



Master's thesis

MA Degree

How do cultural belief systems of sacred groves contribute to environmental conservation, and what are their specific threats?

A case study of the Gua Koo sacred grove in Pokuase,
Ghana

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FACULTY OF SOCIOLOGY, ANTHROPOLOGY
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Abstract

Increased pressures on land resources in urban areas threaten sacred groves that have survived for centuries as people turn to sacred grove's lands to meet demands for settlement and infrastructure development. This study sought to understand how cultural belief systems of sacred groves are linked to environmental conservation and to identify the drivers that endanger such places using the case study of the Gua Koo sacred grove in Pokuase, Ghana. Findings from the research can help diverse stakeholders understand cultural systems of sacred grove management and use that as a foundation for developing a long-term management plan for biodiversity conservation in Ghana. The research used qualitative methods, involving the administration of semi-structured interviews with 21 interviewees. The interviews demonstrated that in the past, traditional taboos were used to restrict access to the grove and regulate resources. These included forbidden days of entry, social rules that promoted good extractive methods of resources, and fines system for individuals breaking the rules. Presently, although the belief systems are eroding, people still fear shrine areas in the sacred grove and hence abstain from polluting such areas for fear of repercussions from the deities. Again, the land ownership system in Ghana was identified as a major threat to the effective management and land use planning of the Gua Koo sacred grove. One of the key recommendations is that actions for the proper coordination between the custodians of the sacred groves and the public authorities should be improved in terms of land use planning near the forest.

Preface

My sincere thanks go to my supervisors, Helga Ögmundardóttir and Jón Geir Pétursson, for their guidance, encouragement and for critically reviewing my work, which has resulted in the successful completion of this study. I am also thankful to the The GRO Land Restoration Training Programme under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO) for their sponsorship of my Master's Degree and for having sponsored this research. I also thank the Environmental Protection Agency of Ghana for supporting my studies in Iceland.

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1 Introduction

Sacred groves can be defined as landscapes such as water bodies, mountains, and forests acknowledged by local people and communities to be possessing unique spiritual, historical, and cultural values (Soutter et al., 2003). Despite having survived over centuries (Verschuuren, 2010a), anthropogenic activities are quickly diminishing the number of sacred groves across the globe and the overall surface they occupy. Research conducted in Ghana, India, Ethiopia, Madagascar, and China, showed that sacred groves are in danger because of the following factors: land-use change, the disintegration of social taboos, and population increase among other threats (Orlowska & Klepeis, 2018; Poreku, 2014; Ray & Ramachandra, 2010; Shengji, 2010; Soutter et al., 2003).

The Gua Koo sacred grove, which is the case study of this research, seems to unfortunately be no exception. Few studies on the Gua Koo sacred grove located in Pokuase in the Ga North Municipality of the Greater Accra region of Ghana, showed that the sacred grove is currently facing a threat of extinction emanating mainly from human activities (African Development Bank Group [ADB], 2015; Commey, 2018). The researcher lives in the capital city of Ghana (Accra), an area characterized by a high population, limited land (Owusu, 2013), and considered as one of the fast-rising cities in West Africa. It is rare to see forests in Accra, the only forest reserve in the city is in an area called the Achimota forest reserve (Mills-Tuffuor et al., 2020). The Achimota forest is managed by the government (European Commission, n.d.) but undergoing significant anthropogenic pressures leading to the degradation of its forest cover (Mills-Tuffuor et al., 2020). Due to the limited availability of land in Accra, more people are migrating from the city to areas including the Ga North municipality which still has vast stretches of land for urban residential use (Owusu, 2013). An ongoing mega road expansion in Pokuase linking the community to Accra Metropolis has led to a sudden boom in economic activities and estate development and consequently to a high human migration from different parts of the country to the area (Møller-Jensen et al., 2020). Even though the Gua Koo sacred forest is facing various land-use competition, some natural vegetation of the site has been conserved (Møller-Jensen et al., 2020). While there is considerable research on sacred groves management in Ghana, information about sacred groves in periurban areas of Accra is scanty. The Gua Koo sacred grove remains the only surviving

forest in the suburb of Accra (UNDP, 2012), yet the researcher did not find any detailed research about the management systems of the Gua Koo sacred grove and how it is surviving amidst competition from other land uses. The researcher found few news articles and only one report providing information on the Gua Koo sacred grove (ADBG; Commey, 2018; Ran, 2009). Thus, it is essential to determine the prospect of conservation of the sacred forest and the motivation of the custodians of the site to conserve the sacred grove. The study seeks to bridge this information gap. Such information would be crucial for the management of the sacred groves under pressure from urbanization in peri-urban areas of Ghana and elsewhere. The researcher was keen to address the information gap by investigating the perception of diverse stakeholders about the Gua Koo sacred grove and their recommendations for conserving the site. It is noteworthy to mention that the researcher was funded by the GRO Land Restoration Training Program under the auspices of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to carry out this research.

The next chapter provides the objectives of the research.

1.1 Objectives of the research

The overall goal of the study was to investigate the specific threats of the Gua Koo sacred grove as well as the interventions to conserve the site.

The specific objectives of the research are as follows:

- To understand the cultural beliefs and practices associated with the Gua Koo sacred grove that can help conserve the environment.
- To investigate the specific threats that hinder the conservation of the Gua Koo sacred grove in Pokuase in the Ga North Municipality.
- To identify the key stakeholders involved in the Gua Koo sacred grove management and how they interact in the conservation of the Gua Koo sacred grove.
- To provide recommendations for the conservation of sacred groves

1.2 Research questions and the outline of the thesis

This chapter provides details about the research questions that guided the study to achieve the research objectives mentioned above. The following chapter provides a background literature of studies conducted on a similar topic. Thereafter, the method of data collection is presented. Next, the limitations, results and discussions are provided. Last but not least, the recommendations are presented in the conclusion.

The research questions for the research were:

- What are the local rules or systems currently in place for the access and use of the forest resources and what are the implications for the conservation of the Gua Koo sacred grove?
- What are the weaknesses in the management systems employed by diverse key stakeholders in managing the Gua Koo sacred forest?
- What are the specific threats to the conservation of the Gua Koo sacred grove?
- What information do people living around Gua Koo sacred grove have on the fauna and flora that can be found in the sacred grove?
- What benefits do different stakeholders gain from the Gua Koo sacred grove and what are the implications for the Gua Koo sacred grove conservation?
- What measures have various stakeholders taken to support the sacred grove?

2 A review of literature on sacred groves

This section highlights studies that have been conducted by academia in different areas across the globe in the social; cultural, economic and environmental context of sacred groves.

2.1 What is a sacred grove?

A sacred grove is a type of a sacred natural site (SNS) (Aniah & Yelfaanibe, 2016) consisting of all kinds of natural attributes including landscapes such as mountains, hills, forests, groves, trees, water bodies (Verschuuren et al., 2010a). Furthermore, sacred groves could be owned and managed by single households or communally (Doda, 2019). According to Verschuuren et al. (2010a), sacred groves are highly respected and reserved for spiritual or religious purposes. The term sacred has different connotations in different communities, the term is opened for further definitions (Verschuuren et al., 2010a). Simply put, in this context, sacredness means profound respect shown to a site and, it is a place designated for religious activities. Furthermore, the term natural is used to differentiate the sacred grove with sacred areas with minimum or no nature such as mosques, churches, or temples (Verschuuren et al., 2010a). According to Boakye and Baffoe (n.d.), sacred groves can be found throughout Ghana and are often very small in size. Similarly, the model of sacred groves has been found to exist in different parts of the world such as in Tanzania, Nigeria, Ethiopia, India, Italy, etc. (Madeweya et al., 2004; Nascimbene et al., 2019; Orłowska & Klepeis, 2018; Ray & Ramachandra, 2010; Udeagha et al., 2013).

Studies by Boakye and Baffoe (n.d.) and Aniah and Yelfaanibe (2016) showed that usually, a sacred grove comprises a shrine area that is looked after by a shrine priest. According to Opusuo (2016), shrine areas are common in every community in Ghana and can be defined as the home of the spirits of forbears and deities who are worshipped for blessings and consulted for intercessory and spiritual sanctions. Furthermore, Opusuo (2016) mentioned that the deities communicate with humans through the shrine priest. Additionally, Aniah and Yelfaanibe (2016) stated that a shrine symbolizes essential elements of people's beliefs and faith.

2.2 The role of religious actors in sacred grove management

According to Berkes et al. (2000), monitoring the condition of a resource is a familiar practice among several bodies of traditional users, and is usually followed with the monitoring of change in ecosystems. On top of that, Berkes et al. (2000) asserted that the proximity of users to the resource grants a capacity to monitor the daily fluctuations, either by the entire local community or by selected actors, such as community wardens and leaders. For instance, research by Poreku (2014) in the northern part of Ghana showed that the "Tindaana", also known as the 'earth priest', is the spiritual front-runner of a local community. According to Poreku (2014), the 'earth priest' is believed to be the offspring of the first inhabitants in a local community and is familiar with the spirits. Further, Poreku (2014) emphasized that the position of the "Tindaana" is inherited and not by an election process. Moreover, Aniah and Yelfaanibe (2016) stated that in most communities across Northern Ghana, the management of sacred groves and shrines is performed by the "Tindaana". Furthermore, Aniah and Yelfaanibe (2016) and Poreku (2014) mentioned that the "Tindaana" has authority over the land and resource use in sacred groves. Additionally, the Poreku study (2014) showed that the local population perceived sacred groves as rain inducers, which was usually done by a rainmaker in consultation with the 'Tindaana'. Likewise, Boakye and Baffoe (n.d.) stated that in certain instances, the community's fetish priest is the warden of its sacred groves and is frequently allowed partial rights to trade tree products, exclusive of the land; what is more, no one has the right to sell sacred grove lands. Additionally, the study by Poreku (2014) showed that, the local people perceived sacred groves as inducers of rains, which was usually done by a rainmaker in consultation with the "Tindaana".

2.3 Social, economic and environmental context of sacred groves

This paragraph provides an overview of the social codes and belief systems used in the management of sacred groves, how local people benefits from sacred groves and its environmental, social and economic impacts.

2.3.1 Provisioning services and educational services of sacred groves

Some provisioning services and educational value of sacred groves are presented here.

Concerning examples of provisional services provided by sacred groves, Poreku (2014) demonstrated that water in sacred groves is used for domestic purposes and is also consumed by animals. Further, a study by Wahabu (2013) in Ghana showed that a restored sacred grove protects rivers and allows them to constantly flow in an area which helps most communities to extract water for drinking purposes during dry periods. Additionally, a study by Kala (2011) in India, demonstrated that sacred groves can contain several wild edible plants, medicines, firewood, and timber plants. What is more, a study by Wahabu (2013) in Ghana showed that a sacred grove and its shrine served as an educational hub used by schools for research because it contained several species of plants and animals. Furthermore, a study by Adam (2019) in Ghana showed that new traditional priest receives spiritual and herbal medicine training in sacred natural sites. Consequently, Aniah and Yelfaanibe (2016) asserted that the benefits the local people gain from the surviving groves and shrines were the incentive for good actions in safeguarding a shared responsibility for sustaining local resource use in compliance with the set rules and protocols.

2.3.2 The ecological importance of sacred groves

Several kinds of research have shown that different approaches to the management of sacred groves may have supported biodiversity conservation. This paragraph provides some examples of how sacred groves support biodiversity conservation.

For example, according to Shengji (2010), sacred groves often provide a refuge for rare or endangered species and thus serve as a potential niche of gene pools that is useful in the restoration of a degraded environment. Similarly, studies conducted by Khan et al. (2008) and Nganso et al. (2012) in India and Ghana respectively show that many rare and threatened species are found only in sacred groves. Likewise, Bhagwat and Rutte (2018) stated that even though sacred groves may be small in size, they serve as an ecological network in a region. The reason being that a sacred grove can preserve a sizeable portion of the local biodiversity in areas where it would not be possible to receive local support to conserve large regions of protected forests. In addition, a study by Ramachandra and Ray (2010) noted that large sacred groves are often protected by strong community management based on their rich biological diversity and cultural value. On the other hand, smaller groves are underestimated because of their smaller spatial coverage

(Ramachandra & Ray, 2010). On top of that, often smaller sacred groves are often considered remnants of vegetation that are unimportant to support biological diversity and provide little monetary gain (Ramachandra & Ray 2010). However, these vegetation remnants affect the local biological diversity by offering refuge to a substantial number of little organisms such as arthropods, insects, microbes, amphibians, and popular larger animals (Ramachandra & Ray, 2010). Furthermore, Ramachandra and Ray (2010) mentioned that one advantage of these small remnants of sacred groves is that, they can be managed more efficiently at the local level in terms of cost and support. Hence Ramachandra and Ray (2010) suggested that promoting the conservation of smaller groves requires proper monitoring to avoid additional degradation. Moreover, Bhagwat and Rutte (2018) stated that in a town called Madurai in India, clusters of tall flora at different sites are considered sacred and host trees that provide nesting habitat for colonies of fauna such as the Indian flying fox (*Pteropus giganteus*). Notably, a study by Soutter et al. (2003) showed that the spiritual values of people and communities are the core of their obligation to protect their natural environment and constitute an incentive to participate in the conservation of sacred forests. Furthermore, it was concluded by Verschuuren et al. (2010b) that sacred natural sites served as points of resilience, repair, and adaptation to climate change risk and provide prospects for restoring local ecologically friendly lifestyles.

According to Boakye and Baffoe (n.d.), traditional authorities in Ghana use indigenous approaches in excluding anthropogenic activities from sacred groves to maintain the original condition of sacred groves. Likewise, research by Onyekwelu and Olusola (2014) in Nigeria showed that sacred forests were protected using taboos, cultural and religious beliefs, or by pledging the forest to divinities. Among these approaches is the use of taboos that limit human access to the sacred groves, either totally or on certain days (Boakye & Baffoe, n.d.). For instance, Poreku (2014) mentioned that a day of no entry was perceived to be a resting day for the deity, and hence no activities were to be performed in the grove except fetching of water. Moreover, the observance of sacred days helps minimise the exploitation of resources and in the restoration of the natural environment (Anwana et al., 2010).

According to Van Andel (2010), several taboos promote respectful conduct towards medicinal and magical flora in that, no extraction of plants is done at night. Furthermore, the local people have been directed not to cut a whole tree or harvest completely the bark of a tree. Instead, the local people can collect the leaves of sacred trees only with permission from the tree deity (Van Andel, 2010). Similarly, research by Van Andel (2010) stated that the Winti people of Suriname have a strong belief in forest spirits and they have several taboos that prevent over-harvesting. Regarding the extraction of plants from sacred groves, a study by Aniah and Yelfaanibe (2016) on sacred groves in Ghana showed that it is believed that, the negligence of anyone to seek permission from the 'Tindaana' to extract herbal medicine from the sacred grove reduced the power of such herbs to cure any ailments. Hence this helped to check the over-extraction of the resources within the sacred grove and the values connected with each sacred place reinforces the function of the local rules and injunctions mechanism in the local community (Aniah & Yelfaanibe, 2016). Notwithstanding, Poreku (2014) cautioned that the harvesting of the roots and removal of barks hindered the tree growth in sacred groves. Furthermore, Poreku(2014) mentioned that large-scale harvesting of plant parts in sacred groves can destroy plants in sacred groves. Again the study by Poreku (2014) in Ghana showed that animals in sacred groves were considered sacred, hence it was forbidden to hunt or kill them, thus leading to a surge in their population and diversity. What is more, research conducted by Attuquayefio et al. (2007) in Ghana showed that disrespecting taboos resulted in high punishments and penalties for the culprits, and the immense cost of compensation, including the execution of certain rites to avoid any calamities, diseases, and deaths. Similarly, a study conducted by Barre et al. (2009) showed that local people in the northern part of Ghana who broke taboos of sacred groves were fined with a fowl or livestock such as sheep, goat, or cow by the custodian of the grove. Another example, presented by Adom (2019) in a study conducted in Ghana showed that when someone was found to have broken the taboos in a sacred grove, they were charged to provide some items or money to be offered to appease the deity in the sacred grove. Due to the system of fines and penalties, people avoid entering sacred groves to avoid fines (Barre et al., 2009). Likewise, Onyekwelu and Olusola (2014) stated that because of the respect for the deities and the fear of breaking taboos, people

avoided entering sacred groves. Further, a study conducted by Spoon (2010) in Nepal showed that the spirits of sacred forests were angered by environmental degradation such as pollution, deforestation, excavation on land among others. So these values affected environmental decision making including taboos on water pollution and the conservation of several flora species (Spoon, 2010). Even though several researchers have demonstrated that taboos have helped check the impacts of human activities in sacred groves, a study by Attuquayefio et al. (2007) in Ghana showed otherwise. Additionally, Attuquayefio et al. (2007) noted in a study in Ghana that the taboo systems which were effective in deterring people from degrading forest resources seem to be relaxed. Thus negatively affecting native forest bird species and exposing forest for occupation by foreign birds (Attuquayefio et al., 2007).

2.3.3 The social importance of sacred groves

The social values derived from the sacred grove by the local communities are presented here. According to a study conducted by Anwana et al. (2010) in Nigeria, people demonstrate their beliefs through the celebrations of festivals to their deities. A day of the week is observed as sacred for reverence of the deities (Anwana et al., 2010). The festivals demonstrate social bonding and nurture a solid relationship among the local people (Anwana et al., 2010). Further, Anwana et al. (2010) added that the celebrations of festivals served as reinforcement of the traditional beliefs of these local communities. Additionally, a study conducted by Wahabu (2013) highlighted that the celebration of traditional ceremonies helped sustain the relationship between the local people and their ancestors by paying homage to their ancestors and cultural heritage. Moreover, Godbole et al. (2010) noted in a study that temples in India located within the sacred grove are used to discuss important matters for the local community, such as advanced development projects and the execution of a watershed program. Additionally, in a study by Orłowska and Klepeis (2018) in Ethiopia, sacred natural sites such as forested churches are used by local communities for rituals, gatherings, and burial places. According to Orłowska and Klepeis (2018), because church forests are used as places for socialization with neighbors, the local people value the community interaction that sacred groves nurture. Further, a study conducted by Adom (2019) in Ghana showed that the preservation of sacred sites is crucial in preserving the community's identity as they

join the local people spiritually with the souls of their ancestors. Additionally, Adom (2019) demonstrated that the Tanoboase Sacred Natural Site in Ghana represents the early life history of the local people and the designation of the boundary of their land. Further, Adom (2019), mentioned that the local people believed that the continuous blessings and goodwill from the deities and their ancestors depended on their conservation of the sacred grove. Moreover, a study by Udeagha et al., (2013) in Nigeria showed that sacred groves are still used for the crowning ceremony of the paramount leaders and chiefs of some clans in Nigeria and also for the celebration of a masquerade ceremony (Udeagha et al., 2013).

According to Barre et al. (2009), even though sacred grove communities are gradually undergoing social transitioning due to factors such as influence from different religious beliefs, western education, and migration, they are still respected by the local people. Moreover, Barre et al. (2009) explains that sacred groves are recognized as spiritual locations in communities, thus they are protected from destruction. In addition, Soutter et al. (2003) noted that in Ethiopia, the perception of sacred trees has been around for centuries and even after Christianity came along. Once the spiritual importance of the tree is recognized by the community, it is not influenced by the religious setting within which it is situated(Soutter et al., 2003).

2.3.4 Tourism potential of sacred groves

Several studies have highlighted the tourist potential of sacred forests, this paragraph provides an overview of the tourist potential and its impacts studied by researchers. Verschuuren (2010) suggests that tourism can help conserve sacred natural sites if it is used to cultivate respect for places and local people. Speaking about tourism, a study by Ormsby & Edelman (2010) found evidence that the collective income generation from the ecotourism activities motivates the local people to preserve their traditions of forest conservation and protect sacred wildlife. In addition, a study conducted by Adom (2019) in Ghana found that a strong cultural identity of a location helps to preserve the site from all types of degradation. In addition, Adom (2019) said the identity of the places favors ecotourism and the protection of sacred groves against encroachment. Adom (2019) added that the local people were oriented to avoid defiling such places or face the wrath of the deities.

Despite the tourism potential and benefits of sacred groves, some researchers admonished that developing the tourism potential of sacred groves has negative implications. For example, Adom (2019) revealed that some local people complained that the marketing of ecotourism of a sacred grove resulted in more attention given to the biological characteristics of the grove and less emphasis on the place identity. Furthermore, a study conducted by Wild (2010) on the Holy Island of Lindisfarne, a sacred natural site in Britain, showed that increasing interest in the island resulted in a boom of tourists. Following this, Wild (2010) cautioned that a resulting shift of the community's focus to mass tourism and property economy could threaten the local community values. Additionally, a study by Spoon (2010) on sacred natural sites in Nepal highlighted that the impact of tourism in the community, including the unplanned arrival of tourists puts pressure on facilities, and disturbs the local traffic flow.

2.3.5 Sacredness attributed to sacred groves

The perception of sacredness and its gender implications are presented here. Research conducted by Poreku (2014) in Ghana showed that, during their menstruation period, women are prohibited from accessing sacred groves because it is perceived that they may pollute the purity of the place. Similarly, Mohammed et al. (2020) asserted that in some cultures in Ghana, females in their menstruation were forbidden from cooking, taking part in religious activities, and considered unclean and impure. With that said, Poreku (2014) mentioned that these customs and cultural beliefs excluded women from using the natural resource at certain times, except when needed urgently. Similarly, in Suriname, Van Andel (2010) reported that women in their menstrual period were forbidden to touch sacred plants used in herbal medicine because it is believed that breaking this taboo will reduce the potency of the plants. Therefore, when clients suspect that taboos have been broken, they do not buy from the female offenders (Van Andel, 2010).

2.3.6 Threats to sacred grove conservation

This paragraph provides an overview of research into the threats facing sacred groves in different parts of the world. In summary, researchers identified the following factors as the critical causes of sacred grove degradation: influence of foreign religion, low interest

by youth to preserve sacred groves, increase in migration, population increase, the impacts of western culture, encroachment, and urbanization.

For example, Poreku (2014) noted that due to the introduction of religions such as Christianity and Islam in the northern part of Ghana, people no longer practiced some traditional beliefs of sacred groves. Moreover, Aniah and Yelfaanibe (2016) stated that the consequences of the influence of foreign religion led to the abandonment of the cultural beliefs that previously served as successful tools for conserving sacred forests. In addition, Ormsby and Edelman (2010) noted in a study in Ghana that, as foreign religions were introduced in a sacred grove community, the indigenous beliefs began to deteriorate, weakening the incentive to protect sacred monkeys. However, the introduction of ecotourism revived the traditional practices and incentives to protect the monkeys (Ormsby & Edelman, 2010). Moreover, a study by Aniah et al. (2014) showed that local people fall on traditional medicine from sacred groves and soothsayers to probe diseases and occurrences of disasters irrespective of their religious affiliation.

Another threat to sacred grove conservation is deforestation, for example, Aniah and Yelfaanibe (2016) reported in a study in Ghana that deforestation in sacred forests led to the loss of wildlife. Additionally, Ray and Ramachandra (2010) noted that deforestation resulted in forest fragmentation. Forest fragmentation occurs when a large area of forest in a region is reduced and split into two or more parts (Ray & Ramachandra 2010). This situation can result in unfavorable conditions for wildlife, including the exposure of the wildlife habitat to the external world, exposure to worse climatic conditions, resource collapse, the influx of competitors leading to the extinction of a high number of species from the region (Ray & Ramachandra, 2010).

Additionally, Bhagwat and Rutte (2018) noted that eroding beliefs among young people is a threat to the conservation of sacred groves. Bhagwat and Rutte (2018) explained that the establishment of sacred groves is losing its cultural importance for the youth in several countries because the local traditions are confronted with challenges of modifying urban cultures. Another cause of the erosion of the cultural significance of sacred groves among the youth mentioned by Aniah and Yelfaanibe (2016) is the influence of western culture. According to a study by Aniah and Yelfaanibe (2016) in Ghana, many young people are often interested in western cultures, so they see

traditional value systems as negative and against western cultures. Similarly, a study conducted by Orłowska and Klepeis (2018) in Ethiopia showed that the importance of the old practices of sacred forest in churches which involves maintaining old, dense, and indigenous forest near churches is eroding among the youth. Furthermore, Orłowska and Klepeis (2018) added that most young people do not recognize much difference between the respected churches surrounded by ancient, thick forest and those enclosed with few native trees, therefore they think that all churches should receive equal treatment irrespective of the tree cover near them.

According to the study by Godbole et al. (2010), another threat to the conservation of sacred groves is a lack of documentation. Godbole et al. (2010) noted that social codes set by the ancestors for the management of sacred groves were undocumented, making them quickly corrupted according to the needs of the community or self-centered persons in the community.

Again, Adom (2019) identified that the lack of communication and shared planning between stakeholders such as forest park officers, tourism operators, and the local community were hindrances to the effective management of a sacred grove because the local community felt that their voices are ignored. Soutter et al. (2003) similarly noted that another shortcoming of sacred natural sites is the lack of policy support or recognition by government and non-governmental organizations. Despite the above, Soutter et al. (2003) highlighted that the recognition, legalization, or policy support are inadequate solutions since the Kaya sacred forest in Kenya continues to be under threat (conversion to other land uses, disrespect for cultural beliefs), despite being recognized as a national monument. Therefore, Soutter et al. (2003) emphasized the benefits of collaboration between traditional authorities and other stakeholders in sacred grove management. Soutter et al. (2003) cited an example that in acknowledging the potentials of local traditions and customs to conserve sacred groves, the World Wild Life Fund (WWF) carried out inventory and intelligence activities of all sacred forests in an area in Madagascar. In addition, Soutter et al. (2003) mentioned that the traditional authorities approached the WWF for support due to an increasing concern for the conservation of the sacred forest in Madagascar. Following this, the WWF collaborated with the local communities and other government institutions to identify ways of solidifying local

beliefs that were valuable to conservation (Soutter et al., 2003). Moreover, Soutter et al. (2003) noted the challenge faced by WWF was to ensure that these local communities were equipped with adequate knowledge on the management of the natural resources in the sacred forest for a long time amidst high human demands. Given this, Soutter et al. (2003) suggested prolonged mentoring to build the capacity of local communities in conserving sacred groves. Additionally, Soutter et al. (2003) recommended that support should be provided for stakeholders working on sacred groves by connecting their initiative with other international initiatives. Notably, Attuquayefio and Gyampoh (2010) suggested that local people should be employed as community game guards to promote a sense of ownership of projects that conserve biodiversity.

Another threat to sacred groves is the increasing needs of the local people (Soutter et al., 2003). According to Soutter et al. (2003), the custom and cultural beliefs of the Tandroy people of Madagascar were declining as their needs increased, influencing them to continuously encroach on formerly forbidden sacred groves and show less reverence for ancestral beliefs. Furthermore, Boakye and Baffoe (n.d.) noted that other threats such as increasing population parallel with high demand for land for agricultural activities and infrastructural development have resulted in the high encroachment of some sacred groves. Additionally, Khan et al. (2008) stated that some groves are well-preserved with few or no signs of degradation, while others have been seriously affected by the following: farming activities, unauthorized logging, bushfires, housing development, hunting and gathering expeditions, road construction, and mining projects (Khan et al., 2008). Additionally, Shengji (2010) noted that in China, sacred forests face threats of pressures of modernization such as fast economic development, the transformation of forest land into other uses, diminishing sacred forests, and threatening biological diversity.

Last but not least, according to a study by Nganso et al. (2012) in Ghana, the disregard of local values by immigrants is a threat to the cultural values of the sacred grove since immigrants frequently hold on to their own cultures and customs, which might exclude the core values of grove maintenance.

2.4 Environmental assessment in Ghana

This paragraph outlines the environmental assessment process that projects near sacred groves must undertake to comply with the environmental regulations of Ghana. The Environmental Protection Agency of Ghana is the lead public body responsible for protecting the environment in Ghana (Environmental Protection Agency [EPA], 2021a). The EPA was established by the Environmental Protection Agency Act, 1994 (Act 490) and has been given the role of managing the environment and promoting the execution of government policies on environmental issues (EPA, 2021a). Further, the EPA collaborates with other institutions to protect Ghana's environment and find common interventions to global environmental issues. A function of the EPA is to ensure compliance with the environmental impact assessment process in planning and implementing new and existing enterprises (EPA, 2021b). Other functions of the EPA include the issuance of environmental permits to companies and the implementation of standards to control the type, amount, and impacts of pollution and waste produced to maintain a safe environment (EPA, n.d.).

In line with the Environmental Assessment Regulations, 1999 (LI 1652) of Ghana, various projects have been classified in schedules according to the significance of their impact on the environment. For instance, schedule 1 projects which have the least impact on the environment are required to directly register and acquire an environmental permit (EPA, n.d.). However, for schedule 5 projects which are projects to be undertaken in environmentally sensitive areas such as forest reserve and sacred groves, it is compulsory for an Environmental Impact Assessment (EIA) to be conducted (EPA, n.d.). An Environmental Impact Statement (EIS) is prepared by the proponent and submitted to the Agency after completing the EIS process to facilitate decision-making (EPA, n.d.). The EIS is to address the potential direct and indirect consequences of an undertaking on the environment from the following stages of the project: pre-construction, construction, operation, decommissioning, and post-decommissioning stages (EPA, n.d.). The EIS also describes mitigation measures aimed at appropriately addressing the company's environmental impacts (EPA, n.d.). In this context, to comply with the Environmental Assessment Regulations, 1999 (LI 1652), an Environmental Social Impact Assessment (ESIA) was prepared by the proponent of the ongoing road project near the Gua Koo

sacred forest (ADBG, 2015). The road project is under construction on existing roads through the city of Pokuase and connecting other cities including the capital of Ghana, Accra (ADBG, 2015). In addition, the project costs an estimated US\$69 million and is financed by the Government of Ghana and the African Development Bank Group (ADBG, 2015). The goal of the road project is to enhance transportation systems in the urban areas in the Greater Accra Region of Ghana, help reduce vehicular traffic to and from the capital city to the Pokuase and other communities, (ADBG, 2021). In addition, the ESIA noted that the road project will provide various employment opportunities for engineers, food vendors, safety officers, construction workers, etc. (ADBG, 2015).

Certain potential environmental impacts of the road project on the Sacred Forest of Gua Koo have been reported in the ESIA (ADBG, 2015). First, the ESIA reported that oil spillage and other waste generated from the road project can pollute the stream in the Gua Koo sacred grove when there is a runoff (ADBG, 2015). Since the road project is situated close to the sacred grove, it was reported in the ESIA that, the road project will encroach on about 0.096 ha (0.7%) of the sacred forest land (ADBG, 2015). Moreover, vegetation removal from the forest due to road construction can lead to erosion (ADBG, 2015). Thus, the proponents of road construction proposed that all waste generated from the construction phase would be disposed of properly (ADBG, 2015). Further, the ESIA stated that proper drainage and earth engineering will be implemented during the construction phase of the road construction to reduce the impact of runoff (ADBG, 2015). In addition, ESIA said the sacred grove is expected to be reforested in degraded areas of the forest to improve its restoration (ADBG, 2015). According to the ESIA report, the road project has blocked vehicular access to the forest's stream, hence resulting in the inability of commercial water providers to extract water from the stream within the Gua Koo sacred forest (ADBG, 2015). Based on this impact, the proponent of the road project proposed the provision of pumping machines to the commercial water suppliers to enable them to extract water from the stream (ADBG, 2015). Another potential impact of the road project referred to in the ESIA is the disruption of the Gua Koo sacred grove by construction workers (ADBG, 2015). As such, the mitigation measure presented in the ESIA report includes educating workers about the presence of the sanctuary and its importance to the grove (ADBG, 2015). Further, a mitigation measure stated in the ESIA

is to provide funding for the fencing of the sacred grove to prevent intruders from entering the Gua Koo sacred grove (ADBG, 2015).

Consultation is a key element of the EIA process and involves consulting key players that may be affected by a company's operations (EPA, n.d.). Key stakeholders consulted on the ESIA include the Municipal Assembly, commercial water suppliers, traditional authorities, the Forestry Commission, the Environmental Protection Agency, and more. (ADBG, 2015). Also, the traditional authorities consist of the chief and his council of elders and they are the guardians of the Gua Koo sacred forest (ADBG, 2015). According to the ESIA, the traditional leaders must enforce actions that will protect the Gua Koo sacred forest from degradation and ensure that the proponents of the road engineers are respectful of the traditional beliefs and culture of the community (ADBG, 2015). Speaking of the challenges of the EPA, Kasanga and Kotey (2001) observed that the EPA may be unable to function effectively in ensuring compliance due to limitations such as weak structures for enforcement and compliance, lack of qualified staff, and deficient coordination with other agencies.

2.5 Regulation on tree cutting in a forest reserve

The details of the regulation of tree cutting in forest reserves in Ghana are provided under this theme. According to the Forest Protection (Amendment) Act, 2002. Act 624, anybody without permission of a legal Forestry authority that cuts or damages a tree in a forest reserve will face high penalties (Food and Agriculture Organisation of the United Nations[FAO], n.d.). Further, the Forest Protection (Amendment) Act, 2002. Act 624, prohibits farming or constructional activities in a forest reserve without permission of a legal Forestry Authority (FAO, n.d.).

3 Description of the case study and its region.

This chapter provides background information about the region of the study area, the history and culture of the native people living in the study area, the baseline information about the study area, and the land tenure system of Ghana.

3.1 The Greater Accra Metropolitan Area

There are 16 jurisdictions in Ghana, including the Greater Accra Region (The Permanent Mission of Ghana to the United Nations [Ghana Mission UN], n.d.). The Greater Accra region is in the southern part of Ghana and has 29 districts (Local Government Service [LGS], 2015). The map in figure 1 illustrates the partition of Ghana (The Ghana Permanent Mission to the United Nations [The Ghana Mission UN], n.d.).



Figure 1: A map of Ghana and its regions (Ghana Mission UN, n.d.)

The Greater Accra Metropolitan Area (GAMA) is an area encompassing administrative areas in the Greater Accra region comprising the Ga municipalities (Ga South, Ga West, Ga East, Ga Central), the Accra Metropolis, etc. (United Nations Human

Settlement Programme [UN-Habitat], 2020). It was not until 2018 that the Municipality of Ga North was formed out of the Municipality of Ga West (GNMA, 2019b). For this reason, the Ga North municipality is a part of the GAMA. The study area of the research is in the Ga North Municipality, with Accra, the capital city of Ghana located in the Accra Metropolis. The Greater Accra Region has a land size of approximately 3245 km², about 1.4% of the total land cover of Ghana (Ministry of Gender, Children and Social Protection & the United Nations Children's Emergency Fund, n.d.). GAMA is one of Ghana's largest urban centers with a population of 4.6 million, representing about 16.3% of the country's population (World Bank Group [WBG], 2017). It is considered one of West Africa's rapidly growing urban regions, attracting more people, investment, and economic ventures (WBG, 2017). However, unprecedented demographic growth and unplanned spatial expansion have outstripped the city's ability to keep up. Therefore, the GAMA faces challenges such as housing shortages, urban sprawl, informal settlements unconnected to essential city services and infrastructure and traffic congestion can slow the city to a halt (WBG, 2017).

3.2 History of Accra and the land tenure system in Ghana

The United Nations Human Settlement Program (UN-Habitat) presented some details of the history of Accra and the factors resulting in its unplanned spatial expansion in an urban settlement report. The UN-Habitat collaborates with public institutions, NGOs, and communities in Ghana on various projects and programs to improve urban colonization (UN-Habitat, n.d.). According to the UN-Habitat (2020) in the early 15th century, the Ga people migrated from Nigeria and originally settled in Accra plains in Ghana. The predominant commercial activities undertaken by the pioneers of Accra were farming and lagoon fishing (UN-Habitat, 2020). The advent of the Europeans in the 15th century and the subsequent construction of trading posts by the colonial masters in the 19th century boosted the economic importance of Accra (UN-Habitat, 2020). Moreover, in 1877, the substitution of Cape Coast by Accra as the capital city of the British Gold Coast territory (now called Ghana) also contributed to the development of Accra (UN-Habitat, 2009). Following the construction of rail infrastructure to support the mining and agricultural sector, Accra became the commercial center of Ghana (UN -Habitat, 2009). Further, Accra progressed into a key trading center during the slave trade period due to

the nearby forts (UN -Habitat, 2020). After the establishment of Accra as the capital city of Ghana, the British colonial administrators and local people moved to areas near the forts, so the city was expanded to accommodate new migrants (UN -Habitat, 2020). Thus, the borders of Accra were further extended in 1908 with the formation of two native-only regions, to accommodate the native people and reduce overcrowding problems in the city (UN-Habitat, 2020). In addition, Accra developed rapidly at the beginning of the 20th century as a key port for cocoa exports (UN- Habitat, 2020). Also, the availability of running water in Accra attracted more rural migrant populations (UN-Habitat, 2020). Accra has a population of 2475208 and is expected to reach 3632284 by 2035 (UN-Habitat, 2020). According to UN Habitat (2020), physical development in Accra is ahead of planning, and several areas lack basic planning. Some landowners often integrate unplanned developments in the official land-use plan of Accra, leading to chaotic development and slum situations in some areas (UN Habitat, 2020).

Owusu (2013) noted that a percentage of the total population of the Accra Metropolis living within the GAMA has highly diminished while a part of the population in the nearby Ga municipalities such as the Ga East, Ga West, and Ga South had increased gradually.

Further, Owusu (2013) explained that in contrast to other municipalities which are nearly built-up, the Ga municipalities are still equipped with a vast stretch of land for urban residential use. Consequently, future population growth is projected to concentrate in the Ga municipalities (Owusu, 2013).

The land tenure system of Ghana was studied by Kasanga and Kotey (2001). According to Kasanga and Kotey (2001), the customary system owns about 80 to 90 percent of all the undeveloped land in the country (Kasanga & Kotey, 2001). Landowners in Ghana are classified into individuals, families, local communities represented by stools, and first settlers or clans (Kasanga & Kotey 2001). Since land is mainly owned by chiefs and family heads (Owusu, 2013), in the situation where there are very large families as landowners, there are often rifts on how to use the land (UN-Habitat, 2020). A stool can be defined as the seat of a chief of a local community. A stool can be defined as the seat of a chief of a local community (sometimes of a head of a family) which also symbolizes the source of authority of a chief (Kasanga & Kotey, 2001). Flourishing peri-urban land markets were in great demand, with high monetary interest. Furthermore, a study

conducted in Ghana by Aniah and Yelfaanibe (2016) showed that there was often a clash of interest among the traditional leaders and the monetization of the services they provide was a challenge in the management of sacred groves. Additionally, Ubink (2008) reported that the land tenure system in Ghana that offered the traditional chiefs managerial roles in land issues gave them power which allow them to appropriate the local people's interests for entire financial purposes. According to Kasanga and Kotey (2001), in the quest of advancing the maintenance or continuation of the stools, chiefs and their elders require funding to fight for litigation issues in court to secure the local community land from rivals, hence they are pushed to sell or convert agricultural lands for urban development. Peri-urban land markets were in great demand, with high monetary interest (Kasanga & Kotey 2001). Moreover, Aniah and Yelfaanibe (2016) noted that due to the flourishing land markets, there are often clashes of interest among the traditional leaders, and the monetization of the services they provide was a challenge in the management of sacred groves. Also, Ubink (2008) reported that the land tenure system in Ghana that offered the traditional chiefs managerial roles in land issues gave them the power to appropriate the local people's interests for entire financial purposes. According to Kasanga and Kotey (2001), in the quest of advancing the maintenance or continuation of the stools, chiefs and their elders require funding to fight for litigation issues in court to secure the local community land from rivals hence some landowners are pushed to sell or convert agricultural lands for urban development. Also, Kasanga and Kotey (2001) also noted that the land tenure system worked flawlessly well before the colonization of Ghana. The advent of colonialism resulted in the allocation of Accra as the capital city of Ghana resulting in pressure on the land systems (Kasanga & Kotey, 2001). In addition, Acheampong (2016) noted that after the colonization of Ghana, cases of corruption and exploitation of chiefly power, particularly with regards to the sale of lands, were common incidences reported daily in the media. Moreover, Kasanga and Kotey (2001) asserted that increasing urbanization, population increase, and land use for commercial and industrial purposes have strained the land delivery system in Accra to the verge of collapse. Thus, to fulfill the increasing demand for land to meet the needs of the State for infrastructural development in the GAMA, some pieces of land was forcibly acquired by the government for the public interest (Kasanga & Kotey, 2001). The inability

to cope with demand pressures and the overshadowing of state land management institutions over the traditional sector has slowed the development of the traditional systems and hindered them from effectively managing their lands (Kasanga & Kotey, 2001). Further, Acheampong (2016) noted that conflicts of land ownership issues in Ghana varied from place to place and attributed them to political influence, lack of transparency and accountability by the traditional leaders, disputes over who succeeded the chieftaincy stool, and land litigation.

Another problem of the land tenure system highlighted by UN-Habitat (2020) is the complex process of land registration in Ghana. For instance, UN-Habitat (2020) reported that land registration and building permit procedures are very long and take about a year. Further, land registration is an expensive process because it can cost roughly half the cost of the land to register and acquire permits. As a result of this challenge, potential landowners are discouraged from acquiring licenses before the construction of their properties (UN-Habitat, 2020).

According to the Local Governance Act, 2016 (Act 936), the District Assembly is the legitimate body to oversee the development, enhancement, and management of anthropogenic settlements and the environment within a district (LGS, 2016). However, there is a limitation in their land-use planning systems, because the lands are owned privately under customary institutions, whereas planning issues are implemented by the local government usually having limited or zero control over the ownership and acquisition of land (Owusu, 2013). According to Owusu et al. (2012), unsuccessful coordination, and communication between customary landowners and public planning institutions resulted in instances where chiefs and others use the land for purposes different from the land planning scheme set by public planners. Therefore, the UN-Habitat (2020) calls for the establishment of a local supervisory capacity to monitor and manage land management issues, planning, environmental management, and infrastructural structural development. According to UN-Habitat (2020), this would involve a dynamic partnership with the central government, financial actors, customary landowners, and institutions towards an appropriate concept for managing green and robust built-up areas (UN-Habitat, 2020).

3.3 The Ga North Municipality

The Ga North Municipality is at the northern part of the Greater Accra Region of Ghana between the following geographical location: latitude 5 ° 37'0 N and 5 ° 42'14 N, and longitude 0 ° 19'31W and 0 °13'42W and covers a total land take about 636.28 square km (Department of Geography, the University of Legon as cited in GNMA, 2019b, p.4). The municipality is bordered in the south by the Accra Metropolitan Area (GNMA, 2019b).

Furthermore, the Ga North is the administrative body enforced to exercise political and administrative functions in the municipality (GNMA, 2019c).

3.3.1 Geology and the soils of the municipality

According to the Ghana Statistical Service (GSS) land in the Municipality contains shallow rocky soils and is considerably developed on the sharp slopes of the Akwapim range (GSS, 2014). The soils in the Akwapim ranges are characterized by pale and sandy with rough quartzite found to the upper boundary in many places (GSS, 2014). The geological background of Pokuase (the study area) is hilly and rocky, making it a viable locality for sand and stone extraction. Indeed, the prevalence of mining and quarrying of large deposits of sand and stone materials by large and small-scale operators has contributed to the growth of the construction industry (Darko, 2014).

3.3.2 Climate, Hydrology and vegetation

The average yearly rainfall figures of the Go North Municipality vary between 790mm on the coastal parts and 1270mm in the high North (GSS, 2014). The mean yearly temperature figures vary between 25.1°C in the month of August and 32.1°C in February and March (GSS, 2014). The municipality is also entirely located in a coastal scrub and grassland ecological zone (GSS 2014). Two rivers traverse the Pokuase area, namely the Ama Sunkwa and Nsakyii rivers(Møller-Jensen et al., 2020).

3.3.3 Population

A national population and housing, survey in 2010 showed that the municipality's population was 101,552 and with a growth rate of 4.2% (GNMA, 2019b). According to GNMA (2019b), the growth rate of the Ga North Municipality was more than both the regional and national growth rates at about 2.5% and 2.5 % individually. Following this estimation, it is projected that the municipality will experience a swift increase in the

pressure on existing services and resources if population issues are neglected (GNMA, 2019b). The Ga North Municipality has fifty-nine (59) local communities (GNMA, 2019b), and the Pokuase community has a population of about 14223 (GSS, 2014). The population composition of the municipality is composed of about 49% men and 51% women (GNMA 2019b).

3.3.4 The Cultural practices of the native people of Pokuase.

The Homowo festival is one of the big traditional ceremonies of the Gas celebrated yearly as a symbol of harvest and the commencement of the new year (Campbell, 2017). The Homowo festival is celebrated by the local people in remembrance of overcoming a time of famine in their past (Nortey, 2019). Nortey (2019) recounted that the ancestors of the Ga people encountered severe hunger while migrating to their current settlement. Nevertheless, they were resilient and farmed their land by planting corn and sought blessings from their deities and ancestors. Ultimately, their prayers were answered with rainfall, which yielded a bounty harvest (Nortey, 2019).

3.3.5 Economic activities and Tourism in the municipality

The most common activities in the Ga North Municipality are trade, manufacturing, and processing, whereas transport and agriculture activities are lower (GNMA, 2019b)

Until the early 1980s, the primary occupation of the people of Pokuase was agriculture. Nearby areas were croplands, and the composition of the population was almost entirely Gas (Møller-Jensen et al., 2020). However, throughout the 1980s and early 1990s, the composition of the population gradually changed as demographic growth led to an increasing density of people in the old town. Further, the prevalent mining and quarrying of large deposits of sand and stone materials contributed significantly to the growth of the construction industry, and a small commercial center was developed in the area (Møller-Jensen et al., 2020). During this time, the chiefs began to sell the land, and also the construction of a gated estate community began. As previously indicated, a large-scale highway interchange began in Pokuase in 2018, expected to be completed in 2021 (Møller-Jensen et al., 2020). The goal of the road project is to assimilate Pokuase and other towns into the Accra cluster (Møller-Jensen et al., 2020). Although, the road construction phase has made access to the community difficult (Møller-Jensen et al.,

2020). According to Møller-Jensen et al. (2020), the road expansion project encouraged more investment and private estate developers in the area. Thus, the continued development of estates neighborhoods in Pokuase is shifting the composition of the population because people from various parts of the country are settling in the area (Møller-Jensen et al., 2020). The municipality has the following historical tourist areas: the sacred Gua Koo Grove, the Okaikwei Shrine, and the Omanyia Forest (GNMA, 2019b). The Ga North Municipal Assembly stated that if these tourism areas are well developed and commercialized, they can attract more tourists to the municipality (GNMA 2019a). The proximity of the Ga North Municipality to Accra advantageously positions it for business opportunities and other economic activities, ranging from services, trading, commerce, manufacturing, and tourism, leading to high migration (GNMA, 2019b).

3.3.6 Some challenges of the Ga North Municipality

Due to densification in the municipality, there is a high demand for water facilities in the Ga North Municipality (GNMA, 2019b). Some of the communities in the municipality do not have access to potable water (GNMA, 2019b). As a result, most rural communities rely on a surface water treatment plant, while some households also rely on hand-drilled wells and boreholes (GNMA 2019b). Further, the Sunkwa stream, which previously crosses the highway at the point of the new interchange, has been encroached resulting in flooding in the area during heavy rainfall (Møller-Jensen et al., 2020).

The problem of waste management represents another challenge for the municipality (GNMA, 2019b). A study conducted by Napari and Cobbinah (2014) in Ghana showed that an increase in plastic waste littering observed in some central business areas of Ghana was attributed to the explosion of hawkers who were mainly immigrants and food vendors in the city. A cause of the waste management problem in the Ga North Municipality is the lack of landfill sites for the disposal of waste (GNMA, 2019 b). According to the UN-Habitat (2020), most District Assemblies in Ghana are incapable of mobilizing enough revenue for providing urban amenities and infrastructure development, so they mostly look up to the central government for financial support for most of their projects. In consequence, the central government influences the level of development of district assemblies and municipalities

3.4 Description of the Gua Koo sacred grove and its importance

The Gua Koo sacred grove is located in Pokuase in Ga North Municipality (Møller-Jensen et al., 2020). According to the UNDP, the sacred grove is a part of a greenbelt that surrounds the capital city of Ghana (UNDP, 2012). The Gua Koo sacred grove is estimated at approximately 14 hectares (ADBG, 2015) and is the only persistent dry and semi-deciduous forest on the outskirts of Accra (UNDP, 2012). According to a study conducted by Commey (2018) on the sacred grove, a prominent traditional leader said that the sacred grove dates back hundreds of years. The sacred grove is the home of the Gua deity who is supposed to be the guardian of the local people of Pokuase (ADBG, 2015). Gua is believed to be a blacksmith who provides the local people with agricultural and hunting tools when they request them (ADBG, 2015). Commey (2018) stated that a member of the traditional authorities accounted that, the Gua deity was helpful to the community during a period of war in their history. So the Gua deity is celebrated annually, one week after Easter to celebrate the restoration and survival of the local people after the period of war that occurred in the 17th Century (ADBG, 2015). For instance, during the celebration of Homowo festival, the chief priests and the local population perform rituals to venerate the deity and ask for goodwill (ADBG, 2015). According to Commey (2018), the Gua was the principal god of the native people during their migration from a foreign country to their first settlement in Ghana. In addition to this, Commey (2018) reported that the Gua is regarded as a thunder and lightning deity who is a protector and provider for the deprived. The Gua Koo sacred grove is owned by the natives of Pokuase and the Pokuase Traditional Authority is the traditional custodian of the grove (ADBG, 2015). In addition, the Gua Koo sacred grove is under the control of the Ga North Municipal Assembly who passed a resolution to protect the forest from further environmental degradation (ADBG, 2015).

In particular, the Gua Koo sacred grove has a shrine, the northern part of the forest area is degraded and the western part is bordered by the main road in the process of expansion (ADBG, 2015). The sacred grove is sandwiched by facilities and infrastructure, which is slowly degrading and shrinking in size through encroachment (ADBG, 2015). According to Ran (2009) in the past, the United Nations Education, Scientific, and Cultural Organization (UNESCO) recognized the unique value of the

Pokuase culture and the Gua Koo sacred grove. The site is also known to be a forest reserve (Ran 2009). The Sunkwa stream takes its source from the Gua Koo sacred grove (ADBG, 2015). Moreover, it serves as a source of livelihood for commercial water suppliers and is used by the local population for household purposes (ADBG, 2015). The Sunkwa stream flows towards the southwestern parts of the sacred grove and across the road project zone to join a river called the Nsakyii River (ADBG, 2015). The river flows into a large river called the Densu (ADBG, 2015). What is more, the Densu River is an important source of water, which feeds into a dam called the Weija dam that serves roughly half the population of the Accra Metropolitan Area (Water Resource Commission, 2021). Commey (2018) reported that through interviews with the local people, it was revealed that while nearby water bodies will dry during drought, the stream in the sacred grove will continue to flow to serve the town and its surroundings.

The sacred forest is a relic of a region that used to be rich in diverse flora (ADBG, 2015). Regarding the plant species in the sacred grove, the ESIA report stated that the sacred forest has an emergent open canopy and underneath the canopy are very dense climbers, twine, and ropes of plants (ADBG, 2015). Further, the ESIA stated that the common flora that can be found in the Gua Koo sacred grove include the following (ADBG, 2015): "Onyina (*Ceiba pentandra*), Mahogany (*Khaya senegalensis*), Odum (*Melicia eselsa*) and Wawa (*Triplociton scleroxylum*), Lucina (*Leucaena leucocephala*), Cassias (*Cassia sp*), and Teak (*Tectona grandis*)" (Sections.4.2.2-4.3.3). Particularly, the sites near and along the Sunkwa stream are waterlogged with plant species, including oil palm (*Elaeis guineensis*) and ferns (ADBG, 2015). Concerning animal species in the sacred grove, the ESIA report showed that the site is used as an eating, mating, breeding, and resting place for different species of birds which are the predominant fauna in the grove (ADBG,2015). Moreover, the forest which formerly served as a habitat for a variety of species of wildlife presently supports only a few numbers of the former animals that lived in the past. At present, species diversity and abundance in the sacred grove are very low (ADBG 2015). A list of animals found in the Gua Koo sacred grove is shown in table 1.

Table 1: A list of fauna found in the Gua Koo sacred grove (ADBG, 2015).

| Common Name | Scientific Name |
|-----------------------------|-------------------------------|
| | |
| <i>Mammals</i> | |
| Giant Gambian Rat | <i>Cricetomys gambianus</i> |
| Ground Squirrel | <i>Euxerus erythropus</i> |
| <i>Avifauna</i> | |
| Cattle egret | <i>Babulcus ibis</i> |
| Black kite | <i>Milvus migrans</i> |
| Blue-billed malimbe | <i>Malimbus nitens</i> |
| Little Green Woodpecker | <i>Campethera maculosa</i> |
| Pied Crow | <i>Corvus albus</i> |
| Senegal Coucal | <i>Cebtropus senegalensis</i> |
| Northern Black Flycatcher | <i>Malaenornis edoloides</i> |
| Village weaver | <i>Ploceus cucullatus</i> |
| Velvet-mantled drongo | <i>Dicrurus modestus</i> |
| <i>Reptiles</i> | |
| Agama lizard | <i>Agama agama</i> |
| <i>Invertebrates</i> | |
| Praying Mantis | <i>Mantis religiosa</i> |
| Dragonfly | Unidentified |

Some environmental challenges of the sacred grove are encroachment by farmers, quarrying along its borders (UNDP, 2012), and encroachment by estate developers (Ran, 2009). The issue of selling the Gua Koo sacred grove land by some chiefs to estate developers was also reported in the media by Appiah (2009). According to the media report, the residents of Pokuase petitioned the then Minister of Environment to help save the sacred grove because they had seen construction vehicles clearing parts of the forest that was believed to have been sold to a construction company (Appiah, 2009). Appiah (2009) also reported that one of the traditional authorities had sold the land to the developer. Following this, the Pokuase Traditional leaders called upon the government to intervene to reclaim the forest from the developers (Appiah, 2009).

Some organizations have in the past worked with the local communities to conserve the Gua Koo sacred grove. For example, more than a decade ago, a Non - Governmental Organization (NGO) called the Rain Forest Network worked with the local communities to organize campaigns to keep encroaches away from the site. The NGO has enhanced the capacity of traditional authorities and community youth to conserve the sacred grove and establish environmentally sound practices at the site (Ran, 2009). Furthermore, in 2013, the Friends of the Earth NGO and the UNDP supported the traditional authorities to establish a buffer zone around the forest, and the local

communities were trained in fire fighting and sustainable land management practices (UNDP, 2012).

4 Methods and materials

This chapter explains the methods used for the data collection and how the data was analysed.

4.1 Qualitative method

A qualitative approach was used for this study to generate descriptive information of people's own written or spoken words and observable behavior (Taylor et al., 2016). Qualitative research was preferred because it develops insights and draws meaning from patterns in the data, rather than gathering data to evaluate defined theories (Taylor et al., 2016). A case study approach was used for the research to generate a deep explanation and analysis of the selected case (Creswell, 2013).

The following methods were used in this order for the data collection and analysis:

- Desk stop studies
- Purposive sampling
- Snowball sampling
- Theoretical sampling
- Participant observation
- Coding and data analysis

Following the guidelines of Taylor et al. (2016), personal memoranda, reflection notes and analytical notes were prepared to comment on the researcher's personal feelings regarding key findings and additional data to be collected. A camera was used to take pictures and videos of the activities observed during the participant observation in the Gua Koo sacred forest. Furthermore, a tape recorder was used to record most of the interviews. The researcher thought that she was taking up the time of the interviewees, in fact, it was during the COVID-19 pandemic, with several national education on the disinfection of hands and the wearing of nose masks. Thus, the researcher thought the right thing to do would be to offer some surprise gifts such as handmade reusable no masks and hand sanitizers only after the interviews. Lunch was occasionally offered to some of the interviewees. Gifts were offered to interviewees only after interviews to minimize situations in which interviewees provided responses that impressed the researcher.

4.2 Phases of the research method

The researcher employed primary and secondary sources for the data collection. The semi-structured interviews and participant observation helped to produce primary data, while desk studies helped to obtain secondary data.

4.2.1 Desk stop studies

The first step involved conducting desktop studies from the internet on existing literature on sacred groves to gain secondary data about the topic.

4.2.2 Interview guide and Semi-structured interviews

The second step of the research method involved preparing an interview guide and setting semi-structured questions containing a list of topics and open-ended questions linked to the research. The interview guide is in Appendix A. A semi-structured interview was selected to ensure a flexible and dynamic interaction, allowing the researcher to give more opportunities for the responders to express their views (Bryman, 2008). The interviewee questions were tailor-made for the various categories of interviewees. Subsequently, the interview questions were constantly reviewed after each interview and adjusted according to other emerging themes or issues. The interview questions did not follow a rigid course instead, the questions were expanded and amended as the researcher conducted new interviews (Taylor et al., 2016). In addition, the researcher scrutinized for details, specific descriptions, follow-ups on issues that emerged by asking specific questions and pressing for an explanation as suggested by Taylor et al. (2016). The interview questions were roughly eighteen in total. This entailed issues such as the history of the Gua Koo sacred grove, the ownership of the forest, the belief systems, the drivers of degradation, management issues, and recommendations for conserving the site. The interview questions are in Appendix B. Additional questions were asked on demographics such as age and occupation. The researcher presented herself to most interviewees (especially the forest users) as a student from the University of Iceland. The researcher felt that this approach would encourage the interviewees to express themselves freely and not consider the researcher as an expert or a spy probing into their activities. For instance, Bruan and Clarke (2013) cautioned about what image a researcher should present of him or herself to an interviewee. According to Bruan and

Clarke (2013), a poor introduction can lead to hierarchical issues that can influence the research and lead to the interviewees perceiving the researcher as an expert. On the other hand, the researcher presented herself to public officials as an EPA worker and a student of the University of Iceland. According to Braun and Clarke (2013), a young researcher can feel intimidated or vulnerable when interviewing people of high societal status. Thus, the researcher perceived that this presentation creates a level of a same playing field for everyone to interact freely.

4.2.3 Sampling

The next step was to sample interviewees for the interviews. The study used a variety of sampling methods to select the individuals interviewed. The following activities and landmarks aided the researcher in identifying the target interviewees: signposts, the uniforms worn by Forestry Commission staff, residential structures at the fringes and within the forest, and interviewees involved in commercial activities of interest.

First, purposive sampling enabled the researcher to select respondents with characteristics of particular interest, which may help answer the research questions (Braun & Clarke, 2013). The researcher went to the study area and asked random people where to find people with such characteristics. Next, the snowball sampling method helped to build the pool of interviewees. In snowball sampling, the interviewees help the researcher to find more interviewees by introducing him or her to their acquaintances (Taylor et al., 2016). Lastly, theoretical sampling helped in building the pool of informants. In theoretical sampling, after the completion of interviews with several interviewees, the researcher intentionally diversifies the type of interviewees until he or she has identified a wide range of opinions (Taylor et al., 2016).

4.2.4 Interviewees

In all, twenty-one (21) interviewees were used for the analysis for the research. The interviewees comprise twelve (12) forest users, one (1) interviewee from a Civil Society Organisation (CSO), three (3) interviewees from traditional authorities, one (1) resident in the Gua Koo sacred grove, and four (4) public officials. The characteristics of the various interviewees are shown in table 2.

Table 2: A table showing pseudonyms of the interviewees and some demographic information.

| Category | Pseudonyms of interviewees | Gender | Occupation | Age (yrs) | Reason for selection |
|-------------------------|-----------------------------------|---------------|-----------------------------------|------------------|---|
| Traditional authorities | <i>Traditional leader 1</i> | M | Artist | 50-55 | Regarded as custodians of the Gua Koo sacred grove |
| | <i>Traditional leader 2</i> | M | Traditional leader | 55-60 | |
| | <i>Yoomo</i> | F | Traditional leader | 70-75 | |
| Resident | <i>Mechanic</i> | M | Mechanic | 20 | interviewee resides and works within the sacred grove |
| Public authorities | <i>Forestry</i> | M | Forestry Commission officer | 30-35 | Part of a team that monitors tree health and growth in the forest |
| | <i>MA</i> | M | officer at the Municipal Assembly | 30-35 | Works on tourism issues in the Municipal Assembly |
| | <i>EPA officer</i> | M | EPA officer | 30-35 | Works at the EPA and conducts environmental auditing assessments of projects in the area. |

| | | | | | |
|--------------|-------------------------|---|-------------------------------|-------|--|
| | <i>EPA officer 2</i> | F | EPA officer | 40-45 | Works on issues of natural resource management |
| CSO | <i>Agro</i> | M | Operates an NGO | 62 | Operates an NGO that organises environmental awareness programmes for forest users and residents in the Gua Koo sacred forest. |
| Forest users | <i>Lady Tia</i> | F | Nurse | 31 | Lives near the Gua Koo sacred forest |
| | <i>Seller 30</i> | F | Trader | 52 | Lives near the Gua Koo sacred forest |
| | <i>GL</i> | F | Herbalist | 35 | Lives near the Gua Koo sacred grove |
| | <i>Secuirty officer</i> | M | Security officer | 40-45 | Works as a security officer on the road construction project near the sacred grove |
| | <i>Ludo</i> | M | Working for a tolling company | 28 | Works for a towing service company, interviewee |
| | <i>Mame N</i> | F | Nurse | 46 | Lives near the forest |
| | <i>Shocki</i> | F | Food vendor | 50-55 | A food vendor near the forest |
| | <i>Taxi driver</i> | M | Taxi driver | 45 | Taxi driver in the Pokuase community |

| | | | | | |
|--|---------------------|---|-----------------------------------|-------|--|
| | <i>Hair woman</i> | F | Trader | 35-40 | Lives near the forest |
| | <i>Kenkey woman</i> | F | Food vendor | 50-55 | Sells food near the forest |
| | <i>Mr. Fair</i> | M | Works with a Transportation Union | 40-45 | Has a shop near the forest |
| | <i>Waterman</i> | M | Commercial Water provider | 28 | Extracts water from the stream in the forest |

The forest users selected were people living on the fringes of the sacred grove, shop owners near the grove, commercial water providers who extract water from the Sunkwa stream, etc. The forest users were interviewed to know their perspective on the local beliefs of the sacred grove, the types of flora and fauna in the sacred grove, and their recommendations on how to conserve the Gua Koo sacred grove. A research assistant was hired to help interview the forest users. The three sampling methods described above were used to build the pool of interviewees. The interviews were held in the shops and homes of the interviewees. Based on the respondents' preferred language, the interviews were either conducted in Twi or Ga, which are local Ghanaian languages.

An officer of a non-governmental environmental organization was interviewed for his long involvement in advocating for the conservation of the sacred forest. The interviewee was selected via snowball sampling. Additionally, the interview was conducted in the English language and at the Gua Koo sacred forest.

The public authorities' category refers to interviewees from the Environmental Protection Agency of Ghana (EPA), the Municipal Assembly, and the Forestry Commission of Ghana (FC). The three institutions have their offices within the Ga North Municipality. The interviews were conducted in English and face-face interviews were conducted in the offices of the interviewees. The snowball and purposive sampling were used to select one interviewee from the Municipal Assembly. The Municipal Assembly was selected because it is the legitimate body that oversees development and land use planning within the municipality (LGS, 2016). The questions covered in the interviews were: how the Municipal Assembly is involved in the management of the sacred grove and what are their

challenges? It would have been useful to interview an officer from the land use planning department. The perspective from the department would have contributed information on the land use planning related to the Gua Koo sacred grove and its immediate surroundings, as well as the enforcement of encroachers on the sacred forest. Unfortunately, the officer in charge declined to participate in the interviews. Notwithstanding, since the researcher is currently a program officer at the Environmental Protection Agency of Ghana, she used her networks to gain access to another interviewee from the Municipal Assembly. The second interviewee was responsible for tourism development in the municipality, so he provided information on tourism planning issues. Furthermore, two officers from the Environmental Protection Agency of Ghana were selected using snowball and purposive sampling. The EPA was selected to provide information on the environmental assessments of projects close to the sacred grove and the compliance of some commercial activities near the site. One of the interviewees was unavailable for a face-to-face interview, so, the questions were emailed to her. The researcher later received a response via email. Additionally, two officers from the FC were selected through snowball and purposive sampling. The FC was selected because it is responsible for overseeing the utilization and conservation of resources from the forest and the organization of policies related to them (FC-Ghana, n.d). The interview questions covered the following issues: the tasks of the forestry staff in the Gua Koo sacred grove, their challenges, and how the Forestry Commission coordinates with other stakeholders in managing the sacred grove. Consequently, a face-to-face meeting was held with only one of the interviewees. On the other hand, a face-to-face meeting with the other interviewee was impossible due to his busy schedule. Following this, the questions were emailed to the interviewee, to which he responded with scanned handwritten notes. The handwritten notes were illegible, and the interviewee failed to send a clear copy after several reminders resulting in its exclusion from the analysis.

4.3 Participant observation

The researcher conducted field observations in the forest and acted as both a passive and active observer. Following the guidelines Taylor et al. (2016), field notes were taken during the visits to the forest on the following: descriptions of the setting, people, events, conversations, the researcher's action, and feelings. For instance, participant

observation was conducted in the shrine area of the sacred grove with a traditional leader given the pseudonym, *Traditional leader 2*. During the participant observation, the researcher asked questions about some of the activities observed. The questions covered the following issues: rituals performed at the shrine, encroachment issues, and how the traditional authorities have supported the conservation of the Gua Koo sacred grove. Another participant observation was organized in the sacred grove with the interviewee working with the NGO given the pseudonym *Agro*. The date for the field observation was chosen to deliberately coincide with a litter clean-up activity organized by *Agro* in collaboration with some forest users. Notes were taken on the interactions, body language, gestures observed during the activity. The interviewee showed the researcher trees that he has planted in the forest. Additionally, the interviewee led the researcher to the encroached areas in the sacred grove.

4.4 Data analysis

After the interviews, the data was analysed. First, the audio recording of the interviewees was played on several occasions and transcribed. Interviews carried out in local languages were translated into English. Interview data were coded to identify themes that contributed to answering the research questions. Open coding is the initial coding process in a grounded theory (Taylor et al., 2016). In the grounded theory approach, theories are generated from the interview data based on interpretation and induction (Taylor et al., 2016). Next, the interview data were coded using the comment function of Microsoft Word. Interview data were read several times and preliminary codes were generated from portions of the data that described emerging themes. After the open coding, targeted coding was done by focusing on the important themes recognized in the open coding (Taylor et al., 2016). Once the themes were listed, they were lumped together under a larger heading. In addition, both supportive and non-supportive statements by interviews regarding the coding category were noted. In the opinion of Taylor et al. (2016), searching for non-supportive statements are useful to gain a better understanding of respondents' views. Data mapping was then carried out to examine the significant issues that emerged from the data and to establish linkages between the themes developed referred to in Braun and Clarke (2013) and Esterberg (2002).

4.5 Limitations and ethical considerations

This paragraph provides an overview of some of the limitations encountered in data collection and analysis and ethical considerations during the data collection process. First, the research is a case study of the Gua Koo sacred grove, so there is a chance that the sacred grove studied is not a total representative of other sacred groves in Ghana or elsewhere. Additionally, the sample size of the interviewees is only 21, thus the results should be treated with caution. Nonetheless, the researcher found the case study method of concentrating on a few key issues to fully understand the complexity of the case (Creswell, 2013).

Secondly, the researcher struggled to access some key informants from the Municipal Assembly's Land Use Planning Department. Some of the officers were reluctant to share information about the sacred grove. It would have been valuable, for instance, to connect the views of the Physical planning Commission of the Municipal Assembly with the issues of encroachment and unplanned development in the sacred grove area, so the absence of interview from the Physical Planning Commission leaves an information gap. However, another officer of the Municipal Assembly in charge of tourism issues was willing to participate in the interviews and gave information on the tourism planning of the Municipality that was valuable in connecting with different views.

Thirdly, there was an inadequate follow-up of the interviews given the busy schedules of some of the interviewees. For example, the interviews began in August, when the Ga people celebrated the Homowo Food Festival. The traditional authorities are key players in the ceremonies and therefore were busy during this period, making it difficult to meet with them. Moreover, the interviews continued until October and November 2020, which were the campaign period for the national presidential and parliamentary elections of December 2020. Since the traditional leaders serve as important stakeholders for politicians in their campaign to garner support ahead of the elections, it affected the possibilities of meeting traditional leaders frequently.

Another limitation of the research is that the researcher did not sufficiently probe certain responses leading to information gaps. However, some of the interviewees were approached to provide more information on responses provided. In two instances, the research questions were e-mailed to officers who were not readily available. The

disadvantage with this process is that the researcher was unable to observe the gestures of the interviewees and probe their responses further.

Furthermore, there may be slight changes when translating interviews from local languages into English. However, errors were minimized because the researcher understands the local languages. Moreover, the research assistant hired for the research is also fluent in the native language, so he assisted with translation.

Additionally, in any qualitative research, the researcher cannot divorce him or herself from subjectivity, because the background and values can influence the interpretations and findings of the study (Taylor et al., 2016). Since the researcher works for the EPA, she may be influenced by environmentally friendly values nevertheless, the researcher was respectful of the opinions expressed by all interviewees.

Concerning the ethical issues addressed in this research, before the interviews began, the researcher introduced herself to the respondents and explained the purpose of the research. The interviewees were informed and asked to permit the use of their statements in the research. They were made aware of their right to end the interview if they were no longer interested. The interviewees were also informed that their responses will be recorded but kept anonymous. All the interviewees were given pseudonyms to hide their identities.

Additionally, the researcher observed the cultural protocols of the traditional leaders to build trust with the interviewees. According to Taylor et al. (2016), observers can only establish a bond with interviewees if they adapted themselves to the interviewee's schedule and ways of life. For example, monetary gifts and a bottle of gin were presented to the traditional leaders to announce the purpose of the visit. According to research conducted by Appiah (2020), it is a proper custom in the southern part of Ghana to offer a bottle of hard liquor as a gift when visiting a community elder or chief. The chiefs use the drinks for performing important rituals such as libation (Van Den Bersselaar, 2005). Libation pouring is a process whereby liquids such as water or alcoholic are poured on the ground to pray to the spirits and ask for their help (Ayim-Aboagye 1993: 165 as cited in Ayim- Aboagye, 1996, p. 9). Nevertheless, providing monetary incentives to the traditional leaders can lead to biased responses, in which interviewees can provide positive feedback to impress the researcher. In addition, the researcher

adhered to traditional protocols by taking off her shoes and walking barefoot in certain holy areas of the interview site. The interviews with the traditional leaders were held in their homes. Finally, background noise in some interviews affected the clarity of the audio recordings, such that two interviews were not used in the analysis.

5 Results

This section presents the findings from the interviews and participant observation activities reported during the study. It shows the major themes and sub-themes that emerged from the analysis of data. The themes that emerged from the findings are presented starting from the most important themes to the less important ones at the end. The importance of themes is both due to the occurrence of the themes that emerged from the interviews and their links in answering the research questions. The next paragraph describes the themes that emerged from the interviews.

A summary of the emerging themes and their capacity to answer the research questions are shown in Table 3.

Table 3: A table illustrating the themes identified and their capacity to answer the research questions

| Major themes | Sub themes | Description | Linkages to the research questions |
|--------------|------------|-------------|------------------------------------|
|--------------|------------|-------------|------------------------------------|

| | | | |
|--|---|---|---|
| <p>Belief systems and local protocols</p> | <p>Taboos and the mystical beings of the sacred grove</p> | <p>Describes portions of the data that highlighted the mystical beliefs and taboo systems</p> | <p>What are the local systems put in place for access and use of the forest resources?</p> <p>What are the specific threats to the conservation of the sacred grove?</p> <p>What benefits do different stakeholders gain from the Gua Koo sacred grove?</p> |
| <p>The cultural heritage of the local people</p> | <p>Festivals and rituals</p> <hr/> <p>The history of the people</p> | <p>describes portion of the data that emphasized on the cultural practices of the local people linked to the sacred grove</p> | <p>What benefits do different stakeholders gain from the sacred grove?</p> <p>What are the specific threats to the conservation of the sacred grove?</p> |

| | | | |
|--|---|--|--|
| Drivers of degradation and their impacts | Pollution | Describes portions of the data that highlighted the degradation in the forest and its impacts. | What is the weakness in the management systems employed by diverse key stakeholders in managing the sacred forest? What are the specific threats to the Gua Koo forest's resources? |
| | Deforestation | | |
| | Land ownership problems | | |
| Importance of the sacred grove | Provisional value of the sacred grove | Describes portions of the interview that highlighted the benefits gained by stakeholders and the ecological importance of the site. | What benefits do different stakeholders gain from the Gua Koo sacred forest? What information do the local people have on the of fauna and flora that can be found in the forest? |
| | Ecological value of the Gua Koo sacred grove | | |
| | Perceived economic and aesthetic value | | |
| | Some flora and fauna found in the Gua Koo sacred grove | | |
| Supporting the Gua Koo sacred grove | The support provided by stakeholders and their challenges | Describe the portion of the data that emphasized the past, present support provided by diverse stakeholders to the sacred grove. Describes the parts of the data that emphasized the shortcomings of the various stakeholders | What are the measures others have taken to support the sacred forest and the opportunities for the conservation of the sacred grove? What are the weaknesses in the management systems employed by diverse major challenges of key stakeholders in managing the sacred grove? |
| | Coordination among stakeholders | | |
| | Priorities of regulators and its implications | | |

5.1 Belief systems and local protocols

Belief systems and local protocols is a major theme that encompasses the sub-theme, taboos and mystical beings of the Gua Koo sacred grove.

5.1.1 Taboos and mystical beings

The subtheme, taboos and mystical beings provides details on the perceived sacredness of the forest, the local beliefs in mystical beings, and taboos that were used to control access and use of resources in the Gua Koo sacred grove and its implications for the conservation of the Gua Koo sacred grove.

Although the researcher did not ask for the perceived size of the Gua Koo sacred grove, most interviewees often spoke to the issue. Most of the interviewees perceived that the forest size was bigger in the past, but had reduced in size presently. A forest user expressed that some parts of the forest had been sold and this has resulted in the reduction of the forest size and the disappearance of some animals in the forest. This issue is illustrated in the quote by the interviewee:

Lady Tia (forest user): The forest used to cover the whole of this area. Monkeys would come to my house, and we would give them bananas to eat... Nowadays, they do not come. Since part of the land is being sold, the monkeys have not come again. The monkeys are all gone.

About the reduction in the size of the forest, one interviewee provided a quantified description of the forest in the past. For example, *Agro* (CSO) indicated that in 1986 the estimated forest area was 32 acres.

Another issue that came up frequently from the interviews, although not raised by the researcher, was the evolution of the fear of entering the forest among the local population. According to some of the forest users, people feared entering the forest in the past because of its big and intimidating size. Now that the forest has reduced in size, the intimidating factor isn't playing anymore and people do enter the forest more easily. For example, *Seller 30* (forest user) said that in the past, people were afraid to get into the sacred grove because it was big and dense. However, as people started cutting down the trees, it decreased the size of the forest and opened up the area, encouraging people to come in whenever they wanted.

An interviewee called *Forestry* (public authorities) was of the view that in the olden days, the traditional leaders performed certain cultural activities in secrecy and therefore deliberately set shrines in the forest to scare away people and protect the forest. Building on this theme, *Forestry* (public authorities) expressed the view that the shrine area in the Gua Koo sacred forest is still feared in the community because the Ga people regard the place as the home of their ancestors. Hence people are afraid to degrade the shrine area. For example, *Forestry* (public authorities) stated, “people don’t joke [are well behaved or more careful] there [in the shrine area] like doing open defecation, because they know it is a holy ground reserved for the ancestors“. Some interviewees demonstrated that the sacred grove is considered a sacred place. For example, *Traditional leader 1* (traditional authorities) stated, “It is the holiest upon the holiest place. If you want anything, a husband, a job, or a cure to an illness, you can get herbs from the Gua Koo sacred forest“. Another interviewee was of the view that the dress code worn by traditional leaders upon entering the sacred grove meant that the place is sacred. For instance, *G.L* (forest user) noted, “very true, when the traditional leaders enter the forest for rituals, they go there barefooted, some even go there naked and wear special costumes“. Additionally, it was revealed among few interviewees that women in their menstruation were forbidden from entering the Gua Koo sacred grove because doing otherwise will pollute the purity of the place. The quote below is another proof that the Gua Koo sacred grove is considered a holy place.

G.L (forest user): In our culture when a woman is in her menstruation, she is considered unclean, when you are in your menstruation you don’t share a bucket with your husband in the bathroom. When my husband was alive, any time I had my menstruation, my husband vacated the house until my menstruation was over. Men are considered the strongest in the family so that when menstruating women approach a man, they eclipse the masculinity of the man. It is the same way we treat the forest, so women having their periods were forbidden from entering in the past.

Some interviewees showed the perceived benefits obtained from the Gua deity. For example, some people believe that the Gua deity is the guardian of the community. For instance *Taxi driver* (forest user) stated, “So, I can boldly say that if the Pokuase Gua Koo [the deity] were a human being, he can be regarded as the caretaker of the whole community“. Further, *Traditional leader 1* (traditional authorities) mentioned that the

Gua deity in the past helped the community by providing them with farming tools and the people requested from the deity by going to the entrance and leaving some money there for deities to make the tools for them.

Regarding the opinions of interviewees that the sacred grove of Gua Koo contained mystical spirits and a deity, the following quotes illustrate this statement:

Traditional leader 1(traditional authorities): When you go into the forest, the Gua [deity] has two wives, “Yoomo Afiekor” and “Afiyee” and then he has his children, the elderly child, “Tete Agbo”, the one who follows is “Opobi”, then the next who follow are “Odum” and “Oyia” and “Ahunbua”.

Another interviewee mentioned that spirits were residing in the stream in the Gua Koo sacred grove. For instance *Security man* (forest user) narrated, “a certain spirit inhabited the water, it brought out the toys, football, and this attracted passerby. However, when the people who came for the discharged items, the stream killed them”. Additionally, *Taxi driver* (forest user) stated that in the past when the forest was denser there were dwarfs in it. Some interviewees were of the view that the sacredness attributed to the Gua Koo sacred grove should render the environment clean, however they perceive the situation in the Gua Koo sacred grove to be a far cry. This is illustrated in the following quote:

GL (forest user): if the Ga people consider the place [Gua Koo sacred forest] as holy, a site for ritual performance, and an important place where they offer prayers to their deity, then the site must be kept neat, and even fenced so that not just anyone can enter.

On the other hand, some of the interviewees stated that they did not perceive the Gua Koo sacred forest to be sacred because the filth in the forest does not portray this attribution. This statement is expressed in the following quote:

Lady Tia (forest user): People are selling the forest land and since they are selling, it has paved a way for people to do anything to it making the place unattractive and that is why I do not believe that it is sacred. Because if something is sacred, then it would be kept neat like a God or deity.

In support of this finding, some interviewees perceived that the spirits had disappeared or were furious because of the degradation of the Gua Koo sacred forest. The following quotations illustrate how the degradation of the forest is perceived to affect the deities

and spirits of the sacred Gua Koo forest. For instance, *GL* (forest user) noted, “people have encroached on the place [the Gua Koo sacred forest], do you think the gods there [the Gua Koo sacred forest] will be happy [about this situation], they will even run away [disappear from the forest]”. Another interviewee mentioned that the Gua Koo sacred grove abhorred filth. For example, *Mame N* (forest user) stated, “what I know is that the forest dislikes filth”. Additionally, another interviewee mentioned that the Gua Koo sacred grove was angry about tree cutting ongoing in the forest. This is exemplified in the following quotation:

Hair Woman (forest user): There are certain parts of the forest where people don't go to cut trees, but now people go there to cut trees. These days I hear the forest is annoyed because people have destroyed the home of the deity.

Further, *Taxi driver* (forest user) also mentioned that the pressures of modernization had made the Gua Koo deities gone into hiding. Moreover, an interviewee mentioned that it was forbidden to hunt sacred animals in the grove and that when monkeys were living in the Gua Koo sacred forest, it was forbidden to eat them. For example, *Traditional leader 1* (traditional authorities) stated, “ we believe the monkeys are our mothers,... we the Gua people believe that the monkeys are our mothers so we don't eat them”. On the contrary, in this research, it was revealed earlier that the monkeys of the sacred grove had disappeared despite the sacred character attributed to them.

The results showed that breaking taboos had implications. Some interviewees reported that entering the shrine area without the permission of traditional leaders resulted in punishments on the part of deities. The quotes below illustrated this statement:

Waterman (forest user): Well, you know that in Ghana people fear the wrath of the gods most of all, so people are afraid to go there [the sanctuary area]. However, if you are caught by the traditional leaders entering the area to spoil it, then you will be punished. We do not go to that area [shrine area]. The punishment for disobeying the rule is that one will have to offer a cow and drinks as a sacrifice to the gods.

Another interviewee mentioned that in the past when the forest was dense, going into the forest without permission of the traditional authorities may result in the person going missing in the forest and to locate the person, rituals had to be performed by the shrine

priest to ask for forgiveness from the deity of the Gua Koo sacred grove. Here are quotes from some respondents explaining this statement:

Interviewer: So, in the past, if you enter without permission, were there any punishments given to offenders?

Yoomo(traditional authorities): If someone enters without permission, he will get lost in the forest, then the shrine priest will perform some rituals, collect some drinks, and a sheep to find the missing person.

Mentioning another possible repercussion of entering the grove, one of the interviewees emphasized that breaking the rules can result in symptoms of diseases on the bodies of the offenders. To cure these symptoms on the body one had to consult the shrine priest to ask for forgiveness on behalf of the offender from the deity. This is illustrated in the following quote:

Traditional leader 1 (traditional authorities): ... If you enter the Gua Koo sacred grove without permission, after a while, you may see signs of different attitudes on your body [symptoms of diseases], then this will tell you that where you went, you don't have a right to enter. Now you have to consult the 'Wuromo' [shrine priest] on what to do, to pour libation to the gods, to plead on your behalf for forgiveness.

Moreover, the influence of Christian religion was mentioned as a reason why people no longer feared entering the Gua Koo sacred grove because the followers were encouraged to undermine the taboos. This statement is illustrated in the following quote:

GL (forest user): Nowadays, churches have multiplied, some pastors have convinced certain people that our traditions are ungodly. Therefore, if one enters the forest and nothing happens to him or her, then it is perceived that there is no power in the forest to be feared, so they can enter and do whatever they like in the forest.

The study revealed that even among traditional authorities, people had a different faith. For example, an interviewee who is part of the family that is custodians of the Gua Koo sacred grove mentioned that her family does not participate in rituals held in the Gua Koo sacred grove because of her affiliation to Christianity. For example, *Yoomo* (traditional authorities) stated that "the chief of this family does not perform any rituals there [Gua Koo sacred grove] because we are Christians". Some of the interviewees who proclaimed to be Christians were asked if they supported the traditional practices in the Gua Koo

sacred forest, upon which they answered that the traditional practices should be conserved. For example, *Lady Tia* (forest user) mentioned that although she is a Christian, she supported the preservation of the cultural practices of her ancestors. Some of the interviewees who are migrants in the Pokuase community and non-followers of the traditional religion mentioned that they supported the conservation of the traditional practices in the Gua Koo because it was their duty to respect the rules of the land. This is explained by the following quotation:

Plantain woman (forest user): When you go to Rome, you do what the Romans do, while we are here when the traditional people ban noise, we all obey, even the big pastors obey. This is not my community so if the owners set up a rule, I have to obey it, so if it is their religion and they want us to obey the rules, we all have to obey the laws of the town.

Furthermore, it was revealed in the past, days of no entry were used to control access to the sacred grove. For instance, *Yoomo* (traditional authorities) said that in the past it was taboo to enter the forest on Saturdays, and farmers were also banned from farming on that day. One forest user, *Security man* (forest user), mentioned that in the past, people were not allowed to enter the forest on Friday. Regardless of the taboos that forbid entry to the sacred grove on certain days, there were conflicting opinions on the forest entry protocols. For instance, while most forest users were of the view that there was no restriction to entering the forest and that anyone could go there and do whatever they like there, few interviewees thought otherwise. For example, *Lady Tia* (forest user) stated that there were no rules restricting access into the Gua Koo sacred forest, hence people entered the forest without control and even practiced open defecation there. On the other hand, *Traditional leader 2* (traditional authorities) stated that one needed permission from the traditional authorities before entering the shrine area in the Gua Koo sacred forest. In addition, *Traditional Leader 1* (traditional authorities) also confirmed that generally, permission from traditional leaders is required before entering the forest. When asked if the local people served as watch guards by directing people to the traditional authorities for permission of entry, *Traditional leader 1* (traditional authorities) stated that people entering the forest must be directed to him.

On the subject of restriction of access into the Gua Koo sacred grove, the researcher observed that the forest was unfenced. Several commercial activities ongoing

within the forest. For example, there was road construction at both north and west of the sacred grove such that construction workers were seen walking through the forest. Near the northern part of the sacred grove, almost near its boundaries, was a car repair shop with several damaged cars parked, where car repairers worked. However, in the northern part of the forest there was a taxi rank with several cars parked and passengers coming into the site. There were also few small wooden residential structures and food vendor shops within the north of the grove. The eastern part of the Gua Koo sacred forest was bordered by residential buildings, the southern part by a factory and residential buildings. In the western part of the forest where the stream is located, residents were observed fetching the water. The researcher saw no structure constructed at the center of the forest.

Although no question was asked on forest guards, some interviewees mentioned that the placement of forest guards in the Gua Koo sacred grove could help control access to the forest and promote surveillance of the site. For example, *GL* (forest user) mentioned that because there were no forest guards in the forest to restrict entry, anyone could enter the site. Another interviewee recommended that forestry guards be deployed to the Gua Koo sacred grove to prosecute the lawbreakers. For example, *Forestry* (public authorities) stated, “we have to be more responsible, so we the Forestry Commission can educate people and station forestry guards, and when we get them [offenders] we will prosecute people”.

Regarding the local protocols for the use of resources in the Gua Koo sacred grove, some interviewees mentioned that the caretaker of the sacred grove had to be consulted before the harvesting of herbs from the forest. For example, *GL* (forest user) mentioned that the shrine priest is the caretaker of the Gua Koo sacred forest and was responsible for regulating the extraction of herbs from the grove. In addition, *GL* mentioned that as a herbalist, if she wanted herbs from the forest, she would consult with a priest of the sanctuary before harvesting the herbs. Moreover, *Traditional leader 1* (traditional authorities) added that people were not permitted to cut a whole tree for herbal medicine rather, they are to harvest the roots and leaves for medicines. With regards to the use of the water resources in the sacred grove, most interviewees mentioned that there was no restriction on the use of the stream water in the forest. For instance, the

Traditional leader 1 (traditional authorities) stated that there were no prohibitions against fetching the stream water, so he is not involved in the management of the stream water and left it instead in the care of the commercial water providers who extract the water to supply the local people. The extraction of the stream water by commercial water providers raises questions regarding the impacts of the withdrawal on the groundwater.

5.2 The cultural heritage of the people

The cultural heritage of the people is a theme, including the sub-themes: Festivals and rituals, and the History of the native people. The theme describes portions of the data that emphasize the cultural ceremonies performed by the local people and the history of the local people linked to the Gua Koo sacred grove.

5.2.1 Festivals and rituals

Festivals and rituals are a sub-theme that provides insights into the cultural activities of the local people linked to the Gua Koo sacred grove and their implications. Although not asked, most interviewees frequently mentioned that the Gua Koo forest is a place used for the celebrations of the Homowo festival. During a participant observation with *Traditional leader 2* (traditional authorities) in the shrine area of the Gua Koo sacred grove, he stated that every year, some traditional leaders enter the forest to perform certain rituals. According to *Traditional leader 2* (traditional authorities), the rituals include food preparation in the forest for the deity before the celebrations of the Homowo festival. Corroborating that, an interviewee with a pseudonym *MA* (public authorities) stated that because annual rituals are performed in the Gua Koo sacred grove to celebrate the Homowo festival, it is the main incentive for the local people to desist from clearing the entire forest area. In support of these claims, some interviewees supported the preservation of the traditional practices because they were part of their cultural identity. For instance, *Taxi driver* (forest user) said that when one threw away his traditions, then he has lost his traditional heritage, a reason why he supported the conservation of the Gua Koo sacred forest

That said, when the question was raised, as to whether traditional beliefs were fading, the answers were mixed. Some interviewees noted that the traditional beliefs were eroding. For example, *GL* (forest user) stated that the traditional beliefs were still

practiced, but not as strongly as in the past. She added that when cultural beliefs were stronger, one could even sense changes in the weather when the native people entered the forest to carry out their rituals. Furthermore, the *Security man* (forest user) stated that the cultural beliefs were fading because, these days, few people believed in the deity.

5.2.2 History of the local people

History of the local people is a sub-theme provides details about the historical context of the Gua Koo sacred grove and its implications. Few people interviewed were aware of the history of the Gua Koo sacred grove. According to Traditional leader 1 (traditional authorities), the sacred grove can be traced to the migration of their forebears when they migrated from Israel to Nigeria, Congo, Togo, and finally settling near the Gua Koo sacred grove. According to *Traditional leader 1* (traditional authorities), the Gua deity lived in the forest and had long protected their ancestors. Furthermore, one interviewee noted that the shrine area in the Gua Koo sacred forest was wedded to the history of the settlement of the local people, so this was an incentive for them not to destroy the whole forest. This statement is emphasized in the following quote:

MA (public authorities): (...) because they do rituals there annually. You cannot go and collapse the place, no no nooo. That is their [the native people's] shrine, this is the first place they came to settle. You know that place has been there since their great great grandfather. They know what they do there. They cannot scrap everything.

5.3 The importance of the Gua Koo sacred grove

The major theme, the importance of the Gua Koo sacred grove encompasses the sub-themes: provisional value of the Gua Koo sacred grove, educational value of the sacred grove and some perceived ecological value.

5.3.1 Provisional value of the sacred grove

This subtheme provides details about the provisional services such as medicine, food and water, among others, perceived to be derived from the Gua Koo sacred forest.

Most interviewees mentioned that the stream in the forest is an important water source in the community. For example, *Seller 30* (forest user) stated that she frequently drank from the stream when she first settled in the Pokuase town. Additionally, *Traditional*

leader1 (traditional authorities) noted that commercial water suppliers extract the stream water with a machine and sell it to the community. Further to that, it has been frequently mentioned among the forest users that the stream water, unlike other surface water sources in the community, was constantly flowing even in the dry season. Examples to illustrate this statement include:

Waterman (forest user): Throughout the community, when there is a dry season, almost all water bodies dry up, but that stream still flows. The level may reduce, but it never dries completely. I have never seen it dry out completely since I have been around.

The interviewee mentioned that the water quality has been tested and proved to be safe for consumption and has even been used before by a factory for beverage production. The following is an illustration of this:

Waterman (forest user):... If you a Ghanaian who has drunk Beer Club or Malta Guinness (alcoholic beverage brands), then I can say that you have drunk the water before. Two years ago, the director of ABC factory (a beverage company) came here to test the water quality and confirmed that it was good for drinking. Thus, the company ordered the commercial water suppliers to load the water to their plant for production.

Additionally, the interviewee added that because his livelihood as a water supplier depended on the stream, he helped protect the forest from destruction. For instance, *Waterman* (forest user) noted, "this is where we get our livelihoods, thus if we see that someone is going there to spoil the place, we will not allow that to happen.

Some respondents indicated that they had stopped collecting water from the stream due to the impact of the road construction. According to some interviewees, the road construction had prevented access to the waterway. For example, *Waterman* (a forest user), a commercial water supplier, stated that the road project had blocked access to the stream, restricting vehicle access. According to one of the interviewees, the road construction that had cut off access to the stream has made them resort to alternative water sources such as wells and buying from other commercial water suppliers. However, these sources provided poor quality water. This statement is described as follows:

Seller 30 (forest user): In the past, the stream water we fetched had a cool temperature and used for washing and cooking. Now the water is degraded, we even dug a well in our home, but the water is salty and brownish. As the forest has deteriorated, water quality

has changed. When we fetch the water, we do not use it for cooking anymore, but we buy treated water packaged for consumption. As the access to the stream is blocked, we are not able to obtain good water. If the forest is protected, that is good for the community, a drainage constructed to the watercourse has made the water turbid. Since we cannot cross the road to fetch the water, we have resorted to buying water from commercial water suppliers. The water they supply is sometimes brown, despite the poor quality we have no option but to use it.

Additionally, one interviewee mentioned that stream conservation is critical as it is a tributary of a dam used for water supply in some communities. The following quotation reflects this statement:

Forestry (public authorities): it [stream] flows and joins another river and other water bodies. The water flows to the 'Weija' dam, which, is purified for us to drink so, if we don't take care of it well, then we know the consequences.

The researcher asked *Waterman* (forest user), a commercial water provider if, the commercial water operators in the Gua Koo sacred grove performed any restoration activities near the stream to conserve it. None of this appears to have happened, and *Waterman* (forest user) mentioned that the only contribution the operators had made was to build a road to the stream.

When some interviewees were asked what benefits they gained from the Gua Koo sacred grove, the following examples were provided: *Seller30* (forest user) mentioned that she uses the herbs in the forest for curing diseases such as malaria or boils. Another forest user, *Mr. Fair*, noted that the forests provide him with Oxygen. In addition, *G.L* (forest user) reported that the only benefits she received from the forest were palm nuts which she used for cooking. Furthermore, another provisional service of the Gua Koo sacred grove revealed in the finding is that they serve as rain inducers. For example, *Traditional leader 1* (traditional authorities) noted that when there is drought, the shrine priest and his elders entered the sacred grove to pray to the deity for rainfall, and according to him, the rains will follow after the prayers.

5.3.2 Educational value of the Gua Koo sacred grove

The theme of educational value provides details on the perceived educational advantages of the sacred grove. An interviewee noted that new graduate priests use the site as a

training ground. For instance, *Yoomo* (traditional authorities) noted, “in the past, annually, if someone was possessed by spirits and was in a shrine school, they were trained in the sacred grove. Additionally, *Forestry* (public authorities) mentioned that the site has medicinal plants and useful for research.

5.3.3 The perceived aesthetic value and tourism potential of the sacred grove

The sub-theme, the perceived aesthetic value and tourism potential of the sacred grove provides details on the perceived tourism potential of the Gua Koo sacred grove and the aesthetic value of the site. Most of those interviewed frequently mentioned that the forest should become a tourist site. For example, *Lady Tia* (forest user) spontaneously indicated that she wanted tourists to visit the sacred grove. In addition, *Forestry* (public authorities) stated that if the local people changed their attitude, the site could be a tourism area, and the Forestry commission could even label the trees in the forest to educate visitors. Corroborating this view, *Agro* (CSO) spontaneously mentioned that, with ecotourism happening at the site, the tourists could pay an entrance fee and buy drinks from nearby shops. *Agro* (CSO) added that the fishes in the stream could be harvested and served to tourists. In addition, *MA* (public authorities) suggested that developing a documentary on the site and setting up a tourism office with tour guides could promote the tourism potential of the sacred grove. The following quote represented an additional view by the interviewee on developing the tourism potential of the sacred grove.

MA (public authorities): Two things can sell a tourist site, mystic context, and history. We need documentation, and we need facts about what happened in that place. I know of a tree in the sacred grove with a white cloth attached and a few pots around it. The tree tells a story. Then we speak of the mystical part, which are the things that are not common to see and can promote tourism. In addition, when the museum is associated with the forest, it can promote the site.

Some interviewees mentioned that the Gua Koo sacred grove is a place of relaxation. For instance, *Security man* (forest user) stated, “there are several birds here, it is very calm in the forest, even listening to birds’ songs helps calm your problems. In addition, *MA* (public authorities) stated that if the site is kept nice, the movie industry can shoot films there, and generate revenue for the local community.

5.3.4 Some perceived ecological value of the Gua Koo sacred grove

The subtheme, some perceived ecological value of the Gua Koo sacred grove provides details about the flora and fauna perceived to be in the sacred grove. When asked about the types of flora and fauna in the forest, most interviewees provided the local names of some flora and fauna they know of in the Gua Koo sacred forest. For example, *G.L* (forest user) stated that there are Onyina trees and palm trees in the forest. *Ludo* (forest user) also stated there are Odum, Wawa and Mohogany in the Gua Koo sacred forest. Lastly, *Forestry* (public authorities) mentioned that there are *Cassia sp* in the Gua Koo sacred forest, and he added that the Gua Koo sacred forest served as a seed bank for rare species of trees for the Forestry Commission of Ghana.

Some interviewees mentioned that the Gua Koo sacred grove is the nearest remnant of natural green space closer to Accra hence acknowledged the value of conserving the site. The examples as follows illustrate this statement:

Lady Tia: In Ghana, we do not have a lot of forests in the Greater Accra region. For instance, where can we point as a forestry zone in Accra (Capital city)? It is only in the Eastern Region. I think in Accra, it is only Achimota that has green space. This forest has been existing for years back. I want it to be there so that animals can feel comfortable.

Additionally, an interviewee mentioned that the Gua Koo sacred forest should be protected because it is among the few green spaces near the capital city, and this can help mitigate diseases and climate change impacts. The following quote represented this statement:

Traditional leader 1 (traditional authorities) : So, I think it is time now, if you look around, there are no forest, it is only this forest that can hold[mitigate] diseases or may be pollution and help solve the problem of climate change.

Some of the interviewees expressed their thoughts on the fauna believed to be in the Gua Koo sacred forest, with others claiming that some animals have disappeared from the forest. For example, *Agro* (forest user) stated, “there used to be grass cutter and this local alligators, grassland alligators. In the stream, there are local Tilapia fish and some dark crabs”.

In addition to that, *Lady Tia* (forest user) also stated that there are birds including bats in the Gua Koo sacred grove. Additionally, *Ludo* (forest user) stated, "with the animals, we normally see snakes in the forest".

5.4 Drivers of degradation and its impacts

The theme, drivers of degradation is a major theme that encompasses the sub-themes: pollution, land ownership issues and deforestation.

5.4.1 Pollution

The sub-theme pollution entails the perceived anthropogenic activities that cause pollution in the forest. Some interviewees mentioned that the stream in the sacred forest was polluted, with other interviews worried that human activities would destroy the water resource.

For example, during a participant observation in the Gua Koo sacred forest, the researcher saw a group of scientists taking samples from the stream for analysis. According to one of the officers, they were consultants for a real estate management company of some residential buildings near the forest. The officer further explained that the water quality test was being done in compliance with an annual EPA environmental reporting condition. The researcher asked if the water quality was deteriorating, which he replied that the water quality was good, but may decline over time due to the increasing urbanization of the area. Moreover, some interviewees were of the view that road construction was contributing to stream degradation. One of the interviewees noted that the road construction will attract more people to the community and threaten. For example, *Waterman* (forest user) stated, "I am more concerned with the water, now that the road is being constructed it will attract more people into this area which may affect the water". Another interviewee was equally of the view that the drainage constructed by the road project in water way will negatively affect the stream.

Taxi driver (forest user): if you go towards the construction side the stream has been polluted, because the course of the stream has been concretedThe original source [water] is cleaner and natural, however, when it progresses to the construction site, it is more polluted.

On the contrary, one of the interviewees expressed that the road construction was rather good for the stream. For example, *Forestry* (public authorities) stated that the constructed drain will help in the easy flow of the stream.

Raising another threat, some interviewees also mentioned that the nearby factory was polluting the stream water and operating without enforcement by the EPA. These quotes demonstrate the views of the interviewees on this issue:

Agro (CSO): Because of this factory near the forest, Eco block (name of the factory) they are producing some chemicals and their untreated sewage runs into the water. I have come to ask the EPA how can you pass a permit to a factory that is discharging their sewage into the stream, where does their end product go? How do you treat it? It [the waste] enters the water. I told them [the local people] to stop drinking from the water, nobody is using it for drinking. They [the local people] only use it for washing. But they [the factory] were supposed to create a septic tank. This way is a cheaper option for the factory.

Similarly, *Security man* (forest user) stated that the factory discharged a whitish liquid substance into the stream. The EPA officer's views were solicited regarding the alleged factory polluting the stream. According to *EPA officer* (public authorities), the EPA issued an enforcement notice to the factory to stop operating when they started constructing the facility without an EPA permit, however, the proponent operated the facility without the permit. To explain in part the slow pace of enforcement by the EPA, *EPA officer* (public authorities) attributed political influence to the company's lack of response. However, *EPA officer* (public authorities) suggested that the EPA should use a stricter strategy as simply writing in the factory would not solve the problem. To add to this concern, it was mentioned that certain chemicals used by settlements at the fringes of the forest impeded seed growth. The following quote illustrates this view:

Forestry (Public authorities): People are building [residential structures] near the forest, and this involves the use of certain chemicals that affect our seedlings. There are drainage systems from these residences channelled through the forest. We are thinking of modifying different seedlings that will withstand some of these conditions...

Furthermore, some interviewees expressed concerns about the improper disposal of waste in the forest by some local people in the community. The researcher observed a

litter cleanup exercise organized by *Agro* (CSO) in collaboration with the food vendors and hawkers near the sacred grove to clean the area of solid waste. Upon seeing solid waste indiscriminately dumped near the forest, *Agro*(CSO) challenged hawkers passing by about the provenance of the waste, and the latter confirmed it was caused by other hawkers from the community. Following this, the interviewee, *Forestry* (public authorities) working with the Forestry commission lamented that he had no control over how people littered in the sacred grove.

Another cause of pollution in the Gua Koo sacred forest that came up in the interviews was open defecation. For instance, *Agro* (CSO) mentioned that since there were no public toilet facilities near the forest, people enter the place to defecate. Following this, his NGO is looking for funding to build a toilet facility at the site. In addition, *Forestry* (public authorities) mentioned that the open defecation problem in the forest did not make the site an attractive place for young forestry staff to work. Additionally, *Security man* (forest user) mentioned that the laborers of the construction road often visited the forest to practice open defecation even though they had adequate toilet facilities at their work station.

5.4.2 Deforestation

The sub-theme of deforestation provides details on the issue of alleged illegal cutting and encroachment in the forest. One interviewee expressed concern that people were cutting rare trees planted by the Forest Commission, which was detrimental to seed preservation for future reproduction. For example, *Forestry* (public authorities) noted, "sometimes people cut what we call rare trees, they are near extinction, which we take care of to get the seeds". Moreover, *forestry* (public authorities) stated that the Gua Koo sacred forest is a forest reserve recognized by the government. Additionally, *Agro* (CSO) mentioned that five residential houses near the Gua Koo sacred grove had cut trees in the forest, which he blamed the chiefs for selling the forest land. *Agro* (CSO) argued that the encroachers had no building permit because the public authorities are against building in a flood-prone area.

Some interviewees emphasized that the Forestry Commission is the main stakeholder to be consulted before cutting any tree in the forest. The following quote represents this statement:

Forestry (public authorities): some time ago, they [the traditional authorities] wanted to cut a big tree, so they informed us and, we gave them permission for that. Even if you have your private land and there is a tree on it which you have planted, if you want to cut the trees, you need to ask permission from the Forestry Commission.

Even one of the interviewees from the traditional authorities category confirmed the regulatory role of the Forestry Commission on tree cutting in the sacred grove. For instance, *Traditional leader 2* (traditional authorities) mentioned that the Forestry Commission could prosecute people for cutting trees in their own house without their permission. Furthermore, one interviewee noted that the demand for housing has led to the encroachment of wetlands in the forest. For instance, *Agro* (CSO) mentioned that due to the high demand for housing, the local people cared least about building in a wetland area of the sacred grove even though it came with flood risks. During a participant observation activity in the sacred grove with *Agro* (CSO), some large trees had been cut with their trunks lying on the ground. *Agro* (CSO) was shocked by the level of tree destruction and lamented that its forest conservation project was in jeopardy. According to *Agro* (CSO), the perpetrators of the activity intended to destroy the forest so they would be able to build on the land. Moreover, the researcher observed some uncompleted structures undergoing construction near the felled trees.

5.4.3 Land ownership issues

The subtheme, land ownership issues provides details about the perception of land ownership issues of the Gua Koo sacred grove, the land use planning problems, and encroachment issues that emerged in the data.

A controversy over the ownership of the Gua Koo sacred grove lands came to the fore in the interviews. Some forest users mentioned that the land belonged to the native people, while others noted that it belonged to a family or the chief of the Pokuase community. For example, *MA* (public authorities) noted that the Gua Koo sacred grove lands belong to the Ga people. One of the interviewees, *Plantain seller* (forest user) was not sure who owned the Gua Koo sacred forest land, hence was of the view that whoever owned the forest, be it the government or the traditional authorities should take the lead in conserving the sacred forest. Another interviewee, *Lady Tia* (forest user) mentioned that the forest land is owned by the Pokuase chief while *Taxi driver* (forest user)

mentioned that the forest land is owned by a family called the 'Asene' family'. On the contrary, one of the interviewees mentioned that the Gua Koo sacred grove was handed over by the traditional leaders to his NGO to manage. For example, *Agro* (CSO) mentioned that because the forest was used as a shrine, the traditional leaders handed over the forest to his NGO in 1986 to manage the place and this was done with the approval of the Forestry Commission. Following this, *Agro*(CSO) stated that the traditional authorities were compensated with money from the NGO. *Agro* (CSO) added that some chiefs were members of the NGO because they were interested in conserving the forest, however, upon their demise, new traditional leaders came into power with no interest in conserving the Gua Koo sacred grove, so they started selling the forest land. It seemed that there was disagreement among the traditional authorities on land ownership issues of the Gua Koo sacred forest. For example, *Yoomo* (traditional authorities), mentioned that the forest land belonged to her family. On the contrary, another traditional leader was of the view that the deities had made him the rightful owner of the Gua Koo sacred forest, despite another family having registered the land in their name. The following quote illustrated this statement:

Traditional leader 1 (traditional authorities): one family here called the Dodu Clotey family, that are now the chiefs here [Pokuase], they made a master plan and registered the sacred grove land in their name. However, the gods know that I am in charge, but when it comes to paperwork[legitimately], it is for the 'Dodu' family..

Other interviewees confirmed the ambiguities related to the land ownership in the Gua Koo forest with a statement that there was disagreement among the traditional authorities in the conservation of the sacred grove. Other interviewees confirmed the ambiguities related to the land ownership in the Gua Koo sacred forest with statements that there was disagreement among the traditional authorities in the conservation of the sacred grove. According to *Security man* (forest user), there was unity in the family in the past under the leadership of a certain chief as well the frequent monitoring of the forest by the government. However, after the demise of the said chief, the family became divided leading to the abandonment of the sacred grove. Additionally, *MA* (public authorities) stated that the chieftaincy problems were common among the local people,

and disagreement among the family members of the conservation purpose of the place is a challenge.

Notwithstanding, one of the interviewees mentioned that some older generation of traditional leaders supported the conservation of the Gua Koo sacred grove by planting trees in the forest unlike the young leaders who were financially driven. The following statement illustrates this statement:

Traditional leader 2 (traditional authorities): the young people of today are always chasing after money, that is why they are causing destruction to this place [the Gua Koo sacred forest]. The trees you see over there, a chief now deceased, called 'Oto Kwame the III' planted them. He planted a lot of trees in the forest.

Furthermore, the issue of selling of the Gua Koo sacred forest land was frequently mentioned by the interviewees even though the researcher did not ask this question. Most of the interviewees mentioned that the chiefs were responsible for selling the Gua Koo sacred forest land to the encroachers and attributed that to their greed and few livelihood opportunities for the local population. For instance, *Agro* (CSO) added that the custodians of the land or native people were avaricious and attributed the problem to inadequate livelihood opportunities since they had shifted from agricultural activities to the selling of their land. Further, *EPA officer* (public authorities) was of the view that because the chiefs mostly owned the lands, it made the regulation of land use planning challenging. The following quote illustrated this statement :

EPA officer (public authorities): That is the challenge of our system, land is vested into the traditional authorities so it is difficult for the state to come in sometimes. The chiefs decide what to do. And the estates behind the forest were all part of the forest, but they sold it to the developer, the estate company has encroached into the forest. One major challenge that can be addressed is to look at our land tenure systems.

5.5 Support to the Gua Koo sacred grove

Support to the Gua Koo sacred grove is a major theme encompassing the following sub-themes: coordination of the stakeholders and priorities of the regulators. Some interviewees described ways in which they support the conservation of the Gua Koo sacred grove.

For example, the *Forestry* (public authorities) of the Forestry Commission stated that they had planted new trees in the forest and frequently monitored the trees in the forest. In addition, *Forestry* (state authorities) noted that nearly 100 employees work in the sacred grove. Also, the discussions above revealed that a traditional leader planted several trees in the sacred grove. Moreover, it was revealed that, in the past, local people opposed the sale of the Gua Koo sacred grove land. The following quotation explains this statement:

Taxi driver (forest user) stated, " but for the firmness of the local people, all the forest land would have been sold, deforested, and the wetlands filled for construction. The local people voiced out their support to conserve the forest leading to its conservation".

Further, the finding showed that an international organization funded a bridge construction over the stream. For example, *Traditional leader 1* (stated that some years ago, Alliance Francaise, a French International Cultural Center, financed the bridge construction over the stream for people to cross. Moreover, *Agro* (CSO) mentioned that his NGO is interested in developing the economic value of the site through the rearing of grasscutters and the introduction of more wildlife since it was necessary to motivate people to volunteer in the forest.

5.5.1 Coordination of stakeholders

The sub-theme, coordination of stakeholders outlines the perceived coordination among the various stakeholders concerning the Gua Koo sacred grove. The interviews with the public authorities showed that the EPA, the Municipal Assembly, and the Forestry commission, sometimes engaged the traditional leaders in planning decisions in the community. For example, *Forestry* (public authorities) was asked if the Forestry Commission often communicated the data generated from the forest to the traditional authorities, he replied that they often do that through workshops with the traditional leaders. Moreover, *Forestry* (public authorities) stated, "sometimes we [the Forestry Commission] invite them [the traditional leaders] to a workshop or go to inform them about developments in the forest. The good thing is that we must work together and work in partnership". According to *Forestry* (public authorities), partnership with traditional authorities was critical, hence emphasized that the Forestry Commission consult them to perform rituals and receive their approval before commencing any project in the forest. In addition, *Forestry* (public authorities) added that the traditional

leaders also consulted them when they wanted to perform logging in the forest. This statement was contradicted by *Traditional leader 1* (traditional authorities), who stated that although the Forestry Commission worked in the forest, they did not communicate with him. Hence *Traditional leader 1* (public authorities) requested more support from the Forestry Commission because according to him, the last time they worked together was 15 years ago to plant trees in the forest. With that said, *Forestry* (public authorities) mentioned that a limitation of their work in the Gua Koo sacred grove was because of unpaid allowances . The following quote illustrated this statement:

Forestry (public authorities): Another issue is with payment. Most of the workers are contract workers, and they are not part of the government payroll. Officers receive allowances, sometimes they work 2 to 3 months until they get paid. They are not motivated to work under these circumstances.

Additionally, *Forestry* (public authorities) mentioned that an impediment to their work was the lack of technology in their work in the forest that affects efficiency. One interviewee said that the staff of the Forest Commission were not up to the task and that they were merely showing themselves in uniform. The following quote represented this statement:

Security man (forest user): It was recently that they started coming to the forest, you will see some men and women in uniform and boots, but they do nothing, it is just for the show. Imagine, if you come here today and come back 10,000 years later, is that proper monitoring?

It was found that the EPA engaged various stakeholders, including traditional authorities and the local communities in the environmental assessment of projects. For instance, *EPA officer* (public authorities) mentioned that the EPA engaged the traditional leaders and the local communities for their inputs during the environmental assessment of the road projects. Also, the interviewee from the Municipal Assembly, *MA* mentioned that they do not take certain decisions in isolation of the traditional leaders so they are part of committees set up by the Municipal Assembly. *Agro* (CSO) also mentioned that its NGO sometimes engaged traditional leaders, but it was an onerous process since they had to pay for their transportation to these meetings. Most of the forest users often reported that they had not been consulted by traditional leaders in decision-making concerning the sacred grove. For example, *Seller 30* stated, “Nobody engages us, the only

time that I was consulted was during the road construction when the road engineers announced to some people to vacate their homes for safety before machines were used to blast rocks near our homes". On the other hand, *Taxi driver* (forest user) mentioned that the traditional leaders are the community leaders, hence they did not require the approval of the local population for decisions taken on the Gua Koo sacred grove. Moreover, *Security officer* (forest user) claims that the Forestry Commission was very biased in whom they employed as forestry guides in the sacred grove because they only employed individuals coming from other regions instead of the local people. According to *Security officer* (forest user), the local people were more qualified to do the job since they were well informed about the terrain of the Gua Koo sacred grove.

5.5.2 Priorities of regulators

Priorities of regulators is a sub-theme that highlights the perceived priorities of key stakeholders of the Gua Koo sacred grove. Some regulatory authorities did not seem to prioritize certain issues about the sacred grove.

For example, *Forestry* (public authorities) stated that they were only concerned with the trees or vegetation in the forest and neglected the stream since it was not part of their mandate. Citing another regulator, *MA* (public authorities) mentioned that the Tourism Department of the Municipal Assembly was focusing on developing the tourism potential of other sacred sites which had more significant cultural importance than the Gua Koo sacred grove. According to *MA* (public authorities), the Municipal Assembly concentrated on these sites before moving to the sacred forest of Gua Koo. To that effect, *Traditional leader1* (traditional authorities) stated that he was surprised by the government's lack of interest in forest conservation in Ghana and the Gua Koo forest in particular, and he compared this situation to Europe, which he thought had a keen interest in forest conservation.

5.6 Recommendations from the interviewees

This section outlines the recommendations made by interviewees when asked what could be done to promote the conservation of the sacred grove. For example, *Traditional leader 1* (Traditional authorities) stated that he does receive adequate support, even though he is trying his best, so he pleaded with the government for funding to fence the

sacred grove. When asked whether the fencing proposed by some interviewees was the best solution to restrict access to the sacred forest of Gua Koo, *Forestry* (public authorities) suggested the following:

Forestry: The most important thing is whether we fence it to the sky, people will find a way to enter. We need to be more responsible so that the Forestry Commission can educate people and place forest rangers, and when we have the offenders, we will prosecute people.

Most respondents often recommended that forests should be turned into tourist sites. For example, *Lady Tia* (forest user) spontaneously mentioned that she wanted tourists to visit the Gua Koo sacred grove. When asked about his opinion on using the Gua Koo sacred forest as a tourist site, *Forestry* (public authorities) stated that the place could be used as an educational site. The following quotes illustrated this:

Forestry: Yes, it can be used as a research site, if you are interested in trees, we have medicinal plants here. ... It was part of our recommendation that one day it will be a tourist site or research site that people will tap in and learn about the forest. With time, we will label all the trees in there with the scientific names and common names for people to know.

Additionally, *MA* (public authorities) stated that exploring tourism at the site could generate revenue for the municipality. In that regard, *MA* (public authorities) suggested that developing a documentary of the sacred grove and setting up a tourism office with tour guides can also promote tourism at the site. *MA* (public authority) also suggested that mystical narratives and literature can help promote tourism on the site. The following quote represented this statement:

MA (public authority): Two things can sell a tourist site, mystical and historical. Documentation and getting the facts well, what happened in this place. I know there's a tree in the Gua Koo sacred grove, and there's a white cloth attached to it with a couple of pots around it. The tree tells us something. Then we talk of the mystic, part, things that are not common to see and, this can serve as a tourist site. And when a museum is attached to the forest, it can promote the place.

6 Discussions

This chapter provides an overview of how the themes generated from the data provided answers to the research questions that guided the study. The importance of the results is also discussed here.

6.1 Belief systems and local protocols; the cultural heritage of the people

The theme belief systems and local protocols, the cultural heritage of the people provided answers to the research questions: what are the local rules and systems used to control the access and use of resources, and its implications for the Gua Koo sacred grove? What are the specific threats to the conservation of the Gua Koo sacred grove?

The findings showed that in the past, the traditional authorities established days of no entry into the sacred grove. The taboos of no entry days set by the traditional leaders could have served as resting days in the forest and limit human impacts and access to the Gua Koo sacred grove (Poreku, 2014; Boakye & Baffoe, n.d.). Moreover, the perception of the sacred grove's sacredness was demonstrated in how women in their menstruation were forbidden to enter the site in a way to avoid them defiling the place due to their perceived uncleanliness state (Mohammed et al., 2020; Poreku, 2014; Van Andel, 2010). Additionally, the sacred grove is recognized as the home of the Gua deity, believed to be an important deity of the forebears of the native people, and still worshipped by some people today. The finding also showed that in the past, entering the sacred grove without permission from the traditional leaders resulted in fines, deaths, and diseases, requiring the mediation of the shrine priest to appease the deities (Adom, 2019; Barre et al., 2009). The findings signify that even though the taboos seem relaxed, the shrine area in the forest is still feared hence people avoided entering those areas or defiling such places. Thus, the reason could be that the shrine area is regarded as the abode of deities or ancestral spirits and perhaps given much respect by the local people (Opusuo, 2016). Moreover, it could be that respect for the deities and the fear of breaking the taboos discouraged people from entering the Gua Koo sacred grove in the past (Onyekwelu & Olusola, 2014). These findings may lead to questions such as the possibility of introducing more shrines into the sacred grove. Even though the shrine area may be a small portion of the grove's landscape, perhaps introducing more shrines in the forest can help conserve biodiversity as emphasized by Ramachandra and Ray (2010) that

sacred groves with smaller spatial coverage are essential in biodiversity conservation because they offer refuge to a substantial population of smaller organisms.

Furthermore, the results showed that the shrine priest was considered an important player in regulating the harvesting of plant resources in the sacred grove. For that matter, herbalists must consult the shrine priest before being authorized to extract only some roots and leaves from a tree, the cutting of an entire tree is prohibited. Therefore, this regulatory role of the shrine priest might have controlled the overexploitation of resources and destructive methods of extraction in the sacred grove. Despite this regulation, Poreku (2014) warned against the fact that the bark and root extraction can destroy trees. Therefore, the extraction methods by commercial actors should be considered in the management of the site.

The results showed that certain local people perceive that the Gua deity offered goodwill, protection, and blessings. Therefore, it could be that such perceived benefits derived from the Gua deity are the motivation for the local people to conserve the site (Adom, 2019) and in a way for continuous gains of goodwill. Additionally, it could be that the spiritual values of the local people, such as the reverence to the Gua Koo deity are the core of their obligation to protect their natural environment and an incentive to participate in the conservation of the Gua Koo sacred grove (Soutter et al., 2003).

Various factors such as degradation, eroding beliefs due to foreign religious influence, and urbanization highlighted the threats to the Gua Koo sacred grove. The findings showed that the forest was impacted by encroachment, improper waste disposal, and illegal tree logging. Moreover, it was perceived that the divinities could have left the sacred grove because they were furious at the continued degradation in the forest. Thus the degradation in the forest can be a threat to the perception of sacredness attributed to the Gua Koo sacred grove as it was perceived that the homes of the deities are linked to purity or a clean environment. Therefore, if people perceive that the deities are not present in a polluted environment, they may not refrain from polluting the place. Moreover, Spoon (2010) observed that because it is perceived that the deities of sacred groves are infuriated by environmental degradation, it influenced the environmental decision-making of the local people. One interviewee thought that modernization had led to the vacation of the deities in the sacred grove. It could be that the modernization

mentioned here refers to pressures of fast economic development and the land-use change of the forest land (Shengji, 2010). In addition, the study findings showed that taboos that conferred sacredness to monkeys previously habiting the forest protected the animals from being hunted or killed and could have contributed to the conservation of the species (Poreku, 2014). However, it could have been short-lived due to external factors such as noise pollution from human activities that drove the animals away. Concerning this discussion, the ESIA report (ADB, 2015) also showed that the impacts of noise contributed to the disappearance of the formerly rich fauna of the sacred grove. The influence of foreign religion is a contributing factor to the erosion of some of the taboos or cultural beliefs that served as effective tools in the past for the conservation of sacred groves (Bhagwat & Rutte, 2018; Ormsby & Edelman, 2010). The finding showed that the influence of Christian religion could have influenced their followers to break those taboos, which contributed to the conservation of the Gua Koo sacred grove. On the other hand, some non-followers of the Gua deity agreed that the cultural practices of the sacred grove should be conserved, because of its linkages to their cultural heritage or to preserve the culture of their ancestors. Moreover, some non-natives mentioned that they supported the conservation of the place due to respect for the local laws. Thus, irrespective of religious backgrounds, some people may support the conservation of the sacred grove. Therefore the common denominator for both believers and non-believers of the Gua deity may be the value of cultural identity linked to the site. It could be that the social capital gained from respecting the customary laws encourages some non-natives to be law-abiding as violating them can make you anathema in the society.

The fact that the Gua Koo sacred grove was unfenced and allowing the existence of commercial activities within and near the forest leads to the question of the control of the access to the forest. The evidence of commercial activities within the Gua Koo sacred grove which was previously forbidden or needed that one sought permission from the traditional authorities may be a sign that the taboos have been weakened. Thus the lack of control of human access to the sacred grove could rapidly degrade the site. In addition, the findings showed that the shrine priest and some traditional leaders perform certain rituals for the deity in the Gua Koo sacred grove before the celebration of the Homowo festival, an important festival of the Ga people. Additionally, the result shows that the

place is a landmark signifying the first settlement of their ancestors when they migrated from foreign countries to the Pokuase community and a site where their forefathers buried the Gua deity, also reported by Commey (2018). Therefore, it could be that the cultural identity and historical factor linked to the Gua Koo sacred grove is an incentive for the local people to conserve the site. It has also been shown in the results that the belief in certain cultural beliefs of the sacred grove was eroding, and now few people believe in the deity Gua. This situation can threaten the conservation values of the people. Therefore, it is critical that the dying cultural beliefs and practices are revived to reinforce the core values of the people in conserving the site.

6.2 The importance of the Gua Koo sacred grove

The theme, the importance of the Gua Koo sacred grove provided answers to the research questions: what benefits do different stakeholders gain from the Gua Koo sacred grove, and its implications for the Gua Koo sacred grove conservation? What information do people living around Gua Koo sacred grove have on the fauna and flora that can be found in the sacred grove?

The results showed that diverse stakeholders have benefitted from the stream: the local people, commercial water providers, and a manufacturing company. In addition, the stream water appears to be an important source of water for the local community, especially during the dry season when other water sources dried up because it was constantly flowing. Another reason is that, due to the blockage of access to the stream by the road project, people looked for alternative sources such as dug wells or purchasing water from commercial providers. Unlike the Sunkwa stream, other water sources were perceived as bad in quality due to their saltiness and brownish nature. Additionally, the importance of the stream in the sacred grove was emphasized by the Ga North Municipal Assembly (GNMA, 2019b) in stating that the municipality encountering challenges of lack of clean potable water sources to communities. As only a few communities have access to potable water, they have resorted to surface water treatment facilities while others depend on water sources like boreholes and hand-dug wells (GNMA, 2019b). In this context, the stream serves as an important source of water for diverse stakeholders, and this can be an incentive for the local community to protect the Gua Koo sacred forest. Moreover, the perception of the Gua Koo sacred forest as an

inducer of rain could be an incentive for the local people to conserve the Gua Koo sacred forest because of the water needs for farming activities and domestic purposes. Most interviewees wanted the stream to be conserved because it serves as a source of subsistence and domestic use. Such benefits gained from the sacred grove as mentioned by Aniah and Yelfaanibe (2016), were an incentive to take good steps to maintain shared responsibility for maintaining the use of local resources per the established rules and protocols.

Nevertheless, the results showed increasing urbanization, including, the road expansion project, the settlements, and a nearby factory pose a danger to the stream. For instance, it was alleged that the nearby factory was polluting the stream with its waste streams, which has resulted in people no longer drinking the water and only using it for other purposes. As mentioned earlier, the road project had cut off access to the stream resulting in the people who formerly used the water looking for alternative sources. It could be that these people no longer see the value of protecting the stream because they no longer benefit from it.

Some interviewees provided an inventory of some flora and fauna perceived to be in the Gua Koo sacred forest, similar to the information provided in an ESIA on the flora and fauna composition of the site (ADBG, 2015). This finding could mean the local people had some little knowledge about the biodiversity sacred grove. Following the evidence of some ecological knowledge by the local people about the Gua Koo sacred grove, it leads to a question such as how can the public authorities and other stakeholders collaborate with the local community to advance scientific knowledge of the site and help better understand the value of its biodiversity? The benefits of this collaboration include knowledge exchange, improving the site inventory, and promoting local beliefs, as demonstrated by Soutter et al. (2003). The Forestry Commission could also use this foundation to support community members and train them as forest guides in the forest. As was perceived, the Forestry Commission did not employ community members. Thus the employment of the community members could promote a sense of ownership and participation among the local population in biological diversity conservation (Attuquayefio & Gyampoh, 2010).

Some interviewees recognized the scarcity of green spaces in urban areas in Accra and therefore value the Gua Koo sacred forest since it is the only forest near the capital city of Ghana. The uniqueness of the Gua Koo sacred grove as the only forest in the suburb of Accra was emphasized by the UNDP (2012). Some interviewees recognized the regulatory services of the sacred grove as serving as climate change mitigation and provision of oxygen. Thus, it could be that because some people in the community value, green spaces and, for that matter, the services provided by the Gua Koo sacred grove, they may support its conservation. Thus, further scientific research is required to assess these values, also the sacred grove requires adequate support and recognition from the government, civil societies, or international communities. The findings also showed that the Forestry Commission is benefiting from the site through research and storage of seeds for reproduction. Thus, the research benefits received by the Forestry Commission of Ghana from the forest can influence the government to support the traditional authorities in conserving the site.

The finding showed that Gua Koo sacred grove provides other provisioning services such as food and medicines for some of the local people. Additionally, the place is a relaxation site and a training site for new shrine priests. The diverse services provided by the Gua Koo sacred to the local people can motivate them to support environmentally friendly actions in the sacred grove, since their livelihood and survival depends on it.

6.3 Drivers of degradation

The theme drivers of degradation provided answers to the research questions: what are the weaknesses in the management systems employed by diverse key stakeholders in managing the Gua Koo sacred forest? What are the specific threats to the conservation of the Gua Koo sacred grove?

A concern was expressed that the construction of the road would draw more people into the community and threaten the forest and its resources. The road project could attract more non-natives to settle in the area, as was mentioned in the study by Møller-Jensen et al. (2020) that the road project attracted both real estate developers and non-natives. Following this, the immigrants could be a threat to the cultural values of the sacred grove since they frequently hold on to their own cultures and customs and

exclude the core values of maintaining the sacred grove (Nganso et al., 2012). The results showed that commercial activities were going on in the sacred grove, which may be the root of improper waste management in the forest. In addition, the results showed that there are no public waste containers or toilet facilities at the site, resulting in inappropriate dumping of waste and open defecation in the sacred grove. As previously discussed, the degradation at the site negatively impacts the perception of sacredness which may result in a vicious cycle.

The evidence of the felled and burnt remnant of trees observed during a participant observation could confirm the problem of tree cutting reported by some interviewees. Moreover, the construction structures observed near these felled trees could explain that the encroachers are felling the trees to make room for construction. It was perceived that due to the demand for housing, people cared less about where they built and even encroached on wetlands in the forest prone to flooding. The complaints made by the interviewee from the Forestry Commission on tree felling in the Gua Koo sacred grove could confirm that people were illegally felling trees in the forest and not following the due regulatory process of a forest reserve (FAO, n.d.). This development may be a result of the land pressure and economic shift happening in the municipality (GNMA, 2019b), which may be pushing the local people to continuously encroach on the previously forbidden Gua Koo Sacred grove and show less respect to the taboos (Soutter et al., 2003). According to the ESIA report (ADBG, 2015) presented by the road engineers, the forest size was 14 hectares in 2015 (34.6 acres), on the other hand, an interviewee who has been working in the sacred grove for 30 yrs mentioned that the forest was almost 32 acres in 1986. The evidence of illegal tree felling and the perceived reduction in the forest cover contradicts the projected size of the forest. Following these conflicting accounts, more research is needed to assess the vegetation cover of the past and the present to confirm the perceived loss in the forest cover. The findings also raise questions as to what effective policies can be formulated to support the conservation of the sacred grove? Since Soutter et al. (2003) recognizes the lack of policy support or recognition as a shortcoming of sacred grove management. Moreover, Soutter et al. (2003) highlighted that recognition alone is inadequate. Therefore, more research is required on policies that can contribute to the effective conservation of the sacred grove. The result showed

that in the past when the forest was perceived to be big and, dense people were intimidated to enter it. However, when the size of the forest decreased, people no longer feared entering it. Consequently, the loss of the forest can encourage more people to enter the forest and degrade it. Moreover, forest fragmentation can result in poor environmental conditions for fauna, leading to wildlife loss (Aniah & Yelfaanibe, 2016; Ray & Ramachandra, 2010).

Furthermore, the inconsistent statements from the traditional leaders on the ownership of the land do give the impression that there isn't a clear alignment about who owns the land, and this can result in the sale of the land. This finding is similar to a report from the UN-Habitat (2020) which stated that land ownership in Ghana has conventionally been at the family level, and requires the community or clan to decide on the purpose of land use. However, in instances where the family is big, there are frequent disagreements about land use and ownership. It could be that the division among the traditional leaders results in some of the members selling parts of the forest land.

Also, it was perceived that unlike the older generation traditional leaders who were more concerned about the conservation of the forest, the younger generation of leaders are financially driven. So the younger leaders had an interest in selling the forest land. According to Owusu (2013), because most of the lands in Accra are nearly built up, people are turning to areas such as the Ga North municipality with their availability of vast stretches of land to be converted into urban residential use. This situation may push some custodians of the Gua Koo sacred grove land to abuse the custodianship power which they have been given to act in their self-serving interests against the local people's interests for entire financial purposes (Ubink, 2008). The above findings lead to questions such as how can the traditional authorities grasp the economic benefits of conserving the Gua Koo sacred grove to meet their financial needs while conserving the site instead of selling or letting the land being sold? As shown by Kasanga and Kotey (2001), this is a particularly sensible question in the context of high demand for land and high interest in land markets. The findings also echo the conclusion of researches run by Aniah and Yelfaanibe (2016) and Orłowska and Klepeis (2018) and, showing that land degradation can be a consequence that the land has lost its cultural significance in the eyes of new generations. Based on this finding of lack of interest among the youth to conserve the

Gua Koo sacred grove, further research is required to look into how young people can be encouraged to conserve the Gua Koo sacred grove by emphasizing its cultural significance and benefits.

Moreover, it seems that the increasing human population and the booming economic activities in the municipality boost the self-seeking interest of some custodians of the land and do not encourage the custodians to support the government land planning use of the Gua Koo sacred grove (Anafo et al., 2016). This may be a sign of a disconnect between the custodians and the government regulators (EPA, the Forestry Commission, and the Ga North Municipal Assembly) in the management of the Gua Koo sacred grove (Owusu, 2013). Moreover, this disconnect may be due to the dual system in place in Ghana whereby land is being mainly owned by the traditional authorities whereas land planning projects and issues are handled by the local government. The local government's limited or absence of control over the ownership and acquisition of land results in the traditional authorities being able to sell land for private ownership, including in a natural site like the Gua Koo sacred grove (Owusu et al., 2012; Owusu, 2013). These findings show the lack of coordination between the traditional authorities and the public authorities in the land use planning of the Gua Koo sacred grove. The findings also raise the question of how could the land tenure systems and the planning scheme of the public authorities be reshaped such that they have a common goal in planning?

6.4 Support provided to the Gua Koo sacred grove

The theme, support provided to the Gua Koo sacred grove provided answers to the research questions: what are the weaknesses in the management systems employed by diverse key stakeholders in managing the Gua Koo sacred forest? What are the specific threats to the conservation of the Gua Koo sacred grove?

The findings showed that the sacred grove has benefited from support from diverse stakeholders: the traditional leaders, NGO, Forestry Commission, community support, and international donor in areas such as tree planting, tree monitoring, advocacy support, infrastructure development. The threats of the sacred grove: encroachment, illegal logging of trees, selling of the forest land, pollution among others, show that more

support is needed from the government and diverse stakeholders to find lasting solutions to these problems. In addition, the result also revealed the weak structures of the EPA in ensuring compliance and the interference of politics in the work of the agency that shields powerful proponents probably the factory and other projects from being compliant (Kasanga & Kotey, 2001). Therefore, the regulating authorities should be empowered to enforce the laws. Moreover, the regulating authorities should adequately monitor the activities of both existing and new developments springing up near the sacred grove to ensure that they do not negatively impact the sacred grove. In addition, the forestry workers should be paid good wages to encourage them to do a good job in the forest. Also, technology support in their work is essential. Moreover, the findings showed that there was less involvement of the local people in decision making on the sacred grove, which could weaken the sense of ownership and the commitment of the local people to preserve the site (Attuquayefio & Gyampoh, 2005 ; Soutter et al., 2003)

The results showed that some regulators did not seem to prioritize certain matters concerning the sacred grove. For instance, the Forestry Commission stated that it was not in their mandate to monitor the forest's stream. Traditional authorities also indicated that they were not involved in the management of the stream and left it in the care of commercial water providers. In the absence of a regulator of the stream, it raises questions about how the withdrawal by commercial water providers affects the groundwater? Moreover, the statement by the Municipal Assembly that they are prioritizing projects according to the importance to the Assembly could be attributed to their limited finances or its main financier (the Local government) (UN-Habitat, 2020), this could explain the relatively low support to the conservation of the Gua Koo sacred grove. Additionally, the limited finances of the Municipal Assembly could also explain the lack of the following facilities at the Gua Koo sacred grove: toilet facilities for forest users, waste management system among others.

A popular recommendation in the findings was that people wanted the place to be a tourism site. It was perceived that developing the tourism of the sacred grove can promote revenue generation for the community and the municipal Assembly. It was recommended that a museum should be attached to the sacred grove, with tourist guides and the documentation of the cultural and mystical context of the sacred grove. Similarly,

Adom (2019) suggested that the management of a sacred natural site should employ documentation tools such as online and print media to inform the general public and especially potential tourists of the rich cultural identity of the local people wedded to the sacred site. The recommendation is in the right direction since the cultural heritage is the core for tourism development of a sacred grove because the cultural stories of the sacred grove could attract tourists and enhance the perceived and actual value of the site (Adom, 2019). Based on the research, the benefits of the Gua Koo sacred grove, beyond providing a place of aesthetic value and relaxation to the local community, could be potential tourism, which could turn into income generation opportunities for the local people, traditional authorities, the Municipal Assembly and other stakeholders. In addition, a collective income generation from the ecotourism activities serves as an incentive for the local people to preserve their traditions of forest conservation (Ormsby & Edelman, 2010). However, based on the perceived economic and tourism potential to be gained from the Gua Koo sacred grove, developing the tourism potential of sacred groves could have negative implications: put high pressure on existing facilities, neglects cultural beliefs (Adom, 2019; Spoon, 2010). Therefore, this raises questions about how to promote the tourism potential of the Gua Koo sacred grove while preserving its cultural beliefs?

7 Conclusion

This thesis provided an overview of the local belief systems of the Gua Koo sacred grove in Pokuase, Ghana, and its implications for environment conservation. The study also improved understanding of the specific threats facing the sacred grove.

Considering the first research question of identifying the local rules and systems used in controlling access and use of resources at the site, the interviews suggested that in the past, taboos such as no entry days to the sacred grove and seeking mandatory permission from traditional leaders before entry were used to control access or minimize human activities in the forest. Furthermore, it was demonstrated that taboos used to forbid the hunting of sacred monkeys believed to have lived in the forest. It was also shown that shrine priests used to be key stakeholders involved in setting up social code, for example, ensuring that good extractive methods were used to collect plants in the forest. The issue of the punishments by the deities and diseases befalling on the offender were mentioned as some of the repercussions for breaking the taboos, with the shrine priest acting as intermediaries to seek pacification for offenders. However, it was acknowledged that presently these taboos have weakened, leading to the disappearance of access controls to the forest as well as the lack of regulation of human activities in the forest. Despite the weakening of the taboos, the shrine area in the sacred grove is still feared among the local people, which proves some remnants of the taboo of forbidden entry to the area and its respect by the local community. It was shown that in the shrine area, people don't defile the place as compared to other parts of the forest. However, some people felt that the degradation ongoing of the forest participated in the deterioration of the sacredness attributed to the site. In an apparent vicious cycle, local people believe that a sacred site should be kept clean and that its ongoing degradation was perceived as a sign that the gods are annoyed with the degradation in the forest and might have vacated the forest. The perceived desacralization of the place, in turn, lowers incentives for the local population to keep it clean and preserve it. Many interviewees acknowledged that traditional leaders are selling the land for financial interest leading to the encroachment of the land. Perhaps if the traditional authorities are supported on how to develop an economic value of the place through conservation they may be motivated to preserve the site.

When it comes to the second research question regarding the weaknesses in the management systems employed by diverse key stakeholders in managing the Gua Koo sacred forest, some interviewees pointed to the lack of unity between the custodians of the Gua Koo sacred forest, leading to unshared decisions on the conservation goal of the site. This was confirmed when two people of the traditional authorities claimed that they were the rightful owners of the forest, with one saying the deity confirmed him as the rightful owner of the sacred forest even though the other party had officially registered the land in its name. Land litigation arising from the lack of clarity around land ownership is a very common issue in Ghana, and the research showed that the Gua Koo sacred grove seems to, unfortunately, be no exception. Secondly, the lack of means and enforcement power of the authorities responsible for the environmental protection and forestry came severally throughout the research. One of the interviewees wondered why the EPA would allow a factory alleged to be polluting the river in the forest to operate, while the EPA officer interviewed admitted himself that some of their strategies to ensure compliance and enforcement were weak. The Forestry Commission mentioned that unpaid allowance to staff working in the Gua Koo sacred forest and lack of technology to aid the work were limitations to their work. On their part, the Municipal Assembly and the EPA complained of the little power or authority they have when the land in the forest is being sold by traditional leaders to individuals for land uses contradicting the government's planning scheme for the Gua Koo forest. Regulators such as the EPA and the land planners called for a change in the land tenure system, which was a limitation to ensuring environmental compliance and effective urban planning. Most of the interviewees acknowledged the importance of having forestry guards in the forest to promote surveillance and enforce compliance. Another weakness identified was the lack of amenities in the areas such as toilet facilities, waste management systems, and water preservation schemes which results in improper disposal of waste and pollution in the forest. The fact that water issues aren't part of the Forestry Commission's mandate and the absence of a government organization in the forest to support the management of the water resources expose the stream within the sacred grove to the sole management, and exploitation by commercial water providers with a little guarantee on the sustainable management of the stream. Lastly, the issue of the lack of involvement of the local people in decision making touching

the forest was highlighted in the interviews, together with the lack of employment opportunities provided to the local people to serve as forest or conservation staff. The less involvement of the local community may lead to an overall distillation of the sense of ownership of the sacred grove and therefore a distillation of the commitment to preserve it by the local population.

When it comes to the third research question regarding the specific threats to the conservation of the Gua Koo sacred grove. External threats were mentioned, including pressures on land resources from the increasing population in the Ga North Municipality, leading to encroachment as well as an increase in land price inciting traditional leaders to sell land at the fringe of the forest. Another external threat was mentioned by some interviewees as being a nearby factory polluting the stream water which is an important source of water in the community. Looking at more endogenous threats, the low interest of the youth to conserve the place came as a key concern from some of the interviewees, partly influenced by the prevalence of religions such as Christianity which contribute to the erosion of the respect for the taboos. Pollution such as open defecation and improper disposal of waste were mentioned as threats to the sacredness ascribed to the place.

On the fourth research question regarding the information held by the local people on the fauna and flora that can be found in the forest, the interviews demonstrated that the local people have a piece of knowledge, though limited, of some of the flora and fauna in the Gua Koo sacred forest. The collaboration of research institutions such as the EPA and the forestry commission with the local people could enhance the inventory of flora and fauna of the place which could be used for scientific purposes and decision making. The evidence of knowledge of the biological components of the place by the local people can be an incentive for the Forestry Commission to employ local people as staff, which could in turn promote a sense of ownership of the forest by the local people. There is a potential for the site to be used as a research or educational hub for students.

The research provided answers to the fifth research question regarding the benefits different stakeholders gain from the Gua Koo sacred grove and their implication for the Gua sacred forest conservation. Aside from the cultural benefits, the findings of this study have demonstrated that the place is useful in providing services such as water,

firewood, food, herbal medicine, but also as a place of educational value, a place for potential research, and a place for relaxation. The Gua Koo sacred forest is a significant cultural landmark serving as the home of the Ga traditional deities, and it is still linked today with festival celebrations like the Homowo festival. The interviews demonstrated that the site is used for spiritual assistance, as a training field for new traditional priests, as a rain inducer, and as a climate regulator. As such, the management of the Gua Koo sacred places should be a priority for the traditional authorities, the Pokuase community, and the municipal Assembly to ensure that the sacred grove is properly conserved and managed for the benefit of the services it provides. Most people mentioned that the site should be developed for tourism, which could be a good idea to help the custodians and the local community generate some revenues and raise their perceived economic value of the site. Further research and assessment should however be conducted on the implications of tourism on the cultural values of the people and the potential threats of the development of tourism on the environmental conservation of the site.

Concerning the sixth research question on the measures other stakeholders have taken to support the sacred forest, it was demonstrated that the Gua Koo sacred forest has received support from diverse stakeholders such as the government, NGOs, traditional leaders, the local community, and an international organization in areas such as advocacy, awareness creation, infrastructure development, tree planting and monitoring among others. Despite all this support from the stakeholders, the grove is still deteriorating. This shows that more support is needed to achieve the conservation outcomes of the Gua Koo sacred grove. What could be done more differently include the following:

- The government, civil societies, or international donors should purchase the land from the traditional leaders and collaborate with the traditional leaders to maintain the cultural practices in the forest. Working with local communities can provide learning experiences of low-cost management strategies employed by the community in managing the sacred grove.

- the Homowo festival linked to the Gua Koo sacred grove can be used to mobilize people from different backgrounds and create awareness about the cultural significance of the place.
- As the only forest in the suburb of Accra, the Gua Koo sacred grove can be used as an ecotourism site to compliment the Achimota forest as the only forest within the capital city.
- employment opportunities should be offered to local populations as forest guides to encourage a sense of ownership by the local community in forest conservation.
- creating awareness for the younger generation through field trips to the site and education in schools about the importance of sacred groves

The researcher hopes that this research will lead to further extensive studies in the future and will possibly contribute to motivating the traditional authorities to conserve the site against the many threats it faces such as the competition from other forms of land use, the impacts of resources extraction, the evolution of the youth's relationship to sacred sites and taboos, etc. The researcher also hopes that the existential threats to the sacred grove described in the research will incite policymakers and research institutions to further work on the harmonization of the land tenure system and the government planning scheme in the area. The next steps in this research are that, the researcher who is an environmental activist is collaborating with a cartoonist on the creation of a children's book to sensitize the young people to the sacred grove, its cultural significance, and environmental value so that the new generation can help better preserve the site.

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Traditional leader 1(traditional authorities)(August 12, 2020)Personal interviews
Ludo(August 19, 2020) (forest user) Personal interviews
Waterman(forest user) (August 19, 2020) Personal interviews
Shocki (forest user) (August 19, 2020) Personal interviews
Mechanic(resident) (August 19, 2020) Personal interviews
GL(forest user) (August 19, 2020) Personal interviews
Lady Tia (forest user) (August 19, 2020) Personal interviews
Hairwoman(forest user) (August 19, 2020) Personal interviews
Plantain woman(forest user) (August 19, 2020) Personal interviews
Agro (CSO) (August 19, 2020) Personal interviews
Yoomo(traditional authorities) (August 20, 2020) Personal interviews
Kenkey Seller (forest user) (August 20, 2020) Personal interviews
Mr.Fair (forest user) (August 20, 2020) Personal interviews
Seller 30 (forest user) (August 20, 2020) Personal interviews
Mame N (forest user) (August 20, 2020) Personal interviews
Taxi driver (forest user) (August 20, 2020) Personal interviews
EPA officer 2 (public authorities) (August 25, 2020) Interview via email
MA (public authorities) (September 25, 2020) Personal interviews
Traditional leader 2(traditional authorities) (November 24, 2020) Personal interviews
EPA officer(public authorities)(October 26, 2020) Personal interviews
Forestry (public authorities)((November 24, 2020) Personal interviews

Appendix A

The Interview guide

The interview aimed at getting the interviewee's views on certain topics and at answering the following research questions:

- What are the local rules or systems put in place for access and use of the forest resources and its implications for the conservation of the Gua Koo sacred grove?
- What are the weaknesses in the management systems employed by diverse key stakeholders in managing the Gua Koo sacred forest?
- What are the specific threats to the conservation of the Gua Koo sacred grove?
- What information do the local people have on the fauna and flora that can be found in the forest?
- What benefits do different stakeholders gain from the Gua Koo sacred grove and their implication for the Gua sacred forest conservation?
- What are the measures others have taken to support the sacred forest?

Since the interviewees have different experiences and characteristics the questions are amended to fit the interviewees.

An interview guide was prepared and adjusted based on significant issues and themes that had emerged from the analysis of the other interviews previously conducted.

The objective of the interview is to allow the interviewees to express him or self freely. The goal of the interview is to let the interviewee express him or herself freely as long as the topics in the guide are covered. Further, probing for further details and follow-up questions are used in the interview to ensure that the interviewee provide more elaborate answers.

Before the interviews start, the researcher introduces herself and the purpose of the research to the respondents. The interviewees are informed and asked to permit to use their statements or words in the research.

They are informed of their right to stop the interview if they were no longer interested. Further, the informants are informed that their response will be tape-recorded, however, kept anonymous. All the interviewees were given pseudonyms to hide their identity. The

interviewees are told the duration of the interviews. Additionally, they are informed to select which language they are comfortable in communicating with.

The interview is asked at the end of the interview if he or she has something more to add to what has been said. If the response is no, then the interviewee is thanked for participating in the interview.

Appendix B

Interview questions

Interview questions for the Forestry Commission

The Forestry Commission (FC) has been selected because it is responsible for the regulation on the use of forest and wildlife resources, the conservation and management of those resources and the coordination of policies associated to them(FC-Ghana, n.d).

Please, I am a master's student at the University of Iceland, studying Environment and Natural Resources. The aim of this research is to understand how cultural belief systems of sacred groves are linked to environment conservation and to identify the drivers that endangers such places using the case study of the Gua Koo sacred grove in Pokuase, Ghana. I have created a survey to be taken by people living in Pokuase, Accra. Please use this survey to reflect on your personal opinions regarding the Gua Koo sacred grove. All responses are confidential.

1. Do you know of the history of the Gua Koo sacred grove ?Why is the Gua Koo considered sacred?
2. Is the Gua Koo sacred forest officially recognized by the organisation?Does the Forestry Commission (FC) have any policies for conservation of the Gua Koo?
3. Has the FC taken any measures to support the conservation of the Gua Koo sacred grove? If Yes, who are they ?
4. What do you think are the challenges involved in the management of Gua Koo sacred grove ?
5. Are there any restrictions any restrictions set by the FC on entry to the Gua Koo sacred grove ? If yes, what are they ?
6. Has the FC conducted any study on the Gua Koo sacred grove, if yes what will the information gathered be used for?

7. Do you know of any plant species in the sacred grove? Are there any restrictions set by the FC on the harvest of plant species in the forest?

8. Do you know of any animal that can be found in the Gua Koo sacred grove? Are there any restrictions by the FC on the hunting of animals in the Gua Koo?

9. There is a stream that flows inside the sacred grove which is extracted by commercial water providers, are there any regulations set by the FC that restrict the use of the water resources in the Gua Koo?

10. Do you know of any traditional ceremonies associated with this sacred grove? If yes can you tell me about them?

Are there any other benefits obtained from the forest that you know of?

11. What do you think are the threats to the Gua Koo? How can these threats be dealt with?

12. Do you think the cultural beliefs of the Gua Koo sacred forest is dying in the community?

13. Do you think the traditional authorities involve the FC in decision making concerning the Gua Koo sacred forest?

14. Do you think that there is a potential for the FC to collaborate with the custodians of Gua Koo sacred forest in managing the landscape?

15. Do you think that the FC involves the traditional leaders in policy making decision concerning the Gua Koo.

16. Please is there something you would like to add?

Thanks a lot for your time.

Interview questions for the forest users

The forest users include people living at the fringes of the Gua Koo, commercial water suppliers that extract water from the stream in the forest and other users. The users of the forest resources can provide useful information about the history, cultural beliefs and their experiences in the sacred forest.

Please, I am a master's student at the University of Iceland, studying Environment and Natural Resources. The aim of this research is to understand how cultural belief systems of sacred groves are linked to environment conservation and to identify the drivers that endanger such places using the case study of the Gua Koo sacred grove in Pokuase, Ghana. Please use this survey to reflect on your personal opinions regarding the Gua Koo sacred grove. All responses are confidential. Thank you all for your time and your participation!

1. Do you know the history of the Gua Koo Sacred grove?
2. Who is regarded as the owner of Gua Koo sacred grove?
3. Why is Gua Koo's sacred forest considered sacred?
4. Do you know how the forest is managed?
5. Are both men and women involved in the management of the sacred grove? If yes, can you explain why or why not?
6. What do you think are the challenges involved in the management of Gua Koo sacred grove?
7. Are you allowed access to the sacred grove at all times?
8. Are there any taboos governing the entry and use of the forest? If yes, what are they?

Are there any penalties for disobeying the rules? If yes what are they
9. Do you know of any plant species in the sacred grove? If yes, what are its uses?
10. Do you know of any animal that can be found in the sacred grove?

Are the animals hunted, and are there any restrictions for hunting in the sacred grove?

11. Do you know of the stream flowing inside this sacred grove? If yes: Who can use this water? Do you think the water level is reducing? Are there any restrictions on its use?

12. Are there any traditional ceremonies associated with this sacred grove? If yes: List names of ceremonies when they are celebrated and reasons for celebration?

Do you use the sacred grove for spiritual assistance? If yes: What are they?

Are there any other benefits you received from the Gua Koo?

Threats and opportunities for the conservation of sacred grove

13. Are there any threats to the existence of the Gua Koo? How do you think these threats can be dealt with?

14. Do you think that the Gua Koo forest grove should be conserved and why?

15. Do you think the cultural beliefs of the Gua Koo in the community are dying?

16. Do you think that the traditional authorities involve the public in decision making concerning the conservation of the Gua Koo?

17. Do you have any further comments to add?

Demographic questions

What is your age?

Gender of the interviewee?

What is your current occupation?

Interview questions for the Municipal Assembly

The Municipal Assembly (MA) has been selected as a respondent to the survey because it is responsible for the administration of land use, and management procedures in the Pokuase community(GNMA, 2019c).

I am a master's student at the University of Iceland, studying Environment and Natural Resources. I am researching sacred forests and how they contribute to the nexus between social, ecological, and environmental issues in Accra, Ghana. I have created a survey to be taken by people living in Pokuase, Accra. Please use this survey to reflect on your personal opinions regarding the Gua Koo sacred grove. All responses are confidential. Thank you all for your time and your participation!

1. Do you know the history of the Gua Koo sacred forest?
2. Is the Gua Koo officially recognised by the MA ? If yes, does the MA have any policies for conservation of the Gua Koo forest? If yes, how is it being implemented?
3. What do you think are challenges encountered in the conservation of the Gua Koo?
4. Are there any bye-laws by the MA governing the entry to the Gua Koo? If yes, what are they?
5. There is a stream that flows inside the sacred grove which is extracted by water tankers, are there any regulations that restrict the use of the water resources in the Gua Koo?Do you think the water level is going down?
6. Are there any traditional ceremonies associated with this sacred grove? If yes: List names of ceremonies when they are celebrated and reasons for celebration?
7. Has the MA used the grove for any educational study? If yes: What will the information gathered be used for ?
- 8.Do you know of other benefits derived from the Gua Koo?

9. What do you think are the threats to the Gua Koo? How can these threats be dealt with?

10. Do you think the cultural beliefs of the Gua Koo are fading in the community?

11. Do you think that the Gua Koo should be conserved? Why?

12. Do you think the traditional custodian of the sacred forest involves the MA in decision making about the Gua Koo?

13. Does the MA involve the traditional authorities in urban planning decisions of the municipality? If yes how are they involved?

14. Do you think there is a potential for the MA to collaborate with traditional authorities in managing the forest? If yes, what are they

15. Has the MA taken any measure to support the conservation of the Gua Koo?

16. Is there something you would like to add?

Demographic questions

What is your age?

Gender of the interviewee?

What is your occupation?

Interview questions for the traditional custodians of Gua Koo sacred forest.

The traditional leasers have been selected for this interview because they are the caretakers of the sacred forest and can provide useful information about the history, cultural, and social relevance of the sacred grove in the community.

I am a master's student at the University of Iceland, studying Environment and Natural Resources. The aim of this research is to understand how cultural belief systems of sacred groves are linked to environment conservation and to identify the drivers that endangers such places using the case study of the Gua Koo sacred grove in Pokuase, Ghana. I have created a survey to be taken by people living in Pokuase, Accra. All responses are confidential. Thank you all for your time and your participation!

1. Who is regarded as the land owner of Gua Koo sacred grove?
2. Why is Gua Koo's sacred forest considered sacred?
3. What is the history of the Gua Koo sacred grove?
4. Who carries out the management practices? (why these people?)
5. Are both men and women involved in the management of the sacred grove? (explain why or why not).
6. What are the challenges involved in the management of Gua Koo sacred grove?
7. Do the traditional authorities collaborate with other stakeholders in managing the forest? How? Who are they?
8. Are there any taboos governing the entry and use of the forest? If yes, what are they? Are there any penalties for disobeying the rules? If yes what are they?

9. Do you know of any plant species in the sacred grove? What are its uses?
What methods are used in collecting the plants in the forest, and are there any restrictions?
10. Do you know of any animal that can be found in the sacred grove?
Are the animals hunted, and are there any restrictions for hunting in the sacred grove?
11. Is there a water body inside this sacred grove? If yes: Who can use this water?
What are the restrictions on its use? Do you think that the water level is reducing?
12. Are there any traditional ceremonies associated with this sacred grove? If yes: List names of ceremonies when they are celebrated and reasons for celebration?
Do individuals use the sacred grove for spiritual assistance? If yes: What are they?
13. Are there other benefits derived from the Gua Koo sacred grove? Please mention them
14. Are there any threats to the existence of the Gua Koo sacred grove? Please mention them. How can these threats be dealt with?
15. Do you think the cultural beliefs of the Gua Koo sacred grove are fading in the community? Explain please.
16. Do you think that the Gua Koo sacred grove should be conserved and why?
17. Do you think the public authorities hear your opinions on planning decision making in the municipality?
18. Has the traditional authorities received any support from other stakeholders in conserving the sacred grove? Please explain?
19. Is there something you would like to add?

Demographic questions

What is your age?

Gender of the interviewee?

What is your occupation?

Interview questions to department A of the of the Environmental Protection Agency (EPA) of Ghana.

The agency has been selected because it is enforced by the Environmental Assessment Regulations, 1999 (LI 1652) to ensure that any undertaking in environmentally sensitive areas such as sacred groves undertake an Environmental Impact Assessment (EPA, n.d.)

I am a Master's student at the University of Iceland, studying Environment and Natural Resources. The title of my research is, 'Beliefs systems of sacred natural landscapes and threats to their conservation: A case study of the Gua Koo sacred forest in Pokuase, Ghana.' I have created a survey to be taken by people living in Pokuase, Accra. Please use this survey to reflect on your personal opinions regarding the Gua Koo sacred grove. All responses are confidential. Thank you all for your time and your participation!

1. According to the Environmental Assessment Regulations, 1999 Schedule 5 (Regulation 30 (2)), any proposed undertaking in Environmentally Sensitive areas such as sacred groves and water bodies tapped for domestics requires an Environmental Impact Assessment(EPA, n.d.). According to some forest users and resident, there is a factory(Eco block factory) near the forest that discharges waste into a nearby stream used as drinking water, please has the EPA conducted any environment audit assessment on the factory? Please explain?

2. Please how does the EPA monitor such a project to ensure that the company's activities do not cause harm to the forest?

3. Please how can the Agency collaborate with the traditional leaders in the Municipality to protect the remaining landscape?

4. Please is there something you would like to add?

Thank you very much for your time?

Interview questions to department B of the Environmental Protection Agency (EPA) of Ghana

The agency has been selected because it is enforced by the Environmental Assessment Regulations, 1999 (LI 1652) to ensure that any undertaking in environmentally sensitive areas such as sacred groves undertake an Environmental Impact Assessment (EPA, n.d.)

I am a master's student at the University of Iceland, studying Environment and Natural Resources. The aim of this research is to understand how cultural belief systems of sacred groves are linked to environment conservation and to identify the drivers that endangers such places using the case study of the Gua Koo sacred grove in Pokuase, Ghana. I have created a survey to be taken by people living in Pokuase, Accra. All responses are confidential. Thank you all for your time and your participation!

1. Please do you know the history of the Gua Koo sacred forest located in Pokuase? Why is the Gua Koo considered sacred?
2. Please, is the Gua Koo officially recognized by the EPA? If yes, does the EPA have any policies for the conservation of the Gua Koo forest?
3. Please has the EPA taken any measures to support the conservation of the forest? If yes, what are they?
4. Please what do you think are the challenges involved in the management of Gua Koo's sacred grove or sacred natural sites?
5. Are there any laws set by the EPA restricting the entry to the Gua Koo? If yes, Are there any penalties for disobeying the rules? What are they?
6. Please has the EPA performed any scientific study on the Gua Koo sacred landscape? If yes, what will the study be used for?
7. Please do you know of any plant species in the sacred forest? What are their uses?

8. Are there any restrictions set by the EPA on the use of the plant species in the Gua Koo sacred forest? If yes, what are they?

9. Please do you know of any animal species that can be found in the Gua Koo sacred grove? Are there any restrictions set by the EPA on hunting in the sacred grove?

10. There is a stream that flows inside the sacred grove which is extracted by water tankers, are there any EPA regulations that restrict the use of the water resources in the Gua Koo? Do you think the water level is reducing?

11. Please do you know of any traditional ceremonies associated with this sacred grove? If yes please can you tell me about them?

Please do you know of other benefits received from the Gua Koo?

12. Please, what do you think are the threats to the existence of the sacred forest? How can these threats be dealt with?

13. Please, do you think the cultural beliefs of the Gua Koo sacred forest is fading in the community?

14. Please, do you think the traditional authorities involve the EPA in decision making concerning the Gua Koo sacred forest?

15. Does the EPA involve traditional leaders in policy decisions concerning the management of sacred natural landscapes? If yes, how?

16. Do you think that there is a potential for the EPA to collaborate with the custodians of sacred grove in managing the land?

17. Do you think that the Gua Koo sacred forest should be conserved and why?

18. Is there something you would like to add?

Demographic questions

Please, what is your age?

Gender of the interviewee:

