

## ABSTRACT

MCWHINNEY, ANNE MARIE. Understanding Collaborative Forest Management in The Gambia. (Under the direction of Dr. Frederick Cabbage).

Over one billion people rely on vital resources from forests; however, forests are disappearing at alarming rates. In developing countries, forests are an important source of income and generate essential environmental services that help to sustain communities. Due in part to The Gambia's size (~1 million hectares) and population density (245.7 people/km<sup>2</sup>), The Gambia's forests have experienced encroachment and degradation for years. For many communities in The Gambia, forests are critical for survival. With increasing pressures from climate change, deforestation, and desertification, The Gambia will likely face more severe food shortages, increased emigration, and stability and security issues in the future.

The Gambia's forests are under multiple forest governance regimes and management arrangements that fall on a spectrum from forests entirely owned and managed by the Government of The Gambia to forests wholly owned and managed by the community. In between, there are forests with varying degrees of collaborative management. Since the 1990s, the Gambian government has promoted community forestry as a way of empowering communities and conserving forests by involving local communities in the governance and management of forest resources. In 2011, the Gambian government's community forest policies were recognized as one of the world's best. Despite policy implementation over several decades and policy recognition on the international stage, there is a lack of knowledge and understanding of outcomes resulting from the different forest management regimes, which is evident by the dearth of peer-reviewed literature on forestry in The Gambia and of relevant information in Gambian forestry reports.

The purpose of this study is to gain a better understanding of the current collaborative forestry approaches used in The Gambia and identify factors and conditions within forest parks and community forests that enhance the sustainability of forests. We interviewed 82 individuals, including forest committee members, Department of Forestry representatives, and forest caretakers, from a total of 77 different community forests, jointly managed forest parks, and state-administered forest parks.

Three primary conclusions were drawn from the research. First, most community forest representatives perceived an increase in forest cover density over the last five years, while the majority of jointly managed forest park and state-administered forest park representatives perceived a decrease in forest cover density. Second, three variables contributed positively to the reported density of forest cover, the study's proxy for forest sustainability. These variables were forest regime, specifically community forests, the number of villages involved in forest management, and the number of different types of funding sources. Third, factors and conditions of community forests enhance the sustainability of forests more than jointly managed forest parks and state-administered forest parks. This is the first study to examine as many as 77 forests from all three of the main forest regimes and in all five regions of The Gambia.

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Understanding Collaborative Forest Management in The Gambia

by  
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A thesis submitted to the Graduate Faculty of  
North Carolina State University  
in partial fulfillment of the  
requirements for the degree of  
Master of Science

Natural Resources

Raleigh, North Carolina  
2022

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## **DEDICATION**

To my family

and all those who supported me along the way.

## **BIOGRAPHY**

Anne McWhinney obtained a B.A. in Environmental Sciences and a B.A. in Foreign Affairs at the University of Virginia. After graduation, she taught English and Environmental Sciences in Shenzhen, China for a year before joining the U.S. Peace Corps. As a U.S. Peace Corps Volunteer, Ms. McWhinney served as an Agriculture and Forestry Specialist for nearly 3.5 years in The Gambia, West Africa. While in The Gambia, Ms. McWhinney worked at Africa BEECause, where she designed and implemented training projects funded by the United Nations Development Programme, British High Commission, and The Waterloo Foundation. Along with her Gambian counterparts, Ms. McWhinney trained over 350 Gambian beekeepers from over 80 rural villages across The Gambia, as well as 60 National Park Rangers and park volunteers, on the best practices of rural beekeeping. Once completing her assignment at Africa BEECause, Ms. McWhinney was selected to serve as the Food Security Coordinator at the Peace Corps The Gambia main office, where she led a variety of technical programs under the West Africa Food Security Partnership. Upon returning to the United States, Ms. McWhinney worked for the Environmental Protection Agency for three years before returning to graduate school. Currently, Ms. McWhinney is graduate student in the Department of Forestry and Environmental Resources at North Carolina State University, where she is pursuing an M.S. in Natural Resources with a concentration in international resources.

## **ACKNOWLEDGMENTS**

I wish to sincerely thank all those who have supported me along the way. This project would not have been possible without Dr. Frederick Cabbage and Dr. Erin Sills of North Carolina State University, Dr. Gregory Frey and Dr. Kathleen McGinley of U.S. Forest Service, the Laarman International Gift Fund, The Gambia's Department of Forestry, and my Gambian colleagues: Momodou Bah, Modou Ndure, Balla Ndure, Ousainou Cham, Muhammed Ndure, and Saikou Njai.

## TABLE OF CONTENTS

LIST OF TABLES .....	vii
LIST OF FIGURES .....	ix
LIST OF ABBREVIATIONS .....	x
<b>1.1 Introduction</b> .....	<b>1</b>
1.2 Literature .....	3
1.2.1 Pre-Colonial Period (prior to 1820).....	4
1.2.2 Period of Colonial Forestry (1821-1965) .....	4
1.2.3 Post-Independence Period (1965-1979) .....	6
1.2.4 Period of Gambian/German Collaboration (1979-2003).....	7
1.2.5 Post-Gambian/German Collaboration Period (2003-Present) .....	8
1.3 Forest Management – Moving from Historical to Present .....	10
1.3.1 Forest Parks – State Managed .....	11
1.3.2 Community Forests – Community Managed .....	13
1.3.3 Forest Parks – Jointly Managed .....	15
1.4 GoTG Policies and Agencies.....	17
1.5 Summary of Literature Review and Forest Management Approaches, Policies, Agencies ..	20
1.6 Research Significance and Overview .....	21
1.7 Research Objectives and Questions.....	24
<b>2.1 Methods</b> .....	<b>25</b>
2.1.1 Study Area .....	27
2.1.2 Building a Database of Forests in The Gambia .....	29
2.1.3 Building a Sampling Frame .....	30
2.1.4 Sampling Technique .....	31
2.1.5 Survey Methods .....	32
2.1.6 Data Entry, Cleaning, and Setup .....	35
2.1.7 Data Analysis.....	37
<b>3.1 Results</b> .....	<b>39</b>
3.1.1 Characterization of Gambian Forests Surveyed .....	41
3.1.1.1 Forest Attributes .....	41
3.1.1.2 Ownership.....	42
3.1.1.3 Governance Structure .....	43
3.1.1.4 Forest Management & Uses .....	49
3.1.1.5 Finances .....	55
3.1.2 Comparison of Community Forests, Jointly Managed Forest Parks, and State- Administered Forest Parks .....	59
3.1.2.1 Forest Attributes .....	59
3.1.2.2 Ownership.....	63
3.1.2.3 Governance Structure .....	64



3.1.2.4 Forest Management & Uses .....	72
3.1.2.5 Finances .....	78
3.1.3 Perceived Benefits, Challenges, and Future Opportunities .....	82
3.1.3.1 Benefits .....	82
3.1.3.2 Challenges .....	83
3.1.3.3 Opportunities .....	86
3.1.4 Factors and Conditions Enhancing the Sustainability of Forests .....	87
3.1.4.1 Correlation Analysis .....	87
3.1.4.2 Regression Analysis .....	91
<b>4.1 Discussion</b> .....	<b>96</b>
4.1.1 Characterization of Gambian Forests Surveyed and Comparison of Community Forests, Jointly Managed Forest Parks, and State-Administered Forest Parks .....	97
4.1.1.1 Forest Attributes .....	97
4.1.1.2 Ownership .....	100
4.1.1.3 Governance Structure .....	100
4.1.1.4 Forest Management & Uses .....	106
4.1.1.5 Finances .....	108
4.1.2 Perceived Benefits, Challenges, and Future Opportunities .....	111
4.1.2.1 Benefits .....	111
4.1.2.2 Challenges .....	112
4.1.2.3 Opportunities .....	114
4.1.3 Factors and Conditions Enhancing the Sustainability of Forests .....	115
4.2 Research Bias and Limitations .....	118
<b>5.1 Conclusions and Recommendations</b> .....	<b>120</b>
5.1.1 Research Questions and Key Findings .....	120
5.1.2 Recommendations and Future Research .....	124
REFERENCES .....	127
APPENDICES .....	132
Appendix A: Survey Protocol .....	133
Appendix B: Codebook .....	146

## LIST OF TABLES

Table 1	Summary of key GoTG forest policies and agencies.....	18
Table 2	Number of surveys completed by role .....	32
Table 3	Data cleaning notes by survey question.....	36
Table 4	Number of forests surveyed per forest regime and region.....	40
Table 5	Number of forests surveyed by the number of governance components in place ...	43
Table 6	Number of forests surveyed by number of day-to-day forest collaborators .....	45
Table 7	Number of forests surveyed by number of involved villages .....	45
Table 8	Number of different types of groups working with the surveyed forests .....	46
Table 9	Number of groups working with the surveyed forests.....	47
Table 10	Number of forests surveyed by number of ways for community members to provide input or participate in forest activities .....	48
Table 11	Number of different methods used to resolve forest-related disputes per forest .....	48
Table 12	Number of different types of training received per surveyed forest .....	49
Table 13	Management goals of the forests surveyed .....	50
Table 14	Frequency of timber harvests .....	51
Table 15	Number of forests surveyed by number of different types of NTFPs harvested .....	52
Table 16	Number of NTFPs harvested by product use .....	53
Table 17	Most recent area survey and tree inventory .....	53
Table 18	Maintenance activities carried out .....	54
Table 19	Number of different types of maintenance activities performed in the forests.....	54
Table 20	Type of forest monitors used by the forests surveyed .....	55
Table 21	Number of different types of forest monitors used by the forests surveyed .....	55
Table 22	Number of different ways in which surveyed forests used profits .....	57
Table 23	Sources of funding .....	58
Table 24	Number of forests with the number of different funding sources received .....	58
Table 25	Employment (FTE) for the surveyed forests.....	59
Table 26	Descriptive statistics for year of forest establishment by forest regime .....	60
Table 27	Descriptive statistics for area in hectares (ha) .....	60
Table 28	Number of forests surveyed by forest regime and adjoining PA.....	61
Table 29	Number of forests surveyed by forest regime and number of different factors contributing to forest density increase .....	62
Table 30	Number of forests surveyed by forest regime and number of different factors contributing to forest density decrease.....	63
Table 31	Number of forests surveyed by forest regime and number of governance components .....	64
Table 32	Number of day-to-day forest collaborators of forest surveyed by forest regime.....	66
Table 33	Number of forests surveyed per forest regime with the number of villages involved in forest management.....	67

Table 34	Number of different types of groups working with the surveyed forests by forest regime.....	68
Table 35	Number of groups working with the surveyed forests by forest regime.....	68
Table 36	Number of forests surveyed per forest regime by number of ways community members can provide input/participate in forest activities .....	69
Table 37	Number of different methods used to resolve forest-related disputes by forest .....	70
Table 38	Descriptive statistics for trained community members.....	71
Table 39	Number of different types of training received per surveyed forest.....	71
Table 40	Number of forests surveyed with the following management goals.....	72
Table 41	Frequency of timber harvests .....	73
Table 42	Number of forests surveyed by number of different types of NTFPs harvested .....	74
Table 43	Number of NTFPs harvested per forest regime by product use.....	75
Table 44	Most recent area measurement and tree inventory.....	76
Table 45	Maintenance activities carried out .....	76
Table 46	Number of different types of maintenance activities performed in the forests by forest regime .....	77
Table 47	Type of forest monitors used by the forests surveyed .....	77
Table 48	Number of different types of forest monitors used by forests in each forest regime.....	78
Table 49	Number of different ways in which forests in different forest regimes used profits .....	80
Table 50	Sources of funding .....	80
Table 51	Number of forests surveyed by number of different sources of funding.....	81
Table 52	Employment (FTE) for the forests in each forest regime .....	81
Table 53	Forest products/services perceived as most valuable grouped by ecosystem service .....	82
Table 54	Number of instances a damaging human activity was identified per forest regime.....	83
Table 55	Number of instances a damaging natural issue was identified per forest regime ....	84
Table 56	Number of forests surveyed with the following as primary issues, constraints, or challenges.....	85
Table 57	Number of forests surveyed by number of different types of issues, constraints, or challenges.....	86
Table 58	Number of instances an improvement method was identified per forest regime.....	87
Table 59	Correlation matrix with all variables .....	89
Table 60	Binomial logistic regression estimating the likelihood of an increase in forest cover density .....	95

**LIST OF FIGURES**

Figure 1 Flow chart of mixed method approach ..... 26  
Figure 2 Map of administrative regions and city of Banjul..... 28

## LIST OF ABBREVIATIONS

CRR	Central River Region
CF	Community Forest
CFMA	Community Forest Management Agreement
Covid	Covid-19 pandemic
DoF	Department of Forestry
DPWM	Department of Parks and Wildlife Management
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization of the United Nations
FOSA	Forestry Outlook Study for Africa
GoTG	Government of The Gambia
Ha	Hectares
JFPM	Joint Forest Park Management
JMFP	Jointly Managed Forest Park
LRR	Lower River Region
NEA	National Environment Agency
NGO	Non-governmental organization
NTFP	Non-Timber Forest Product
NBR	North Bank Region
NCSU	North Carolina State University
PCFMA	Preliminary Community Forest Management Agreement
PA	Protected area
SAFP	State-Administered Forest Park
TP	Timber Product
URR	Upper River Region
VDC	Village Development Committee
WCR	West Coast Region
MECCANR	Ministry of Environment, Climate Change, and Natural Resources

## 1.1 Introduction

The Republic of The Gambia is the smallest country on the mainland of Africa (Moore et al. 2019). Located in western Africa, The Gambia is composed of two small strips of land on the northern and southern banks of the Gambia River, giving the country a north-south width varying between 25 and 50 kilometers and east-west length of 480 kilometers (Wally 2001; Belhabib et al. 2016). The Gambia is bordered by the Republic of Senegal on the north, east, and south, while the western edge lies along the Atlantic coast (Wally 2001). Given The Gambia's proximity to the Atlantic Ocean and Gambia River, the entire country is flat and low-lying with elevations no greater than 50 meters above sea level (Wally 2001). The Gambia's total area, including the Gambia River and other watercourses, is 11,295 square kilometers, with approximately 10,000 square kilometers (1 million hectares) being landmass and 25.1% (about 250,000 hectares) being forested as of 2021 (World Bank 2020b; UN-SD 2021). For reference, The Gambia is less than one-tenth as large as North Carolina, which has 12.6 million hectares (ha), or about as large as eight counties.

From 1990 to 2020, The Gambia's forest area has decreased from 4,146.6 to 2,426.7 square kilometers (242,670 ha) (World Bank 2020a). The Gambia's population is 2,487,000, and its density is 245.7 people per square kilometer (UN-SD 2021). The Gambia's current population growth rate is 2.9% annually (UN-SD 2021). Classified by the United Nations as one of the least developed countries in the world, The Gambia has a gross national income of \$711 per capita and ranks 172 out of 189 on the human development index (UN-DESA 2021; UNDP 2021). Despite The Gambia's small landmass, population density, development status, and loss of forest

area, The Gambia was recognized alongside prominent global leaders for the nation's excellent forest policies (WFC 2011).

In 2011, the World Future Council awarded both The Gambia and the United States second place in the category of the best forest policies in the world (WFC 2011). The United States received the award for the 2008 amendments to the Lacey Act, while The Gambia received the award for the country's Community Forestry Policy initiated in 1995 (WFC 2011). For a country rarely recognized, the award was a significant achievement that The Gambia did not reach easily. For decades, The Gambia experimented with different forest policies that reflected distinct, and sometimes contradictory, perspectives about how to properly manage forest resources. Over the last few centuries, forest management in The Gambia evolved from being entirely managed by indigenous communities to an approach focused on collaborative forest management between the government and the public.

To better understand how The Gambia became prominent on the international forestry scene, I begin with a review of the scientific and gray literature related to the history of forest management in The Gambia and examine current forest management approaches utilized in The Gambia. The review aims to highlight how attitudes, approaches, and policies around forestry changed throughout The Gambia's history and how these changes led to its forest policy recognition.

## 1.2 Literature

I begin with a review of the literature discussing the history of forest management in The Gambia. The review summarizes literature that comments on the history of forest management in The Gambia, highlights the scarcity of comprehensive publications and research studying forest management in The Gambia, notes the enormous gaps in the literature, and recommends areas for future research.

The scientific community has focused most of its studies on the developed world, so scientific literature on the history of forest management in The Gambia is sparse, fragmented, and often tangential. Most peer-reviewed literature looks at forestry's social and political aspects and fails to comprehensively examine the evolution of forest management in The Gambia over time.

Scientific literature alone for The Gambia is incomplete, so I rely substantially on gray literature to reach a more complete picture of the history of forest management in The Gambia. In particular, government and industry reports provide some of the best information on the history of forest management in The Gambia.

Five distinct periods in the history of forest management in The Gambia emerge from literature, which are differentiated by the predominant attitudes, approaches, and policies defining forestry during each time. The five periods are pre-colonial, colonial, post-independence, Gambian/German collaboration, and post-Gambian/German collaboration. Across periods, there are some notable shifts in thinking around forestry, but all are ultimately aimed at realizing a better way to manage forest resources.



### **1.2.1 Pre-Colonial Period (before 1820)**

Forestry literature during the pre-colonial period in The Gambia is sparse. Early European explorer accounts of West Africa make no mention of forests from the indigenous population's perspective and usually only describe the observation of large trees. A common theme emanating from the literature is the portrayal of forests as mysterious and largely unknown. Even as late as Henry Reeve's 1913 publication *The Gambia: Its History Ancient, Medieval, and Modern Together with Geographical, Geological, and Ethnological Conditions and a Description of the Birds, Beasts, and Fishes Found Therein*, forests are framed as a mysterious and sometimes dangerous place with only one substantive mention of forests as a place where people live and sustain themselves through the consumption of forest products.

Given the lack of published literature on forestry in The Gambia for the years before colonization, much could be studied and better understood. A subject that has historically received less attention is the study of the native population's activities and perspectives related to forests. We now understand much of the close relationship Native Americans had with forests in North America. It would be instructive if future research examined the relationship native populations in The Gambia had with forests in order to understand better how current customary practices evolved and were informed by the past.

### **1.2.2 Period of Colonial Forestry (1821-1965)**

As with the pre-colonial period, much of the discussion on forestry in the colonial period has been led by non-Gambian and non-African voices. A leader in this discussion has been the *Empire Forestry Journal*, first published in 1922 by the Commonwealth Forestry Association and

since published under different titles. For forestry events of the 1940s, 1950s, and 1960s, information from the Empire Forestry Journal is supplemented by gray literature. However, across all literature examined, there is the common theme of the “colonizers know best.”

Colonial authors, such as D.R. Rosevear (1937), promote the need for scientific forest management and emphasize the critical role the colonial government should play in introducing and implementing scientific forest management practices. Officially, this process began with the introduction of the scientific forest management concept by colonial administrators in the early 1940s, the enactment of the Land Provinces Act in 1946, and the establishment of 66 state-owned forest parks in the 1950s (Norikane 2007). Forestry developments of the 1940s, 1950s, and early 1960s created tension between colonial rulers and communities across the colony, because traditional land tenure rights were essentially deemed inconsequential when forest parks were established on customary lands (Norikane 2007).

Despite the presence of both peer-reviewed and gray literature in this period, the literature has many weaknesses, perhaps most notably, the absence of a diversity of voices and viewpoints. Recently, some in the academic community have started to reframe the conversation on colonial forestry. For example, Paul Munro (2020) published *Colonial Seeds in African Soil*, which focuses on examining the complex history of forestry in Sierra Leone and analyzing the economic, political, and social aspects that have produced different forest management approaches through the years. Similar work focused on The Gambia and other former colonies would greatly benefit the body of literature on the history of forestry by expanding the number of

perspectives and potentially offering new conclusions around conflict management, collaborative management, and sustainable management.

### **1.2.3 Post-Independence Period (1965-1979)**

In 1965, The Gambia gained independence from its British colonial rulers (Hughes and Perfect 2008). The literature defines this period as having rising tensions over forest resources, which began before independence and were exacerbated during the post-independence period.

The Gambia forestry literature between 1965 and 1979 is patchy and tangential. Some specific events highlight the escalation of tensions, the first being the Provinces' Lands Regulations of 1966 (Camara and Dampha n.d.). These regulations provided The Gambia's forest parks with greater protections, which further limited the public's access and use, and the government was declared owner and manager of all forest resources (Camara and Dampha n.d.). Despite suffering this loss of rights, local communities were charged with complete responsibility for fire prevention on all customary lands (Camara and Dampha n.d.). Thus, paradoxically, expectations of the public increased while the public's rights to forest resources decreased.

The literature continues to tell a similar story for the 1970s. In 1976, the Gambian government issued a broad forest policy statement, and in 1977, a new Forest Act was enacted (Sonko and Camara 2000; Norikane 2007). In 1978, new Forest Regulations were imposed (Norikane 2007). Together, these policies established a forestry approach that relied on the public's involvement while taking away their rights to resources and power to make management decisions (Norikane 2007).

As a whole, the literature presents a picture of high tension in the post-independence period. However, none of the literature provides a detailed examination of this period. All references to this period are brief, subsumed within a larger topic, and lack detail. To help fill this gap, future studies could analyze the events of this period, examine the decision-making processes utilized, and identify communication failures that led to the rise in tensions.

#### **1.2.4 Period of Gambian/German Collaboration (1979-2003)**

The fourth distinct period in the history of forestry in The Gambia is the years of Gambian/German collaboration, which ended in 2003 with the conclusion of the German-funded forestry projects. Defined by scientific management and experimentation, this period largely shaped The Gambia's current forest management trajectory. The body of literature is composed primarily of government reports. However, there is one frequently referenced journal article titled *Community, Forestry and Conditionality in the Gambia* by Richard A. Schroeder (1999), which discusses issues and weaknesses of the forestry approaches implemented during the period of Gambian/German collaboration.

Due to the numerous government reports and the one peer-reviewed journal covering this period, we have an understanding of the experimental forestry projects implemented, descriptions of forest resources coming from the 1981/1982 and 1997/1998 national forest inventories, outlines of new participatory forest management approaches for trial and later implementation, and critiques of the forestry approaches initiated (Camara and Dampha n.d.; Schroeder 1999; Sonko and Camara 2000; Norikane 2007; FAO 2011).

Ultimately, this period of Gambian/German collaboration is the first time The Gambia was committed to developing the forestry sector based on scientific information gathered from inventories and pilot studies, and where data-driven information likely resulted in greater achievements (FAO n.d.). However, given the limited amount of peer-reviewed literature on the topic, more research on the long-term forestry outcomes from the Germans' sustained, large-scale development initiative with the Gambian government would be beneficial.

### **1.2.5 Post-Gambian/German Collaboration Period (2003-Present)**

The literature for the post-Gambian/German collaboration period consists of numerous reports. National-level data were collected, analyzed, and then incorporated into country-specific reports, regional reports, and the United Nation's Food and Agriculture Organization (FAO) global report. These reports, rather than peer-reviewed scientific literature, provide most of what we know about forestry in The Gambia today.

National reports, such as National Forest Assessment 2008-2010 and Forestry Outlook Study for Africa (FOSA) – Country Report The Gambia, provide forest inventory information, evaluations of governmental capacity, discussions on forest threats, and strengths/weaknesses of the forestry sector, as well as summaries of national strategies for advancing forestry in the future (FAO n.d.; FAO 2011). Regional reports, such as FOSA - Subregional Report West Africa, highlight The Gambia's place in the greater region, as a small player, but one that gives hope to the rest of West Africa as The Gambia was one of only two countries in the region that saw a gain in forest cover between 1990 and 2000 (FAO 2003). Global reports, such as the Global Forest Resources Assessment, are published every ten years. The most recent report incorporates forest data from

236 countries to provide a comprehensive look at forestry and provides data-based information on how The Gambia is performing compared to the rest of the world (FAO 2020).

From this literature, it is evident that the defining theme for the most recent period in the history of forest management in The Gambia is centered around modernization of forest management approaches, increased emphasis on collaboration, and continual policy improvement. Thus far, this period has been marked by significant implementation effort, and actions have been undertaken to increase the number of collaborative forestry management agreements (FAO 2011). During this period, The Government of The Gambia (GoTG) conducted its most comprehensive and scientifically advanced forest inventory (GoTG 2010). In response to the findings, The Gambia published a new Forestry Sub-Sector Policy for 2010-2019, Environmental Impact Assessment Regulations of 2014, and a new Forest Act of 2018 (FAO 2011; GoTG 2014; GoTG 2018).

Though the post-Gambian/German collaboration period has been defined by advancement, there is still a significant amount unknown due to the limited scope and number of scientific papers. Numerous areas are awaiting further exploration, including how the forestry industry's structure impacts sustainable forest management; how the illegal rosewood trade impacts forests and the forestry industry; and how The Gambia's tourism industry can be better leveraged to help land managers meet forest management goals.

In summary, while some peer-reviewed articles touch on the history of forest management in The Gambia, none provide a comprehensive examination of the topic without being

supplemented by gray literature. As noted, five distinct periods in the history of forestry in The Gambia emerged. Each period is characterized by unique attitudes, approaches, and policies of the time, but not much has been examined by the scientific community. The Gambia is small and intellectual resources have been scarce, so larger countries in Africa probably have received more attention.

### **1.3 Forest Management – Moving from Historical to Present**

To create a more complete picture of how The Gambia became prominent on the international forestry scene in 2011, one must examine how shifting attitudes, approaches, and policies around forestry have led The Gambia to its more recent forest management structure, which involves three commonly utilized and heavily promoted management regimes: forest parks (FP), community forests (CF), and joint forest park management (JFPM). These three management regimes emerged as the dominant management arrangements used to manage forest resources in The Gambia.

The newest of the three approaches was introduced in the early 2000s with the publication of the Joint Forest Park Management Concept by the Government of The Gambia's (GoTG) Department of Forestry (DoF) (Thoma and Camara 2005). With the creation of the JFPM Concept, The Gambia established a unique system of management regimes that ranged from exclusively state managed to entirely community managed. Each management regime stems from a different historical period in the history of forest management in The Gambia. In order to connect the past with the present, I explore the development of each management regime and what each regime looks like in more recent times.

### **1.3.1 Forest Parks – State Managed**

During the Period of Colonial Forestry (1821-1965), 66 state-owned forest parks were established in the 1950s as part of the colonial administrators' aim to introduce the concept of scientific forest management in The Gambia (Norikane 2007). These 66 forest parks were established on formerly customary land with little concern for traditional land tenure rights (Norikane 2007). The forests designated as forest parks were to be exclusively managed by the state, and today, these parks continue to be managed by the state, specifically the DoF. Initially, one of the primary objectives was to ensure permanent forest cover by placing forests under the state's control (Camara and Dampha n.d.). However, over the years, forest park objectives have evolved to include additional aims, such as production, demonstration of forestry techniques, training of foresters, training of local communities in forestry practices, applied research, and conservation (Camara and Dampha n.d.).

In more recent years, the roles and responsibilities of the state have become more well defined with regard to the state's management of forest parks. For each forest park, the DoF, on behalf of the GoTG, must prepare a forest management plan (Camara and Dampha n.d.). Management plans must be prepared by a professional forester within the Department or by a qualified consultant forester (Camara and Dampha n.d.). All management plans must include forest area and boundaries, a description of the forest's structure, management objectives for the next ten years, prescribed silvicultural activities, and planned bushfire measures (Camara and Dampha n.d.). However, the Director of Forestry may specify additional content that must be included in a management plan (Camara and Dampha n.d.). Each forest management plan is then approved by the Director of Forestry (Camara and Dampha n.d.). At least every ten years, the DoF must



revisit management plans and prepare an updated plan no later than one year before the current plan's expiration (Camara and Dampha n.d.). Under Gambian law, the DoF is solely responsible for the management of forest parks and possesses exclusion authority over these forests.

Despite the state's good intentions, placing significant forest resources in the hands of an underfunded, understaffed, and undertrained Department has resulted in the degradation and exploitation of forest parks over the years (Thoma and Camara 2005). The DoF's inability to properly manage forest parks scattered across the country, combined with the public's lingering animosity toward the state, resulted in a dramatic decrease in closed woodland cover (Thoma and Camara 2005).

The GoTG's state-controlled, top-down forest management approach for over 40 years failed. The Department of Forestry did not have the resources to manage the forest parks, and communities whose land had been taken away held strong feelings of alienation (Thoma and Camara 2005). As a result, communities became unwilling to care for the state-owned forests around their village and instead participated in damaging forest utilization practices (Thoma and Camara 2005). Recognizing this major issue, the GoTG, along with German collaborators, developed new forest management strategies aimed at increasing the public's active participation in forest management across the country (Thoma and Camara 2005). The first approach piloted, and officially implemented, was the community forest concept, which involved the allocation of legally secure ownership and exclusive user rights to build the public's sense of responsibility for the protection of forest resources (Thoma and Camara 2005).

Today, state-managed forest parks still exist; however, the GoTG is working continuously toward placing all forest parks under joint forest park management, which will be discussed in section 1.3.3.

### **1.3.2 Community Forests – Community Managed**

During the Period of Gambian/German Collaboration (1979-2003), the concept of community-managed forest resources under the community forest designation was first introduced in response to concerns about decreasing woodland cover in forest parks (Thoma and Camara 2005). The Period of Gambian/German Collaboration was defined by scientific management and experimentation, with much of the experimentation at the time centered around the development of participatory forest management approaches. The GoTG recognized the Department of Forestry's limited capacity and the need to involve the public in forest management (Thoma and Camara 2005). As a result, the Gambian/German collaboration developed and piloted multiple community forestry approaches from 1991 to 1994 (Thoma and Camara 2005). In 1996, the GoTG officially promoted a community forestry concept built on the pilot test findings (Thoma and Camara 2005). The two main goals of the community forestry approach were to improve community welfare by introducing ecologically adapted natural resource management practices and to maintain national forest cover by slowing down and ultimately halting environmental degradation (Thoma and Camara 2005). These goals were to be accomplished through participatory forest management. The logic was that communities would be interested in establishing community forests, because they would regain ownership of traditionally held lands and manage the forest on their terms and to their benefit.

Throughout the 1990s, detailed community forestry policies, regulations, and guidelines were developed, revised, and formalized for implementation. In order to gain rights and responsibilities over forest resources under the community forestry policies, communities must organize themselves and complete a three-step community forest process (Thoma and Camara 2005). The process begins with identifying the forest area and establishing a community forest committee (Thoma and Camara 2005). Each community forest committee must have six executive members from the community (Thoma and Camara 2005). The committee is responsible for carrying out all procedures necessary for obtaining a preliminary community forest management agreement (PCFMA) and, ultimately, a community forest management agreement (CFMA) (Thoma and Camara 2005). On behalf of the community, the community forest committee applies for and signs a PCFMA, which begins a three-year-long period in which the committee must demonstrate its ability to create management structures and implement the preliminary community forest management plan (Thoma and Camara 2005).

Upon a successful evaluation at the end of the preliminary phase, the forest is surveyed, the forest boundaries are demarcated, and a five-year forest management plan is established (Thoma and Camara 2005). Upon successful implementation of the five-year management plan, a community forest management agreement is signed, and permanent ownership transfer is finalized with the publishing of the community forest in the national gazette (Thoma and Camara 2005). Along the way, the community forest committee must take responsibility for all forest administration, including communication between DoF authorities and community members, management planning, labor organization, forest activity monitoring, creating and enforcing bylaws, and managing financial resources (Thoma and Camara 2005).

Today, the community forestry program continues to expand. New communities begin the community forestry process each year, and new community forests are awarded official community forest designation. However, as of 2010, the initial objective of transferring 80% of the nation's forests to community management had not been met (FAO 2011). For 54.3% of the forestland in The Gambia, the GoTG remains the sole manager (FAO 2011). In the forest policy for 2010-2019, the goal was to transfer an additional 200,000 hectares (ha) of forestland to local Gambian communities (FAO 2011). As of 2022, a new national assessment has not been conducted, so it is unclear whether these targets have been reached.

### **1.3.3 Forest Parks – Jointly Managed**

The newest of the three primary management arrangements is the jointly managed forest park system. In 2003, at the beginning of the Post-Gambian/German Collaboration Period (2003-Present), the GoTG's Department of Forestry introduced the Joint Forest Park Management Concept (Thoma and Camara 2005). The Joint Forest Park Management (JFPM) Concept falls between the two management extremes: state-managed forest parks and community-managed community forests. Jointly managed forest parks are owned by the state but managed by both the Department of Forestry and community partners (Thoma and Camara 2005). The JFPM Concept grew out of continued interest in participatory forest management approaches and the persistent resource challenges faced by the Department of Forestry (Thoma and Camara 2005).

Under the JFPM Concept, the Department of Forestry is charged with actively involving interested communities in forest management with the goal of sustainably managing forest resources in order to ensure The Gambia's forest resource demands are met (Thoma and Camara

2005). The Department of Forestry looks for community partners who have socially recognized claims to forest park resources (Thoma and Camara 2005). If interested, the Department of Forestry will enlist these identified partners to participate in management activities within the state-owned forest park (Thoma and Camara 2005).

As with the community forest policy, the GoTG has established a process for initiating and implementing JFPM agreements; however, the JFPM process is not as prescribed as the community forest process and allows for more flexibility based on the needs and desires of participating parties (Thoma and Camara 2005). The process begins with interested community partners organizing themselves and establishing appropriate governance structures, which can vary depending on the partners involved (Thoma and Camara 2005).

For example, if partners are from different villages, an inter-village committee can be established to formalize the relationship. Once the appropriate institutional structures are established, the community partners begin the planning/negotiation phase with Department of Forestry representatives (Thoma and Camara 2005). Discussion points include co-management terms, management goals and objectives, overall strategies for achieving objectives, fire management, financial administration, activity implementation, forest park monitoring, and controlled utilization, especially as it relates to grazing activities (Thoma and Camara 2005).

Once all parties agree on management arrangements, the JFPM agreement is signed, and parties begin the process of developing a detailed 10-year co-management plan (Thoma and Camara 2005). The signed JFPM agreement does not expire; however, the agreement and associated

management plans must be revisited every five years and revised only with agreement from all parties (Thoma and Camara 2005). Under a JFPM agreement, community partners are granted user rights for identified forest resources (Thoma and Camara 2005). Without such an agreement, community partners are not permitted access to these resources within the forest park boundaries (Thoma and Camara 2005).

Today, JFPM agreements take many forms with varying degrees of responsibility and entitlement sharing (Thoma and Camara 2005). This pluralistic approach has facilitated increased collaboration between the Department of Forestry and communities; however, some challenge the approach as merely a means for shifting financial and management responsibilities onto community partners while keeping resource control with the state (Schroeder 1999). As of 2020, 94,270 hectares of forestland are under joint forest park management (FAO 2020).

#### **1.4 GoTG Policies and Agencies**

Compared to other countries in Africa, the GoTG is considered progressive in its management of forest resources (Thoma and Camara 2005). Since the 1990s, a series of forest initiatives have been advanced, including formal legislation, regulations, management strategies and principles, action plans, financing mechanisms, and supporting cross-sectorial policies (Thoma and Camara 2005). Below is a summary table of GoTG policies and agencies relevant to forest management.

**Table 1: Summary of key GoTG forest policies and agencies**

<b>Multilateral Environmental Agreements</b>	<b>Description</b>
UN Convention on International Trade in Endangered Species (1977)	The Gambia joined in 1977. <i>Pterocarpus erinaceus</i> is listed on Appendix 2. Agreement protects endangered plants and animals by ensuring their trade is sustainable, legal, and traceable (CITES 2016).
UN Convention on Biological Diversity (1994)	The Gambia ratified in 1994. Agreement promotes sustainable forest management (UNEP n.d.).
UN Convention to Combat Desertification (1996)	The Gambia ratified in 1996. Binding framework set up to address the problem of desertification (UN-TC 2022).
<b>Laws</b>	<b>Description</b>
Land Provinces Act (1946)	District chiefs given authority to make land management decisions and village heads given authority at the local level. Even though the Act weakened the authority of the village heads to make certain resource management decisions, the customary system remained mostly unchanged (Norikane 2007).
Forest Act of 1977	Granted GoTG power over forest resources, specifically ownership of all naturally grown trees. Established designated forest areas, which the DoF was responsible for managing. DoF controlled forest delineation and access to forests (GoTG 1977).
State Lands Act (1990)	Reaffirmed the Land Provinces Act of 1946 (Norikane 2007).
National Environment Management Act (1987; amended 1994)	Required consultation with forest administration before participating in forest conversion activities. Includes the conversion of natural forests to plantation forests. Created the National Environment Agency (NEA) (GoTG 2019).
Forest Act of 1998	Authorized community forest management and community forest ownership. Provided detailed guidance aimed at supporting the resource management activities of local communities. Created the National Forest Fund. Forest Service responsible for promoting community forests (GoTG 1998).
Local Government Act of 2002	Defined land ownership and spelled out local governments' role in natural resource management. Act allowed for the streamlining of PCFMA and CFMA application procedures (GoTG 2002).

**Table 1 (continued)**

Forest Act of 2018	Update to the Forest Act of 1998. Outlined administrative provisions for the DoF. Provided detailed guidance for the management of forest parks and establishment of community forests, joint managed forest parks, and private forests. Updated guidance for the import and export of forest products and penalties for forest offences (GoTG 2018).
<b>Regulations</b>	<b>Description</b>
Forest Regulations (1978)	Spelled out prohibited acts, license requirements, permit requirements, regulations for the import and export of forest products, penalties, schedule of tariffs for timber trees, and schedule of protected tree species (GoTG 1978).
Forest Regulations Amendment (1996)	Set prices on timber permits and annual licenses (GoTG 1996).
Forest Regulations (1998)	Established forest product import and export fees. Laid out management plan and forest inventory requirements. Prohibited practices with the goal of protecting forests. Updated license and permit requirements, penalties, and authorization of exploitation for community forests. Provided guidance on how community forests would be managed (GoTG 1998).
Environmental Impact Assessment Regulations (2014)	Required a full environmental impact study if activities involve the clearance of more than 10 hectares of forest per year or if wood plantations of more than 10 hectares are established (GoTG 2014).
<b>Policies</b>	<b>Description</b>
Forest Policy of 1976	Broad statement of policy objectives. Lacked specifics for achieving objectives. Expected public involvement without providing a hospitable environment (Thoma and Camara 2005).
Forestry Sub-Sector Policy (2010-2019)	Departmental policy that provided guidance to the DoF. Set minimum standards for program management and clear departmental positions to inform staff decisions. Established benchmarks against which to monitor and assess DoF effectiveness (GoTG 2010).
National Climate Change Policy of The Gambia (2016)	Laid out four strategic and integrated focal areas. The first being climate resilient food systems and landscapes, which involved prioritizing tree planting, participatory sustainable forest management, and agroforestry practice adoption (Urquhart 2016).



**Table 1** (continued)

<b>Government Organizations</b>	<b>Description</b>
Ministry of Environment, Climate Change, and Natural Resources (MECCNAR)	Responsible for sustainably managing and protecting natural resources for current and future generations. Oversees the development and implementation of policies and programs related to the environment, climate change, and natural resources. Under the MECCNAR are the DoF, NEA, and Department of Parks and Wildlife Management (DPWM) (GoTG 2019).
Department of Forestry (DoF)	Under MECCNAR, the DoF's goal is to maintain 30% of land under forest cover and manage 75% of forest cover for environmental and socioeconomic development. Mandated with enforcing the Forest Act and Regulations. Tasked with promoting the establishment of forest plantations and use of agroforestry practices. Implements participatory forest management approaches for natural forests, forest plantations, and agroforestry establishments (GoTG 2011).
National Environment Agency (NEA)	Under MECCNAR, NEA is mandated with ensuring environmentally sustainable economic and social development. Tasked with overseeing compliance and providing technical consultation. Regulates environmental impact assessments and establishes environmental quality and monitoring standards (GoTG 2019).
Forest Service	Under the DoF, the Forest Service provides assistance to private forest owners and local forest committees on the implementation of management plans. Mandated to carry out research and establish training centers (Kohler and Schmithüsen 2004).

### **1.5 Summary of Literature Review and Forest Management Approaches, Policies, Agencies**

In 2011, the World Future Council awarded both The Gambia and the United States second place in the category of the best forest policies in the world (WFC 2011). To better understand how The Gambia found itself as a prominent example on the international forestry scene, I reviewed the scientific and gray literature and examined forest management approaches used in The Gambia today. The literature review found that the body of scientific literature on the history of forestry in The Gambia is sparse, fragmented, and often tangential. However, five distinct periods in the history of forestry in The Gambia emerged: pre-colonial, colonial, post-independence, Gambian/German collaboration, and post-Gambian/German collaboration.

Historically shifting attitudes, approaches, and policies around forestry created the current forest management structure in The Gambia.

Today, three commonly utilized and heavily promoted management regimes exist: forest parks, JFPM, and community forests. Two management regimes, JFPM and community forests, focus on participatory forest management approaches, while the least participatory forest management regime, forest parks, is an arrangement that the GoTG is actively seeking to discontinue.

In 2011, The Gambia likely found itself catapulted to the international forestry scene, not only because of its highly structured community forestry policy but also because of its history of experimenting with different forest policies to find the best way to sustainably manage forest resources in the Gambian context. While it is encouraging that The Gambia's forest policies rank as some of the best in the world, there are significant challenges related to actual implementation. These include funding for multi-level training courses, providing adequate logistical support to DoF field staff, eradicating corruption, and controlling the illegal forest product trade (Thoma and Camara 2005). The following research examines the current state of collaborative forest management in The Gambia and seeks to understand better the factors and conditions within forest parks and community forests that enhance the sustainability of forests in The Gambia.

## **1.6 Research Significance and Overview**

Over one billion people rely on vital resources from forests; however, forests are disappearing at alarming rates (World Bank 2020c). In developing countries, forests are an important source of

income and generate essential environmental services that help to sustain communities. Due in part to The Gambia's size and population density, The Gambia's forests have experienced encroachment and degradation for years. For many communities in The Gambia, forests are critical for survival, and even more so now. With increasing pressures from climate change, deforestation, and desertification, The Gambia will likely face more severe food shortages, increased emigration, and stability and security issues in the future (World Bank 2019). Given these looming crises, it is imperative to study and identify effective strategies for building resiliency and reducing vulnerabilities in communities throughout the country, and forests play a critical role. According to the World Bank, access to forest resources is known to lift one in eleven people out of extreme poverty (World Bank 2020c).

Community forestry is a forest governance approach that enables community members to manage local forests to produce a range of benefits. Since the 1990s, the Gambian government has promoted community forestry as a way of empowering communities and conserving forests by involving local communities in the governance and management of forest resources. As mentioned, the Gambian government's community forest policies have been recognized as one of the world's best (WFC 2011).

The Gambia's forests are under multiple forest governance regimes and management arrangements that fall on a spectrum from forests entirely owned and managed by the GoTG to forests wholly owned and managed by the community. In between, there are forests with varying degrees of collaborative management. Despite policy implementation over several decades and policy recognition on the international stage, there is a lack of knowledge and understanding of

outcomes resulting from the different forest management regimes, which is evident by the lack of peer-reviewed literature on forestry in The Gambia and the dearth of relevant information in forestry reports coming out of The Gambia (FAO 2011).

I am interested in examining the management success and sustainability of forests under three prominent forest arrangements utilized in The Gambia: (1) forest parks under state management, (2) forest parks under joint community/state management, and (3) community forests under community management. Moving forward, the forest regimes will be referred to as state-administered forest parks (SAFP), jointly managed forest parks (JMFP), and community forests (CF).

The purpose of this study is to gain a better understanding of the current collaborative forestry approaches used in The Gambia and identify factors and conditions within forest parks and community forests that enhance the sustainability of forests. We surveyed individuals, including forest committee members, DoF representatives, and forest caretakers, from community forests and forest parks, both state-managed and jointly managed. I hypothesized that community forests and forest parks with different ownership types and management arrangements would result in different outcomes, such as varying levels of timber and non-timber products and ecosystem services. This research aims to identify strategies for improving collaborative forestry programs to enhance sustainable forest management in The Gambia.

## 1.7 Research Objectives and Questions

Responding to the limited information on the topic of forest management in The Gambia, our research aims to, at least in part, fill gaps in knowledge by addressing the following four objectives:

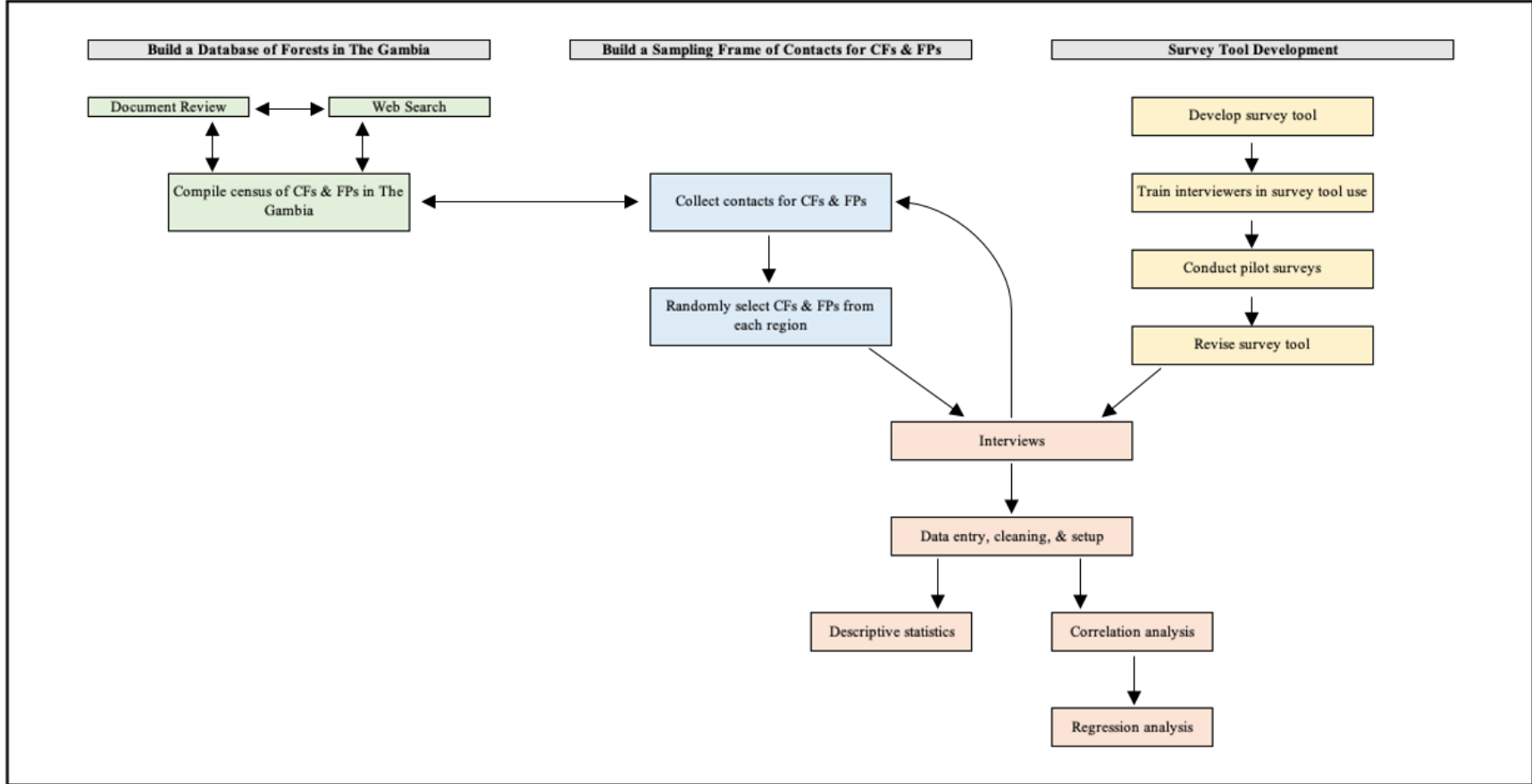
1. Characterize the nature and extent of a sample of at least 60 Gambian forests, including community forests, jointly managed forest parks, and state-administered forest parks;
2. Compare and contrast forest attributes under the different forest regimes;
3. Identify perceived benefits, challenges, and future opportunities as defined by forest committee members, Department of Forestry employees, and forest users; and,
4. Identify factors and conditions within community forests and forest parks that enhance the sustainability of forests.

In line with these objectives, I asked the following four research questions:

1. What are the characteristics of community forests and forest parks in The Gambia?
2. How do forest attributes of community forests and forest parks in The Gambia compare?
3. What are the perceived benefits, challenges, and future opportunities of community forests and forest parks as defined by forest committee members, Department of Forestry employees, and forest users?
4. What factors and conditions enhance the sustainability of forests? Do the different forest regimes (community forests (CF), jointly managed forest parks (JMFP), and state-administered forest parks (SAFP)) improve the sustainable management of forest resources?

## **2.1 Methods**

A mixed method approach was used in this study. Figure 1 illustrates the research process followed. In summary, I began by compiling a database of community forests and forest parks in The Gambia. Primary and secondary source information obtained from contacts in The Gambia and web-based searches were used to complete the database. As new information became available, I added to, refined, and verified the information in the database. Simultaneously, I built a database of contacts for community forests and forest parks in The Gambia. The contacts consisted of individuals closely associated with community forests and forest parks. Most often, these individuals were forest committee members or Department of Forestry (DoF) staff. The survey tool was developed. Then, interviewers were trained, and pilot surveys were conducted. Community forests and forest parks from within each region were randomly selected, and telephone interviews were conducted with the contact person for the selected forest. Telephone interviews were used, because the Covid-19 pandemic (Covid) precluded face-to-face interviews.



**Figure 1: Flow chart of mixed method approach**

### **2.1.1 Study Area**

The study was conducted across The Gambia, depicted below in Figure 2. The Gambia is organized into five administrative regions, West Coast Region (WCR), North Bank Region (NBR), Lower River Region (LRR), Central River Region (CRR), and Upper River Region (URR), and the city of Banjul. Forests from all five regions of The Gambia were included in the study. However, the study did not include forests located in Banjul, because there are no forest parks or community forests within the city limits. The Gambia occupies the tropical zone between the Sahel in the north and the Guinean forests in the south, with the Gambia River as the country's dominant feature (Baldeh 2018b). Vegetation zones vary within and across regions. However, generally, vegetation zones reflect rainfall patterns (Baldeh 2018b). The Gambia's extended dry season spans from October to June, with a short rainy season that extends from July through September (Baldeh 2018b). Average annual rainfall ranges from 800 to 1,200 millimeters, with the greatest rainfall in the southwest portion of the country (Baldeh 2018b; Yaffa 2013). There are savanna ecosystems north of the river with scattered shrubs and short trees. South of the river, the savanna ecosystem turns into denser forests with larger tree species and greater canopy closure found in the southwest (Baldeh 2018b).





Figure 2: Map of administrative regions and city of Banjul (Academia Maps 2012)

### **2.1.2 Building a Database of Forests in The Gambia**

When beginning the study, the number of forest parks in The Gambia was known. Some forest parks have merged, been renamed, re-demarcated, and degazetted since the establishment of The Gambia's forest parks in the 1950s. Yet, the current number of forest parks in The Gambia could be determined. For research purposes, a database of the forest parks was created that included the most current information available as well as relevant historical data. However, the situation was dramatically different for community forests. When beginning the study, the number of community forests was unknown. A database of community forests was constructed through web-based searches and document review. Initially, a list of community forests and accompanying information were compiled from web-based searches. FAO documents and research literature were scoured for names of community forests. Subsequently, the database was expanded, refined, and verified with documentation from in-country contacts. Documentation included official notices and orders from the National Publishing and Printing Corporation of The Gambia, DoF documentation, and images of forest lists maintained on forestry station walls. The changing status of forests, redistricting in some regions, similar village names, and variations in the spelling made it challenging to identify duplicates in the database. However, duplicates were removed from the database with careful comparisons of the region, district, village, forest area, reference codes, and location description. As new information became available, the database was updated. Ultimately, the database contained 485 community forests and 65 forest parks, of which 40 were jointly managed forest parks and 25 were state-administered forest parks.

### **2.1.3 Building a Sampling Frame**

No centralized list of names and telephone numbers existed for forest committee members, DoF employees, or general forest associates. Even if such a list existed, telephone numbers would have likely been outdated or incomplete. It is common for individuals in The Gambia to have multiple telephone numbers which are used with varying frequency. To build a sampling frame of forest contacts, an exponential non-discriminative snowball approach was used (Etikan et al. 2016). A snowball approach involves the researcher obtaining one or a few contacts and then working with those contacts to obtain additional contacts (Goodman 1961). The process repeats itself until the desired number of contacts are acquired (Goodman 1961). Typically, a snowball approach is used to develop and select the sample. However, in this study, the snowball approach was used to build a sampling frame of forest contacts from which a sample was selected. Given time constraints, it would not have been possible to contact and interview every forest associate obtained, nor would it have been appropriate. Sometimes multiple contacts were provided for one forest, or many contacts were provided for one region. Interviewing all contacts obtained would have resulted in overcoverage of a forest or a region.

With the exponential non-discriminative snowball approach, initial contacts were obtained, and then these initial contacts provided new contacts. Each new contact provided additional contacts until nearly 200 contacts were obtained with adequate regional coverage. Initial contacts were DoF employees. These contacts provided names and telephone numbers for Regional Forest Officers (RFO) and Administrative Circle (AC) Heads. The RFOs and AC Heads provided contact information for Implementation Area (IA) Head or staff, forest scouts, forest committee members, and others closely connected with forests within their jurisdiction. A proportionate

sample of forest parks and community forests for each region was selected from the resulting sampling frame.

#### **2.1.4 Sampling Technique**

Data were collected between May and August 2021 using a structured telephone survey. Eighty-two telephone surveys were completed. Five forests were surveyed twice, resulting in a total sample size of 77 different forests. The survey gathered information on general forest attributes, ownership, organizational structure, governance, the forest ecosystem, forest management, forest uses, finances, and benefits and challenges.

Surveys were conducted by the researcher, with a translator when necessary, and by two local interviewers who possess extensive experience working with rural Gambian communities on a range of natural resource issues. The interviewers and translator were selected specifically for this project based on background, proven ability to communicate in multiple local languages, and availability. Most of the surveys were conducted in English, Wolof, or Mandinka, although Pulaar and Serer were used when necessary.

The study used a stratified proportional sampling technique to select forests. For each region, the number of forest parks and community forests selected was proportional to the total number of forest parks and community forests in the region. Selecting a stratified proportional sample was challenging in that the database of community forests evolved as new information became available, so I attempted to maintain proportionality with a moving target. Additionally, the sampling frame was limiting in that the contacts provided were the only contacts available for

potential interviews. If a significant gap in the sampling frame became evident, attempts were made to close the gap by requesting contacts for forests in a specific area, within a specific forest regime, or in a particular forest when necessary. If a forest park or community forest had multiple contacts listed in the database, one contact was selected at random. If a contact could not be reached for an interview, the alternate contact in the database would be telephoned. If a contact was unavailable for an interview, the surveyors scheduled a callback time or collected contact information for an alternate forest associate. In the event that an interview could not be conducted for the selected forest, a new forest of the same forest regime would be selected at random from the region. The total number of surveys completed per day varied due to surveyor availability, holidays, funerals, and natural disasters. Table 2 provides a breakdown of the number of surveys completed by role of the forest contact.

**Table 2: Number of surveys completed by role**

<b>Role of Survey Participant at Forest</b>	<b>Surveys</b>
CF committee member	51
DoF employee	19
Forest caretaker	3
Forest user	0
JMFP committee member	8
Other role	1

### **2.1.5 Survey Methods**

The survey was developed at North Carolina State University (NCSU) with faculty consultation and refined based on feedback from experts in The Gambia. The questionnaire was based on similar tools used for community forest work in Mexico and the United States (Cubbage et al. 2012; Cubbage et al. 2015; Frey et al. 2020). Questions were adapted to fit the Gambian context and streamlined for use over the telephone. A combination of closed-ended and open-ended questions was used to elicit information about the community forest or forest park of interest.

Answer choices were informed by The Gambia's 2010 National Forest Assessment, forestry references developed by Peace Corps The Gambia, forestry experts in The Gambia, and personal knowledge of The Gambia (FAO 2011, Walberg et al. 2013). Further refinement of the questions was based on feedback from country experts, including Department of Forestry personnel, Peace Corps The Gambia staff, and extension agents. Given that the same questionnaire was to be used for community forests (CF), jointly managed forest parks (JMFP), and state-administered forest parks (SAFP), mechanisms for skipping inapplicable questions were built into the questionnaire. The researcher trained the two in-country interviewers on the tool, which included a detailed discussion of each question and answer choice and practice interviews. Additionally, the translator was provided training, so questions and answer choices would be familiar to the translator when conducting interviews. Following this process, pilot tests were conducted by the researcher in the United States and the two interviewers in The Gambia. The researcher tested the survey with Gambian Americans, and the in-country interviewers tested the survey with trusted forestry colleagues. The questionnaire was further revised before implementation.

Interviews were conducted over a three-month period between May and August 2021. The researcher provided batches of ten forests, sometimes with multiple contacts per forest, for the two interviewers to complete. The interviewers split the forests based on their availability and the preferred local language of the community. Local language strengths differed between the two interviewers, with one having fluency in Pulaar and the other in Serer. However, both interviewers were fluent in English, Mandinka, and Wolof, the languages most commonly used for the interviews. As interviews were completed, the interviewers briefed the researcher, and the researcher collected survey papers. The researcher collected additional contact information if

obtained, and alternate contact information was provided to the interviewers if necessary. Interviewees were individuals of at least 18 years of age and associated with the forest of interest, typically a forest committee member or Department of Forestry staff member. The interviews began with traditional greetings and then a review of the informed consent agreement, where emphasis was placed on the voluntary nature of participation. Out of those contacted, a total of seven individuals could not be reached over the telephone after multiple attempts. Out of those reached, 11 individuals opted out of participation. Most frequently, contacts opted out because the contact thought another person was more equipped to answer questions about the forest. In these cases, the contact provided the contact information for the person recommended for interview. However, typically, participants were eager to share information about the community forest or forest park of interest. Questions regarding forest attributes, ownership, organizational structure, governance, the forest ecosystem, forest management, forest uses, finances, and benefits and challenges were asked. Participants provided responses based on their knowledge, memory, and perceptions of the forest. The interviews ranged in length from 30 minutes to an hour and 15 minutes. Interview length varied with translation needs, number of questions for the researcher/interviewer, level of familiarity with the forest, and level of detail provided in their responses. Some interviewees offered lengthy explanations for both open-ended and closed-ended questions. Most often, the interviews took around 50 minutes to complete. The interview protocol was approved by NCSU Institutional Review Board (IRB). The full survey tool is attached as Appendix A.

### **2.1.6 Data Entry, Cleaning, and Setup**

Data from 82 hardcopy surveys were entered by hand into Microsoft Excel for all 48 questions of the survey. Data were systematically cleaned. Data cleaning notes are provided in Table 3. The survey comprised closed-ended and open-ended questions. An inductive coding approach was used for the open-ended questions that collected qualitative data. Interviewee responses were grouped based on common themes. The groupings revealed the categories that the responses would be coded into. For example, the forest representatives were asked, “In your view, what are the three most damaging human activities to this forest?” The categories revealed in the data were: fire, illegal logging, cutting down trees, livestock, firewood collection, poor management, charcoal production, land use change, chainsaws, and other. The nominal variable “damaging human activities” was then coded with “1” for “fire”, “2” for “illegal logging”, “3” for “cutting down trees”, “4” for “livestock”, “5” for “firewood collection”, “6” for “poor management”, “7” for “charcoal production”, “8” for “other”, “9” for “land use change”, and “10” for “chainsaws”.



**Table 3: Data cleaning notes by survey question**

<b>Survey Question</b>	<b>Explanation</b>
Q3_District	Original survey list was missing Niamina Dankunku in CRR South, a district of historical significance, but small. Adjusted to include Niamina Dankunku.
Q8_Year	If provided a range, used the most recent year from that range.
Q9_Area	If provided a range, used the smallest number from that range.
Q15_Org_Structure	Based on Gambian law/policy, more should be in place but frequently not all were said to be in place.
Q16_DM_Auth	For CFs, most said forest committee members, which is true to a point. There are avenues where the CF status can be revoked by the GoTG.
Q18_Contri_D2D	Likely others contribute but answer choices were not circled.
Q20_Com_Input	Added answer choices that had been skipped over but were evident in responses to other questions such as Q37 and Q38.
Q21a_Org_Collab	Added skipped over groups if evident from responses to other questions such as Q18.
Q24_Area_Increase, Q25_Area_Decrease	Interview questions actually used explained density increase/decrease rather than an increase/decrease in area. Rarely is there an increase in area. More frequently there is a decrease in area. This was a key question and adaptation and was used as the dependent variable in most regression analyses.
Q28_Mgmt_Goals	If more than 3 goals listed, used top three goals.
Q32_#_Trained	If provided a range, used the smallest number from that range.
Q35_Tim_Har, Q36_Tim_Sales, Q37_Tim_Har_Work	Sometimes timber was harvested illegally, so responses have timber harvested but no sale or harvesting work information.
Q46_Challenges	Added answer choices that had been skipped over but were evident in responses to other questions such as Q45.

With the closed-ended questions, a variety of data types were collected. The quantitative variables were composed of both discrete and continuous data. The qualitative variables included dichotomous, nominal, and ordinal data. The cleaned data for the qualitative variables were coded. For example, the forest representatives were asked, “Is this forest adjoining other

protected area(s)?" The dichotomous variable "adjoining protected area(s)" was labeled "1" for "yes", "2" for "no", and "-99" for unknown. The nominal variables were labeled as described in the "damaging human activities" example above, with a different number assigned to each of the answer choices in the closed-ended question. Ordinal variables, such as the variable "density of forest cover," were coded in sequence. The question asked, "In your view, has the density of forest cover in this forest increased, decreased, or remained the same over the last five years?" For responses of "increased", a code of "3" was assigned. For "stable", a code of "2" was assigned. For "decreased", a code of "1" was assigned. However, it is important to note that the "density of forest cover" variable had to be recoded for statistical analysis purposes, and further "dummy" variables had to be created for categorical variables to run specific regression analyses in the SPSS Statistics software. The full codebook is attached as Appendix B. Lastly, for the five forests surveyed twice, the data were combined into one entry for each of the five forests. With the five duplicates removed, the original sample of 82 surveys ( $N=82$ ) was reduced to 77 forests ( $N=77$ ).

### **2.1.7 Data Analysis**

A mixed-methods approach was used to characterize Gambian forests, compare forest attributes across forest regimes, identify benefits, challenges, and future opportunities, and uncover factors and conditions that enhance the sustainability of forests in The Gambia. Grounded analysis, descriptive statistics, correlation analysis, and regression analysis were used to analyze the data collected in the 77 interviews.

Grounded analysis was used to analyze data elicited from the open-ended questions in the survey. Themes emerged from the open-ended question responses, and responses were grouped into categories based on the identified themes. Descriptive statistics were then used to summarize the data, characterize the nature and extent of Gambian forests, compare forest attributes across forest regimes, and identify benefits, challenges, and future opportunities. Additionally, variables were consolidated where appropriate.

Pearson's product-moment correlations were run in Microsoft Excel, and a correlation matrix was developed that incorporated all variables in the dataset. The correlation coefficients in the correlation matrix provided the strength of association and the direction, whether positive or negative, between two variables in the dataset. Given the large size of the dataset, correlation analysis was useful for identifying patterns in the dataset. The correlation matrix was used in conjunction with regression analysis. Patterns identified in the correlation matrices informed the selection of independent variables in the regression analyses performed.

Regression analysis for one dependent variable, forest cover density, was conducted. Forest cover density served as a proxy for forest sustainability and was used to identify factors and conditions within community forests and forest parks that enhance the sustainability of forests. Regression analysis was selected, because I wanted to identify the factors, independent variables, that predict or explain an outcome, in this case, forest cover density. Essentially, I wanted to know which factors are likely to lead to an increase in forest cover density, our proxy for forest sustainability. Regression analysis is designed to predict the value of one dependent variable given one or more independent variables. Furthermore, regression analysis allows the researcher

to determine the contribution of any single independent variable to the outcome. In this study, each potential independent variable in the dataset was examined. Based on the results from the correlation analysis, the literature, and knowledge of the Gambian context, several groups of independent variables that had strong probable explanatory power were identified. For the dependent variable, forest cover density, I ran several groups of independent variables that were most likely to be useful in explaining forest sustainability. After an initial round of regression analyses, nine independent variables were selected from the original groups to form a refined model. These independent variables were shown to have some explanatory power in the initial regression analyses and were thought to reasonably explain changes in the dependent variable based on the Gambian context. I began with ordinal logistic regression because the dependent variable, forest cover density, was an ordinal variable. However, binomial logistic regression was used in the end because the data did not meet the assumptions for an ordinal logistic regression. When an ordinal logistic regression is not appropriate, a multinomial logistic regression or binomial logistic regression can be used instead, accepting that the ordinal nature of the dependent variable will be lost. A binomial logistic regression was selected because the dependent variable, forest cover density, was dichotomous, having only two categories. Both ordinal logistic regression and binomial logistic regression were conducted in the SPSS Statistics software.

### **3.1 Results**

The survey team conducted 82 interviews for 77 different forests. Five forests were surveyed twice. However, before data analysis, duplicates were combined, resulting in one survey entry per forest. Of the 77 forests surveyed, forest committee members provided information on 58

forests, Department of Forestry (DoF) employees provided information on 17 forests, and forest caretakers provided information on two forests. Based on the forest database developed in this study, there are 25 state-administered forest parks (SAFP), 40 jointly managed forest parks (JMFP), and 485 community forests (CF) across The Gambia. Six state-administered forest parks, 17 jointly managed forest parks, and 54 community forests were surveyed. In total, about 14% of all forests were surveyed – 11% of CFs, 43% of JMFPs, and 24% of SAFPs. Table 4 provides a breakdown of the number of forests surveyed per forest regime and region.

**Table 4: Number of forests surveyed per forest regime and region**

Region	Forest Regime			Total
	CFs	JMFPs	SAFPs	
CRR	19	7	0	26
LRR	8	1	2	11
NBR	10	2	1	13
URR	9	4	3	16
WCR	8	3	0	11
<b>Total Sampled</b>	<b>54</b>	<b>17</b>	<b>6</b>	<b>77</b>
<b>Population</b>	<b>485</b>	<b>40</b>	<b>25</b>	<b>550</b>

Results are presented by study objective. Section 3.1.1 presents summary statistics for all forests surveyed to characterize the nature and extent of the Gambian forests surveyed. Section 3.1.2 presents descriptive statistics for community forests, jointly managed forest parks, and state-administered forest parks to facilitate a comparison between the three forest regimes. Section 3.1.3 presents perceived benefits, challenges, and future opportunities revealed in the interviews. Section 3.1.4 presents results from correlation and regression analyses that reveal relationships between variables and inform the identification of factors and conditions that enhance the sustainability of forests in The Gambia.

### **3.1.1 Characterization of Gambian Forests Surveyed**

#### *3.1.1.1 Forest Attributes*

The median year CFs and forest parks (FP) were established in The Gambia was 1996, with the first forest established in 1952 and the most recent established in 2019. The mean area for the CFs and FPs surveyed was 343 hectares, with the smallest forest being 2 hectares and the largest being 8,000 hectares. The standard deviation is 1,005 hectares, indicating the data for area are quite variable. Of the 77 forests surveyed, 76 were comprised of a single parcel of land. One forest encompassed multiple, unconnected parcels of land. Protected areas (PA), such as national parks, nature reserves, community forests, and forest parks, adjoined 19 of the surveyed forests, while 53 of the surveyed forests had no adjoining protected areas. For five of the forests surveyed, the forest representative did not know if a protected area adjoined the forest. Of those forests with an adjacent protected area, sixteen forests had one protected area bordering the forest, and three forests had two protected areas bordering the forest.

Most forests surveyed, 55 forests, were comprised of predominantly naturally grown trees. Planted trees made up more than half of the trees in seven forests surveyed, and fourteen forests were said to have an even mix of naturally grown and planted trees. The composition of one forest was unknown. Deciduous trees, trees that shed leaves annually, were said to be most abundant in 45 of the forests surveyed, while evergreen trees, trees that retain green leaves throughout the year, were the most abundant in 11 forests. Nineteen forests had an even mix of deciduous and evergreen trees. The forest representatives for two forests could not say which type of trees were most abundant in the forests.

Respondents said the density of forest cover increased for 44 of the forests surveyed over the last five years. The density of forest cover was said to have decreased for 29 of the forests surveyed, and the density of forest cover was said to be stable for four of the forests surveyed. Of those forests with an increase in forest cover density, tree planting was a contributing factor for 34 forests, and natural regeneration was a contributing factor for 29 forests. Additionally, one forest representative said preventing bushfires was a contributing factor that led to the increase in the density of forest cover. For those forests with an increase in forest cover density, 24 forests were said to have one factor contributing to the increase, while 20 forests were said to have two factors contributing to the increase.

Of those forests with a perceived decrease in forest cover density, degradation was a contributing factor for 22 forests, destructive bushfires were a contributing factor for 15 forests, and conversion to other land uses was a contributing factor for two forests. Three forest representatives provided other reasons for a decrease in forest cover density, including poor forest management and salt intrusion. For those forests with a perceived decrease in forest cover density, 19 forests were said to have one factor contributing to the increase, while ten forests were said to have two factors contributing to the increase. For those forests with a stable forest cover density, a balance between tree planting and degradation kept the forests from either having a net increase or decrease in forest cover density over the past five years.

#### *3.1.1.2 Ownership*

Of the 77 forests surveyed, the land for 23 forests was owned by the Government of The Gambia (GoTG), the land for 50 forests was owned by local governments, and the land for four forests

was under joint ownership by two or more village governments. This equates to 30% of the forest land owned by the GoTG, 65% owned by local governments, and 5% owned jointly by two or more village governments. None of the forests surveyed were privately owned.

### 3.1.1.3 Governance Structure

Under Gambian law, community forests and forest parks are required to have a number of governance components in place. Of those forests surveyed, 71 forests had a forest committee, 47 forests had a management plan, 39 forests had an annual workplan, 33 forests had a constitution, 29 forests had bylaws, and 28 forests had a local fund (e.g., bank account) and management agreement according to the forest representative interviewed. Three forests were said to have no governance components in place. On average, forests had between three and four governance components in place. Table 5 provides the number of forests with between zero and seven governance components in place for the forest.

**Table 5: Number of forests surveyed by the number of governance components in place**

No. of Governance Components	No. of Forests
0	3
1	7
2	21
3	13
4	7
5	11
6	7
7	8

Of the 77 forests surveyed, forest committee members were said to have the ultimate decision-making authority for 44 forests. Ultimate decision-making authority was held jointly between two or more parties for 19 of the forests surveyed. The GoTG was said to have ultimate decision-



making authority for 11 forests, and local governments were said to have ultimate decision-making authority for two forests. A local group was said to have ultimate decision-making authority for one forest, while no local individuals or NGOs held ultimate decision-making authority for any of the forests surveyed.

Of the 77 forests surveyed, forest committee members were said to have responsibility for overseeing day-to-day activities for 48 forests. Responsibility was held jointly between two or more parties for 20 of the forests surveyed. The GoTG was said to have responsibility for overseeing day-to-day activities for nine of the forests. Local governments, local groups/individuals, and non-governmental organizations (NGO) were not responsible for overseeing day-to-day activities at any of the 77 forests surveyed.

Forest committee members were said to collaborate on a day-to-day basis in 60 of the forests surveyed. In contrast, GoTG employees, such as Administrative Circle (AC) Heads, Implementation Area (IA) Heads and staff, and forest scouts, were said to collaborate on a day-to-day basis in 33 of the forests surveyed. Local individuals were said to be involved with 13 forests, and local groups were involved with five forests. Additionally, although not responsible for overseeing day-to-day activities, local governments were said to be involved with four forests on a day-to-day basis. On average, the forests surveyed had between one and two day-to-day collaborators. All forests had at least one day-to-day collaborator. Table 6 provides the number of forests with between one and four day-to-day collaborators.

**Table 6: Number of forests surveyed by number of day-to-day forest collaborators**

No. of Collaborators	No. of Forests
1	44
2	26
3	4
4	1
Unknown	2

Additionally, the forests surveyed had between two and three villages on average involved in forest management, with the maximum number of villages being 36. Table 7 provides the number of forests surveyed with their number of villages, ranging from zero to 36, involved in forest management.

**Table 7: Number of forests surveyed by number of involved villages**

No. of Involved Villages	No. of Forests
0	6
1	50
2	8
3	2
4	2
5	2
6	1
7	1
8	0
9	0
10	2
11	0
12	1
19	1
36	1

In addition to asking about the number of day-to-day collaborators and the number of villages involved in forest management, forest representatives were asked about the number and types of

groups working with the forest in general. The forest representatives were asked specifically about forest associations, kafos (i.e., Gambian term for affinity group based on any number of characteristics or interests), non-profit organizations, private companies (e.g., tour operators), village development committees (VDC), and youth groups. Thirty forests worked with village development committees. Nineteen forests worked with non-profit organizations. Fifteen forests worked with forest associations. Ten forests worked with kafos. Five forests worked with youth groups. Two forests worked with private companies. Twenty-four forests worked with other groups, including the beekeeper groups, U.S. Peace Corps, German Aid and Development, and other international organizations. Fourteen forests did not work with other groups. Table 8 provides the number of forests surveyed and the number of different types of groups, ranging from zero to four, working with the forest. Table 9 provides the number of forests surveyed and the number of groups, ranging from zero to four, working with the forest. On average, forests worked with between one and two groups.

**Table 8: Number of different types of groups working with the surveyed forests**

No. of Different Types of Groups	No. of Forests
0	15
1	28
2	21
3	9
4	1
Unknown	3

**Table 9: Number of groups working with the surveyed forests**

No. of Groups	No. of Forests
0	15
1	26
2	17
3	14
4	2
Unknown	3

To gauge community participation, forest representatives were asked to provide the ways in which community members can provide input or participate in forest activities. Community meetings were one way for community members to provide input at 68 of the forests surveyed. At 48 forests, community members participated by providing forest protection. For example, these community members helped protect the forests from bushfires, illegal harvesting, or unauthorized livestock grazing. Volunteer workdays were a way for community members to participate in forest activities at 47 forests. Harvesting non-timber forest products (NTFP) at 43 forests and timber products (TP) at 31 forests were ways for community members to participate in forest activities. On average, the forests surveyed had three to four ways for community members to provide input or participate in forest activities. Table 10 provides the number of forests with the number of ways community members can provide input or participate in forest activities. Of the forests surveyed, one forest was said to have no opportunities for community input or participation. In contrast, other forests had as many as five ways to provide input or participate in forest activities.

**Table 10: Number of forests surveyed by number of ways for community members to provide input or participate in forest activities**

No. of Ways to Participate	No. of Forests
0	1
1	16
2	17
3	12
4	5
5	25
Unknown	1

For the 77 forests surveyed, the most used method to resolve forest-related disputes was discussion. Discussion was used by 63 of the forests surveyed. Legal action was used by 31 forests. Payments in cash or in kind were used by 12 forests, formal agreements were used by six forests, and voting was used by one forest. Withdrawal from participation was used to resolve forest-related disputes for three forests. On average, forests used between one and two methods to resolve forest-related disputes. All forests utilized at least one method to resolve forest-related disputes. Table 11 provides the number of different methods used by the forests surveyed to resolve forest-related disputes.

**Table 11: Number of different methods used to resolve forest-related disputes per forest**

No. of Different Methods Used	No. of Forests
1	42
2	26
3	5
4	0
5	0
6	1
Unknown	3

On average, the forests surveyed had eight community members trained in topics related to forest management. However, the data have a large range with a minimum of zero trained community

members and a maximum of 70 trained community members. Variability within the data is also evident in that the standard deviation is ten, larger than the mean of eight. Of those forests with community members that have received training, six forests had community members trained in financial management, 53 forests had community members trained in forest operations, 12 forests had community members trained in organizational management, and five forests had community members trained in other skills such as beekeeping and ecotourism. Sixteen forests out of the 77 forests surveyed reported no prior training of community members on topics related to forest management. Table 12 provides the number of forests surveyed and the number of different types of training received.

**Table 12: Number of different types of training received per surveyed forest**

No. of Types of Training	No. of Forests
0	17
1	40
2	14
3	2
Unknown	4

#### *3.1.1.4 Forest Management & Uses*

Forest representatives were asked to list the three primary management goals of their forest.

Table 13 lists management goals and the number of forests that listed each management goal as one of their three primary management goals. The three most frequently selected management goals were forest restoration, biodiversity conservation, and timber production. Forest restoration was stated to be one of the three primary management goals in 53% of the forests surveyed.

Biodiversity conservation was stated to be one of the three primary management goals in 48% of the forests surveyed. Timber production was stated to be one of the three primary management goals in 45% of the forests surveyed.

**Table 13: Management goals of the forests surveyed**

<b>Management Goal</b>	<b>No. of Forests</b>
Agroforestry	16
Biodiversity conservation	37
Cultural or spiritual	4
Ecotourism	13
Education	31
Fishing	4
Forest restoration	41
Hunting	2
Livestock grazing	13
Non-timber forest products	21
Recreation	4
Restoration or protection fish/wildlife habitat	4
Timber production	35
Water resources/watershed protection	0
Other	3

Even though only 35 forests stated timber production as a primary management goal, forty-seven forests reported harvesting timber. Table 14 provides the number of forests that have harvested timber along with the frequency of timber harvests. No timber was harvested in 28 of the 77 forests surveyed, and two forest representatives did not know if timber was harvested or how frequently. The six forests under “Other” had harvest frequencies that varied based on community needs and whether planted or naturally grown trees were being harvested.

**Table 14: Frequency of timber harvests**

<b>Harvest Frequency</b>	<b>No. of Forests</b>
No timber harvested	28
Annually	10
Every 2 to 5 years	28
Every 6 to 10 years	2
Every 11 to 20 years	0
Every 20 years or more	1
Other	6
Unknown	2

Of the forests that harvested timber, harvesting work was primarily completed by local community work crews. Twenty-six forests used a local community work crew for harvesting timber, while 14 forests used a combination of work crews. Three forests used a GoTG crew. Two forests used a crew hired through a non-profit organization. One forest used a private contracting company, and three forests had timber harvested illegally. Of the forests that sold timber, forest leaders managed the timber sales for 31 forests. Seven forests used a combination of managers, four forests used a GoTG employee, and one forest used a local group to manage timber sales.

In summary, out of the 77 forests surveyed, 28 forests did not harvest timber, 47 forests harvested timber, and two forest representatives did not know if timber was harvested or how frequently. Yet only 43 forests sold timber, while thirty-two forests reported not selling timber. This discrepancy is due to timber being harvested illegally on occasion, and therefore, never sold. In other cases, timber was harvested and donated instead of being sold.



Non-timber forest products (NTFP) harvested in The Gambia include fiber, fodder, fruits, herbs and spices, honey and wax, nuts, palm oil, seeds, tea/beverages, thatching grass, and raw materials for dyes, handicraft construction, incense products, and medicine. Of those forests where NTFPs were harvested, there were, on average, between three and four different NTFPs harvested. Eight NTFPs was the highest number of different NTFPs harvested in a single forest. Eight forests were said to have no NTFPs harvested from the forest. Table 15 provides the number of forests surveyed and the number of different types of NTFPs harvested, ranging from zero to eight, in the forest.

**Table 15: Number of forests surveyed by number of different types of NTFPs harvested**

No. of Types of NTFPs Harvested	No. of Forests
0	8
1	9
2	8
3	15
4	12
5	8
6	7
7	6
8	2

NTFPs were aggregated into product use categories, and Table 16 provides the number of NTFPs harvested by product use category for all 77 forests surveyed. For example, across the 77 forests surveyed, there were 136 NTFPs harvested for food purposes.

**Table 16: Number of NTFPs harvested by product use**

<b>Product Use Category</b>	<b>No. of NTFPs Harvested</b>
Beauty	7
Construction	17
Farming	27
Food	136
Handicrafts	3
Medicine	50
Other	1

To better understand management practices used by the forests surveyed, forest representatives were asked about the last area survey and tree inventory as well as about the maintenance and monitoring activities carried out. Table 17 provides information about when the last area survey and tree inventory took place for the surveyed forests. For 34% of the forests surveyed, the forest area was measured and the tree inventory was taken between one year and five years ago. For 25% of the forests surveyed, the forest area was measured and the tree inventory was taken within the last year. Three of the 77 forests surveyed have never had the area measured nor tree inventory taken.

**Table 17: Most recent area survey and tree inventory**

<b>Timeframe</b>	<b>No. of Forests</b>
Never taken place	3
Within the last year	19
Between 1 year and 5 years ago	26
More than 5 years ago	6
More than 10 years ago	14
Unknown	9

The most commonly carried out maintenance activities were patrolling, tree planting, and prevention and control of wildfires. Of the 77 forests surveyed, 86% carried out patrolling

activities, 81% carried out tree planting activities, and 62% carried out wildfire prevention activities. Table 18 provides the number of forests that carry out each maintenance activity.

**Table 18: Maintenance activities carried out**

Maintenance Activities	No. of Forests
Non-commercial thinning	4
Patrolling	66
Prescribed burning	14
Prevention and control of diseases and pests	7
Prevention and control of wildfire	48
Tree nurseries	23
Tree planting	62

On average, the forests surveyed carried out between two and three maintenance activities in the forest. The greatest number of different types of activities carried out in a single forest was six maintenance activities. Two forests carried out no maintenance activities. Table 19 provides the number of forests surveyed by the number of different types of maintenance activities carried out in the forest.

**Table 19: Number of different types of maintenance activities performed in the forests**

No. of Different Types of Maintenance Activities	No. of Forests
0	2
1	5
2	20
3	30
4	14
5	4
6	2

The forests surveyed were monitored by assigned community members, Department of Forestry employees, general community members, and forest committee members. Assigned community members were used most often, with 88% of the forests surveyed using an assigned community

member to monitor the forest. No forests were said to be unmonitored, and paid guards were not used by the forests surveyed. The “other” category included community forest committee members and joint forest park management committee members. Table 20 provides the type of forest monitors used to patrol the forests surveyed.

**Table 20: Type of forest monitors used by the forests surveyed**

Type of Monitor	No. of Forests
Assigned community members	68
Department of Forestry employees	29
General community members	6
Paid guards	0
Other	2

Typically, between one and two different types of forest monitors were used to patrol the surveyed forest. One type of monitor was used in 70% of the forests surveyed, and two types of monitors were used in 26% of the forests surveyed. Table 21 provides the number of different types of forest monitors used by the forests surveyed.

**Table 21: Number of different types of forest monitors used by the forests surveyed**

No. of Different Types of Forest Monitors	No. of Forests
1	54
2	20
3	3

### *3.1.1.5 Finances*

Income was generated for the owning entity of 46 forests, the managing entity of 34 forests, and community members of 33 forests. Income was not generated for the owning entity of 24 forests, the managing entity of 15 forests, and community members of 15 forests. For seven forests, the forest representative said either they were unsure or income generation for the owning entity was unknown. For 28 forests, the forest representative said either they were unsure or income

generation for the managing entity was unknown. For 29 forests, the forest representative said either they were unsure or income generation for community members was unknown.

On average, total revenue was 34,934 dalasi, or approximately \$700, for 2020. Total expenses averaged 21,036 dalasi, or approximately \$420, for 2020. Total revenues ranged from zero dalasi to 600,000 dalasi, about \$12,000. Derived profit averaged 18,895 dalasi, or approximately \$378, for 2020. Total expenses ranged from zero dalasi to 250,000 dalasi, about \$5,000. The mode for both total revenue and total expenses was zero. There was great variability in the total revenue and total expense data, with standard deviations of 97,748 dalasi and 48,883 dalasi, respectively.

When asked about the impact of the Covid-19 pandemic (Covid) on forest revenue and expenses, most forest representatives said that the impact was either unknown or revenue and expenses remained stable despite Covid. Only 13 forests saw total revenue decline due to Covid, and two forests reported an increase in total revenue despite Covid. For total expenses, only two forests saw total expenses increase due to Covid, and seven forests saw total expenses decrease as a result of Covid.

Forest management operations were reported to be the largest expense for 40 forests over the last three years, whereas staff salaries and service contracts were reported to be the largest expense for six and two forests, respectively. Six forests reported “other” as the largest expense. This included community donations, food for workdays, and one-time expense, such as purchasing beehives or renovating the forest station. The remaining forests reported either not having expenses or the largest expense as unknown.

Forest profits were used for forest expansion, forest maintenance, school fees, social programs and celebrations, tree planting, village development, and “other” uses. Thirty-two forests reported using forest profits for village development. Twenty forests used forest profits for forest maintenance. Seventeen forests used profits for forest expansion and tree planting. Five forests used profits for social programs and celebrations, while one forest used forest profits to pay school fees. Ten forests reported other uses, including allocation to trainings, forest savings, the GoTG Forest Fund, and local emergencies (e.g., funerals, medical bills, feeding the hungry). Twenty-four forests reported no profit. Table 22 provides the number of different ways, ranging from zero to four, that forests used their profits.

**Table 22: Number of different ways in which surveyed forests used profits**

No. of Different Ways	No. of Forests
0	24
1	14
2	11
3	11
4	8
Unknown	9

Forest representatives were asked about the types of funding their forest either currently receives or had received in the past. It was reported that 26% of forests received grants from the GoTG, and 27% of forests received grants or donations from external non-profit organizations. However, 45% of the forests surveyed reported no current or past funding. Table 23 provides a list of funding sources and the number of forests receiving each type of funding.

**Table 23: Sources of funding**

<b>Funding Source</b>	<b>No. of Forests</b>
Donations from local community members	2
Fundraiser events	2
Grants/donations from external non-profit organizations	21
Grants from GoTG	20
Loans	1
Local govt funds	0
Member dues	2
Sale of forest products	8
Tourism	1
User fees	1
Other	3
No funding	35

On average, forests had no more than one different source of funding. The maximum number of different sources of funding was four. Table 24 provides the number of different sources of funding, between zero and four, received by the forests surveyed.

**Table 24: Number of forests with the number of different funding sources received**

<b>No. of Different Sources of Funding</b>	<b>No. of Forests</b>
0	35
1	29
2	10
3	1
4	2

Sixty-seven forests out of the 77 forests surveyed did not employ paid workers. The mean full-time equivalent (FTE) for all surveyed forests was 0.32 FTE. Table 25 shows employment by FTE category.

**Table 25: Employment (FTE) for the surveyed forests**

<b>FTE</b>	<b>No. of Forests</b>
0	67
0.5	0
1	1
1.5	1
2	4
2.5	0
3	1
3.5	0
4	2
4.5	0
5	1

### **3.1.2 Comparison of Community Forests, Jointly Managed Forest Parks, and State-Administered Forest Parks**

#### *3.1.2.1 Forest Attributes*

Descriptive statistics for the year of establishment by the forest regime are provided in Table 26. On average, community forests (CF) have been established more recently than jointly managed and state-administered forest parks. Of the forests surveyed, the first community forest was established in 1970. The data indicate that the first jointly managed forest park (JMFP) and state-administered forest park (SAFP) were established in the same year, 1952. Although forest parks were established in the 1950s, the concept of joint forest park management was not introduced until 2003.



**Table 26: Descriptive statistics for year of forest establishment by forest regime**

Statistic	Forest Regime		
	CFs	JMFPs	SAFPs
Mean	2003	1975	1968
Median	2001	1969	1968
Mode	1996	1966	1952
Standard Deviation	13	16	17
Minimum	1970	1952	1952
Maximum	2019	2005	1984
Range	49	53	32

Descriptive statistics for area are shown in Table 27 by forest regime. On average, community forests had the smallest area, and jointly managed forest parks had the largest. However, the high standard deviations for the community forest and jointly managed forest park data indicate substantial variability given the mean.

**Table 27: Descriptive statistics for area in hectares (ha)**

Statistic	Forest Regime		
	CFs	JMFPs	SAFPs
Mean	88	1084	320
Median	48	701	317
Mode	5	#N/A	#N/A
Standard Deviation	141	1913	182
Minimum	2	2	94
Maximum	900	8000	527
Range	898	7998	433

The majority of the forests in all three forest regimes were comprised of a single parcel. Only one jointly managed forest park had a forest that was comprised of multiple, unconnected parcels. Similarly, most forests in all three forest regimes had no adjoining protected area. Thirty-nine community forests, nine jointly managed forest parks, and five state-administered forest parks had no protected area adjoining the forest. Whereas there were 11 community

forests, seven jointly managed forest parks, and one state-administered forest park reported to have protected areas bordering the forest. The status of five forests was unknown. The number of forests with either zero, one, or two adjoining protected areas is provided in Table 28 by forest regime.

**Table 28: Number of forests surveyed by forest regime and adjoining PA**

No. of Adjoining PAs	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	39	9	5
1	9	6	1
2	2	1	0

All six of the state-administered forest parks surveyed were comprised of predominantly naturally grown trees. Of the community forests surveyed, 63% comprised predominantly naturally grown trees, 13% comprised mostly of planted trees, and 22% comprised an even mix of naturally grown and planted trees. The status of one community forest was unknown. Of the jointly managed forest parks surveyed, 88% comprised mostly of naturally grown trees, and 12% comprised an even mix of naturally grown and planted trees.

For all three forest regimes, most forests were comprised of mostly deciduous trees. Of the community forests surveyed, 63% were comprised of mostly deciduous trees, 11% were comprised of mostly evergreen trees, and 24% were comprised of an even mix between deciduous and evergreen trees. The status of one community forest was unknown. Of the jointly managed forest parks surveyed, 41% comprised mostly deciduous trees, 24% comprised mostly evergreen trees, and 35% comprised an even mix between deciduous and evergreen trees. Of the state-administered forest parks surveyed, 67% comprised mostly deciduous trees, and 17% comprised mostly evergreen trees. The status of one state-administered forest park was unknown.

The majority of the community forests surveyed, 74%, reported a perceived increase in the density of forest cover over the last five years. Only 24% of community forests reported a decrease in forest cover density, and one community forest reported that the density of forest cover had remained stable. Whereas only 23% of jointly managed forest parks and no state-administered forest parks reported an increase in forest cover density over the last five years. Rather, 71% of jointly managed forest parks and 67% of state-administered forest parks saw a decrease in forest cover density. The status of one jointly managed forest park and two state-administered forest parks were not known.

Of those forests that remained stable or saw an increase in density of forest cover, 61% of community forests and 80% of jointly managed forest parks reported natural regeneration as a contributing factor. Tree planting was reported as a contributing factor in 71% of community forests and 100% of jointly managed forest parks reporting a stable or increasing forest cover density. Additionally, one community forest reported bushfire prevention as a contributing factor. The number of forests attributing an increase in forest cover density to more than one factor is shown in Table 29.

**Table 29: Number of forests surveyed by forest regime and number of different factors contributing to forest density increase**

No. of Different Factors	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	15	12	6
1	23	1	0
2	16	4	0
3	0	0	0

Of those forests that remained stable or saw a perceived decrease in forest cover density, 85% of community forests, 75% of jointly managed forest parks, and 50% of state-administered forest

parks reported degradation, such as unsustainable harvesting, agriculture, fire, fuelwood gathering, and livestock grazing, as a contributing factor. Destructive bushfires were reported as a contributing factor for 31% of community forests, 83% of jointly managed forest parks, and 25% of state-administered forest parks. Additionally, 50% of SAFPs reported conversion to other land uses as a contributing factor. One community forest and two JMFPs reported other contributing factors, such as poor forest management and salt intrusion. The number of forests attributing a decrease in forest cover density to more than one factor is shown in Table 30.

**Table 30: Number of forests surveyed by forest regime and number of different factors contributing to forest density decrease**

No. of Different Factors	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	40	5	2
1	12	5	3
2	2	7	1
3	0	0	0

### 3.1.2.2 Ownership

In The Gambia, land ownership is inherently tied to the forest regime. As mentioned, 54 community forests, 17 jointly managed forest parks, and six state-administered forest parks were surveyed. Consistent with this, the survey results showed that the land for 50 community forests was owned by a single village government, while the land for three community forests was owned jointly by two or more village governments. One community forest was reported to be owned by the GoTG. The latter is unusual, and further investigation would need to be conducted to explain the anomaly. However, as expected, all land for the 23 forest parks, both JMFPs and SAFPs, was reported to be owned by the GoTG.

### 3.1.2.3 Governance Structure

Of the forests surveyed, 52% of community forests, 59% of jointly managed forest parks, and 17% of state-administered forest parks had annual workplans in place for the forest. Bylaws were in place for 33% of CFs, 47% of JMFPs, and 50% of SAFPs. A constitution was in place for 41% of CFs, 53% of JMFPs, and 33% of SAFPs. A forest committee was in place for 96% of CFs, 100% of JMFPs, and 33% of SAFPs. Management plans were in place for 59% of community forests, 76% of JMFPs, and 33% of SAFPs. A local fund was in place for 41% of CFs and 35% of JMFPs. Management agreements were in place for 30% of community forests and 71% of JMFPs. None of the state-administered forest parks surveyed had local funds or management agreements. Of the SAFPs surveyed, 50% did not have any governance components in place. However, a third of SAFPs and many CFs and JMFPs had more than one governance component in place. Table 31 provides a breakdown of the number of forests per forest regime with the number of governance components in place for the forest. On average, CFs had between three and four organizational components in place, JMFPs had between four and five organizational components in place, and SAFPs had between one and two organizational components in place.

**Table 31: Number of forests surveyed by forest regime and number of governance components**

No. of Governance Components	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	3
1	3	3	1
2	19	2	0
3	10	3	0
4	5	1	1
5	8	2	1
6	5	2	0
7	4	4	0

Of the community forests surveyed, ultimate decision-making authority was held by forest committee members in 81% of the forests, the GoTG in 2% of forests, local governments in 4% of forests, local groups in 2% of forests, and a combination of parties in 11% of forests. Joint authority was typically held between the forest committee and the local government or the forest committee and the GoTG. Of the JMFPs surveyed, ultimate decision-making authority was held by the GoTG in 24% of forests and a combination of parties in 76% of forests. Joint authority was typically held by the forest committee and the GoTG. For the SAFPs, the GoTG held ultimate decision-making authority for 100% of the forests surveyed.

Of the community forests surveyed, responsibility for overseeing day-to-day activities was delegated to forest committee members in 81% of the forests, the GoTG in 2% of the forests, and a combination of parties in 17% of forests. Joint responsibility was typically held by forest committee members and local groups or individuals. Of the JMFPs surveyed, responsibility for overseeing day-to-day activities was delegated to forest committee members in 23% of the forests, the GoTG in 12% of the forests, and a combination of parties in 65% of forests. Joint responsibility was typically held by the forest committee and the GoTG. For the SAFPs, the GoTG held responsibility for overseeing day-to-day activities for 100% of the forests surveyed.

Forest committee members collaborated in day-to-day forest activities with 85% of CFs and 82% of JMFPs. GoTG employees collaborated in day-to-day forest activities with 31% of CFs, 71% of JMFPs, and 67% of SAFPs. Local government officials (e.g., village alkaloo/head, district chief) collaborated in day-to-day forest activities with 4% of CFs and 33% of SAFPs. Local groups collaborated in day-to-day forest activities with 7% of CFs and 6% of JMFPs. Local

individuals collaborated in day-to-day forest activities with 19% of CFs, 12% of JMFPs, and 17% of SAFPs. Forest committee members and local groups were not reported to have collaborated in day-to-day activities with any of the SAFPs surveyed. Local government officials were not reported to have collaborated in day-to-day activities with any of the JMFPs surveyed. However, most forests surveyed had more than one collaborator involved in day-to-day activities. A breakdown of the number of forests per forest regime with the number of day-to-day collaborators is provided in Table 32. All three forest regimes had an average of between one and two day-to-day collaborators.

**Table 32: Number of day-to-day forest collaborators of forest surveyed by forest regime**

No. of Collaborators	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	0
1	34	5	5
2	17	8	1
3	3	1	0
4	0	1	0
5	0	0	0
Unknown	0	2	0

There were substantial differences between the number of villages involved in forest management at CFs, JMFPs, and SAFPs. On average, one to two villages were involved in forest management at CFs versus seven to eight villages for JMFPs. While no villages were involved in forest management at the SAFPs surveyed. Table 33 provides the number of forests per forest regime by the total number of villages involved in forest management at that forest.

**Table 33: Number of forests surveyed per forest regime with the number of villages involved in forest management**

No. of Involved Villages	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	6
1	46	4	0
2	5	3	0
3	1	1	0
4	1	1	0
5	1	1	0
6	0	1	0
7	0	1	0
8	0	0	0
9	0	0	0
10	0	2	0
11	0	0	0
12	0	1	0
19	0	1	0
36	0	1	0

In addition to asking about the number of day-to-day collaborators and the number of villages involved in forest management, I looked at the number and types of groups working with the forests. As mentioned earlier, forest representatives were asked specifically about forest associations, kafos, non-profit organizations, private companies, village development committees, and youth groups. The data showed that community forests and jointly managed forest parks worked with one to two groups on average, while SAFPs worked with no more than one group on average.

Of the forests surveyed, 19% of CFs and 29% of JMFPs worked with a forest association. Kafos worked with 15% of CFs and 12% of JMFPs surveyed. Non-profit organizations worked with 26% of CFs, 24% of JMFPs, and 17% of SAFPs. Private companies worked with 2% of CFs and



6% of JMFPs. Village development committees worked with 48% of CFs and 24% of JMFPs. Youth groups worked with 6% of CFs and 12% of JMFPs. Other groups, such as beekeeper groups, U.S. Peace Corps, German Aid and Development, and other international organizations, worked with 33% of CFs, 24% of JMFPs, and 33% of SAFPs surveyed.

None of the SAFPs surveyed worked with forest associations, kafos, private companies, village development committees, or youth groups. Table 34 provides the number of forests surveyed per forest regime and the number of different types of groups, ranging from zero to four, working with the forest. Table 35 provides the number of forests surveyed per forest regime and the number of groups, ranging from zero to four, working with the forest.

**Table 34: Number of different types of groups working with the surveyed forests by forest regime**

No. of Different Types of Groups	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	10	2	3
1	19	8	1
2	16	5	0
3	8	0	1
4	1	0	0
Unknown	0	2	1

**Table 35: Number of groups working with the surveyed forests by forest regime**

No. of Groups	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	10	2	3
1	17	8	1
2	14	3	0
3	11	2	1
4	2	0	0
Unknown	0	2	1

Community participation across forest regimes was evaluated. Community meetings were a way to provide input to 98% of CFs and 88% of JMFPs. Protecting the forest was a way to participate in 56% of CFs, 88% of JMFPs, and 50% of SAFPs. Harvesting NTFPs was a way to participate in 61% of CFs and 59% of JMFPs. Harvesting timber was a way to participate in 41% of CFs, 47% of JMFPs, and 17% of SAFPs.

Volunteer workdays were a way to participate in 63% of CFs and 76% of JMFPs. Of the SAFPs surveyed, none provided community members with the opportunity to participate in community meetings, volunteer workdays, or through harvesting of NTFPs. The data showed that community members have, on average, three to four ways in which community members can provide input or participate in forest activities at CFs and JMFPs. In contrast, SAFPs provide, on average, no more than one way for community members to provide input or participate in forest activities. Table 36 provides the number of forests per forest regime with the number of ways community members can provide input or participate in forest activities.

**Table 36: Number of forests surveyed per forest regime by number of ways community members can provide input/participate in forest activities**

No. of Ways to Participate	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	1
1	9	3	4
2	13	4	0
3	11	1	0
4	3	2	0
5	18	7	0
Unknown	0	0	1

Regardless of the forest regime, all forests surveyed utilized, on average, between one and two methods to resolve forest-related disputes. Of the forests surveyed, 89% of CFs, 71% of JMFPs,

and 50% of SAFPs used discussion to resolve forest-related disputes. Legal action was used by 28% of CFs, 65% of JMFPs, and 83% of SAFPs. Formal agreements were used by 6% of CFs and 18% of JMFPs. None of the SAFPs surveyed used formal agreements. Payment in cash or in kind were used by 22% of CFs, but JMFPs and SAFPs did not use the method to resolve disputes. Similarly, 2% of CFs used voting, and 6% of CFs used withdrawal of participation to resolve disputes, but neither method was used by the JMFPs and SAFPs surveyed. Lastly, informal agreements were not used by any of the forests surveyed to resolve disputes. A breakdown of the number of methods used by CFs, JMFPs, and SAFPs is shown in Table 37.

**Table 37: Number of different methods used to resolve forest-related disputes by forest**

No. of Different Types of Methods Used	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	0
1	30	8	4
2	16	8	2
3	5	0	0
4	0	0	0
5	0	0	0
6	1	0	0
Unknown	2	1	0

Descriptive statistics for the number of trained community members by forest regime are shown in Table 38 by forest regime.

**Table 38: Descriptive statistics for trained community members**

Statistic	Forest Regime		
	CFs	JMFPs	SAFPs
Mean	6	15	0
Median	3	10	0
Mode	0	10	0
Standard Deviation	7	15	0
Minimum	0	0	0
Maximum	30	70	0
Range	30	70	0

Types of training received ranged from training in financial management, forest operations, organizational management, and other types of training such as beekeeping and ecotourism training. Forest operations training was received by 70% of CFs, 82% of JMFPs, and 17% of SAFPs. Even though 17% of SAFPs received forest operations training, no other training was received. Financial management training was received by 7% of CFs and 12% of JMFPs. Organizational management training was received by 13% of CFs and 29% of JMFPs. Other types of training were received by 4% of CFs and 18% of JMFPs. No training had been received by community members for 20% of the CFs, 6% of the JMFPs, and 83% of the SAFPs had never received training related to forest management. Table 39 provides the number of forests per forest regime and the number of different types of training received by community members associated with the forest.

**Table 39: Number of different types of training received per surveyed forest**

No. of Different Types of Training	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	11	1	5
1	32	7	1
2	6	8	0
3	2	0	0
Unknown	3	1	0

### 3.1.2.4 Forest Management & Uses

The top three goals for community forests were forest restoration, timber production, and education based on the data. The three most selected goals for JMFPs were forest restoration, biodiversity conservation, and timber production. The three most chosen goals for SAFPs were biodiversity conservation, followed by a tie between education, forest restoration, and NTFPs.

Table 40 lists management goals and the number of forests that listed each particular management goal as one of their three primary management goals.

**Table 40: Number of forests surveyed with the following management goals**

Management Goals	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
Agroforestry	13	3	0
Biodiversity conservation	22	10	5
Cultural or spiritual	4	0	0
Ecotourism	7	6	0
Education	23	5	3
Fishing	4	0	0
Forest restoration	28	10	3
Hunting	2	0	0
Livestock grazing	10	3	0
Non-Timber Forest Products	14	4	3
Recreation	0	3	1
Restoration or protection fish/wildlife habitat	2	1	1
Timber production	27	8	0
Water resources/watershed protection	0	0	0
Other	0	1	2

Although only 27 CFs, eight JMFPs, and zero SAFPs stated timber production as a primary management goal, 35 CFs, ten JMFPs, and two SAFPs reported harvesting timber. Table 41 provides the number of forests per forest regime that have harvested timber along with the frequency of timber harvests. No timber was harvested in 19 CFs, six JMFPs, and three SAFPs.

The “Other” category included harvest frequencies that varied based on community needs and whether planted or naturally grown trees were being harvested. Across all three forest regimes, most forests either did not harvest timber or harvested timber every two to five years.

**Table 41: Frequency of timber harvests**

Harvest Frequency	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
No timber harvested	19	6	3
Annually	8	2	0
Every 2 to 5 years	20	6	2
Every 6 to 10 years	2	0	0
Every 11 to 20 years	0	0	0
Every 20 years or more	1	0	0
Other	4	2	0
Unknown	0	1	1

Of the forests surveyed, 35% of CFs, 35% of JMFPs, and 50% of SAFPs had not harvested timber, while 41% of CFs, 41% of JMFPs, and 50% of SAFPs had not sold timber. As mentioned, the discrepancy is due to illegally harvested timber not being sold and timber harvested for donation instead of sale. Of those CFs that harvested timber, 3% used a crew hired through a non-profit organization, 63% used a local community crew, 3% used a private contracting company, 26% used a combination of work crews, and 6% had timber harvested illegally. Of those JMFPs that harvested timber, 9% used a crew hired through a non-profit organization, 36% used a local community crew, 18% used a GoTG crew, 27% used a combination of work crews, and 9% had timber harvested illegally. Of those SAFPs that harvested timber, 33% used a GoTG crew, and 67% used a combination of work crews.

Timber sales were managed by forest leaders, GoTG employees, local groups, or a combination of managers. For the CFs, 28 forests used forest leaders, one used a local group, and two used a

combination of managers to manage timber sales. For the JMFPs, three forests used forest leaders, two used GoTG employees, and four used a combination of managers to manage timber sales. For the SAFPs, two forests used GoTG employees, and one used a combination of managers to manage timber sales.

In addition to timber harvests, non-timber forest products were harvested from the forests surveyed. Across all three forest regimes, between three and four different NTFPs were harvested on average from the forests. The three most commonly harvested NTFPs from community forests were fruits, honey and wax, and herbs and spices. The three most commonly harvested NTFPs from JMFPs were fruits, herbs and spices, and teas/beverages. The three most commonly harvested NTFPs from SAFPs were fruits, herbs and spices, with a tie for third between nuts, seeds, and teas/beverages. Table 42 provides the number of forests surveyed by the forest regime and the number of different types of NTFPs harvested, ranging from zero to eight, in the forest.

**Table 42: Number of forests surveyed by number of different types of NTFPs harvested**

No. of Different Types of NTFPs	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	7	1	0
1	6	2	1
2	2	5	1
3	12	3	0
4	10	0	2
5	5	2	1
6	4	3	0
7	5	0	1
8	2	0	0

NTFPs were aggregated into product use categories, and Table 43 provides the number of NTFPs harvested by product use category for each of the three forest regimes. For example, there were 94 NTFPs harvested for food purposes from the community forests surveyed.

**Table 43: Number of NTFPs harvested per forest regime by product use**

Product Use Category	No. of NTFPs Harvested per Forest Regime		
	CFs	JMFPs	SAFPs
Beauty	6	1	0
Construction	12	3	2
Farming	16	8	3
Food	94	28	14
Handicrafts	2	0	1
Medicine	41	6	3
Other	0	1	0
None	6	1	0

To understand and compare management practices between the three forest regimes, forest representatives were asked about area surveys, tree inventories, maintenance activities, and forest monitoring. Table 44 provides information about when the last area survey and tree inventory took place for the surveyed forests. For 41% of CFs, the forest area was measured and the tree inventory was taken between one year and five years ago. For 35% of JMFPs, the forest area was measured and the tree inventory was taken within the last year. For 67% of SAFPs, the forest area was measured and the tree inventory was taken more than ten years ago.



**Table 44: Most recent area measurement and tree inventory**

Timeframe	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
Never taken place	1	2	0
Within the last year	13	6	0
Between 1 year and 5 years ago	22	3	1
More than 5 years ago	4	2	0
More than 10 years ago	8	2	4
Unknown	6	2	1

The most commonly carried out maintenance activities were the same for all three forest regimes. These activities were patrolling, tree planting, and prevention and control of wildfires. Table 45 provides the number of forests by forest regime that carry out each maintenance activity.

**Table 45: Maintenance activities carried out**

Maintenance Activities	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
Non-commercial thinning	1	3	0
Patrolling	47	15	4
Prescribed burning	8	4	2
Prevention and control of diseases and pests	4	3	0
Prevention and control of wildfire	33	12	3
Tree nurseries	17	6	0
Tree planting	47	13	2
Other	0	0	0
No maintenance activities	0	0	2

On average, community forests carried out two to three different types of maintenance activities. While JMFPs carried out three to four activities and SAFPs carried out one to two activities on average. Table 46 provides the number of forests surveyed per forest regime by the number of different types of maintenance activities carried out in the forest.

**Table 46: Number of different types of maintenance activities performed in the forests by forest regime**

No. of Different Types of Maintenance Activities	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	2
1	5	0	0
2	13	5	2
3	23	6	1
4	9	4	1
5	3	1	0
6	1	1	0

As mentioned, patrolling was the maintenance activity performed by the most forests across all three forest regimes. In the interviews, forest representatives were asked who monitors (i.e., patrols) the forest. Forest monitors patrol the forest to help control unauthorized activity within the forest and alert forest managers if issues are identified. Nearly all the CFs and JMFPs were monitored by assigned community members, 96% and 94%, respectively. Department of Forestry rangers also monitored 22% of CFs, 65% of JMFPs, and 100% of SAFPs. Table 47 provides the type of monitors used by the forests under the three forest regimes.

**Table 47: Type of forest monitors used by the forests surveyed**

Monitor	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
Assigned community members	52	16	0
Department of Forestry rangers	12	11	6
General community members	5	1	0
Paid guards	0	0	0
Other	0	2	0
Not monitored	0	0	0

Typically, CFs and JMFPs used either one or two different types of forest monitors, while all SAFPs surveyed used only one type of forest monitor. Table 48 gives the number of different types of forest monitors used by the forests surveyed in each forest regime.

**Table 48: Number of different types of forest monitors used by forests in each forest regime**

No. of Different Types of Forest Monitors	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	0	0	0
1	41	7	6
2	11	9	0
3	2	1	0
4	0	0	0

#### 3.1.2.5 Finances

Income was generated for the owning entity in 65% of CFs surveyed, 53% of JMFPs surveyed, and 33% of SAFPs surveyed. Income was generated for the managing entity in 46% of CFs surveyed, 41% of JMFPs surveyed, and 33% of SAFPs surveyed. Income was generated for community members in 50% of CFs surveyed, 29% of JMFPs surveyed, and 17% of SAFPs surveyed.

On average, the total revenue, including grants and donations, generated by CFs was 40,115 dalasi, approximately \$802, for 2020. JMFPs generated 32,364 dalasi, approximately \$647, in total revenue on average, and SAFPs generated 9,500 dalasi, approximately \$190, on average. On average, total expenses accrued by CFs were 21,885 dalasi, approximately \$438, for 2020. JMFPs accrued 20,500 dalasi, approximately \$410, in total revenue on average, and SAFPs accrued 13,333 dalasi, approximately \$267, on average. Across all three forest regimes, the modes for total revenue and total expenses were zero. There was great variability in the total

revenue and total expenses data, with standard deviations greater than the mean for all three forest regimes.

For all three forest regimes, forest management operations were reported to be the largest forest expense over the last three years, with 59% of CFs, 35% of JMFPs, and 33% of SAFPs reporting forest management operations as the largest expense. Other expenses, such as donations, food for workdays, and one-time expenses, were reported as the largest expense for 9% of CFs, while staff salaries were reported as the largest expense for 24% of JMFPs and 17% of SAFPs. 28% of CFs, 29% of JMFPs, and 50% of SAFPs had no expenses, or the largest expense was unknown.

Forest profits were used for forest expansion by 26% of CFs, 12% of JMFPs, and 17% of SAFPs. Forest profits went to forest maintenance in 31% of CFs and 18% of JMFPs, to school fees in 2% of CFs, to social programs and celebrations in 7% of CFs and 6% of JMFPs, to tree planting in 26% of CFs, 12% of JMFPs, and 17% of SAFPs, and to village development in 54% of CFs and 18% of JMFPs. Jointly managed forest parks did not use profits on school fees, and none of the surveyed SAFPs reported using forest profits for forest maintenance, school fees, social programs and celebrations, or village development. Other uses for forest profits, including funding trainings, forest savings, GoTG Forest Fund, and local emergencies, were reported by 6% of CFs, 29% of JMFPs, and 33% of SAFPs. No profit was reported by 28% of CFs, 29% of JMFPs, and 67% of SAFPs. Table 49 provides the number of different ways, ranging from zero to four, that forests used their profits.

**Table 49: Number of different ways in which forests in different forest regimes used profits**

No. of Different Ways	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	15	5	4
1	12	1	1
2	9	2	0
3	8	2	1
4	7	1	0
Unknown	3	6	0

In terms of funding sources, grants/donations from external non-profit organizations were received predominantly by CFs, 28%, while JMFPs and SAFPs were most often funded by grants from the GoTG, 35% and 50% respectively. A list of funding sources and the number of forests receiving each type of funding are shown in Table 50.

**Table 50: Sources of funding**

Funding Source	Forest Regimes		
	No. of CFs	No. of JMFPs	No. of SAFPs
Donations from local community members	1	1	0
Fundraiser events	2	0	0
Grants/donations from external non-profit organizations	15	5	1
Grants from GoTG	11	6	3
Loans	1	0	0
Local govt funds	0	0	0
Member dues	2	0	0
Sale of forest products	5	3	0
Tourism	0	1	0
User fees	1	0	0
Other	2	1	0
No funding	25	7	3

There was little variation between forest regimes in terms of the number of different sources of funding. All three forest regimes average between zero to one different sources of funding. Table

51 provides the number of different sources of funding, between zero and four, received by forests in each forest regime.

**Table 51: Number of forests surveyed by number of different sources of funding**

No. of Different Sources of Funding	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	23	6	3
1	21	6	2
2	4	5	1
3	1	0	0
4	2	0	0
Unknown	3	0	0

Limited employment was provided by the forests surveyed. No paid workers were employed by 98% of CFs, 65% of JMFPs, and 50% of SAFPs. The mean FTEs for community forests was 0.09, for JMFPs was 0.68, and for SAFPs was 1.42. The mode for all three forest regimes was zero. Employment by FTE category is shown in Table 52 for forests in each of the three forest regimes.

**Table 52: Employment (FTE) for the forests in each forest regime**

FTE	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
0	53	11	3
0.5	0	0	0
1	0	1	0
1.5	0	0	1
2	0	4	0
2.5	0	0	0
3	0	0	1
3.5	0	0	0
4	0	1	1
4.5	0	0	0
5	1	0	0

### 3.1.3 Perceived Benefits, Challenges, and Future Opportunities

#### 3.1.3.1 Benefits

Forest representatives were asked to name the three most valuable forest products or services of the forest. Responses were grouped into categories based on common themes. The resulting categories borne out of the data were timber, firewood, bee products/services, fruits, trees, palm products, fence posts, NTFPs, fishing, charcoal, and livestock grazing. The data were further grouped into ecosystem services. Out of 162 possible responses, products and services under the ecosystem service of provisioning were identified 93 times as the most valuable in community forests. Out of 51 possible responses, products and services under the ecosystem service of provisioning were identified 26 times as the most valuable in jointly managed forest parks. Out of 18 possible responses, products and services under the ecosystem service of provisioning were identified 12 times as the most valuable in state-administered forest parks. Out of the responses received, provisioning services were identified as most valuable 94% of the time in CFs, 93% of the time in JMFPs, and 100% of the time in SAFPs. Table 53 shows the number of instances a cultural, provisioning, regulating, or supporting service was identified as the most valuable service in CFs, JMFPs, and SAFPs.

**Table 53: Forest products/services perceived as most valuable grouped by ecosystem service**

Ecosystem Services	No. of Products/Services per Forest Regime		
	CFs	JMFPs	SAFPs
Cultural services	0	0	0
Provisioning services	93	26	12
Regulating services	5	1	0
Supporting services	0	0	0
None	1	1	0

### 3.1.3.2 Challenges

Human activities and issues of natural origin were reported to cause damage to the forests surveyed. From their perspective, forest representatives were asked to name the three most damaging human activities and the three most damaging issues of natural origin impacting the forest. Responses were grouped into categories based on common themes. For damaging human activities, the resulting categories that were borne out of the data were fire, illegal logging, cutting down trees, livestock, firewood collection, poor management, charcoal production, land use change, chainsaws, and an “other” category for the remaining three responses that did not logically group with the other responses. The “other” responses were cashew nut theft, Senegalese smugglers, and hunters. The data were further aggregated with illegal logging, cutting down trees, charcoal production, and chainsaws combined into a new category called “harvesting trees.” Once all responses had been grouped by themes, harvesting trees, fire, and livestock were identified most frequently by CFs and JMFPs, whereas harvesting trees, fire, and poor management were identified most frequently by SAFPs as damaging human activities to the forests. Table 54 provides the number of instances a damaging human activity was identified as one of the top three most damaging in CFs, JMFPs, and SAFPs.

**Table 54: Number of instances a damaging human activity was identified per forest regime**

Damaging Human Activity	No. of Instances per Forest Regime		
	CFs	JMFPs	SAFPs
Harvesting trees	48	16	4
Fire	36	13	4
Livestock	11	5	1
Firewood collection	7	1	2
Poor management	6	1	3
Land use change	1	0	2
Other	3	0	0



Similarly, the responses for damaging issues of natural origin were grouped into categories based on common themes. The resulting categories that were borne out of the data were heavy winds/storms, drought, pests and diseases, climate change, erosion, saltwater intrusion, monkeys, temperature, soil conditions, lightning, flooding, and bushfire. The data were further aggregated with lightning grouped with heavy wind/storms, monkeys grouped with pests and diseases, temperature grouped with climate change, and erosion grouped with soil conditions. Heavy wind/storms, drought, and pests and diseases were identified most frequently by CFs. Climate change, pests and diseases, and soil conditions were most frequently identified by JMFPs and SAFPs. Table 55 provides the number of times a damaging issue of natural origin was identified as one of the top three most damaging in CFs, JMFPs, and SAFPs.

**Table 55: Number of instances a damaging natural issue was identified per forest regime**

Damaging Issues of Natural Origin	No. of Instances per Forest Regime		
	CFs	JMFPs	SAFPs
Heavy wind/storms	32	3	2
Pests and diseases	15	6	3
Drought	19	3	0
Climate change	6	7	3
Soil conditions	5	5	3
Saltwater intrusion	7	2	0
Flooding	1	1	1
Bushfire	2	0	0
None	2	1	1

Additionally, forest representatives were asked to report the primary issues, constraints, or challenges encountered when undertaking forest management activities. On average, CFs and JMFPs reported between two and three different types of issues, constraints, or challenges while SAFPs reported between three and four. The primary issues, constraints, and challenges are listed in Table 56 along with the number of forests per forest regime identifying the issue,

constraint, or challenge for their forest. Four community forests reported no issues, constraints, or challenges.

**Table 56: Number of forests surveyed with the following as primary issues, constraints, or challenges**

Primary issues, constraints, or challenges	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFPs
Conflict among stakeholders	5	3	1
Lack of financial resources	40	15	5
Lack of political support	1	2	2
Lack of necessary equipment	39	10	4
Legal limitations	4	0	0
Limited access to technical expertise	33	7	3
Problems with forest land tenure	3	0	2
Maintenance costs	24	8	1
Multiple layers or levels of govt	0	0	0
Other	7	2	1
No issues, constraints, or challenges	4	0	0

Table 57 provides the number of forests per forest regime reporting between zero and seven different issues, constraints, or challenges. Four different issues, constraints, or challenges were most often reported by community forests. Jointly managed forest parks most often reported between three and four different issues, constraints, or challenges. State-administered forest parks most often reported three issues, constraints, or challenges. However, overall, the six SAFPs were quite evenly spread between one and six issues, constraints, or challenges.

**Table 57: Number of forests surveyed by number of different types of issues, constraints, or challenges**

No. of Different Issues, Constraints, or Challenges	Forest Regime		
	No. of CFs	No. of JMFPs	No. of SAFP
0	4	0	0
1	9	4	1
2	8	2	1
3	7	5	2
4	22	5	0
5	3	1	1
6	0	0	1
7	1	0	0

### *3.1.3.3 Opportunities*

Forest representatives were asked to provide up to three ways in which their forest could be improved. Responses were grouped into categories based on common themes. The resulting categories that came from the data are listed in Table 58 along with the number of instances an improvement method was identified by a forest in the three forest regimes.

**Table 58: Number of instances an improvement method was identified per forest regime**

Ways to Improve	No. of Instances per Forest Regime		
	CFs	JMFPs	SAFPs
Tree planting	39	6	2
Fire prevention	30	8	2
Forest protection	21	2	0
Funding/material resources	7	5	1
Transport access	10	3	0
Training/education	3	6	3
Reducing the cutting of trees	7	1	0
Increasing community engagement	4	4	4
Reducing illegal activities	4	1	3
Improving forest management	4	0	3
Water access	4	2	0
Increasing agroforestry activities	4	1	0
Tree nurseries/seedling protection	3	1	0
Increasing economic benefits	2	1	0
Improving organizational management	2	1	0
Ecotourism facilities	1	2	0
Forest expansion	1	1	0

Tree planting, fire protection, and forest protection were identified most frequently by CFs as ways to improve the forest. Fire protection, tree planting, and training/education were identified most frequently by JMFPs as ways to improve the forest. Increasing community engagement was identified most frequently by SAFPs as a way to improve the forest with training/education, reducing illegal activities, and improving forest management tied for second.

### **3.1.4 Factors and Conditions Enhancing the Sustainability of Forests**

#### *3.1.4.1 Correlation Analysis*

Correlation analysis was conducted to visualize the data as a whole and identify patterns in the dataset. A Pearson's product-moment correlation was run in Microsoft Excel between all 50

variables in the dataset. Data for all 77 surveyed forests were included in the analysis. The correlation matrix produced is shown as Table 59 below. The darker shading indicates a stronger association between variables, while the lighter shading indicates a weaker association.



The correlation matrix revealed 11 strong positive associations between variables. First, there was a strong positive association between district and region in which the forest was located,  $r = .971$ , which is to be expected, because district and region are inherently tied together. There was a strong positive correlation between the number of different types of groups working with the forest and the number of total groups working with the forest,  $r = .921$ . There was a large positive correlation between the total number of maintenance activities carried out in the forest and the total number of governance components in place for the forest,  $r = .614$ . There was a large positive correlation between the number of community members trained in topics related to forest management and the number of villages involved in forest management,  $r = .742$ . There was a large positive correlation between the frequency of timber harvests and the type of work crew that does the harvesting,  $r = .606$ . There was a strong positive correlation between the density of forest cover and the number of factors leading to an increase in forest cover density,  $r = .813$ . There was a strong positive correlation between the forest generating income for the owning entity and the forest generating income for the managing entity,  $r = .906$ . There was a strong positive correlation between total revenue and total expenses,  $r = .959$ . There was a strong positive correlation between the total revenue and derived profit,  $r = .972$ . There was a strong positive correlation between the Covid impacts on total revenue and Covid impacts on total expenses,  $r = .815$ . There was a strong positive correlation between the total expenses and derived profit,  $r = .866$ .

The correlation matrix revealed five large negative associations between variables and two moderate associations of special interest. There was a large negative correlation between year of establishment and type of forest regime,  $r = -.696$ . There was a large negative correlation

between the number of different types of groups working with the forest and the impact of Covid on total forest expenses,  $r = -.683$ . There was a strong negative correlation between the density of forest cover and the number of factors leading to a decrease in forest cover density,  $r = -.897$ . There was a large negative correlation between the number of factors leading to an increase in forest cover density and the number of factors leading to a decrease in forest cover density,  $r = -.697$ . There was a large negative correlation between the forest generating income for the owning entity and how the forest profits are used,  $r = -.647$ . There was a moderate negative correlation between the forest generating income for the managing entity and how the forest profits are used,  $r = -.578$ . There was a moderate negative correlation between the forest generating income for the community members and how the forest profits are used,  $r = -.574$ .

The correlation matrix was used in conjunction with regression analysis. Patterns identified in the correlation matrix informed the selection of independent variables in the regression analyses performed.

#### *3.1.4.2 Regression Analysis*

Regression analysis was conducted for the dependent variable, the perceived density of forest cover, which served as an overall representation of forest sustainability in this study. In order to construct the dependent variable, we used the adjusted written question and asked in the interviews if the forest density increased, decreased, or remained stable over the last five years. Furthermore, since there were only a few “stable” responses, I combined “stable” and “increased” into one group, thus yielding a binary variable of (1) stable or increased or (0) decreased. Based on the correlation analysis, I selected a group of independent variables that



were most likely to be useful in explaining this density dependent variable as a proxy for forest sustainability. Then, ordinal logistic regression and binomial logistic regression were run in the SPSS Statistics software. The nine independent variables were: (1) region, (2) forest regime, (3) number of governance components in place, (4) number of villages involved in forest management, (5) number of groups working with the forest, (6) number of different types of forest monitors, (7) number of different maintenance activities carried out in the forest, (8) timber harvest frequency, and (9) number of different types of funding sources.

Four assumptions tests were run before conducting the ordinal logistic regression to ensure the data collected in the 77 interviews could be analyzed using ordinal logistic regression. However, the data failed the assumption of proportional odds using a full likelihood ratio test and a separate binomial logistic regressions test (Laerd Statistics 2015). Given that the data violated the assumption of proportional odds, a binomial logistic regression was used instead.

Binomial logistic regression was carried out to ascertain the effects of each of the nine independent variables on the density of forest cover. However, before running the binomial logistic regression, seven assumptions were checked (Laerd Statistics 2017). First, I confirmed that the dependent variable, density of forest cover, was measured on a dichotomous scale. The dependent variable was coded as “0” for decreasing and “1” for stable or increasing. The first assumption was met. Second, I confirmed that all the independent variables were either continuous, ordinal, or categorical variables. There were six continuous variables and three categorical variables. The second assumption was met. Third, the independence of observations

was verified, and the nominal independent variables were determined to be mutually exclusive. The third assumption was met.

Fourth, a minimum of 15 cases per independent variable was confirmed. Some answer choices for the categorical independent variables had very low counts. However, overall, for each categorical independent variable, there is a count of at least 15. The number of cases per independent continuous variable was adequate. The fourth assumption was met. Fifth, the relationship between the continuous independent variables and the logit transformation of the dependent variable was confirmed to be linear. The Box-Tidwell procedure was used to assess the linearity of the continuous variables in relation to the logit of the dependent variable. The fifth assumption was met.

Sixth, multicollinearity was evaluated for the continuous independent variables using the Tolerance/Variance Inflation Factor (VIF) values outputted in SPSS's collinearity diagnostic report. All tolerance values were greater than 0.1 (the lowest is 0.413), and VIF values were much less than 10, with the greatest being 2.421. Therefore, collinearity was determined not to be a problem, and the sixth assumption was met. Lastly, the seventh assumption was tested, which required that there be no significant outliers. There was one standardized residual with a value of 2.846 standard deviations and another with a value of -4.757, both of which were kept in the analysis. Given that all seven assumption tests were met, binomial logistic regression was determined to be appropriate for this dataset.

The general model was that of: stand density (stable and increasing or decreasing) = f(independent variables). The logistic regression model was statistically significant  $\chi^2(17) = 41.914, p = 0.001$ . The model explained 61.8% (Nagelkerke  $R^2$ ) of the variance in forest cover density and correctly classified 85.7% of cases. Sensitivity was 93.3%, specificity was 72.0%, positive predictive value was 85.7%, and negative predictive value was 85.7%. Thus, 93.3% of forests that had an increase in forest cover density were also predicted by the model to have an increase in forest cover density. Additionally, 72.0% of forests that had a decrease in forest cover density were correctly predicted by the model to have a decrease in forest cover density. These measures were calculated based on a cut-off point of 0.5, meaning forests with a predicted probability of increased forest cover density greater than or equal to 0.5 were classified as having increased forest cover density. Whereas forests with predicted probabilities lower than 0.5 were classified as not having increased forest cover density.

Of the nine independent variables, four variables added significantly to the model. As shown in Table 60, these variables were type of forest regime ( $p = 0.009$ ), number of villages involved in forest management ( $p = 0.027$ ), number of different types of forest monitors ( $p = 0.001$ ), and number of different types of funding sources ( $p = 0.040$ ). The remaining variables, including region, did not add significantly to the model. However, there were some differences among regions, with LRR appearing to be the best at increasing forest density according to forest representatives. For the independent variables, Table 60 provides the odds ratios and beta values. The odds ratios and beta values provide measures of relative importance for each independent variable. Odds ratios magnified differences, while the beta values provided a more modest range in outcomes.

**Table 60: Binomial logistic regression estimating the likelihood of an increase in forest cover density**

Independent Variable	<i>B</i>	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Region – CRR	-1.422	1.429	0.990	1	0.320	0.241	0.015	3.970
Region - LRR	2.221	1.869	1.412	1	0.235	9.218	0.236	359.304
Region - NBR	-0.708	1.819	0.151	1	0.697	0.493	0.014	17.406
Region - URR	-0.563	1.576	0.128	1	0.721	0.570	0.026	12.495
Type of forest regime <sup>1</sup>	4.680	1.796	6.787	1	0.009	107.785	3.187	3644.786
Type of forest regime <sup>2</sup>	3.214	1.264	6.462	1	0.011	24.875	2.087	296.427
Type of forest regime <sup>3</sup>	1.466	1.939	0.572	1	0.449	4.333	0.097	193.688
Number of governance components	0.216	0.293	0.546	1	0.460	1.242	0.699	2.205
Number of villages involved in forest management	0.245	0.111	4.890	1	0.027	1.278	1.028	1.588
Number of groups working with the forest	0.482	0.481	1.006	1	0.316	1.620	0.631	4.157
Number of different types of forest monitors	-3.577	1.082	10.928	1	0.001	0.028	0.003	0.233
Number of different maintenance activities	0.086	0.525	0.027	1	0.870	1.089	0.389	3.051
Timber Harvest - No harvest	1.978	2.370	0.696	1	0.404	7.229	0.069	752.881
Timber Harvest - Annually	-0.160	2.473	0.004	1	0.948	0.852	0.007	108.550
Timber Harvest - Every 2-5 yrs.	-1.186	2.141	0.307	1	0.580	0.305	0.005	20.273
Timber Harvest - Every 6-10 yrs.	19.257	25574.846	0.000	1	0.999	230738778.367	0.000	-
Timber Harvest - Every 11-20 yrs.	-27.996	40192.970	0.000	1	0.999	0.000	0.000	-
Number of different types of funding sources	1.296	0.631	4.214	1	0.040	3.654	1.060	12.588

Note:

<sup>1</sup>Community forests compared to state-administered forest parks.

<sup>2</sup>Community forests compared to jointly managed forest parks.

<sup>3</sup>Jointly managed forest parks compared to state-administered forest parks.

Community forests had 107.785 times higher odds of exhibiting a perceived increase in forest cover density than state-administered forest parks. Or in other words, the odds of having a perceived increase in forest cover density were more than 100 times greater for community forests as opposed to state-administered forest parks. Increasing the number of villages involved in forest management (odds ratio of 1.3) and increasing the number of different types of funding sources (odds ratio of 3.7) were associated with an increase in forest cover density, but increasing the number of different types of forest monitors (odds ratio of 0.03) was associated with a very small reduction in the likelihood of an increase in forest cover density. Community forests had about 25 times higher odds of exhibiting an increase in forest cover density than jointly managed forest parks.

#### **4.1 Discussion**

As previously stated, this study aimed to gain a better understanding of the current collaborative forestry approaches used in The Gambia and identify factors and conditions within forest parks and community forests that enhance the sustainability of forests. The research involved a survey of a large sample of 77 forests in The Gambia—approximately 14% of the population of all forests in the country by my estimates.

The research aimed to fill gaps in knowledge by addressing the following research questions:

1. What are the characteristics of community forests (CF) and forest parks (FP) in The Gambia?
2. How do forest attributes of community forests and forest parks in The Gambia compare?

3. What are the perceived benefits, challenges, and future opportunities of community forests and forest parks as defined by forest committee members, Department of Forestry (DoF) employees, and forest users?
4. What factors and conditions enhance the sustainability of forests? Do the different forest regimes (community forests (CFs), jointly managed forest parks (JMFPs), state-administered forest parks (SAFPs)) improve the sustainable management of forest resources?

Section 4.1.1 responds to the first two research questions. The third research question is addressed in Section 4.1.2. In Section 4.1.3, the final research question is discussed, and four variables, including the type of forest regime, are revealed as leading to a greater likelihood of increased forest density cover (i.e., this study's proxy for forest sustainability).

#### **4.1.1 Characterization of Gambian Forests Surveyed and Comparison of Community Forests, Jointly Managed Forest Parks, and State-Administered Forest Parks**

##### *4.1.1.1 Forest Attributes*

All forests surveyed were established as a community forest or forest park at some point between 1952 and 2019. The data suggest that CFs were established more recently on average than jointly managed and state-administered forest parks. This aligns with what we know about the history of the three forest regimes, with the original CFs being established in the 1990s (Thoma and Camara 2005). However, the data are misleading regarding the establishment year of jointly managed forest parks. The data indicate JMFPs were established as early as 1952, although we know that the Joint Forest Park Management Concept was not introduced until the early 2000s

(Thoma and Camara 2005). We can deduce that forest representatives provided the year the forest park was established rather than the year the joint forest park management began.

According to my data, Gambian forests, both CFs and FPs, averaged 343 hectares. On average, community forests had the smallest area, and jointly managed forest parks had the largest. However, the data indicate that area is quite variable. In the dataset, the large range, 2 ha to 8,000 ha, contributes to the higher variability. However, I speculate that the variability may also be due to a lack of current, accurate measurements of forest area or forest representatives' recall of these data when they do exist.

Nearly three-quarters of the forests surveyed were comprised of predominantly naturally grown trees, and deciduous trees were most abundant in over half of the forests. This is consistent with recent reports published by the Government of The Gambia (GoTG), which report more deciduous forest cover than evergreen forest cover in The Gambia (Baldeh 2018a).

Nearly all the forests surveyed were comprised of one parcel of land. These results are to be expected when recent forest trends are considered. In recent years, forest area has decreased in The Gambia (World Bank 2020a). Forests, or protected areas (PA), comprised of multiple parcels are more challenging to protect, especially when resources are limited. The absence of multi-parcel forests in The Gambia may be a reflection of these challenges. For example, during the construction of the FP database, I learned that three forest parks had been consolidated into one forest park because each FP had experienced significant encroachment, and it was

determined by the GoTG that resources would be better used to protect one forest park parcel comprised of the remaining forest cover.

A strategy advanced by the GoTG is the use CFs as buffers around FPs, and the literature supports such a strategy. The literature shows that the utilization of buffer parks, or forests in this case, supports the protection of the inner park, or forest, that traditionally has more restrictive access and use privileges (Martino 2001). However, according to the data, approximately two-thirds of the forests surveyed did not have an adjoining protected area. These results are unanticipated given the GoTG's support of such protected area designs.

Just over half of the forests were reported to have an increase in density of forest cover over the last five years, with tree planting and natural regeneration as the most frequently mentioned contributing factors. For those forests with a reported decrease in forest cover density, degradation and destructive bushfires were reported as the primary contributing factors. Many of the community forests surveyed, 74%, reported an increase in the density of forest cover over the last five years. In contrast, 71% of jointly managed forest parks and 67% of state-administered forest parks reported a decrease in forest cover density over the last five years. These are encouraging results for CFs, and perhaps unsurprising results for SAFPs. As discussed in Section 1.3, it became apparent that the DoF did not have the resources or community buy-in to adequately protect and manage the country's forest resources (Thoma and Camara 2005). CFs and JMFPs were borne out of the DoF's need for assistance (Thoma and Camara 2005). The two main goals of the community forestry approach were to improve community welfare by introducing ecologically adapted natural resource management practices and to maintain national



forest cover by slowing down and ultimately halting environmental degradation (Thoma and Camara 2005). Twenty-six years after community forestry was officially adopted in The Gambia, our results indicate CFs contribute to a perceived increase in forest cover density, our proxy for forest sustainability. However, our results suggest less promising outcomes for JMFPs, with the majority of JMFPs reporting a decrease in forest cover density over the last five years. Only 23% of jointly managed forest parks reported an increase in forest cover density.

#### *4.1.1.2 Ownership*

Aspects of governance, management, and ownership are inherently tied to the forest regime in The Gambia. Community forest land is typically owned by local governments, while the GoTG owns forest park land. These ownership arrangements are outlined in Gambian law, and our results reflect these arrangements. Of the forests surveyed, 70% were community forests, and 30% were forest parks. Our results reflect alignment with Gambian laws in that approximately 70% of surveyed forests reported ownership by one or more local governments, and 30% of surveyed forests reported ownership by the GoTG. Governance and management will be addressed in the following sections.

#### *4.1.1.3 Governance Structure*

As mentioned, governance is closely tied to the forest regime. The Forest Act of 2018 and its associated regulations outline governance components that each type of forest regime is legally obligated to have in place for the forest (GoTG 2018). Under Gambian law, community forests are required to have five governance components, namely, (1) a forest committee (i.e., Community Forest Committee), (2) management agreement, (3) management plan, (4) bylaws,

and (5) a local fund (Thoma and Camara 2005; GoTG 2018). Of the forests surveyed, a forest committee was in place for 96% of CFs. Management agreements were in place for 30% of the 54 CFs. Management plans were in place for 59% of community forests. Bylaws were in place for 33% of CFs. A local fund was in place for 41% of CFs. On average, CFs had between three and four governance components in place, short of the five required under Gambian law.

Jointly managed forest parks are required to have (1) a forest committee (i.e., Joint Forest Management Committee), (2) management agreement, (3) management plan, and (4) local fund (Thoma and Camara 2005; GoTG 2018). Of the forests surveyed, a forest committee was in place for 100% of the 17 JMFPs. Management agreements were in place for 71% of JMFPs. Management plans were in place for 76% of JMFPs. A local fund was in place for 35% of JMFPs. On average, JMFPs had between four and five organizational components in place, in line with the requirements outlined in Gambian law.

State-administered forest parks are required to have (1) a forest committee (i.e., Reserve Settlement Committee) and (2) management plan (Camara and Dampha n.d.; GoTG 2018). Of the forests surveyed, a forest committee was in place for 33% of the six SAFPs. Management plans were in place for 33% of SAFPs. On average, SAFPs had between one and two organizational components in place. These results indicate that SAFPs are partially in compliance with Gambian law.

Our results showed that, on average, forests had between three and four governance components in place, with a forest committee, management plan, annual workplan, and constitution being the

four most frequently implemented components. However, due to numerous factors, the implementation of the Forest Act requirements can be challenging. For example, according to Gambian law, management plans are supposed to be based on the national forest assessments conducted every ten years. However, as of 2021, the national forest assessment due in 2020 had not been conducted due to a lack of funds, and there were no plans for an assessment in the near future. Therefore, it would not be unexpected to see forests with out-of-date management plans or no management plans at all.

Similarly, ultimate decision-making authority and responsibility for overseeing day-to-day activities are closely connected to the forest regime. For community forests, decision-making authority and responsibility for overseeing day-to-day activities typically rests with forest committee members. The GoTG typically holds ultimate decision-making authority and responsibility for overseeing day-to-day activities for SAFPs. Decision-making authority and responsibility for overseeing day-to-day activities are typically held jointly between the GoTG and the forest committee members for JMFPs.

The data reflect these arrangements. Of the forests surveyed, 70% were CFs, 22% were JMFPs, and 8% were SAFPs. We found that forest committee members held ultimate decision-making authority for 57% of forests. Joint decision-making authority was held for 25% of forests. GoTG officials held ultimate decision-making authority for 14% of forests. Similarly, forest committee members were responsible for overseeing day-to-day activities for 62% of forests. Joint responsibility was held for 26% of forests. GoTG officials were responsible for overseeing day-to-day activities for 12% of forests. Our results have the GoTG holding ultimate decision-making

authority for a slightly higher percentage of forests than would be expected given the number of SAFPs included in the sample. However, this result may point to forest representatives' understanding of Gambian law. Under Gambian law, the GoTG has ultimate authority over all forest resources in The Gambia, even community forests. The Forest Act of 2018 includes a provision that gives the GoTG the option to revoke CF rights and de-reserve a community forest if determined appropriate (GoTG 2018).

Several variables measured collaboration. Our analysis showed that the forests surveyed had between one and two day-to-day collaborators on average, with forest committee members and GoTG employees being the most common collaborators. Forest committee members collaborated in day-to-day forest activities with 85% of CFs and 82% of JMFPs. GoTG employees collaborated in day-to-day forest activities with 31% of CFs, 71% of JMFPs, and 67% of SAFPs. All three forest regimes had an average of between one and two day-to-day collaborators. These results align with what would be expected for each of the three different forest regimes. We would expect forest committee members to be heavily involved in CF activities with some involvement by the GoTG, but not as much involvement as we would expect to see with the JMFPs and SAFPs. Additionally, we would expect to see greater forest committee involvement in JMFPs than SAFPs, as SAFPs rely more on DoF employees.

Regarding village involvement, the forests surveyed had an average of two to three village communities involved in forest management. Notably, JMFPs had an average of seven to eight villages involved in forest management, while CFs averaged one to two, and SAFPs averaged zero. These data likely reflect the DoF's outreach efforts and success in bringing partners into the

fold. The DoF's aim with the jointly managed forest parks is to involve as many communities as possible, especially those with socially recognized claims to the forest (Thoma and Camara 2005). The high average seen for JMFPs illustrates the DoF's success in forming partnerships, although I speculate this could be disadvantageous to communities. JMFPs rely on management assistance from communities (i.e., unpaid labor), and benefits are divided between the GoTG and the involved communities (GoTG 2018). As more communities become involved, the benefits are split between a greater number of parties, resulting in a smaller share of the benefits for each party (GoTG 2018). Interestingly, 85% of CFs had only one village involved in forest management. The desire to keep forest benefits within the community may explain this result.

Additionally, the study found that forests worked with one to two groups, such as forest associations, kafos (e.g., affinity groups), non-profit organizations, private companies (e.g., tour operators), village development committees (VDC), and youth groups, on average. The data showed that community forests and jointly managed forest parks worked with one to two groups on average, while SAFPs worked with no more than one group on average. These results align with earlier results in that the data seem to suggest SAFPs have slightly lower levels of collaboration than JMFPs or CFs. Data are limited on forest collaboration in The Gambia, and these are the first data to my knowledge measuring forest collaboration.

The results showed that, on average, the forests surveyed had between three and four ways for community members to provide input or participate. Community meetings, forest protection, and volunteer workdays were the three primary ways. Community meetings were a way to provide input for 98% of CFs and 88% of JMFPs. Protecting the forest was a way to participate in 56%

of CFs, 88% of JMFPs, and 50% of SAFPs. Volunteer workdays were a way to participate in 63% of CFs and 76% of JMFPs. The data showed that community members have, on average, three to four ways to provide input or participate in forest activities at CFs and JMFPs. In contrast, SAFPs provide, on average, no more than one way for community members to provide input or participate in forest activities. It is not unexpected that SAFPs provide fewer ways for community members to provide input or participate in forest activities. SAFPs are designed to exclude communities and rely on the DoF. Perhaps more notable is that two of the most common ways for communities to participate in forest activities involve the donation of labor. These results seem to support the argument advanced by Schroeder (1999) that the GoTG is shifting management responsibility onto community members while the GoTG maintains ultimate control of forest resources.

Discussion was the most used method to resolve forest disputes. Of the forests surveyed, 89% of CFs, 71% of JMFPs, and 50% of SAFPs used discussion to resolve forest-related disputes. Legal action was used by 28% of CFs, 65% of JMFPs, and 83% of SAFPs. These results are indicative of the more collaborative, community-centric approaches seen in CFs and JMFPs versus the more bureaucratic, top-down approach used by SAFPs. In other words, CFs and JMFPs likely attempt first to resolve forest conflicts through discussion, while SAFPs begin with legal action.

The analysis determined that on average, eight community members are trained in forest management topics, with training in forest operations being the most common. However, the data are highly variable, ranging from zero to 70, and averages between the three forest regimes differ considerably. JMFPs had 15 community members trained on average, whereas CFs had six

community members and SAFPs had zero community members trained on average. I speculate that this might be due to a few JMFPs that are managed by numerous villages. Typically, with such joint arrangements, each village involved is provided with equal opportunities for GoTG training. Therefore, the more communities involved, the more community members trained. This makes sense because the GoTG has a vested interest in training community members, so they are well equipped to manage JMFPs. Similarly, we would expect SAFPs to have few or no community members trained. SAFPs do not rely on community members' participation in management, and therefore, the GoTG would have little interest in investing time and money into training community members near SAFPs.

#### *4.1.1.4 Forest Management & Uses*

The three most frequently selected management goals were forest restoration, biodiversity conservation, and timber production according to the data. The top three goals for community forests were forest restoration, timber production, and education. The three most selected goals for JMFPs were forest restoration, biodiversity conservation, and timber production. The three most chosen goals for SAFPs were biodiversity conservation, followed by a tie between education, forest restoration, and non-timber forest products (NTFP). It is unclear why SAFPs selected NTFPs as a primary goal more frequently than CFs or JMFPs. Out of the three forest regimes, SAFPs largely restrict community members from accessing NTFPs, although in practice, restrictions may not be enforced (GoTG 2018). Similarly, it is surprising that more CFs and JMFPs did not report NTFPs as a primary management goal, given that community members are more likely to rely on NTFPs than salaried DoF employees.

Timber was harvested by 61% of the forests surveyed, with most harvesting timber annually or every two to five years. Of those CFs and JMFPs that harvested timber, a local community crew was most often used. SAFPs used a combination of work crews to harvest timber. To manage timber sales, we found that CFs typically used forest leaders, JMFPs typically used a combination of managers, and SAFPs typically used GoTG employees. These results also highlight the close ties CFs and JMFPs have with communities, the joint nature of JMFPs, and SAFPs reliance on the GoTG and its employees.

The forest area was measured, and the tree inventory was taken for 60% of the forests within the last five years. These are unexpected results in that forests are notoriously under-resourced in The Gambia, and technical training is often limited. However, the data show that CFs and JMFPs were more likely to have had the forest measured and the tree inventory taken within the last five years than were SAFPs. Measurements and inventories for SAFPs typically took place more than ten years ago. From these results, it is clear that CFs and JMFPs receive more attention than do SAFPs. This attention could be a result of policy emphasis at the national level, increased manpower available to CFs and JMFPs, or greater amounts of funding. However, it seems reasonable to expect SAFPs to have equal or greater access to technical expertise than CFs and JMFPs, as SAFPs are solely managed by trained DoF employees.

The most commonly carried out maintenance activities were the same for all three forest regimes. These activities were patrolling, tree planting, and prevention and control of wildfires. On average, JMFPs carried out three to four different types of maintenance activities, community



forests carried out two to three activities, and SAFPs carried out one to two activities. Once again, these results suggest that JMFPs and CFs receive more attention than SAFPs.

The literature indicates that forest monitoring by local community members contributes to enhanced forest protection and decreased degradation (Seymour et al. 2014). My findings are consistent with the literature. As highlighted in earlier sections, most CFs reported an increase in the density of forest cover over the last five years. An increase in the density of forest cover would only be possible if the forest is being protected, and the literature suggests that forest monitoring by local community members is best (Seymour et al. 2014). Of the forests surveyed, most forests, 70%, used just one type of forest monitor. However, of the three forest regimes, JMFPs were most likely to utilize two different types of forest monitors. Assigned community members monitored 96% of the CFs. In contrast, all SAFPs were monitored solely by DoF rangers. Jointly managed forest parks were somewhere in between, with 94% of JMFPs monitored by assigned community members and 65% of JMFPs monitored by DoF rangers. These forest monitoring arrangements conform with what would be expected and support the earlier finding that CFs were more likely to lead to an increase in forest cover density than SAFPs or JMFPs. Additionally, these results highlight, once again, that CFs and JMFPs are largely reliant on community labor, most of which is unpaid. Unpaid labor will be further discussed in Section 4.1.1.5.

#### *4.1.1.5 Finances*

Income was generated for the owning entity of 46 forests, the managing entity of 34 forests, and community members of 33 forests. These results highlight that, generally, forests are more likely

to generate income for those higher up in the organizational structure. However, this may be less meaningful to CFs than JMFPs and SAFPs. Community forests are owned and managed by the community, so even if the results had shown that no income was generated for community members, that would not necessarily be accurate for community forests. The situation is different for JMFPs and SAFPs. Jointly managed forest parks are owned by the GoTG but managed jointly by the DoF and the community. In this case, we can assume that at least a portion of the income generated for the managing entity would go back to the community. State-administered forest parks are owned and managed by the GoTG, and based on their design, it would be surprising if any income were generated for community members.

The study found that income was generated for the owning entity in 65% of CFs surveyed, 53% of JMFPs surveyed, and 33% of SAFPs surveyed. Income was generated for the managing entity in 46% of CFs surveyed, 41% of JMFPs surveyed, and 33% of SAFPs surveyed. Income was generated for community members in 50% of CFs surveyed, 29% of JMFPs surveyed, and 17% of SAFPs surveyed. Of note is that SAFPs did, in fact, generate some income for community members. The other results are what would be expected. Out of the three forest regimes, community forests were most likely to generate income for community members. JMFPs were more likely to generate income for the owning entity over the managing entity and, in turn, the managing entity over community members. Given how JMFP benefits are to be shared under Gambian law, it would be expected that the managing entity and community members would be less likely to receive income than the owning entity.

On average, total revenue per forest was 34,934 dalasi, or approximately \$700, for 2020. Total expenses averaged 21,036 dalasi, or roughly \$420, for 2020, while derived profit averaged 18,895 dalasi, or approximately \$378, for 2020. When asked about the impact of the Covid-19 pandemic (Covid) on forest revenue and expenses, most forest representatives said that the impact was either unknown or revenue and expenses remained stable. When examined by forest regime, the data showed that CFs generated, on average, the greatest total revenue, followed by JMFPs and SAFPs. Total expenses were also the greatest on average for CFs, followed by JMFPs and SAFPs. It is important to note that the modes for total revenue and total expenses were zero across all three forest regimes, meaning most forests reported no revenue and no expenses. Additionally, total revenues were reported as unknown for 36 forests, and total expenses were unknown for 42 forests. Possible reasons for such responses are that forest representatives either did not know the values or did not have the account books readily accessible or simply did not want to share the values. Based on the values reported, forests generate very low amounts of income, especially on a community basis, and are probably not adequate for adequate forest protection.

Forest management operations were reported to be the largest expense for 40 forests over the last three years, while 28% of CFs, 29% of JMFPs, and 50% of SAFPs reported no expenses or that the largest expense was unknown. These results are curious, because they either indicate that some CFs, JMFPs, and SAFPs are not performing any maintenance activities, which contradicts my results that show only two forests did not perform any maintenance activities, or maintenance activities are performed by unpaid volunteers. Given the results that found no paid workers were employed by 98% of CFs, 65% of JMFPs, and 50% of SAFPs, it is reasonable to conclude that

volunteer labor was used to conduct maintenance activities in the forests that reported no expenses.

It was reported that 26% of forests received grants from the GoTG, and 27% of forests received grants or donations from external non-profit organizations. However, 45% of the forests surveyed reported no current or past funding. On average, forests had no more than one different source of funding. When funded, CFs typically received funding through grants/donations from external non-profit organizations, while JMFPs and SAFPs were most often financed through GoTG grants. These funding sources align with what would be expected. The GoTG tends to fund forest parks, both JMFPs and SAFPs, while external funding sources fund community forests.

#### **4.1.2 Perceived Benefits, Challenges, and Future Opportunities**

##### *4.1.2.1 Benefits*

One limitation of this study was that the telephone interview format did not allow us to gather as much detail or ask as many questions as originally planned. Due to interview length concerns, most of the benefits questions were deleted. Only one question, perhaps less directly than I wanted, addressed benefits. The forest representatives were asked to name the three most valuable forest products or services in the forest. Out of 162 possible responses, products and services under the ecosystem service of provisioning were identified 93 times as the most valuable in community forests. Out of the responses received, provisioning services, such as timber, firewood, fruit, and bee products, were identified as most valuable 94% of the time in

CFs, 93% of the time in JMFPs, and 100% of the time in SAFPs. Cultural and supporting services were not identified by any of the three forest regimes as the most valuable in the forest.

These results suggest that forest representatives perceive provisioning services as the greatest benefit of forests. Interestingly, cultural and supporting services were not identified as a primary benefit of the forest, and regulating services were only identified by a handful of forest representatives. However, I speculate that the low number of mentions of cultural, supporting, and regulating services has less to do with these services not being seen as valuable, but more to do with the critical role provisioning services play in the daily lives of many Gambians.

#### *4.1.2.2 Challenges*

On average, CFs and JMFPs reported between two and three different types of issues, constraints, or challenges, while SAFPs reported between three and four. The most frequently raised issues for CFs and JMFPs were lack of financial resources, lack of necessary equipment, limited access to technical expertise, and maintenance costs. These results are consistent with other findings in this study. However, the results for the SAFPs are a mix of expected and unexpected. The most frequently raised issues for SAFPs were lack of financial resources, lack of necessary equipment, limited access to technical expertise, and problems with forest land tenure. As mentioned, the DoF is notoriously underfunded, understaffed, and undertrained (Thoma and Camara 2005). However, in comparison to community members living in rural areas, DoF employees have significant access to technical expertise than the average villager. Therefore, it is interesting that one of the primary challenges identified by SAFP representatives is limited access to technical expertise.

Although expected, it is notable that SAFP representatives identified problems with forest land tenure as a primary issue. Multiple DoF employees mentioned the issue of perceived land tenure. Particularly with SAFPs, there tends to be little activity in the forest. As a result, villagers from the surrounding communities believe the GoTG is no longer interested in the land, and the villagers begin to expand their farmlands and encroach on the forestland. Thus, when a DoF employee inspects the forest, they find that the forest survey markers are now in the middle of a groundnut field. At this point, issues over land tenure ensue, with the farmer claiming the forestland as their own.

Additional challenges, both anthropogenic and of natural origin, were identified by forest representatives. Damaging human activities most frequently identified by CFs and JMFPs were tree harvesting, fire, and livestock, whereas SAFPs identified tree harvesting, fire, and poor management. Both legal and illegal harvesting of trees is rampant in The Gambia. Trees are harvested for timber, but often immature trees are harvested for fenceposts, and other trees are simply cut to clear land for other purposes. Bushfires are seen as a major problem by the DoF, and the results suggest that forest representatives view bushfires in a similar light. Yet, every year more than 70% of The Gambia's forest and grassland is burned (GoTG 2011). Bushfires are started accidentally when cropland is burned in preparation for planting, when honey hunters use open flames to harvest from wild colonies, when charcoal production operations go unattended, and when children use fire to smoke out animals they are hunting. Livestock refers to uncontrolled grazing of cattle, sheep, and goats in forests by both Gambian and Senegalese herders, and the associated damages, including debarking, the killing of seedlings and saplings through grazing and trampling, and the cutting down of branches so tree leaves can be fed to

livestock. The results align with the challenges described in official GoTG reports (Baldeh 2018a).

Issues of natural origin that CFs identified as the most damaging were heavy wind/storms, drought, and pests and diseases. In contrast, JMFPs and SAFPs identified climate change, pests and diseases, and soil conditions. I suspect that heavy wind/storms and drought were identified by forest representatives in part, because of when we conducted the interviews. The interviews were conducted at the end of the dry season and continued through the beginning of the rainy season. At the end of the dry season, the land is parched. When the rains are late or inadequate, drought is at the forefront of villagers' minds. Additionally, in June 2021, unusually strong storms with heavy winds caused unprecedented damage to communities across The Gambia. Forests suffered damage with windthrown trees, broken and twisted branches, and trees stripped of their leaves. Therefore, I speculate that heavy wind/storms and drought were frequently identified because of the timing of the interviews.

Also of note is that soils, or supporting services, are revealed as a forest benefit within the survey question about challenges. However, we cannot presume soils are perceived as a primary forest benefit, because soils were not named when questioned about the most valuable forest products and services in the forest.

#### *4.1.2.3 Opportunities*

Forest representatives were asked to identify ways in which the forests could be improved. CF representatives most frequently identified tree planting, fire protection, and forest protection as

opportunities for improving community forests. JMFP representatives most frequently identified tree planting, fire protection, and training/education as opportunities for improving jointly managed forest parks. These results are notable because the study found that JMFPs, on average, have the most community members trained in topics related to forest management. The identification of training/education as an opportunity, despite JMFPs' high training numbers relative to CFs and SAFPs, suggests the high-value JMFPs place on training/education.

SAFP representatives most frequently identified increasing community engagement followed by training/education, reducing illegal activities, and improving forest management tied for second as opportunities for improving SAFPs. The opportunities identified by the SAFP representatives are expected, because all four of the opportunities identified closely align with GoTG policy. The GoTG is attempting to transition the remaining SAFPs to JMFPs (Thoma and Camara 2005). The only way to do this is through the engagement of the neighboring communities. Additionally, the DoF, which is responsible for managing SAFPs, is charged with improving forest management across the country, training people in forest management, and reducing illegal activities related to forestry.

#### **4.1.3 Factors and Conditions Enhancing the Sustainability of Forests**

The correlation analysis showed 11 strong positive and five strong negative associations between variables. However, what is more meaningful for identifying factors and conditions that enhance forest sustainability are the regression analysis results that reveal whether our proxy for forest sustainability, forest cover density, is influenced by any of the independent variables that we suspect are useful in explaining forest sustainability.



The regression analysis showed that three variables contributed positively to the density of forest cover. The statistical odds ratio indicates probability of independent variables affecting the outcome of a dependent variable. The odds ratio for a perceived increase in forest cover density was nearly 108 times greater for community forests compared to state-administered forest parks. Additionally, the odds ratio for a perceived increase in forest cover density was 25 times greater for community forests compared to jointly managed forest parks. These results indicate that factors and conditions of community forests enhance the sustainability of forests as opposed to JMFPs and SAFPs.

Second, increasing the number of villages involved in forest management was associated with an increase in forest cover density, or the sustainability of forests. Interestingly, other results discussed earlier found CFs involve one to two villages on average in forest management while JMFPs involve seven to eight villages on average. Based on these results, we suspect community forests could see even greater improvements in forest sustainability if more villages were involved in forest management. However, this might be harder to administer, and limited forest income would be divided up between even more parties. Further research would need to be conducted to determine if there is a threshold where increasing village involvement no longer results in increases in forest cover density.

Third, increasing the number of different types of funding sources was associated with an increase in forest cover density. These results are anticipated as it would be expected that different types of funding sources would lead to a whole range of activities carried out in the

forest. Typically, funding sources are narrowly focused, so having different types of funding sources leads to more areas receiving attention.

The regression analysis showed that one variable contributed negatively to the density of forest cover. Increases in the number of different types of forest monitors were associated with a reduction in the likelihood of an increase in forest cover density. These findings are curious. The results suggest that increasing the number of different types of forest monitors (e.g., from only assigned community members to both assigned community members and DoF rangers) is associated with reductions in forest cover density. It is difficult to explain such results without more research. Is it that having a greater number of different types of forest monitors leads to no one group feeling responsible for monitoring? Do some combinations of forest monitors (i.e., assigned community members and DoF rangers) result in more positive outcomes than other combinations? The literature indicates that forest monitoring by local community members contributes to enhanced forest protection and decreased degradation (Seymour et al. 2014). Perhaps, assigned community members alone, or together with general community members, lead to similar outcomes, whereas assigned community members and DoF rangers together lead to less desirable outcomes. To fully understand the dynamics behind the numbers, further research is needed.

Finally, it is important to note again that the data on forest cover density reflect perceptions. Forest representatives were asked to provide their view of whether forest cover density increased, decreased, or stayed the same over the last five years. There may be some bias among respondents that affected the results in general, or for any particular type of forest regime. On-

the-ground, satellite, aerial, or lidar measurements of forest cover density may produce different findings.

#### **4.2 Research Bias and Limitations of Study**

Due to the ongoing Covid-19 pandemic (Covid), development context, and time constraints of this study, some limitations exist. As a result of Covid, restrictions were placed on in-person contact. Initially, the study design involved in-person interviews of multiple forest representatives at each forest. On-the-ground measurements were going to be collected at the forests, and forest documents were going to be reviewed at field offices and in forest representatives' homes. None of this was possible due to Covid. The study had to be redesigned with Covid precautions incorporated. Several limitations stem from the new study design, while other limitations existed in both study designs. Limitations include conducting interviews over the telephone, reliance on participant recall rather than actual measurements in the field, the inability to triangulate data through interviewing multiple forest representatives per forest or the review of forest documents, and building a sampling frame using a snowball approach.

A telephone interview format impacts the number of questions that can be asked, the types of questions that can be asked, and does not allow for the interviewer to observe body language. Telephone interviews tend to be shorter than face-to-face interviews. Questions tend to be of limited complexity, and the interviewer cannot use visual aids to explain concepts. Additionally, open-ended questions must be limited, because it can be considered impolite to keep the interviewee on the phone for long periods of time.

The study relies on participant recall rather than actual measurements in the field. Attempts were made to interview the most knowledgeable forest representative. For example, it was not uncommon for the first forest contact to refer the interviewers to a more knowledgeable individual. Nonetheless, all data were based on interviewee memory and perceptions. Formal records are kept for CFs, JMFPs, and SAFPs. However, records were not referenced by the interviewees during the interviews. The interviewers asked for their best recollection if an interviewee could not remember precisely.

As a result of Covid restrictions and time limitations, it became infeasible to triangulate data. In order to interview multiple forest representatives per forest over the telephone, significant time would have been needed to expand the sampling frame of forest contacts. Similarly, to review forest documents when in-person contact was not permitted, considerable time would have been required to identify an individual with a smartphone from within the forest community in order to scan and send forest documents to the researcher. In addition to the time requirement, there would be a financial burden, as phone data would be required to send the documents. Given these limitations, data reflect one person's recollection without empirical field validation, as is true for many surveys.

A snowball approach was used to build the sampling frame of forest contacts. Given that people often refer or provide contact information for those they know, like, and have similar traits to, there may be potential bias in the sampling frame (Black and Champion 1976). Additionally, there is the possibility of bias borne from the first contacts having a strong influence on the overall direction of the sampling frame (Black and Champion 1976).

Despite these limitations, this line of research provides significant contributions to the scientific community. We sampled a relatively large share (14%) of the forests in The Gambia, distributed across the entire country. Historically, research focused on forests in the West Coast Region (WCR), the most easily accessible region in The Gambia. To my knowledge, this is the first study to examine forests in all three of the main forest regimes and in all five regions of The Gambia. Furthermore, the results often conformed with our a priori expectations, providing some validation for the study as well.

## **5.1 Conclusions and Recommendations**

This final section summarizes key research findings in relation to the study's research questions, discusses the value and contribution of the research, provides recommendations for implementation, and suggests areas for future research.

### **5.1.1 Research Questions and Key Findings**

This study aims to gain a better understanding of the current collaborative forestry approaches used in The Gambia and identify factors and conditions within forest parks and community forests that enhance the sustainability of forests by addressing the following research questions:

1. What are the characteristics of community forests (CF) and forest parks (FP) in The Gambia?
2. How do forest attributes of community forests and forest parks in The Gambia compare?
3. What are the perceived benefits, challenges, and future opportunities of community forests and forest parks as defined by forest committee members, Department of Forestry (DoF) employees, and forest users?

4. What factors and conditions enhance the sustainability of forests? Do the different forest regimes (community forests, jointly managed forest parks (JMFP), state-administered forest parks (SAFP)) improve the sustainable management of forest resources?

The results indicate that CFs are younger, or more recently established, than jointly managed and state-administered forest parks. CFs are the smallest in terms of area, while JMFPs are the largest. The majority of forests are comprised of one parcel with predominantly naturally grown deciduous trees and no adjoining protected areas (PA). Local governments tend to own CF land, while the Government of The Gambia (GoTG) owns FP land. Forest restoration, biodiversity conservation, and timber production are the three most common management goals. JMFPs carry out the greatest number of different types of maintenance activities, followed by CFs and SAFPs. Most forests reported no revenue and no expenses. Nearly half of the forests surveyed have no current or past funding. Most forests employ no paid workers.

The results show that JMFPs have the most organizational components in place, such as a forest committee, management agreement, and management plan, followed by CFs and SAFPs. When it comes to village involvement in forest management, most CFs involve only one village, whereas JMFPs involve seven to eight villages on average. SAFPs tend not to involve villages in forest management. The data show that community members have more ways to provide input or participate in forest activities at CFs and JMFPs than SAFPs. Discussion is most commonly used to resolve forest-related disputes in CFs and JMFPs, while legal action is the preferred method used by SAFPs. JMFPs tend to train more community members on average, followed by CFs and SAFPs.

CFs have close ties to the community, SAFPs have close ties to the GoTG, and JMFPs have close ties to both. This is reflected in who possesses decision-making authority and responsibility for overseeing day-to-day activities, who collaborates on a day-to-day basis in the forest, who does the timber harvesting work, who manages the timber sales, and who monitors the forest. Forest committee members tend to possess decision-making authority and responsibility for overseeing day-to-day activities for CFs. In contrast, authority and responsibility are held by GoTG for SAFPs and jointly between the GoTG and forest committee members for JMFPs.

One to two day-to-day collaborators are typical for all forests surveyed. CFs tend to work with forest committee members, SAFPs tend to work with GoTG employees, and JMFPs tend to work with both. Local community crews typically conduct timber harvesting work for CFs and JMFPs, while SAFPs use a combination of work crews. Timber sales are typically managed by forest leaders at CFs, GoTG employees at SAFPs, and by a combination of managers at JMFPs. CFs typically are monitored by assigned community members, while SAFPs typically are monitored by Department of Forestry (DoF) rangers. JMFPs are monitored by a combination of the two.

Further findings show that most CFs reported an increase in forest cover density over the last five years, while the majority of JMFPs and SAFPs reported a decrease in forest cover density. Increases are attributed to tree planting and natural regeneration, while decreases are because of degradation and destructive bushfires.

Forest representatives perceive provisioning services, such as timber, firewood, fruit, and bee products, as the greatest benefit of forests across all three forest regimes. The primary challenges

faced by CFs and JMFPs are lack of financial resources, lack of necessary equipment, limited access to technical expertise, and maintenance costs. SAFPs face a lack of financial resources, lack of necessary equipment, limited access to technical expertise, and problems with forest land tenure. Forest representatives perceive tree harvesting, fire, and livestock as the three most damaging human activities taking place in CFs and JMFPs, while tree harvesting, fire, and poor management are the most damaging in SAFPs. Forest representatives perceive heavy wind/storms, drought, and pests and diseases as the three most damaging issues of natural origin taking place in CFs, while climate change, pests and diseases, and soil conditions are perceived as the most damaging in JMFPs and SAFPs.

CF representatives perceive tree planting, fire protection, and forest protection as opportunities for improving community forests. JMFP representatives perceive tree planting, fire protection, and training/education as opportunities for improving jointly managed forest parks. SAFP representatives perceive community engagement, training/education, reducing illegal activities, and improving forest management as opportunities for improving state-administered forest parks.

Three variables contribute positively to the reported density of forest cover, the study's proxy for forest sustainability. These factors are forest regime, specifically community forests, the number of villages involved in forest management, and the number of different types of funding sources. The results indicate that factors and conditions of CFs enhance the sustainability of forests more than JMFPs and SAFPs. Additionally, both increasing the number of villages involved in forest management and increasing the number of different types of funding sources are associated with an increase in forest cover density, or the sustainability of forests.



To my knowledge, this is the first study to examine as many as 77 forests from all three of the main forest regimes and in all five regions of The Gambia. Prior to this research, studies focused on community forests in the West Coast Region (WCR), the most easily accessible region. Research typically involved a handful of case studies. This research provides a more comprehensive examination of forest regimes across the country and provides a characterization of forests in each of the three forest regimes, where one did not exist before. This research helps create a better understanding of the current collaborative forestry approaches utilized in The Gambia and begins to identify factors and conditions within forest parks and community forests that enhance the sustainability of forests. This research can be the basis for further research and used to guide implementation changes.

### **5.1.2 Recommendations and Future Research**

Based on the research findings, a few recommendations related to implementation can be made. First, placing a focus on building the capacity of the DoF employees and community members involved or interested in forest management is recommended. Limited access to technical expertise was identified as an issue by all three forest regimes. Education was identified by CFs and SAFPs as a primary management goal. Additionally, training/education was recognized by JMFPs and SAFPs as a way to improve the forests. The study results indicate there is not only a need for capacity building but interest in expanded educational opportunities. Second, the study found that approximately two-thirds of the forests surveyed did not have an adjoining protected area. Although challenging to achieve, it is recommended that the DoF place a focus on designing a strategy for achieving a network of FPs and CFs, where CFs act both as buffers around FPs and corridors between FPs.

Third, the results indicate that increasing the number of different types of funding sources is associated with an increase in forest cover density, or the sustainability of forests. This may be associated with the better planning and skills required to obtain external funding, the number of committed stakeholders, the added finances, or the interaction of the technical assistance of the funders, forest managers, and communities. Improving access to outside funding sources through the dissemination of funding opportunities via a forest committee WhatsApp group is recommended. The DoF could manage the WhatsApp group in collaboration with the regional forest associations. Removing the hurdle of locating funding opportunities could result in forests applying for and receiving a greater number of different funding sources. Additionally, a GoTG or NGO grants expert or program that focuses on helping communities identify and prepare applications would likely be helpful.

Areas for future research are numerous. I provide a few recommendations for future research based on the limitations of this study and notable results that require further research for a more complete understanding.

First, this research is based on one person's perspective of each forest. Time and Covid-related constraints prevented the triangulation of data. Future research could verify this study's findings by interviewing multiple people at each forest and conducting document reviews. The review of financial records would be especially beneficial, as 36 out of 77 forests in this study reported that total revenues were unknown, and 42 out of 77 forests reported that total expenses were unknown. Second, future research could build from this study by taking actual measurements on the ground. On-the-ground, satellite, aerial, or lidar measurements could then be compared to the

findings in this study to verify the forest representatives' perspectives. Third, the results indicate that factors and conditions of CFs enhance the sustainability of forests as opposed to JMFPs and SAFPs. Future research could explore the factors and conditions specific to CFs that lead to forest sustainability. Along these lines, future research could also explore why JMFPs seem to have a less favorable outcome, decreases in forest cover density. Fourth, the results suggest that increasing the number of different types of forest monitors (e.g., from only assigned community members to both assigned community members and DoF rangers) is associated with reductions in forest cover density. This research did not explore monitoring dynamics. Further research could explore the factors behind this finding. Fifth, the results show that increasing the number of villages involved in forest management is associated with an increase in forest cover density, or the sustainability of forests. Future research is needed to determine if there is a threshold where increasing village involvement no longer results in increases in forest cover density. It is my hope that this research encourages other researchers to delve deeper into the research opportunities and gaps presented in this thesis.

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## APPENDICES

# Appendix A

## Survey Protocol

**Materials:** printed questionnaire, pen, cell phone

**Introduction (Estimated time: 2 minutes):**

*The interviewer will begin with traditional Gambian greetings, as is customary.* Thank you for taking my call today. My name is \*insert name of the interviewer\*. I am calling to ask that you participate in a research study on forests in The Gambia. If you agree to participate, I will ask you about basic characteristics, usage, and management of \*insert name of the forest\*. The survey should last no more than 45-60 minutes. If you agree to proceed, I will ask you questions in English or in local language (Mandinka, Wolof), if you prefer. At any point during this process, please let me know if you have any questions. Next, I will review the consent information.

**Informed Consent (Estimated time: 5 minutes):**

**What are some general things you should know about research studies?**

You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate, or to stop participating at any time without penalty. If you withdraw from the study before data collection has been completed, any information you have provided will be destroyed if you so require.

**What is the purpose of this study?**

The purpose of this study is to gain a better understanding of the collaborative forestry approaches used in The Gambia and their objectives, outcomes, challenges, and success factors.

**What will happen if you take part in the study?**

If you agree to participate in this study, you will be asked a series of questions regarding your experiences, perceptions, involvement, and knowledge of forest characteristics, usage, and management. After the survey, the researcher will analyze the results. Your answers will provide information about Gambian forestry and natural resources and will aid in the completion of the researcher's thesis project at North Carolina State University in the U.S.

**Risks and Benefits**

There are minimal risks associated with participation in this research, and there are no direct benefits. The indirect benefits include gaining critical knowledge of how forests may provide ecological and socioeconomic benefits for rural communities in The Gambia.

**Confidentiality**

The information that you provide will be kept confidential. The information we gather will not be linked to you personally and will only be analyzed at the forest level.

**Compensation**

There is no payment or compensation for participating in this study.

**What if you are a government or non-government employee?**

Participation in this study is not a requirement of your employment, and your participation or lack thereof, will not affect your job.

**What if you have questions about this study?**

If you have questions at any time about the study itself, the procedures implemented, or your participation in this study, you may contact, Anne McWhinney, by email at ammwhin@ncsu.edu or via international call, WhatsApp, or Viber at +1-434-989-1620, or Dr. Frederick Cabbage, by email at cubbage@ncsu.edu or via international call at +1-919-630-8928.

**What if you have questions about your rights as a research participant?**

If you feel you have not been treated according to the descriptions just given or your rights as a participant in research have been violated during the course of this project, you may contact the North Carolina State University Institutional Review Board (IRB) Office by email at irb-director@ncsu.edu or via international call at +1-919-515-8754.

**Consent to Participate**

"I understand the information described. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty."

To continue with the survey, please state "I agree". If you do not wish to participate in the survey, please state "I do not wish to participate".

**Interviewer Instructions:**

*Prior to interviews, interviewers will be provided with the interview instructions, protocol, and questionnaire. The researcher will conduct informal training sessions with the interviewers, so the interviewers can become comfortable with the protocol and materials. The training sessions will include: a review of the instructions, protocol, and questionnaire, mock interviews, and a discussion to address questions and areas of concern. The following are reminders for the interviewer when conducting the interview. These are not to be read to the interviewee.*

- Do not read the sentences/words in italic.
- Words separated by a slash (/) indicate there are several options for the question. The interviewer should choose the most appropriate option.
- Words in square brackets ([]) provide information about the type and number of answers requested. The interviewer should choose if the information needs to be read to the interviewee or not.
- Circle answers. Complete other information as appropriate.

**Survey (Estimated time: 45-60 minutes):**

Identifier #: _____
<b>INTRODUCTION</b>
<b>Q1) What is the official name of the forest that you are involved with? [fill in the blank]</b>
_____
<b>Q2) In what region (or regions) is this forest located? [circle the letter for all that apply]</b>
A. Central River Region (CRR)
B. Lower River Region (LRR)
C. North Bank Region (NBR)
D. Upper River Region (URR)
E. West Coast Region (WCR)
<b>Q3) In what district (or districts) is this forest located? [circle the letter for all that apply]</b>
<u>Central River Region (CRR)</u>
CRR North -
A. Lower Saloum (Balangarr/Kaur area)
B. Niani (Kuntaur/Jarumeh Koto area)
C. Nianija (Chamen/Jailand Bakadagi area)
D. Sami (Karantaba/Pochonki area)
E. Upper Saloum (Njau/Panchang area)
CRR South -
F. Janjanbureh
G. Lower Fulladu East (Bansang area)
H. Lower Fulladu West (Jahali/Brikamaba area)
I. Niamina East (Kudang area)
J. Niamina West (Dankunku area)

Lower River Region (LRR)

- K.** Jarra Central (Japineh area)
- L.** Jarra East (Jassong area)
- M.** Jarra West (Soma area)
- N.** Kiang Central (Kwinella area)
- O.** Kiang East (Kaiaf area)
- P.** Kiang West (Keneba area)

North Bank Region (NBR)

- Q.** Central Baddibu (Salikene/Njaba Kunda area)
- R.** Jokadu (Kuntair/Dasilami area)
- S.** Lower Baddibu (Kerewan/Bani area)
- T.** Lower Niumi (Barra/Essau area)
- U.** Sabah Sanjal (Ngain Sanjal/Bambali area)
- V.** Upper Baddibu (Illiasa/Farafenni area)
- W.** Upper Niumi (Jufureh/Lamin area)

Upper River Region (URR)

URR North -

- X.** Sandu (Diabugu/Dasilami area)
- Y.** Wuli East (Sutukoba/Passamas area)
- Z.** Wuli West (Nyakoi/Yorobawol area)

URR South -

- AA.** Kantora (Garawol/Fatoto area)
- BB.** Tumana (Tinkinjo/Sare Alpha area)
- CC.** Upper Fulladu East (Basse/Gambisara area)
- DD.** Upper Fulladu West/Jimara (Bakadagi/ Hela Kunda area)

West Coast Region (WCR)

- EE.** Foni Bintang-Karenai (Bintang/Sibanor area)
- FF.** Foni Bondali (Bondali area)
- GG.** Foni Brefet (Besse/Brefet area)
- HH.** Foni Jarrol (Jarrol area)
- II.** Foni Kansala (Bwiam area)
- JJ.** Kombo Central (Brikama area)
- KK.** Kombo East (Pirang/Faraba area)
- LL.** Kombo North (Lamin/Sukuta area)
- MM.** Kombo South (Gunjur area)

**Q4) What is the nearest village(s) to this forest? [fill in the blank]**

\_\_\_\_\_

**Q5) How are you associated with this forest? [circle the letter for your primary role]**

- A. Community forest committee member [please specify title] \_\_\_\_\_
- B. Department of Forestry employee [please specify title] \_\_\_\_\_
- C. Forest caretaker
- D. Forest user
- E. Joint forest park management committee member [please specify title] \_\_\_\_\_
- F. Other [please describe] \_\_\_\_\_

**Q6) Is this forest a: [circle one letter]**

- A. Community forest?
- B. Forest park?
- C. Other [please describe] \_\_\_\_\_

**Q7) If a forest park, is this forest park: [circle one letter]**

- A. Jointly managed? [please specify between whom] \_\_\_\_\_
- B. Administered by the Government of The Gambia?
- C. Other [please describe] \_\_\_\_\_
- D. Not applicable; forest is not a forest park.

**Q8) What year was this forest named as a forest park/community forest? [fill in the blank]**

\_\_\_\_\_

#### FOREST ATTRIBUTES

**Q9) What is the approximate area of this forest (in hectares or by dimension, e.g., 50m x 200m)? [fill in the blank]**

\_\_\_\_\_

**Q10) Are the hectares in a single, continuous area, or are there multiple, unconnected parcels that make up this forest? [circle one letter]**

- A. Single, continuous area
- B. Multiple, unconnected parcels [please specify how many parcels.] \_\_\_\_\_

**Q11) Is this forest adjoining other protected area(s)? [circle one letter]**

- A. Yes [please describe] \_\_\_\_\_
- B. No

**Q12) Is this forest predominantly (more than half): [circle one letter]**

- A. Naturally grown?
- B. Planted?
- C. Other [please describe] \_\_\_\_\_

**Q13) What type of trees are most abundant in this forest? [circle the letter for all that apply]**

A. Deciduous trees (sheds leaves annually)

(e.g., *Combretum glutinosum* (Jambakatango), *Terminalia macroptera* (Wolo), *Pterocarpus erinaceus* (Rosewood, Keno), *Prosopis africana* (Ironwood, Kembo), *Lannea acida* (Bembo-fingo), *Bombax costatum* (Silk Cotton, Bunkungo), *Gmelina arborea* (White Teak, Malaynoo), *Adansonia digitata* (Baobab, Sitoo), *Daniella oliveri* (West African Copal Tree, santango))

B. Evergreen trees (retains green leaves throughout the year)

(e.g., *Cordyla pinnata* (Bush Mango, Duto), *Tamarindus indica* (Tamarind, Dakhaar), *Khaya senegalensis* (Mahogany, Jaloo), *Eucalyptus camaldulensis* (River Redgum Eucalyptus, Xoti-butel), *Cola cordifolia* (Mandinka Cola, Taba), *Ptilostigma thoningi* (Camel's Foot, Faaraa), *Acacia albida* (Winter Thorn, Baransaŋo))

C. Mangroves

(e.g., *Avicennia nitida* (Black Mangrove, Jumbukungo), *Rhizophora mangle* (Red Mangrove, Mankwo), *Avicennia africana* (White Mangrove, Manki Koyoo))

D. Palms

(e.g., *Elais guineense* (African Oil Palm, Tengo), *Borassus aethiopum* (Rhun Palm, Siboo), *Cocos nucifera* (Coconut Palm, Kokoo))

E. Semi-deciduous trees (occasionally evergreen/deciduous)

(e.g., *Acacia holserica* (Gamtel), *Acacia laeta*, *Acacia mellifera* (Black Thorn), *Acacia nilotica* (Egyptian Thorn, Nebneb), *Parkinsonia aculeate* (Jerusalem Thorn), *Acacia senegal* (Gum Arabic, Baanoo))

F. Other [please describe] \_\_\_\_\_

**OWNERSHIP**

**Q14) Who owns the land on which this forest is located? [circle one letter]**

A. Government of The Gambia (e.g., Department of Forestry, Department of Parks & Wildlife Management)

B. Local government (e.g., village, community, district) [please specify] \_\_\_\_\_

C. Private – family or tribe [please specify] \_\_\_\_\_

D. Private – corporate (e.g., private industry, private company) [please specify] \_\_\_\_\_

E. Private – other (e.g., nongovernment organization) [please specify] \_\_\_\_\_

F. Joint ownership between [please specify] \_\_\_\_\_

G. Other [please describe] \_\_\_\_\_

**ORGANIZATIONAL STRUCTURE**

**Q15) Which of the following are in place for this forest? [circle the letter for all that apply]**

- A. Annual workplans [please specify written or oral] \_\_\_\_\_
- B. Bylaws
- C. Constitution
- D. Forest committee
- E. Local fund
- F. Management agreement
- G. Management plan
- H. Other [please describe] \_\_\_\_\_
- I. None of the above.

**GOVERNANCE**

**Q16) Who has ultimate decision-making authority over management (i.e., access and use) of this forest? [circle one letter]**

- A. Forest committee member(s)
- B. Government of The Gambia (e.g., Department of Forestry, Ministry)
- C. Local government (e.g., village alkaloo, district chief)
- D. Local group(s)
- E. Local individual(s)
- F. Nongovernmental organization
- G. Joint decision-making authority between [please specify] \_\_\_\_\_
- H. Other [please describe] \_\_\_\_\_

**Q17) Who is responsible for overseeing day-to-day activities for this forest? [circle one letter]**

- A. Forest committee member(s)
- B. Government of The Gambia (e.g., Department of Forestry, Department of Parks & Wildlife Management)
- C. Local government (e.g., village alkaloo, district chief)
- D. Local group(s)
- E. Local individual(s)
- F. Nongovernmental organization
- G. Joint responsibility between [please specify] \_\_\_\_\_
- H. Other [please describe] \_\_\_\_\_

**Q18) Who contributes to or collaborates in the day-to-day activities of this forest? [circle the letter for all that apply]**

- A. Forest committee member(s)
- B. Government of The Gambia (e.g., Department of Forestry, Department of Parks & Wildlife Management)
- C. Local government (e.g., village alkaloo, district chief)
- D. Local group(s)
- E. Local individual(s)
- F. Nongovernmental organization
- G. Other [please describe] \_\_\_\_\_

**Q19) If your forest is a community forest or jointly managed forest park, how many villages are involved in the management of this forest? [fill in the blank]**

\_\_\_\_\_

**Q20) In which of the following ways can community members provide input or participate in forest activities? [circle the letter for all that apply]**

- A. Community meetings
- B. Forest protection (e.g., from bushfires and illegal harvesting)
- C. Harvesting non-timber forest products
- D. Harvesting timber
- E. Volunteer workdays
- F. Other [please specify] \_\_\_\_\_
- G. No opportunities for input or participation are provided.

**Q21) What type of organizations or groups work with this forest, and how many? [circle the letter for all that apply]**

- A. Forest association(s), [please specify #] \_\_\_\_
- B. Kafo(s), [please specify #] \_\_\_\_
- C. Non-profit organization(s), [please specify #] \_\_\_\_
- D. Private company (e.g., tour operator), [please specify #] \_\_\_\_
- E. Village Development Committee(s), [please specify #] \_\_\_\_
- F. Youth group(s), [please specify #] \_\_\_\_
- G. Other [please specify] \_\_\_\_\_
- H. No organizations or groups work with this forest.



**Q22) What methods are used to resolve forest-related disputes? [circle the letter for all that apply]**

- A. Discussion (e.g., chief/alkaloo/elder led talks/mediation/negotiation)
- B. Formal agreements
- C. Informal agreements
- D. Legal action
- E. Payment in cash or in kind
- F. Voting
- G. Withdraw from participation
- H. Other [please describe] \_\_\_\_\_

**FOREST ECOSYSTEM**

**Q23) In your view, has the density of forest cover in this forest increased or decreased over the last five years? [circle one word]**

**Q24) If the forest area increased over the last five years, what factors contributed to this increase? [circle the letter for all that apply]**

- A. Not applicable; forest area has not increased.
- B. Acquisition of additional forested land
- C. Natural regeneration
- D. Tree planting [please specify species] \_\_\_\_\_
- E. Other [please describe] \_\_\_\_\_

**Q25) If the forest area decreased over the last five years, what factors contributed to this decrease? [circle the letter for all that apply]**

- A. Not applicable; forest area has not decreased.
- B. Conversion to other land uses (e.g., agriculture, pasture, settlement)
- C. Degradation (e.g., overgrazing, overharvesting, pests/diseases)
- D. Destructive bushfire
- E. Other [please describe] \_\_\_\_\_

**Q26) In your view, what are the three most damaging human activities to this forest? [fill in the blank]**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**Q27) In your view, what are the three most damaging natural causes to this forest? [fill in the blank]**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**FOREST MANAGEMENT**

**Q28) What are three primary management goals of this forest? [circle the letter for up to three goals]**

- A. Agroforestry
- B. Biodiversity conservation
- C. Cultural or spiritual
- D. Ecotourism
- E. Education
- F. Fishing
- G. Forest restoration, including wildfire management
- H. Hunting
- I. Livestock grazing (e.g., cattle, donkeys, goats, rams, sheep) [please describe] \_\_\_\_\_
- J. Non-timber forest products
- K. Recreation
- L. Restoration or protection fish/wildlife habitat
- M. Timber production
- N. Water resources/watershed protection
- O. Other non-consumptive benefits (e.g., aesthetic, bird watching) [please describe] \_\_\_\_\_
- P. Other [please describe] \_\_\_\_\_

**Q29) When was the last time the forest area was measured, and the tree inventory was taken? [circle one letter]**

- A. Never taken place.
- B. Within the last year
- C. Between 1 year and 5 years ago
- D. More than 5 years ago
- E. More than 10 years ago

**Q30) Who monitors this forest land? [circle the letter for all that apply]**

- A. Assigned community members
- B. Department of Forestry rangers
- C. General community members
- D. Paid guards
- E. Other [please describe] \_\_\_\_\_
- F. This forest land is not monitored.

**Q31) What maintenance activities are carried out in this forest? [circle the letter for all that apply]**

- A. Non-commercial thinning
- B. Patrolling
- C. Prescribed burning
- D. Prevention and control of diseases and pests
- E. Prevention and control of wildfire
- F. Tree nurseries
- G. Tree planting
- H. Other [please describe] \_\_\_\_\_
- G. No maintenance activities are carried out.

**Q32) Approximately how many community members received training related to forest management? [fill in the blank]**

\_\_\_\_\_

**Q33) What types of trainings have community members received? [circle the letter for all that apply]**

- A. Not applicable; no training received.
- B. Financial management
- C. Forest operations (e.g., tree nursery, transplanting, protection)
- D. Organizational management
- E. Other [please describe] \_\_\_\_\_

#### FOREST USES

**Q34) In your view, what forest products or services are most valuable in this forest? [Fill in the blank. Please provide between one and three products or services.]**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**Q35) How frequently is timber harvested? [circle one letter]**

- A. Not applicable; no timber is harvested.
- B. Annually
- C. Every 2 to 5 years
- D. Every 6 to 10 years
- E. Every 11 to 20 years
- F. Every 20 years or more
- G. Other [please describe] \_\_\_\_\_

**Q36) Who usually manages the timber sales? [circle the letter for all that apply]**

- A. Not applicable; no timber is sold.
- B. Forest leaders
- C. Government of The Gambia employee (e.g., Department of Forestry employee)
- D. Local group(s)
- E. Local individual(s)
- F. Non-profit organization
- G. Private consulting forester
- H. A combination of [please specify] \_\_\_\_\_
- I. Other [please describe] \_\_\_\_\_

**Q37) Who usually does the harvesting work? [circle the letter for all that apply]**

- A. Not applicable; no timber is harvested.
- B. A crew hired through a non-profit organization
- C. A local community crew
- D. Government of The Gambia crew
- E. Private contracting company
- F. A combination of [please specify] \_\_\_\_\_
- G. Other [please describe] \_\_\_\_\_

**Q38) What non-timber forest products are harvested from this forest? [circle the letter for all that apply]**

- A. Fiber (e.g., rope)
- B. Fodder
- C. Fruits
- D. Herbs and spices
- E. Honey and wax
- F. Nuts
- G. Palm oil
- H. Raw material for dyes
- I. Raw material for handicraft construction
- J. Raw materials for incense products
- K. Raw material for medicine
- L. Rhun palm splits
- M. Seeds
- N. Tea/beverages
- O. Thatching grass
- P. Other [please describe] \_\_\_\_\_
- Q. None

**FINANCES**

**Q39) Does this forest generate income:**

**For the owning entity?** Yes, No, Not Sure [circle one]

**For the managing entity?** Yes, No, Not Sure [circle one]

**For community members (e.g., through employment, harvesting activities, etc.)?** Yes, No, Not Sure [circle one]

**Q40) What sources of funding has this forest had? [circle the letter for all that apply]**

- A. Donations from local community members
- B. Fundraiser events
- C. Grants/donations from external non-profit organizations
- D. Grants from the Government of The Gambia
- E. Loans
- F. Local government funds
- G. Member dues
- H. Sale of forest products [please specify] \_\_\_\_\_
- I. Tourism
- J. User fees
- K. Other [please describe] \_\_\_\_\_
- L. This forest has received no funding.

**Q41) Using 2020 as the reference year, approximately how many people were directly employed to work with this forest? [fill in the chart]**

	Estimated number of people employed
Full-time	
Part-time	
Seasonal	
Contractual	

**Q42) What were the approximate total revenues and expenses in 2020 for this forest? [fill in the blanks – enter in Gambian Dalasi]**

**Total revenues = \_\_\_\_\_; Did this number go up, down, or stay stable due to Covid? [circle one word]**

**Total expenses = \_\_\_\_\_; Did this number go up, down, or stay stable due to Covid? [circle one word]**

**Q43) In thinking about the last three years, what was the largest expense for this forest? [circle one letter]**

- A. Forest management operations
- B. Staff salaries
- C. Service contracts [please specify] \_\_\_\_\_
- D. Taxes
- E. Other [please describe] \_\_\_\_\_

**Q44) How are forest profits used? [circle the letter for all that apply]**

- A. Not applicable; no profit has been made.
- B. Forest expansion
- C. Forest maintenance
- D. School fees
- E. Social programs and celebrations
- F. Tree planting
- G. Village development [please specify] \_\_\_\_\_
- H. Other [please describe] \_\_\_\_\_

**BENEFITS AND CHALLENGES**

**Q45) In your view, what are three ways to improve this forest? [Fill in the blank. Please provide between one and three answers.]**

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

**Q46) What are the primary issues, constraints, or challenges encountered when undertaking forest management activities? [circle the letter for all that apply]**

- A. Conflict among stakeholders
- B. Lack of financial resources
- C. Lack of political support
- D. Lack of necessary equipment
- E. Legal limitations
- F. Limited access to technical expertise
- G. Problems with forest land tenure
- H. Maintenance costs
- I. Multiple layers or levels of government (national, regional, district, village)
- J. Other [please specify] \_\_\_\_\_
- K. There are no issues, constraints, or challenges.

**CONCLUSION**

**Q47) Do you have any other comments or suggestions? [fill in the blank]**

\_\_\_\_\_

**Q48) If you would like to receive more information and results from this study, please provide your contact information (email or phone number). Your contact information is completely confidential. [fill in the blank]**

\_\_\_\_\_

**Conclusion (Estimated time: 1 minute):**

Thank you for answering my questions today. I truly appreciate you taking the time to help us better understand the various aspects of \*insert name of the forest\*. We received very good insights that will help gain new knowledge in the field of collaborative forestry. Thank you again! Hope you have a great rest of your day!

## Appendix B

Code	Question	Response categories
Q6_Forest_Regime	Is this forest a: (a) community forest, (b) forest park, or (c) other?	1=community forest, 2=forest park, 3=other
Q7_Mgmt_Type	If a forest park, is this forest park: (a) jointly managed, (b) administered by the GoTG, (c) other, or (d) n/a?	1=jointly managed, 2=administered by GoTG, 3=other, (-99)=n/a
Q6&Q7_Aggregate_Forest_Regime	N/A, combines data from Q6 and Q7 into one independent variable column.	1=community forest, 2=jointly managed forest park (JMFP), 3=state administered forest park (SAFP)
Q5_Role	How are you associated with this forest? (a) community forest committee member, (b) Dept of Forestry employee, (c) forest caretaker, (d) forest user, (e) joint forest park management committee member, or (f) other	1=community forest committee member, 2=Dept of Forestry employee, 3=forest caretaker, 4=forest user, 5=joint forest park management committee member, 6=other
Q2_Region	In what region (or regions) is this forest located? (a) CRR, (b) LRR, (c) NBR, (d) URR, or (e) WCR	1=CRR, 2=LRR, 3=NBR, 4=URR, 5=WCR
Q3_North/South	If this forest is in CRR or URR, is it located in: (a) CRR North, (b) CRR South, (c) URR North, or (d) URR South	1=CRR North, 2=CRR South, 3=URR North, 4=URR South, (-99)=n/a
Q3_District	In what district (or districts) is this forest located? (a) Lower Saloum, (b) Niani, (c) Nianija, (d) Sami, (e) Upper Saloum, (f) Janjanbureh, (g) Lower Fulladu East, (h) Lower Fulladu West, (i) Niamina East, (j) Niamina West, (k) Jarra Central, (l) Jarra East, (m) Jarra West, (n) Kiang Central, (o) Kiang East, (p) Kiang West, (q) Central Baddibu, (r) Jokadu, (s) Lower Baddibu, (t) Lower Niumi, (u) Sabah Sanjal, (v) Upper Baddibu, (w) Upper Niumi, (x) Sandu, (y) Wuli East, (z) Wuli West, (aa) Kantora, (bb) Tumana, (cc) Upper Fulladu East, (dd) Upper Fulladu West, (ee) Foni Bintang-Karenai, (ff) Foni Bondali, (gg) Foni Brefet, (hh)	1=Lower Saloum, 2=Niani, 3=Nianija, 4=Sami, 5=Upper Saloum, 6=Janjanbureh, 7=Lower Fulladu East, 8=Lower Fulladu West, 9=Niamina East, 10=Niamina West, 11=Niamina Dankunku, 12=Jarra Central, 13=Jarra East, 14=Jarra West, 15=Kiang Central, 16=Kiang East, 17=Kiang West, 18=Central Baddibu, 19=Jokadu, 20=Lower Baddibu, 21=Lower Niumi, 22=Sabah Sanjal, 23=Upper Baddibu, 24=Upper Niumi, 25=Sandu, 26=Wuli East, 27=Wuli West, 28=Kantora, 29=Tumana, 30=Upper Fulladu East, 31=Upper Fulladu West/Jimara, 32=Foni Bintang-

	Foni Jarrol, (ii) Foni Kansala, (jj) Kombo Central, (kk) Kombo East, (ll) Kombo North, or (mm) Kombo South	Karenai, 33=Foni Bondali, 34=Foni Brefet, 35=Foni Jarrol, 36=Foni Kansala, 37=Kombo Central, 38=Kombo East, 39=Kombo North, 40=Kombo South
Q9_Area	What is the approximate area of this forest?	(-99)=unknown, all other values are actual values in hectares (ha)
Q8_Year	What year was this forest named as a forest park/community forest?	(-99)=unknown, all other values are actual values of the year
Q10_Parcels	Are the hectares in a single, continuous area, or are there multiple, unconnected parcels that make up this forest? (a) single, continuous area or (b) multiple, unconnected parcels	1=single, continuous area, 2=multiple, unconnected parcels
Q11_Adjoining_PA	Is this forest adjoining other protected area(s)? (a) yes or (b) no	1=yes, 2=no, (-99)=unknown
Q12_Natural/Planted	Is this forest predominantly (more than half): (a) naturally grown, (b) planted, or (c) other	1=naturally grown, 2=planted, 3=other, (-99)=unknown
Q13_For_Type	What type of trees are most abundant in this forest? (a) deciduous trees, (b) evergreen trees, (c) mangroves, (d) palms, (e) semi-deciduous trees, or (f) other	1=deciduous trees, 2=evergreen trees, 3=mangroves, 4=palms, 5=semi-deciduous trees, 6=other, (-99)=unknown
Q14_Own_Type	Who owns the land on which this forest is located? (a) govt of The Gambia, (b) local govt, (c) private - family or tribe, (d) private - corporate, (e) private - other, (f) joint ownership between ____, or (g) other	1=govt of The Gambia, 2=local govt, 3=private - family or tribe, 4=private - corporate, 5=private - other, 6=joint ownership between ____, 7=other
Q15_Org_Structure	Which of the following are in place for this forest? (a) annual workplans, (b) bylaws, (c) constitution, (d) forest committee, (e) local fund, (f) mgmt agreement, (g) mgmt plan, (h) other, (i) none	For answer choices a through i: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.



Q16_DM_Auth	Who has ultimate decision-making authority over management (i.e., access and use) of this forest? (a) forest committee member(s), (b) govt of The Gambia, (c) local govt, (d) local group(s), (e) local individual(s), (f) ngo, (g) joint decision-making authority between _____, or (h) other	1=forest committee member(s), 2=govt of The Gambia, 3=local govt, 4=local group(s), 5=local individual(s), 6=ngo, 7=joint decision-making authority between _____, 8=other, (-99)=unknown
Q17_Oversee_D2D	Who is responsible for overseeing day-to-day activities for this forest? (a) forest committee member(s), (b) govt of The Gambia, (c) local govt, (d) local group(s), (e) local individual(s), (f) ngo, (g) joint responsibility between _____, or (h) other	1=forest committee member(s), 2=govt of The Gambia, 3=local govt, 4=local group(s), 5=local individual(s), 6=ngo, 7=joint responsibility between _____, 8=other, (-99)=unknown
Q18_Contri_D2D	Who contributes to or collaborates in the day-to-day activities of this forest? (a) forest committee member(s), (b) govt of The Gambia, (c) local govt, (d) local group(s), (e) local individual(s), (f) ngo, (g) other	For answer choices a through g: 0=no, 1=yes. Total column contains actual values.
Q19_#_Village_Mgmt	If your forest is a community forest or jointly managed forest park, how many villages are involved in the management of this forest?	(-99)=unknown, 0=n/a, all other values are actual values
Q20_Com_Input	In which of the following ways can community members provide input or participate in forest activities? (a) community meetings, (b) forest protection, (c) harvesting NTFPs, (d) harvesting timber, (e) volunteer workdays, (f) other, (g) no opportunities	For answer choices a through g: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.
Q21a_Org_Collab	What type of organizations or groups work with this forest, and how many? (a) forest association(s), (b) kafo(s), (c) non-profit organization(s), (d) private company, (e) village development committee(s), (f) youth group(s), (g) other, (h) no organizations or groups work with this forest	For answer choices a through h: 0=no, 1=yes. Total column contains actual values of the number of different types of organizations or groups working with this forest. Blank cells are unknown.

Q21b_#_Org_Collab	How many?	(-99)=unknown, all other values are actual values of the number of organizations or groups working with this forest
Q22_Res_Disputes	What methods are used to resolve forest-related disputes? (a) discussion, (b) formal agreements, (c) informal agreements, (d) legal action, (e) payment in cash or in kind, (f) voting, (g) withdraw from participation, (h) other	For answer choices a through h: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.
Q23_Density_FC	In your view, has the density of forest cover in this forest increased or decreased over the last five years? (a) increased, (b) decreased	0=decreased, 1=increased/stable
Q24_Density_Increase	If the forest density increased over the last five years, what factors contributed to this increase? (a) forest density has not increased, (b) acquisition of additional forested land, (c) natural regeneration, (d) tree planting, (e) other	For answer choices a through e: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.
Q25_Density_Decrease	If the forest density decreased over the last five years, what factors contributed to this decrease? (a) forest density has not decreased, (b) conversion to other land uses, (c) degradation, (d) destructive bushfire, (e) other	For answer choices a through e: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.
Q26_Human_Act	In your view, what are the three most damaging human activities to this forest?	1=fire, 2=illegal logging, 3=cutting down trees, 4=livestock, 5=firewood collection, 6=poor mgmt, 7=charcoal production, 8=other, 9=land use change, 10=chainsaws. Blank cells are unknown.
Q27_Nat_Causes	In your view, what are the three most damaging natural causes to this forest?	1=heavy wind/storms, 2=drought, 3=pests and diseases, 4=climate change, 5=erosion, 6=saltwater intrusion, 7=monkeys, 8=temperature, 9=none, 10=soil conditions, 11=lightning, 12=flooding, 13=bushfire, 14=other . Blank cells are unknown.

Q28_Mgmt_Goals	What are three primary management goals of this forest? (a) agroforestry, (b) biodiversity conservation, (c) cultural or spiritual, (d) ecotourism, (e) education, (f) fishing, (g) forest restoration, (h) hunting, (i) livestock grazing, (j) NTFPs, (k) recreation, (l) restoration or protection fish/wildlife habitat, (m) timber production, (n) water resources/watershed protection, (o) other non-consumptive benefits, (p) other	For answer choices a through p: 0=no, 1=yes.
Q29_Inventory	When was the last time the forest area was measured, and the tree inventory was taken? (a) never taken place, (b) within the last year, (c) between 1 year and 5 years ago, (d) more than 5 years ago, or (e) more than 10 years ago	1=never taken place, 2=within the last year, 3=between 1 year and 5 years ago, 4=more than 5 years ago, 5=more than 10 years ago, (-99)=unknown
Q30_Monitors	Who monitors this forest land? (a) assigned community members, (b) Dept of Forestry rangers, (c) general community members, (d) paid guards, (e) other, (f) not monitored	For answer choices a through f: 0=no, 1=yes.
Q31_Main_Act	What maintenance activities are carried out in this forest? (a) non-commercial thinning, (b) patrolling, (c) prescribed burning, (d) prevention and control of diseases and pests, (e) prevention and control of wildfire, (f) tree nurseries, (g) tree planting, (h) other, (g) no maintenance activities carried out	For answer choices a through g: 0=no, 1=yes. Total column contains actual values.
Q32_#_Trained	Approximately how many community members received training related to forest management?	(-99)=unknown, all other values are actual values
Q33_Train_Type	What types of trainings have community members received? (a) no training received, (b) financial mgmt, (c) forest operations, (d) organizational mgmt, (e) other	For answer choices a through e: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.

Q34_Val_Products	In your view, what forest products or services are most valuable in this forest?	1=timber, 2=firewood, 3=bee products/services, 4=fruits, 5=trees, 6=palm products, 7=fence posts, 8=NTFPs, 9=fishing, 10=nothing, 11=charcoal, 12=livestock grazing. Blank cells are unknown.
Q35_Tim_Har	How frequently is timber harvested? (a) no timber harvested, (b) annually, (c) every 2 to 5 years, (d) every 6 to 10 years, (e) every 11 to 20 years, (f) every 20 years or more, or (g) other	1=no timber harvested, 2=annually, 3=every 2 to 5 years, 4=every 6 to 10 years, 5=every 11 to 20 years, 6=every 20 years or more, 7=other, (-99)=unknown
Q36_Tim_Sales	Who usually manages the timber sales? (a) no timber sold, (b) forest leaders, (c) govt of The Gambia employee, (d) local group(s), (e) local individual(s), (f) non-profit organization, (g) private consulting forester, (h) a combination of ____, (i) other	1=no timber sold, 2=forest leaders, 3=govt of The Gambia employee, 4=local group(s), 5=local individual(s), 6=non-profit organization, 7=private consulting forester, 8=a combination of ____, 9=other, (-99)=unknown
Q37_Tim_Har_Work	Who usually does the harvesting work? (a) no timber harvested, (b) a crew hired through a non-profit organization, (c) a local community crew, (d) govt of The Gambia crew, (e) private contracting company, (f) a combination of ____, (g) other	1=no timber harvested, 2=a crew hired through a non-profit organization, 3=a local community crew, 4=govt of The Gambia crew, 5=private contracting company, 6=a combination of ____, 7=other
Q38_NTFP_Har	What non-timber forest products are harvested from this forest? (a) fiber, (b) fodder, (c) fruits, (d) herbs and spices, (e) honey and wax, (f) nuts, (g) palm oil, (h) raw materials for dyes, (i) raw material for handicraft construction, (j) raw materials for incense products, (k) raw material for medicine, (l) rhun palm splits, (m) seeds, (n) tea/beverages, (o) thatching grass, (p) other, (q) none	For answer choices a through q: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.
Q39a_Own_Income	Does this forest generate income for the owning entity? (a) yes, (b) no, or (c) not sure	1=yes, 2=no, 3=not sure, (-99)=unknown

Q39b_Mgmt_Income	Does this forest generate income for the managing entity? (a) yes, (b) no, or (c) not sure	1=yes, 2=no, 3=not sure, (-99)=unknown
Q39c_Com_Income	Does this forest generate income for community members? (a) yes, (b) no, or (c) not sure	1=yes, 2=no, 3=not sure, (-99)=unknown
Q40_Funding	What sources of funding has this forest had? (a) donations from local community members, (b) fundraiser events, (c) grants/donations from external non-profit organizations, (d) grants from the govt of The Gambia, (e) loans, (f) local govt funds, (g) member dues, (h) sale of forest products, (i) tourism, (j) user fees, (k) other, (l) received no funding	For answer choices a through l: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.
Q41_Employed	Using 2020 as the reference year, approximately how many people were directly employed to work with this forest?	(-99)=unknown, all other values are actual values (full-time equivalent - FTE)
Q42a_Rev_Dalasi	What were the approximate total revenues in 2020 for this forest?	(-99)=unknown, all other values are actual values in Gambian dalasi
Q42b_Rev_Covid	Did this number go up, down, or stay stable due to covid? (a) up, (b) down, or (c) stable	1=up, 2=down, 3=stable, (-99)=unknown
Q42c_Exp_Dalasi	What were the approximate total expenses in 2020 for this forest?	(-99)=unknown, all other values are actual values in Gambian dalasi
Q42d_Exp_Covid	Did this number go up, down, or stay stable due to covid? (a) up, (b) down, or (c) stable	1=up, 2=down, 3=stable, (-99)=unknown
Q43_Large_Exp	In thinking about the last three years, what was the largest expense for this forest? (a) forest mgmt operations, (b) staff salaries, (c) service contracts, (d) taxes, or (e) other	1=forest mgmt operations, 2=staff salaries, 3=service contracts, 4=taxes, 5=other, 6=no expenses, (-99)=unknown
Q44_Profit_Use	How are forest profits used? (a) no profit, (b) forest expansion, (c) forest maintenance, (d) school fees, (e) social programs and celebrations, (f) tree planting, (g) village development, (h) other	For answer choices a through h: 0=no, 1=yes. Total column contains actual values. Blank cells are unknown.

<p>Q45_ Improve</p>	<p>In your view, what are three ways to improve this forest?</p>	<p>1=tree planting, 2=fire prevention, 3=forest protection, 4=funding/material resources, 5=transport access, 6=training/education, 7=reducing the cutting of trees, 8=increasing community engagement, 9=reducing illegal activities, 10=improving forest mgmt, 11=water access, 12=increasing agroforestry activities, 13=tree nurseries/seedling protection, 14=increasing economic benefits, 15=improving organizational mgmt, 16=ecotourism facilities, 17=forest expansion. Blank cells are unknown.</p>
<p>Q46_Challenges</p>	<p>What are the primary issues, constraints, or challenges encountered when undertaking forest management activities? (a) conflict among stakeholders, (b) lack of financial resources, (c) lack of political support, (d) lack of necessary equipment, (e) legal limitations, (f) limited access to technical expertise, (g) problems with forest land tenure, (h) maintenance costs, (i) multiple layers or levels of govt, (j) other, (k) no issues, constraints, or challenges</p>	<p>For answer choices a through k: 0=no, 1=yes. Total column contains actual values.</p>