

SIMON DIEDONG DOMBO UNIVERSITY OF BUSINESS AND

INTEGRATED DEVELOPMENT STUDIES

**EFFECTS OF COMMUNITY-BASED MANAGEMENT OF THE BOABENG-
FIEMA CONSERVATION AREA ON LIVELIHOODS OF FRINGE
COMMUNITIES IN THE NKORANZA NORTH DISTRICT,
BONO EAST REGION**

RICHMOND NGMENSANE WULEKA

2025

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**THESIS SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY,
FACULTY OF SOCIAL SCIENCE AND ARTS, SIMON DIEDONG DOMBO
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STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE AWARD OF MASTER OF PHILOSOPHY IN GEO-SPATIAL SCIENCE**

MAY, 2025

DECLARATION

As a result, I declare that this thesis is entirely the result of my original work and has not been submitted for any other degree or academic qualification at this University or any other institution. I confirm that all information and ideas derived from different sources have been properly acknowledged and cited.

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ABSTRACT

The Boabeng-Fiema Conservation Area (BFCA) in the Nkoranza North District of Ghana plays a significant role in conserving biodiversity and supporting community livelihoods. This study explores the effects of community-based management of the conservation area on the livelihoods of fringe communities. Specifically, it assesses land use and land cover dynamics over thirty years (1992–2022), evaluates the effectiveness of management practices, and examines the conservation area on the people's livelihoods. A mixed-methods approach was employed, integrating remote sensing, household surveys, and key informant interviews. LULC changes were analyzed using satellite imagery classification and accuracy assessment, while socio-economic data were examined using descriptive and inferential statistical techniques. A total of 100 households were surveyed, and 5 key informants provided qualitative insights. The analysis revealed significant improvements in forest cover, primarily driven by reforestation initiatives, while some areas experienced agricultural expansion. Management practices were found to be effective in promoting biodiversity conservation but imposed restrictions on traditional livelihoods, particularly in resource access. Despite these limitations, alternative livelihood programs, including beekeeping, snail farming, and non-timber forest product (NTFP) ventures, have contributed to economic development. Fringe communities benefited from improved income opportunities and community development projects funded by conservation revenues. The community-based management system of the BFCA has had a positive impact on biodiversity conservation and provided alternative income-generating activities for local communities. However, the restrictive nature of resource access has challenged traditional livelihood strategies, particularly for those heavily reliant on forest resources. The balance between conservation goals and livelihood needs remains delicate, requiring adjustments in policy and management strategies. It is recommended that management practices be adapted to better align with the livelihoods of local communities, ensuring greater involvement in decision-making processes. Expanding livelihood diversification programs and enhancing equitable benefit-sharing mechanisms could foster stronger community support for conservation efforts. Further research should focus on long-term socioeconomic impacts and the role of governance structures in enhancing both conservation and livelihood outcomes.

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DEDICATION

To my family, my dad, Prof. Conrad Wuleka Kuuder, and to my mom, Ms. Evelyn K. Yirbekyaa (blessed memory) who had always wanted to see the end of this milestone. And to aunties Ms. Eunice S. Yirbekyaa and Mrs. Leonicia Kuusokob. I also dedicate this to Mrs. Flora Augusta Pufaa.

LIST OF ACRONYMS

BFCA - Boabeng-Fiema Conservation Area

BRDF - Bidirectional Reflectance Distribution Function

CPR - Common Pool Resources

CREMA - Community Resource Management Area

GDP - Gross Domestic Product

GEE - Google Earth Engine

GPS - Global Positioning System

IFRC - International Federation of Red Cross and Red Crescent Societies

LEAN - Landscapes and Environmental Agility across the Nation

MLNR - Ministry of Lands and Natural Resources

NDVI - Normalized Difference Vegetation Index

NICFI - Norway's International Climate and Forest Initiative

NTFP - Non-Timber Forest Products

PGIS - Participatory Geographic Information System

PNWP - People, Nature, Wealth, and Power

SPSS - Statistical Package for Social Sciences

TABLE OF CONTENTS

DECLARATION	i
ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	iv
LIST OF ACRONYMS	v
TABLE OF CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Research Questions	5
1.3.1. Main Research Question.....	5
1.3.2. Specific Research Questions	6
1.4 Research Objectives	6
1.4.1. Main Research Objective	6
1.4.2. Specific Research Objectives	6
1.5 Significance of the Research	6
1.6 Scope of the Research	7
1.7 Limitations of the Study	8
1.8 Organization of the Study	8
CHAPTER TWO	9
LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Definition of Key Terms	9
2.2.1 Conservation.....	9

2.2.2 Land Use/Land Cover.....	10
2.2.3 Community Resource Management Area (CREMA).....	10
2.2.4 Livelihoods.....	11
2.2.5 Forest Reserve.....	11
2.2.6. Sustainable Development.....	12
2.3 Theoretical Review.....	13
2.3.1 Community Theory.....	13
2.3.2 Tragedy of the Commons.....	15
2.3.3 Sustainable Livelihoods Framework.....	17
2.4 Empirical Review.....	21
2.4.1 Land use and land cover dynamics of the conservation area from 1992 to 2022.....	21
2.4.2 Effectiveness of the Management system of conservation areas.....	24
2.4.3 Effects of the conservation area on the livelihoods of the fringe communities.....	28
2.5 Conceptual Framework.....	32
2.6 Conclusion.....	36
CHAPTER THREE.....	38
RESEARCH METHODOLOGY.....	38
3.1 Introduction.....	38
3.2 The Study Area.....	38
3.2.1 Location and Size.....	38
3.3 Methodology.....	39
3.3.1 Philosophical Underpinnings.....	39
3.3.2 Research Design.....	40
3.3.3 Research Approach.....	41
3.3.4 Sources of Data.....	42
3.3.5 Sampling Techniques.....	44
3.3.4.1 Simple Random Sampling.....	44

3.3.4.2 Purposive Sampling Technique	44
3.3.6 Sample Size Determination	45
3.3.7 Data Collection Methods and Tools	47
3.3.7.1 Land Use / Land Cover Classification	47
3.3.7.2 Key Informant Interviews	50
3.3.7.3 Household Questionnaire.....	52
3.3.8 Data Analysis and Presentation	52
3.3.8.1 Assessment of Land use and land cover dynamics in the Conversation area from 1992 to 2022	52
3.3.8.2 Analyses of the effectiveness of the management systems of the conservation area	54
3.3.9 Ethical Considerations.....	54
CHAPTER FOUR.....	55
RESULTS AND DISCUSSIONS.....	55
4.1 Introduction	55
4.2 Land Use and Land Cover Dynamics in the Conservation Area From 1992 to 2022.....	55
4.2.1 Analysis of the various Land Covers.....	55
4.2.2 Accuracy Assessment.....	63
4.2.3 Changes in the Land Use / Land cover.....	65
4.3 Effectiveness of the Management System of the Conservation Area	74
4.3.1 Management practices within the conservation area.....	76
4.3.2 Knowledge about the management practices.	77
4.3.3 The current management practices that are beneficial for the conservation of biodiversity in the area.	78
4.3.4 Participation in conservation activities.....	79
4.3.5 Challenges the management of the conservation area faces	80
4.3.6 Roles local and national government agencies play in the management of the conservation area.	81

4.3.7 Ways of funding management practices of the conservation area.	83
4.3.8 Laws or regulations that govern the management practices.....	84
4.3.9 Ways laws and regulations are enforced effectively.	85
4.3.10 The management practices are effective in mitigating environmental challenges	86
4.4 Effects of the Conservation Area on the Livelihoods of the Fringe Communities	88
4.4.1 Estimated monthly income	88
4.4.2 Alternative Livelihood Opportunities for the Community.....	89
4.4.3 The conservation area has improved my family's economic well-being.....	90
4.4.4 Jobs related to the conservation area.	91
4.4.5 Community Projects funded by the conservation area’s revenues	93
CHAPTER FIVE	95
SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS	95
5.1 Introduction	95
5.2 Summary of Findings	95
5.3 Land Use and Land Cover Dynamics in the Conservation Area From 1992 to 2022.....	95
5.4 Effectiveness of the Management System of the Conservation Area	95
5.5 Effects of the Conservation Area on the Livelihoods of the Fringe Communities	96
5.6 Conclusion.....	96
5.7 Recommendations	96
5.7.1 Recommendations for Policy Planning:	96
5.7.2 Recommendations for Future Research:	97
REFERENCES.....	98
APPENDIX I	114
APPENDIX II.....	119
APPENDIX III	121

LIST OF TABLES

Table 1: Breakdown of the objectives or data requirements, the source of data, and the data collection technique.....	43
Table 2: Apportionment of Sample Size to Fringe Communities Using Proportionate Sampling	46
Table 3: Description of satellite data	49
Table 4: Description of Land use/land cover classes.....	49
Table 5: Area of the various Land use/land covers.....	62
Table 6: Accuracy Assessment report of the various land covers	64
Table 7: Area of change detection	73
Table 8: Management Practices	76
Table 9: Knowledge about the management practices	77
Table 10: Management practices are beneficial for the conservation.....	79
Table 11: Participation in conservation activities	80
Table 12: Challenges the management faces	81
Table 13: Roles the government agencies play.....	83
Table 14: Ways of Funding Management Practices	84
Table 15: Laws governing the area.....	85
Table 16: Laws governing the area.....	86
Table 17: Mitigation ways towards environmental challenges.....	87
Table 18: Estimated Monthly income.....	89
Table 19: Alternative Livelihood Support	90
Table 20: conservation area has improved my family's economic well-being	91
Table 21: Jobs related to the conservation area	92
Table 22. Community Projects funded by the conservation area's revenues	94

LIST OF FIGURES

Figure 2. 1: Conceptual framework, Authors construct, 2024.....	36
Figure 3. 1: Map of Nkoranza North showing the communities under study.....	39
Figure 4. 1: Land Use / Land Cover 1992	57
Figure 4. 2: Land Use / Land Cover 2002	59
Figure 4. 3: Land Use / Land Cover 2022	61
Figure 4. 4: Area of the various land use/land covers.....	62
Figure 4. 5: Change in Closed Woodland from 1992 – 2002	65
Figure 4. 6: Changes in Woodland from 2002 - 2022	66
Figure 4. 7: Changes in Woodland from 1992 - 2022	67
Figure 4. 8: Changes in Open Woodland from 1992 - 2002.....	68
Figure 4. 9: Changes in Open Woodland from 2002 – 2022.....	69
Figure 4. 10: Change in Open Woodland from 1992 – 2002.....	70
Figure 4. 11: Change in Built Up / Bare lands from 1992 -2002.....	71
Figure 4. 12: Change in Built Up / Bare lands from 2002 -2022.....	72
Figure 4. 13: Change in Built Up / Bare lands from 1992 – 2022.....	73
Figure 4. 14: Trend of change in the area of conservation	74
Figure 4. 15: Structure of the Management System	75

CHAPTER ONE

INTRODUCTION

1.1 Background

Forest landscapes provide vital natural resources for human sustenance and ecological maintenance (Husseini et al., 2016; FAO, 2016; Jiao et al., 2019; Mavhura and Mushure, 2019; Islam et al., 2019; Gilli et al., 2020; Kamwi et al., 2020). Forest resources help to sustain, preserve, and restore global ecosystems (Baskent, 2020). Forest landscapes have a crucial role in human well-being, but are constantly depleted due to over-exploitation for livelihood purposes (Baskent, 2020). The Food and Agriculture Organization (2014) reports that an average of 13 million hectares of global forest cover are degraded each year, with Africa alone accounting for around 3.4 million. According to Husseini et al. (2016) and Amoah and Korle (2020), Africa ranks second in the world for deforestation due to population growth and increased usage of forest resources.

The conservation of forest landscapes has become a top priority on the global agenda to reverse the degradation trend and its effects on climate change and natural resource-based livelihoods. This is manifested in the devotion of Sustainable Development Goal (SDG) 15 to the protection, restoration, and promotion of sustainable use of terrestrial ecosystems, sustainable management of forests, reduction of desertification, land degradation, and biodiversity loss across the world. This has seen changes in the conventional top-down management approaches of natural resources, emphasizing bottom-up approaches. This has resulted in global support for community resource management and resource governance for sustainable natural resource management and natural resource-based livelihoods.

In Ghana, nearly 70% of people rely on forest resources for their livelihoods (Amoah and Korle, 2020). Over the previous decade, Ghana's forest sector has contributed around 6% of its GDP (Osei-Mainoo, 2012). Over-exploitation of these resources has led to considerable depletion (Amoah and Korle, 2020). From 2000 to 2010, the country's forest cover decreased by around 1.6 million hectares (Marfo, 2010; Osei-Mainoo, 2012). Ghana's forest landscapes are diverse, with some complicated factors. Some forest reserves are designated for wood extraction, while others are for environmental protection (Acheampong et al., 2020). Most of these reserves have both legal and illegal settlements and agriculture (Agyemang et al., 2018). Most forest reserves are surrounded by communities that rely on them for a living (Sobeng et al., 2018; Damnyag et al., 2013). This occasionally causes disputes in the management of these resources, which has the potential to undermine the full advantages of the forest resources.

For generations, fringe people have had a specific relationship with trees, which they rely on for economic output, social structure, religion, and identity (Abane, 2017). For example, their livelihoods depend on the availability, access, and utilization of forest lands and non-timber forest products. These societies produce, gather fuelwood, hunt wildlife, log, and harvest snails, medicinal herbs, bamboo, chewsticks, ropes, and other items from both primary and secondary woods.

The Community Resource Conservation Area approach is one of the decentralized natural resource management methods that give local people more opportunities to manage the natural resources on their land (Marfo, 2010; Baland and Das, 2010; Baruah, 2015; Baker et al., 2018; Gilli et al., 2020; Owusu-Ansah, 2020). It is well acknowledged that natural resource regions managed by or in collaboration with local populations have reduced levels of forest resource degradation (Baruah, 2015; Hussein

et al., 2016; Baker et al., 2018; Addison et al., 2019). The strategy is meant to stop biodiversity degradation and help regenerate the ecosystem to its optimum productive levels that will support rural livelihoods (Ekpe et al., 2014; Owusu-Ansah, 2019).

However, conservation management practices can negatively impact the lives of fringes populations. Despite the relevance of community resource conservation zones in conserving biodiversity and enhancing the lives of fringe people, the effects of the interplay between community resource management governance and livelihoods have not been examined.

This is significant because it helps uncover the positive and negative implications of the link between the two, which will assist enhance community-based resource management practices in the country.

1.2 Problem Statement

The Boabeng-Fiema Conservation Area is a tangible manifestation of Ghana's steadfast dedication to safeguarding ecological diversity (Eshun, 2011). The Boabeng-Fiema Monkey Sanctuary is in Ghana's Bono East Region, specifically the Nkoranza North District. The Sanctuary is one of Ghana's most important and well-known tourist attractions. It occupies 4.5 km² of land. The sanctuary, which was created in 1975, is home to about 1,012 monkeys, the majority of which are Colobus (*Colobus Vellerosus*) and Mona (*Cercopithecus Campbelli Lowei*) species. Between 2002 and 2004, the Nature Conservation Research Centre, which was sponsored by USAID, selected the sanctuary as part of the Community-Based Ecotourism programs in Ghana, resulting in a joint effort to protect the region. It is the country's first protected area with statutory backing for the local indigenous protection system to enforce traditional/indigenous wildlife conservation (Forestry Commission, 2021). However, the sanctuary borders towns such as Akrudwa, Bonte, Bomini, Busunya, and Kokompe.

The Boabeng-Fiema Monkey Sanctuary (BFMS) significantly contributes to local economic development through ecotourism. The revenue generated from entrance fees, guided tours, and sales of products supports community development projects and infrastructure improvements. This influx of funds enhances the economic vitality of the area, benefiting both individuals and the broader community (Agyare et al., 2016). In addition, developing tourism in rural areas will reduce rural-urban migration and its attendant effects both in the rural and urban communities (Mintah et al, 2022). The sanctuary promotes sustainable agricultural practices and alternative livelihoods to lessen the dependence on forest resources. Activities such as beekeeping, agroforestry, and the production of non-timber forest products enable residents to earn an income while conserving the environment (Acheampong et al., 2021).

This unique area has been the focus of several research studies. Ankama (2020) investigated the impact of the pluralistic management approach by identifying the challenges and benefits of co-management, as well as ascertaining the type of co-management utilized in the Boabeng and Fiema conservation area. Additionally, Amponsah et al. (2020) examined the different forest cover types and changes in the Boabeng-Fiema conservation area using time series data from 1992, 1998, 2004, 2010, 2016, and 2018. Yeboah and Baffour (2020) assessed the factors that influence community attitudes towards the Boabeng-Fiema conservation area in Ghana, focusing on four fringe communities around the conservation area. More so, Yeboah (2024) explored the dynamics of ecotourism benefits distribution at Boabeng, which is found within the Boabeng-Fiema Monkey Sanctuary (BFMS) in Ghana having findings that the adverse impacts of ecotourism are making it difficult for households whose livelihood activities are located in the fringes of BFMS to engage in normal activities. Many locals have less access to natural assets despite conservation measures, which

has an impact on their income and food security. These issues are made worse by low participation in decision-making procedures and unequal benefit-sharing from tourist and conservation efforts. As a result, there is increasing conflict between the objectives of conservation and the socioeconomic requirements of these marginalized populations.

While previous studies have examined aspects of biodiversity conservation, cultural significance, and ecotourism development, there is limited empirical research assessing how such conservation frameworks affect local livelihoods. The socio-economic consequences of conservation, both positive and negative, have not been sufficiently analysed, particularly concerning land use changes and income generation. Existing research often focuses on the ecological and cultural dimensions of conservation, but does not systematically evaluate the economic trade-offs for local communities.

This study seeks to bridge this gap by critically assessing the impact of community-based management on the livelihoods of fringe communities surrounding the BFCA. It will analyze the extent to which conservation policies have influenced economic activities, land use patterns, and income sources, considering both the benefits and challenges faced by local populations. By integrating spatial analysis, socio-economic surveys, and stakeholder perspectives, this research aims to contribute to the broader discourse on sustainable conservation practices and inform policy strategies that enhance both conservation effectiveness and community well-being.

1.3 Research Questions

1.3.1. Main Research Question

How has the Community-Based Management of the Boabeng-Fiema Conservation Area impacted the livelihoods of fringe communities in the Nkoranza North?

1.3.2. Specific Research Questions

- i. What are the dynamics of the conservation area's land use and land cover from 1992 to 2022?
- ii. How is the management system of the conservation area effective?
- iii. How does the conservation area affect the livelihoods of the fringe communities?

1.4 Research Objectives

1.4.1. Main Research Objective

To investigate the Effects of Community-Based Management of the Boabeng-Fiema Conservation Area on the livelihoods of fringe communities in the Nkoranza North.

1.4.2. Specific Research Objectives

- i. To assess the land use and land cover dynamics of the conservation area from 1992 to 2022.
- ii. To analyze the effectiveness of the management system of the conservation area.
- iii. To examine the effects of the conservation area on the livelihoods of the fringe communities.

1.5 Significance of the Research

The study aligns with Sustainable Development Goal (SDG) 1: No Poverty, particularly Target 1.4, which emphasizes ensuring that all men and women, especially the poor and vulnerable, have access to economic resources and sustainable livelihoods. By assessing the socio-economic effects of the Boabeng-Fiema Monkey Sanctuary (BFMS) protected area on fringe communities, the research provides critical insights into how conservation efforts impact income generation, employment opportunities,

and access to natural resources. Strengthening governance structures in conservation management can enhance sustainable livelihood strategies, contributing to poverty alleviation (Target 1.2) by promoting inclusive economic growth for local communities. Furthermore, the study supports SDG 15: Life on Land, which focuses on the sustainable management of terrestrial ecosystems, biodiversity conservation, and forest preservation. Specifically, it aligns with Target 15.1, which calls for the conservation and restoration of ecosystems, and Target 15.5, which aims to halt biodiversity loss. The research highlights stakeholder roles in afforestation, ecosystem restoration, and biodiversity conservation by examining the management systems governing the conservation area. Strengthening community involvement in conservation efforts can foster long-term sustainability and resilience against environmental degradation. Contributions to Agenda 2063, national contribution to forest policy or land policy, etc, contribution to knowledge/literature.

1.6 Scope of the Research

The study will focus on the local communities of Fiema, Boabeng, Bonte, and Konkompe, responsible for protecting the BFMS-protected area in the Nkoranza North district. These communities will be the primary sites for data collection, with close collaboration between the local communities and relevant stakeholders. The research will assess the impact of the protected area on the livelihoods of the local communities over a specific period. It will also examine the management systems of the conservation area and their effects on local livelihoods, while specifically analyzing land cover and land use dynamics over the past seven years. The study will concentrate solely on vegetation changes and their impact, without focusing on wildlife. This approach will allow for a comprehensive assessment of how the protected area has influenced economic development, social dynamics, and environmental sustainability within the

region, focusing on both short-term and medium-term impacts of community-based management.

1.7 Limitations of the Study

The study encountered difficulties in accessing sufficient long-term data, particularly for land use and land cover dynamics (1992). This limited the ability to assess changes over an extended period, which could have provided more robust conclusions on the impact of conservation efforts. Also during the questionnaire administration, there was a lack of community participation.

1.8 Organization of the Study

The thesis contains five chapters. Chapter One outlines the study's background, problem, research questions, objectives, significance, scope, and thesis organization. The second chapter covers the literature review, including theoretical, empirical, and conceptual difficulties. Chapter 3 describes the methodological processes, whereas Chapter 4 presents and discusses the results. The thesis concludes with Chapter Five, which presents major results, conclusions and suggestions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, the discussions focus on the review of relevant literature related to the topic under study. As a result, the discussion defines some key terms and further look at the theoretical review where a particular theory related to the study is reviewed and discussed in detail and as well its relevance for this study is emphasized. The literature review then goes further to present an empirical review of already existing literature that is of relevance to the study by way of satisfying the objectives of the study. The literature review finally provides a conceptual framework in a diagram to draw a logical relationship among the key concepts used in the study.

2.2 Definition of Key Terms

2.2.1 Conservation

Conservation is the control of the human use of organisms or ecosystems to ensure that it is sustainable and environmentally sound. Conservation, in addition to sustainable use, involves the protection, maintenance, rehabilitation, restoration, and enhancement of populations and ecosystems (MLNR, 2012). Furthermore, Leader-Williams et al. (2011) define conservation as 'activities that directly increase the likelihood of ecosystems and species remaining in the wild'. This stresses habitat, species, and wild persistence, implying a specific set of behaviors to attain these aims.

Conservation is the process of conserving natural resources for future generations. A forest's conservation requires safeguarding the ecosystems and people mutually benefiting from the natural resources. Forested regions must be preserved, planned, and improved via the practice of conservation (Pawar and Rothkar, 2015)

2.2.2 Land Use/Land Cover

Land use refers to the arrangements, activities, and inputs by people to produce, change, or maintain a particular land cover type. It involves human activities that are directly related to the land, such as agriculture, forestry, urban development, and recreation. "Land use involves the management and modification of natural environment or wilderness into built environments such as fields, pastures, and settlements" (Ellis & Ramankutty, 2020). "Land use describes the human employment of land for specific activities like agriculture, forestry, or urban development" (Verburg et al., 2015).

Land cover, on the other hand, refers to the physical and biological cover of the land's surface, which includes vegetation, urban infrastructure, water, bare soil, and other natural or manufactured components. It describes the biophysical condition of the earth's surface and near subsurface. Land cover is "the observed (bio)physical cover on the earth's surface" (Gong et al., 2013). Land cover is the observed physical cover that includes the flora (natural or artificial) and human structures that cover the earth's surface (Grekousis & Mountrakis, 2015).

2.2.3 Community Resource Management Area (CREMA)

The CREMA mechanism is an innovative natural resource management and landscape-level planning tool for community initiatives. According to Asare et al. (2013), "CREMAs are areas within which communities have agreed to manage natural resources sustainably, governed by locally crafted rules and regulations. It was developed by Ghana's Wildlife Division, an arm of the Forestry Commission, together with its partners, to support community resource management in off-reserve (un-gazette) lands.

2.2.4 Livelihoods

The livelihood concept is derived from the ‘sustainable livelihood’ approach, which has been defined broadly as a means of living that is resilient to shocks and stresses and does not adversely affect the environment (Meikle et al. 2001). Livelihoods refer to the means of securing the necessities of life (OXFAM GB, 2015). In other words, livelihoods imply means of living and encompass people's competencies, assets, income, and activities required to secure the necessities of life (IFRC, 2018). The concept of livelihood activities, therefore, refers to any activity that contributes to the socio-economic needs of the one engaged in it. Some of these activities are but are not limited to petty trading, soap making, shea and dawadawa processing, farming, fishing, mining, forest harvesting, and any form of venture that could contribute to the amelioration of the basic and economic needs of the people. According to the International Federation of the Red Cross and Red Crescent Society (IFRC, 2018). They said a livelihood activity is beneficial to both current and future generations when it can assist people recover or withstand negative externalities such as natural disasters and economic or social upheavals without compromising the environment or resource base of the community.

2.2.5 Forest Reserve

Forests are officially designated geographical areas established by governmental or regulatory authorities to primarily conserve and protect forest ecosystems and their associated biodiversity (Morales-Hidalgo, Oswalt, & Somanathan, 2015). These areas, protected by the state, hold great importance for wildlife, flora, or fauna of the country and provide opportunities for research and conservation of species. The government of the nation where a forest reserve is located must ensure its well-being, preventing the exploitation of its resources for agricultural activities (Definition and Concept, 2020).

According to MacDicken (2015), forests are characterized by their legal status, formalized through legislation, regulations, or official government decrees, providing a framework for governance, management, and enforcement of regulations within the reserve boundaries. The core objective is the conservation and preservation of forest ecosystems, encompassing flora, fauna, soil, water resources, and ecological processes. By serving as refuges for native species and protecting critical habitats, forest reserves significantly contribute to biodiversity maintenance. Management practices include zoning, monitoring, research, and adaptive strategies to address environmental challenges (Oswalt, Smith, Miles, & Pugh, 2019).

2.2.6. Sustainable Development

Scholars have connected the notion of development with a variety of meanings, interpretations, and theories. Mensah and Ricart (2019) describe development as an evolutionary process in which human potential improves in terms of creating new structures, coping with issues, adjusting to continual change, and striving consciously and creatively for new objectives. Todaro and Smith (2006) describe development as a multifaceted process that includes significant changes in social structures, attitudes, and institutions, as well as economic growth, inequality reduction, and the abolition of extreme poverty. Many ideas have been proposed to explain the concept of development. They include theories such as homogenization, dependency, world systems, and globalization.

Sustainability refers to the ability to preserve an entity, consequence, or process across time (Mensah & Ricart, 2019). However, in development literature, most academics, researchers, and practitioners (Gray & Milne, 2013; Tjarve & Zemīte, 2016; Mensah & Enu-Kwesi, 2018; Thomas, 2015) utilize the notion to connote developing and preserving a healthy economy, ecological, and social system for human development.

Since it has been linked to a variety of definitions, interpretations, and meanings, the term "sustainable development" (SD) has become a buzzword in the development debate. "Development that can be continued either indefinitely or for the given period" is what SD actually means (Stoddart, 2011). Additionally, the National Sustainable Development Strategy defines sustainable development as a focused, long-term, all-encompassing, and cooperative process that (i) impacts all facets of life at all levels, (ii) meets people's material, biological, spiritual, and social needs and interests, (iii) eliminates or drastically reduces interference that jeopardizes, damages, or destroys conditions and forms of life, (iv) does not burden the nation, (v) preserves resources, and (vi) preserves the environment and cultural heritage. The process of enhancing human well-being while remaining within the carrying capacity of supporting ecosystems is known as sustainable development in the scholarly literature (Ozili, 2022).

2.3 Theoretical Review

2.3.1 Community Theory

According to Nath et al. (2016), the CBFM is a type of forestry practice that has been approved by the government and involves direct forest users in joint decision-making processes and the execution of forestry activities. As such, it calls for local control over forest management and utilization, decision-making autonomy for the direct forest users in setting goals, and ownership of the forest's benefits. It can be seen as a state-community forest management strategy with the goals of enhancing the standard of living for forest users, lowering poverty, protecting natural resources, and encouraging decentralization and good governance (Nath et al. 2016). It has been intended as a tool for a people-centered approach to forest governance and as a successful tactic to

accomplish the twin objectives of poverty reduction and sustainable forest resource management (Nath et al. 2016).

Contemporary views on forest management have shifted towards preserving nature untouched by humans, resulting in challenges for rural communities reliant on forest resources (Pujo et al. 2018). Community-based forest Management (CBF) emerges as a potential solution to reconcile conflicting views on forest landscapes. CBF advocates assert its potential to restore both communities and forests, yet its dynamics remain understudied, particularly in the context of the US. Drawing from global experiences, particularly in developing nations, a three-stage process has been identified: local engagement in decision-making (social forestry), government devolution of forest management to local communities, and community involvement in value-added activities, Davis et al. (2020) assert. However, the literature lacks comprehensive analysis and consensus on the implementation of CBF, necessitating a deeper understanding of its contextual nuances.

A Community Approach to Community-based Forestry

According to Wulandari and Inoue (2018), the community framework emphasizes the deliberate involvement of local actors bound by shared values, interests, and actions in specific places. Community emerges through collective actions aimed at enhancing well-being. Mobilizing local human resources is essential for community action, underpinned by a sense of collective identity rooted in narratives linking present actions with historical context. Community, in this framework, is not merely a geographic location but a socio-cultural construct shaped by ongoing social interactions and shared narratives. Challenges arise when interactions essential for community formation are obstructed, hindering bottom-up decision-making processes.

The dichotomy between people and place often dominates development policies, overlooking the interdependence between them, according to Davis et al. (2020). Acknowledging the capacity of communities to manage and enhance local resources, termed "community agency," is crucial. Community agency refers to the collective capacity for action driven by shared needs and concerns, despite potential conflicts or divergent interests. Understanding the mechanisms through which communities make choices and address local issues is imperative for leveraging economic, social, and natural resources for sustainable development (Mahajan et al. 2021).

This theoretical framework integrates insights from community theory and community-based forestry literature to analyze the effects of CBF on the livelihoods of fringe communities in the Nkoranza North District, Ghana. It emphasizes the importance of local engagement, collective action, and shared narratives in fostering sustainable forest management practices and enhancing community well-being.

2.3.2 Tragedy of the Commons

The concept of the "Tragedy of the Commons," as introduced by Garrett Hardin, illustrates the potential consequences of unregulated access to shared resources, positing that individual self-interest in exploiting these resources leads to collective overuse and depletion. Hardin's perspective has significantly influenced resource management practices, advocating for centralized control as a means to prevent resource exhaustion. This theory has informed policies in emerging economies, leading to strategies such as privatization or governmental oversight of natural resources (Hardin, 1968; Ostrom et al., 2002).

However, the application of Hardin's theory to communal resource management has been met with criticism and reevaluation. Studies have demonstrated that communal resources do not inevitably lead to the outcomes predicted by Hardin. For instance, the

Seri community in Mexico successfully managed their fishing grounds by developing inclusive regulations and direct economic benefits, thereby challenging the inevitability of resource overexploitation under communal management (Basurto, 2005).

Further critique of Hardin's theory comes from the recognition of institutional, cultural, and social structures that significantly impact resource management outcomes. Feeny et al. (1990) argue that Hardin's direct correlation between property rights and resource sustainability oversimplifies the complex interplay of factors that govern resource use and conservation. Similarly, Young (2007) contends that the core issue of the "Tragedy of the Commons" lies not in the use of common pool resources (CPRs) per se, but in the challenges of managing resources that are in high demand and difficult to regulate or exclude usage.

The debate extends to the effectiveness of private versus state control of CPRs. While some advocate for private ownership as a means to incentivize sustainable management (Demsetz, 1967), others argue for state stewardship to ensure conservation (Hardin, 1968). Yet, evidence from places like Guatemala suggests that collaborative management approaches may offer more sustainable outcomes than either private or state ownership alone (Gibson et al., 2000). Andersson et al. (2006) further emphasize the importance of context-specific strategies, acknowledging that various management models can succeed or fail based on local conditions, such as economic pressures, legal frameworks, and cultural practices.

In light of these insights, this theoretical framework proposes that community-based management of forest conservation areas can potentially align the interests of fringe communities with sustainable resource use. By integrating local knowledge, participatory decision-making, and culturally tailored management practices,

community-based approaches may offer viable alternatives to the dilemmas posed by the "Tragedy of the Commons." This perspective recognizes the complexity of resource management and the potential for communal systems to foster sustainable livelihoods and conservation outcomes when appropriately supported by institutional and policy frameworks.

2.3.3 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework (SLF) is a comprehensive and widely used theoretical framework that provides a holistic approach to understanding and analyzing the livelihoods of communities, especially in the context of development interventions such as community-based management (Natarajan et al., 2022; Levine, 2014; Pasanchay & Schott, 2021; Mazur & Stakhanov, 2008). The SLF was developed by the Department for International Development (DFID) in the late 1990s and has since been applied in various studies and projects worldwide.

The SLF is based on the premise that livelihoods are influenced by a combination of different types of capital or assets that individuals and communities possess (Levine, 2014). These assets are categorized into five main types:

1. **Human Capital:** Human capital refers to the skills, knowledge, health, and education of individuals within a community. It encompasses the capabilities and capacities of people to engage in livelihood activities, make informed decisions, and adapt to changing circumstances (Levine, 2014). Investments in human capital, such as training programs, education initiatives, and healthcare services, can enhance the productivity and well-being of individuals, thereby improving livelihood opportunities and outcomes (Damastuti & de Groot, 2017).

2. **Social Capital:** Social capital includes the social networks, relationships, and institutions that individuals and communities can leverage for support, cooperation, and collective action. It emphasizes the importance of social cohesion, trust, and reciprocity in facilitating access to resources, information, and opportunities (Barnes et al., 2017). Strong social capital can enhance community resilience, promote collaboration, and enable effective community-based management initiatives that benefit livelihoods.
3. **Natural Capital:** Natural capital comprises the natural resources such as land, water, forests, and biodiversity that communities rely on for their livelihoods. It emphasizes the sustainable management and conservation of ecosystems to ensure the availability of essential resources for livelihood activities. Preserving and enhancing natural capital is critical for maintaining ecosystem services, biodiversity, and the long-term sustainability of livelihood systems (Natarajan et al., 2022).
4. **Physical Capital:** Physical capital includes the infrastructure, tools, equipment, and technology that individuals and communities use to support their livelihood activities. It focuses on the built environment and assets that facilitate productive activities, transportation, communication, and access to markets (Mazur & Stakhanov, 2008). Investments in physical capital, such as improved infrastructure and technology, can enhance the efficiency and productivity of livelihood strategies (Barnes et al., 2017).
5. **Financial Capital:** Financial capital refers to the financial resources, savings, credit, and income that individuals and communities have access to for investing in livelihood activities and coping with shocks and risks. It emphasizes the economic aspects of livelihood sustainability, including access to financial

services, income-generating opportunities, and risk management mechanisms. Adequate financial capital enables individuals to invest in productive assets, diversify income sources, and build resilience against economic uncertainties (Barnes et al., 2017).

The Sustainable Livelihoods Framework (SLF) serves as a fundamental tool for analyzing livelihood systems and directing development interventions. However, its application is not without shortcomings. One significant limitation is the complexity and overwhelming detail inherent in the framework (Barnes et al., 2017). While the SLF's comprehensive nature, with its emphasis on multiple forms of capital and their interactions, provides a holistic view of livelihoods, it can also lead to challenges in analysis. Researchers and practitioners may find it difficult to effectively capture and integrate all dimensions of livelihoods, particularly in contexts where data availability is limited or there is a lack of capacity for in-depth assessments (Kunjuraman, 2024). Another weakness of the SLF lies in its static representation of livelihoods. By offering a snapshot of livelihood assets and strategies, the framework may fail to fully capture the dynamic and evolving nature of livelihood systems (Pasanchay & Schott, 2021; Levine, 2014). Changes in socio-economic, environmental, and political factors over time significantly influence livelihoods, and the static approach of the SLF may not adequately reflect these dynamics. Moreover, the framework often overlooks power dynamics, inequalities, and structural barriers that shape livelihood opportunities, resulting in a partial understanding of how these factors influence access to resources, decision-making processes, and outcomes (Toillier et al., 2011).

Additionally, while the SLF includes social capital, there may be limitations in how gender dynamics and social equity issues are addressed within the framework. Gender-specific constraints, cultural norms, and social inequalities that impact livelihoods may

not be fully integrated into the analysis (Mazur & Stakhanov, 2008). This deficiency can lead to biased or incomplete assessments. Furthermore, the SLF primarily serves as a conceptual framework for understanding livelihoods and may provide limited guidance on practical implementation strategies or action plans for improving livelihood outcomes (Pasanchay & Schott, 2021). Translating insights gained from SLF analysis into actionable interventions may require additional tools, methodologies, and participatory approaches.

The above notwithstanding, within the context of this study, SLF provides a structured framework for assessing the impact of community interventions on various aspects of livelihoods. By analyzing how community-based management influences the five forms of capital within the SLF, researchers can evaluate the strengths and weaknesses of the intervention in enhancing livelihood outcomes for fringe communities (Toillier et al., 2011; Kunjuraman, 2024; Levine, 2014).

Specifically, the SLF can help in:

- Identifying the assets and resources that are critical for the livelihoods of fringe communities and assessing how community-based management interventions contribute to building or depleting these assets.
- Understanding the social dynamics, relationships, and networks within fringe communities and how community-based management influences social capital formation and utilization.
- Evaluating the sustainability and resilience of livelihood strategies adopted by fringe communities in response to community-based management initiatives.
- Assessing the role of external support, policies, and institutions in enhancing the livelihood opportunities and well-being of fringe communities through community-based management.

The SLF provides a robust analytical framework for studying the effects of community-based management on livelihoods by considering the multidimensional nature of livelihoods and the interconnectedness of various forms of capital. It helps in capturing the complexities of community dynamics, resource management, and development interventions in a systematic and integrated manner.

2.4 Empirical Review

2.4.1 Land use and land cover dynamics of the conservation area from 1992 to 2022

Considerable changes in Land Use and Land Cover (LULC) during the past several years have been highlighted by studies conducted on the Boabeng-Fiema Conservation Area (BFCA). Agyei et al. (2019) found that deforestation and agricultural development were the main causes of the distinct shift from thick forest cover to increasingly dispersed ecosystems. As a result of these modifications, the ecosystem's structure has changed, resulting in habitat loss and dispersion. The region's biodiversity is in danger due to the reduction in forest cover, which has also affected the physical terrain. The wildlife, especially the local primate species, is seriously threatened by the dispersion of habitats.

The area's biodiversity has been greatly impacted by LULC changes, particularly concerning the number of resident monkeys. Yeboah (2020) argued that the local communities safeguard these primates, especially the Lowe's mona and Geoffroy's pied colobus monkeys. Furthermore, as noted by Owusu and Boafo (2018), species like *Cercopithecus lowei* and *Colobus vellerosus* have become more widespread in certain areas due to better food and habitat conditions. The indigenous customs and beliefs, which see monkeys as holy and representing spiritual value, are the foundation of this cultural regard. Because the communities tend to be less inclined to participate in

actions that could endanger the monkeys, the protection provided by these cultural traditions has helped to lessen some of the detrimental effects of habitat fragmentation. According to Diawuo and Issifu (2015), traditional institutions such as kings and queens, ordained ministers, and clan heads create laws to safeguard natural resources including forests, waterways, and mineral deposits. These are made feasible by the application of knowledge that has been ingrained in society for a long time, such as beliefs, conventions, moral principles, and social standards. Appiah et al. (2014) contend that to maintain, safeguard, and manage specific natural resources before the development of contemporary methods for protecting natural resources, traditional civilizations employed intricate religious as well as cultural belief systems through customs, taboos, symbols, and restricted periods. These belief systems were employed to safeguard and advance the welfare of the community. Allotey and Wiafe (2015) investigate deeper into the ways that cultural customs have impacted conservation initiatives within the BFCA. Because of the regard that the local communities have for monkeys, unofficial methods of preservation have emerged to supplement official conservation programs. The conservation of primate populations and their habitats has been made possible in large part by these community-based initiatives. Amankwah et al. (2021) also emphasized how community involvement and care are fostered by traditional conservation strategies, which are frequently based on regional cultural and spiritual beliefs and complement contemporary scientific methods. By using a coordinated strategy, conservation plans are guaranteed to be socially as well as culturally appropriate and have a higher chance of being long-term maintained.

Ankamah (2020) reports that a survey carried out between 2007 and 2019 revealed a significant 72% rise in forest cover. This shows that reforestation and ecological restoration programs within the sanctuary have been effective. A transition against

agriculture and development in cities and regarding preservation and rehabilitation of natural habitats is indicated by the 18% and 44% declines in farmlands and constructed areas, respectively, which balance this encouraging trend. The expansion in forested areas supports the natural balance and robustness of the sanctuary by improving biodiversity and offering essential homes for a variety of species.

Numerous investigations on the LULC factors within the BFCA have shown intricate relationships between alterations in the environment and human activity. The complete loss of appropriate habitats caused by rising agricultural activity remains a severe threat to these primate species (Afutor, 2021). An extensive study of land cover changes between 1986 and 2016 by Badiella-Giménez et al. (2021) showed notable transitions from wooded regions to agricultural lands and urbanization. The stresses of expanding agriculture and the growing human population inside and outside the protection area are mostly to blame for this change. Natural forests were cut down to create room for farming and human settlement as the need for cultivable land increased, upsetting regional ecosystems and decreasing biodiversity. Moreover, Afutor (2021) highlights that one of the biggest threats to conservation efforts is the expansion of agricultural operations. He emphasizes that this invasion reduces the efficacy of conservation initiatives meant to maintain the area's sustainability in addition to causing habitat damage. They promote the use of environmentally friendly agricultural techniques, which are essential for striking a balance between the demands of nearby communities and conservation objectives, to counteract these negative effects.

Despite the immediate decline in ecosystems, the conversion of forest areas to agricultural usage in the BFCA has profound consequences. Important ecosystem services like the preservation of soil, water purification, and retention of carbon are disrupted by this transition. According to Agyei et al. (2019), the loss of forest cover

aggravates soil deterioration, which lowers water quality by degrading soil quality and increasing deposition in water bodies. Furthermore, the region's ability to sequester carbon is weakened by the loss of wooded regions, which raises environmental carbon levels and accelerates climate change.

2.4.2 Effectiveness of the Management system of conservation areas

Over the years, management forestry management structures have emerged, either complimenting what already exists or proposing new approaches that seem to address some systemic issues with old practices. One such approach in the literature is collaborative forestry management, allowing for local and external actors to participate in protecting the ecological integrity of forest reserves/resources. Community-based Forest management interventions have yielded mixed results across different contexts. Hashiguchi et al. (2016) report positive outcomes in the Philippines, where interventions led by local forest institutions improved forest conditions and equity. However, the same interventions had limited impacts on household incomes, suggesting the necessity of complementary livelihood strategies. In contrast, Dev et al. (2003) document various positive impacts of community forestry in Nepal, including improved access to forest resources, income-generating opportunities, and enhanced social capital.

The significance of including various players and creating local institutions that involve users in decisions about access and management of natural resources is emphasized by these new collaborative methods (Lockwood et al., 2010). The cooperative management of natural resources depends on strong local institutions for group action (Kepe, 2008, Lockwood et al., 2010). According to Ostrom (1990), local actors are the people tasked with mediating access to and control over natural resources by deciding who has the authority to make decisions, what behaviors are allowed or prohibited, how

actions should be carried out, and what kinds of information are available in a given situation. They have consequences for the cooperative management of natural resources as they represent the vested values and interests of local actors, which are fulfilled through contested and negotiated arrangements (Young, 2002; Kepe, 2008). When functioning local actors participate, collaborative management of forest flora species is successful (Kepe, 2008; Lockwood, M., 2010). Multi-actors are started in Africa's forests and community lands to promote cooperative management of natural resources (Jones, 1997). Cooperative measures are ensured by participatory conversations (Cundill et al., 2012). According to Mwakaje et al. (2013), participatory dialogues frequently assert that requirements such as guaranteeing openness, legitimacy, social justice, establishing trust, and more fairly allocating costs and risks among industry participants would support collaborative management.

Nonetheless, the government and its institutions are the external players in the management processes of forest reserves. External actors, namely the Wildlife Division and the Forest Services Division, create and carry out Ghana's forest laws and regulations. The two most well-known outside parties involved in Ghanaian forest reserve management are the Wildlife Division and the Forestry Commission, which together make up the Forest Services Division. They occasionally collaborate with a number of NGOs that are primarily focused on community involvement in the management and preservation of natural resources. According to a research by Yahaya et al. (2021), the Wildlife Division and non-governmental organizations (NGOs) that are interested in managing the Mole National Park as a state property.

Although it is an external player in Ghana, the Forestry Commission is how the state exercises its operational powers. The country's main organization for managing forest reserves is the Ministry of Lands and Natural Resources. The state uses the ministry to

manage forest-related matters in order to exercise its control over forest reserves. In order to jointly administer Ghana's forest reserves, the external and local players create laws, rules, and bylaws.

International development agencies like the ILO, UNDP, UNCDF, GIZ, DFID World Bank, and UN-HABITAT are promoting forest reserve management as an alternative development strategy for the developing world. This has made it a promotional "commodity" of international donor agencies in the pursuit of the 21st century's sustainable development goals. These multinational non-governmental organizations are primarily responsible for directing donor funds for programs like the CREMA project. The idea of co-management has been emphasized in attempts to guarantee the achievement of the Sustainable Development Goals, and a number of international organizations and bodies that serve as external actors join forces to guarantee sustainable management of natural resources, including forest reserves.

These collaborative forest management players use a variety of strategies. For instance, local actors integrate indigenous beliefs and practices into official conservation models by using a variety of traditional and community-based tactics in the management of forest resources. Education, raising awareness, and active local involvement in natural resource management are all components of community conservation strategies, including those employed in Kenya, Angola, and Tanzania. These methods emphasize the significance of including all community levels in resource management, which is in line with global conservation aims (Adom, 2016).

In order to save forests, indigenous knowledge systems are essential. Through the use of rich indigenous knowledge, local strategies—such as the preservation of holy trees and groves—complement scientific approaches in Ghana (Dagba et al., 2013; Yahaya,

2012). By controlling the harvesting of plants and animals, as is the case among the Gonds of Central India and other tribes, sociocultural taboos and beliefs also play a crucial role in conservation efforts by maintaining ecological balance and species survival (Worrel, 2017).

Community engagement and awareness are vital for effective forest management. In Ghana's Upper West Region, the Yuoboli Forest Reserve is maintained through community practices like group labor, bans, and annual libation ceremonies (Yahaya, 2012). These efforts are reinforced by traditional fines and sacrifices for rule violations, ensuring compliance. Additionally, local leaders and community committees promote conservation awareness and enforce rules through participatory approaches, highlighting the necessity of combining traditional practices with formal enforcement to achieve sustainable forest management (Issaka & Ayamga, 2017; Agyeman et al., 2010).

External actors, including government agencies, donor countries, consultancies, non-profit organizations, and private entities, play significant roles in forest resource management. Studies by Aurenhammer (2015) reveal that these actors frequently influence forest-related policies and projects, shaping sustainable forest management practices. In Bavaria, governmental actors and forest owner associations/cooperatives also exert a strong influence on forest initiatives (Aurenhammer, 2015). Effective governance is critical, especially in countries like Uganda, where forest degradation is attributed to poor governance. Challenges such as political interference, corruption, and inadequate law enforcement necessitate improved forest governance, particularly at the local level where illegal logging and forest malpractices are prevalent (Kamugisha-Ruhombe, 2007; The Republic of Uganda, 2013).

In Ghana, the Forestry Commission has developed a manual for managing High Forest Zones, providing essential guidelines for preparing management plans and ensuring compliance with the Timber Resources Management Act. These procedures emphasize the obligations of the Forest Service Division to landowners and aim to ensure equitable distribution of forest resource benefits while adhering to sustainable forestry principles. The manual, periodically updated with revision sheets, underscores the need for forest service staff to remain informed about the latest procedures and regulatory changes. Additionally, District Assemblies are mandated to form Environmental Committees responsible for coordinating forestry sector developments, with five-year development plans outlining strategic directions and resource management priorities.

External actors in Uganda, including government agencies and NGOs, employ various strategies to manage forest reserves effectively. The National Forestry Authority and District Forestry Services staff are tasked with enforcing laws and regulations, ensuring accountability, and providing timely information about projects and activities to stakeholders. These efforts aim to mitigate risks of project failures and combat illegal practices such as corruption and abuse of office. The National Forestry Authority's proactive communication and the development of control systems help staff report and resist involvement in illegal activities, thereby promoting sustainable forest management practices (ACODE, 2015).

2.4.3 Effects of the conservation area on the livelihoods of the fringe communities.

Forests serve as vital ecosystems, providing essential benefits to humanity, including biodiversity conservation, climate regulation, and livelihood support for millions worldwide. The relationship between forests and the communities living in and around them is significantly influenced by forest management policies and practices.

Extant studies consistently highlight the challenges faced by forest fringe communities due to restrictions on access to forest resources. Sobeng et al. (2018) illustrate how limitations on forest resource access in Ghana's Atwima Mponua District have constrained livelihood options, exacerbating poverty levels. Similarly, Amoah and Wiawe (2012) shed light on the persistent reliance of households near Ghana's Kakum National Park on Non-Timber Forest Products (NTFPs) for sustenance, despite regulatory restrictions. Ndoye (2004), Timko (2010), and Nambiar (2019) collectively underscore the challenges faced by forest-dependent communities due to these restrictions, leading to a reliance on NTFPs for sustenance and limited livelihood improvement strategies. The conflict between timber and NTFP exploitation further exacerbates these challenges (Ndoye, 2004).

Several studies examine the economic and environmental viability of community forestry initiatives. Beauchamp and Ingram (2011) demonstrate the economic profitability of community forests in Cameroon, emphasizing the importance of factors such as technical skills and access to finance. Similarly, Bijaya et al. (2016) highlight the success of Nepal's Community Forestry Program in environmental governance and livelihood improvement, albeit acknowledging the need to address challenges such as elite capture and social disparity to ensure equitable distribution of benefits.

Despite the potential benefits of forest management initiatives, challenges and unintended consequences abound. Rantala et al. (2012) identify exclusionary practices and unevenly distributed costs as challenges in Tanzania's community-based forest management, while Toillier et al. (2011) highlight unintended consequences of forest management policies in Madagascar, including increased deforestation and deepened poverty among marginalized households.

Extant studies collectively underscore the importance of policy reform and institutional support in enhancing the effectiveness and equity of forest management initiatives. Beauchamp and Ingram (2011) and Ali et al. (2007) stress the need for policy reforms to address regulatory gaps and enhance institutional capacity. Poudel et al. (2015) underscore the role of community management in forest rehabilitation and revenue generation, emphasizing the importance of context-specific approaches in policy formulation and implementation.

The cooperative administration of conservation areas by local communities has the potential to significantly impact the livelihoods of fringe communities through various mechanisms. This collaborative approach fosters sustainable resource management by ameliorating environmental conditions, augmenting resource accessibility, bolstering forest management proficiency, fostering social cohesion, and enhancing local livelihoods (Matsvange et al., 2016). Community-based management entails a cooperative endeavor among diverse stakeholders, encompassing local communities, non-governmental organizations (NGOs), research institutions, and governmental bodies, aimed at the sustainable conservation of natural resources. The cooperative framework not only emphasizes conservation objectives but also endeavors to uplift local livelihoods (Lee et al., 2017). Moreover, collaborative management facilitates knowledge exchange across diverse sources and tiers, thereby enriching the pool of expertise accessible through such joint endeavors.

However, the efficacy of community-based management hinges upon several factors, including equitable social representation, administrative proficiency, and the potential to augment resource availability for management purposes.

Community-based management of conservation areas epitomizes a comprehensive and inclusive approach to grappling with the intricate challenges entwined with natural resource conservation (Dangelico & Pontrandolfo, 2015). This strategy has garnered considerable traction as an efficacious means of attaining sustainable development goals while reconciling environmental conservation with enhancing local livelihoods. Nevertheless, the success of community-based management is contingent not solely on the efforts of local communities or governmental bodies but also on the substantial involvement of external actors in shaping the outcomes and ramifications of such initiatives (Friedman et al., 2020).

External actors significantly influence various facets of community-based management, particularly in enhancing environmental conditions (Kofi Akamani & Troy Elizabeth Hall, 2019). Environmental NGOs and international organizations often contribute considerable technical expertise and financial resources to bolster conservation endeavors. They play a pivotal role in aiding local communities and governmental bodies in implementing sustainable forestry practices such as reforestation, biodiversity conservation, and habitat restoration. These external actors furnish invaluable training, technological access, and funding for conservation projects, thereby fostering the preservation of critical ecosystems within conservation areas (Lee et al., 2017).

The influence of external actors extends to the welfare of fringe communities reliant on forest resources (Friedman et al., 2020). By supporting sustainable livelihood opportunities and diversifying income streams, external actors can mitigate the vulnerability of forest-dependent communities to economic fluctuations and environmental perturbations (Dangelico & Pontrandolfo, 2015). Initiatives such as agroforestry, eco-tourism, and non-timber forest product (NTFP) enterprises hold the

potential to ameliorate the socio-economic conditions of these communities while mitigating their dependence on deleterious forest practices (Petheram et al., 2004).

2.5 Conceptual Framework

At the national and international levels, ineffective community conservation measures for forest flora species, tropical deforestation, and forest degradation are issues with associated social, environmental, and economic consequences (Geist and Lambin, 2016; Uriarte et al., 2010). Since the causes and causal explanations of deforestation vary and rely on the location, methods for reversing this trend are usually challenged, even while forest conservation practices continue to deteriorate globally (Geist and Lambin, 2016). It is generally acknowledged that a mix of public, private, and community-managed resources is needed to preserve tropical rainforests across the tropics (Bray et al., 2008).

Livelihood pathways like agricultural intensification or extensification and livelihood diversification are sustainably improved when local actors (chiefs, land priests, sectional heads, etc.) successfully implement community conservation practices like taboos, folklore, belief systems, traditional awareness creation, wildfire control, afforestation, etc. The livelihood outcomes that follow from improved and sustained livelihood pathways include the provision of gainful employment, which may take the form of businesses that generate income (such as honey tapping, soap production, or soy bean kebab), activities that produce consumable outputs, and jobs that offer chances to participate in worthwhile endeavors that guarantee the sustainability of natural resources (Scoones, 1998).

Following extensive experiences in natural resource management initiatives across Africa, a consortium of development institutions developed a framework known as "People, Nature, Wealth, and Power" (PNWP), offering a structured approach to

analyzing the impacts of conservation efforts on local communities (USAID et al., 2002).

In response to the intricate dynamics of natural resource management, particularly in the context of community-based conservation efforts, the "People, Nature, Wealth, and Power" (PNWP) framework provides a comprehensive lens through which to understand the multifaceted impacts of conservation initiatives on local communities.

1. **People:** At the heart of community-based conservation lies the involvement and well-being of local inhabitants. The "People" component of the PNWP framework delves into the social fabric of fringe communities surrounding the Boabeng-Fiema Conservation Area. This includes examining the demographic makeup, socio-economic conditions, and cultural practices that shape their interactions with the natural environment. Understanding the aspirations, needs, and challenges of these communities is paramount for designing effective conservation strategies that resonate with their livelihoods and aspirations.
2. **Nature:** The conservation area itself serves as a critical focal point within the PNWP framework. Here, the emphasis is placed on the ecological integrity and biodiversity of the Boabeng-Fiema Conservation Area. By scrutinizing the management structures governing this natural reserve, researchers can gain insights into the policies, regulations, and practices that influence land use, wildlife conservation, and ecosystem health. Additionally, assessing the ecological changes within the conservation area over time provides valuable data on the efficacy of community-based conservation efforts in preserving biodiversity and ecosystem services.

3. **Wealth:** Economic considerations form a fundamental aspect of the PNWP framework, especially concerning the livelihoods of fringe communities. By investigating the socio-economic impacts of the conservation area, researchers can evaluate how resource management practices affect local livelihood strategies, income generation, and access to natural resources. This involves analyzing the economic benefits derived from eco-tourism, sustainable harvesting of forest products, and other income-generating activities facilitated by community-based conservation initiatives.

4. **Power:** Governance structures and decision-making processes play a pivotal role in shaping the outcomes of conservation interventions. The "Power" component of the PNWP framework elucidates the distribution of authority, rights, and responsibilities among various stakeholders involved in the management of the Boabeng-Fiema Conservation Area. This includes assessing the inclusivity of decision-making processes, the role of local institutions and traditional authorities, and the effectiveness of mechanisms for resolving conflicts and ensuring equitable resource distribution.

By adopting the PNWP framework, the study can provide a holistic understanding of the interplay between community-based conservation, livelihoods of fringe communities, and environmental sustainability in the Nkoranza North District, Bono East Region. Through rigorous analysis guided by this framework, policymakers, conservation practitioners, and local communities can identify strategies to enhance the resilience of both natural ecosystems and human societies in the face of evolving environmental challenges.

The framework of "People, Nature, Wealth, and Power" seamlessly integrates the intricate connections among environmental management, economic growth, governance, and health and education initiatives, all aimed at fostering effective forest management within rural areas inhabited primarily by communities reliant on subsistence economies. This hierarchical framework aligns with prevailing national priorities, not only in Ghana but also in other regions grappling with similar challenges.

At the apex of this framework lies "Wealth," symbolizing the overarching objective of sustainable economic development and poverty alleviation. This echoes the sentiments expressed in various national policies across African nations, such as those articulated by the Government of Burkina Faso and Madagascar, as well as in donor strategy documents like those from Klugman and USAID. The foundation of the framework is formed by "People" and "Nature," representing the fundamental elements of rural society in many developing regions.

In this context, "Power" assumes a central position, embodying governance structures that permeate and influence all facets of environmental management, economic activity, and community well-being. The interconnectedness of these elements is vividly depicted through the two-way arrows, illustrating the dynamic and mutually reinforcing relationships among environmental conservation, economic prosperity, social equity, and governance effectiveness.

This hierarchical conceptualization, identified during a brainstorming workshop convened by USAID/Madagascar in July, is recognized as a valid framework for understanding the multi-sectoral linkages crucial for promoting sustainable forest management and holistic development in rural areas.

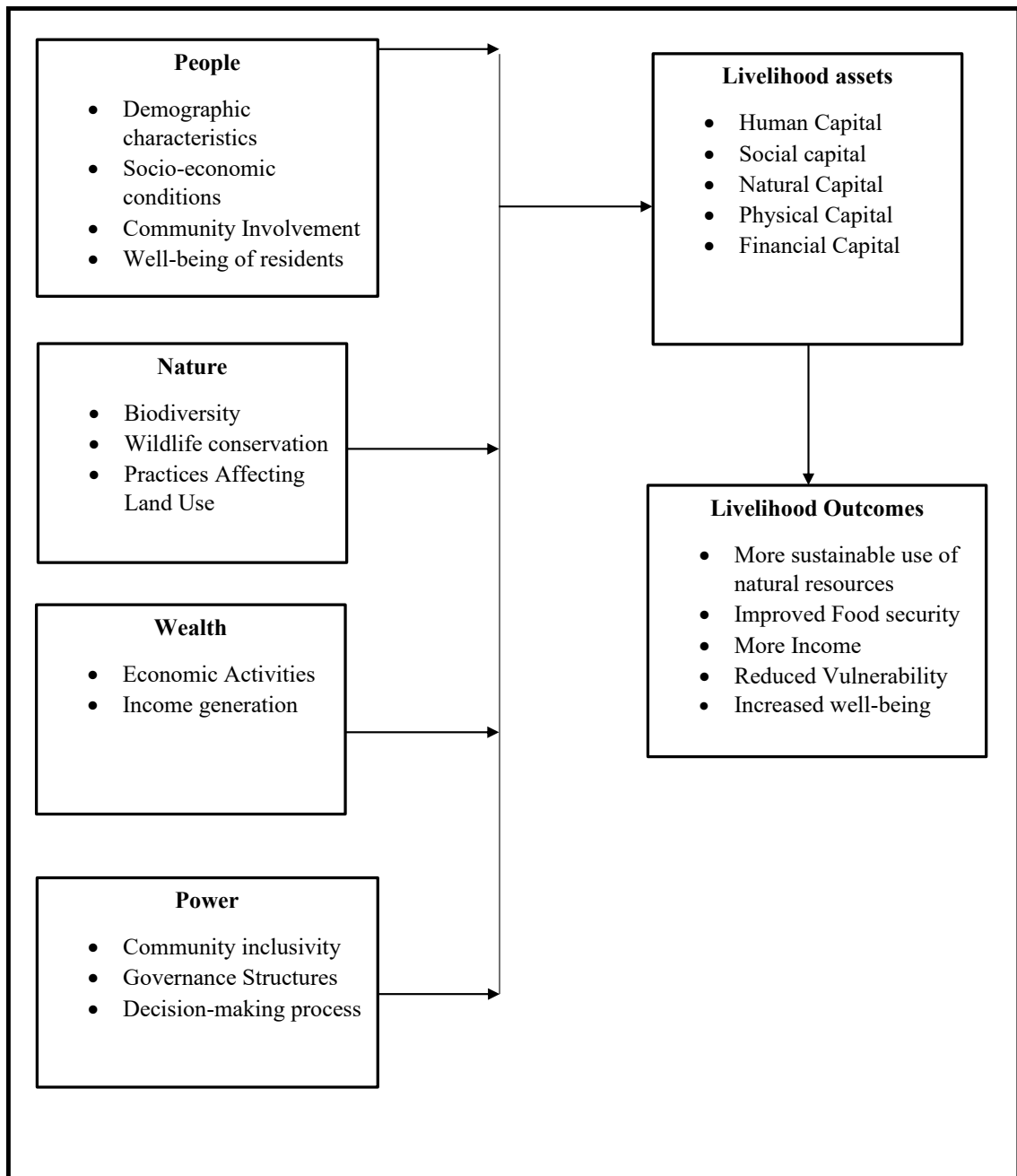


Figure 2. 1: Conceptual framework, Authors construct, 2024.

2.6 Conclusion

The literature review in this chapter has provided a deep insight into the complex and multifaceted concept of management, particularly in the context of forest management.

Scholars have grappled with defining management due to its intricate nature, with

various perspectives emphasizing different aspects such as forecasting, planning, organizing, commanding, coordinating, and controlling.

Peter F. Drucker's definition of management as a multi-purpose organ that regulates and directs activities within an organization encapsulates the essence of managerial roles and responsibilities. Additionally, Henri Fayol's detailed breakdown of management functions further highlights the dynamic and proactive nature of management in guiding and overseeing organizational operations.

Furthermore, the theoretical frameworks discussed, such as the Tragedy of the Commons and the People, Nature, Wealth, and Power model, shed light on the challenges and opportunities in community-based forest management. These frameworks underscore the importance of local engagement, collective action, and sustainable practices in enhancing community well-being and natural resource conservation.

The chapter underscores the critical role of effective management practices in fostering sustainable development, particularly in the realm of forest management. By integrating insights from community theory and forestry literature, stakeholders can work towards leveraging economic, social, and natural resources for the benefit of both present and future generations.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is focused on the description of the study area and methodology. The study area description covers location and size. In contrast, the methodology covers research design, data sources, sampling techniques, sample size determination, data collection methods and tools, data analysis, and presentation techniques, ethical considerations, and accuracy, validity, and reliability.

3.2 The Study Area

3.2.1 Location and Size

The study district is the Nkoranza North District of the Bono East Region with its district capital being Busunya. The district lies within latitudes $7^{\circ} 50' 0''$ and $7^{\circ} 30' 0''$ North and longitudes $1^{\circ} 50' 0''$ and $1^{\circ} 20' 0''$ West (Figure 3.1). The district borders Kintampo South and Pru Districts to the north, Nkoranza Municipality to the south, Atebubu Amantin District to the east, and Techiman Municipality to the west. Major towns such as Dromankese, Bonte, Yefri, Dromankuma, Fiema, Kranka, Konkompe, Bono Manso, Odumase, Pinihini, Senya, and Sikaa are located distant from the district headquarters. Nkoranza North District covers 2,322 square kilometers, accounting for 7.84% of the Brong Ahafo region and 1.3% of the national land area. The district capital, Busunya (9,243), and Dromankese (8,582) are the only two urban towns that serve as primary business communities. The remaining villages with populations under 5,000 are rural and make up 97.2% of the total settlement (FAO, 2021).

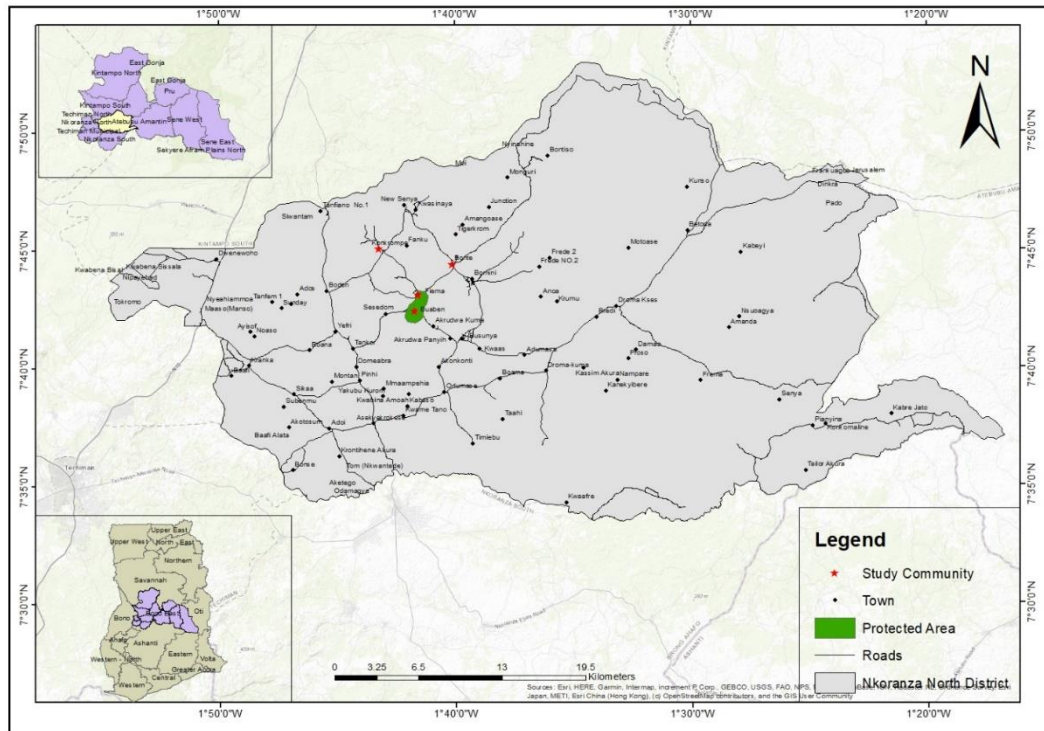


Figure 3. 1: Map of Nkoranza North showing the communities under study

3.3 Methodology

3.3.1 Philosophical Underpinnings

The philosophical underpinning of this study is rooted in the pragmatist’s paradigm. The research objectives of the study are such that they require both qualitative and quantitative data, so neither is the constructivist philosophy that believes in objective reality and single truth which can be found through measurements and experiments to deduce meanings from phenomena (Kivunja & Kuyini, 2017) will adequately investigate the questions of the study. However, pragmatism gives room for the combination of both the tenets of constructivism and positivism (Morgan, 2007), where the researcher can qualitatively examine the management system of the conservation area and also examine the effects of the conservation area on the livelihoods of the community they associate with the phenomena and to quantitatively assess the objective meaning associated with the phenomena of examining the assessment of Land

use and land cover. This helps compensate for the weaknesses between qualitative and quantitative approaches (Creswell & Clark, 2018) since its ontological basis is on what works best at addressing the questions of the study. Morgan (2007) terms it “inter-subjective”, that is being both objective and subjective also; recognizing the existence of singular reality with individuals interpreting the reality differently. Pragmatism is concerned with both the outcome of the findings and the meaning associated with the phenomenon (Johnson & Onwuegbuzie, 2004). The pragmatist inquirer can maintain some balance between their subjective reflection of the research and the objectiveness of the gathered data through analysis (Shannon-Baker, 2016). In the context of the study topic, Effects of Community-Based Management of The Boabeng-Fiema Conservation Area on Livelihoods of Fringe Communities in the Nkoranza North District, by specifically exploring the management structure of the conservation area, analyzing the effects of the conservation area on the livelihoods of the community and the examination of the land use and land cover dynamics of the conservation area from 1992 to 2022 dynamics of the conservation area. To this end, adopting the pragmatist’s paradigm will facilitate a comprehensive investigation (Creswell, 2014) into the Effects of Community-Based Management of The Boabeng-Fiema Conservation Area on the Livelihoods of Fringe Communities.

3.3.2 Research Design

According to Creswell (2014), a research design is a plan for integrating the many components of a study cohesively and logically to successfully solve the research topic. Kothari (2004) describes a research design as a set of methodologies, strategies, procedures, and instruments used to answer a specific research topic.

The research design for this study is a case study research design. A case study research design is an empirical investigation that focuses on current events in the context of real-

world events and blurred boundaries between the phenomena and their setting. According to Yin (2011), the case study research design is appropriate for researching intricate social issues of forests. This design allows the researcher to gather information on the knowledge of many stakeholders which provides a detailed perspective of the research or problem under investigation (Locke, 2001).

The case study design specifically explores in detail the structure put in place for the management of the Boabeng-Fiema conservation area, and how the conservation practice or structure affects the livelihood of individuals in the fringe communities who derive from the conservation area.

3.3.3 Research Approach

This study uses a mixed-methods research design to investigate the effects of community-based management of the Boabeng-Fiema conservation area on the livelihoods of fringe villages in Nkoranza North District. Mixed-method research involves gathering and combining qualitative and quantitative data. This allows researchers to get in-depth knowledge beyond what is supplied by qualitative or quantitative data (Creswell & Creswell, 2018). The mixed approach is based on the pragmatic paradigm, which is not limited to a single system of reality and philosophy. The mixed-method research technique has been described as a silent revolution since it focuses on eliminating tensions between qualitative and quantitative methodologies, leading to its acceptance. A convergent parallel mixed methods design was used, and it is a type of design in which qualitative and quantitative data are collected in parallel, analyzed separately, and then merged. Questionnaires and interviews are commonly used to collect data for mixed-methods research (Johnson and Onwuegbuzie, 2004). Blaxter et al. (2010) argue that this improves the validity of the obtained data.

The study takes a mixed-method approach since conservation management involves a wide range of stakeholders from various backgrounds, necessitating all-encompassing techniques to provide a full and vigorous conversation. The mixed method is also used for triangulation since no one technique or approach can capture in-depth insights into every research while also maximizing the strengths of both qualitative and quantitative methodologies and minimizing their respective shortcomings (Laari et al., 2019).

3.3.4 Sources of Data

This study relies on both primary and secondary data sources. Secondary data is gathered from journals, books, published articles, newspapers, theses, magazines, and World Wide Web (Internet) sources relevant to the subject. Primary data will be gathered from opinion leaders, family or household heads, community forest reserve or conservation guards, community members, assemblymen and chiefs, and other significant participants in fringe communities.

Table 1: Breakdown of the objectives or data requirements, the source of data, and the data collection technique

S/N	OBJECTIVES	DATA REQUIRED	TYPES OF DATA	DATA COLLECTION METHODS
1	To assess the land use and land cover dynamics of the conservation area from 1992 to 2022	Satellite images, ground truth data, Past reports on the state of the conservation area, changes over time, and progress toward conservation goals. Detailed old maps of the area	Primary data (collected data such as satellite images and coordinates) and Secondary data (Existing data such as past reports and old maps)	Classify images separately for each time compare the resulting land cover classes and calculate to detect changes.
2	To analyze the effectiveness of the management system of the conservation area.	Documents outlining the goals, strategies, and policies for conservation within the area. Relevant local, state, and federal laws governing the conservation area	Primary data (Interviews with chiefs, District Assembly, and Wildlife Services) and Secondary data (Review of journals and articles)	Semi-structured interviews with the Chiefs, District Assembly, and Wildlife services and review of some journals and articles.
3	To examine the effects of the conservation area on the livelihoods of the fringe communities	income sources, and household incomes.	Primary Data (Data on household income sources, expenditures, and livelihood activities)	Collect data on household income sources, expenditures, and livelihood activities using household questionnaires

3.3.5 Sampling Techniques

The study uses both simple random selection and purposive sampling to identify respondents.

3.3.4.1 Simple Random Sampling

The study employs a simple random sample procedure to choose households within the study jurisdiction to administer the data-collecting tools. Data gathering targets include household heads, farmers, and community leaders. Simple random sampling is utilized because it is the most popular and typical sampling approach, particularly in quantitative or mixed-method investigations.

Simple random selection guarantees that every person in the population has an equal and independent chance of being picked, which increases the sample's representativeness (Creswell & Creswell, 2017). The sampling frame was obtained from the district assembly. Each household was assigned a unique number and selected using a random number generator, and if a selected household was unavailable, a replacement method was applied to maintain the sample size.

This feature reduces selection bias and enables statistical judgments about the population using known probabilities (Trochim & Donnelly, 2008). Simple random sampling is very simple to implement and comprehend, making it an appealing option for researchers; it is especially beneficial when working with homogeneous populations (Yamane, 1967). Furthermore, it improves the use of inferential statistics, making it easier to estimate population parameters from sample data (Levy & Lemeshow, 2013).

3.3.4.2 Purposive Sampling Technique

Purposive sampling is a qualitative research method for discovering and choosing persons who have the essential topic expertise to make the best use of limited resources (Patton, 2002). Purposive sampling will be used to choose research participants in

Boabeng, Fiema, Bonte, and Konkompe. Because the research is looking into the consequences of resource management, the most significant group of respondents will be those in charge. There will be a conscious attempt to initially target management stakeholders, which are who serve on both the board and the management committee. Moving forward from management stakeholders, the research will seek to identify inhabitants whose daily lives are impacted by management choices and the existence of the protected area.

Purposive sampling requires identifying individuals or groups of people who are solely knowledgeable in the issue of interest (Creswell et al., 2011). In a nutshell, purposive sampling allows the researcher to establish what information is required, and then the researcher seeks out persons who can and will provide the facts for the case under inquiry (Kothari 2004).

The researcher will thus use the purposive sampling technique to select five (5) stakeholders that is the traditional rulers (3), the officer of the Forestry Services Division (1), and district assembly representative (1) based on their in-depth knowledge and understanding of the study as an expert or respondent for the qualitative part of the study.

3.3.6 Sample Size Determination

A total of 100 respondents were sampled for this study. The sample size is determined using the formula of Yamane (1967)

$$n = \frac{N}{11 + N \times (e)^2}$$

Where n designates sample size; N designates the total household population of the study community; e designates the margin of error, which is 10% given a confidence interval of 90%. The sample size of the study community is computed as follows.

The total household population of the study community is 8521 according to the Ghana Statistical Service, 2021 of the Nkoranza North District. Hence, the computation of e sample size using the formula of Yamane (1967) is as follows:

$$n = \frac{8521}{1 + 8521(0.10)^2} = 100$$

The total number of respondents who were used is 100. A proportional sampling method is used to apportion the sample size to the four fringe communities of the Boateng-Fiema Conservation area.

The total household population of Boabeng = 1170. Therefore, the sample size is = $\frac{1170}{8521} \times 100 = 13$

The total household population of Fiema = 3146. Therefore, the sample size is $\frac{3146}{8521} \times 100 = 36$

The total household population of Bonte = 2852. Therefore, the sample size is $\frac{2852}{8521} \times 100 = 33$

The total household population of Konkrompe = 1353. Therefore, the sample size is $\frac{1353}{8521} \times 100 = 15$

The data is therefore illustrated in the table below.

Table 2: Apportionment of Sample Size to Fringe Communities Using Proportionate Sampling

Community Name	Total Household Population	Sample size
Boabeng	1170	13
Fiema	3146	36
Bonte	2852	33
Konkrompe	1353	15
Total	8521	100

Apart from the computed sample size, Key Informants, consisting of the management of the conservation area (Wildlife Division), the chief and his elders, and the District Assembly, will be interviewed to ascertain data relevant to the study.

3.3.7 Data Collection Methods and Tools

Assessment of Land use and land cover dynamics in the conservation area from 1992 to 2022

3.3.7.1 Land Use / Land Cover Classification

This research examines land use and cover changes in Nkoranza North District, Bono East Region of Ghana, spanning three decades, concentrating on 1992, 2002, and 2022. Satellite imagery was received from Landsat using SEPAL (System for Earth Observation Data Access, Processing, and Analysis for Land Monitoring). Landsat satellite data is most commonly utilized for land cover mapping because to its 35-year record and excellent geographic resolution (Knorn et al., 2009). SEPAL is a cloud-based platform for autonomous land monitoring with remotely sensed data. It combines Google Earth Engine (GEE) with open-source software (Gomes et al, 2020).

Satellite imaging presents obstacles, including cloud-covered pixels and image noise, systematic errors, topographical distortions, and the complexity of multispectral images (Panuju et al, 2020), making it less suitable for direct usage with map-based products. Image preprocessing methods must be used to eliminate or reduce distortions caused by these causes (Sommervold et al., 2023). Before digital image categorization, the collected satellite images were preprocessed to reduce discrepancies induced by atmospheric and radiometry effects. Preprocessing the satellite imagery ensured uniformity and accuracy throughout the research region. This included processes such as cloud masking, atmospheric correction, and radiometric adjustments. The radiometric corrections were carried out using SEPAL's "use scenes atmospherically

corrected surface reflectance (SR)" and "correct for bidirectional reflectance distribution function (BRDF) effects" commands.

Ground truth data is essential to relate remotely sensed data to the ground and provide successful categorization (Lillesand et al., 2008). In comparison to the Google Earth Engine, ground truth data was collected for validation and accuracy evaluation. Points were earned for each of the preset land covers. The study also used Norway's International Climate and Forest Initiative (NICFI) planet satellite base map in Sepal, which provides 3-5 meters spatial and near-daily temporal resolution for a synoptic view of the study area, covering inaccessible regions to aid in validation and accuracy assessment.

Satellite data Used

The table of Landsat images provides essential data on satellite imagery used for analyzing land cover changes over time. It includes details from three different Landsat satellites—Landsat 4, Landsat 7, and Landsat 8—spanning from 1992 to 2022. These satellites are equipped with sensors such as the Thematic Mapper (TM), Enhanced Thematic Mapper (ETM), and Operational Land Imager with Thermal Infrared Sensor (OLI_TIRS), offering varying numbers of spectral bands. Each satellite image is captured along the same path and row (194/055) but at different times, ensuring consistent spatial coverage. The table also highlights image quality and cloud cover, critical factors in ensuring the accuracy of the land cover analysis. This data serves as the foundation for monitoring changes in vegetation and urban development over the three decades.

Table 3: Description of satellite data

Satellite Name	Sensor	Number of Bands	Path/Rows	Date of Acquisition	Image Quality	Cloud Cover
Landsat 4	TM	7	194/055	1992-11-21	7	42
Landsat 7	ETM	9	194/055	2002-11-15	9	18
Landsat 8	OLI_TIRS	11	194/055	2022-10-29	9	28

Land use and Land cover Classes

Supervised image classification is used to identify the quantitative approach in remote sensing images. The primary objective of supervised classification is to divide the spectral domain into regions that correspond to the ground cover interest classes for a specific application. One or more training locations were designated to represent a certain class. During the supervised classification process, the image was divided into three classes: closed woodland, open woodland, and built-up/barelands.

Table 4: Description of Land use/land cover classes

Land Cover	Description
Closed Woodland	Natural forest plants with a canopy cover of 35% to 75% and a canopy height of more than 2.5 meters.
Open Woodland	Natural forest plants with a canopy cover of 10% to 35% and a canopy height of more than 2.5 meters.
Built-up / Bare lands	Land covered by structures and other artificially constructed objects with bare soil, sand, or rocks, and never having more than 10% vegetative cover at any time of the year.

Participatory GIS

Participatory mapping is a prominent data-collecting approach under the Participatory Geographic Information System (PGIS) concept. It is any combination of participatory approaches for gathering and documenting geographic data. The quality of PGIS data is also influenced by a variety of other aspects, such as mapping efforts, accuracy and precision, the type of geographical data gathered, and data usability in terms of how well it serves its purpose. It involves sketch mapping, scale mapping, and transect walking, among other things (Akongbangre 2016). In this project, participatory mapping took the form of guided Global Positioning System (GPS) mapping, in which locals or key informants participated in walking around the land covers such as farmlands, barren lands, and Woodlands. The tracks/points were recorded alongside the researcher using a handheld GPS receiver. Participatory mapping is a strong technique that incorporates vital local information about the location, land cover, and land use history of the landscape, assisting communities in making land use decisions (Danielsen et al., 2021).

Examination of the effectiveness of the Management systems of the conservation area.

3.3.7.2 Key Informant Interviews

The key informant interview is a data-gathering technique that incorporates the presentation of oral stimuli and verbal answers (Kothari, 2004). During a one-on-one interview, the interviewee presents the necessary information verbally. This strategy is desirable in the sense that it requires more and better facts to back up the information gathered through other data collection methods.

Key informant interviews were chosen as a data collecting approach for this study because they are a powerful qualitative research method with distinct strengths. For starters, it gives a thorough grasp of a certain subject, particularly in complicated or

specialized sectors, by using the skills and insights of those with direct knowledge (Bernard, 2006).

Key informants frequently provide rich, context-specific information that is difficult to access through other means, making them indispensable in exploratory or niche research (Denzin and Lincoln, 2011). Furthermore, these interviews build rapport and trust between the researcher and the informant, allowing for honest and thorough replies (Patton, 2015). Furthermore, they provide flexibility in data gathering by allowing the interview process to be tailored to follow up on emerging themes or go further into areas of interest (Rubin & Rubin, 2011).

Face-to-face interviews were the primary method of data collection in the four communities; however, unavailable stakeholders were questioned over the phone. Throughout the interviews, technological equipment was employed to capture all events that occurred on the field. Photographs were taken to help study. Each interview with stakeholders and residents lasted no longer than 30 minutes. The interviewer inquired about each stakeholder's involvement in the sanctuary's administration.

To acquire succinct and exact data on the issue under study, stakeholders include the chief and his elders, the Wildlife Division, and the District Assembly of the Conservation Area. The key informants were chosen because of their active involvement in the protection of forest flora species. Interviews with the aforementioned stakeholders would aid in the examination of the conservation area's management structure since informants are knowledgeable about how the conservation area is governed or managed, as well as the many stakeholders that are accountable for managing it.

Examination of effects of the conservation area on the livelihoods of communities.

3.3.7.3 Household Questionnaire

According to Johnson and Christensen (2008), a questionnaire is a self-reporting data-collecting device completed by each research participant. Quantifiable data will be obtained from fringe community members using a home questionnaire. Furthermore, to help participants comprehend the study and facilitate analysis, the questionnaires will be created following the study objectives.

The surveys included both open-ended and closed-ended questions. Questionnaire administration is an important component of research in many areas because of its efficiency, consistency, and variety. These questions were coded in the Kobo Collect tool app, which was administered and completed by the researcher. It allows researchers to gather data swiftly, consistently, and even anonymously, encouraging honest replies, particularly on difficult themes. Furthermore, surveys are inexpensive, produce quantitative data suited for statistical analysis, and are available via digital platforms (Ajayi, 2017; Theofanidis and Fountouki, 2018; Igwenagu, 2016).

3.3.8 Data Analysis and Presentation

3.3.8.1 Assessment of Land use and land cover dynamics in the Conversation area from 1992 to 2022

A supervised classification technique was used to categorize land cover types. SEPAL gives a variety of classification algorithms such as Random Forest. The Random Forests Algorithm (RFA) is a machine learning technique that is increasingly being used for image classification (Horning, 2010), which was used to analyze the land cover types. Training samples were generated by selecting representative areas of different land cover types and assigning them to corresponding classes, where the trained classification model uses these samples and applies them to the entire study area to

produce a classified land cover map. Accuracy assessment of the land cover classification results was validated with ground truth data (Google Earth Engine) with accuracy (error) metrics such as overall accuracy, user's accuracy, producer's accuracy, and Kappa coefficient to evaluate the classification performance.

The error matrix is the most often used method for evaluating picture classification accuracy and may be used to generate a variety of descriptive and analytical statistics (Horvat, 2013). In this study, all three-time steps' classified maps were assessed for correctness. Error matrices were utilized to evaluate classification accuracy using four different measures: overall accuracy, user accuracy, producer accuracy, and Kappa statistics. The user's accuracy shows the likelihood that a pixel in the image represents the class on the ground (Horvat, 2013).

It is determined for each class by dividing the properly categorized pixels by the total number of rows in that class. The producer's accuracy is defined as the chance of accurately classifying a pixel and is mostly used to determine how successfully a region may be identified (Horvat, 2013). Kappa statistics have been a common method for assessing categorization accuracy during the last 15 years (Horvat, 2013). Kappa statistics is a discrete multivariate approach used to assess the accuracy of change detection and classification maps by comparing the two pictures (Horvat, 2013). Kappa statistics compares the real agreement between reference data and an automated classifier to the probability agreement between reference data and a random classifier. Change detection analysis reveals inter-class disparities across time as well as land cover changes. The identification of land cover changes was investigated by comparing categorized photos from various periods. Final land cover and change maps were created using ArcMap.

3.3.8.2 Analyses of the effectiveness of the management systems of the conservation area

The data gathered from the household surveys and key informant interviews were analyzed using statistical methods. The raw data were processed with the Statistical Product for Service Solutions (SPSS) software. Additionally, the data was formatted in Excel, and tables, and charts were generated using information from primary data.

3.3.9 Ethical Considerations

Ethical issues include the procedures taken by the researcher to guarantee that people or groups are not offended by the research process, as well as the accuracy and reliability of the data acquired and, consequently, the conclusions of the study.

Ensuring Ethical Clearance from the mandated authority

The researcher will first of all obtain ethical clearance from the faculty registry.

Community entry procedure/formalities

The researcher will contact community leaders (chiefs and assembly members) to explain the goal of the research and obtain permission to perform the study.

Ensuring accuracy, value, and reliability

To collect correct and trustworthy data and so give timely and valuable conclusions, the researcher will make every effort to ensure the data's quality, validity, and reliability. This will be accomplished by first making the respondent(s) feel comfortable and calm so that they may freely provide the requested information without hesitation. The researcher will also ensure the respondents that their replies will only be used for academic reasons and that any information provided will not contain any personal information that may be linked back to them. Furthermore, the researcher will triangulate all information offered by repeating questions and asking the same question in multiple ways to guarantee that the replies given by the respondents are accurate and reliable.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

As described in Chapter 3, study participant data is meaningless unless it is processed, evaluated, and presented understandably. As a result, the survey data were analyzed and assessed in this chapter to verify that the study's objectives were met. The analysis and interpretation were divided into three portions. The first portion looked at the conservation area's land cover trends throughout three time periods: 1992, 2002, and 2022. In addition, the conservation area's management system was evaluated for efficacy. Finally, this chapter looked at the impact of the protected area on the livelihoods of the fringe communities.

4.2 Land Use and Land Cover Dynamics in the Conservation Area From 1992 to 2022

4.2.1 Analysis of the various Land Covers

Land Use / Land Cover 1992

The spatial pattern of land cover across the landscape reflected a relatively undisturbed natural environment. Closed woodlands were predominantly concentrated in the central and northern portions of the study area, forming a contiguous block of dense vegetation. This core forest zone provided a strong ecological backbone, likely serving as a refuge for wildlife and supporting ecosystem services across the region. Open woodlands were typically located along the edges of the closed forest, particularly in the eastern and southeastern zones, suggesting a natural transition zone possibly influenced by seasonal variations or low-impact human activity such as controlled grazing or shifting cultivation. These areas may have served as ecological buffers, gradually moving from dense forest to more open and human-influenced spaces. Built-up and bare lands were

scattered and mostly isolated in small pockets near major roads or village centers, particularly towards the southern boundary of the landscape. Their dispersed and fragmented nature indicates early stages of settlement expansion, with limited infrastructure or urban sprawl.

In 1992, the landscape was predominantly natural, with closed woodlands occupying the largest share at 2.98 sq. km (65.7%). This indicates that densely forested areas were still largely intact, providing significant ecological benefits such as biodiversity preservation, carbon sequestration, and climate regulation. Open woodlands, covering 0.91 sq. km (19.96%), represented regions with less dense vegetation but still maintained a healthy ecosystem balance. These areas were likely transitioning between fully closed forests and more open lands due to natural processes or light human activity. The minimal presence of built-up/bare lands at 0.65 sq. km (14.34%) suggests that urbanization and infrastructure development were relatively limited at this time, allowing the natural landscape to thrive.

The large percentage of closed woodland aligns with global patterns seen in the early 1990s when many regions had not yet experienced the full impacts of rapid urban expansion and deforestation. According to Ankomah, (2012), regions within the transitional zone like this in 1992 would have played a critical role in sustaining local biodiversity and regulating environmental conditions. However, the low percentage of built-up areas implies that the pressure on natural ecosystems was not yet as intense as it would become in subsequent years, but the potential for change was evident. This data sets the baseline for understanding how human activity over the next decades will transform the landscape.

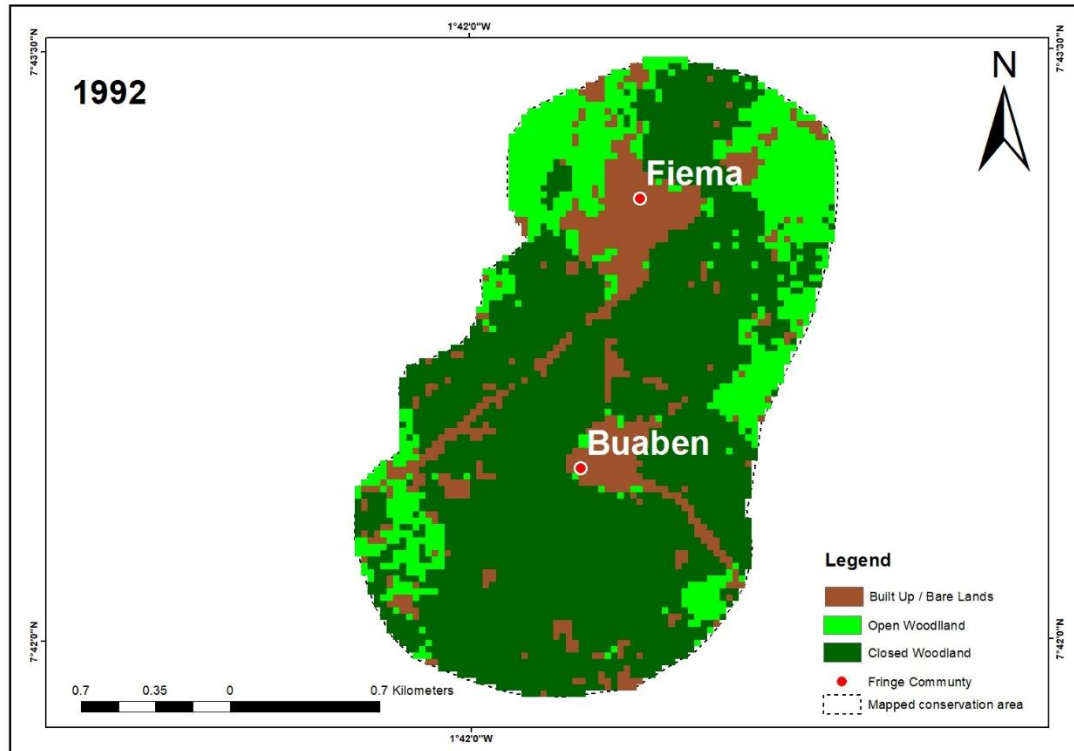


Figure 4. 1: Land Use / Land Cover 1992

Land Use / Land Cover 2002

The spatial distribution of the landscape revealed increasing fragmentation of the natural vegetation cover. Closed woodlands, which were once centrally dominant and relatively contiguous in 1992, had become disjointed and patchier, particularly along the northern and central zones. This spatial thinning suggests ongoing encroachment from human activities, such as farming and small-scale timber harvesting, which may have penetrated previously intact forest blocks. Open woodlands, now the most extensive land cover type, formed a broad transitional belt across much of the middle and eastern portions of the study area. These areas often appear as mosaics of trees interspersed with cleared patches, indicating regions of active land-use change. The spatial spread of open woodland suggests that previously closed forest areas were progressively opening up, either naturally or through selective human use. Built-up and

bare land areas, while still not dominant, showed signs of spatial consolidation. Instead of isolated pockets seen in 1992, these areas had begun to cluster, particularly near road corridors and existing settlements in the southwestern and southeastern edges of the study area. This pattern hints at expanding human settlement and infrastructure development, potentially radiating outward from local community centers.

The area of built-up or bare lands slightly increased to 0.87 sq. km, but now represents 20% of the total land area. This suggests that urbanization and infrastructure development continue to play a crucial role in reshaping the landscape, consuming natural areas for human use. The percentage indicates that while this is a significant portion, it is not as overwhelming as other land types, leaving space for natural landscapes. The closed woodlands have decreased to 1.28 sq. km (29%), showing a continued decline in dense, forested areas. This suggests ongoing pressures such as deforestation, land conversion, or natural factors that reduce forest cover. Closed woodlands are typically critical for biodiversity, water regulation, and climate regulation, so this decrease signals a potential loss of important ecosystem services.

This period represents a critical shift in land use, with the natural landscape being increasingly fragmented by human activity. The reduction in closed woodlands signifies a loss of crucial ecosystem services, such as habitat for wildlife and climate regulation. McDonald et al. (2013) discuss similar patterns globally, where urbanization leads to the degradation of forests and other natural landscapes. Open woodlands now cover 53% of the land area, or 2.33 sq. km, making it the dominant land type. This increase could be due to the thinning of previously dense forest areas, possibly as a result of logging, agricultural expansion, or other forms of human activity. Open woodlands can serve as transitional landscapes, where ecosystems are in flux and often at risk of further degradation if not managed sustainably. The large proportion of

open woodlands indicates that significant portions of the landscape are in a state of change, possibly on the verge of further conversion to either built-up land or degraded bare land.

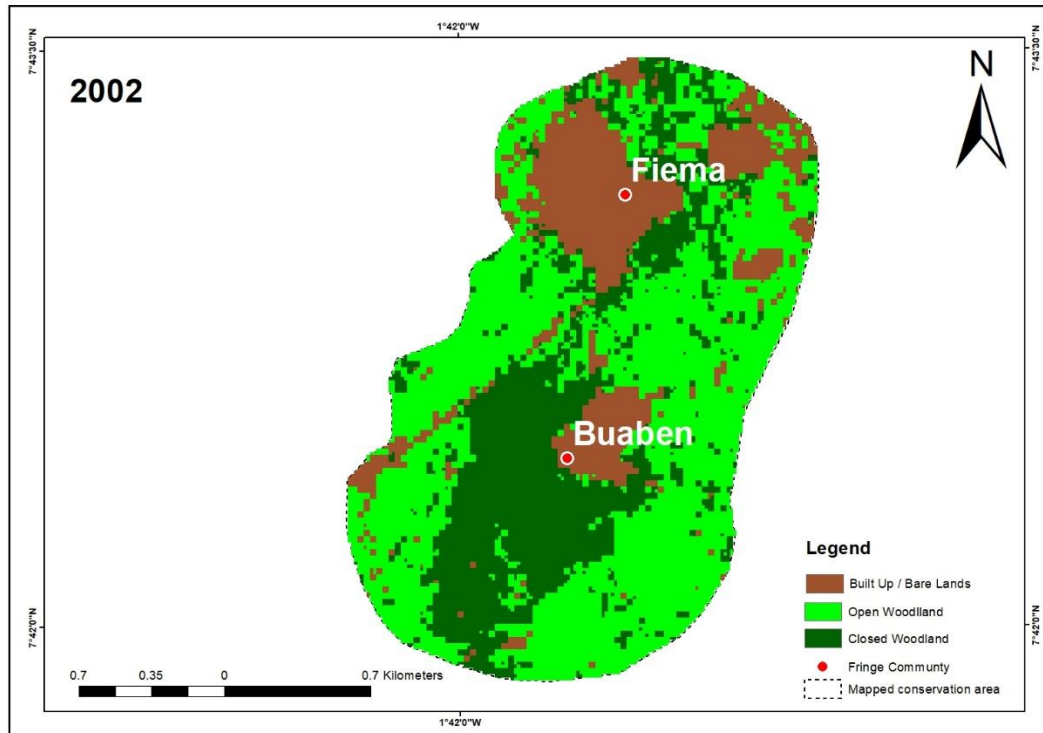


Figure 4. 2: Land Use / Land Cover 2002

Land Use / Land Cover 2022

The spatial pattern of the landscape reflected an increasingly complex mosaic of land uses shaped by both natural processes and human interventions. Built-up and bare lands, while still limited in absolute area, exhibited a more concentrated and clustered pattern, particularly around settlement nodes and transportation routes in the southern and southeastern regions. These areas have expanded outward from earlier urban centers, forming more defined and continuous patches rather than scattered outposts, signalling a maturing phase of urban development. Closed woodlands, which had experienced significant decline in 2002, showed signs of re-establishment primarily in the northern and central interior zones, where human activity may be less intensive. The

pattern suggests that either targeted conservation efforts, such as afforestation or reforestation, or natural regeneration processes have taken hold in areas previously disturbed. However, these regenerated patches appear smaller and more fragmented compared to the large, contiguous blocks of 1992, which could affect their ecological integrity and resilience. Open woodlands, still the most spatially dominant cover type, stretched across much of the central and eastern parts of the landscape. However, their pattern indicates increasing heterogeneity, with some zones appearing to be in transition toward either forest regeneration or further degradation. These areas often border built-up zones and closed woodland patches, acting as buffer zones but also remaining highly susceptible to land-use pressures such as grazing, selective logging, or small-scale farming. In 2022, the landscape showed a continued trend of urban expansion, with built-up/bare lands slightly increasing to 0.98 sq. km, now accounting for 22% of the land. This marks a significant increase in built-up areas, though it is somewhat more contained compared to the 44.79% from the previous decade. The expansion of urban areas, while steady, indicates ongoing infrastructure development or population growth pressures, which continue to encroach on natural landscapes. The recovery of closed woodlands to 1.44 sq. km (32%) is a positive trend, showing some degree of forest restoration or natural regeneration. This improvement, compared to earlier declines, hints at conservation efforts or natural forest regrowth taking effect. Closed woodlands provide critical ecosystem services, such as biodiversity conservation, carbon sequestration, and water regulation, and their recovery offers a hopeful sign for the preservation of natural habitats. Without sustainable management, the continued encroachment of urban areas could lead to the further decline of these crucial ecosystems, reinforcing the concerns raised by Ankomah, F. (2012) regarding global deforestation and habitat loss.

Open woodlands remain the dominant land type, occupying 46% of the landscape. Although slightly lower than the 53% recorded in 2022, this large portion indicates that open woodlands still play a critical role as a transitional ecosystem. This also suggests that much of the landscape remains in a phase of ecological flux, likely at risk of further degradation or conversion if not managed sustainably. Open woodlands could be responding to a combination of natural disturbances or human interventions such as selective logging or land clearing for agriculture.

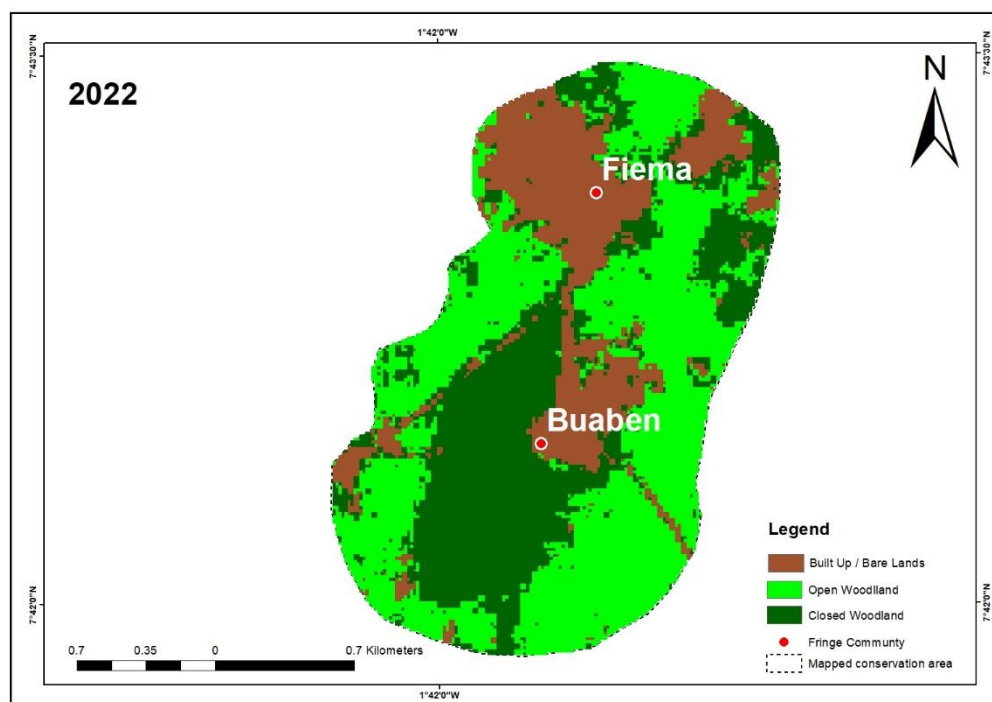


Figure 4. 3: Land Use / Land Cover 2022

Table 5: Area of the various Land use/land covers

Classes	Area 1992		Area 2002		Area 2022	
	(sq. km)	%	(sq. km)	%	(sq. km)	%
Built-Up /						
Bare Lands	0.65	14	0.87	20	0.98	22
Open						
Woodlands	0.91	20	2.39	53	2.11	46
Closed						
Woodlands	2.98	66	1.30	29	1.45	32
Total Area/						
Percent	4.54	100.00	4.54	100.00	4.54	100.00

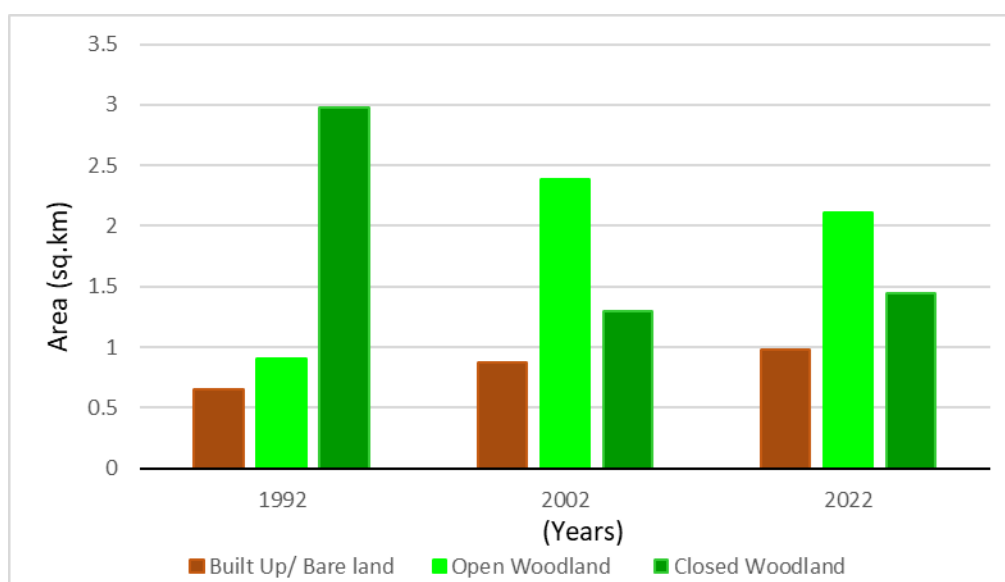


Figure 4. 4: Area of the various land use/land covers

4.2.2 Accuracy Assessment

1992 Accuracy Assessment Report

In 1992, the land use and land cover (LULC) classification achieved a strong overall accuracy of 90.48% with a Kappa coefficient of 0.86, indicating a high level of agreement between classified data and reality. Built-up/Bare Lands were perfectly classified, with 100% user accuracy (U.A.) and 100% producer accuracy (P.A.), meaning all built-up / Bare land areas were correctly identified. However, Closed Woodland had lower user accuracy (71.43%), indicating some confusion in identifying these areas, although its producer accuracy was 100%, signifying that all truly closed woodlands were correctly recognized. Open Woodland also had 100% U.A. but lower P.A. (77.78%), showing some misclassification. The 1992 assessment was reliable, particularly for urban areas, though the distinctions between different vegetation types were less precise.

2002 Accuracy Assessment Report

By 2002, the LULC classification maintained an overall accuracy of 89.29% with a Kappa coefficient of 0.80, slightly lower than in 1992. Built-up/Bare Lands continued to be classified with 100% U.A. and 100% P.A., showing perfect accuracy for urban areas. However, the accuracy of vegetation classification decreased, with Open Woodland showing a significant drop in user accuracy (62.5%), indicating that many areas classified as open woodland were actually other land cover types, even though all actual open woodland areas were correctly identified (100% P.A.). Closed Woodland also saw a decline in U.A. (50%), suggesting more significant classification challenges, despite maintaining 100% P.A. This reflects the growing complexity of land use as urbanization intensified, leading to more difficulties in distinguishing vegetation types.

2022 Accuracy Assessment Report

By 2022, the LULC classification achieved an overall accuracy of 91% with a Kappa coefficient of 0.87, indicating highly reliable classification across all categories. Both Built-up/Bare Lands attained 100% User's Accuracy (U.A) and 100% Producer's Accuracy (P.A.), ensuring flawless identification with no misclassification. Open Woodland recorded 100% U.A. and 78.17% P.A., while Closed Woodland achieved 71.43% U.A. and 100% P.A. This notable improvement in classification accuracy is attributed to advancements in satellite technology and data processing, particularly the higher spectral resolution of the Landsat 8 OLI_TIRS sensor. These enhancements facilitated clearer differentiation between urban and natural landscapes, reinforcing the reliability of remote sensing data for monitoring land cover changes and supporting future environmental assessments.

Table 6: Accuracy Assessment report of the various land covers

	Accuracy Assessment Report					
	LULC 1992		LULC 2002		LULC 2022	
	<i>U.A</i>	<i>P.A</i>	<i>U.A</i>	<i>P.A</i>	<i>U.A</i>	<i>P.A</i>
Built-Up / Bare Lands	100%	100%	100%	100%	100%	100%
Open Woodland	100%	77.78%	62.50%	100%	100%	78.17%
Closed Woodland	71.43%	100%	50.00%	100%	71.43%	100%
Overall Accuracy	90.48%		89.29%		91%	
Kappa Co-efficient	0.86%		0.80%		0.87%	

4.2.3 Changes in the Land Use / Land cover

a. Closed Woodlands

i. From 1992 – 2002:

Closed woodlands, once dominant and continuous across the central and northern parts of the landscape in 1992, became increasingly fragmented and scattered by 2002. The most significant reductions occurred along the eastern and southwestern edges, where land conversion was most intense. The area decreased dramatically from 2.98 sq. km (65.7%) in 1992 to 1.28 sq. km (29%) in 2002, marking a drop of 36.7 percentage points. This sharp decline reflects widespread deforestation, shifting cultivation, and encroachment, likely driven by expanding agricultural activities and weak enforcement of forest boundaries.

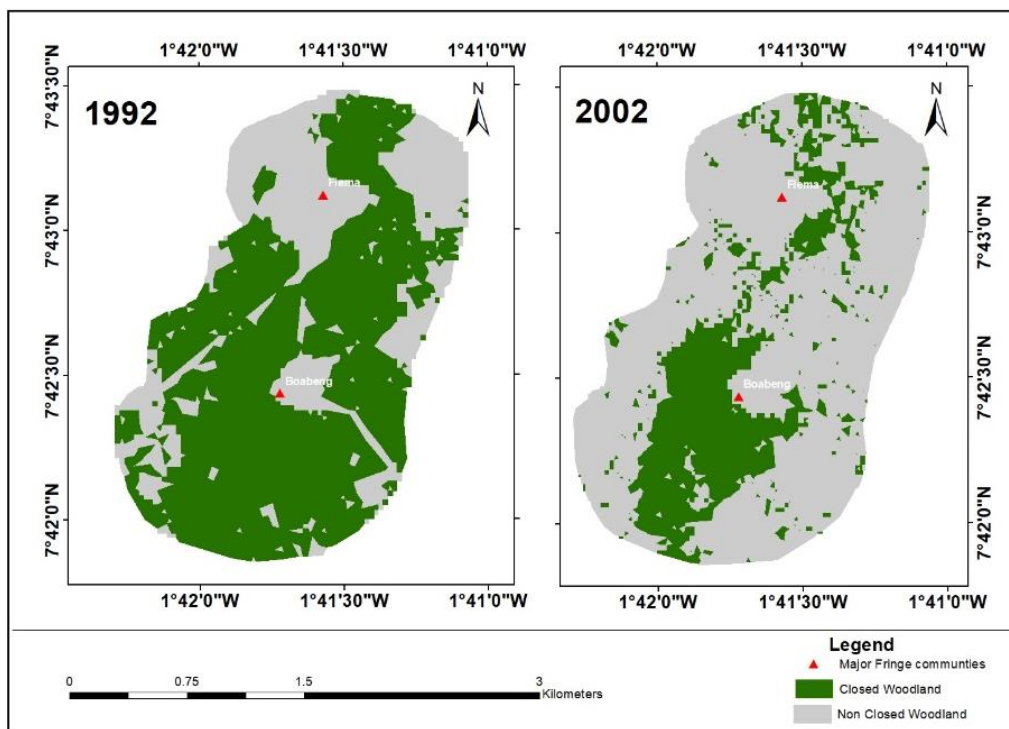


Figure 4. 5: Change in Closed Woodland from 1992 – 2002

ii. From 2002–2022:

Between 2002 and 2022, closed woodland patches showed partial re-establishment, mostly in central interior zones and pockets within less accessible northern areas. However, the regrowth was dispersed and spatially disjointed, lacking the cohesion of 1992. There was a modest increase to 1.44 sq. km (32%) in 2022, an increase of 3 percentage points over two decades. This suggests the presence of natural regeneration processes and/or conservation interventions, though the gains remain limited relative to earlier losses.

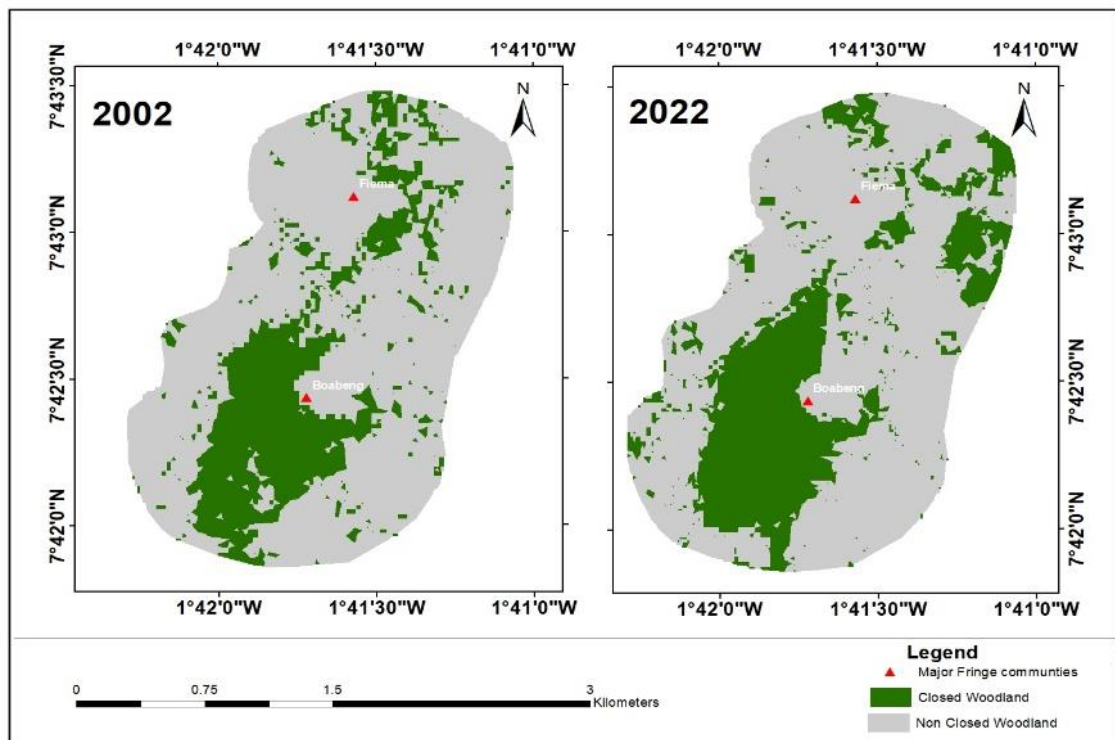


Figure 4. 6: Changes in Woodland from 2002 - 2022

iii. From 1992–2022:

Over the full 30-year period, the closed woodland zone transformed from a dominant and continuous core into fragmented, regenerating pockets. Most losses appear irreversible, especially in the southern fringe. The net loss from 1992 to 2022 is 1.54

sq. km (a reduction of 33.7 percentage points), emphasizing the long-term ecological impact of early-period deforestation, only marginally offset by later recovery.

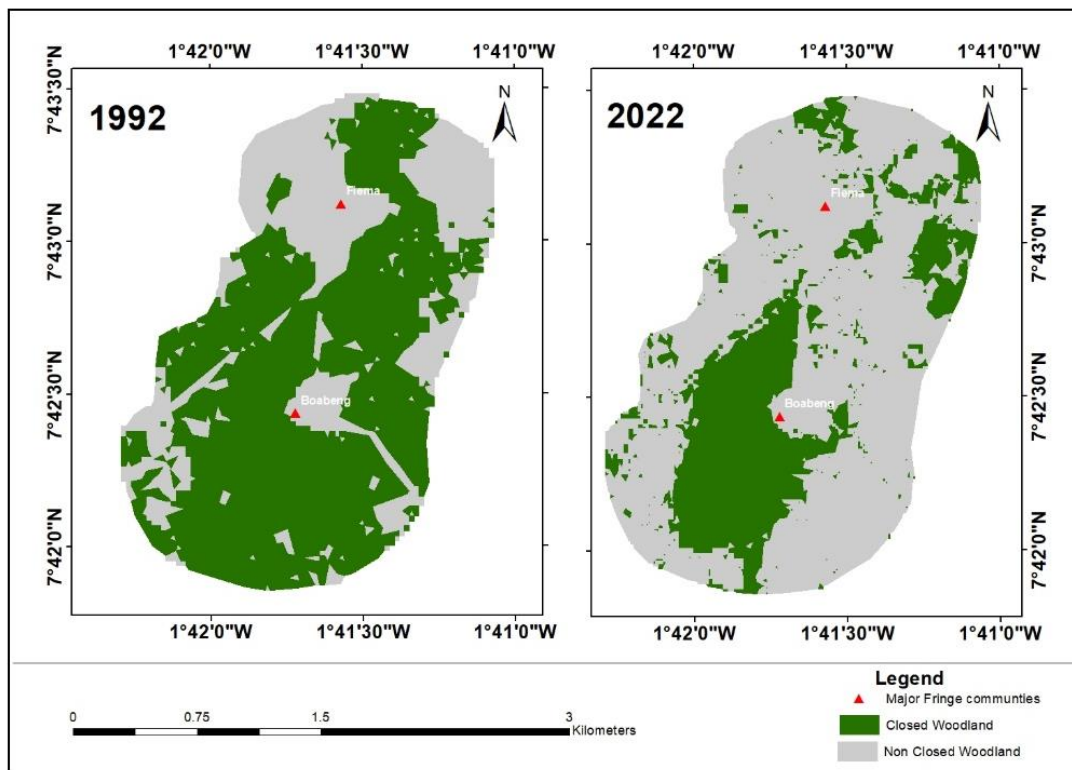


Figure 4. 7: Changes in Woodland from 1992 - 2022

b. Open Woodlands

i. From 1992–2002:

Open woodlands expanded across the eastern and central transitional zones, often replacing formerly dense forests. The western and northern boundaries also saw scattered patches of open woodland emergence, indicating ecological thinning. Open woodland grew from 0.91 sq. km (19.96%) in 1992 to 2.33 sq. km (53%) in 2002—an increase of over 33 percentage points. This suggests widespread thinning of closed forests, likely due to selective logging, fire, or partial clearing.

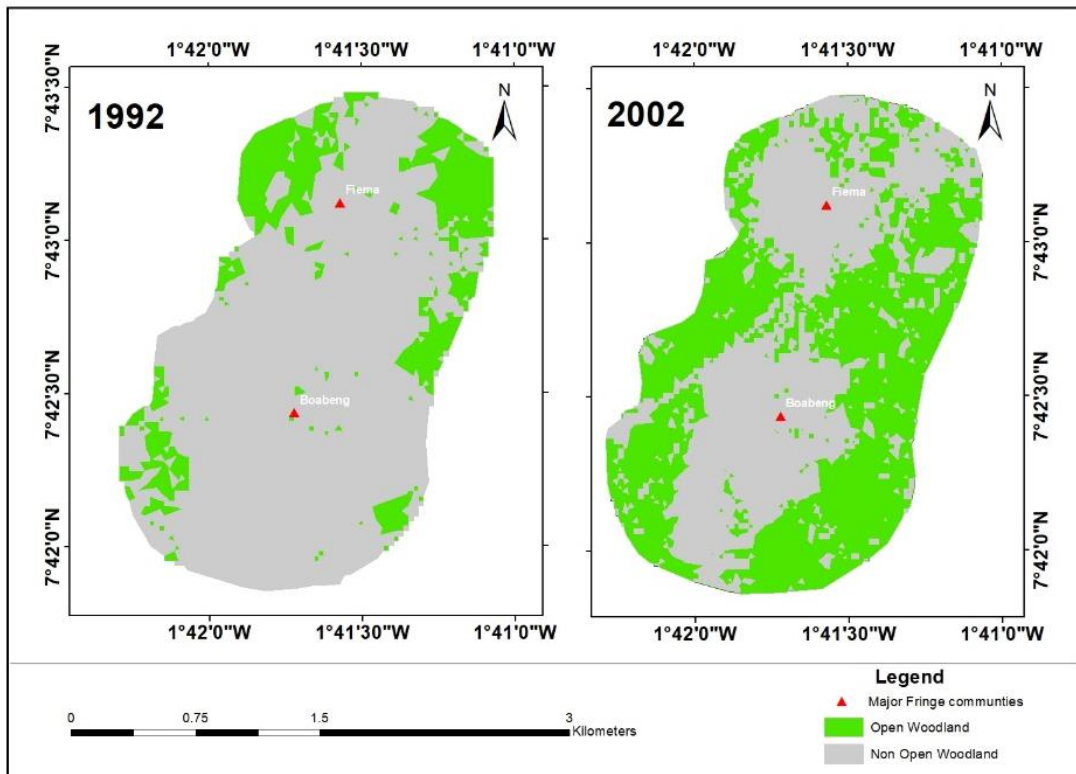


Figure 4. 8: Changes in Open Woodland from 1992 - 2002

ii. From 2002–2022:

Open woodlands in 2022 showed a mixed distribution, with some areas reverting to closed canopy cover (especially near conservation cores), while others transitioned toward bare or built-up land. The pattern became increasingly patchy and fragmented, especially along human-activity corridors. The coverage reduced slightly to 2.01 sq. km (46%), a 7-percentage point decline. This may reflect both reforestation and continued degradation, depending on the local context.

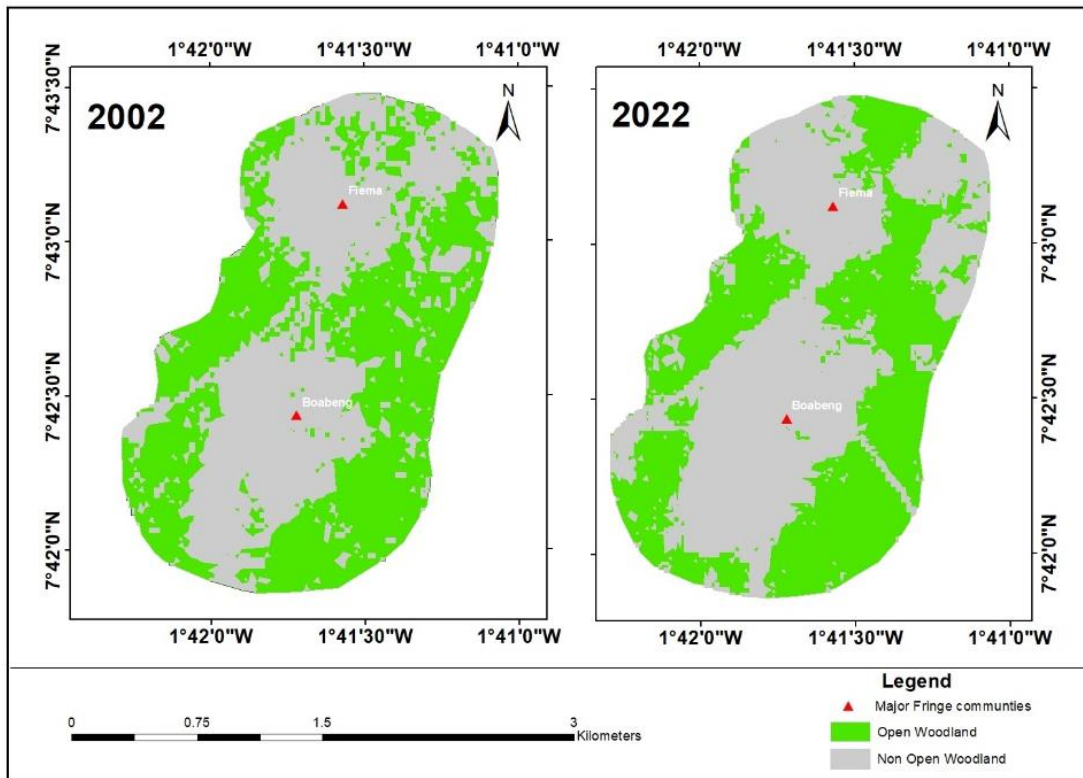


Figure 4. 9: Changes in Open Woodland from 2002 – 2022

iii. From 1992–2022:

Overall, the landscape moved from a well-defined forested structure to a mixed woodland state, dominated by open forests across most of the landscape. These zones remain ecologically unstable, often acting as intermediate stages of either recovery or degradation. Open woodland saw a net increase of 26 percentage points over 30 years, indicating large-scale forest transformation and potential ecosystem stress.

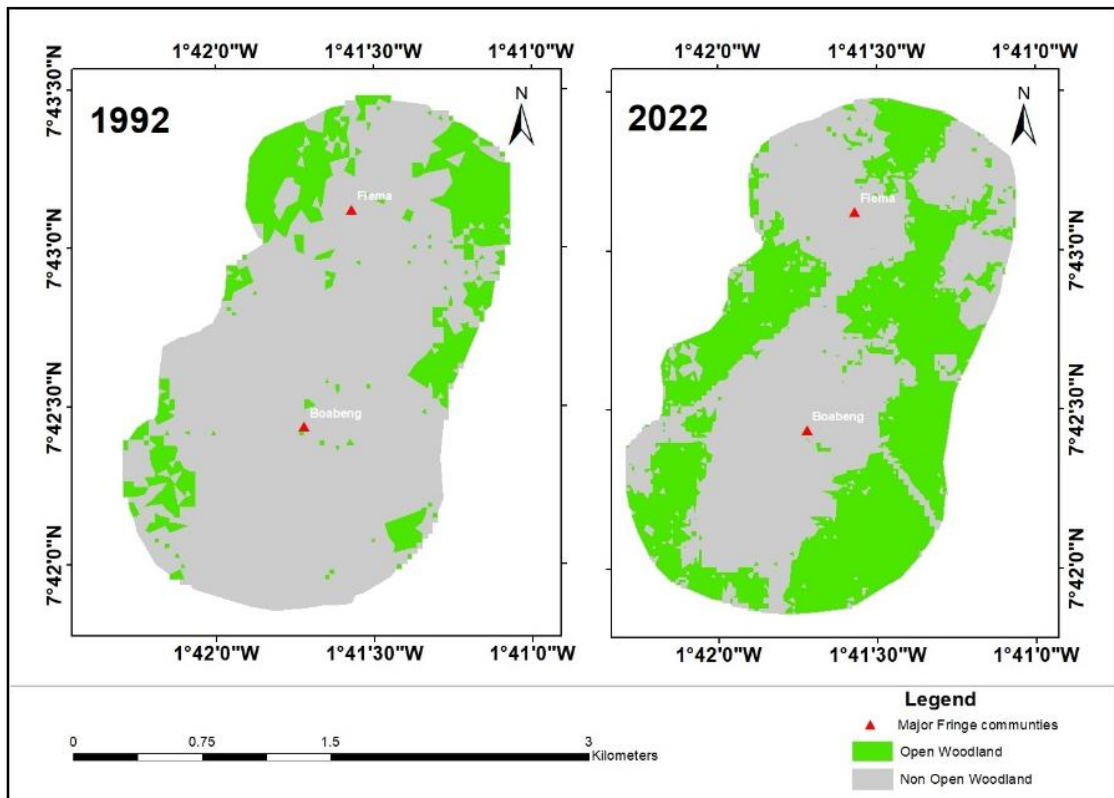


Figure 4. 10: Change in Open Woodland from 1992 – 2002

c. Built-up/Bare Lands

i. From 1992–2002:

Built-up areas began forming distinct clusters near existing road networks and settlement cores, particularly in the southern and southeastern sectors. This period marked a transition from isolated bare spots to consolidated urban nodes. The area increased from 0.65 sq. km (14.34%) in 1992 to 0.87 sq. km (20%) in 2002—a rise of nearly 6 percentage points, driven by population growth, rural infrastructure, and expansion of community settlements.

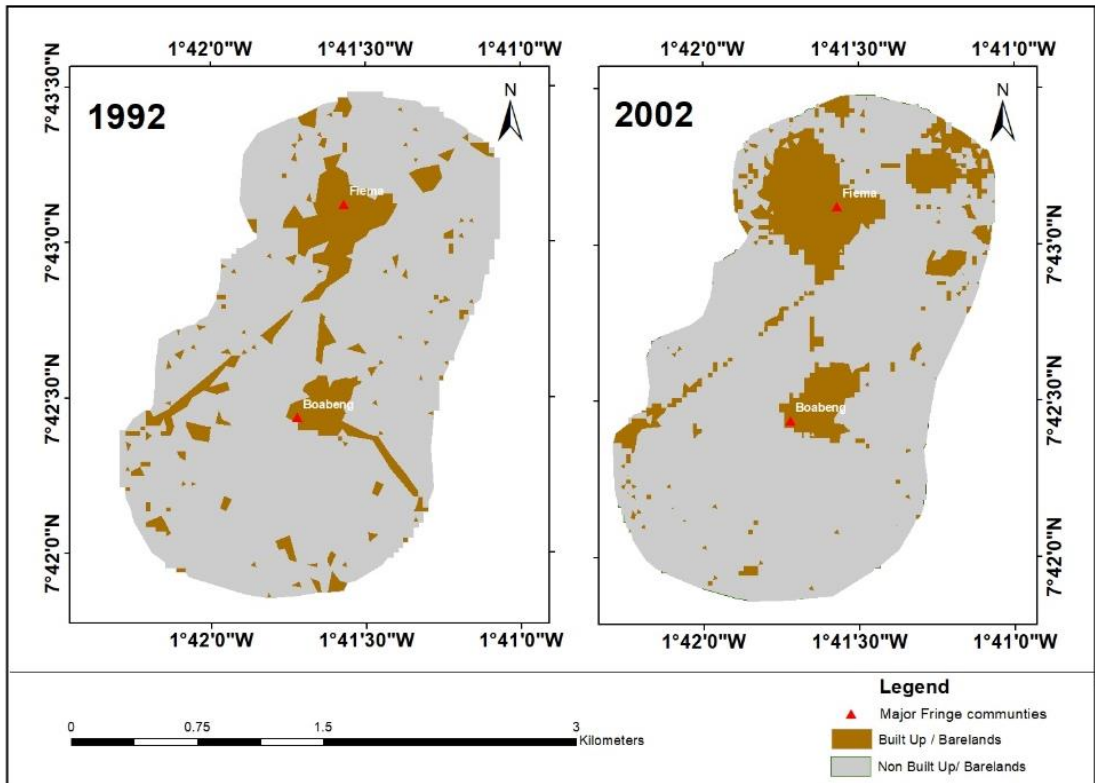


Figure 4. 11: Change in Built Up / Bare lands from 1992 -2002

ii. From 2002–2022:

Built-up areas continued to densify and expand, radiating outward from earlier nodes. New developments emerged along access routes and buffer zones, with linear sprawl observed near forest boundaries and agricultural frontiers. The built-up area reached 0.98 sq. km (22%) by 2022, an additional 2 percentage point increase, showing slower but steady urban expansion.

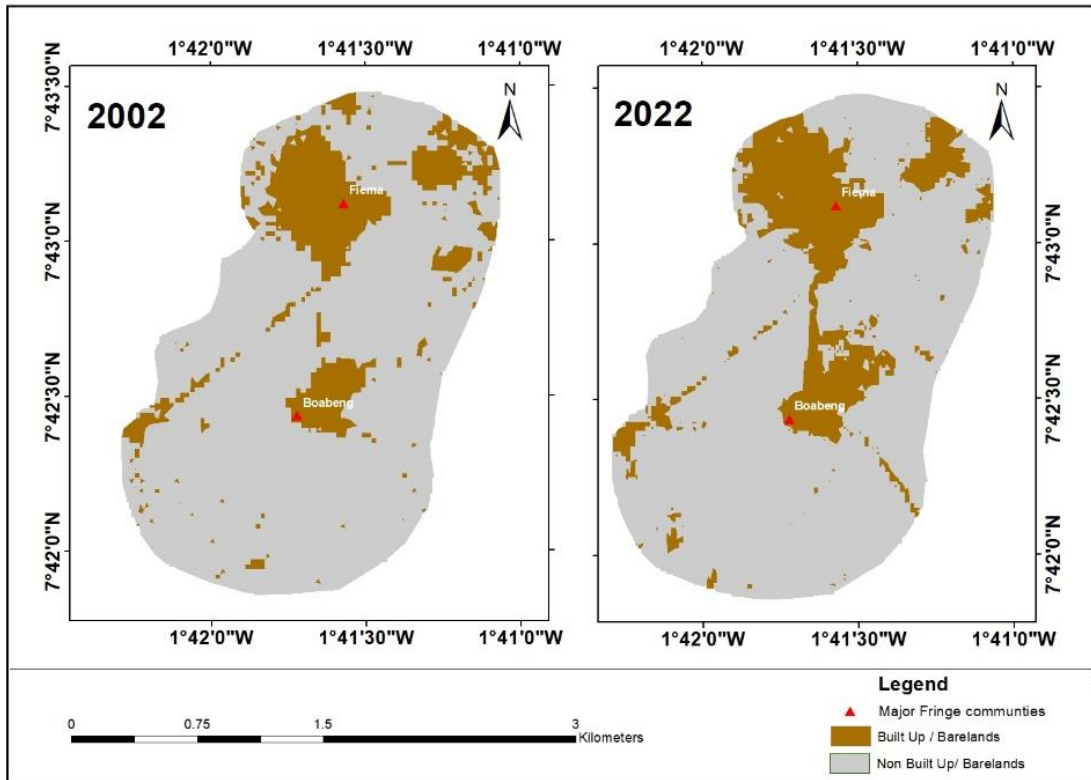


Figure 4. 12: Change in Built Up / Bare lands from 2002 -2022

iii. From 1992–2022:

Over the long term, built-up land changed from a minor, scattered component to a persistent and expanding feature of the landscape. This trend indicates the growing human footprint and the need for buffer zone management and land-use regulation. The total increase over 30 years was 8 percentage points, from 14.34% to 22%, underscoring the steady encroachment on ecological zones.

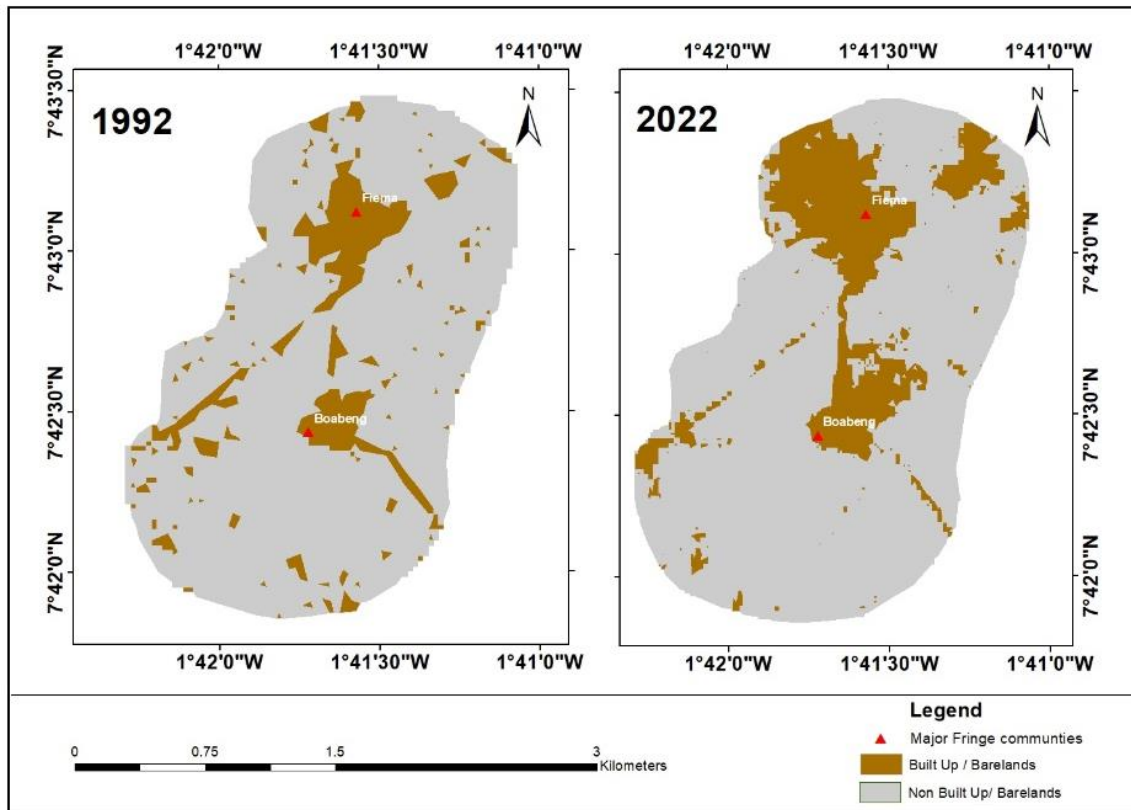


Figure 4. 13: Change in Built Up / Bare lands from 1992 – 2022

Table 7: Area of change detection

	Lulc 1992 (Sq.km)	Lulc 2002 (Sq.km)	Lulc 2022 (Sq.km)	Change (Sq.km) Lulc 1992 – 2002	Change (Sq.km) Lulc 2002 – 2022	Change (Sq.km) Lulc 1992 – 2022
Built-Up / Bare Lands	0.65	0.87	0.98	0.22	0.11	0.33
Open Woodland	0.91	2.39	2.11	1.48	-0.28	1.2
Closed Woodland	2.98	1.3	1.45	-1.68	0.15	-1.53

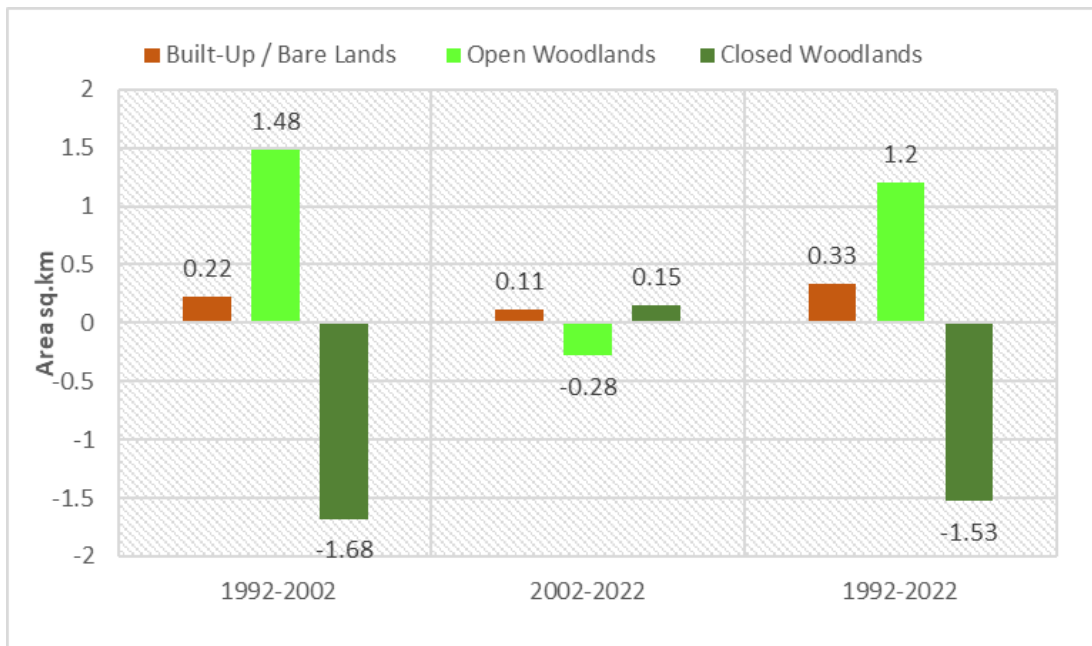


Figure 4. 14: Trend of change in the area of conservation

4.3 Effectiveness of the Management System of the Conservation Area

The management structure of the Boabeng-Fiema Conservation Area (BFCA) is a collaborative system that integrates traditional and modern approaches to conservation. It involves key stakeholders from the traditional council, the district assembly, the Wildlife Division, and the two local communities (Boabeng and Fiema) with some external organizations such as Arocha Ghana, Tropenbos Ghana, Ecocare and others supporting the idea of community-based conservation. This structure incorporates local knowledge, cultural values, and practices, such as taboos and customary laws, to create a sense of ownership and responsibility among community members. Additionally, modern conservation strategies, such as eco-tourism, are being explored to complement these traditional practices, ensuring environmental sustainability and community development.

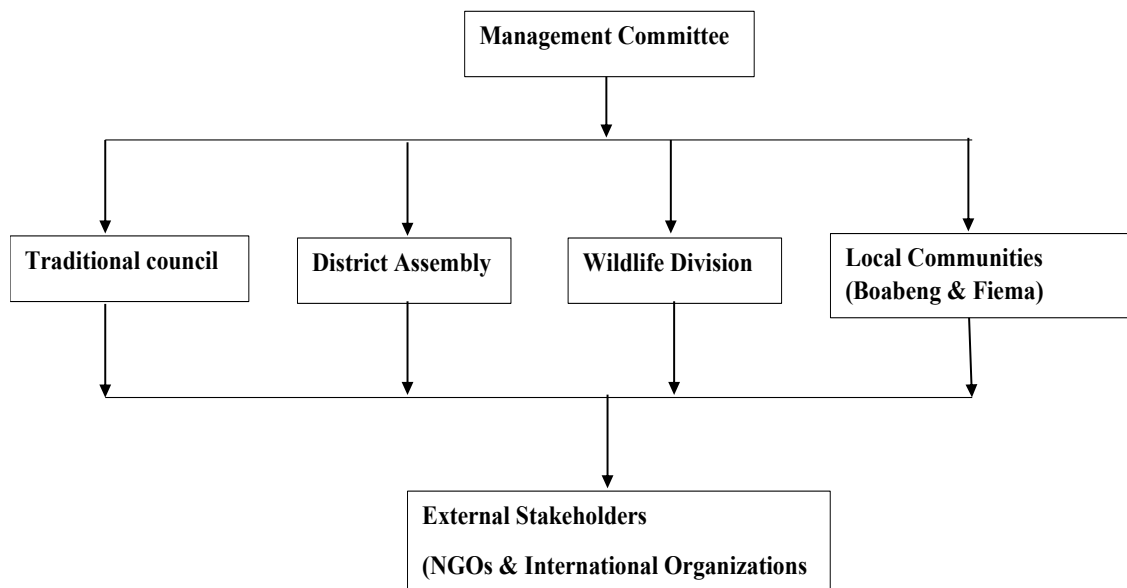


Figure 4. 15: Structure of the Management System

The traditional Council body represents the cultural and traditional values of the communities. They ensure conservation practices respect local customs, such as taboos against harming specific wildlife. The traditional rulers comprise the Boabeng and Fiema Chief and his elders, with the Boabeng Chief being the overall. The Wildlife Division, on the other hand, is responsible for enforcing national conservation laws and providing expertise on biodiversity management. Their collaboration with local communities fosters a shared responsibility for conservation. Whereas, the District Assembly plays a crucial role in integrating conservation initiatives within broader local development policies, ensuring that conservation goals contribute to the overall welfare of the community. Residents of Boabeng and Fiema are critical to the success of the conservation area. They utilize traditional knowledge and practices to manage resources and their adherence to the laws governing conservation. NGOs and international organizations provide necessary funding, training, and technical assistance to enhance conservation and community development efforts.

4.3.1 Management practices within the conservation area

Table 9 analyses the management practices within the Boabeng-Fiema Conservation Area. It reveals that 92% of respondents identified customary practices associated with the conservation area as the primary management practice. This finding aligns with qualitative analysis, where it is noted that "*the management system at BFCA is designed to involve the two local communities (Boabeng and Fiema), The traditional council, the district assembly, and the Wildlife division incorporating local knowledge and cultural values to create a sense of ownership*" (Chiefs). The deep-seated cultural and religious reverence for sacred species, particularly the Mona and Colobus monkeys, reinforces the effectiveness of these traditional management practices. Taboos, which often restrict hunting or harming these species, are deeply embedded in the social and cultural fabric of the community, providing a culturally appropriate and cost-effective approach to conservation.

Despite this strong traditional foundation, the quantitative data shows that 8.0% of respondents consider eco-tourism a primary management practice, indicating underutilization of this potential revenue source. This role is crucial for bridging the gap between traditional practices and modern conservation policies. Expanding eco-tourism could enhance community livelihoods and conservation efforts, benefiting from traditional cultural values and modern economic opportunities. This balanced approach could lead to more sustainable and inclusive management practices at BFCA.

Table 8: Management Practices

Management Practices within the conservation		
	N	Percent
Customary Practices associated with the conservation area	173	92%
Eco-tourism Purpose	15	8.00%
Total	188	100.00%

4.3.2 Knowledge about the management practices.

The results from the analysis of how participants learned about the management practices show that 38.3% were informed through community meetings, 35.1% through word of mouth, 20.6% via media such as TV, radio, and newspapers, 5.2% through workshops or training sessions, and only 0.4% through government announcements and social media, as presented in Table 10. The prevalence of community meetings and word-of-mouth referrals emphasizes how crucial conventional and face-to-face modes of communication are for fringe communities. This emphasis on in-person interactions is a reflection of these civilizations' communal structure, where informal relationships are essential for the exchange of knowledge. A disparity in official communication tactics and the digital divide, which frequently affects rural regions and limits access to more contemporary and larger information outlets, might be indicated by the restricted usage of social media as well as government statements. The results indicate that improving local communication and looking at methods that incorporate and increase access to media and digital platforms are crucial if we want to raise knowledge of and participation in management practices.

Table 9: Knowledge about the management practices

Ways of learning management practices	N	Percent
Community meetings	95	38.30%
Government announcements	1	0.40%
Workshops or training sessions	13	5.20%
Media (TV, radio, newspapers)	51	20.60%
Social media	1	0.40%
Word of mouth	87	35.10%
Total	248	100.00%

4.3.3 The current management practices that are beneficial for the conservation of biodiversity in the area.

The quantitative analysis in Table 11 indicates that 97.0% of respondents view current management practices as beneficial for biodiversity conservation. This high level of community approval aligns with qualitative insights, which state that *"the current management system aligns well with the goals of protecting biodiversity, particularly the sacred monkeys, and preserving the forest"* (Boabeng chief). Furthermore, *"the collaboration between the community and stakeholders has generated revenue from tourism, reinvested in local infrastructure and services, thus supporting biodiversity conservation"* (District Assembly representative). These findings are consistent with previous research highlighting the effectiveness of community-based management in improving conservation outcomes (Laurila-Pant et al., 2015). Wildlife officers also note that *"the community's adaptation and the reduction in conflicts indicate that the management practices have been somewhat beneficial,"* reflecting a decrease in tensions and increased support for conservation efforts (Wildlife Officer).

This information demonstrates that the current management practices, deeply rooted in local knowledge and cultural values, are effectively fostering community support and achieving conservation goals. This is supported by literature indicating that community-based approaches, which incorporate traditional practices and local engagement, are crucial for successful conservation (Fariss et al., 2023). However, the 3% of respondents who highlight alternative livelihood programs suggest that these programs, including bee-keeping, are relatively small to support conservation efforts. This underutilization implies that while traditional management practices are successful, the current alternative livelihood programs are insufficient in providing the necessary financial resources for both conservation and community development.

Enhancing these programs could help create a more sustainable model for managing natural resources, further supporting conservation goals and community benefits.

Table 10: Management practices are beneficial for the conservation

The current management practices are beneficial for the conservation of biodiversity in the area.	Count	Column N %
Traditional and cultural practices	97	97.00%
Alternative Livelihood Programs	3	3.00%
Total	100	100%

4.3.4 Participation in conservation activities.

In Table 12, Quantitative data shows that 77.0% of respondents participate occasionally in conservation activities, 21.0% do so regularly, and only 2.0% rarely engage. This trend of occasional participation is echoed in qualitative insights, with “*community members actively involved in practical conservation efforts such as reforestation projects, guiding tourists, creating fire belts, and engaging in alternative livelihoods*” (District Assembly Representative; Chiefs). Despite this involvement, the irregular nature of participation suggests that while there is significant support for conservation, it is not sustained consistently. Jacobson et al. (2015) highlight that such inconsistencies can often stem from economic and social constraints, which prevent regular and deeper engagement in conservation activities.

The implications of these findings indicate a need for more structured and frequent opportunities for community involvement. Although practical activities like reforestation and tourism guiding show a high level of community participation, these

efforts are not uniform or continuous. To address this, there should be an increased focus on integrating conservation practices into daily life and providing tangible rewards to boost regular involvement. By ensuring that conservation activities are embedded in routine activities and offering incentives for consistent participation, community engagement can be enhanced. This approach aligns with Edwards (2019), who emphasizes the importance of overcoming barriers to maintain long-term community commitment to conservation. Enhancing these aspects will help build a more robust and sustained involvement, crucial for the success of conservation efforts at BFCA.

Table 11: Participation in conservation activities

Frequency of participation in conservation activities	Count	Column N %
Regularly	21	21.00%
Occasionally	77	77.00%
Rarely	2	2.00%
Total	100	100%

4.3.5 Challenges the management of the conservation area faces

Table 13 analysis reveals that the most significant challenge in managing the Conservation Area is a lack of community involvement, reported by 49.7% of respondents, followed by poor governance at 39.4%. These challenges indicate a gap in integrating local interests into decision-making processes. Qualitative insights support these findings, highlighting specific issues like “*community members feeding wildlife despite regulations, which leads to dependency and aggression in animals*” (Wildlife Officers). This issue of limited external support further exacerbates governance problems, where weak leadership or lack of transparency may hinder the

management's ability to address local concerns effectively. This aligns with studies suggesting that inadequate community engagement can lower compliance and lead to suboptimal conservation outcomes (Nandigama, 2020).

The information suggests that while traditional conservation practices and community support exist, substantial gaps in governance and sustainable engagement remain. The problem of community involvement implies that current conservation strategies may not fully address local needs or behaviours, limiting their effectiveness. The dependence on external organizations also introduces sustainability risks, as projects may falter once external funding ends. Addressing these challenges would require stronger governance frameworks and enhanced community participation, alongside strategies to build local capacity for long-term conservation management. The implication is that improving governance structures and community involvement is essential for achieving more sustainable and successful conservation efforts.

Table 12: Challenges the management faces

Challenges the management of the conservation faces	N	Percent
Lack of funding	18	10.30%
Poor Governance	69	39.40%
Lack of community involvement	87	49.70%
Conflicts over land use	1	0.60%
Total	175	100.00%

4.3.6 Roles local and national government agencies play in the management of the conservation area.

The quantitative analysis in table 14 shows that 53.5% of respondents identified enforcement as the primary role of local and national government agencies in the

management of the BFCA, followed by 45.3% citing regulation. Qualitative data support this, as chiefs note that "*local authorities enforce regulations and integrate conservation goals into development plans,*" while the District Assembly Representatives emphasize their role in ensuring compliance with environmental laws. This focus on enforcement and regulation demonstrates that the key contribution of government agencies lies in maintaining legal frameworks and ensuring adherence to conservation directives. However, the minimal roles of funding and technical support, each at 0.6%, suggest a critical gap in providing the necessary resources and expertise to fully implement these regulations. Studies confirm that enforcement alone, without sufficient financial and technical backing, can limit the effectiveness of conservation efforts (Watson et al., 2015).

Both qualitative and quantitative findings implies that while enforcement and regulation are crucial, they are insufficient by themselves for sustainable conservation management. The lack of funding and technical assistance indicates that local communities and authorities may struggle to adopt innovative or efficient practices due to resource constraints. The implication here is that without additional financial support and capacity-building measures, the long-term sustainability of conservation projects may be jeopardized, as observed when external funding ceases. To address these challenges, enhancing the roles of local and national agencies in providing both technical and financial support will be key to overcoming current limitations and promoting more effective conservation outcomes.

Table 13: Roles the government agencies play

Roles Local and national agencies play in management	N	Percent
Funding	1	0.60%
Regulation	77	45%
Enforcement	91	53.50%
Technical support	1	0.60%
Total	170	100.00%

4.3.7 Ways of funding management practices of the conservation area.

The results in Table 15 indicate that the primary source of funding for the Conservation Area comes from government grants and sponsorships, accounting for 55.4%, followed by community funding at 24.0%, and tourist fees at 20.7%. This distribution points to the conservation area's heavy reliance on outside funding from the government, which is consistent with funding models common for designated areas in developing nations where public funds frequently support conservation efforts (Wilson et al., 2017). The comparatively smaller assistance from tourism fees indicates a possible inadequate use of ecotourism as a viable financing source. This may be improved to diversify revenue streams and lessen reliance on public assistance. A feeling of ownership and accountability among community members is fostered by local dedication and expenditure on the conservation area, which is shown in the noteworthy engagement of community finance.

Table 14: Ways of Funding Management Practices

If yes, how is the conservation area funded?	N	Percent
Government Grants and sponsorship	67	55.40%
Tourist Fees	25	20.70%
Community funding	29	24.00%
Total	121	100.00%

4.3.8 Laws or regulations that govern the management practices.

Table 16 analysis indicates that a significant majority (91.0%) of respondents are aware of the specific laws and regulations governing the Conservation Area, reflecting a strong awareness of the regulatory framework in place. This high level of recognition suggests that the enforcement of these regulations is a critical component of the management strategy. Qualitative data corroborates this, with wildlife officers noting that enforcement is guided by the Wildlife Conservation Regulations 1971 (LI 685), which emphasizes the structured legal foundation supporting management practices. This alignment between community awareness and legal frameworks supports the view that clear and enforced regulations are essential for effective conservation management (Hoffmann, 2022).

However, the 9.0% of respondents who are unaware of these regulations highlight a potential gap in communication and education. This suggests that while the regulations are in place and broadly acknowledged, there may be areas where dissemination and understanding could be improved to ensure complete community engagement. Effective conservation management relies not only on the existence of regulations but

also on their comprehensive implementation and the active involvement of the community. Addressing these gaps in knowledge could enhance overall compliance and support for conservation initiatives, leading to more sustainable and effective management practices (Barton et al., 2019).

Table 15: Laws governing the area

Are there specific laws or regulations that govern the usage of the conservation area?	Count	Column N %
None	9	9.00%
Customary Laws and Tradition	71	71.00%
Wildlife Conservation regulations	20	20%
Total	100	100%

4.3.9 Ways laws and regulations are enforced effectively.

The results in Table 17 reveal that 58.0% of respondents believe the laws and regulations governing the Conservation Area are enforced "well," and 13.0% rate enforcement as "very well." Meanwhile, 22.0% remain neutral, and a small fraction, 1.0%, perceive the enforcement as "very poorly." The fact that enforcement is often seen favorably suggests that the regulations are not only enacted but also successfully carried out, both of which are critical to the accomplishment of conservation goals. By guaranteeing adherence to laws that safeguard wildlife and ecosystems, efficient enforcement is essential to preserving the authenticity of conservation areas (Lubis, 2017). Nonetheless, there may be discrepancies or holes in enforcement procedures, as shown by the 1.0% who think enforcement is inadequate and the 22.0% who are neutral.

The body of research indicates that sufficient financing, community participation, and the presence of committed law enforcement officers are frequently necessary for efficient administration (Lubis, 2017). Improving enforcement strategies, for example, by enlisting more community members to monitor and report infractions could bolster conservation efforts and guarantee that the area's set rules are followed consistently.

Table 16: Laws governing the area

Ways laws and regulations are enforced effectively.	Count	Column N %
Well	58	58.00%
Very well	13	13.00%
Neutral	22	22.00%
Very poorly	1	1.00%
Poorly	6	6.00%
Total	100	100%

4.3.10 The management practices are effective in mitigating environmental challenges

Table 18 analyses the effectiveness of the management practices at the BFCA and the data reveals a generally positive perception among the community, with 65.0% of respondents acknowledging the practices as effective in addressing environmental challenges. This effectiveness is reflected in the qualitative feedback, which reveals that the rules set by management have successfully curtailed harmful activities such as tree cutting (Chiefs). Furthermore, the management practices have fostered positive adaptations within the community and reduced conflicts, demonstrating their role in mitigating environmental challenges (Wildlife officers). These findings emphasize the benefits of integrating local rules and regulations into conservation strategies, which

aligns with literature suggesting that community-based management approaches can enhance environmental protection by leveraging local knowledge and promoting compliance (Kilpatrick et al., 2017).

However, the presence of neutral and negative perceptions among some respondents indicates that there are areas for improvement. Specifically, addressing the gaps in community participation and increasing transparency could further enhance the effectiveness of the conservation efforts. The qualitative data points to the need for continued enforcement of rules and adaptation of management practices to sustain and build on the positive outcomes achieved so far. Studies have shown that effective conservation management requires ongoing community engagement and adaptive strategies to address emerging challenges (Sterling et al., 2017). By focusing on these areas, the management practices at BFCA could achieve even greater success in environmental conservation and community relations.

Table 17: Mitigation ways towards environmental challenges

Ways in mitigating environmental challenges	Count	Column N %
Neutral	24	24.00%
Effective	65	65.00%
Very ineffective	1	1.00%
Ineffective	10	10.00%
Total	100	100%

4.4 Effects of the Conservation Area on the Livelihoods of the Fringe Communities

4.4.1 Estimated monthly income

The analysis of estimated monthly income among participants in Table 19 shows that 54.0% of respondents earn less than GHC1,000 per month, while 45.0% earn between GHC1,000 and GHC2,000. Only 1.0% of participants report earning between GHC2,000 and GHC3,000. These findings show that just a tiny percentage of community members receive greater monthly salaries, with the vast majority earning very low amounts.

The predominance of lower income levels indicates that many community members face economic challenges, which could affect their capacity to benefit fully from or contribute to community-based management initiatives. The high proportion of participants earning less than GHC1,000 per month suggests that economic activities in the fringe communities are primarily low-income, potentially influenced by limited access to resources, markets, or employment opportunities. This finding aligns with existing literature that highlights the economic constraints faced by rural and peri-urban communities, where lower income levels can impact their ability to engage in or benefit from conservation and development programs (Mohammed et al., 2020). The results suggest that in order to enhance these communities' standard of living, community-based management solutions should include chances for revenue generation or other forms of financial support. Conservation efforts may improve local participation and guarantee that the positive effects of conservation are spread fairly by addressing the financial constraints of community members. This will assist the management measures' longevity and efficacy.

Table 18: Estimated Monthly income

Estimated Monthly Income	Count	Column N%
Between 1000 - 2000	45	45.0%
Less than 1000	54	54.0%
Between 2000 - 3000	1	1.0%

4.4.2 Alternative Livelihood Opportunities for the Community.

Table 20 reveals that a significant majority of respondents (79.0%) feel that the conservation area has not yet provided alternative livelihood opportunities, which suggests a gap in integrating livelihood support into conservation management. Despite this, qualitative analysis indicates that *“beekeeping, eco-tourism, and agroforestry have been promoted as viable income-generating activities that do not harm the forest”* (chiefs). These efforts align with the research indicating that sustainable livelihood projects can enhance community support and reduce reliance on harmful traditional practices such as hunting or unsustainable farming (Van Gils et al., 2019). By integrating alternative livelihoods that align with conservation goals, such as beekeeping and eco-tourism, communities can be offered financial incentives while simultaneously contributing to environmental preservation. This approach supports local economies and also fosters a deeper commitment to conservation efforts by demonstrating clear, tangible benefits.

The promotion of activities like beekeeping, eco-tourism, and agroforestry suggests an important strategy to address the identified gap in alternative livelihoods. The low percentage of respondents who have benefited from such initiatives (21.0%) highlights the need for more widespread and effective implementation of these programs. Incorporating sustainable practices that generate income while preserving natural

resources can mitigate the negative impacts of traditional livelihoods (Roe et al., 2015). Effective integration of these activities into the community can enhance overall support for conservation efforts and align local economic interests with environmental goals. Ensuring that these initiatives are adequately supported and scaled can bridge the gap between conservation objectives and community benefits, ultimately fostering a more sustainable model of conservation that benefits both people and the environment (Edwards, 2019).

Table 19: Alternative Livelihood Support

Alternative livelihood opportunities for the community	Count	Column N %
Beekeeping	13	13.00%
Agroforestry	5	5%
Ecotourism	3	3%
None	79	79.00%
Total	100	100.00%

4.4.3 The conservation area has improved my family's economic well-being.

The quantitative analysis in Table 21 reveals a complex perception of the economic benefits provided by the conservation area, with a significant portion of respondents remaining neutral (50.0%) about its impact on their family's economic well-being, while 33.0% strongly agree and 14.0% agree that it has been beneficial. This mixed response shows that while some community members recognize positive effects, others remain uncertain or feel that the benefits have been marginal. This aligns with the qualitative data that *“biodiversity conservation contributes to essential ecosystem services such as clean air, water regulation, and soil fertility, which can indirectly enhance community well-being”* (chiefs). Research supports this by highlighting that ecosystem services resulting from conservation efforts can improve the overall quality

of life, even when direct economic benefits are not immediately apparent (Alexander et al., 2016).

However, the perception of limited economic upliftment, as noted by the high percentage of neutral responses, suggests that while ecosystem services contribute to broader community well-being, they may not directly translate into visible economic gains for all individuals. The literature emphasizes that the benefits of ecosystem services, such as improved environmental quality and increased resource availability, often have long-term and indirect effects on community welfare (Daily, 1997). This indicates a need for better communication of the indirect benefits of conservation and the development of additional strategies to ensure that economic opportunities align more closely with conservation goals. Enhancing direct engagement and benefit-sharing mechanisms could help bridge the gap between ecosystem service improvements and tangible economic benefits for local communities (Calfucura, 2018).

Table 20: conservation area has improved my family's economic well-being

The conservation area has improved my family's economic well-being	Count	Column N %
Neutral	50	50.00%
Agree	14	14.00%
Strongly Agree	33	33%
Disagree	3	3.00%
Total	100	100.00%

4.4.4 Jobs related to the conservation area.

Table 22 reveals that a significant majority of respondents (98.0%) do not work in conservation-related jobs, such as tour guides or park rangers, suggesting a lack of

direct employment opportunities linked to the conservation area. This minimal direct job provision could contribute to the moderate economic impact observed in the region. Conversely, the qualitative input from (*chiefs*) “*indicates that community members are involved in activities such as guiding tourists, creating fire belts, and engaging in alternative livelihoods*”. This involvement in diverse conservation-related activities highlights an indirect economic contribution, suggesting that while direct employment opportunities are scarce, there are other ways in which the conservation area influences local livelihoods.

Integrating these findings with existing literature reveals the need for comprehensive strategies to enhance the economic benefits of conservation efforts. Research by Cobbinah et al. (2015) and Sene-Harper et al. (2019) emphasizes that successful community-based conservation programs require substantial income-generating and job-creating activities to ensure meaningful local benefits. The observed discrepancy between the high rate of non-employment in conservation jobs and the engagement in other activities indicates a gap that needs addressing. Implementing targeted training and creating more direct job opportunities within the conservation area could enhance the socioeconomic impact and foster greater community support for conservation initiatives.

Table 21: Jobs related to the conservation area

Jobs related to the conservation area.	Count	Column N %
None	98	98.00%
Tour guides	2	2.00%
Total	100	100.00%

4.4.5 Community Projects funded by the conservation area's revenues

As seen in Table 23, a significant number of the respondents reported receiving financial support in the form of community project funding (20%) and child sponsorship (10%), while a majority portion of the population (70%) reported receiving no financial support at all. This distribution highlights that while financial assistance from conservation area funds is present, it does not reach all households in the community.

Child sponsorship represents 10% of the community's financial support, directly benefiting households with children. The program typically covers education expenses for children who cannot afford fees within the first year of admission into tertiary institutions. Respondents in this category generally report a positive impact on household well-being. Sponsorship has significantly improved access to education, with some families reporting that it has enabled their children to attend school, reducing financial stress on parents. The child sponsorship program helps stabilize households by easing the financial burden of education enabling families to allocate resources to other important needs.

Funding for community projects, which constitutes 20% of the financial support, plays a critical role in developing local infrastructure. The types of projects funded include the construction of a healthcare center that has improved access to essential services for a large segment of the population. Respondents report improved living standards as a result of these community-led projects. However, respondents also noted that while community projects benefit the collective, not all households experience direct financial gains from these projects. Community leaders play a significant role in determining project priorities, which may not always align with the specific needs of certain households. The body of research indicates that for community-based

conservation to be successful, it must both protect the environment and provide locals with real advantages, such as better infrastructure and assistance for community initiatives (Oduor, 2020; Kim et al., 2019).

A substantial 70% of respondents reported receiving no financial support at all from the conservation area funds. This lack of support represents a critical gap in the distribution of resources, leaving a portion of the population disconnected from the financial benefits intended to improve livelihoods. Respondents in this category expressed frustration and concerns about the lack of direct financial benefits for some households can reduce their motivation to participate in conservation efforts. As financial support is a key incentive for local engagement in conservation, those not benefiting from these programs may feel alienated and less willing to support conservation initiatives.

Table 22. Community Projects funded by the conservation area’s revenues

Financial Support Category	Count	Column N %
Child Sponsorship	10	10%
Funding for Community Projects	20	20%
No Support (None)	70	70%
Total	100	100%

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The major goal of the current study was to look at the impact of community-based management of the Boabeng-Fiema Conservation Area on the livelihoods of marginalized groups. The study examined land use and land cover changes from 1992 to 2022, the efficiency of the management system, and the conservation area's impact on the lives of the surrounding communities. Both qualitative and quantitative data were collected using a survey. Data were acquired using formal surveys and interviews. To determine current understanding, theories, concepts, and empirical evidence were evaluated. As a result, this chapter presented the analysis's findings, reached conclusions, and made key arguments that will influence how policies are constructed.

5.2 Summary of Findings

As mentioned before, this part provided the study's key findings about the objectives.

5.3 Land Use and Land Cover Dynamics in the Conservation Area From 1992 to 2022

Closed forests dominated the landscape in 1992, indicating a well-preserved ecosystem. By 2002, rapid urbanization and infrastructure development led to significant deforestation and land-use changes. In 2022, a slight recovery in forest cover was observed, suggesting conservation efforts have had some ecological benefits despite ongoing urban expansion.

5.4 Effectiveness of the Management System of the Conservation Area

Traditional practices (taboos, customary laws) remain the primary conservation tools, fostering community involvement but limiting modern conservation strategies. Eco-tourism is underutilized, presenting an opportunity to improve both conservation and

livelihoods. Community participation in conservation activities is inconsistent, influenced by economic constraints and governance issues

5.5 Effects of the Conservation Area on the Livelihoods of the Fringe Communities

54% of respondents earn less than GHC 1,000 per month, indicating economic hardship. 79% believe the conservation area has not provided sufficient alternative livelihood opportunities, despite the potential of eco-tourism, beekeeping, and agroforestry. 98% of respondents do not have conservation-related jobs, highlighting a gap in employment opportunities. Conservation revenues support community projects and child sponsorship programs, but financial benefits remain unevenly distributed.

5.6 Conclusion

This study assessed the impact of community-based management of the Boabeng-Fiema Conservation Area on land use and livelihoods. Findings indicate that while conservation efforts have led to some forest regeneration, they have also restricted access to natural resources, limiting economic opportunities for local communities. Traditional conservation practices remain effective, but weak governance, limited community participation, and an underdeveloped eco-tourism sector pose significant challenges. Addressing these issues through enhanced community engagement, equitable benefit-sharing, and diversified livelihood programs is essential for balancing conservation with sustainable development.

5.7 Recommendations

5.7.1 Recommendations for Policy Planning:

1. Enhance Community Involvement and Governance: The District Assembly should encourage greater community participation in conservation

management. It is crucial to address gaps in community involvement, as many respondents highlighted insufficient engagement and governance challenges.

2. **Develop Livelihood Alternatives:** NGOs who support conservation efforts could help residents in the provision of alternative livelihoods, such as beekeeping, snail rearing, and agroforestry, which should be expanded and effectively integrated into conservation efforts to ensure that local communities benefit economically from sustainable practices.
3. **Equitable Distribution of Financial Support:** the District Assembly and the Wildlife Division should make the distribution of revenues from conservation funds transparent and equitable, targeting both community-wide projects and individual household needs. This can enhance the community's support for conservation initiatives.

5.7.2 Recommendations for Future Research:

1. **Longitudinal Studies on Land Use Change:** Future research should conduct long-term studies on land cover changes to assess the dynamics between urbanization, deforestation, and conservation efforts. Such studies will help identify sustainable land-use practices.
2. **Effectiveness of Traditional Knowledge Integration:** Studies should assess how effectively traditional knowledge is integrated into modern conservation practices and explore opportunities for enhancing this collaboration in a way that benefits both biodiversity and local cultures.

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APPENDIX I

QUESTIONNAIRE

Demographic characteristics

1. Gender

- a) Male []
- b) Female []

2. What is your age group

- a) 15 – 30 []
- b) 31 – 45 []
- c) 46 – 60 []
- d) 60+ []

3. Educational status

- a) No formal education
- b) Basic Education
- c) Secondary Education
- d) Tertiary Education
- e) Other (please specify):

4. Occupation

- a) Farmer (crop and animal)
- b) Small-scale business
- c) Commercial drivers
- d) Artisan
- e) Civil servant
- f) Other (please specify): _____

5. Please indicate your estimated monthly income?

- a) Less than 1000
- b) Between 1000 - 2000
- c) Between 2000 - 3000
- d) More than 3000

6. How long have you lived in the community?

- a) < 5 years
- b) 6-10 years
- c) 11-20 years

d) More than 21 years

7. Which community do you live in?

a) Boabeng

b) Fiema

c) Bonte

d) Konkompe

To examine the effectiveness of the management system of the conservation area.

1. What are the management practices within the conservation area? (Select all that apply)

a) Taboos associated with the conservation area

b) Customary Practices

c) Eco-tourism purpose

d) Partnerships and Support

2. How did you learn about these management practices? (Select all that apply)

a) Community meetings

b) Government announcements

c) Workshops or training sessions

d) Media (TV, radio, newspapers)

e) Social media

f) Word of mouth

g) Other: [Please specify]

3. Are these current management practices beneficial for the conservation of biodiversity in the area?

a) Alternative Livelihood Programs

b) Traditional and cultural practices

4. How often do you participate in conservation activities (e.g., community meetings, clean-ups, awareness programs)?

a) Regularly

b) Occasionally

c) Rarely

d) Never

5. What challenges do you think the management of the conservation area faces?
(Select all that apply)
- a) Lack of funding
 - b) Poor governance
 - c) Lack of community involvement
 - d) Conflicts over land use
 - e) Others (please specify)
6. What role do local and national government agencies play in the management of the conservation area? (Select all that apply)
- a) Funding
 - b) Regulation
 - c) Enforcement
 - d) Technical support
 - e) Community engagement
 - f) Other: [Please specify]
7. if yes, how are the conservation area management practices funded? (Select all that apply)
- a) Government grants
 - b) Tourist fees
 - c) Community funds
8. Are there specific laws or regulations that govern the management practices?
- a) Traditional and cultural laws
 - b) Wildlife conservation regulations
9. How well are these laws and regulations enforced?
- a) Very Poorly
 - b) Poorly
 - c) Neutral
 - d) Well
 - e) Very Well

10. How effective are the management practices in mitigating environmental challenges?
- a) Very Ineffective
 - b) Ineffective
 - c) Neutral
 - d) Effective
 - e) Very Effective

Effects of the conservation area on the livelihoods of the fringe communities

1. what types of alternative livelihoods have been provided? (Select all that apply)
- a) Eco-tourism
 - b) Handicrafts
 - c) Agroforestry
 - d) Small-scale businesses
 - e) Others (please specify)
2. Has the conservation area improved your family's economic well-being?
- a) Strongly agree
 - b) Agree
 - c) Neutral
 - d) Disagree
 - e) Strongly disagree
3. Do you or any household members work in jobs related to the conservation area (e.g., tour guides, park rangers, hospitality services)?
- a) Yes
 - b) No
4. Have you benefited from any community development projects funded by the conservation area's revenues?
- a) Yes
 - b) No

5. What are they?.....

6. Have your community received financial support from conservation area funds for projects or businesses?

a) Yes

b) No

APPENDIX II

Key Informant interview

Chiefs and opinion leaders

- a) How do you believe the current management system is affecting conservation efforts in the area? What do you see as its main strengths and weaknesses?
- b) In your opinion, how well does the current management system align with the conservation goals for the area?
- c) How would you rate the level of community involvement in conservation activities under the current management system?
- d) What suggestions do you have for improving community participation in conservation efforts?
- e) Based on your experience, what changes would you recommend to enhance the management system's effectiveness in protecting biodiversity and natural resources?
- f) As a community leader, what roles should stakeholders such as local authorities, conservation groups, and residents play in supporting and improving the management system for environmental conservation?
- g) What do you consider to be the primary factors driving changes in land use and land cover in the area?
- h) What alternative livelihood activities (e.g., beekeeping) have been promoted in your community as part of conservation efforts?
- i) What benefits has the community experienced due to the presence of the Boabeng-Fiema Conservation Area (BFCA)

The District Assembly Representative

Examination of the effectiveness of the Management systems of the conservation area.

- a) How would you describe your role in the community concerning the Boabeng-Fiema Conservation Area (BFCA)?
- b) In what ways does the community participate in your management activities?
- c) How many external organizations do you collaborate with within this community?
- d) Could you share some challenges you have encountered while working with external organizations?

- e) How has the assembly benefited from managing the conservation area in collaboration with stakeholders such as the community, the wildlife division, and others?

Wildlife officers

- a) How does the current conservation area management affect the animals and their habitats?
- b) What do Wildlife Services do to help or enforce the rules for protecting wildlife in the conservation area?
- c) In your experience, how well are the current methods used by Wildlife Services working to reduce conflicts between people and animals and manage wildlife sustainably in the conservation area?
- d) Does the Wildlife Services work with other groups or NGOs to protect, restore habitats, and monitor wildlife in the conservation area?
- e) Looking ahead, what suggestions do you have for improving the cooperation between Wildlife Services and other groups to manage the conservation area better?

APPENDIX III



Some snail rearing and bee-keeping as an alternative livelihood support an NGO supported some community members



Interview with the Konkrompe chief



Afforestation activity is undertaken by the Fiema community