DEFORESTATION THREATENING PRACTICAL AND CULTURAL LIVELIHOODS: LESSONS LEARNED FROM PARTICIPATION IN TREE PLANTING BY RURAL WOMEN OF KENYA AND GHANA

By
FLANNERY BETHEL

A THESIS

Presented to the Department of International Studies
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Arts or Science

June 2016

An Abstract of the Thesis of

Flannery R. Bethel for the degree of Bachelor of Science
in the Department of International Studies to be taken June 2016

Title: Deforestation Threatening Practical and Cultural Livelihoods: Lessons Learned from Participation in Agroforestry by Rural Women of Kenya and Ghana

Approved: _____

Galen Martin

Deforestation is impacting the lives of rural women across the world as climate change proliferates, and these threats go beyond affecting their functional livelihoods. This article examines how deforestation jeopardizes the livelihoods and cultural identities of rural women in Kenya and Ghana, and their efforts to combat the deforestation through tree planting. Based on case studies conducted in various rural regions and diverse ethnic groups of Kenya and Ghana and testimony from the rural women, deforestation is a heavier burden on women than men. But the fundamental connection between these women and trees that is reinforced by societal customs and values that have placed them in unique positions as managers of natural resources, their contribution to sustainable forest management is essential.

Acknowledgements

I would like to thank my thesis committee, Galen Martin, Habib Iddrisu and Mark Carey for their support and knowledge throughout this process. I would also like to thank my family, friends, and partner for being an endless source of positivity, and for believing in me.

Table of Contents

Figures

Tables

Photos

Introduction

Wangari Maathai as a young girl in the Central Highlands of Kenya grew up with a huge sycamore fig tree right outside her window. As one of her household responsibilities, she had to collect firewood for fuel. Her mother was insistent on never taking firewood from the fig tree, or even around the base of it. When Wangari asked why, her mother responded that the tree was sacred, but she still did not understand. The stream that lay next to the tree was her source of water, and also a source of fascination for Wangari. She spent hours under the tree at the edge of the stream, looking at the various creatures that found a home there. It was not until after she returned home from attending school elsewhere that she understood the true significance of the tree. After a Christian church had been built, the tree was no longer considered by the community to be the place of God, so it was cut down and the stream simultaneously dried up. Her mother's words echoed in her head as she recounted her memories of sitting under the sacred tree that protected the Earth.

> "I later learned that there was a connection between the fig tree's root system and the underground water reservoirs… The reverence the community had for the fig tree helped preserve the stream… The trees also held the soil together, reducing erosion and landslides. In such ways, without conscious or deliberate effort, these cultural and spiritual practices contributed to the conservation of biodiversity." (*Unbowed* 46)

Gender equity and empowerment, environmental degradation and community development represent some of the most essential global concerns today in the pursuit of a sustainable social, environmental and economic future. In response to issues related to this nexus that are only becoming more serious as the threat of climate change increases, international and western institutions aim to create solutions, especially in

developing nations. This means that natural resource management issues in developing countries are increasingly imitating western models (Rondinelli and Ruddles, 1983). These models, however, may not work in such settings—and they tend to disregard the contribution of indigenous cultures and institutions (Fairhead and Leach, 2004). Furthermore, rural women, representing one of the most marginalized demographics worldwide (UN News Watch, *WomenWatch: Women, Gender Equality and Climate Change*) are even more so overlooked in terms of their knowledge and experience with natural resources. Beginning in the 1980s, policy makers began to be more aware of the close connection between the environment and gender issues (Cleaver and Schreiber 1994). A report conducted by the World Bank stated that, "women play an essential role in the management of natural resources, including soil, water, forests and energy...and often have a profound traditional and contemporary knowledge of the natural world around them" (1991). The United Nations outlines the promotion of gender equality and empowerment of women as well as assurance to seek environmental sustainability as two of the Millennium Development Goals: objectives that all 189 member states and more than 20 international organizations committed to achieving (*Millennium Development Goals*, UN Millennium Project).

While all of this has amounted to increased recognition of the importance of women's roles as agents of change in the future, unfortunately their skills and experience in the management of natural resources are underappreciated and they are mostly left out of decision-making processes. It has become progressively evident that there is a necessity for sustainable alternatives for natural resource management if biological and cultural diversity are to be maintained (Pillien and Walpole, 2001;

ASTREC, 1997; Marglin, 1990). Environmental degradation affects the natural resources upon which rural women rely for their livelihoods. The majority of women living in poverty reside in rural areas. Resource degradation is an acute issue in rural regions, with 60 percent of the most impoverished people on earth living in environmentally vulnerable areas (Angelsen, 1997). This is a more critical concern across Africa, as two thirds of the continent consist of deserts or drylands (Cleaver and Schreiber 1994).

Historical, societal and cultural traditions align men and women different roles in relation to natural resources (Kiptot and Franzel 2012). This thesis looks at two African countries, Kenya and Ghana, where these roles are particularly instructive. Kenya and Ghana are two regions in which forests are essential to the livelihoods of rural women, and include diverse cultures with distinct relationships to trees (Kiptot and Franzel 2012, Catacutan, McGaw, Llanza 2014). These two countries were also chosen based upon the diverse customs associated with gender and land tenure systems. Rural women in Africa generally represent the majority of those involved with production of resources at the center of land management systems in both Kenya and Ghana. Through some traditional management systems specific to certain ethnic groups, or through the synergy of traditional practices and modern technologies, these women understand the behavior of vegetation over time (Kiptot and Franzel 2012). These products and services include increased amounts of timber for fuel, food, fodder, medicinal benefits, fruits and improvement of soil fertility. The women use the forest goods to maintain the health and livelihood of themselves and their families, and also provide a chance to increase their personal income if they sell the products (Quisumbing, A. and

Pandolfelli, L. 2010).). In these countries, growing perennial crops for sustenance produces a fraction of the benefits that trees provide, and purchasing the products aren't an option due to minimal economic means (Wambugu et al, 2007). In terms of labor, tree enterprises require minimal labor after establishment, and in some cases require no purchase of planting materials if they can be found in forest areas. Moreover, agroforestry represents an opportunity for women to enhance their livelihoods in multiple ways that require non-intensive labor, and minimal economic burdens. Therefore, despite societal challenges, the fundamental connection between trees and the rural women of Kenya and Ghana is strengthened through their participation in agroforestry systems that promote the cultural and practical applications of forests, and should be a priority for policies concerning sustainable forest management and gender empowerment in the future.

Gender analysis in research surrounding advancements in sustainable forest management is critical. While there is substantial literature investigating how deforestation affects rural women in terms of practical livelihoods, generally speaking, there is a severe lack of research that considers how the degradation of the natural environment threatens the cultural identity of rural African women—and why that is important. In a very broad sense, the question to be answered is, how can rural women inform sustainable forestry management? There is significant value in the knowledge of local women and the relationship with their environment, so in an effort to answer some important aspects of the originating question, the central questions this paper addresses are as follows: How are rural women in Kenya and Ghana affected differently by deforestation, how are the cultural identities of these women tied to trees and therefore

threatened as deforestation increases, and what are they doing to combat impending effects as trees decrease? These women, most of whom live in rural areas, have many generations of knowledge passed down about the management of natural resources in their environment, and they understand how critical the protection of that environment is. Actions by rural women in response to deforestation that will be evaluated in these regions include various agroforestry practices such as fodder production, soil fertility improvement and woodlot technology, as well as sustainable management and harvesting of existing trees. Despite disadvantages women face environmentally and socially, their knowledge of and cultural bonds to trees are both essential and especially relevant to consider in working toward sustainable forest management policies. As is identified in *Environment at the Margins: Literary and Environmental Studies in Africa,* "the exclusion of women from natural resource management can have negative effects on both the household and the community" (Commonwealth Secretariat 1996).

Historical, cultural and social norms that have aligned women with societal, religious and professional positions that work closely with trees and other natural resources are a source to be learned from, and therefore a deeper understanding of these relationships is necessary. A gender-equitable and ecologically holistic approach to forest policy begins with an improved comprehension of the unique position women hold in the management of forest resources.

The majority of this research is based on reviews of literature and case studies. In order to understand the experiences of rural women in Kenya and Ghana, information surrounding how various environmental issues have affected women will be explored. Case studies are crucial for this study because they provide specific situations, issues

and tangible material that reveal essential connections. They expose the multifunctional and multifaceted nature of women's roles in natural resource management while simultaneously emphasizing the various restrictions women face. Case studies expose strategies that may be pertinent in sustainable development efforts by providing tangible evidence. This Case Study will explore findings from ten case studies in two chapters.

The case studies to be reviewed in Kenya include:

- The Green Belt Movement
- Afforestation by Mama Watoto Women's Group
- Fodder Production in western Kenya
- Soil Improvement in western Kenya
- Farmer Natural Resource Management

The case studies to be reviewed in Ghana include:

- World Resources Institute: "From the Ground Up" Agroforestry Efforts in Goviefe Agodome and Malshegu
- Enhancing Livelihoods: Sustenance and Economic Opportunity through Shea and Baobab Tree Management in Northern Ghana
- Community Resource Management Initiatives:
  -Ashanti Region

Finally, the fourth chapter presents a discussion of the path forward with a new understanding of rural women's contribution to forestry. The remainder of this introductory chapter outlines the key terms and background essential for understanding the context.

"While women have suffered setbacks and at times the power of their voices have been marginalized, women persevere, they are an essential force, they are strong, they matter and like a tree. While one woman can enrich a community it requires thousands of trees and women to sustain life on this planet."

- Jean Shinoda Bolen

2nd Annual Passion Into Action Women's Conference, October 13, 2012

A. Deforestation: Definition and Context

Deforestation may be defined as the depletion and exploitation of forest resources, as well as the conversion of forested land into alternative land uses (Secretary General of the United Nations, *Underlying Causes of Deforestation and Forest Degradation*) Regardless of the cause of deforestation, it results in loss of forest cover and biodiversity, creating broader environmental degradation and increased likelihood of climate change (fewer forests implies less natural carbon stores). The chart below, provided by the 2010 *Global Forest Resources Assessment* (FAO), displays the deforestation trends globally, and shows that Africa has one of the highest rates of deforestation as a continent.

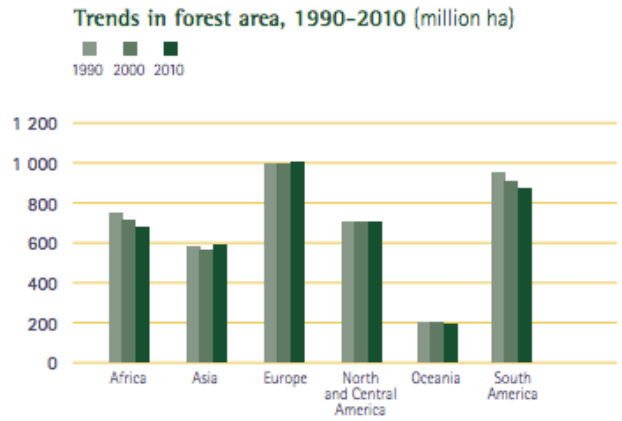

Figure 1: Global Forest Trends 1990-2010
The X-axis describes each continent and the Y-axis displays in millions how many hectares of forest area are present in 1990, 2000 and 2010. In 20 years, total forested land in Africa decreased almost linearly by approximately 80 million hectares.
Source: "Global Forest Resources Assessment 2010: Main Report." *FAO Forestry Paper* 163 (2010): United Nations Food and Agriculture Organization.

According to a statement made by the representative of the United Nations Environment Programme (UNEP), Africa is experiencing deforestation at twice the global rate

(Doyle). Below, Figures 2 and 3 indicate loss of forestland in both Kenya and Ghana. The first describes the percentage of forest in relation to the total area of Kenya between 1990 and 2012. The second displays loss of forest cover of Ghana in hectares between 1990 and 2010. The information describing deforestation in both countries has been converted from percentage of land to hectares (and vice versa) to accurately compare the units of each graph. Additionally the graph of destruction of forest cover in Ghana indicates the presence of planted forests, naturally regenerating forests and primary forest during the time period. The inclusion of these graphs in this introductory section is meant to be a reference moving forward, but specific details about deforestation in each country will be explored in the individual chapters about Kenya and Ghana.

Percent of Forest Loss in Kenya 1990-2012

Figure 2: Percent of forest cover loss. Deforestation in Kenya was relatively gradual through the 1990s, and began exponentially decreasing in the early 2000s. Over the 22 years, approximately .5 percent (290,650 hectares) of forestland was destroyed. It is important to note that there was not sufficient data representing forest cover in Kenya between 2008-2010 (The World Bank, *Forest Area in Kenya (% of Land Area)*).

Total forested land by forest classification in Ghana 1990-2010

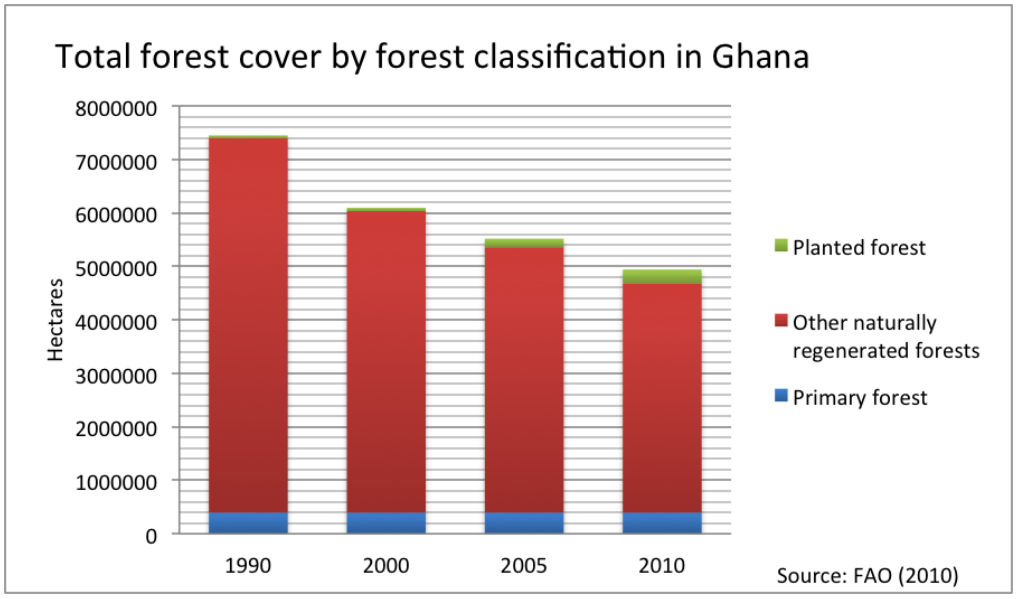

Figure 3: The graph indicates an overall loss of approximately 250,000 ha trees over 20 years. Although the total area of planted forests in Ghana has shown a slight increase, the loss of other naturally regenerating forests greatly outweigh those gains. Primary forest cover has remained relatively steady. (Food and Agriculture Organization, *Global Forest Resources Assessment 2010*).

B. Legitimizing connections among Women, Environment and Development

There are three strongly connected factors that explain the relationship among gender, environment and development: the sexual division of labor, the feminization of poverty and gender ideology. The sexual division of labor makes women, specifically rural women, often solely responsible for firewood and fodder collection and important contributors to natural resource management. This division of labor also implies that women and men have different domains of knowledge and concern for the management of natural resources.

The term “gender,” as it is to be understood in the context of this paper, refers to cultural and historical notions of femininity and masculinity and the implied power relations between men and women. Considering these elements, “gender shapes the sexual division of labor, knowledge, responsibility and control” (Ruether and Mvududu 144). Due to the diversity of tasks traditionally conducted by women, their knowledge of the environment is often more comprehensive. Most responsibilities surrounding sustaining the family fall to women, especially because men are increasingly migrating away from degraded rural areas (Ruether and Mvududu 144-145). Because of the sexual division of labor and the feminization of poverty, it is most often women that suffer the heaviest burden of environmental degradation. Decline in fuelwood, fodder, food, and other timber products, as well as deteriorating soil fertility forces the workloads of rural women grow more demanding. This impacts their livelihoods and eventually the society at large. Gender in its connection to natural resources, and to broader political, societal, and cultural systems, represents important power dimensions, and to bring about change, these power relations must change.

C. General Relevance of Trees and their Connection to Women

Women and trees have shared a unique relationship throughout history. Trees signify powerful symbols across the world as physical expressions of life and growth. In the United Nations Environment Programme publication entitled *Cultural and Spiritual Values of Biodiversity,* Sarah A. Laird writes,

> “…[trees] can symbolize historical continuity and human society. They are often of frightening magnitude, linking earth and heavens, arbiters of life and death,

> incorporating both male and female aspects, and home to both good and bad spirits, including the souls of ancestors. Trees provide protection from harm, cure disease and increase fertility. Trees preside over marriages, are planted at the birth of a child and at burial sites. In some origin myths, the first men and women were made of wood" (353).

Regardless of the society, forest practices and connections with trees (including conservation methods) reflect fundamental social values and relations between young and old, and men and women (Peluso 1992; Schama 1995). This implies that the variety of traditional and symbolic beliefs attributed to trees is representative of the numerous communities and diverse cultures that value them. Though a distinction between the cultural values of a group and the functions of forests has been made, it is in fact a false one. Physically and spiritually, tangibly and intangibly, forests are featured in all aspects of culture: "language, history, art, religion, medicine, politics, and even social structure itself" (FAO, *The Cultural And Symbolic Importance Of Forest Resources*). The two fundamentally connected concepts in the relationship between women and trees that are often perceived as separate are the cultural applications and the practical applications. Balée refers to these concepts collectively in their relationship to forests as 'mental economy'. The mental economy therefore refers to the various elements of communities that rely on forest resources—these include traditional ecological knowledge such as "relations between species of flora and fauna, edible versus inedible foods, and forest management systems, but also shared notions of kinship, marriage, taboos, cosmology and ritual" (UNEP 379). Forests may house spirits of ancestors or newborns. They are important in many traditional healing practices, including providing the venue for religious, social and healing rituals. The implications of myths, folklore and other culturally controlled systems are essential in traditional forest management of

rural communities. Cultural values maintain unity and shared ethics that inform resourceful usage of forest resources.

C. Understanding the Necessity of and Societal Obstacles to Natural Resources for Rural Women

Most households in rural areas are dependent on common property resources, meaning resources such as forests, fishing grounds and pasturelands that are used to sustain livelihoods. A report published by the United Nations indicates that women with fewer occupational choices and less mobility depend on forests more so than men and are particularly knowledgeable about diverse plants and tree species and about their uses for health care, fuel and fodder, as well as food (Abramowitz and Nichols 1993; Thrupp 1984). With reduced soil quality and decreasing availability of firewood, the burden of time on women counteracts their ability to address solutions to the issues caused by climate change and affect where they must live. Rural women are especially vulnerable to environmental degradation, and in terms of deforestation, women must walk further to collect wood and other forest products for, "food, fodder, fuel, medicinal plants and other sources of sustenance" (OECD/DAC). In "Reversing the Spiral: the Population, Agriculture, and Environment Nexus in Sub-Saharan Africa," the World Bank states:

> "Given women's triple roles - child bearing/rearing, family and household maintenance, and production/income-earning activities - the pressures on their time continue to intensify. With increasing deforestation, combined with growing populations requiring more fuelwood, fuelwood has become scarcer. Women must walk farther to fetch it – or reduce the number of hot meals prepared." (6)

Despite the enhanced susceptibility of rural women to the depletion and conversion of surrounding natural resources, they most commonly do not have a voice in decision-making processes which can produce resource uses that negatively affect them. All of these factors create disadvantages in terms of health, education and livelihoods. The excerpt above was published in 1994, but deforestation and its disproportionate effects on women remain a critical issue. Based on data collected between 1990 and 2010, the UN Gender Inequality Index was causally related to deforestation in more than 100 countries. The United Nations Development Program Human Development Report 2011 identifies some of these links: because women and children are traditionally aligned with firewood collection and must walk further for fuelwood or are forced to burn crop residues instead, which threatens their health. Some studies link deforestation and lack of access to contraceptive options or choices for women in family planning, due to the pressures of population on the natural environment. In many cases, it is expected that women have many children to increase the likelihood of economic opportunities for the family but this only increases the reliance on trees (Patel 2013). Perhaps the most hindering threat linking gender inequality and deforestation is the blatant exclusion of women in decision-making surrounding the protection and management of natural resources. With no voice in policy, women are often excluded from the benefits of shared resources, while experiencing a disproportionate share of the negative impacts. The report goes on to confirm that empirical evidence emphasizes the value of the nature and extent of women's contribution to resource management decisions (UNDP, *Sustainability and Equity: A Better Future for All).*

While this thesis research focuses specifically on Kenyan and Ghanaian women's knowledge and connection with the environment, it is pertinent to reference the Chipko movement in India of the 20th century to establish that fundamental relationship between women and trees. The Chipko Movement began in the 18th century when a woman named Amrita Devi gathered 84 other women to risk their lives to prevent the felling of the local sacred trees. Gradually, it led to an increased recognition of deforestation in the region and the implied negative impacts on livelihoods, and with this recognition, strong political activism on the issue. The movement was revitalized in the 1970s when rural women began organizing in small groups to bring awareness to deforestation among local authorities and stand up against commercial logging. The conflict began to emerge between loggers, government and peasants in India due to lack of agreement on forest clearing. State government and private contractors led the men of several villages living near a targeted clearing location away to another site through, unknowingly to the men, fiction compensation for labor, so the men departed and the women were left alone. With the men gone, the loggers thought that the trees would be much more easily cut down, but were instead faced with an involved demonstration by the women in Chipko. In order to protest the destruction of the trees, all of the women physically hugged the trees, which initiated the Chipko environmentalist movement. The term "tree hugger" is indeed based on the actions of these women. By taking this nonviolent, clearly symbolic action, the women of Chipko were able to protect the forests from outsiders clear cutting (Educate Green). Today, the Chipko Movement comprises hundreds of locally autonomous initiatives across India led by rural women. After the demonstration of the women as legitimate catalyzers of tangible change in the

18th and 20th century, their efforts in protecting forests and developing afforestation projects only grew. The afforestation program they created has reduced landslides, and increased fuel and fodder production in the Uttarakhand region of the Himalayas. The success of the program is proven in the survival rate of the trees that are regularly at 60-80 percent (Joshi, 2007). Some other achievements of the organization include a 15-year ban on forest felling in the Himalayas and the Western Ghats, as well as general pressure for natural resource management that is more aware and sensitive to the cultural and ecological relationships in India (Aguilar, Araujo, and Quesada-Aguilar).

The Chipko Movement demonstrates that the resiliency of communities and households are often dependent on the knowledge and strength of women. But women face social and cultural barriers to control over and access to natural resources. Women have different responsibilities, needs, knowledge experiences and relationships with the natural world. In 2015 at the Women and Environment Forum, Jonathan Muriuki, Kenya Country Representative for World Forestry Centre recognized this in saying,

> "Women…bear most of the work of tree and forest management, but receive back a disproportionately small portion of the benefits. There is evidence that men usually have the overall authority over tree products that are considered to have high financial returns, such as timber" (Ouya)

With traditional responsibilities as food growers, water and fuel gatherers and caregivers, women are closely connected with the natural world, which makes them more susceptible to environmental hardships. Below, Table 1, based on research conducted by the United Nations displays the ecological concerns beside the concerns of women on specific environmental issues.

Issue	Environmental View	Women's View
Deforestation, Land Use and Livelihoods	*Forests absorb more carbon than they emit. Forest clearing causes about 1/6 of global carbon emissions *Industrial agriculture and livestock production represent approx. 17% of anthropogenic greenhouse gas emissions when one considers processing, packaging and transport. *Synthetic nitrogen fertilizer used in industrial agriculture breaks down into one of the most powerful greenhouse gases, nitrous oxide.	*Forests provide food, medicinal plants, fuel non-timber products that are livelihoods. The survival of women, specifically indigenous women is threatened as deforestation increases *Women account for 43 percent of labor in non-industrialized countries but their land rights are highly limited and they do not have input on land-use decisions *Women can be displaced and lose access to land for agriculture due to limited rights

Table 1.

In addition to the disproportionate manner in which environmental issues affect women, there are historical and cultural barriers as well. Land rights and titles are more often vested in men, whether that is due to legal conditions or social customs. In Africa, both patrilineal and matrilineal societies across Africa customarily require male intergenerational allocation of land, meaning the nephews in the matrilineal case, and the sons in the patrilineal case (Lastarria-Cornhiel 1997). In most circumstances, women have limited rights to land largely due to the common custom of patrilineal land tenure systems (Place, 1994). This does vary across Africa; however, generally across patrilineal societies, the rights of women are connected with their husbands and may become even more limited should there be a divorce, death of the husband or failure of the woman to produce a son. In many cases, including the Luo of western Kenya, if a

woman's husband perishes, the rights of his property are not transferred to her, but to his eldest brother. In this region, the control over land is solely invested in the senior male members of the ethnic group (Scherr, 1995). Even in matrilineal societies, as seen in western Ghana, women do not possess the rights to inherit land (Quisumbing et al, 2001).

In Africa tree tenure represents the right to own, plant and use trees. Private rights to trees that have been planted can lie with individuals or households but are dependent on the manner of agroforestry (pollarding, harvesting and felling). Men and women have separate rights to diverse parts of the tree such as the leaves, branches, fruits, timber or roots and their implied applications (Kiptot and Franzel). Land reformation and resettlement have tended to reinforce the prejudices against women, leaving women less opportunity to seek economic opportunities like agriculture (Mehra). Intrahousehold allocation of resources is also strongly related to the gendered decision-making within individual households. These two factors are determinants of the adoption of reforestation technologies both by men and women. Interestingly, however, trees are unique in that although formal land tenure institutions tend to prioritize men, women do regularly engage with informal rights in terms of forestry. In some communities such as the Akamba of eastern Kenya, although male heads of households are the primary decision-makers, women enjoy many rights related to trees.

There are other barriers that Kenyan and Ghanaian (and many rural) women face. In these two countries, women generally utilize less advanced technology due to limited access, cultural restrictions on use, or outside consideration for women's crops and livestock as less relevant priorities. Women have less access to formal economic

services because of limited education, limited mobility, social and cultural barriers, and many businesses require collateral such as land title, which many women do not possess. Time is often a greater constraint for women than men. Although their labor contributions (mostly in agriculture) are often less than men, women commit more hours completing household responsibilities, child care and fuel and water gathering. Mobility is limited for women due to their obligations with childcare, household responsibilities and other sociocultural norms. In many parts of Africa, women have less education and training. Illiteracy and lack of training limit women's opportunities to understand technical information and agriculture. There are many barriers that women face; however, the realization of women as agents of change is only growing (UNDES).

CHAPTER 2: KENYA

I. Deforestation in Kenya

Overview

The forests of Kenya have been gradually declining from augmented population growth and changes in land use (Masinde Karanja 2011). As communities grow, they rely on more fuel and space for agriculture, therefore they are cutting down more trees. In 1963, ten percent of Kenya's land was covered by forest (5.81 million ha), but as of 2011 that figure was close to dropping below 6 percent, leaving total area in forest loss comparable to the size of Puerto Rico (Ibid). According to the World Conservation Monitoring Centre, Kenya is home to 6506 vascular plant species, 4.1 percent of which are native only to Kenya. Most of the indigenous forests are located in areas in which they are more vulnerable, meaning they are under increased pressure to be transformed into different land use (Global Village Energy Partnership International, *Environmental and Social Management Framework*).

Forests of Kenya

The forests of Kenya, most significantly the indigenous closed canopy forests, can be classified into four different regions: coastal forest, dry zone forest, montane forest and western rainforest. The indigenous closed canopy forests of the coastal region accounts for a large portion of the land. Only .4 percent of the total drylands consist of closed canopy indigenous forest. With 18 percent of the total region, indigenous forests of the mountain regions comprise the most closed canopy cover in the country, and lastly it holds 1.9 percent in the western rainforests (Peltorinne 2004, Obare and

Wangwe). The Mau Forest Complex is the largest indigenous montane forest in East Africa, and is critical to countless ecological systems beyond the borders of Kenya (Klopp and Sang). The forests of Kenya had never suffered such extensive devastation than before the destruction of this large closed canopy forest beginning in the 1930s (Klopp and Sang). The Okiek[1] people, who historically lived in a sustainable relationship with their natural resources, are the original inhabitants of this forest region (Birdlife International). However, due to large patterns of immigration by other ethnic groups driven by natural and anthropogenic changes in the natural environment, deforestation in the region has been devastating (Klopp and Sang).

The path toward deforestation began when Kenya became a part of the British Empire in 1895 and ownership of public forestland was transferred from ethnic communities to state control (Ibid). With this western presence came western approaches to forestry, conservation, and land tenure decisions. In the 1930s, large portions of the Mau forest were cleared in order to establish plantations of primarily exotic tree species for logging purposes and tea plantations. The colonial government did not recognize the Okiek people's claim to the land, and chose to move forward by displacing them into designated reserves in other forests across Kenya. These land use changes escalated over time, and over the last two decades, over 107,000 ha of forest, accounting for over 25 percent of the Mau complex, has been destroyed (Munguti). The graph below describes this loss of forest cover over 36 years:

[1] Also written as Ogiek or Akiek

Changes in Forest Cover of the Mau Forest Complex 1973-2009

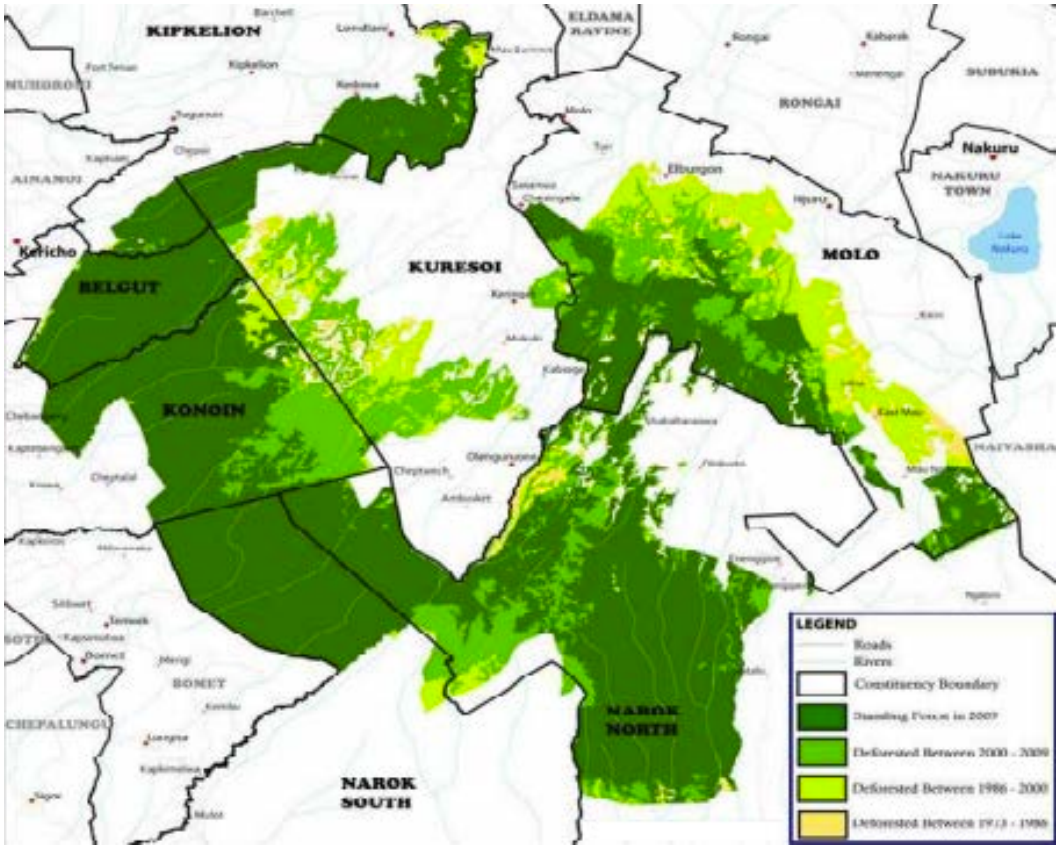

Figure 4: This map indicates decreases in Mau forestland in three periods of time: each color corresponds with the 254,100 hectares of forest cover in 1973, 249,400 hectares in 1986, 226,100 hectares in 2000 and 179,000 hectares in 2009.

Source: Olang, Luke Omondi, and Peter Musula Kundu. "Land Degradation of the Mau Forest Complex in Eastern Africa: A Review for Management and Restoration Planning." 2011.

Direct Causes and Actors Contributing to Deforestation and Forest Degradation

Beyond the explanations provided in the discussion of the Mau Forest Complex, there are other causes of deforestation across Kenya. The primary cause is logging and harvesting (Lynette Obare and J. B. Wangwe). In an interview conducted by Miriam Kanyugo of Ebru Africa Television in Nairobi with Joan Sang, World Vision Kenya

National Coordinator for Environment and Climate Change, Sang identifies that in Kenya there are 43 million sq meters of wood consumption annually, but only 30 million sq meters are being used to produce trees. World Vision confirms that 80 percent of households in Kenya rely on firewood for energy and tree-based charcoal for cooking (Kanyugo). Fire and conversion of forest into land for agriculture and human settlements are other drivers of deforestation. In an effort to clear the forest, many who intend to settle on the land or clear it for agriculture burn it down, but the fires are not easily controlled so significant portions of the forest may be destroyed. This causes an increased risk of biodiversity loss as well. (Lynette Obare and J. B. Wangwe). Joan Sang additionally recognizes a lack of strong governance and policy enforcement as a barrier in ameliorating deforestation. Finally, climate change increases and intensifies droughts and floods, and those who live in poverty and/or rural areas are forced to increase their reliance on forest resources in order to maintain their livelihoods through these disasters. It is important to also note that financially, deforestation is a threat to Kenya because a large portion of the economy is natural-resource based (Logan).

II. Cultural Ties to Trees in Kenya: Okiek and Gikuyu Communities

Okiek Ethnic Group of the Mau Forest

The Okiek ethnic group makes up the largest community of forest-dwellers in Kenya (Lynette Obare and J. B. Wangwe). The Okiek have relied on forest resources for subsistence, and through that, culture, beyond memory or record. According to their traditions, the Mau forest is the mother of the Okiek, and she gave birth to them. Because of this, every Okiek group of Kenya has lived within or directly next to

primary Mau forest (M. Mukuria). The Okiek society considers nature as a guide for human development that will lead to a culture that is, "imaginative, ecocentric, cooperation based, just, compassionate and sustainable" (M. Mukuria) and does not engage with materialism or anthropocentris (Ibid). In terms of religion, the Okiek communities have specific measures that all members must respect to conserve the trees (Obare and Wangwe). Over time, the Okiek learned sustainable beekeeping to produce honey for the community, but customs require experienced elders to make the beehives from the bark of the trees because they have the knowledge to conserve the tree. There were also specific species such as the *Dobeya goetzeni, Olea euro, Olea hochstetteri* were prohibited from being cut because of the sacred gifts they provide (honey, herbs, energy). Lastly, these communities knew they had to manage the forest resources carefully among clans, so each clan was allocated a specific area of the forest. Each portion was assigned a name that reflected the family to which it was assigned to maintain respect boundaries and customs. The boundaries among these communities were not arbitrarily decided (as the borders of African nation-states were at the Berlin Conference of 1884-5), they were agreed upon based on customary land tenure systems of each group, as well as physical markers like rivers, valleys, and swamps (Ibid).

Gikuyu Ethnic Group and the Forests of the Rift Valley

The Gikuyu[2] are the largest ethnic group in Kenya. They live mostly in the Great Rift Valley of Kenya, where there are low-land rainforests as well as montane forests. The word *Gikuyu* is a Swahili form of the native pronunciation of the word,

[2] Also written as Kikuyu

which literally means a large sycamore fig tree. Embodied in this term is the implication that this ethnic group considers themselves children of the tree.

> In Africa, there lives an extraordinary tree. She is queen of the riverbank. A monarch, whose story stretches back millions of years. In tribal cultures, her mysterious ways have fuelled myth and legend. They set her apart from other trees. She is a Sycamore Fig, Queen of Africa's trees. (Deeble and Stone, *Queen of Trees*)

The excerpt above is spoken in the documentary 'Queen of Trees' (Deeble and Stone). It describes the mythology surrounding the Sycamore Fig Tree, which is native to Kenya and found throughout Kenyan folklore and the traditional narratives of the Gikuyu. The Gikuyu believe that the tree had nine daughters, who became ancestral mothers of the major clans of the Gikuyu people. The Gikuyu word for God is *Ngai*, meaning the "apportioner." The significance of this meaning is how God divided gifts to the Earth: the Gikuyu were given the knowledge and skills to excel at agriculture (Kenyatta). The introduction of the British Empire to the region in 1895 involved land appropriations that divided some ethnic groups weakening their cultural strength, and infiltrating local beliefs with Christianity. These influences have extended to the beliefs of the Gikuyu. Before colonization, the Gikuyu people believed that God alone had rights over ecological properties (Ruether). Due to this theological understanding of the Earth, certain ideals developed among the Gikuyu people, ideals that remain today. For example, the Gikuyu consider the environment as a gift and therefore believe it is their obligation and innate responsibility to protect it (Maathai *Replenishing the Earth: Spiritual Values for Healing Ourselves and the World*, 42).

The sense of responsibility the Gikuyu feel toward nature is evident in the manner in which they utilize it. In her memoir, *Unbowed*, Wangari Maathai, a native

Kikuyu commonly considered the Tree Mother of Africa, comments on the colonial influences, writing: “logging, clear-cutting native forests, establishing plantations of imported trees, hunting wildlife and undertaking expansive commercial agriculture.” And ultimately from cultural transformation, “hallowed landscapes lost their sacredness and were exploited as the local people became insensitive to the destruction, accepting it as a sign of progress” (*Unbowed* 6).

The tree is essential to the local environment, as well as the unity it creates related to the shared beliefs and spirituality among members of the community (Maathai 81). The tree represents many things: first and foremost, it is a symbol of fertility. For example, the Kikuyu men pray beneath the tree for rain, without which they could not grow their food. In order to ensure fertility, the women rub themselves with the juices of the tree and pray beneath it. When clearing a forest to create a space for agriculture, the Gikuyu people choose to leave one large and conspicuous tree, referred to as *murema kiriti*. This tree is believed to collect spirits from the trees that were cut down. If *murema kiriti* displays indications of decay, it is subject to felling (Ruether).

III. Case Studies

There will be five case studies reviewed that represent rural women’s involvement with agroforestry in Kenya. The first two are the Green Belt Movement and Mama Watoto Women’s Group, both tree-planting initiatives born from rural women and led by rural women. These cases demonstrate the extent to which women’s participation in reforestation efforts can have on the natural environment and their own empowerment. The third and fourth cases explore rural women’s contributions to fodder productivity and soil fertility in western Kenya. Lastly, an approach to forestry called

Farmer Managed Natural Regeneration will be explored. By examining efforts in diverse representations (through organizations and specific technologies and approaches), a more holistic understanding of the multiplicity of efforts rural women make in combatting deforestation will be evident.

A. The Green Belt Movement in Kenya: a Blueprint for Sustainable Forest Development

Local women across Kenya are wary of other countries or organizations coming in to "develop" the country, when colonialism has led to many business practices and approaches that have caused rampant deforestation in the first place (Kameri-Mbote). Wangari Maathai, an environmental and political rights activist, recipient of the Nobel Peace Prize, founder of the Green Belt Movement and member of the Gikuyu ethnic group, stated that, "the environment in third world countries is destroyed with the full knowledge and support of the developed countries, who support the dictators, who don't help us to overcome these dictators, and who do business with these dictators and then hold the poor people to account." (*Taking Root*) She advocates for joint approaches that create links among gender, environment, and community development to catalyze positive collaboration and tangible change. As Mathaai said, "We want to protect the forests because the forests are our lives" (*Taking Root).*

In Kenya, the areas considered plantation forests are expected to decrease from 164,000 to 80,000 by the year 2020 (The Green Belt Movement). The scarcity will manifest itself primarily in firewood, which will burden women. In response to this, many organizations have worked with women to overcome this problem by planting woodlots that improve firewood supply for rural communities, increase income and

alleviate environmental degradation. In Kenya, planting of woodlots is pervasive in high potential areas of the western, central and eastern parts of the country. By far the best example of the extent of positive outcomes that can come from community collaboration of women in agroforestry is the Green Belt Movement. The Green Belt Movement is a non-governmental environmental organization started by Professor Wangari Maathai in 1977 under the auspices of the National Council of Women of Kenya. The program seeks to empower communities, specifically women, to protect the environment and improve livelihoods. When women in rural Kenya reported that their food supply was vulnerable, their water sources were drying up, and their journey to gather firewood for fuel was consistently increasing, Maathai wanted to respond to their needs. She recalled, "I was doing research in the field and I observed a lot of deforestation and soil loss. I was hearing many rural women complaining out the fact that they did not have firewood. They were also complaining that they did not have water" (*Taking Root)*. The organization encourages women to collaborate to plant trees and seedlings in order to increase soil quality to grow firewood and food, store rainwater, and in return they receive small monetary compensation. After working with the program, Maathai quickly realized that disempowerment, marginalization and a loss of traditional practices that valued community-based environmental protection, and selfless mutualism were the reasons behind ecological degradation, deforestation and food insecurity (The Green Belt Movement). Participants in the organization realized that they had been placing trust in leaders who did not work toward the common good and who abused natural resources. The Green Belt Movement responded by creating seminars that encouraged individuals to increase their agency in their political,

economic and environmental context. Since the creation of the organization, over 51 million trees have been planted and more than 30,000 women have learned forestry, food processing, beekeeping and other methods of environmental conservation that allow them to be compensated for their labor and protection of natural resources. A local woman who is a member of the Sunshine Women's Group in Kangari, which is supported by the Greenbelt Movement commented on how the organization and Maathai's example has shaped her in terms of empowerment: "we try to encourage ourselves because if we don't do that our country will come to expire. Now I have courage to say anything" (*Taking Root*). Though focused on women, the Green Belt Movement has benefitted men and women across Kenya. The organization supports over 4,000 community tree nursery groups and has established 6,500 tree-planting sites in critical watersheds. When describing the organization, Maathai said, "the movement started as a tree planting campaign but it is a little more than just the planting of trees It's planting of ideas, it's giving them reasons why they should protect their environmental reasons and it's giving them reasons why they should protect their women's rights" (*Taking Root*).

This case is a primary example of the cultural and practical relevance of women's participation in tree planting. Wangari Maathai was a leader that confirmed the essentiality of women's involvement in natural resource management in Kenya.

B. Afforestation project by the Mama Watoto Women's Group

The Mama Watoto Women's Group began in the 1990s when rural women began coming together to discuss their experiences with poverty and depletion of natural resources (FAO *Afforestation Initiative, Kakamega, Kenya*). As is true for the

majority of households in Kenya, firewood is the primary source of energy in this area, and as the shortage increased, these women were forced to gather wood illegally from the Kakamega National Forest Reserve, which borders many communities in the Kakamega district in western Kenya. This only contributed to obstacles for the women, as it subjected them to legal action, economic burdens, and imprisonment. When these women of the Kakamega region were consistently facing more and more issues related to fuelwood scarcity, and they had limited economic means to address the problem, they began a program that focused on tree-planting (Ibid). The organization has women at the helm, but with the participation of their families and other members of the villages involved, it is very much a community effort. The goals of the group were originally to address the depletion of trees and create sustainable livelihoods in the community, but as the project has developed, the program has had extensive success in empowering women and teaching skills to expand their livelihoods in an environmentally conscious manner (Aguilar). Evelyn K. Njue of the FAO conducted interviews with women across multiple villages, and all stakeholders confirmed the programs success and positive impact on their livelihoods (FAO *Afforestation Initiative, Kakamega, Kenya*).

Initially, after agreeing among other members across the Kakamega region about the critical issues related to deforestation, a woman living in rural Kambiri, Kenya set out with the purpose of planting trees to increase forest cover. The Kenya Woodfuel and Agroforestry project (KWAP) was implementing a program across the Kakamega district, and provided her with four types of seedlings to plant a tree farm, one of them being the Egyptian riverhemp, a smaller tree, but very fast-growing. After the organization was more established, this tree planting was spread to all members.

The founding member provided seedlings to the women with the instructions to establish at least 1/8 of an acre of a tree lot. Through this process, which only grew, the land used to establish new forests across Kakamega belongs solely to the women and their families, and in turn, they control the forest resources. Beyond the firewood and benefits that renewed forest cover provides, the agroforestry program allowed for more expansive impacts like sustainable beekeeping, which provides honey for personal benefit, and increased economic autonomy (Aguilar 2009).

C. Fodder trees for improving livestock productivity and smallholder livelihoods in the Highlands of Western Kenya

Beyond just tree planting, there have been common reports of a shortage of vegetation for feeding animals, or fodder, from people across Kenya (Kiptot and Franzel 2011). The scarcity of fodder combined with its low quality is the largest restriction on productive livestock for many Kenyans (Wambugu et al. 2013). This shortage not only reduces the soil's quality, but also increases the likelihood of malnutrition (Ibid). However, women in Kenya are attempting to redress this shortage (Kiptot and Franzel 2011). A study conducted by Wambugu et al (2013) aimed to evaluate how fodder production can improve livelihoods in Embu of the western highlands of Kenya. It revealed that of the 2,600 participants that were evaluated, 60% of them were women who establish fodder shrub nurseries in order to combat the deficiency:

Gender of farmer	No.	%
Female	1560	60
Male	1040	40
Total	**2600**	**100**

Figure 5: Participation of women in fodder improvement in western Kenya
Of the 2600 participants involved in the study, 1560, the majority, were female, and 1040 (40%) were male.

Source: Wambugu, Charles et al. “Scaling up the Use of Fodder Shrubs in Central Kenya.” *Development in Practice* 11.4 (2001): 487–494.

Calliandra calothyrsus (commonly calliandra) proved to be the most commonly planted tree across the region because it is fast-growing and sustainable harvesting is easy because it is tolerant to repeated trimming and drought. Nurseries are established by individuals in the community, which is beneficial to women who often do not own their own land to plant on, and the trees are planted either bare-rooted or in polythene pots. They are first pruned for use between 9-12 months after use. The positive results, yielded much more than healthier fodder and livestock. The trees were more plentiful, providing more resources with which income can be created. Like most fodder trees, this species is used for multiple purposes and benefits. Below is a table describing how the benefits of increased fodder yields have manifested themselves:

Type of benefit	Embu area, Kenya (N = 60)
Firewood	50
Soil fertility improvement	48
Improvement in animal health	38
Soil erosion control	18
Improved creaminess of milk (increase in butter fat)	18
Fencing	18
Revenue from sale of seedlings	13

Figure 6: Benefits of fodder shrubs according to interviewed farmers in the Embu area (mostly women). The N value, 60, represents the mean number of trees used for the benefits described above.

Source: Kiptot, Evelyne, and Steven Franzel. “Gender and Agroforestry in Africa: Are Women Participating?” *World Agroforestry Centre* 13 (2011)

Because of the success, rural women of Embu have made a “considerable adoption of fodder shrubs” in the highlands of East Africa to provide the much-needed protein to dairy cows. The shrubs they use are easy to grow, adaptable, and have a relatively short gestation period. The shrubs not only feed the livestock, but are also planted in a terrace manner along boundaries and pathways, therefore reducing erosion and increasing firewood (Franzel et al. 2011).

D. Agroforestry for Soil-fertility Replenishment in Western Kenya

Perhaps the most critical concern over deforestation is the declining of soil fertility. Farmers in sub-Saharan Africa managed soil quality in the past by fallowing their land, which became increasingly difficult as the population increased exponentially and farmers had to use land use practices that required extensive fertilizer use. In fact, many African states began subsidizing fertilizer prices. However the Kenyan government began implementing structural adjustment programs (economic loans and policies for developing countries promoted by the World Bank and the International Monetary Fund), as did many developing nations, that eliminated subsidies for fertilizers, therefore making it very difficult for people, especially women who have generally to maintain soil fertility in a condensed, limited space (Ochola 2015). Out of this came three options through collaboration between scientists and local community members to identify low-cost methods for rural farmers; better tree fallow methods, biomass transfer and mixed intercropping (Franzel et al. 2011). Improved tree fallows involve methodical planting of fast growing trees in rotation with crops.

Biomass transfer is a technology in which biomass from trees is cut and integrated in the soil when planting other crops. Lastly, mixed intercropping requires planting nitrogen-fixing trees in a consistent pattern with another crop, most likely maize (Niang et al.). In the Luhya and Luo communities of western Kenya, the Egyptian River Hemp (also used by the Mama Watoto Women's Group) is considered a woman's tree. Luo and Luhya women have been very successful in improving soil fertility with this tree through healthier tree fallows and intercropping (Rocheleau and Edmunds 1997, Bradley, 1991). Additionally, as stated in the discussion of the Mama Watoto Women's Group, this tree can be sustainably treated while providing a substantial fuelwood source. The women of these communities have also enriched the soil through the biomass transfer of the Tithonia tree. Biomass transfer had been practiced in the past across western Kenya, but with vegetation found on the properties of families in the communities, or along roadsides (Kiptot 2008). The Tithonia tree proved to be the most efficient, and low-cost option. Luo and Luhya women are able to harvest the leaves without hindering the growth of the tree to create a green manure, therefore adding nutrients to the soil and enhancing its fertility (Franzel et al. 2011). Evelyn Kiptot, who conducted multiple studies in western Kenya evaluating gender and soil fertility management captured the growth of the Tithnonia tree in the image below:

Photo 1.

Source: Kiptot, E. 2008. *Dynamics of the use of Tithonia diversifolia for soil fertility management in pilot villages of western Kenya*. Experimental Agriculture 44: 473-484

These solutions have allowed the possibility of increased participation of women in the maintenance of forest health and soil quality because they are low cost, they involve low input, but they also yield high returns. These approaches have also encouraged women to educate people in surrounding communities on these methods, which allow them to empower themselves and inspire others to be environmentally conscious for their own sake and the sake of their community.

E. Farmer Managed Natural Regeneration (FMNR): Empowering Rural Women through Forest Management

Farmer Managed Natural Regeneration or FMNR is an economical and sustainable method of restoring land. It is commonly used to combat deforestation and poverty amongst rural peoples across the world, especially in Africa (World Agroforestry Center 2012). The practice involves an organized regeneration and management of trees and other vegetation. “The approach is based on the systematic re-growth of existing trees stumps, roots, or self-sown seeds and is possible where there

are living tree stumps with the ability to re-sprout or seeds in the soil that can germinate," Joan Sang (discussed in previous deforestation section) explains (Murunga 2014). Combined with the age-old process of coppicing, when the plant is pruned at the beginning of spring to the point at which sprouts can grow vigorously, FMNR is an easily replicable system to address multiple threats of deforestation (World Resources Institute 2008). The process yields sustainable growth of trees for fuel, building materials, fodder and food without the economic and time-intensive burdens to continuously replant them (Holland, Tucker, Mark, Kelly 2012). The World Vision International FMNR Project Model identifies that the primary beneficiaries of the FMNR approach are: "those who use or depend on tree resources such as farmers, herders, community members, and particularly women and children who harvest wood and non-timber forest products." – FMNR Project Model, World Vision International (Francis, Weston, and Birch 2015).

Part of Joan Sang's role in World Vision is to oversee reforestation efforts in rural communities, so they need not abandon the manner in which trees benefit their livelihoods, and she is a strong proponent of FMNR. Empowering rural women in Kenya through the implementation of FMNR has had catalytic positive effects on their livelihoods, their families, communities and the surrounding environment. The FMNR method educates women on effective, low-cost and realistic ways in which they can restore trees that are so essential to their livelihoods. In terms of ecology, the benefits of this reforestation effort go beyond the health of trees themselves, but in fact vastly improves the soil quality, which in turn increases food production, crop yields and firewood to use and sell (Francis, Weston, and Birch 2015). The production and sale of

trees grown with this method also increases the economic autonomies of the rural women. With the increased availability of sustainably grown and harvested fuelwood and economic opportunities, the time and energy spent on traveling long distances in search of wood for fuel significantly decreases. Florence Morah, the treasurer of a FMNR group in Kiambogoko, Kenya of the Great Rift Valley, knows first hand the multiplicity of benefits the system can provide for women with few means. She explains that women would always, "worry about where to get fuel wood from daily. Collecting it involved a 10 kilometre hike to the 'near-by' Eburu forest – which was illegal, and in our desperation, we were destroying the environment" (Rinaudo). This recognizes ecological and practical advantages, but the impacts expand beyond a woman as an individual and the environment around her—she adds:

> "the necessity of having fuel also forced us to require our children to spend time each day helping us by collecting firewood – sometimes this made them late for school and it meant that there was no time for them to play or study after school…Our farms are regenerating, we have more vegetables from our gardens and our children eat a more balanced diet. We are self-sufficient in firewood and even selling the surplus" (Ibid).

Dinah Chepkochei, another woman living in the Baringo County of the Great Rift Valley, reported that she fully supports the FMNR method both because her children are healthier, and she has a newfound sense of independence (Murunga 2014). Rural women in multiple locations across Ghana have experienced successes with the implementation of FMNR as well, but this will be expanded upon later.

The FMNR method has proven to be an effective, low-cost and sustainable option for agroforestry, and often encourages gender-inclusive operations beyond just those evaluated in Kenya, but across Africa. It offers a platform for women to pursue

progressively critical roles in forestry and community decision-making, in addition to the many benefits it provides to them as individuals and caretakers.

IV. Conclusions

It has become evident that women across Kenya, and across Africa experience environmental degradation very differently than men. Culturally, the Okiek consider the Mau forest their mother, and the sacred Sycamore Fig Tree is the 'Queen of Trees' for the Gikuyu. Because of this, as well as the various societal roles women play that establish a close relationship with the natural environment, women have a unique opportunity and knowledge to contribute in efforts to combat deforestation. Integrated approaches like the Green Belt Movement sustainably maintain and diversify sources of compensation for women by generating income from tree planting activities and the promotion of alternative agroforestry methods like fodder nurseries, better tree fallow methods, biomass transfer and mixed intercropping. The Green Belt Movement is very passionate about educating others, and that includes people around the world.

Maathai said it perfectly while being interviewed, "you cannot protect the environment unless you empower people, you inform them, and make them understand that their resources are their own resources and they must protect them" (*Taking Root*). Providing incentives for women to be involved in the enrichment of our environment, and the enrichment of themselves and their communities will truly be the most valuable way to approach the future.

CHAPTER 3: GHANA

I. Deforestation in Ghana

Overview

The FAO identifies 21.7 percent (4,940,000 ha) of Ghana's land forest, and of this forest, eight percent is classified as primary, and just under 5 percent are plantations (FAO 2010). Ghana has one of the highest deforestation rates in Africa. As of 2010, 33.7 percent (2,500,000 ha) of Ghana's forests have been lost to deforestation. Between the years of 2005 and 2010, the rate of deforestation in the country was estimated at 2.19 percent—the sixth fastest rate in the world for that period (Asante 2014), and the Global Forest Watch estimates that between 2001 and 2013, Ghana lost 500,000 hectares of land.

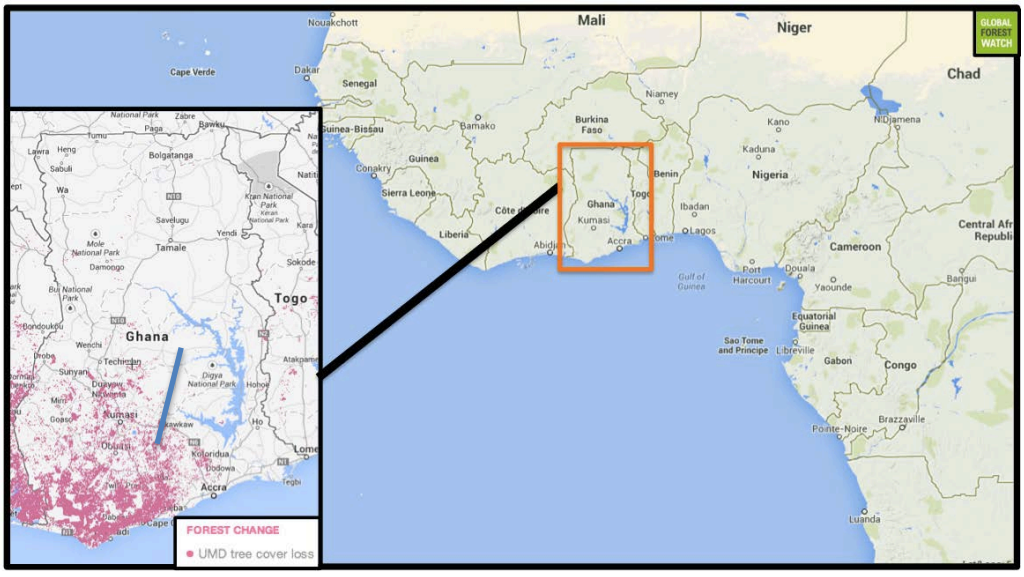

Figure 7: Map of Forest Loss in Ghana through 2010. The presence of pink on the map indicates where there used to be tree cover

Source: Ogutu, Judy. "Can It Be Stopped? Ghana's Forests 'could Completely Disappear in Less than 25 Years'." *Mongabay*. N.p., 25 Aug. 2014.

Forests of Ghana

Ghana's location along the southern coast of West Africa positions it within two distinct ecological zones: savannah and forest. As the map below displays, savannah makes up a significant portion of the country, and forested areas consist of semi-deciduous and evergreen types.

Map of Vegetation Zones in Ghana

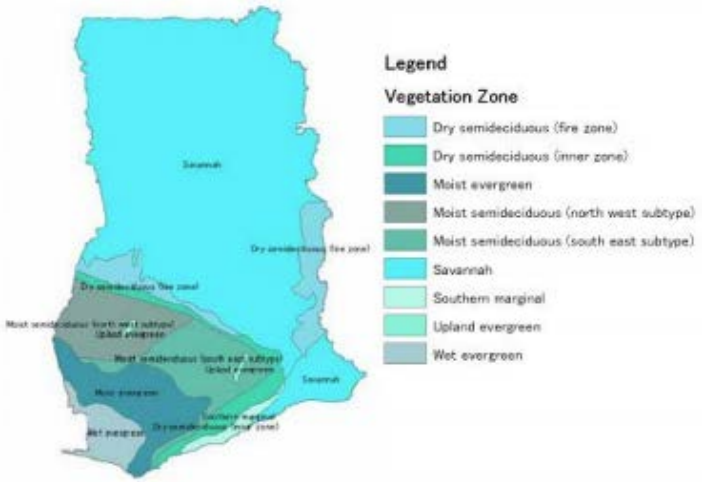

Figure 8: The key contains nine types of vegetation zones: dry semideciduous (fire zone), dry semideciduous (inner zone), moist evergreen, moist semideciduous (north west subtype), most semideciduous (south east subtype), savannah, southern marginal, upland evergreen and wet evergreen. Moist evergreen, moist semideciduous (south east subtype) and moist semideciduous (north west subtype) make up the largest forest regions in the country.

Source: Asante, Winston. *Operational Guidance And Standards For National And Subnational Reed+ Programs In Ghana*. Forestry Commission Ghana. 2014.

As deforestation has intensified, excessive logging, a deteriorating resource base, and depletion of species and biodiversity have characterized the forestry sector (FAO 2010). The FAO recognizes the severe pressures that the forests of Ghana have endured for many years. In fact, the organization identifies that Ghana has always struggled with sustainable forest management. Much of the original vegetation in Ghana

has been substantially altered, damaged or eradicated, both through natural and human disturbances (Asante 2014).

Driving Forces of Deforestation and Factors of Change

The largest threats to trees in the region are demographic and economic pressures, excessive timber harvesting, unsustainable agriculture, annual bushfires, mining and infrastructural development. It is the policy failures, unrealistic forest payment systems and weak institutional structures that ultimately catalyze these drivers of deforestation (FAO 2010, Mongabay, Baofo 2013). The causes of deforestation vary across different forest zones in the country. In the southern part of the country, timber exploitation, mining and agricultural expansion are the primary drivers, and in the north they are more commonly fires, unsustainable production of fuelwood and charcoal as well as agriculture (Agyeman et al, 2012, Baofo 2013).

In 2014, a publication by the International Journal of Geomatics and Geosciences states that deforestation can be strongly linked to the marginalization of local peoples by the colonists, and has been a critical issue for the country since the 1930s, similar to Kenya (Mongabay). The policies concerning forests created by the British Empire, who colonized what is now Ghana, and other surrounding coastal communities, forcefully took community, family and individually owned land, over exploited forest resources (Boafo 1).

In Ghana there are approximately 2.5 million people living in communities who rely on the forest for their livelihoods (Acheampong and Marfo, 2011; Domson, 2007). In *The Impact of Deforestation on Forest Livelihoods in Ghana*, James Baofo writes:

> "Forest communities use their surroundings for a variety of activities: the collection and production of fuel wood, hunting for game, collection of snails and mushrooms, gathering of medicinal herbs and chewing sticks, and both legal and illicit logging. The products obtained from these activities are recognized as resources that contribute directly to communities' well-being, especially during the agricultural lean seasons" (Baofo, Ahenkan and Boon, 2)

It is evident that the forests of Ghana are an essential part of being, for various reasons related to the economic potential of individuals, and sustaining their livelihoods.

II. A Look into the Culture-Gender-Tree Nexus in Ghana: the Akan people, Sacred Groves and the Baobab Tree

The Akan: Ethics in Conservation

The Ghanaian ethnic group called the Akan people, who live throughout the southern regions of the country, are an example of how trees are central to Ghanaian culture. The traditional beliefs and practices of the Akan concerning conservation nurture a sustainable relationship with the environment: "Akan beliefs and practices highlight their moral import, are crucial in preserving the environment, and protect water sources, the natural vegetation and wildlife and endangered nonhuman species" (Adu-Gyamfi 1). Similar to many ethnic groups across Africa, and specifically the Gikuyu of Kenya referenced above, the introduction of the Christian church by the British has altered some of the local customary measures of the Akan taken to conserve their natural resources. However, traditional authorities that maintain taboos for managing a moral use of resources on behalf of a healthy environment and sustainable development remain. Some of these principles prohibit the clearing of sacred forests and the felling of certain, specifically foreign, timber species. In fact elders in most

Akan communities insist that violating the ecological codes can result in the wrath of the earth goddess Asasae Yaa.

Cultural and Ecological Importance of the Sacred Groves of Ghana

The sacred forest groves of Ghana, which are important to the Akan as well as other ethnic groups, represent an oasis of biodiversity and tradition amidst environmental degradation across the country. Yet due to many social factors such as the pressures of migration, cultural change and poverty are forcing rural inhabitants to resort to harvesting trees of deep sanctity. There has been increased recognition of the significance of the local traditional spiritual beliefs and culture-based knowledge systems in addressing issues of deforestation. In his report "Religion and Conservation in Ghana," Ghanaian environmental journalist Mike Anane states,

> "It is gratifying that in Ghana today, some NGOs and scholars are recognizing the importance of various traditional religious beliefs or culture-based knowledge systems in addressing alarming problems of environment and development … The old 'top-down' or paternalistic forms of development can no longer be enough in the face of environmental catastrophe" (Anane).

UNEP joins in the recognition of increasing interest in sacred groves as models for the conservation of forests and biodiversity. Sacred and protected groves of trees are common throughout Ghana. Sacred groves have different origins and represent diverse functions depending on the community. Some origins are linked to ideas surrounding creation, and others reflect the occurrence of historical events. Some general culturally significant aspects of sacred forests include the location of burial grounds, shelter of the spirits of ancestors, healing powers of deities, sources of powers for healers and priests and protection of other sacred features such as rivers. According to the degree of sanctity considered by the community, the protection of sacred groves varies, as well as

the attitudes and beliefs surrounding traditional deities who inhabit the groves. In some cases, access to sacred groves is strictly limited, but in others the forest resources may be utilized. In the village of Nanhini of southern Ghana, villagers do not enter the grove of the goddess Numafoa or ignore her messages; however in another nearby wood called Kobri Kwaye, despite specific limitations on hunting and farming, palms may be used for wine and other materials may be collected for traditional medicinal purposes. The case of Nanhini is especially relevant in its connection between traditional beliefs and gender. The entirety of the grove is characterized as female based upon its status as the home to the goddess Numafoa. Even those who fervently practice Christianity have deep beliefs in her protective capabilities. The local chief has protected her grove for many generations, and even amidst bushfires that destroyed much of the surrounding landscape in 1983, Numafoa's grove remained untouched. In Julia Falconer's *The Major Significance of 'Minor' Forest Products; The Local Use and Value of Forests in the West African Humid Forest Zone*, testimony of locals recount visits from Numafoa and her healing abilities. They believe that the goddess is active in participating in the daily lives of the local people.

Folklore of the Baobab: the Tree of Life

The baobab tree is most common across desert ecosystems of Africa but the arid climate of northern Ghana provides the perfect environment for the tree to thrive. Baobabs are commonly referred to as the "upside down tree," for when they lose their leaves they look as though they are growing upside down. The great baobab, with its broad, strong protruding root system, holds magical and symbolic value for many indigenous peoples of Africa and is a common meeting place and safe haven in

traditional African societies. The tree is even personified by association with stoicism and gentle humor, and as a listening tree. It is considered modest, for when it dies, it rots away immediately and is reduced to only wood shavings and wasp nests. But it still lives throughout the centuries, as a symbolic meeting place for communities in the shelter of is far-reaching branches. As Thomas Pakenham author of *The Remarkable Boab* writes, "the villagers gather and talk about the day's events and problems and the baobab is the benevolent listener to all these problems. In that sense, it is a mother tree" (Pakenham)

The baobab is widely considered to have qualities that increase fertility. This is observed for several reasons for ethnic groups in Ghana; first, the dioecious nature of the tree represents a very powerful symbol for many pregnant women. According to many Bantu ethnic groups, such as the Gourmantché ethnic group in Ghana, women are more likely to become pregnant if they eat the fruit of the baobab tree. The Venda people also hold the belief that the consumption of the bark can determine the gender of the child—if a mother wants a son, she consumes an infusion of the bark from the male tree, and for a daughter, the female tree. If the mother goes through this process and her child is born the opposite gender, the child is considered unique, with abilities that can defy the spirits. Lastly, ethnic groups across Ghana don’t consider it a coincidence that the female baobab tree is one of the most productive and fertile trees in Africa. It is the female tree that actually grows fruits, while the male tree does not (Wickens 1982).

Case Studies

The case studies in Ghana were chosen based upon the multiple representations of benefits agroforestry can pose to rural women, as well as the various societal, economic and community systems at large. Researchers with the World Resources Institute program, “From the Ground Up”, conducted the first two case studies in the villages of Goviefe-Agodome and Malshegu. In Goviefe-Agodome, women have formed mobilization squads that create tree nurseries. The case in Malshegu focuses more so on cultural and societal barriers for women and agroforestry, despite the common understanding that women protect the sanctity of local forests. Next, the various applications of the shea and baobab tree and the potential of economic opportunity for rural women is evaluated. Lastly the tenets of a collaborative resource management program in the Ashanti region of Ghana that specifically benefit women are assessed.

I. World Resources Institute: “From the Ground Up”

A project titled “From the Ground Up,” conducted by the World Resources Institute and local collaborators in the region, sheds light on individual women who persevere in the face of adversity caused by the depletion of natural resources. The purpose of the project was to investigate the lessons in natural resource management from local communities in sub-Saharan Africa. Case studies were conducted in Nigeria, Tanzania, and Ghana. The studies in Ghana were conducted in the villages of Goviefe-Agodome and Malshegu.

A. Goviefe-Agodome

The study conducted in Goviefe-Agodome evaluated a local development cooperative in the form of mobilization groups. These groups, deemed “mobisquads” are mostly led by women, who utilize their knowledge about the local environment to inform agroforestry practices that transform the infertile land into viable locations for planting trees and productive farmland. Anna is a woman who lives in Goviefe-Agodome, in the Volta region of Ghana, which is a dry highland area with very scarce vegetation (Thrupp and Green 269). With her child on her back, she wakes up before anyone else in her household to gather fuelwood. During the dry season, Anna spends increasingly long hours in search of fuel wood (Thrupp and Green 270). After the sun rises, she works alongside her husband to harvest cassava until she must attend to the household chores, which include fetching water, cleaning, cooking and bathing the children. After attending to the many daily responsibilities she must uphold to maintain the livelihoods of her family, she joins in the mobilization squad with other women in Goviefe-Agodome to plant fuelwood trees on land that was once infertile (Ibid). Women in Goviefe-Agodome work an average of twelve hours a day when accounting for the planting of trees, collecting water and wood for fuel, cooking, caring for the children and cleaning the house (FAO/SIDA 1991).

In the wake of political changes in Nigeria in1983, more than one million Ghanaians that were residing there were forced to return to Ghana. This large inundation of people intensified the economic, social and political issues that were present in Ghana at the time (Boafo 2013). The previous year was rife with drought and

brush fires, leaving the country with critical food shortages. The employment rate and political climate were facing serious instability, and these issues were accompanied by a record high rate of inflation at 130% (Ogutu). In response to these issues affecting the livelihoods of all citizens, the government institutionalized the National Mobilization Programme. This program sought to support the creation of mobilization squads within communities in an effort to empower local people to solve issues that affected them. Specifically there were mobilization squads created with the intent to fight bushfires, plant coffee, cocoa and other food crop farms, and plant trees in degraded forest regions.

The Goviefe-Agodome mobisquad was formed in 1983 by six returnees from Nigeria and grew by almost 70 members in 7 years. In order to meet the food necessities of the community, the organization's goal was to alleviate soil erosion. With the initial creation of the group, men outnumbered women, but the community quickly realized the participation of women was vital, and today women account for the majority of the mobisquad members. Through the leadership of the women, in four years the group planted trees to develop a 37.6-hectare tree nursery that includes a section of 1,000 trees solely for the purpose of improving the water and soil systems (Thrupp and Green 278).

The primary findings of the project revealed that women in these rural communities have "vast, varied, and changing roles as environmental managers in Africa, and underscore gender-based realities, particularly the major but often overlooked contributions and potential of women in production and environmental management." (Thrupp and Green 270). There are economic barriers, biased land tenure

systems, deficiency in support from government institutions that affect the ability for women to contribute to forest management policy (Kiptot and Franzel 2012). However the authors confirm that, while women remain at a structural disadvantage in Ghana, their knowledge and experience are critical in the wise management of natural resources (Thrupp and Green 296).

B. Malshegu

The case study evaluated in Malshegu, Ghana, highlights women's cultural relationship and its basis in the conservation of natural resources, and builds upon the social barriers rural women face introduced in the previous case study. In Malshegu, it is the women who sustain the cultures and traditions that manage the use of forests, rivers and trees (Posey et al. 1999). There exists a sacred grove of trees that has been conserved and protected by the community for 300 years, mostly because the women acknowledge and espouse its sanctity. Because of this internal instinct to protect the sacred trees, the women must search for fuelwood elsewhere (Dorm-Adzobu et al. 1991). This has increasingly become an issue with the intensification of deforestation in the region. In addition to the harmful time and economic burdens environmental degradation brings, the women here experience considerable disadvantages in terms of the traditional patrilineal land tenure laws—even more so than is seen in Goviefe-Agodome (Thrupp and Green 276). Land control and distribution are both exercised by the traditional priest in the community, called the *tindana*. One can only gain access to land through birthright or kinship but this institution discriminates against women because the inheritance only passes through males. As Thrupp and Green write, "this

undermines optimal land use because it excludes those who are often the most efficient land users" (290). Although customs affect the roles of women and men, just as culture is dynamic, behavioral patterns and tradition can change. For example, as male migration to urban areas increases, women in rural areas are more often the heads of household (Kiptot and Franzel 2012). While this may increase their positions of power to an extent, there is still a severe lack of institutional support especially considering the amount of responsibilities these women uphold for their families and communities. Amassachina, an NGO based in the Malshegu region works with women directly to create woodlots, methods for soil improvement and fuel-efficient cooking stoves to aid them in maintaining the balance between the restraints of social systems and their obligations that are growing every day (Thrupp and Green 292).

The study conducted in Malshegu by the World Resource Institute focused more so on the traditional and political elements of agroforestry rather than sustainable forestry methods themselves, to exemplify that "the key issue... is... to focus attention on women's access to and control over such resources as land and trees. When this is achieved, women can build on the existing knowledge and management skills" (Thrupp and Green 294). This supports the claim that sustainable forestry practices would be benefitted by the inclusion of more rural women.

II. Enhancing Livelihoods: Sustenance and Economic Opportunity through Shea and Baobab Tree Management in Northern Ghana

"Shea is kind of the gold for the women of northern Ghana" –PBS *On the Frontline*

Amina Mahammadu is a farmer in the Bunkpurugu/Yunyoo region of northern Ghana. A widow, and mother of seven children, she, like many women in this region faces everyday struggles to meet her basic needs and those of her children. The terrain in northern Ghana is difficult to rely on because of inconsistent nutrient content and unreliable rain patterns (Trax Ghana 2016). Amina knows the shea tree well, as do many rural women in northern Ghana, and through the support of Trax Ghana, a non-governmental organization working toward poverty amelioration through agroforestry, she can now use that knowledge to sustainably harvest and process shea nuts for sustenance and economic opportunity (Ibid).

The tree grows in the wild in the savanna belt of West Africa and it takes about 30 years to reach the age of maturity. Without harsh environmental conditions such as bush fires, and the felling of the trees, it can bear fruit for 300 years.The fruits of the tree are traditionally guarded by women and turned into shea butter (PBS *The Shea Tree, The Hope Of Northern Ghana*).

The West Gonja District of northern Ghana experiences especially high levels of poverty, illiteracy, malnutrition and food insecurity and these have disproportionate effects on women (Dessus and Jackson 2011). One resource that is abundant in the region is shea trees, used as a non-timber forest product. The northern region is considered one of the poorest in Ghana, but the shea production improves the lives of many women. It is estimated that there are about 9 million shea trees in Ghana. This number is declining, however because the destruction of the trees paves way for the

planting of other economic trees like mangos. This pattern is threatening the livelihoods of the women engaged with shea business (PBS *The Shea Tree, The Hope Of Northern Ghana*).

Rural women use the shea tree in a variety of ways. For many generations, women across northern Ghana have transferred the technique of manually and sustainably harvesting shea nuts to their daughters. With this knowledge, they are able to transform the shea nuts into butter, providing a considerable financial compensation, to the most economically disadvantaged demographic. The shea nut, often referred to as the cocoa of northern Ghana, provides health benefits,, sustenance and income opportunities for many Ghanian women (UNDP Ghana, "Tapping into Women's Gold").

In an installment of the Public Broadcasting System's *On the Frontline* titled, "The Shea Tree, The Hope Of Northern Ghana," multiple interviews were conducted with women of the region that regularly engage with shea trees for economic opportunities. The journalist of the program, Thomas Naadi Bitlegma, states: "most of the areas where we find the shea nut do not have electricity, and therefore the women are forced to use trees as fuel, and using firewood as fuel is not sustainable. That means when all the other trees and plants are consumed eventually they will start relying on the shea tree." Another interview question asked, 'what is your view on the destruction of shea trees?'

To which the response was:

> "Such a complicated tree, that doesn't grow easily, that provides jobs for rural people, that gives us important shea butter… It doesn't make economic sense to cut down a shea tree. In fact, we think that there have to be regulations to prevent the cutting-down of shea trees. Because otherwise, when the shea trees are gone, we will have a generation of rural women who are illiterate and the only job they have is to produce shea butter." (PBS *The Shea Tree, The Hope Of Northern Ghana*).

According to the SNV Netherlands Development Organization, there are about 900,000 rural women engaged in Shea production. Statistics from Shea Network Ghana, a private sector coordinating body for shea, shows that there are about 1,000 shea treaters and 200 shea cooperatives in the country. The local treaters, face challenges in the area of low prices and lack of government supportive policy.

In the wake of Ghana's energy crisis, recent studies have also revealed that the by-product of shea can be used to generate electricity. Through research conducted by the Shea Network Ghana it was discovered that a by-product of the shea nut has the energy potential per kilo of the shea biomass is 5,075. About 770 grams of the biomass can give you 1 kilowatt of electricity (Ibid). By encouraging and supporting the women to collect shea nuts for these purposes as well, the income per capita for women can quadruple. Apart from providing electricity for the rural populous, it will also provide energy for irrigation (Ibid).

Beyond the demand outside of these communities that allow for rural women to enhance their economic independence, various parts of the shea tree are harvested for cooking oil in traditional dishes and as a remedy for various illnesses and skin ailments. With its nutritional and medicinal benefits, and its significance in the protection of the forested land from the impinging desertification of the Sahel basin, Ghanian culture

considers the shea tree in very high esteem. Thus, there are multiple reasons that rural women maintain their special relationship with the tree.

Baobab: the Tree of Life

Though not as common as the shea, the baobab tree represents significance in terms of culture, health and functional livelihoods for rural women across Ghana. It is often called the 'Tree of Life' because of its importance to local communities. Research scientist Katja Kehlenbeck for the World Agrforestry Center commented on its relevance saying, "besides being an important, nutritious source of food for local people in many African countries, the baobab tree has the potential to increase the incomes of local communities, particularly women" (Kehlenbeck 2015). The cultural value of the tree goes beyond the spirituality associated with it discussed above; it is highly nutritious, and provides nutrients that may otherwise be scarce.

III. Collaborative Resource Management Programs in Ghana

Beginning in 1992, the national forestry sector began to root its initiatives in collaborative resource management (CRM). It was not the intention of all of these CRM initiatives to specifically help rural women, for this measure has involved both men and women, but it has been the women who have played the key role in the success of the initiatives (Ardayfio-Schandorf 2007). Although only two of these initiatives will be discussed, it is pertinent to identify all eight. The Forest Commission of Ghana enacted eight initiatives of agroforestry, and those in bold have resulted in the best successes of women:

1. Forest Management Planning: the integration of communities in management plans of forest reserves
2. Community Forest Committees (CFCs) & Community Biodiversity Advisory Groups (CBAGs): communities nominate delegates that represent the well being of the forests, and are trained to reach out/communicate with people at the local and regional level to expand the capability for collaboration among communities
3. Boundary Maintenance Contracts: the Forestry Commission may employ communities to maintain forest boundaries
4. Dedicated forests: should a forest not lie within a designated reserve, the community may gain the right to establish their own forestry management plan
5. **Establishment of Non Wood Forest Product (NWFP) plantations**: Non Wood Forest Products are essential to communities, and especially important to women. The Forestry Commission provides technical support for women to replant trees in degraded areas
6. **Modified Taungya Systems (MTS)** Plantations: specific parts of degraded forests are allocated to communities, who receive 40% of the profits of the timber sales (which must be harvested sustainably) and food products from the tree
7. Forestry Forum: Increasing the capacities of civil society to engage with decision making strategies
8. Participatory Forest Management (PFM) mentoring scheme: community members are selected and trained to use several tools aimed to create efficiency in collaborative natural resource management

The study that evaluated the implementation of these programs was conducted in the Ghana High Forest (permanent reservation) in the Ashanti Region of southern Ghana. Of these initiatives, women have both benefited, and benefitted from each one, but have found the most success in Modified Taungya Systems (MTS) Plantations and NWFP plantations. A specific example of women's involvement in MTS is seen at Kwapanin of the Offinso District. For more than a decade, these women have been actively involved in the cultivation of the Marantheceae species ("wrapping leaves") to reforest degraded areas of the Afram Headwaters Forest Reserve. The Oda, Offinso, Sunyani and Begoro districts all reported the lead role of women in seedling production (Ibid).

In terms of non-timber forest products, women in the Ashanti region have increased their access to snails, mushrooms, fruits, yams and bush meat for food, leaves, roots and spices for medicinal benefits, protection of the rivers for reliable water resources, and products for income generation through their participation in the NTFP plantations. Fifty-eight percent of women reported they use NTFPs for multiple purposes like household use and income generation (Ibid).

Beyond their success in specific CRM programs, there was general consensus among the community, and the authors of the study, that when it comes to knowledge of forest resources, the women are more familiar (Ibid). When focus group discussions were held, women's groups proved to be more knowledgeable about both tree species, as well as resources that come from those species. However, as previously stated, women face more societal barriers and this remains true for the women of the Ashanti region. Women here face restricted access to land rights, lack of mobility and time (due

to other commitments) and limited education. Despite these difficulties, the study discovered that most women interviewed contributed significantly to the sustainable growth and management of forest products (Ibid).

CONCLUSIONS AND CHALLENGES MOVING FORWARD

This thesis was guided by three central questions, which were informed by available research, but it is necessary to address the restrictions of this research. First, there are few studies evaluating gender and agroforestry, and therefore limit generalizations that can be made about all rural women in Africa. A more cohesive understanding of the extent that the impacts of deforestation have and the possibility of agroforestry involvement for different rural women would be possible with more attention from the scientific community and policy makers. Moving forward, research in this subject should focus on evaluating identities, benefits, participation and obstacles related to trees across different categories, such as age groups, or differing systems of land tenure. Additionally, a more thorough record of the cultural relationships and taboos between rural women and trees is necessary. Lastly, as this thesis has done, identifying specific success stories for rural women and agroforestry across Africa will inform methods moving forward.

This thesis provides evidence that trees and forest management represent unique opportunities for women to protect their cultural identities and enrich their functional livelihoods in the face of deforestation. Deforestation disproportionately impacts women in their widely common positions of fuelwood and water collectors, and managers of natural resources. Societal systems often interfere with the ability of rural women to address the ecological and cultural threats of deforestation. Limited access is due to gender structures and restricted land access, credit, technology, burdens of mobility and time, and more factors. These obstacles create disempowered positions relative to men, but it also results in distinct experiences, knowledge, perceptions and

goals that are critical in sustainable resource management. Although there are variances in needs and access, rural women are drawn to agroforestry because it offers low-cost, realistic methods to grow trees for food, fuelwood, other timber and non-timber products and services that are substantially beneficial. By exploring cultural, spiritual and practical relationships with trees that rural women experience, a greater understanding of the extensive threats that deforestation poses (that are often not considered in policy) and the necessity of their involvement in future policy has been achieved. Despite societal barriers, this fundamental connection is strengthened through tree planting programs, and is critical in informing sustainable forest management and gender empowerment policy for the well being of women, and rural communities across Africa.

Bibliography

Achieving Gender Equality, Women's Empowerment And Strengthening Development Cooperation. Rep. New York: United Nations Department Of Economic And Social Affairs, 2010. Print.

Adu-Gyamfi, Yaw. "INDIGENOUS BELIEFS AND PRACTICES IN ECOSYSTEM CONSERVATION: RESPONSE OF THE CHURCH 1." Scriptura 107 (2011): 145–155. Print.

Aguilar, L. Et Al (2009). Afforestation Project By The Mama Watoto Women's Group (Kenya). N.P., 2009. Web. 1 Jan. 2016.

Ardayfio-Schandorf, Elizabeth. "GENDER MAINSTREAMING IN FORESTRY IN AFRICA: GHANA." Food And Agriculture Organization (2007): N. Pag. Print.
Asante, Winston. OPERATIONAL GUIDANCE AND STANDARDS FOR NATIONAL AND SUBNATIONAL REED+ PROGRAMS IN GHANA. N.P., 2014. Print.

Asante, Winston. "OPERATIONAL GUIDANCE AND STANDARDS FOR NATIONAL AND SUBNATIONAL REED+ PROGRAMS IN GHANA." Forestry Commission Of Ghana (2014): N. Pag. Print.

Beentje, H.J. 1994. Kenya Trees, Shrubs And Lianas: A Field Guide To The Indigenous Woody Plants Of Kenya- NMK.

Birdlife International (2016) Important Bird And Biodiversity Area Factsheet: Mau Forest Complex

Boafo, James. "The Impact Of Deforestation On Forest Livelihoods In Ghana." Africa Portal 49 (2013): N. Pag. Print.

Bolen, Jean Shinoda. Like A Tree: How Trees, Women, And Tree People Can Save The Planet. San Francisco, CA: Conari, 2011. Print.

Caminero-Santangelo, Byron, And Garth Andrew. Myers. Environment At The Margins: Literary And Environmental Studies In Africa. Athens, OH: Ohio UP, 2011. Print.

Catacutan, D, E Mcgaw, And MA Llanza (Eds). "In Equal Measure: A User Guide To Gender Analysis In Agroforestry." World Agroforestry Centre (2014): N. Pag. Print.

Cleaver, Kevin M., And Gotz A. Schreiber. "Reversing The Spiral: The Population, Agriculture And Environment Nexus In Sub-Saharan Africa." Directions In Development (1994): N. Pag. The World Bank.

Crews, Judith. “Forest And Tree Symbolism In Folklore.” Unasylva (2003): N. Pag. Print.

Dessus, Sébastian, And Chris Jackson. “Republic Of Ghana Tackling Poverty In Northern Ghana.” Global Climate Governance (2011): N. Pag. Print.

Donkoh, Sa, R. Tiffin, And C. Srinivasan. "Adoption Of Green Revolution Services And Poverty Reduction In Ghana." Ghana J. Dev. Stud. Ghana Journal Of Development Studies 6.1 (2009): N. Pag.AGRICULTURA TROPICA ET SUBTROPICA. Web.

Dorm-Adzobu, Clement, Okyeame Ampadu-Agyei, And Peter G. Veit.Religious Beliefs And Environmental Protection: The Malshegu Sacred Grove In Northern Ghana. Nairobi, Kenya: ACTS, 1991.Center For International Development And Environment. July 1991. Web.

Doyle, Alister. "Africa's Deforestation Twice World Rate, Says Atlas."Reuters. Thomson Reuters, 10 June 2008. Web. May 2016.

"Empowering Women – A Case Study Of Sheanut Picking And Processing." Weblog Post. Trax Ghana. 2 Feb. 2016. Web.

Environmental And Social Management Framework: Final Draft Report. Lilongwe: Ministry Of Economic Planning And Development, Government. Of The Republic Of Malawi, 2006. Global Village Energy Partnership International. The World Bank, Jan. 2013. Web.

Food and Agriculture Organization. 2010. Global Forest Resources Assessment, 2010. Country Report, Ghana

Food And Agriculture Organization Of The United Nations And Swedish International Development Authority (FAO/SIDA), Restoring The Balance: Women And Forest Resources (FAO/SIDA, Rome, 1991), P. 6.

Food and Agriculture Organization "Key Findings: Global Forest Resources Assessment 2010." (2010): 1-12

Food and Agriculture Organization "The Cultural And Symbolic Importance Of Forest Resources." N.d.

"Forest Area In Kenya (% Of Land Area)." The World Bank, 2015. Web. May 2016.

Francis, Rob, Peter Weston, And Julia Birch. “The Social, Environmental And Economic Benefits Of Farmer Managed Natural Regeneration (FMNR).” World Vision International (2015): N. Pag. Print.

Holland, Mina, Ian Tucker, Monica Mark, And Annie Kelly. "Africa Innovations: 15 Ideas Helping To Transform A Continent." The Guardian. Guardian News And Media, 25 Aug. 2012. Web.

"Interview With Joan Sang On Deforestation And Afforestation Of Forests In Kenya." Interview By Miriam Kanyugo. Youtube. Ebru Africa Television. Nairobi, Kenya, 13 July 2015. Television.

Joshi, G. (2007). The Chipko Movement And Women. Peoples Union For Civil Liberties

Kanyugo, Miriam, “Deforestation And Afforestation Of Forests In Kenya” Interview With Joan Sang. Ebru Africa TV. Nairobi. July 2015. Web.

Kehlenbeck K., S. Padulosi And A. Alercia. 2015. Descriptors For Baobab (Adansonia Digitata L.). Bioversity International, Rome, Italy And World Agroforestry Centre Kenyatta, Jomo. "Kikuyu Religion, Ancestor-Worship, And Sacrificial Practices." Africa: Journal Of The International African Institute 10.3 (1937): 308-328.

Kiptot, E. 2008. Dynamics Of The Use Of Tithonia Diversifolia For Soil Fertility Management In Pilot Villages Of Western Kenya. Experimental Agriculture 44: 473-484

Kiptot, Evelyne, And Steven Franzel. "Gender And Agroforestry In Africa: A Review of Women's Participation." Agroforestry Systems 84.1 (2012): 35-58.

Kiptot, Evelyne, And Steven Franzel. “Gender And Agroforestry In Africa: A Review Of Women’s Participation.” Agroforestry Systems 84.1 (2012): 35–58. Web. 25 Apr. 2016.

Kiptot, Evelyne, And Steven Franzel. “Gender And Agroforestry In Africa: Are Women Participating?” World Agroforestry Centre 13 (2011): N. Pag. Print.

Kiptot E. And Franzel S. 2011. Gender And Agroforestry In Africa: Are Women Participating? ICRAF Occasional Paper No. 13. Nairobi: World Agroforestry Centre

Klopp, Jacqueline M, And Job Kipkosgei Sang. “Maps, Power, And The Destruction Of The Mau Forest In Kenya.” N. Pag. Print.

Logan, Michael. “Deforestation Costing Kenyan Economy Millions Of Dollars Each Year And Increasing Water Shortage Risk.” UNEP News Centre. N.P., 2012. Print.

Lynette Obare And J. B. Wangwe. Underlying Causes Of Deforestation And Forest Degradation In Kenya. N.P. Print.

Maathai, Wangari. Replenishing The Earth: Spiritual Values For Healing Ourselves and The World. New York: Doubleday, 2010. Print.

Masinde, Sheila, And Lisa Karanja. "The Plunder Of Kenya's Forests."Global Corruption Report: Climate Change. Transparency International, 2011. Web.

Mehra, Rekha. Women, Land And Sustainable Development. Rep. Massachusetts: International Center For Research On Women, 1995. Print.

Mukuria, M. "Mau Forest's Conscience." Web Log Post. Mau Mandala. Wildlife Direct Organization, Jan. 2010. Web.

Munguti, Serah. "Encroachment On Mau Forests Complex, Kenya." Environmental Justice Atlas. N.P., 2014. Print.

Murunga, Lucy. "World Vision And Australian Government Partner To Assist Communities Cope With Climate Change." World Vision Kenya, 28 Mar. 2014. Web.

Ochola, Robert Odhiambo. "Evaluating The Effects Of Fertilizer Subsidy Programmes On Vulnerable Farmers In Kenya." Institute Of Agricultural Information, 23 June 2015. Web. May 2016.

OECD/DAC. "Poverty-Environment Gender Linkages." Off-Print Of The DAC Journal 2.4 (2001) : 77. Print.

Ogutu, Judy. "Can It Be Stopped? Ghana's Forests 'Could Completely Disappear In Less Than 25 Years'." Mongabay. N.P., 25 Aug. 2014. Web.

Olang, Luke Omondi, And Peter Musula Kundu. "Land Degradation Of The Mau Forest Complex In Eastern Africa: A Review For Management And Restoration Planning." N. Pag. Print.

Pakenham, Thomas. The Remarkable Baobab. New York: Norton, 2004. Print.

Parker, Elisa. "How Women & Trees Will Save The Planet." See Jane Do. N.P., 19 Apr. 2011. Web.

Patel, Erik R. "Fighting Deforestation With Family Planning." Duke Lemur Center RSS. Duke University, 14 Nov. 2013. Web.

Peltorinne, Piritta. “The Forest Types Of Kenya.” 40.148 (2004): 8–13. Print.

Posey, Darrell Et Al. Cultural And Spiritual Values Of Biodiversity. London: N.P., 1999. Print.

“Poverty-Environment Gender Linkages.” Off-Print Of The DAC Journal 2.4 (2001): N. Pag. Web. 12 May 2016.

Queen Of Trees. Dir. Mark Deeble And Victoria Stone. NATURE, 2005. Queen Of Trees. British Broadcasting Service, 2009. Web.

Quisumbing, A. And Pandolfelli, L. 2010. Promising Approaches To Address The Needs Of Poor Female Farmers: Resources, Constraints And Interventions. World Development 38(4): 581-592

Ruddle, Kenneth, And Dennis A. Rondinelli. Transforming Natural Resources For Human Development: A Resource Systems Framework For Development Policy. Tokyo, Japan: United Nations U, 1983. Print.

Ruether, Rosemary Radford., Sarah C. Mvududu, And Terisia Hinga.Women Healing Earth: Third World Women On Ecology, Feminism, And Religion. Maryknoll, NY: Orbis, 1996. Print.

Ruether, Rosemary Radford. Women Healing Earth: Third World Women On Ecology, Feminism, And Religion. Maryknoll, NY: Orbis, 1996. Print.

Secretary General Of The United Nations. Underlying Causes Of Deforestation And Forest Degradation. Rep. N.P.: World Rainforest Movement, N.D. Print.

Sena, Kanyinke. “Mau Forest: Killing The Goose But Still Wanting The Golden Eggs.” N. Pag. Print.

Stapleton, Paul. "Characterizing Baobab, The Nutritious African ‘Tree Of Life’." Web Log Post. World Agroforestry Centre, 5 Jan. 2015. Web. May 2016.

The Shea Tree, The Hope Of Northern Ghana. Perf. Thomas Naadi Bitlegma. Public Broadcasting Service, 21 Dec. 2014. Web.

The UNDP Human Development Report Office (Jeni Klugman, Lead Author). Sustainability And Equity: A Better Future For All. Rep. New York: United Nations Development Programme, 2011. Print.

Thrupp, Lori Ann And Jennifer Green. "Gender, Sustainable Development, And Improved Resource Management In Africa." Africa's Valuable Assets: A Reader In Natural Resource Management. Edited By And Peter Veit. Washington, DC: World Resources Institute, 1998. 269-97. Print.

United Nations, World's Women, Trends And Statistics, 1970-1990 (New York, 1991), Pp. 39-40.

United Nations "Millennium Development Goals." UN Millennium Project. 2006 Wandago, Ben. "Country Paper: Kenya." TROPICAL SECONDARY FOREST MANAGEMENT IN AFRICA. Food And Agriculture Organization

Wickens, G. E. 1982. The Baobab-Africa's Upsidedown Tree. Kew Bulletin 37:173–209

Wilkie, Mette Løyche. "Forestry Department GLOBAL FOREST RESOURCES ASSESSMENT 2010 COUNTRY REPORT GHANA 2 The Forest Resources Assessment Programme." (2010): N. Pag. Print.

World Agroforestry Center 2012, Improving Sustainable Productivity In Farming Systems And Enhanced Livelihoods Through Adoption Of Evergreen Agriculture In Eastern Africa, Research Proposal To The Australian Centre For International Agricultural Research, World Agroforestry Center, Nairobi.

World Resources Institute (WRI) In Collaboration With United Nations Development Programme, United Nations Environment Programme, And World Bank. 2008, Turning Back The Desert: How Farmers Have Transformed Niger's Landscapes And Livelihoods, Chapter 3 In World Resources 2008: Roots Of Resilience – Growing The Wealth Of The Poor