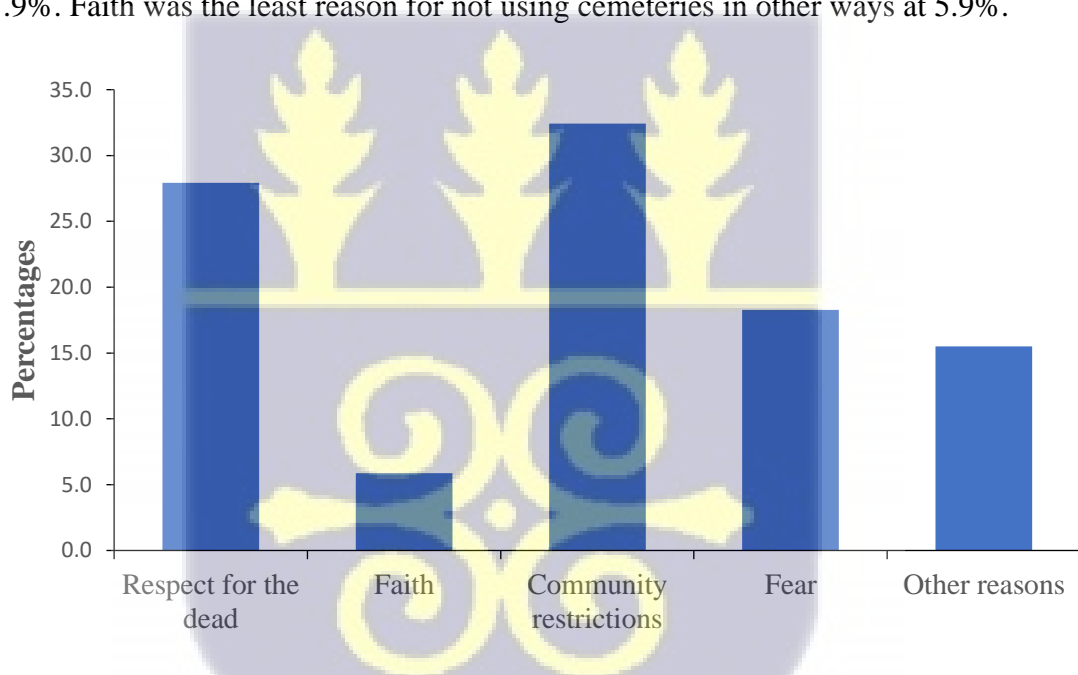


Figure 4.15: Reason for not using cemetery in other ways apart from burial

4.5.2. Self-reported use of cemeteries aside burial

Respondent were asked to state the other ways in which they used cemeteries. About 42% of the respondents indicated that they used cemeteries as memorial place for the dead, followed by those who used the cemetery as walkway, with about 36% of the respondents

falling in this group, and 7.4% of the respondents indicated they used the cemetery as a place of convenience (toilet). All the self-reported uses are presented in figure 4.15.

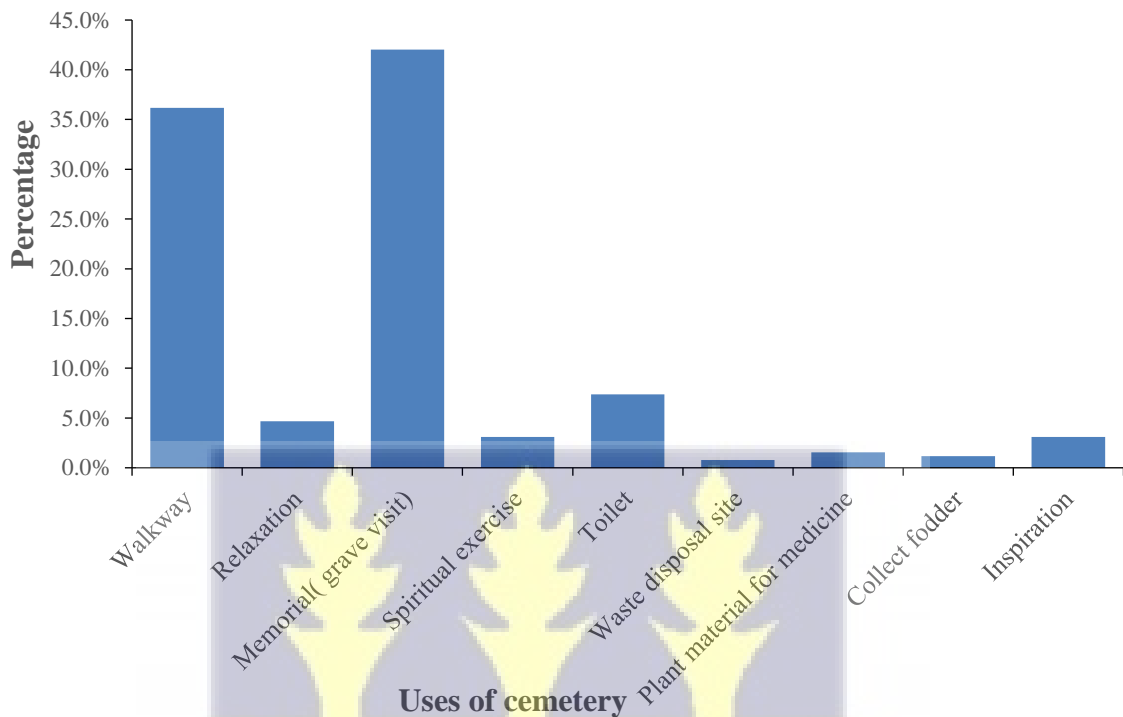


Figure 4.16: Self-reported uses of cemeteries aside burial

The results further indicated that, 4.7% of respondents used the cemetery for relaxation, 3.1% for spiritual exercises like the pouring of libation, prayers and sacrifices whilst 3.1%, 1.6%, 1.2%, and 0.8% of respondents use cemeteries as places for inspiration, collection of plant materials for medicine, collection of fodder and use cemeteries as waste dump (rubbish) sites respectively.

4.6 Inappropriate use of cemeteries

4.6.1 Open defecation

Findings on the self-reported use of cemeteries reveal that 7.4% of respondents use cemeteries for defecation. The results from observing activities taking place in cemeteries provided evidence to support the inappropriate use of cemeteries as toilets. There were

human excreta on some of the graves and footpaths in the cemeteries making it difficult to move freely in them. The interviewee's narrative about the situation gives a clearer picture of how pervasive open defecation in cemeteries is:

"...The main problem for us here is open defecation. It is difficult for one to walk freely in the cemetery. The smell is just bad..." - (Caretaker in Cemetery, Ablekuma).

"...One time, I caught someone in the act. I forced him to strip naked and scoop the faeces with his hands. I then forced him to walk through the community to serve as a deterrent to others..." - (Cemetery manager, Weija).

The findings confirm that open defecation occurs in cemeteries in GAMA although the self-reported cases seem to be low.

4.6.2 Cemetery as waste dump site

It was revealed that, the waste in cemeteries was generated either during funeral ceremonies, from wreaths and material that are left on graves or from using the cemeteries as a waste dumping site. In some cases, the cemeteries had been turned into a waste collection point with a skip that was placed there for receiving household waste from the community. On site observations revealed that, 88% of the cemeteries sampled had evidence of waste being dumped indiscriminately in cemeteries. Whilst it is true that waste in cemeteries is generated during funeral and grave site visits, the huge proportions of household waste in cemeteries are indicative of the inappropriate use of cemeteries as waste dump site. Accounts by interviewees on this problem indicate that the problem persists even with regular clean ups and the provision of waste bins. However only 0.8% of respondents admitted that they used the cemetery for waste disposal.

“...We are trying to keep the cemetery clean. But people come and dump rubbish here in the night’. At least, now we have a skip for collection of the rubbish...”- (Caretaker at Cemetery, Adjirigano).

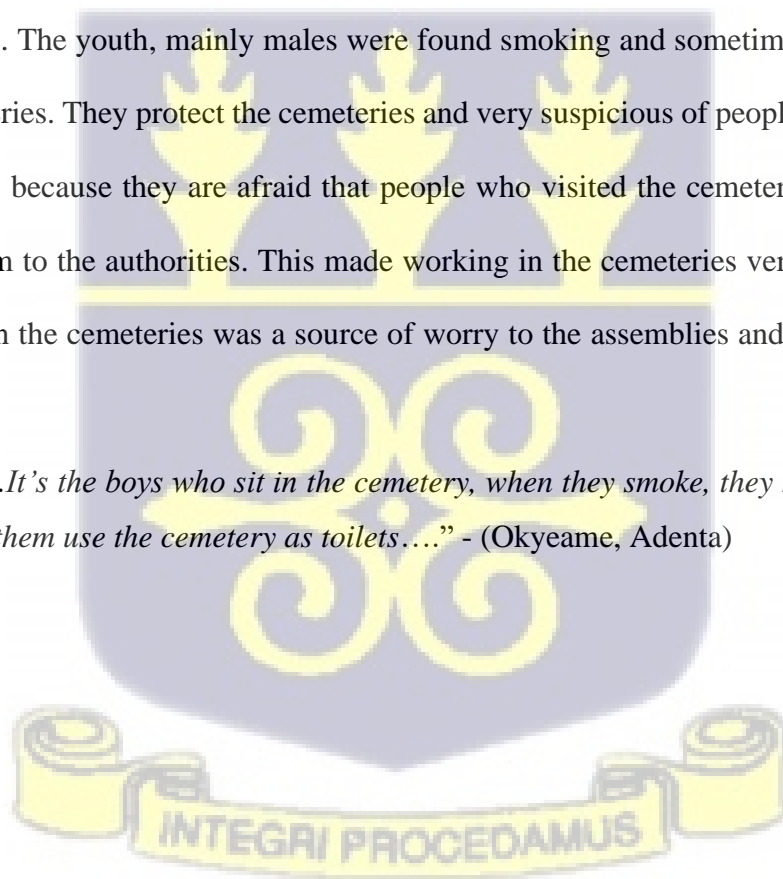
“...We are not dirty people o. Just that, there are few bad people among us who throw rubbish into the cemetery. That is why we are planning to wall the cemetery. Once it is walled, all these will stop...”- (Cemetery Caretaker, Gbawe).

“...Before you came, we had the youth in the community coming to clear all the waste in the cemetery, but they have started throwing rubbish here again and we have a waste bin too o...”- (Cemetery Caretaker, Agbogba).

4.6.3 Use of cemetery as hideouts

A total of 68% of the cemeteries observed show the use of cemeteries as hideouts by miscreants. The youth, mainly males were found smoking and sometimes using drugs in the cemeteries. They protect the cemeteries and very suspicious of people who visited the cemeteries because they are afraid that people who visited the cemeteries could go and report them to the authorities. This made working in the cemeteries very difficult. Their presence in the cemeteries was a source of worry to the assemblies and some traditional leaders.

“...It’s the boys who sit in the cemetery, when they smoke, they misbehave. Some of them use the cemetery as toilets....”- (Okyeame, Adenta)



4.7 Relationship between perception of cemetery use and actual use of cemetery

Table 4.9: Association between perception on use and actual use of cemeteries

Respondents' perception on uses of cemetery * Use of cemetery by respondent				
Cross-tabulation				
Count				
Perception on use of cemetery aside burial		Use of cemetery by respondent		Total
		Yes	no	
Respondent's perception on uses of cemetery	mono-functional (burial only)	183	276	459
	multi-functional (other uses)	27	14	41
Total		210	290	500

The table 4.9 illustrates the association between perception about multi use of cemetery and actual use of cemetery. The cross-tabulation of perception on multi use and actual use of cemetery aside burials showed that a total 459 respondents perceived the cemetery to be a monofunctional space. Interestingly, 183 of them had used the cemetery in other ways whilst 276 had not used the cemetery in any other way. Whilst 41 respondents felt the cemetery was a multifunctional place, 14 of them had not used the cemetery in other ways despite their perception of the cemetery as a multifunctional place and 27 respondents who perceived cemeteries as mono functional had used cemeteries in other ways aside burial.

4.8 Bivariate Analysis

4.8.1 Chi-squared test of association between perception on use of cemetery and actual use of cemetery

To test if there was an association between perception about use of cemetery and actual use of cemetery, a chi-square test was performed. The results are presented in table 4.10.

Table 4.10: Chi-square test of association between perception about use of cemetery and actual use of cemetery by respondent

Chi-Square Tests					
	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.432 ^a	1	.001		
Continuity Correction ^b	9.393	1	.002		
Likelihood Ratio	10.313	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	10.411	1	.001		
N of Valid Cases	500				

Difference is significant at $p < 0.05$ (95%)

There was a significant relationship between people's perception about multiuse of cemetery and use of cemetery $\chi^2(1, N=500) = 10.43, p=.001$.

The *chi-square* test confirms that there was a significant association between perception about multi-use of cemetery and actual cemetery uses as the study proposes. This is depicted in table 4.10.

4.8.2 Cemetery and other uses aside burial

Chi-square test of association was performed between cemetery and other uses of cemetery to explore whether there was an association between the cemetery and other uses of cemeteries aside burial. The results showed that, there was a highly significant association between cemetery and use of cemetery $\chi^2(24, N=500) = 9.24, p=.00$.

Table 4.11: Chi-square test for site (cemetery) and use of cemetery

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	95.238 ^a	24	.000
Likelihood Ratio	104.512	24	.000
Linear-by-Linear Association	1.804	1	.179
N of Valid Cases	500		

Difference is significant at $p < 0.05$ (95%)

The *chi-square* test confirms a significant relationship between cemetery and actual cemetery uses. This is depicted in table 4.11.

4.9 Challenges governing cemetery operation and management

The challenges being experienced by cemetery managers and supervisory bodies with regards to cemetery governance are explored here. This section summarises the findings.

Table 4.12: Summary of themes and sub-themes from key-informant interviews

Main theme	Sub-theme
Policy challenge	Policy Fragmented responsibilities involving different institutions
Cemetery administration	Ownership and control Financial management Operation and supervisory challenges
Weak enforcement	Non enforcement of siting regulation Burial regulation
Way forward	Public education and advocacy Enforcement of laws Integrating culture and traditional beliefs into policy

4.9.1 Policy challenge

Findings from review of policies and key informant interviews indicate that, policies on cemeteries are not harmonised. There is also a lack of coherence in the policies governing their operations and management. The policies associated with cemetery operation are presented in table 4.13.

Table 4.13: Policies associated with cemetery siting, operation and management of cemeteries

Name of Act	Year of Enactment	Act Number
Town and Country Planning Act	1945	Cap 84
Registration of births and deaths	1965	ACT 301
Local Government Act	1993	Act 462
Mortuary and Funeral Facilities Act	1998	Act 563
Mortuary and Funeral Facilities Act	2011	Act 829

Mortuary and Funeral Facilities Act (Act 829) was created to harmonise and regulate the cemetery space. The creation of the Act appears to add to the confusion in the regulatory space when it comes to cemetery governance. The interviewee's submission supports the argument that there was confusion with regards to cemetery regulation.

'...We are Environmental Health Officers. We are under the Ministry of Local Government and Rural Development. We cannot report to the Ministry of Health...' - (Key Informant, Accra Metropolitan Assembly Metro Public Health Department).

4.9.2 Fragmented responsibilities and roles in cemetery management

There are a number of institutions responsible from cemetery operation and management. For example, the Lands Commission of Ghana are responsible for the allocation of lands

for cemeteries, the Physical Planning Department under the Ministry of Local Government are responsible for the allocation of graves and planning the physical space in the cemeteries. The Environmental Health Department then manage and control of burial in cemetery in the cemeteries. Again, the Environmental Protection Agency come in to control and management all environmental issues associated with cemeteries.

It is evident that, efforts and actions are being directed at regulating cemetery operations and management. However, the institutions involved are many and therefore require great collaboration in order to work in this sector. The establishment of the Mortuary and Funeral Facility Agency is seen as a way to bring all institutions within that realm under one umbrella but this appears not to be working.

Currently in Ghana, the Environmental Health Officers who work under the Ministry of Local Government and Rural Development (MLGRD) are responsible for the entire burial process. The Land Use and Spatial Planning Authority (LUSPA) regulate the siting of cemeteries by ensuring that public health standards are met, and enforcing the cemetery to population ratio. The Environmental Protection Agency are also tasked with ensuring that standards that protect the environment are maintained. The fragmented nature of the institutions and the responsibilities assigned them usually leads to conflicts or abdication of responsibilities as each institution looks up to the other to perform specific functions.

4.9.3 Cemetery administration

4.9.3.1 Land ownership and control

Interviews with traditional leaders of host-communities unveil the struggle for the control of cemeteries between the traditional authorities and MMDAs. The traditional leaders have over the years lost control of many lands in the city space, and are therefore unwilling

to lose control of the rest of the cemeteries. This was also confirmed during key informant interviews with some cemetery managers.

“...The assemblies should go and retrieve the 20-acre Mile 11 communicable disease cemetery and leave this small cemetery for us...”- (Family Cemetery Manager).

‘...On the Mile 11 Cemetery, the way I see it, the land was not properly acquired or at least the right compensations were not paid. So, the state lost the land. The traditional leaders who gave out the land, started selling it to private individuals for other uses. When you go there now, there is no evidence that there was a cemetery. The whole place has been converted into human settlements...’- (Environmental Health Analyst).

4.9.3.2 Financial management

The one who controls the cemetery controls the revenue from the cemetery. The proposal by the Assemblies to take a share in the revenues collected by family cemetery managers has been met with stiff opposition. The families insist that they do not charge much for burial. They also contend that sometimes families of the dead cannot even afford the subsidized rates. Thus, sharing the revenue with the assemblies was not possible.

“...How can the assemblies think of splitting the money we get from burial into three and propose to take two parts? The money we get from the cemeteries is not much. Most of the people who come here are family members and we do not take much from them...”- (Private Family Cemetery Manager).

4.9.3.3 Operations and supervisory challenges

Results from the key informant interviews with the Environmental Health Officers, Sextons and Traditional Leaders indicate a lack of collaboration between the assemblies and the Traditional Leaders who own and manage the family cemeteries. There have been several attempts by assemblies of the Municipalities under GAMA to come to a compromise with Traditional Leaders to no avail. The traditional leaders prefer to control

the burial processes, being in charge gives them the ability to do that. This is highlighted by the narrations from a family cemetery manager and an environmental health analyst.

“...This is our cemetery and we already have our own rules and regulation. The assembly cannot come and dictate how it should be run.”- (Private Family Cemetery Manager)

“...We have had several meetings with the Traditional Leaders but there has been no agreement. The leadership continues to refuse to work with the assemblies.” – (Environmental Health Analyst, AMA)

4.9.4 Weak enforcement

Interactions with all key-informants emphasize the problem of lack of enforcement of all regulations on cemetery operations and management. They indicate non-enforcement of cemetery siting regulation, non-enforcement of burial regulations and the non-enforcement of standards in the construction of epitaphs and other monuments on graves, as evidence of weak enforcement.

‘...We need enforcement, enforcement, enforcement! We do not have the power especially over the family cemeteries. We are not able to control what happens there...’ (Environmental Health Officer, AMA).

‘...There is no control. Everyone is doing what they want to do...’ - (Public Health Officer, Korle Klottey).

4.9.5 Way forward

4.9.5.1 Public education and advocacy

The issue of space for new cemeteries brought to light the need for new ways of managing the limited space available. The interviewees spoke about the need for extensive education on multiuse of graves, the practice of green burial, and other ways of body disposal.

‘...the public need a lot of education because there are no new lands available. The public will be opened to other ways of disposing the dead apart from burial. The simple truth is we don’t have the lands....’ – (Public Health Director, Korle Klottey).

4.9.5.2 Enforcement of laws

From further interactions with the key informants, there was indication that, there are adequate laws that govern cemetery operations and management. They however, insist that enforcement is the way to go. Going further, the need for punitive measures to serve as deterrent for all was also mentioned.

‘...Once we are given the right powers to operate, this space will be sanitized. We cannot continue to live like this...’ (Public Health Director, Korle Klottey).

4.9.5.3 Integration of culture and tradition into policies

Responses from the key informants highlighted the role of culture and tradition in the cemetery space. They noted that culture and tradition cannot be ignored because cemeteries and burials had strong associations with culture and tradition. The good practices can be used to promote good cemetery governance.

‘...Some of our culture and tradition when it comes to cemeteries are very good. They can be incorporated into the formal regulatory framework for the good of all. I’m a Ga, you know. We pour libations in the cemetery during our festival, we invite our ancestors so cemeteries are important to us. The vegetation in the cemetery is equally important to us...’ - (Environmental Health Officer, AMA).

The number of cemeteries, their location, distribution, vegetation cover and floral composition make cemeteries distinctive green spaces that can play the role of greening cities. In spite of this unique quality, the perceptions about cemeteries and their actual uses pose a threat to their potential as functional green spaces in GAMA.

CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

This study assessed the potential of cemeteries as green areas within cities by examining the physical characteristics, the environmental and ecological features, and the social perspectives of people on cemeteries in GAMA. Findings suggest that the number of cemeteries, their location and distribution, the ecological significance and the socio-cultural attributes of cemeteries make them suitable for this role as greening agents in cities and as sustainable green spaces. This chapter therefore discusses the findings under the stated objectives.

5.2 Mapping and characterisation of cemeteries in GAMA

Forty-eight (48) cemeteries were identified with the assistance of community members within GAMA, with the majority of the municipal assemblies having at least one cemetery within them. The presence of a cemetery in almost every assembly could be attributed to the traditional and cultural belief that ancestors should be near the living, which means that cemeteries must be close to human settlements. Furthermore, the desire to have control over what happens in the cemeteries at the family level and the unique burial practices of families are other reasons why cemeteries are located in the majority of the assemblies. This makes cemetery one of the available green spaces in GAMA.

5.2.1 Cemetery Ownership

The cemeteries identified through the study were grouped into private and public, which could also be state-owned or state-managed. The private cemeteries were either commercial, religious or family owned and managed by individuals, religious bodies or families. This finding relates to a study by Rugg, (2000) on cemetery ownership; where

she found that cemeteries were either public or private. The categorization of cemeteries into private and public in this study are again similar to Harnik & Merolli, (2010), who categorised cemeteries into three groups, which are private cemeteries that are for profit, private cemeteries that are not for profit and public cemeteries. On the contrary, other researchers had different classifications and assigned other meanings to the ownership of cemeteries found in their research. For example, Santime, (2019) described public cemeteries as cemeteries owned by religious bodies, municipal authorities or members of certain clans in rural areas of Ethiopia, whilst private cemeteries are owned by families. The grouping of cemeteries in some other studies was more straightforward as reported in South Africa where, all cemeteries are owned and operated by the state (Leuta, 2019).

Several factors determine the ownership type assigned to a cemetery. In the South African case, ownership is a straightforward issue, with the state having ownership and control over cemeteries. Consequently, cemeteries in South Africa as a greening tool could be easily achieved once there is Government commitment. The ownership situation in GAMA is a mixture of state and private ownership. The fragmented nature of these types of ownership, where some of the cemeteries are owned by private individuals, families, religious bodies or the state makes it a bit more complicated in using the cemetery space for greening cities. The complication is because the different entities operate and manage their cemeteries differently and this has implication on the vegetation as well as other uses aside burial. In the GAMA situation, a lot more work is required in terms of consulting traditional authorities, families, clans, and private individuals to use these spaces in greening cities.

The ownership types have implications for the management and operation of the cemeteries similar to the study by Rae, (2021). It also has implication on the vegetation and conservation practices within the cemeteries. For example, the private commercial cemeteries are intentional about the kinds of plants that are cultivated. The private commercial cemeteries tend to cultivate more exotic species and are more focused on the aesthetic value of vegetation within cemeteries. On the contrary, the only a small proportion of public cemeteries mirror similar practices with regards to vegetation management. The usual practice is to allow nature to take its course resulting in the growth and spread of naturally occurring plants or native plant species. This is different from the findings of Yilmaz et al., (2018) and Kusak et al., (2022) where more exotic plants species than native plant species were found in Municipal and Metropolitan cemeteries of Istanbul. In essence the cemetery ownership types play a major role in the type and quality of vegetation found in cemeteries.

5.2.2 Location and distribution of Cemeteries

The Zoning and Planning Guidelines of 2011, implemented under the auspices of the Land Use and Spatial Planning Authority (LUSPA), direct how cemeteries should be sited. There are specific requirements such as the population to cemetery size ratio that ought to be met before a cemetery can be constructed. However, from the study, there appears to be no or an indeterminate pattern in the location and distribution of cemeteries in GAMA. This is not entirely surprising as the development of community spaces outpaces planning in GAMA and Ghana in general. It is common for people and communities to develop spaces within communities even before getting approval from any authorized state institution.

In Ghana, lands are vested in families, clans or private individuals (Ayivor, et al., 2020), therefore, they exercise that authority in allocating spaces for use within their communities, quite often without regard to the local governance structures such as the assemblies which is not ideal. These families and clans have their criteria for selecting a place for a cemetery. These criteria may not necessarily be focused on the public health or environmental standards of the Zoning and Planning Guidelines of 2011. A major factor considered in the siting of private family cemeteries revealed in the findings is the comfort of the dead. The belief is that the dead are resting and therefore must be placed in shady, serene and well-vegetated places. Places where water bodies exist, are considered perfect places for cemeteries so that the dead can rest comfortably. The preference for such places in the siting of cemeteries raises serious health concerns about their effect on water quality. Studies like that of Zychowski, (2012) have established the negative effect of cemeteries on underground water bodies. Best practice requires that some guidelines be followed in the siting of cemeteries for the safety of the living. These requirements also apply to the cemeteries which are in existence already.

Using Ghana's Zoning and Planning Guidelines of 2011, the criteria of the population to cemetery size, many private family cemeteries do not meet some of the requirements for siting a cemetery. For example, the guideline stipulates that 0.5ha to 1ha size cemetery should serve a population of 5,000 (LUSPA, 2011). A cemetery like that of Oblogo is as small as 573m² (0.0573ha) in size and the population of Oblogo as at the year 2000 was 3,165 Owusu, et al., (2012), which would have increased by 2021. The national population of Ghana currently is 30.8 million and GAMA has a population of 4 million according to the 2021 Population and Housing Census (PHC) (Ghana Statistical Service, 2021). The official figures on the population of Oblogo is however yet to be published by the PHC of 2021.

Many private cemeteries did not meet the population to cemetery size criterion because the size of cemeteries that they establish depends on the availability of land space. Furthermore, another criterion from the Zoning and Planning Guidelines of 2011 of one cemetery per village, town or city and cemetery accessibility could also not be met by all the assemblies. Critical to this criterion is the availability of land, among other resources. There are intense competitions for land space within cities space, making it virtually impossible for the population to cemetery size criteria to be met without proper planning. The result is the distribution of small pockets of cemeteries within GAMA. On the positive side, although this distribution is not even, it still allows the city to benefit from the greenery in the cemeteries.

5.2.3 Cemetery boundary

This study revealed that there are more walled than unwalled cemeteries in GAMA. The most common material used in walling the cemeteries was cement block. This finding is consistent with Nordh & Evensen, (2018) who found in their work that concrete was the most material used in walling cemeteries in Scandinavian countries. Walls and well-defined entrances protect the cemeteries from threats of encroachment, unregulated access, and unacceptable use. It also guaranteed the protection of flora and fauna in the cemeteries. Walled and gated cemeteries can be safe places for rare plants and animal species. Although the walling of the cemeteries is seen as a way to secure the cemeteries, it equally provides cover for other unauthorised users who use the cemetery in ways that are unacceptable. Whereas, absence of boundary in cemeteries allowed for easy access to the cemetery. This makes it easy for any one at all to enter the cemetery at any time. Activities like dumping of household waste, smoking and drug use, and open defecation are more likely to occur in these cemeteries. Also, cemeteries that were unwalled, had encroachment activities going on in them for example the placing of metal containers,

kiosk and other temporary structure around them for either residential or commercial purposes.

Basically, the physical feature of cemeteries is important for both burial and their role as green spaces. These features influence the role of cemetery as green spaces. The location and distribution are linked to availability and accessibility of cemeteries as green spaces. At the same time ownership can be linked to accessibility and management of cemetery as a green space. The presence of walls tackles the safety and security aspect of cemeteries as green spaces. The physical features of cemeteries have implication on their role as sustainable green spaces.

5.3 Ecological significance of cemeteries

5.3.1 Vegetation in cemeteries

Generally, cemeteries have abundant vegetation. In GAMA, this feature is promoted by the traditional and cultural beliefs associated with having vegetation in cemeteries.

The land cover analysis presented four land cover classes; trees and shrub cover, grass cover, bareland and graves. All cemeteries sampled had all four land classes represented in them. Mpoase Cemetery (Fig. 4.8) is a prime example of a cemetery with vast vegetation protected by traditional and cultural beliefs. The Mpoase Cemetery has a relatively large area covered by grass cover and is associated with the belief that; the dead need well-vegetated places to rest. Although Gethsemane Cemetery, a private cemetery, has a large proportion of the cemetery being vegetated, the reason for having that vegetation is not attributed to traditional and cultural beliefs but to the desire of the cemetery managers to have beautiful vegetation using ornamental and exotic plant species.

The Weija, Gbawe, Pokuase and Ablekuma Cemeteries had the most extensive tree cover relative to their sizes (Fig 4.9). The interesting thing about these cemeteries is that, they were on the periphery of GAMA where the pressure on cemeteries was lower than the other areas of GAMA. In addition, these areas had many indigens whose traditional beliefs frowned on the indiscriminate felling of trees, including those found in cemeteries.

The Osu Cemetery stands out among the public cemeteries as one with the highest vegetation cover. The managers do not allow the felling of trees and the use of weedicides in the cemetery. Their actions are supported by traditional beliefs that cemeteries need to be kept close to their natural state for the ancestors to be at peace. Having cemeteries without vegetation makes cemeteries unsustainable. When it comes to cemeteries, striking a balance between the graves, bareland, trees, and grassland is a sure way to greening cities that guarantee good health and wellbeing.

5.3.2 Floristic composition in cemeteries

There was vegetation presence in all the types of cemeteries identified as mentioned earlier. One reason for this is the history behind the siting of cemeteries. Cemeteries were sited at the outskirts or fringes of communities for minimal human interactions. This influenced vegetation growth in cemeteries, mostly trees and grassland and the local climate. In recent times, development has extended to areas originally demarcated as cemeteries, with human activities destroying the vegetation within cemeteries.

The findings further confirmed that cemeteries are host to diverse plants, either exotic or indigenous. The floral analysis showed the ecological importance of these types of landscapes in urban areas. With the number of plant species in the cemeteries, if well protected and maintained, cemeteries will be vital in the greening cities agenda.

5.3.2.1 Traditional, cultural and spiritual factors influencing vegetation in cemeteries

One of the study's key findings was the discovery that vegetation played a major role in siting most cemeteries. The traditional process of siting cemeteries involves selecting places with abundant vegetation. Traditional leaders believe that the vegetation on land for new cemeteries 'calls out' to them before the cemeteries are sited. It is believed that vegetation in cemeteries provides shade for the departed. 'The dead are still with us and therefore need to be protected from the vagaries of the weather' to quote one of the key informants. There is the belief that the ancestors must be protected from harsh weather, in other words, sheltered from conditions in order for them to rest well. Royals, who are mostly buried in private family cemeteries are usually buried in thick forests with lush vegetation in order for them to have peaceful rest.

The study also observed that, there were more naturally growing plants than cultivated ones in the cemeteries. Similar results were obtained by Yilmaz et al. (2018) whilst, Quinton et al. (2020) found contrary results where there were more cultivated plants in the cemeteries they researched. The traditional process of site selection for cemeteries and the maintenance culture in most cemeteries where naturally growing plants are left undisturbed also accounts for this phenomenon. In addition, human as well as other animals aid in the dispersal of seeds directly or indirectly in cemeteries thereby resulting in more naturally growing plants than cultivated plants. In private commercial cemeteries like Gethsemane, there are more exotic species than native ones. Whether naturally growing or cultivated, urban cemeteries can be described as places with diverse plant species that can be valuable in greening cities (Yilmaz et al., 2018).

Some plants served as family symbols, and thus their presence on graves of family members were for identification, recognition and communication of messages to the living. This matched the results in the study by Yilmaz et al. (2018). For instance, in the

Osu Cemetery, there is the practice where families are allowed to come and grow ornamental plants in the cemetery to create a conducive environment for the ancestors to live in.

Other spiritual reasons accounted for the type of plants found in cemeteries. For example, some plants were believed to house spirits and were therefore planted in cemeteries. The belief was that the dead was still with the living and, therefore, must be provided with homes. This finding matched the findings of Abbiw (2013) on the association between plants and spiritual or religious beliefs. A typical example is the plant *Elaeis guineensis* (Palm tree) which is believed to be for everlasting life and keeps the ancestors living forever.

Another example is *the Heliotropium indicum*, a plant locally known in Akan as 'Akonfem Etiko', which is believed to wake the dead up to communicate with the living. Additional examples include *Plumeria obtusa*, commonly called 'forget-me not', which symbolised death and memorial and *Anchomanes difformis*, also commonly known as 'God's umbrella' which protects the dead, were found in both private and public cemeteries in GAMA. The community members confirmed the findings of Abbiw, (2013) that plants in cemeteries hold special meanings.

Another important observation was the occurrence and abundance of *Azadirachta indica* (neem). From the study, it was observed to be present in 24 out of the 25 cemeteries sampled. This finding matched the findings of Pervaiz et al., (2018) where the Neem tree was found to be abundant in cemeteries in Berlin. The neem tree, a native Indian plant is seen to occur in most cemeteries because their copious seeds are widely distributed, easily germinate and adapt well to harsh tropical weather conditions. Traditionally in Ghana, *Azadirachta indica* symbolises the transition from the earth to the next world. Their

presence in cemeteries in Ghana connotes the transformation of the dead. The vegetation in cemeteries will continue to exist for as long as these beliefs exist. This is a critical finding in understanding the management of vegetation and the promotion of conservation in urban cemeteries as a tool for greening cities.

5.3.2.2 Aesthetic factors

In addition to their cultural and spiritual value, plants were cultivated in cemeteries for beautification or aesthetic value. Many of the plants in Gethsemane Cemetery were exotic species and few naturally growing native species. They were cultivated and tendered to beautify the cemetery, by dedicated staff. In some public cemeteries like Osu, some families planted exotic plant species on top of the graves of family members to beautify the graves and, by extension, the cemetery. This practice aims to make the cemetery a beautiful place for the dead. The introduction of these exotic species adds to the diversity of plants in the cemeteries. Although the cultivation of exotic plants in cemeteries requires constant care and has cost implications, proper maintenance contributes to the ecological diversity of plants in the cemetery.

5.3.2.3 Food and medicinal factors

Results from the floral analysis indicated that there were food crops cultivated in some cemeteries to serve as food for both animals and humans. Cemetery managers and caretakers cultivated some of the plants for consumption or sale. Some of these trees in these cemeteries were also harvested as firewood. For instance, in the La Muslim Cemetery, it was observed that trees were cut and dried for firewood. The study also found that some trees in the cemeteries were used for medicinal purposes. The most common plant species found in the cemeteries; *Azadirachta indica* was reported to have been used to treat many diseases. The community believes that it had numerous medicinal values including the treatment of fever, stomach upset and more recently covid-19. On the

importance of trees in cemeteries, Quinton et al. (2019) found out that respondents in their study rated cooling or provision of shade as the most crucial property of trees in cemeteries. Although the importance of trees was not examined in this study, the traditional and cultural importance of having vegetation and trees in cemeteries highlights their importance to the dead.

5.3.2.4 Assessment of risk of extinction

Most of the plant species identified were not evaluated and of least concern with regards to the International Union for Conservation of Nature Red List Rating (IUCN). The reason for this lack of assessment may be due to the fact that the plant species were pan-tropical in nature or peculiar to the tropics and were not at much risk. A further assessment using the Ghana Star Rating also indicated that majority of the plants were not assessed. The Ghana star rating is mostly for forest species and has not been updated in more than 30 years. The study revealed that only 1% of species were near threatened: *Milicia excelsa* (Iroko) and *Gossypium arboreum* (Cotton). This finding could be because the majority of the plants identified were natives and had not been assessed to evaluate their risk of being extinct.

5.3.2.5 Management of vegetation in cemeteries

It is worthy to note that, the private commercial cemeteries were the only ones with a well-defined vegetation management structure. In the Gethsemane Cemetery for example, it was observed that a large portion of the cemetery was covered with lawns and exotic trees planted to beautify the place. On the contrary, the primary focus of the cemetery managers in the public cemeteries is the protection of the monuments and not the growing of vegetation. They generally ensure that the vegetation in these cemeteries is not disturbed; however, the trees, shrubs and grasses that naturally occur in these cemeteries thrive because of the presence of these cemetery managers. These findings are consistent

with what was observed by Quinton et al. (2019) in their study. The vegetation in most public or private family cemeteries was either left unmaintained or cleared through weeding. A worrying discovering was that some trees were even burnt to make room for graves. It is unclear where the balance should be regarding the primary function of cemeteries as places for burial and the promotion of their ecological function and for conservation.

Another observation is that tree planting by cemetery managers was more common in the private cemeteries than in the other cemeteries, where most existed either through the activities of birds, animals, humans or the wind as agents of dispersal or pollinators. This was confirmed through an informal interview with the locals in the host communities. Similar results were found by Quinton et al. (2019), who reported that tree planting and maintenance do not form part of the core duties of cemetery managers. The study also revealed that; some families planted trees on the grave of their relatives who had died. Whilst this practice has ecological benefits, the type of trees planted by the family may not fit into the general plan of the cemeteries. This practice however, increases plant biodiversity, thus promoting conservations and a greener urban environment.

All the cemeteries have greening potential due to the presence of vegetation within them. There were several factors influencing vegetation within cemeteries. One strong factor is the tradition and culture. For cemeteries to realise their full potential as sustainable green spaces, these factors need to be considered. In other words, there is the need to understand the factors that influence the presence of vegetation in cemeteries in order to make use of cemeteries as sustainable green spaces,

5.4 Socio-cultural attributes of cemeteries

Cemeteries continue to play a vital role in human existence. They are basically where the dead are disposed of in a dignified manner and provide a space for humans to grieve. They

are places that hold history, culture and have the ability to tell the way of life of a group of people. Furthermore, they serve as places for social interaction between the living and the dead emphasising their socio-cultural attributes.

5.4.1 Socio-demographic characteristics of respondents

Respondents of this study included people who lived or worked in communities where the cemeteries were located. The information from the survey indicate that most respondents had a Middle School Leaving Certificate (43.6%), with 88.6% of the population being Christians. The dominant ethnic group were Gas /Adangbes with 38.6%, followed closely by the Akans at 38.4%. The 49.4% to 50.6% male to female ratio mirrors the national figures from the recent population and housing census (Ghana Statistical Service, 2021).

The just ended Population and Housing Census of Ghana reports that Greater Accra region is now the region with the largest population of people. The close nature of the population of Ga/Adangbes to Akans, for example, reflects how cosmopolitan Greater Accra and to a lesser extent, GAMA has become. This means migrants contribute significantly to this population increase and when the unfortunate happens, and they die, they are usually sent to their hometowns for burial. This could be one of the reasons why more respondents did not have their relatives buried in the cemeteries than those who had relatives buried in the cemeteries.

About 66% of respondents were residents in the host communities where the cemeteries were located, 62% of them indicated that they had no concerns about the locations of the cemeteries. The lack of concern about the cemetery's location indicates the integration of cemeteries within human settlements. A conscious effort at using cemeteries to green cities is possible due to this integration.

5.4.2 Perception of city dwellers on the multi-use of cemeteries

The description, meaning and attachment to cemeteries influence people's behaviour towards cemeteries and how they are used. This is known as sense of place according to Stedman, (2003) of cemeteries. Rugg, (2000) asserts that, the term cemetery means a place for burial and not a recreational, a spiritual or a place to conserve vegetation. However, cemeteries are classified as green spaces with multi-functional properties. Most respondents perceive the cemetery as an ordinary place rather than a sacred or scary place or a green space. The theory of place making can be applied here. The cemetery exists already and performs various functions within the communities located. Perceiving cemeteries as ordinary places allows for reinventing and reimagining the cemetery as sustainable green space.

In most traditional settings in Ghana, cemeteries invoke a feeling of fear and the reminder that humans are mortal. Traditional and religious beliefs allude to the fact that humans are both body and spirit. They also believe that when people die, their spirits reside in the cemetery after burial, promoting the mystic aura around cemeteries. However, this mystic aura is no longer seen in urban areas, as is revealed in the study's findings where people perceive cemeteries as ordinary places. The fear invoked by these beliefs resulted in some form of respect for cemeteries. However, these beliefs and associated respect for cemeteries have been missing for some time in urban communities. The general lack of respect for cemetery spaces in urban areas is apparently due to the cosmopolitan nature of these areas. Most people who migrate to these urban areas do so mainly for economic reasons and thus have little or no attachment to these cemeteries. The study results confirmed that only about a third of the respondents had their relatives buried in the cemeteries included in the study. This indicated that majority of respondents had little or

no attachment to the cemeteries within their communities. They, therefore, prioritised issues of survival over death, cemeteries and the comfort of the dead.

How people perceive cemeteries definitely influence how they use cemeteries. The study threw more light on the relationship between perception and the use of cemeteries in ways other than burial. The analysis showed a strong significant association between perception about the use of the cemetery and the actual use of cemeteries. The majority of the respondents felt that the cemetery should be used for burial only, an assertion consistent with the findings of (Nielsen & Groes, 2014). The strength of the perception that cemeteries should be used for burial purposes only, to the use of cemeteries for social purposes, profitable ventures or as conservation hubs can be seen in Fig. 4.10. The perception is that cemeteries should have only one use which burying the dead. According to Długoński, et al., (2022), perception of cemeteries as sustainable green spaces depends on how communities and societies dissociate from religious and cultural beliefs linked with cemeteries. In other words, the perception of cemeteries as green spaces with multi-functional properties is dependent on the sense of place of individuals in the community. This complements the sense of place theory as well as place making theory that people have meanings and attachment to places and these meaning and attachment can be used to create quality places that people will be protective towards.

The perception about multi use of place is very important in determining use of place. The study showed that, although people perceived the cemetery as a monofunctional place, people used the cemeteries in other ways apart from burial. There was a disparity between perception about multi-use of cemetery and other uses of cemetery apart from burial. It is unclear from this result, why a perception/use disparity exists when it comes to multi-use of cemeteries. It is important to note that, the complex nature of cemeteries and the feeling they invoke have to be considered during discussions of the multifunctionality of

cemeteries. In South Africa for example, Leuta, (2019) explored institutional perception on multi-use of cemeteries and found that, respondents were not open to other uses of cemeteries.

5.4.3 Acceptable use of cemeteries

The acceptable use of cemeteries apart from burial generated varied responses among people. While some felt that cemeteries could be used in other ways, others believed that uses aside from burial, were disrespectful to the dead and were therefore unacceptable. To explore respondents' openness to other uses of cemeteries, examples of multi-use from other studies and uses identified from direct observation were listed for respondents to rank. The results were similar to the one by Goh and Ching, (2020), which indicated that research activities and gravesite visits were acceptable uses of cemeteries for a majority of respondents. Whilst recreation, use of cemetery as an access route or thoroughfare, farming, performing rituals, waste dump site and human settlements in cemeteries were seen as unacceptable uses of cemeteries. Those who also saw the cemetery as an ordinary place will be more open to other uses of cemeteries and the idea of integrating cemetery space into their daily routine. From the data, respondents used cemeteries mainly as memorial or grave visits (42%) and as thoroughfares (36.2%). These uses support the green cities concept of valuable urban green spaces as green spaces with multiple functions in cities.

An interesting result from the study, which aligned favourably with Nielsen and Groes, (2014) was that bereaved families were open to the idea of multiuse cemeteries. Findings from this study indicated that respondents who had a relative buried in a cemetery were more open to using the cemetery in other ways. These results demonstrated two things: on one hand, people perceived cemeteries as a monofunctional space, and on the other hand, people used cemeteries in more ways than just burial. The inconsistency between

the perception about multiuse of cemeteries and the actual uses that these cemeteries were being put to has the potential of affecting greenery in these cemeteries.

5.5 Extent of use and threats to vegetation within cemeteries

The use of cemeteries was analysed using self-reporting and observation techniques. The study found out that most respondents had not used cemeteries in ways other than interring the dead. The respondents indicated that, they did not use the cemetery in other ways mainly due to community restrictions imposed on the use of cemeteries. Respect for the dead, was the next reason for not using cemeteries.

The self-reported uses of cemeteries highlighted grave visits and use as thoroughfare as the two dominant uses of cemeteries in GAMA. The use as thoroughfare matches with results from studies in Canada and England (Quinton et al., 2019; McClymont & Sinnett, 2021; Lai et. al., 2019; Swensen, et al., 2016; Nordh & Evensen, 2018). These uses indicated the everyday use of cemeteries. In addition to the use as thoroughfares, Quinton et al. (2019) also found out that people used cemeteries for tourism although not observed or self-reported in the case of GAMA. Other the self-reported uses revealed the use of cemetery as toilets, waste dump sites and hideouts.

The problem of cemeteries as waste disposal sites can be traced to two main sources, waste generated during funeral ceremonies and also household waste dumped into the cemeteries by adjoining communities. Some cemeteries have waste disposal bins on site, but waste was still seen scattered on the ground in the cemeteries. The above indicated the widespread lack of proper waste management in GAMA and Ghana as a whole (Miezah et al., 2015; Lissah, et al., 2021). Population increases and urban expansion has exacerbated the problem of waste management in urban communities. The use of cemeteries as toilets is indicative of the widespread problem of the lack or inadequate

sanitation infrastructure in urban communities of Ghana. Many urban households do not have toilet facilities. The government has, over the years, implemented programmes like public toilets and other cheaper forms of toilets for households and landlords to adopt. These programmes have not been wholly successful. The other issue is the general challenge of housing in fast-developing urban communities. The 2021 population and housing census reports that people lived in structures without proper toilet facilities. Population increases, migration and the lack of waste management infrastructure contribute to some of the inappropriate uses of cemeteries. Seemingly vacant land like cemeteries provides a fertile ground for some of these activities. The consequence is that cemeteries become unsafe for both the dead and the living.

The presence of metal containers and kiosks on the periphery of majority of the cemeteries was observed. The 2021 Population and Housing Census reports that a fifth of all structures identified during the census were metal containers and kiosk. These containers and kiosk are most at times located on seemingly vacant lands such as cemeteries. The census further notes Accra's population density now stood at 1,236 people per square kilometer (Ghana Statistical Service, 2021) which clearly indicates the struggle for land space especially in urban Accra. As a consequence, people try to occupy any space available including cemeteries that seem to be without owners. To formalize and regulate the use of lands at the periphery of cemeteries, the authorities of some of the assemblies took some levies from the people occupying such lands legitimizing their presence in the cemeteries.

In addition, the observed use of cemetery as a dwelling place by some people was not self-reported but matched what Evensen et al., (2017) found about the use of cemetery by the homeless and findings by Paraschiv, (2013) on allure of cemeteries to the homeless as public spaces or ostensibly unoccupied lands. Cemeteries are usually considered as

unoccupied lands although they are occupied by the dead. The silence of the dead makes cemeteries appear vacant. This use by the homeless even though may appear to support multi-use, can cause vegetation losses and also make the space unattractive to others. This result supports the findings by Nowińska, et al., (2020) that use of cemetery affects the flora of cemeteries.

In general, most of the activities observed in the cemeteries were commercial in nature. Examples include, car wash, sale of food, sale of poultry and sale of materials for construction of epitaphs and grave stone. Another interesting activity was the placement of a school in the cemetery. Other activities observed include recreational (relaxing in cemetery). These activities clearly depict the living sharing the space with the dead.

Most Africans still see cemeteries in the traditional light with the sole function of being the final resting place for the dead. Multi-use of cemeteries is more common in western countries. The findings however indicate that, cemeteries in GAMA were being put to other uses apart from burial. Some of these uses have implication on the vegetation and as well as the sustainability of the cemeteries. One would argue that if there are strong cultural and traditional beliefs associated with cemeteries, why then are cemeteries being used in these ways? There are no direct answers to such enquiries. The fact remains that inappropriate use of cemeteries occur even with strong cultural and traditional belief. The situation could be worse with no strong cultural and traditional beliefs. From this standpoint, multi-use of cemeteries must be brought to the fore and regularized. This will ensure the promotion of uses complimentary to their primary role and the preservation of cultural and traditional beliefs associated with cemeteries. It will also ensure that the vegetative cover of cemeteries are conserved in urban spaces.

5.6 Policy, regulation and implementation of rules on cemetery operation and management

The findings highlighted that little is known officially about the total number of cemeteries in GAMA, their operations and management. The results from review of policies governing cemetery management and operation in GAMA indicate that the Ministry of Local Government and Rural Development (MLGRD) through the assemblies were responsible for the managing the entire process of interring the dead. The Assemblies are to ensure that each locality, town or city have cemeteries complying with the right standards. The policies further require the MLGRD to provide access roads, ensure good drainage, protect and beautify the cemeteries.

From the study, private commercial cemeteries were licensed by the local assemblies with a requirement for the annual renewal of license. The public cemeteries are managed by the assemblies and any revenue generated belonged to the state. The private family cemeteries were under the control and management of the families although the assemblies have the power to supervise the burial process and ensure that burial is done in a sanitized manner. Notwithstanding the fact that the assemblies have this power to take on any cemetery manager or families who goes contrary to this requirement, they lack the will power and the resources to perform such roles, particularly, in the case of family cemeteries. This posture of the assemblies leaves the management of the cemeteries at the mercy of the users and does not help in promoting cemeteries as places that can be used in greening the urban space. They may eventually become places of public health concern within cities.

There is a general lack of coordination between institutions responsible for the management and supervision of cemeteries. Whiles some of the institutions involved in the burial process are under the Ministry of Health, others involved in managing land

spaces and environmental issues are under the Ministry of Local Government and Rural Development and the Ministry of Environment, Science, Technology and Innovation. The scattered nature of these institutions who take policy direction from their parent ministries leave gaps that are exploited by cemetery owners when it comes to managing these spaces. The assemblies and the traditional leaders have so far not found common grounds on which to collaborate and work together for the common good of the city. The owner takes all system that is currently in operation makes it difficult for any supervision to take place. Land as a resource has become very scarce in GAMA. The few left include cemetery lands which traditional authorities are guarding jealously in order to make some money. They are unwilling to cede control of cemeteries to the assemblies.

5.7 Conclusion

After examining the physical features, ecological status and socio-cultural attributes of cemeteries in GAMA, the study showed that, cemeteries have the potential to be functional green spaces in cities. The location, distribution and ownership of the cemeteries indicate their availability and accessibility as sustainable green spaces. Green space availability and accessibility are important qualities in green space sustainability discussions. The presence of vegetation is a critical component of cemeteries as sustainable green spaces. The perceptions about cemeteries as well their use apart from burial cannot be overlooked in green space discussions. Additionally, the governance structure employed in managing cemeteries remains key to promoting cemeteries as sustainable green spaces. Cemeteries have the potential to be sustainable green spaces and this potential can be realised by taking advantage of the sense of place of people and place making processes.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The main focus of the study was to explore the potential of cemeteries as sustainable green spaces in GAMA. It was to provide evidence that cemeteries had the potential to play the role as green spaces as well serve as the abode of the dead. Chapter six presents a summary of the study and the key findings. The conclusions drawn from the study and recommendations are also presented in this chapter.

6.2 Summary of study and key findings

Cemeteries are unique green spaces with the primary role of burying the dead. They serve as a dignified place for disposing off the dead and also provide ecological, social and cultural benefits to humans. Cemeteries contribute to solving some of the urban problems such as extreme heat, pollution and the like. Making cemeteries one of the critical spaces in urban landscape. Hence the focus of the study which was to explore the potential of cemeteries as sustainable green spaces in cities. The study therefore, explored the potential of cemeteries as sustainable green spaces in urban landscape of the Greater Accra Metropolitan Accra (GAMA) by characterising the cemeteries in GAMA, examining their ecological significance, exploring people's perception on other uses of cemeteries, examining other uses and threats to cemetery. The study also examined the governance system employed in the operation and management of cemeteries and implications for vegetation in cemeteries.

Results of the study show as many as 48 cemeteries covering a total land size of 1.12km², were located in GAMA. The cemeteries were located within the central parts of the cities with constant interaction with host communities. There was no clear distribution pattern

of the cemeteries. The two broad types of cemetery ownership in GAMA were private cemeteries and public cemeteries. The private cemeteries could be classified as commercial, religious or family owned whilst the public cemeteries were state owned.

The land cover analysis indicated that, there were four main land cover classes identified in the cemeteries; grass cover, trees and shrubs cover, bareland and graves. All cemeteries had vegetation within them indicating that vegetation was an important component of cemeteries in GAMA. The analysis of vegetation in cemeteries in GAMA generally confirmed that cemeteries were habitat for a wide range of plants species. 176 species belonging to 62 families were identified. The vegetations in the cemeteries were valued for their cultural, aesthetic, medicinal, nutritional as well as historical benefits. Cemeteries in GAMA were largely composed of native plants species with exotic species found mainly in private commercial cemeteries. The cemeteries were predominantly located within human settlements which increased everyday interaction within them. People's perceptions were that the cemetery was for burial purposes only. People appeared not to be opened to the multifunctional properties of cemeteries.

Cemeteries in GAMA had strong traditional and cultural beliefs associated with them. These beliefs were not only associated with burial practices but also with vegetation in cemeteries. The beliefs helped to protect and conserve the vegetation cover in these cemeteries. Findings from the self-reported and observed uses of cemeteries showed that cemeteries were used for toilet and waste dump sites. Some of the cemeteries also served as hide outs for some people. There were no collaborations between local authorities and traditional leaders with regards to cemetery operation and management.

6.3 Conclusion

The aim of the study was to explore the potential of cemetery as green spaces in urban landscape of the Greater Accra Metropolitan Area of Ghana. The specific objectives of the study were to characterise the cemeteries, examine their ecological significance, explore the perception on cemeteries as green spaces, examine the others uses of cemeteries, the threats that cemeteries face and finally investigate the regulatory and governance framework under which cemeteries are managed in GAMA and their implications for vegetation management in cemeteries.

The findings of the study indicate that locations and distribution of the cemeteries identified in GAMA make them great potential for greening the city. There was a cemetery in almost all the communities within GAMA.

The study highlighted the ecological significance of cemeteries in GAMA. The findings indicate that every cemetery had some vegetation within it. The vegetation cover and composition of both native and exotic plant species in cemeteries provide a sound basis for their greening quality and potential as sustainable green spaces.

The perception that cemeteries are mono-functional places was likely to create a situation where multi-use cannot be formalised or regulated, thereby creating a space where inappropriate uses will thrive.

Analysis of the other uses of cemeteries apart from burial showed a disparity between perception about the multi-use of cemeteries and the actual uses of cemeteries in GAMA. This study did not cover why this disparity exists and why people use cemeteries the way they do. The use of cemeteries, especially as toilets and waste disposal sites, poses a threat to the potential of cemeteries as green spaces. The unsightly nature and smell from the waste negatively impacts to their ability to provide ecosystem services.

The lack of cohesive policy and weak enforcement of laws governing cemetery management and operation endanger the potential of cemeteries to green cities. Without proper management the full potential of cemeteries would not be realised. This will also affect their management as green spaces.

Current knowledge from study and available literature indicate that cemeteries are sustainable green spaces. The following recommendations must be considered for cemeteries to fulfill their full potential as greening agents.

6.4 Recommendations

Introduction

This section contains summary of findings of the study, recommendation and suggestions for future research. This study has established a set of problems associated with mainly the public and community cemeteries. The first is the lack of records on cemeteries existing in GAMA. Another problem relates to the management of trees in the cemetery. Even though vegetation is an important component of cemeteries, epitaphs rather than trees are the focus of management. Open defecation and use of cemeteries as waste dump site were observed and self-reported abuses experienced in the cemeteries in GAMA especially cemeteries that were not walled. Assemblies are not allowed to perform supervisory role in Community or private family cemeteries. Policies on operation, management and use of cemeteries are not harmonised.

This study therefore recommends that the following actions are taken in order to ensure that cemeteries are managed and used in ways that promote their green space qualities in cities

- i. First of all, the database created from this study should be adopted and maintained by the office of the Greater Accra Regional Coordinating Council. This will be useful for planning and regulation purposes.
- ii. The cultivation of certain plants on the grave of the dead should be integrated into the formal cemetery management system by Metropolitan and Municipal Assemblies (MMDAs) to derive the benefits.
- iii. Traditional leaders and family cemetery managers must be trained by Metropolitan and Municipal Assemblies (MMDAs) to actively plant trees in cemeteries, particularly threatened species for conservation purposes.
- iv. Metropolitan and Municipal Assemblies (MMDAs) should educate community members on the acceptable uses of cemeteries with clear warnings and direction on what is allowed and what is not in the cemeteries for people to follow.
- v. Metropolitan and Municipal Assemblies should provide waste management facilities to manage both solid and liquid wastes generated within cemeteries.
- vi. To help curb the use of cemeteries for open defecation, people found guilty of openly defecating in cemeteries must be prosecuted.
- vii. Metropolitan and Municipal Assemblies (MMDAs) should collaborate with traditional leaders to ensure that cemetery governance is cohesive and inclusive.
- viii. Metropolitan and Municipal Assemblies (MMDAs) must deliberate and dialogue with the traditional leaders to help them understand the supervisory role they play in ensuring burial process is sanitised.

Any interventions to promote use of cemetery for greening cities should be done with these factors in mind:

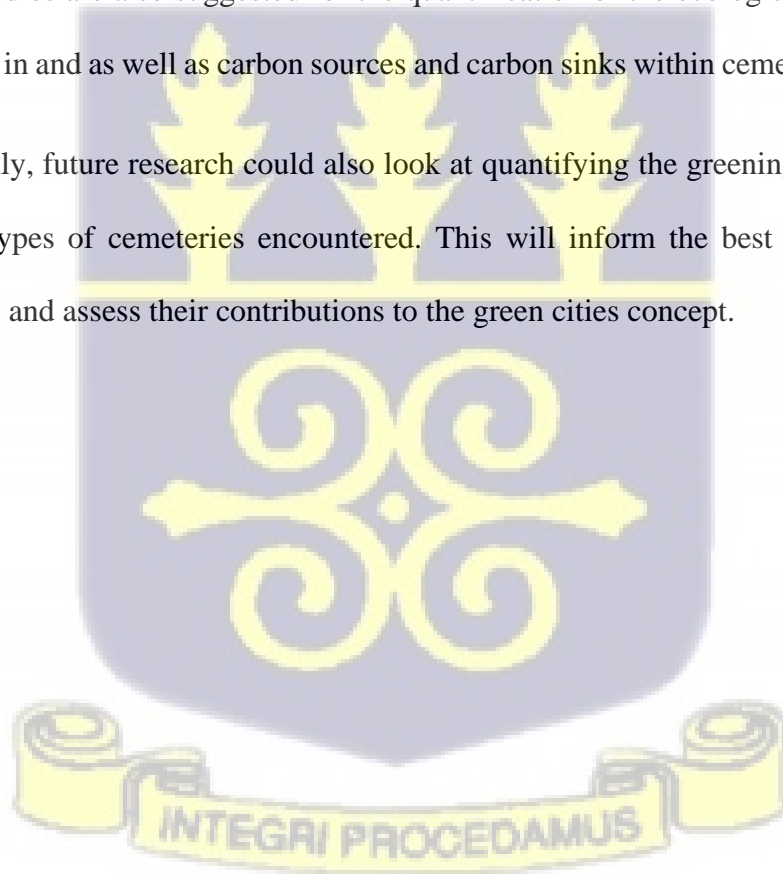
- i. A holistic approach to address all facets of cemetery use, operation, management and preservation in GAMA needs to be adopted.
- ii. MMDAs must be empowered to enforce the laws on burial and cemetery management.
- iii. Alternate burial practices like green burial must be enforced by law for cemeteries to realise their full potential as green areas in cities.

6.5 Future research

In terms of future research, this study could be expanded to explore the disparity between people's perception about the multi-use of cemeteries and actual use of cemeteries.

Further studies are also suggested for the quantification of the ecological benefits of the vegetation in and as well as carbon sources and carbon sinks within cemeteries in GAMA.

Additionally, future research could also look at quantifying the greening potential of the different types of cemeteries encountered. This will inform the best way to integrate cemeteries and assess their contributions to the green cities concept.



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APPENDICES

Appendix 1: Observation Checklist

Observation guide to categorise the cemeteries in the study area. The checklist for the observation guide was under the headings;

Items	Criteria	Observational comments
1	Cemetery name	
2	Latitude	
3	Longitude	
4	Community	
5	District/Municipality found	
6	Presence of boundary	
7	Ownership	
8	Observed activity	



Appendix 2: Questionnaire for Community Members

CEMETERIES AS SUSTAINABLE GREEN SPACES: THE CASE OF THE GREATER ACCRA METROPOLITAN AREA OF GHANA (GAMA)

NAME OF CEMETERY:

GPS LOCATION CORDINATES:

A. CEMETERY LOCATION/SITING

1. Do you:

a. live here?

1. Yes		2. No	
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b. How long have you lived here (in years)?

1. < 2	2. 2- 5	3. 6 – 10	4. 11 – 15	5. 16 – 20	6. 21+	7. Not applicable
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2. work here?

1. Yes		2. No	
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b. How long have you worked here (in years)?

1. < 2	2. 2- 5	3. 6 – 10	4. 11 – 15	5. 16 – 20	6. 21+	7. Not applicable
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3. a. Can you see the cemetery from where you live?

1. Yes		2. No		3. Not applicable	
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b. Can you see the cemetery from where you work?

1. Yes		2. No		3. Not applicable	
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4. Do you have any relatives buried here?

1. Yes		2. No	
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B. CEMETERY LOCATION

5. Do you have any concerns about this cemetery in terms of the following?

Description	Yes	No
1. Location		
2. Security/Safety		
3. Bad odour		
4. Waste disposal		
5. Defecation		
6. Risk of disease		
7. None		
8. Other		

If other, please specify

C. ASSESSMENT OF CEMETERY

6. How easily can you get access to this cemetery from your community?

1. Very easy		2. Very difficult	
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7. Please indicate whether the cemetery in your area is;

1. Unrestricted		2. Restricted	
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8. In your view, is there enough vegetation cover (grass and trees) in this cemetery?

1. Sufficient (grass and vegetation well maintained)		2. Not sufficient (Majority of the soil not covered with grass)	
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D. DESCRIPTION OF CEMETERY

9. What word best describes this cemetery? Please indicate yes/no for each option provided

Description	Yes	No
1. Scary		
2. Peaceful		
3. Ordinary		
4. Sacred		
5. None		
6. Other		

If other, please specify

E. MEANING

10. What does this cemetery mean to you? Please indicate yes/no

Description	Yes	No
1. Place of burial only		
2. Burial and place of recreation		
3. Burial and spiritual place		
4. Burial and green vegetation		
5. Other		

If other, please specify

F. USE OF CEMETERY

11. Have you visited this cemetery before?

1. Yes		2. No	
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12. What did you do during the visit to this cemetery apart from burial (if your answer to Q1 is Yes?)

Description	Yes	No
1. Access route (walkway)		
2. Relaxation		
3. Bird watching		
4. Grave visits		
5. Spiritual (Prayers & rituals)		
6. Others		

If other, please specify

13. Why haven't you used this cemetery before if your answer to Q1 is No?

1. Respect for the dead		2. Faith		3. Community restrictions		4. Fear		5. Others	
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If other, please specify

14. Have you collected any plant material from this cemetery?

1. Yes		2. No	
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If yes, please specify

G. PERCEPTION

15. In your opinion, cemeteries should be;

1. Mono-functional (use for burial purposes only)		2. Multi-functional (Different activities)	
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Please indicate whether you agree to the following statements or not

16. Apart from burial, the activities that should be allowed or accepted in the cemetery are:

In your opinion, the following activities are acceptable in cemeteries

Please rank by ticking. (1-Most acceptable, 2-somewhat acceptable, 3-Least acceptable)

Activity	1	2	3
1.Recreation (Relaxing, Birdwatching, Jogging,			
2.Access route (Walking through the cemetery)			
3.Performing of ritual/prayers			
4.Visiting grave sides			
5.Research(reading)			
6. Commercial (Selling food and other items, construction)			
7.Farming			
8.Dumping of rubbish			
9.Human settlements			

In your opinion;

17. Cemetery can be used for social purposes when necessary?

1.Strongly agree		2.Agree		3.Undecided		4.Disagree		5.Stronlgy disagree	
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18. Cemetery can be used for profitable ventures?

1.Strongly agree		2.Agree		3.Undecided		4.Disagree		5.Stronlgy disagree	
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19. The cemetery can be used as conservation hub (Place where rare and nearly endangered plants and animals can be kept).

1.Strongly agree		2.Agree		3.Undecided		4.Disagree		5.Stronlgy disagree	
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20. Please indicate the types of activity that can take place in cemeteries if multi-functional

Multiple answers may be given. (Please tick one or more)

Description	Yes	No
1.Sport related activity (Jogging, cycling)		
2.Political activity (Demonstration)		
3.Religious activity (Praying)		
4.Recreational activity (Theatre, dancing, relaxing)		
5.Commercial related activity (Washing bay, vending or selling)		
6.Anti-social activity (mugging, snatching of people's valuables)		
7.Reside (living there)		
8.Other		

H. DEMOGRAPHIC FACTORS

21. Gender

1. Male		2. Female	
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22. Which age bracket do you fall in (in years)?

1. < 20		2. 20 -29		3. 30 - 39		4. 40 - 49		5. 50 - 59		6. 60+	
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23. Which ethnic group do you belong to?

1.Ga/Ga Adangbe		2.Akan		3.Ewe		4. Mole Dagbani		5. Nzema		6.Gur		7.Others	
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If other, please specify

24. What is your religion?

1. Christian		2. Muslim		3. Traditional		4.Others		5. No Religion	
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25. What is your level of education?

1. No formal education		2. Primary		3. Secondary		4. Technical/ Vocational		5.Tertiary	
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26. What is your employment status?

1.Full time/ Self-employed		2.Part time		3. Student		4. Unemployed	
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Appendix 3: Interview Guide

Protocol A: Environmental Health Officers Interview questions

1. Please tell me a little about yourself (demographics: age, ethnicity, observed gender).
 - a) How long have you worked here, and where did you work previously?
 - b) What position do you hold, and how long have you worked in this position?

[Objective: To establish social-demographic and employment profile of participants]

2. What is your view on the current locations and distribution of cemeteries in Greater Accra Metropolitan Area?
3. What are the typical ways in which cemeteries are owned in Ghana? What do you make of cemetery ownership system in Ghana? How does this ownership affect management and regulation of cemetery activities?
4. How are cemeteries managed? Are there challenges? How can cemetery management be made comprehensive?

[Objective: identify the current state of cemeteries, ownership and its effect on management]

5. How do you perceive use of cemeteries in Ghana? Can you mention some activities you observe in cemeteries?
 - a) What do you think about the multi-use of cemeteries?
 - b) How do you feel about it? Do you think people should use cemeteries in other ways aside burial? Are there instances where you have put cemeteries to other uses?
 - c) Do you know any rules on the use cemeteries beyond burial? What kinds of activities should be allowed in cemeteries? What do think about use of cemeteries for conservation?
 - d) What, in your view, are the top three factors that account for people using cemeteries the way they do? What other ones are there?
 - e) In your opinion, what can be done to ensure cemeteries are used in beneficial ways? How do we enforce rules and regulations on activities in cemeteries?

[Objective: To ascertain the perceptions about multi-use of cemeteries in Ghana, and how to regulate these uses]

6. Do you think cemeteries are necessary?

- a) What do you think are the threats and pressures that cemetery face? Do you believe that cemeteries will still exist in future (100 years)?
- b) Do you know of any instances where cemeteries lands have been completely converted to residential spaces?
- c) Please suggest what can be done to protect cemeteries in Ghana?

[Objective: To find out the threats and pressures cemeteries face in Ghana]

7. Would you please walk me through how your department contributes to managing cemeteries?

- a) Can you mention specific activities your department performs with regards to cemetery management?
- b) What are the challenges you face with your work on cemeteries? What do you suggest can be done to improve cemetery management?
- c) What are the policies that have been formulated for cemetery operation and management?
What are the challenges with these policies?
- d) Do you plant trees in the cemetery?
- e) Can you briefly talk about the origin of the trees in the cemetery?
- f) Do your duties include vegetation management?
- g) What policies are associated with cemetery management?
- h) What are some of the efforts made policy wise to ensure that greenery is maintained in cemeteries?

[Objective: To identify management efforts, challenges, policies recommendations for cemetery management]

Closure

Thank you for participating

I assure you once again that this interview will remain confidential and only be used for this research.

Do I have your permission to make some follow-ups if need be?

Protocol B: Semi-structured Interview Guide

Clan Heads

Interview questions

1. Please tell me a little about yourself (demographics: age, observed gender).
 - a. How long have you been clan head?
 - b. What do you do as clan head?

[Objective: To establish social-demographic and employment profile of participants]

2. What is your view on the current locations and distribution of cemeteries in Greater Accra Metropolitan Area?
3. What do you make of cemetery ownership in Ghana?
4. Do you feel that the current management of cemeteries is comprehensive? What are the challenges? How could it be made comprehensive?

[Objective: identify the current state of cemeteries, ownership and its effect on management]

5. How do you perceive use of cemeteries in Ghana? Can you mention some activities you observe in cemetery?
 - a) What do you think about the multi-use of cemeteries?
 - b) How do you feel about it? Why do you think people should use cemeteries in other ways aside burial? Are there instances where you have put cemeteries to other uses?
 - c) What do think about the use of cemetery for conservation and the use of plant material from cemetery?
 - d) What, in your view, are the top three factors that account for people using cemeteries the way they do? What other ones are there?
 - e) In your opinion, what can be done about ensuring cemeteries are used in beneficial ways?

[Objective: To ascertain the general perceptions about multi-use of cemeteries in Ghana, the causes and how to control it]

6. Do you think cemeteries are under threat? And why?
 - a) What do you think are the threats and pressures that cemetery face? Do you believe that cemeteries will still exist in future (100 years)?

- b) Do you know of any instances where cemeteries lands have been completely converted to residential spaces?
- c) Please suggest what can be done to protect cemeteries in GAMA?

[Objective: To find out the threats and pressures cemeteries face in Ghana]

7. Would you please walk me through your role as clan head in managing cemetery?
- a) Can you mention specific activities you perform to manage use and encroachment of cemetery? Are they sufficient? What more can be done?
 - b) What are the challenges that affect the performance of this role?
 - c) What do you suggest can be done to improve cemetery management?

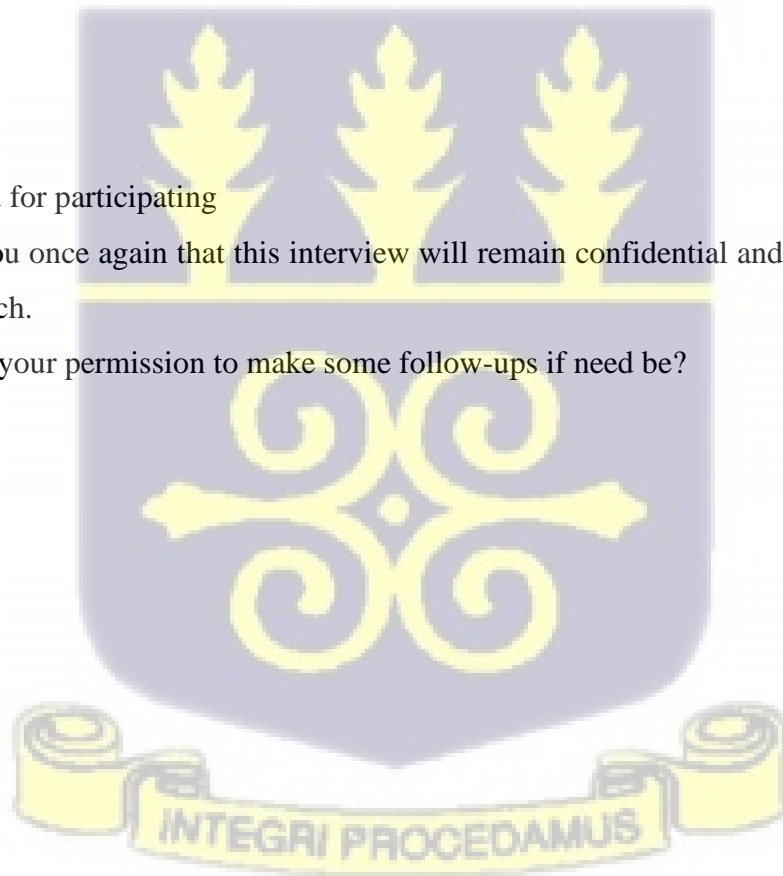
[Objective: To identify traditional management efforts, challenges, and recommendations for cemetery management at the local level]

Closure

Thank you for participating

I assure you once again that this interview will remain confidential and only be used for this research.

Do I have your permission to make some follow-ups if need be?



Protocol C: Semi-structured Interview Guide

Cemetery Managers

1. Please tell me a little about yourself (demographics: age, ethnicity, observed gender).
 - a. How long have you worked here, and where did you work previously?
 - b. What position do you hold, and how long have you worked in this position?

[Objective: To establish social-demographic and employment profile of participants]

2. What is your view on the current locations and distribution of cemeteries in Greater Accra Metropolitan Area?
3. What do you make of cemetery ownership in Ghana?
4. Under whose control is the cemetery (Government managed and government institution managed; Non-government institution managed; Joint [Government & Non-government institution]; Other)?
5. Do you feel that the current management of cemeteries is comprehensive? What are the challenges? How could it be made comprehensive?

[Objective: identify the current state of cemeteries, ownership and its effect on management]

6. How do you perceive use of cemeteries in Ghana? Can you mention some activities you observe in cemetery?
 - a) What do you think about the multi-use of cemeteries?
 - b) How do you feel about it? Why do you think people should use cemeteries in other ways aside burial? Are there instances where you have put cemeteries to other uses?
 - c) What, in your view, are the top three factors that account for people using cemeteries the way they do? What other ones are there?
 - d) In your opinion, what can be done about ensuring cemeteries are used in beneficial ways?

[Objective: To ascertain the general perceptions about multi-use of cemeteries in Ghana, the causes and how to control it]

7. Do you think cemeteries are under threat? And why?

- a) What do you think are the threats and pressures that cemetery face? Do you believe that cemeteries will still exist in future (100 years)?
- b) Do you know of any instances where cemeteries lands have been completely converted to residential spaces?
- c) Please suggest what can be done to protect cemeteries in GAMA?

[Objective: To find out the threats and pressures cemeteries face in Ghana]

8. Would you please walk me through how your department contributes to managing cemetery?

- a) Can you mention specific activities your department performs to manage use and encroachment of cemetery? Are they sufficient? What more can be done?
- b) What are the challenges you face with your work on cemeteries? What do you suggest can be done to improve cemetery management?

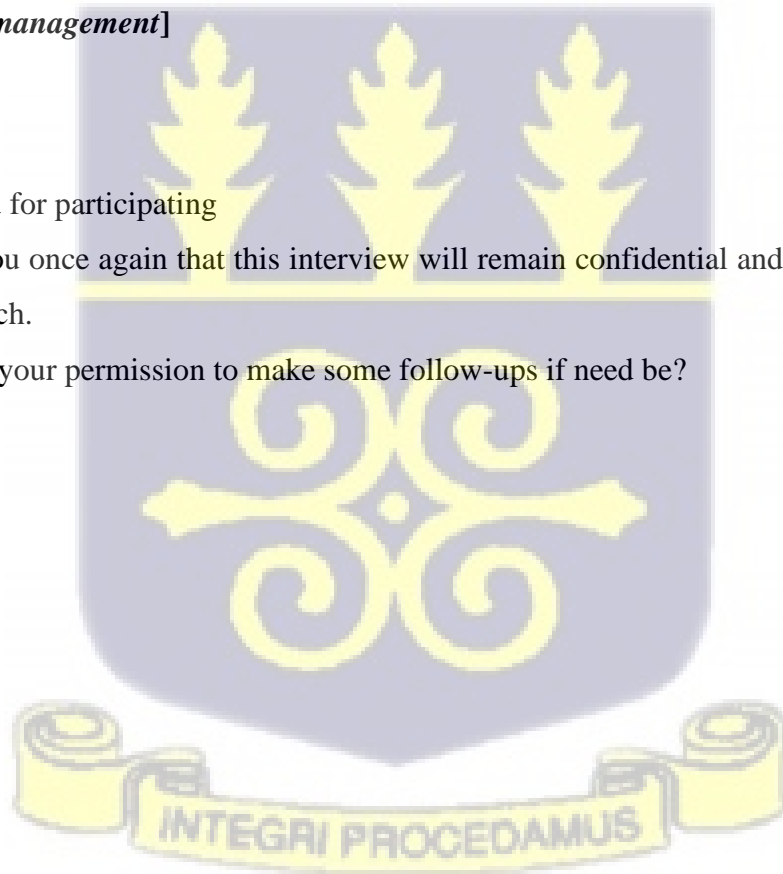
[Objective: To identify management efforts, challenges, and recommendations for cemetery management]

Closure

Thank you for participating

I assure you once again that this interview will remain confidential and only be used for this research.

Do I have your permission to make some follow-ups if need be?



Appendix 4: List of Municipal and Metropolitan Assemblies in GAMA

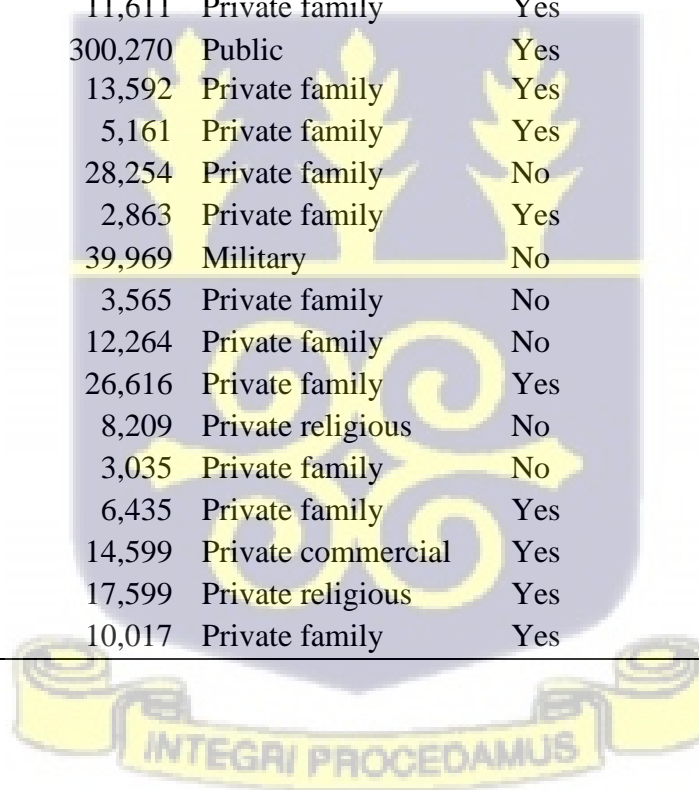
1. Adentan Municipal Assembly
2. Ablekuma Central Municipal Assembly
3. Ablekuma North Municipal Assembly
4. Ablekuma West Municipal Assembly
5. Accra Metropolitan Assembly
6. Ayawaso Central Municipal Assembly
7. Ayawaso East Municipal Assembly
8. Ayawaso West Municipal Assembly
9. Ayawaso North Municipal Assembly
10. Okaikoi North Municipal Assembly
11. Korle Klottey Municipal Assembly
12. Ashaiman Municipal Assembly
13. Ga Central Municipal Assembly
14. Ga East Municipal Assembly
15. Ga South Municipal Assembly
16. Ga West Municipal Assembly
17. Ga North Municipal Assembly
18. Kpone Katamanso Municipal Assembly
19. La Dade-Kotopon Municipal Assembly
20. La Nkwantanang Madina Municipal Assembly
21. Ledokuku Municipal Assembly
22. Tema Metropolitan Assembly
23. Tema West Municipal Assembly
24. Krowor Municipal Assembly
25. Weija Gbawe Municipal Assembly



Appendix 5: Cemetery name, size, ownership type, accessibility and assembly located

No.	Cemetery Name	Size (m ²)	Ownership type	Accessibility	Location / Assembly
1	Ablekuma Cemetery +	7,601	Private family	Yes	Ablekuma (GA Central Municipal)
2	Achimota Cemetery	25,817	Private family	No	Okaikoi North Municipal
3	Adenta Cemetery +	7,130	Private family	Yes	Adentan Municipal
4	Adjiringanor Cemetery +	11,863	Private family	Yes	Adentan Municipal
5	Agbogba Cemetery +	15,649	Private family	Yes	GA East Municipal
6	Amrahia cemetery +	14,787	Private family	Yes	Adentan Municipal
7	Anglican Cemetery	4,586	Private religious	No	Krowor Municipal
8	Ashieye_Cemetery	9,726	Private family	Yes	Adentan Municipal
9	Ashongman Cemetery +	11,611	Private family	Yes	GA East Municipal
10	Awudome Cemetery +	300,270	Public	Yes	Okaikoi South Sub Metro of AMA
11	Ayawaso Cemetery +	13,592	Private family	Yes	Ayawaso North Municipal
12	Ayi Mensah Cemetery	5,161	Private family	Yes	GA East Municipal
13	Bawaleshie Cemetery	28,254	Private family	No	Kpone Katamanso Municipal
14	Bubiashie Cemetery +	2,863	Private family	Yes	Okaikoi South Sub Metro of AMA
15	Burma Camp Military Cemetery	39,969	Military	No	Korle Klottay Municipal
16	Dome Cemetery	3,565	Private family	No	GA East Municipal
17	Dome main Cemetery	12,264	Private family	No	Ga East Municipal
18	Gbawe Main Cemetery +	26,616	Private family	Yes	GA South Municipal
19	Gbawe Methodist Cemetery	8,209	Private religious	No	GA South Municipal
20	Gbawe Royal Cemetery	3,035	Private family	No	GA South Municipal
21	Gbetseli Cemetery	6,435	Private family	Yes	Kpone Katamanso Municipal
22	Gethsemane Memorial Cemetery +	14,599	Private commercial	Yes	Ayawaso West Municipal
23	Greda Estate Muslim Cemetery +	17,599	Private religious	Yes	Ledzokuku Municipal
24	Haatso Cemetery +	10,017	Private family	Yes	GA East Municipal

Where + = Cemeteries sampled



Appendix 5: Cemetery name, size, ownership type, accessibility and assembly located (continued)

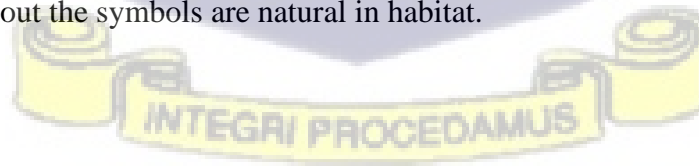
No.	Cemetery Name	Size (m ²)	Ownership type	Accessibility	Location / Assembly
25	Kwabanya Cemetery ⁺	6,895	Private family	Yes	GA East Municipal
26	Kwabanya Main Cemetery	5,656	Private family	Yes	GA East Municipal
27	La Public Cemetery ⁺	73,888	Public	Yes	LA Dade Kotopon
28	La Wuogon Muslims trust Cemetery ⁺	22,690	Private religious	Yes	Ayawaso West Municipal
29	Lashibi Cemetery	10,339	Private commercial	No	Tema West Municipal
30	Madina Public Cemetery ⁺	92,073	Public	Yes	LA Nkwantanang Madina
31	Mantse Ankrah Royal Cemetery	5,960	Private family	No	Okaikoi South Sub Metro of AMA
32	Mpoase Agage Cemetery	11,727	Private family	No	Ablekuma West Municipal
33	Mpoase Cemetery ⁺	5,449	Private family	Yes	Ablekuma West Municipal
34	Nanoma Cemetery	3,972	Private family	No	Kpone Katamanso Municipal
35	Nikoi Olai Stool Royal	2,333	Private family	No	Okaikoi South Sub Metro of AMA
36	Oblogo Cemetery ⁺	573	Private family	Yes	GA South Municipal
37	Ofankor Cemetery	28,352	Private family	No	GA West Municipal
38	Osu Military Cemetery	20,623	Military	No	Korle Klottey Municipal
39	Osu Public Cemetery ⁺	81,141	Public	Yes	Korle Klottey Municipal
40	Pantang-Abokobi Cemetery	22,223	Private religious	No	GA East Municipal
41	Pokuase Cemetery ⁺	7,005	Private family	Yes	GA West Municipal
42	SS.Anne & Joachim Catholic Cemetery	1,175	Private religious	No	Ledzokuku Municipal
43	Tema Community 9 Cemetery ⁺	86,575	Public	Yes	Tema Metropolitan Assembly
44	Tema New Town Cemetery ⁺	36,773	Private family	Yes	Tema Metropolitan Assembly
45	Teshie Cemetery ⁺	8,269	Private family	Yes	Ledzokuku Municipal
46	Weija Cemetery	16,464	Private family	Yes	GA South Municipal
47	Weija Public Cemetery ⁺	26,108	Private family	Yes	GA South Municipal
48	Zimmermann Cemetery	16,397	Private religious	No	Krowor Municipal

Where + = Cemeteries sampled

Appendix 6: List of plant species encountered in the cemeteries

No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
1	<i>Abbrus precatorious</i> L.	Fabaceae	Herb	Not evaluated		3
2	<i>Abutilon theophrasti</i> Medik.	Malvaceae	Herb	Not evaluated		2
3	<i>Acacia auriculiformis</i> A.Cunn. ex Benth.	Leguminosae	Tree	Least concern		5
4	<i>Acalypha indica</i> L.	Euphorbaiceae	Herb	Not evaluated		20
5	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Not evaluated		12
6	<i>Adansonia digitata</i> L.	Malvaceae	Tree	Not evaluated		2
7	<i>Agave americana</i> L. ®	Asparagaceae	Herb	Least concern		2
8	<i>Agave augustifolia</i> Haw. ®	Asparagaceae	Herb	Not evaluated		1
9	<i>Agave bracteosa</i> S. Wats. ex Engelm. ®	Asparagaceae	Herb	Least concern		2
10	<i>Agave filifera</i> Salm-Dyck®	Asparagaceae	Herb	Least concern		1
11	<i>Agave parviflora</i> Torr.	Asparagaceae	Herb	Least concern		3
12	<i>Agave sisalana</i> Perrine®	Asparagaceae	Herb	Not evaluated		1
13	<i>Agave vivipara</i> L./ <i>Agave angustifolia</i> Haw. ®	Asparagaceae	Herb	Least concern		1
14	<i>Albizia lebeck</i> (L.) Benth.	Leguminosae	Tree	Least concern		4
15	<i>Alchornea cordifolia</i> Mull.Arg.	Euphorbiaceae	Shrub	Least concern		2
16	<i>Allamanda cathartica</i> L.®	Apocynaceae	Shrub	Not evaluated		1
17	<i>Allium tuberosum</i> Rottler. ex Spreng.	Amaryllidaceae	Herb	Not evaluated		1
18	<i>Aloe vera</i> (L.) Burm. f®	Asphodelaceae	Herb	Not evaluated		1
19	<i>Alternanthera pungens</i> Kunth	Amaranthaceae	Herb	Not evaluated		2
20	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Herb	Not evaluated		1
21	<i>Amaranthus viridis</i> L.	Amaranthaceae	Herb	Not evaluated		1
22	<i>Ananas comosus</i> (L.) Merr. ®	Bromeliaceae	Herb	Not evaluated		1
23	<i>Anchomanes difformis</i> (Blume) Engl.	Araceae	Herb	Least concern		3

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.



Appendix 6: List of plant species encountered in the cemeteries (continued)

No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
24	<i>Antiaris toxicaria</i> Lesch.	Moraceae	Tree	Least concern	Pink	8
25	<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Herb	Not evaluated		2
26	<i>Araucaria columnaris</i> J. R. Frost. Hook®	Araucariceae	Tree	Least concern		1
27	<i>Asparagus aethiopicus</i> L.	Asparagaceae	Herb	Least concern		2
28	<i>Astragalus glycyphyllos</i> L.	Fabaceae	Herb	Least concern		1
29	<i>Auracaria heterophylla</i> (Salisb.) franco ®	Araucariceae	Tree	Not evaluated		1
30	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Tree	Least concern		24
31	<i>Bambusa vulgaris</i> Schrad. ex. J.C. Wendl	Poaceae	Tree	Not evaluated		1
32	<i>Baphia nitida</i>	Fabaceae	Shrub	Least concern	Green	1
33	<i>Bauhinia lunarioides</i> A. Gray ex S.Watson	Leguminosae	Tree	Not evaluated		1
34	<i>Bauhinia variegata</i> L.	Fabaceae	Shrub	Least concern		6
35	<i>Bignonia capreolata</i> L.	Bignoniaceae	Shrub	Not evaluated		2
36	<i>Boehmeria cylindrica</i> (L.) SW.	Urticaceae	Herb	Not evaluated		1
37	<i>Boehmeria macrophylla</i> Hornem.	Urticaceae	Herb	Not evaluated		1
38	<i>Boerhavia diffusa</i> L. nom. Cons.	Nyctaginaceae	Herb	Not evaluated		11
39	<i>Borassus aethiopum</i> Mart.	Arecaceae	Tree	Least concern		2
40	<i>Bougainvillea glabra</i> Choisy.	Nyctaginaceae	Shrub	Least concern		2
41	<i>Broussonetia papyrifera</i> L.	Moraceae	Herb	Least concern		1
42	<i>Bryophyllum Bryophyllum calcicola</i> (H.Perrier) V.V.Byalt / <i>Kalanchoe pinnata</i> (Lam.) Pers. ®	Crassulaceae	Herb	Not evaluated		1
43	<i>Cactus grandiflorus</i> (L.) ®	Cactaceae	Shrub	Least concern		1
44	<i>Calotropis procera</i> (Aiton) W. T. Aiton	Apocynaceae	Shrub	Not evaluated		12

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.



Appendix 6: List of plant species encountered in the cemeteries (continued)

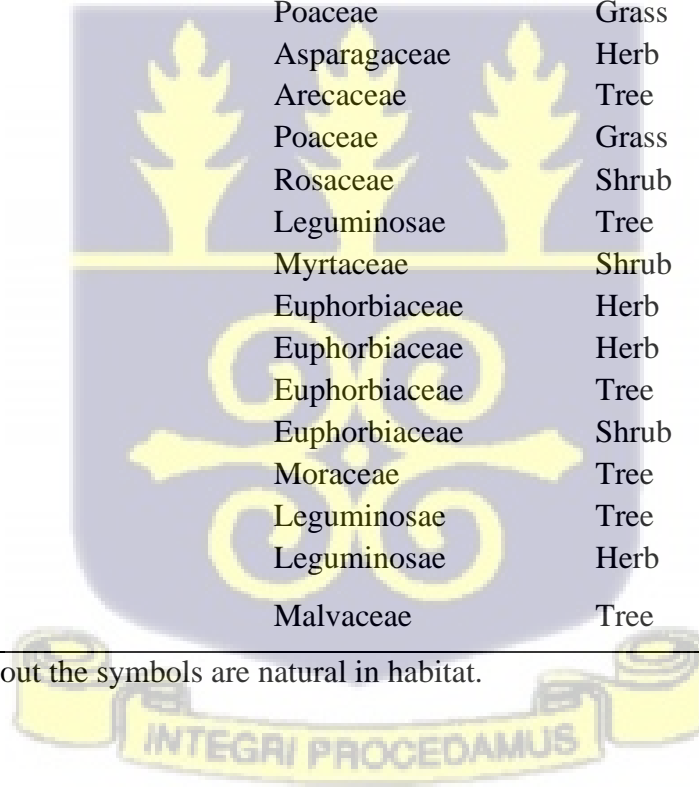
No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
45	<i>Calycanthus floridus</i> L.	Canlycanthaceae	Shrub	Not evaluated		1
46	<i>Carica papaya</i> L. ®	Caricaceae	Tree	Data deficient		9
47	<i>Cascabela thevetia</i> / <i>Thevetia peruviana</i> (Pres.) K. Schum	Apocynaceae	Tree	Least concern		5
48	<i>Cassia rotundifolia</i> Benth./ <i>Chamaecrista rotundifolia</i> Pers.	Fabaceae	Herb	Not evaluated		1
49	<i>Cassia siamea</i> / <i>Senna siamea</i> (Lam.) Irwin et Barneby	Fabaceae	Tree	Least concern		4
50	<i>Cassytha filiformis</i> L.	Lauraceae	Herb	Not evaluated		1
51	<i>Ceiba pentandra</i> (L.) Gaertn.	Malvaceae	Tree	Least concern	Red	2
52	<i>Cenchrus ciliaris</i> L.	Poaceae	Grass	Least concern		3
53	<i>Centrosema pubescens</i> Benth.	Leguminosae	Herb	Not evaluated		1
54	<i>Chenopodium vulvaria</i> L.	Amaranthaceae	Herb	Not evaluated		1
55	<i>Chromolaena odorata</i> (L.) R.M. King & H.Rob.	Asteraceae	Herb	Not evaluated	Green	6
56	<i>Cissus quadrangularis</i> L.	Vitaceae	Herb	Not evaluated		8
57	<i>Citrus x sinensis</i> (L.) Osbeck ®	Rutaceae	Tree	Not evaluated		1
58	<i>Cocos nucifera</i> (L.) ®	Arecaceae	Tree	Not evaluated		11
59	<i>Codiaeum variegatum</i> (L.) A. Juss.	Euphorbiaceae	Shrub	Least concern		1
60	<i>Colocasia esculenta</i> (L.) Schott ®	Araceae	Herb	Least concern		4
61	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Herb	Not evaluated		15
62	<i>Convallaria majalis</i> L.	Asparagaceae	Herb	Not evaluated		1
63	<i>Cordia africana</i> Lam.	Boraginaceae	Tree	Least concern		1
64	<i>Cordia sebestana</i> L. ®	Boraginaceae	Tree	Least concern		1
65	<i>Crossandra infundibuliformis</i> (L.) Nees	Acanthaceae	Shrub	Least concern		1

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.

Appendix 6: List of plant species encountered in the cemeteries (continued)

No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
66	<i>Cuphea hookerriana</i> P. Browne ®	Lythraceae-	Shrub	Not evaluated		1
67	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Grass	Not evaluated		1
68	<i>Cyperus articulatus</i> L.	Cyperaceae	Sedge	Least concern		1
69	<i>Cyperus eragrostis</i> Lam.	Cyperaceae	Sedge	Least concern		1
70	<i>Cyperus esculentus</i> L.	Cyperaceae	Sedge	Least concern		1
71	<i>Cyperus rotundus</i> L.	Cyperaceae	Sedge	Least concern		3
72	<i>Delonix regia</i> (Boj. ex Hook.) Raf.	Leguminosae	Tree	Least concern		2
73	<i>Diathus barbatus</i> L. ®	Caryophyllaceae	Herb	Not evaluated		1
74	<i>Digitaria insularis</i> (L.) Fedde	Poaceae	Grass	Not evaluated		2
75	<i>Dracaena trifasciata</i> (Prain) Mabb	Asparagaceae	Herb	Not evaluated		1
76	<i>Elaeis guineensis</i> Jacq. ®	Arecaceae	Tree	Least concern		16
77	<i>Eleusine indica</i> (L.) Gaertn	Poaceae	Grass	Least concern	Pink	1
78	<i>Eriobotrya japonica</i> (Thumb.) Lindl	Rosaceae	Shrub	Not evaluated		1
79	<i>Erythrina crista-galli</i>	Leguminosae	Tree	Least concern		1
80	<i>Eugenia auciflora</i> L.	Myrtaceae	Shrub	Least concern		1
81	<i>Euphorbia hirta</i> Linn ®	Euphorbiaceae	Herb	Not evaluated		4
82	<i>Euphorbia milii</i> Des Moul ®	Euphorbiaceae	Herb	Not evaluated		4
83	<i>Euphorbia tirucalii</i> L.	Euphorbiaceae	Tree	Least concern		2
84	<i>Euphorbia tithymaloides</i> L. ®	Euphorbiaceae	Shrub	Least concern		1
85	<i>Ficus spp</i> L.	Moraceae	Tree	Least concern	Green	12
86	<i>Gliricidia sepium</i> (Jacq.) Steud.	Leguminosae	Tree	Least concern		1
87	<i>Glycine max</i> (L.) Merr. ®	Leguminosae	Herb	Not evaluated		1
88	<i>Gossypium arboreum</i> L. ®	Malvaceae	Tree	Near threatened		1

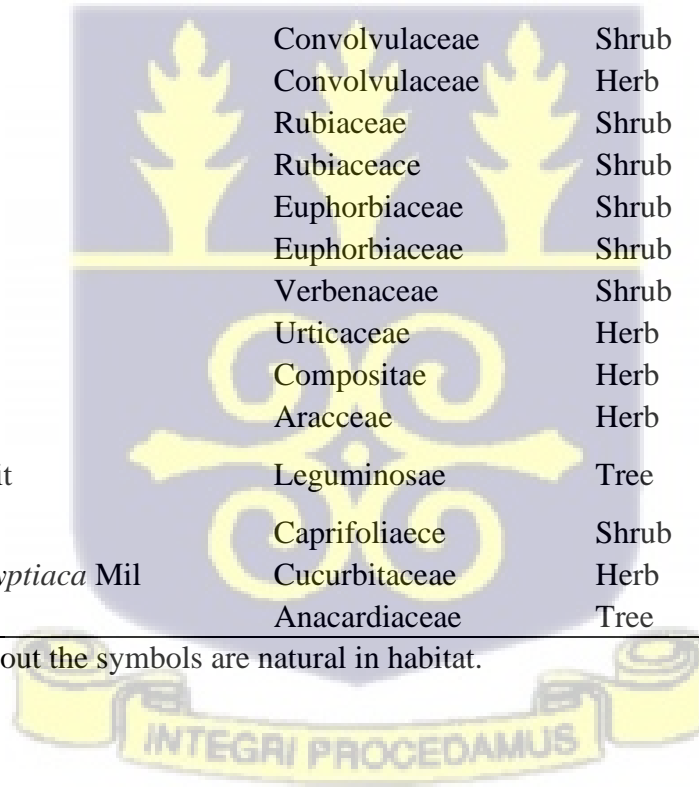
Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.



Appendix 6: List of plant species encountered in the cemeteries (continued)

No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
89	<i>Grewia flavescens</i> Juss.	Malvaceae	Shrub	Least concern		3
90	<i>Grewia occidentalis</i> L.	Malvaceae	Shrub	Least concern		3
91	<i>Griffonia simplicifolia</i> (DC.) Baill	Fabaceae	Shrub	Not evaluated	Green	2
92	<i>Griselinia littoralis</i> Raoul ®	Griselinaceae	Shrub	Not evaluated		1
93	<i>Helitropium indicum</i> L.	Boraginaceae	Herb	Not evaluated		3
94	<i>Hippeastrum reticulatum</i> (L'Her) Herb ®	Amaryllidaceae	Herb	Not evaluated		1
95	<i>Imperata cylindrica</i> (L.) P. Beauv. ®	Poaceae	Grass	Least concern		1
96	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae	Herb	Data deficient		1
97	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Shrub	Not evaluated		3
98	<i>Ipomoea purpurea</i> (L.) Roth	Convolvulaceae	Herb	Not evaluated		1
99	<i>Ixora coccinea</i> L.	Rubiaceae	Shrub	Least concern		1
100	<i>Ixora duffii</i> L. ®	Rubiaceae	Shrub	Least concern		3
101	<i>Jatropha curcas</i> (L.) Britts	Euphorbiaceae	Shrub	Not evaluated		3
102	<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	Shrub	Least concern		1
103	<i>Lantana camara</i> L.	Verbenaceae	Shrub	Not evaluated		5
104	<i>Laportea aestuans</i> (L.) Chew	Urticaceae	Herb	Not evaluated		1
105	<i>Launaea taraxacifolia</i> (Wild.) Amin	Compositae	Herb	Not evaluated		5
106	<i>Lemna paucicostata</i> Hegelm.	Araceae	Herb	Not evaluated		1
107	<i>Leucaena leucocephala</i> (Lam.) de Wit	Leguminosae	Tree	Not Evaluated		12
108	<i>Linnaea borealis</i> L.	Caprifoliaceae	Shrub	Not evaluated		1
109	<i>Luffa cylindrica</i> M. Roem/ <i>Luffa aegyptiaca</i> Mil	Cucurbitaceae	Herb	Not evaluated		4
110	<i>Mangifera indica</i> L. ®	Anacardiaceae	Tree	Not evaluated		9

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.



Appendix 6: List of plant species encountered in the cemeteries (continued)

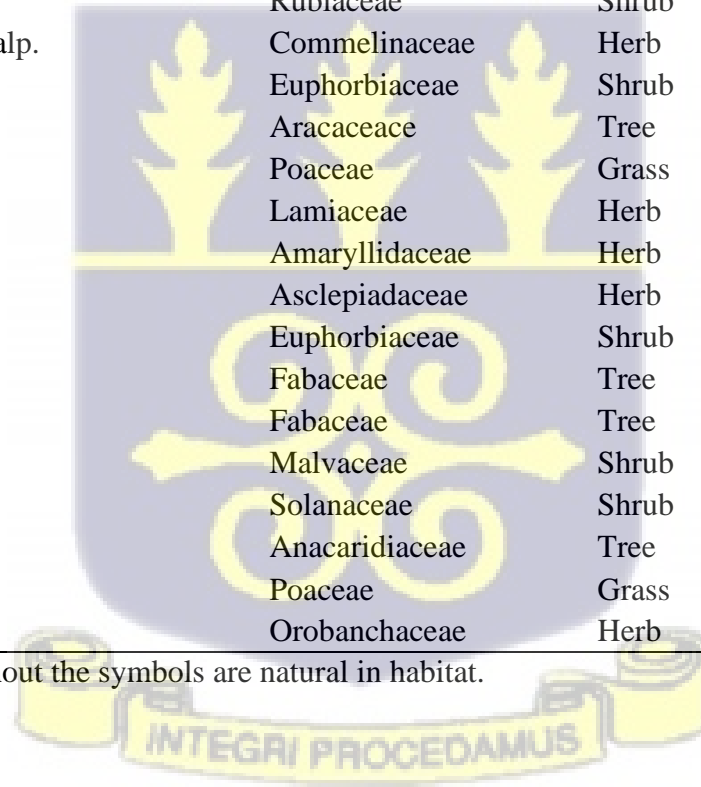
No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
111	<i>Manihot esculenta</i> Crantz ®	Euphorbiaceae	Shrub	Data deficient		2
112	<i>Milicia excelsa</i> (Welw.) C.C. Berg	Moraceae	Tree	Near threatened	Scarlet	1
113	<i>Millettia thonningii</i> (Schumach. & Thonn.) Baker	Leguminosae	Tree	Not evaluated		6
114	<i>Mimosa pudica</i> L.	Fabaceae	Herb	Least concern		3
115	<i>Mimusops elengi</i> L. ®	Sapotaceae	Tree	Least concern		1
116	<i>Morinda citrifolia</i> L.	Rubiaceae	Tree	Not evaluated		2
117	<i>Morinda lucida</i> Benth.	Rubiaceae	Tree	Least concern		5
118	<i>Moringa oleifera</i> Lam. ®	Moringaceae	Tree	Least concern		4
119	<i>Murraya paniculata</i> (L.) Jack	Rutaceae	Shrub	Not evaluated		2
120	<i>Musa x paradisiaca</i> L.	Musaceae	Herb	Least concern		12
121	<i>Mussaenda philippica</i> A. ®	Rubiaceae	Shrub	Least concern		1
122	<i>Nerium oleander</i> L. ®	Apocynaceae	Shrub	Least concern		1
123	<i>Nicotiana tabacum</i> L. ®	Solanaceae	Shrub	Not evaluated		1
124	<i>Odontonema cuspidatum</i> (Nees) Kuntze	Acanthaceae	Shrub	Not evaluated		1
125	<i>Opuntia ficus-indica</i> (L.) Mill. ®	Cactaceae	Shrub	Data Deficient		3
126	<i>Panicum maximum</i> (Jacq.)/ <i>Megathyrsus maximum</i> (Jacq.)	Poaceae	Grass	Not evaluated		13
127	<i>Paspalum dilatatum</i> Poir ®	Poaceae	Grass	Not evaluated		2
128	<i>Passiflora foetida</i> L.	Passifloraceae	Herb	Not evaluated		6
129	<i>Paullinia pinnata</i> L.	Sapindaceae	Shrub	Not evaluated		2
130	<i>Persea americana</i> Mill.	Lauraceae	Tree	Least concern		2
131	<i>Phaseolus vulgaris</i> L.	Fabaceae	Herb	Least concern		1
132	<i>Phyllanthus amarus</i> Schumach & Thonn.	Phyllanthaceae	Herb	Not evaluated		4

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.

Appendix 6: List of plant species encountered in the cemeteries (continued)

No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
133	<i>Phyllanthus tenellus</i> Roxb.	Phyllanthaceae	Herb	Not evaluated		2
134	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Shrub	Not evaluated		1
135	<i>Plumeria obtusa</i> L.	Apocynaceae	Tree	Not evaluated		3
136	<i>Polyalthia longifolia</i> (Sonn.) Thwaites/ Monoon longifolium Sonn. B. Xue	Annonaceae	Tree	Not evaluated		4
137	<i>Portulaca oleracea</i> L.	Portulacaceae	Herb	Least concern		1
138	<i>Pseuderanthemum carruthersii</i> ®	Acanthaceae	Shrub	Least concern		1
139	<i>Psidium guajava</i> L. ®	Myrtaceae	Tree	Least concern		1
140	<i>Psychotria nervosa</i> Sw.	Rubiaceae	Shrub	Least concern		1
141	<i>Rhoeo discolor</i> (L'Her.) Hance ex Walp.	Commelinaceae	Herb	Not evaluated		2
142	<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	Not evaluated		11
143	<i>Roystonea regia</i> Kunth. ®	Aracaceae	Tree	Least concern		3
144	<i>Saccharum officinarum</i> L.	Poaceae	Grass	Not evaluated		1
145	<i>Salvia tilifolia</i> Vahl.	Lamiaceae	Herb	Not evaluated		1
146	<i>Scadoxus multiflorus</i> (Martyn) Raf.	Amaryllidaceae	Herb	Not evaluated		1
147	<i>Secamone afzelii</i> Schult.	Asclepiadaceae	Herb	Not evaluated		2
148	<i>Securinega virosa</i> (Roxb.) Baill	Euphorbiaceae	Shrub	Not evaluated		15
149	<i>Senna occidentalis</i> (L.) Link	Fabaceae	Tree	Not evaluated		2
150	<i>Senna siamea</i> Lam. /Siamese cassia	Fabaceae	Tree	Least concern		9
151	<i>Sida acuta</i> Burm. f.	Malvaceae	Shrub	Not evaluated		9
152	<i>Solanum torvum</i> Sw. ®	Solanaceae	Shrub	Not evaluated		3
153	<i>Spondias mombin</i> Linn. ®	Anacardiaceae	Tree	Not evaluated		1
154	<i>Sporobolus pyramidalis</i> Beauv.	Poaceae	Grass	Not evaluated		2
155	<i>Striga hermonthica</i> (Delile) Benth.	Orobanchaceae	Herb	Not evaluated		2

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.



Appendix 6: List of plant species encountered in the cemeteries (continued)

No.	Species Name	Family	Life form	IUCN rating	Star rating	Frequency
156	<i>Syngonium auritum</i> L. ®	Araceae	Herb	Not evaluated		1
157	<i>Tabernaemontana divaricata</i> R. Br. ex. Roem. Schult.	Apocynaceae	Shrub	Least concern		1
158	<i>Talinum triangulare</i> Jacq.	Talinaceae	Herb	Not evaluated		10
159	<i>Terminalia catappa</i> L.	Combretaceae	Tree	Least concern		6
160	<i>Terminalia mantaly</i> L.	Combretaceae	Tree	Least concern		1
161	<i>Theobroma cacao</i> L. ®	Malvaceae	Tree	Not evaluated		2
162	<i>Thuja occidentalis</i> L. ®	Cupressaceae	Tree	Least concern		1
163	<i>Thunbergia erecta</i> Benth. ®	Acanthaceae	Shrub	Not evaluated		1
164	<i>Tiliacora acuminata</i> Lam.	Menispermaceae	Shrub	Not evaluated		5
165	<i>Tiliacora triandra</i> (Colebr.) Diels.	Menispermaceae	Herb	Not evaluated		1
166	<i>Tradescantia spathacea</i> Sw. ®	Commelinaceae	Herb	Not evaluated		1
167	<i>Tridax procumbens</i> L.	Asteraceae	Herb	Not evaluated		2
168	<i>Typha angustifolia</i> L.	Typhaceae	Grass	Least concern		1
169	<i>Typha domingensis</i> Pers.	Typhaceae	Grass	Least concern		2
170	<i>Uncaria macrophylla</i> Wall.	Rubiaceae	Herb	Not evaluated		1
171	<i>Verbena urticifolia</i> L.	Verbenaceae	Herb	Not evaluated		1
172	<i>Vernonia amygdalina</i> Delile	Asteraceae	Shrub	Not evaluated		1
173	<i>Vernonia cinerea</i> L.	Asteraceae	Herb	Not evaluated		1
174	<i>Vinca minor</i> L. ®	Apocynaceae	Shrub	Least concern		1
175	<i>Vitex doniana</i> Verdc. ®	Lamiaceae	Tree	Least concern		1
176	<i>Zanthoxylum zanthoxyloides</i> Lam.	Rutaceae	Tree	Least concern		3

Where ® = Cultivated in habitat. Those without the symbols are natural in habitat.



Appendix 7: Ethical Clearance



UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR BASIC AND APPLIED SCIENCES (ECBA)

P. O. BOX LG 1195, Legon-Accra

Ref. No: ECBAS 032/19-20

24th January, 2020.

Ms. Stella Kwami
Institute of Environmental
and Sanitation Studies
University of Ghana
Legon, Accra

Dear Ms. Kwami

**ECBAS 032/19-20: USE AND MANAGEMENT OF URBAN GREEN SPACES: THE
CASE OF CEMETRIES IN THE GREATER ACCRA METROPOLITAN AREA**

This is to inform you that the above reference study has been presented to the Ethics Committee for Basic and Applied Sciences for a full board review and the following actions taken subject to the conditions and explanation provided below:

Expiry Date: 11/01/21
On Agenda for: Initial Submission
Date of Submission: 12/11/2019
ECBAS Action: Approved
Reporting: Quarterly

Please accept my congratulations.

Yours sincerely,

Professor Daniel Bruce Sarpong
ECBAS Chairperson



INTEGRI PROCEDAMUS

Appendix 8: Introductory Letter

GREATER ACCRA REGIONAL COORDINATING COUNCIL

In case of reply the number
and the date of this letter
should be quoted

TEL. +233-

MY Ref. No EHU/GAR/ Gen/vol 10/0

Your Ref. No JZ 206/238/01



REPUBLIC OF GHANA

REGIONAL ENVIRONMENTAL
HEALTH & SANITATION DEPT
REGIONAL CO-ORD. COUNCIL
P. O. BOX MB. 196
ACCRA

27TH AUGUST, 2020

**TO ALL
METROPOLITAN,
MUNICIPAL ENVIRONMENTAL HEALTH OFFICERS (MEHOs)
GAMA**

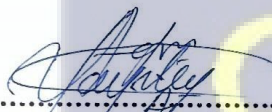
INTRODUCTORY LETTER

I hereby introduce Miss Stella Kwami - A PHD student at the Institute for Environment and Sanitation Studies (IESS) UG, Legon, who is into the study of Green Spaces in the Greater Accra Metropolitan Area of Ghana.

Please give her all the assistance she may need to complete her work.

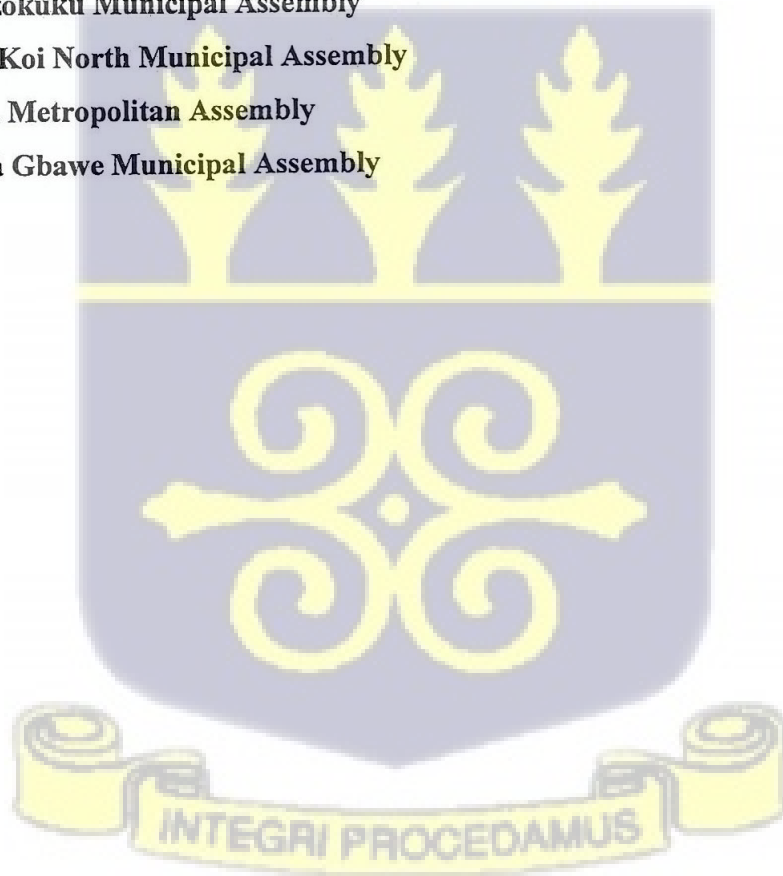
Please find attached the list of Municipal and Metropolitan Assemblies.

Your cooperation please needed.


.....
DOUGLAS N.A. TAGOE
AG. REG. ENV. HEALTH DIRECTOR
GREATER ACCRA



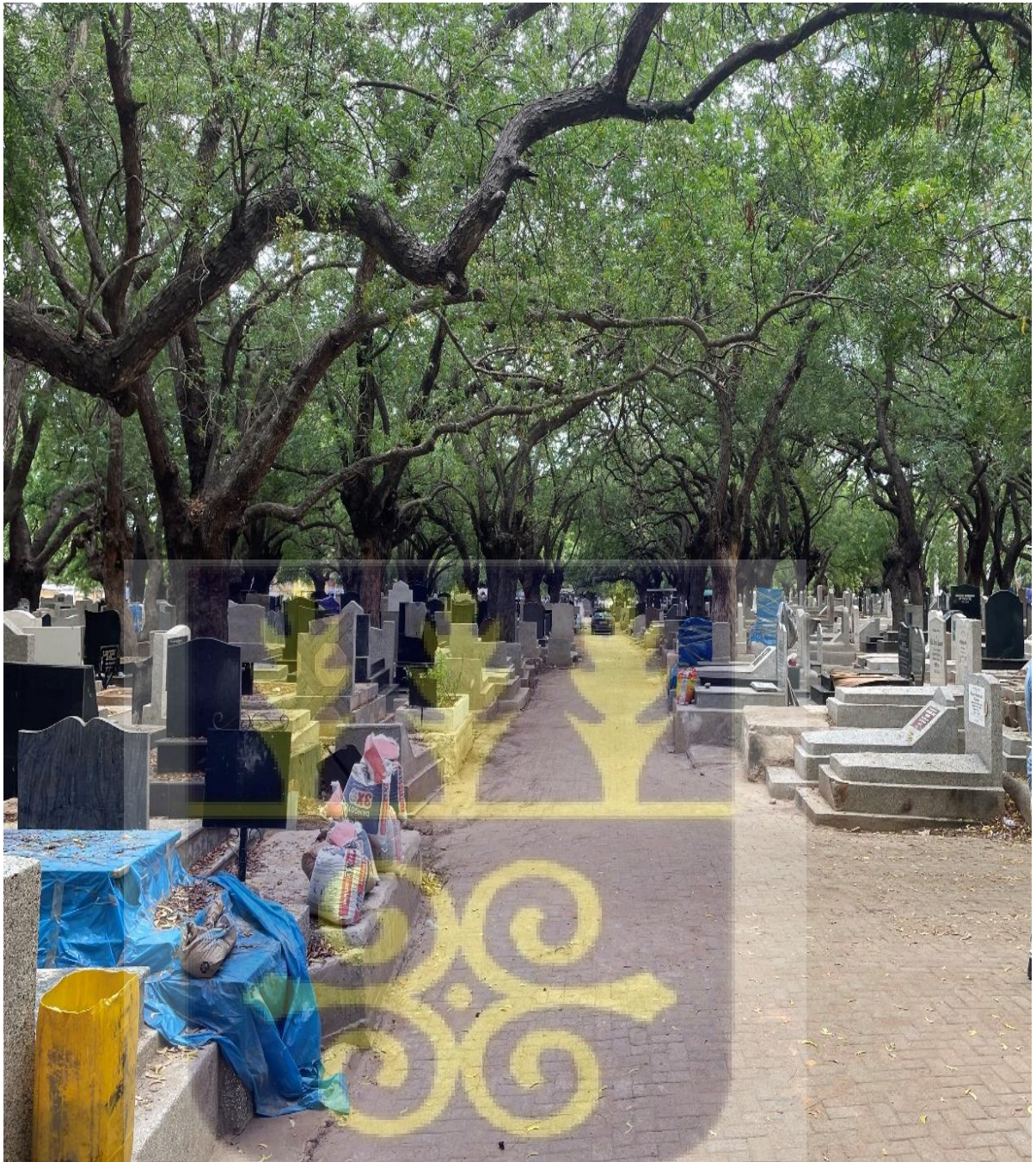
1. Accra Metropolitan Assembly
2. Adentan Municipal Assembly
3. Ayawaso West Municipal Assembly
4. Ga East Municipal Assembly
5. Ga Central Municipal Assembly
6. Ga North Municipal Assembly
7. Ga South Municipal Assembly
8. Ga West Municipal Assembly
9. Korle- Klotey Municipal Assembly
- 10.Kpone – Katamanso Municipal Assembly
- 11.Krowor Municipal Assembly
- 12.La Dade Kotopon Municipal Assembly
- 13.La Nkwantanang Madina Municipal Assembly
- 14.Le Dzokuku Municipal Assembly
- 15.Okai Koi North Municipal Assembly
- 16.Tema Metropolitan Assembly
- 17.Weija Gbawe Municipal Assembly



Appendix 9 Picture of field and Meeting with Traditional Leaders in Oblogo



Appendix 10: Plate showing paved walk way within portions of Osu cemetery



Sections of Osu Cemetery, a public cemetery located within Accra.

